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Medical education in Nepal during the COVID-19 pandemic: challenges and opportunities

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Medical courses are designed by incorporating several aspects of teaching and learning including lectures, preclinical laboratory exercises, community field postings, clinical postings, compulsory rotatory internships etc. They are multidimensional and multifaceted. The aim of the course is to produce competent medical personnel who can deliver health care in respective fields with some set standards of knowledge and skills. The graduates should also possess empathetic and compassionate attitude towards the patients, attendants and colleagues. In order to do this, they need competence in various theoretical, practical, clinical as well as soft skills like counselling and communication.[1]

Every part of medical course is important to produce competent graduates. This has called for the design of competency-based curriculum, focusing on variety of learning methods like didactic lectures, problem based learning, videos, simulation, skills laboratory, demonstrations, history taking, patient examinations, laboratory exercises etc.[2] Whatever way we design them, it is not easy to incorporate all the aspects of learning and this is a major concern for medical educationist in the world today.

COVID-19 has caused a great impact on peoples' mobility and education sector is among the most highly affected. Any compromise in shaping the future health care professionals would result in a huge loss, especially in a scenario where there has been a high demand for them. There is a concern whether the crisis, if persistent, will fundamentally alter medical education.[3] Due to this, world-wide researches have been done on effective online learning. The guidelines of country-wide lockdown initially and the need for physical distancing has made it impossible to continue regular physical classes, clinical postings and practical exercises. While all the educational activities including the University examinations were put to halt during the initial days of COVID-19 crisis, medical universities still seem to be at a loss on how to resume classes. Gradually, online classes have been started and different software are being used to deliver classes mostly theory based.

Though online classes appear to be the only suitable modality of resumption and continuation of educational activities for now, the effectiveness of classes with only a single form of learning (didactic lecture) for a long duration seems questionable. There is a need for some improvement in the form of delivery of online classes.[4] Universities need to incorporate learning methods like problem-based learning, case-based learning and team-based learning. These methods can be performed online without much inconvenience. They

will engage students and motivate them for active learning. As proven by many studies, they are better strategies than didactic lectures.[5,6] Traditional teaching through online learning has a disadvantage of being less interactive, which poses a risk of decreasing students' concentration and eventually learning. We also need to focus on practical and clinical aspects of learning along with theory classes. These are better clarified and elucidated with newer learning strategies. As medical teachers, we have experienced that there is a limited scope in online learning, so we need to bring the best out of it.

The postponed examinations were rescheduled by most of the institutes in Nepal and attempts of resumption of clinical postings and practical classes were made but the surge in number of COVID-19 cases have limited their feasibility and again the activities have been halted in many institutes. This situation has created a concern regarding the quality of education, extension of graduation, financial obligations and psychological well-being of students at large. Recent advancements in technology, however, have made it possible to fill this void. The universities should therefore now also focus on imparting the non-theoretical skills. The use of virtual reality techniques have already been tried successfully at different setups.[7]

These technologies can be used for better learning and can even act as alternatives to the existing teaching modalities not only during this pandemic but at all times. It is high time that the universities with technical support from experts develop different learning management systems and software to conduct practical classes and examinations. The rest of the world is a step ahead of us and it would not take much effort to learn from scholars around the globe.

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Bacteriological profile and antibiotic susceptibility pattern of Neonatal Septicemia in Kanti Children Hospital, Nepal

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ABSTRACT

Background: Neonatal sepsis is one of the major causes of neonatal morbidity and mortality globally. Current neonatal mortality rate of Nepal is 21/1000 live birth which is higher than that of the global average of 19.2 and slightly lower than the regional (South East Asia). Pathogenic strains of neonatal sepsis varies from place to place and also from time to time, so it is very important to know the common pathogens and its resistant pattern locally. The aim of this study is to find out the hospital based frequency of neonatal sepsis and characterize the bacteriological profile along with their sensitivity and resistance pattern. **Materials and Methods:** This is a retrospective study done in Kanti Children Hospital, Kathmandu, Nepal over the period of one year starting from July 2018 to June 2019. All culture positive cases were enrolled in the study and their sensitivity pattern were analyzed. Results were expressed as percentage, mean, P-Value and Odds Ratio. **Results:** A total of 107 cases were culture positive among 1064 probable sepsis accounting 10.05%. Predominant microorganism isolated in this study were *staphylococcus aureus* 66(61.7%), *Klebsiella spp*. 15(14%), *Esherichia Coli* 7(6.5%) followed by *Acinatobacter spp* 6(5.6%). Most of the Gram positive organisms were resistant to Ampicillin, Cetazidime, Cefotaxime and sensitive to Gentamicin, Amikacin, Imipenam, Vancomycin, Ofloxacin, and Tigecyclin. Whereas Gram negative organisms are resistant to Cephalexin, Ampicillin, Piperacillin/Tazobactum, Cefotaxime and sensitive to Tigecyclin), Vancomycin Chloramphenicol and Colistin**. Conclusion**: There was striking similarity in bacteriological profile in both early onset as well as late onset neonatal sepsis. Most of the pathogens were resistant to WHO first line antibiotics Ampicillin and also the resistance is increasing even in 3rd generation Cephalosporin.

Key words: Antibiotics, microorganism, neonatal sepsis, resistant.

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INTRODUCTION

Neonatal sepsis is diagnosed when generalized systemic feature are associated with pure growth of bacteria from one or more sample sites[1] One of the major causes of Neonatal mortality in Nepal is neonatal sepsis.[2] The contribution of neonatal sepsis for such high mortality and morbidity make it quite important study for research as well as action.[1] The organism causing neonatal sepsis and their antimicrobial susceptibility pattern are highly diverse and vary geographically, temporarily and locally attributed to changing pattern of antibacterial use.[3, 4] In View of growing concern of changing pattern of bacteria and their sensitivity patterns it is essential to do periodic surveillance and to collect local epidemiological data to provide guidance to formulate antibiotic policy in local as well as regional prospective. The aim of this study is to find out the hospital based frequency of neonatal sepsis and characterize the bacteriological profile along with their sensitivity and resistance pattern.

METERIALS AND METHODS

This was a hospital based retrospective study conducted in NICU (Neonatal Care Unit) and NIMCU (Neonatal Intermediate Care Unit) at Kanti Children Hospital (KCH) Maharajgunj, Kathmandu, Nepal, over the period of one year from July 2018toJune 2019. KCH is the only one government Pediatric tertiary care center in Nepal. It receives the sick children including neonates from all over the Country. This study was done after the ethical clearance which was obtained from Institutional Review Committee (IRC), of KCH.Ref.No.266. 25 August, 2019. Ethical principles were considered and followed throughout the study. Purposive sampling technique was used in this study. All newborns admitted to the NICU and NIMCU of KCH with positive blood culture during the study period was included in this study. None of the newborns were excluded. A total of 107 cases were included. All necessary information's were collected in predesigned Performa including patient baseline and demographic profiles like age at admission , sex, gestation age, birth weight, parity of mother, mode of delivery, place of delivery, main diagnosis, organism isolated and their sensitivity and resistant patterns. Short term hospital outcome was shown in the form of good out come if the newborn were discharged with complete recovery and poor outcome if the newborn were died. These data were retrieved from medical record section of KCH.

Under all aseptic precautions one to two ml of venous blood was collected and inoculated in conventional method Brain heart infusion broth (BHIB) containing 9 ml of BHI broth in the final ratio of 1:10.The broth is then incubated at 35 to 37°C in the incubator aerobically .After overnight incubation one loopful of the broth was sub cultured into blood agar and Mac.Conkey agar respectively and further incubated to look for growth. Repeated subculture was done after 48 hours and 72 hours in Blood agar and MacConkey agar. If no growth was seen after 72 hours of incubation the culture was reported as sterile. If growth was seen, Gram staining was performed to identify the bacteria and, biochemical test was performed for identification and antimicrobial testing was done accordingly. Antibiotic susceptibility was done by using modified Kirby-bauer disc diffusion method according to guidelines of clinical and laboratory standards institute (CLSI).The antibiotics used for sensitivity patterns were ampicillin, amoxicillin, amikacin, cotrimoxazole, chloramphenicol, ciprofloxacin, cefotaxim, ceftazidime ,ceftriaxone, cephalexin, cloxacillin, gentamicin, polymyxinB, ofloxacin, cefixim, cephazolin, piperacillin/tazobactum, imipenam, vancomycin, tobramycin, ampicillin/sulbactum, clindamycin, meropenam, levofloxacin, imipenam, linezolid, teicoplanin, aztreonam, colistin, tigecyclin. Statistical analysis was done by using the statistical package for social science (SPSS) version 20. Data were expressed as percentage, mean, P value and Odds Ratio with confidence interval of 95%. P-Value was calculated using chi-square test and considered as significant when it is <0.05.

RESULTS

Out of 1064 cases, 107 were found to be culture positive which accounts for10.05% incidence of culture positivity. Majority of newborns were delivered at or after 34 weeks of gestation (86%). Males outnumbered females (71% vs. 29%). Almost 90% of newborns were delivered in health institution. Spontaneous delivery was seen in 64.5% of cases and majority (64.5%) of newborns had a birth weight between 2500- 3999 Grams. The average length of stay was 18.82 ± 13.9 days (Demographic and clinical parameters are shown in Table 1).

Table 1: Demographic and Clinical parameters

Characteristics (n=107	Number (%)
Mother's Age	
< 20 years	6 (5.6)
20-35 years	94 (88)
> 35 Years	7 (6.4)
Gestational Age	
< 34 weeks	15 (14)
≥ 34 weeks	92 (86)
Parity	
Primi	59 (55)
Multi	48 (45)
Sex	
Male	76 (71)
Female	31 (29)
Place of delivery	
Institutional	96 (89.7)
Non- institutional	11 (10.3)
Mode of delivery	
SVD	69 (64.5)
LSCS	36 (33.6)
Instrumental	2 (1.9)
Birth weight in grams	
< 1500 gms	12 (11.2)
1500-2499 gms	24 (22.4)
2500-3999 gms	69 (64.5)
≥ 4000 gms	2 (1.9)
Length of Stay	
< 14 days	52 (48.6)
≥ 14 days	55 (51.4)

Among the isolates *Staphylococcus aureus (Staph. aureus*) was the most frequent isolate accounting for 66 (61.7%) of cases followed by *Klebsiella , Escherichia coli (E. Coli), Acinatobacter, Enterobactericiae, Coagulase negative staphylococcus aureus(CONS), Pseudomonas* and *Enterococcus facium*. In case of Early onset neonatal sepsis(EONNS) *Staph. aureus* was the most common isolate with

18 cases. This was followed by *Klebsiella, Acinatobacter, E. coli*, *Enterobactericiae,* and *CONS*. *Staph. aureus* was the most common isolate with 48 cases even in late onset neonatal sepsis (LONNS). This was followed by *Klebsiella, E. coli, Enterobactericiae, Pseudomonas, Acinatobacter, CONS and Enterococcus* (Table 2).

Table 2: Distribution of isolated organisms

Organism	Frequency of isolation n (%)	EONNS	LONNS
Staph aureus	66 (61.7)	18	48
Klebsiella	15 (14)	8	7
E. coli	7 (6.5)	3	4
Acinetobacter species	6 (5.6)	4	2
Enterobactericiae	5 (4.7)	2	3
CONS	4(3.7)	2	2
Pseudomonas	3 (2.8)	0	3
Enterococcus faecium	1 (0.9)	0	1
Total	107 (100)	37	70

Table 3: Antibiotic susceptibility of gram positive organisms

Antibiotics	Resistant n (%)	Sensitive n (%)
Ampicillin	16 (69.6)	7 (30.4)
Ceftazidime	2 (66.7)	1 (33.3)
Cefotaxime	13 (54.2)	11 (45.8)
Meropenem	2 (50)	2 (50)
Clindamycin	2 (50)	2 (50)
Cefepime	8 (47)	9 (53)
Ceftriaxone	8 (44.4)	10 (55.6)
Amoxiclav	3 (42.8)	4 (57.2)
Cephalexin	8 (42.1)	11 (57.9)
Ciprofloxacin	18 (39)	28 (61)
Flucloxacillin	7 (29.2)	17 (70.8)
Piperacillin/ TtaactumTazobTazobactum	1 (16.7)	5 (83.3)
Chloramphenicol	2 (12.5)	14 (87.5)
Amikacin	5 (8.5)	54 (91.5)
Gentamicin	0	5 (100)
Imipenem	0	2 (100)
Vancomycin	0	53 (100)
Ofloxacin	0	8 (100)
Tigecycline	0	3 (100)

Among the various antibiotics which were tested for susceptibility Gram positive organisms were resistant to Ampicillin in 69.6% of cases followed by Ceftazidime 66.7%. This was followed in descending order of frequency by cefotaxime, Meropenem, Clindamycin, Cefepime, Ceftriaxone, Amoxiclav, Cephalexin, Ciprofloxacin, Flucloxacillin, Piperacillin/tazobactum, Chloramphenicol and Amikacin accounting for 54.2%, 50%, 50%, 47%, 44.4%, 42.8%, 42.1%, 39%, 29.2%, 16.7%, 12.5% and 8.5% respectively. Among the isolates there was no resistance seen for Vancomycin, Ofloxacin, Gentamicin, Imipenem and Tigecycline (Table 3).

Among the various antibiotics which were tested for susceptibility all of Gram negative organisms were predominantly resistant to Cephalexin, followed by Ampicillin, Piperacillin/Tazobactum, Cefotaxim, Ceftriaxone, Ceftazidime, Meropenem, Cefepime, Amikacin, Ciprofloxacin, Ofloxacin, Imipenem, Gentamicin, Polimixin B and Colistin accounting 91.3%, 75%, 75%, 66.7%, 62.5%, 53.8%, 50%, 45.5%, 41.7%, 40%, 33.3%, 28.6%, 16.7% and 8.3% respectively. There was no resistance seen for Vancomycin, Chloramphenicol and Tigecycline(Table 4).

Table 4: Antibiotic susceptibility of Gram negative organisms

Antibiotics	Resistant n (%)	Sensitive n (%)
Cephalexin	5 (100)	0
Ampicillin	21 (91.3)	2 (8.7)
Piperacillin/ Tazobactum	12 (75)	4 (25)
Cefotaxime	12 (75)	4 (25)
Ceftriaxone	8 (66.7)	4 (33.3)
Ceftazidime	5 (62.5)	3 (37.5)
Meropenem	7 (53.8)	6 (46.2)
Cefepime	3 (50)	3 (50)
Amikacin	10 (45.5)	12 (54.5)
Ciprofloxacin	10 (41.7)	14 (58.3)
Ofloxacin	2 (40)	3 (60)
Imipenem	2 (33.3)	4 (66.7)
Gentamicin	2 (28.6)	5 (71.4)
Polimixin B	2 (16.7)	10 (83.3)
Colistin	1 (8.3)	11 (91.7)
Vancomycin	0	1 (100)
Chloramphenicol	0	4 (100)
Tigecycline	0	11 (100)

There was a significant association between outcome and organism isolated with a p-vale of 0.003. There were 8 fold odds of having a good outcome whenever an organism was isolated in the admitted cases. Among the Gram positive organisms good outcome was noted in 97% of cases while poor outcome was noted in 3% of cases. Among the Gram negative organisms good outcome was noted in 80.5% of cases while poor outcome was noted in 19.5% on cases. Looking at the specific organism's good outcome was noted among 64 cases where *Staph aureus* was isolated. Similarly among isolates of *Klebsiella, E. coli, Acinatobacter, Entrobactericiae, CONS, Pesudomonas* and *Enterococcus* good outcome was seen among 9, 6, 6, 5, 4, 3 and 1 case respectively. Similarly poor outcome was noted among most cases isolated for *Klebsiella, Staph aureus,* and *E. Coli* accounting for 6, 2 and 1

cases respectively. Rest of the isolated organisms didn't have poor outcome (Table 5).

Table 5: Comparison of outcome with organism isolated

Type of organism isolated	Good Outcome n (%)	Poor Outcome n (%)	p-value	Odds Ratio
Gram Positive	69 (97)	2 (3)	0.003	8.32 (1.63-42.5)
Gram Negative	29 (80.5)	7 (19.5)		
Total	98 (91.5)	9 (8.5)		
Specific organisms				
Staph aureus	64	2		
Klebsiella	9	6		
E. coli	6	1		
Acinetobacter	6	0	N/A	N/A
Enterobactericiae	5	0		
CONS	4	0		
Pseudomonas	3	0		
Enterococcus faecium	1	0		
Total	98	9		

DISCUSSION

Neonatal septicemia is a life-threatening emergency, and rapid treatment with antibiotics is essential for a favorable outcome.[5] Neonatal sepsis is a major cause of morbidity and mortality in developing countries like Nepal. The emergence of antibiotic resistant bacteria and its dissemination is exacerbated by inappropriate antimicrobial consumption and precarious living conditions. The most common organisms associated with neonatal sepsis vary with time of infections and geographical location.[6] Therefore, information on bacteriological profile of neonatal sepsis and effective antimicrobials for its treatment are important to combat neonatal morbidity and mortality issues. Blood culture is still the gold standard for diagnosis of neonatal sepsis, in spite of few drawbacks such as being time consuming, low sensitivity, and possible contamination especially with commensal *CONS* that could be produced.[7]

Blood culture positivity rate in this study was 10.05% (107 out of 1064). A wide range of culture positivity rate have been reported in the past (6.1 to 40 %) in various studies conducted in different place and times.[6, 8, 12] Similar findings have also been reported by K.M. Zaidi (1.7-33/1000 live birth with rates in Africa 20 and south Asia around 15/1000 live birth.[13] Low incidence of culture positivity in this study could have been because of prior use of antibiotics since we receive extramural cases from all over the country. Inadequate blood volume, less blood to BHIB ratio, less and poor Microbiological yields could be additional causes for the fewer yields.

Males outnumbered females, 76(71%) vs. 31(29%) in our study is comparable to other studies conducted in the past.[6-12]

This study showed commonest organism to be Gram Positive. Similar finding of bacterial yield has also been reported by several other studies in the past.[6,8-10] Predominant pathogen found in our study was *staphylococcus aureus* consisting 62% followed by *Klebsiella spp.* 14%.There were striking similarities between early onset and late onset neonatal sepsis .Among Gram positive organism *Staphylococcus aureus* was the leading causative agent consisting 67(63%) followed by CONS. High incidence of *staph aureus* sepsis has also been reported by in various other studies conducted in Nepal at different times.[6, 8-12] A recent Indian population based study conducted in a large no of neonates(12,622) in Odissa[14] also have reported *Staph. aureus* as the most common organism causing LOS. On the contrary *CONS* was the commonest causative organism in EOS in other studies.[15,18] One study in Nepal however have reported different bacteriological profile; he has been reported predominance of *CONS* in EONNS and Gram negative bacteria in LONNS.[17]

The second most common organism isolated in our study was *Klebsiella* followed by *E. coli*. This was in consist ant with findings of various studies in our country.[9, 10, 18, 19] However, it was contrary to various studies from India which reported different bacteria.[15, 19, 20-22] Shankar et al[23] conducted meta-analysis on neonatal sepsis and antibiotics in South Asian countries in India, Pakistan, Bangladesh, Nepal and Srilanka between 2000-2018. They found predominance of Gram-negative bacteria namely *Klebsiella* spp. and *E. Coli* followed by methicillin resistant *Staph. aureus* (*MRSA*). Incidence of *Klebsiella* spp was 53.6% (50.7-56.5%) in India,33 % (3.0-63.0%) in Nepal and 60% in Srilanka. Among pathogens in hospital, Gram negative was 63% (K*lebsiella* 23%, *E. coli* 14%, and *Acinatobacter* 8%). Common Gram-positive pathogens were Staph aureus (20%) and CONS (9%). Zaidi et.al.[13] did the meta-analysis on hospital acquired neonatal infection in developing countries (Africa, South East Asia, South Asia, Latin America, Carabian middle east and central Asia) over 14 years (1990 to 2004) found Gram negative organism to occupy 60.5% of the total burden (*Klebsiella spp.* 22.8%, *E. coli* 12.2%, *Pseudomonas* 7.9%, *Enterobacter spp*. 5.5%*, Acinatobacter* spp.5.0%, Citrobacter 1%, Salmonella 0.9%, Proteus 0.8%, Serrtia 0.1%, *N. Meningitis* 0.1%, and *Haemophilus spp*. 0.1%). All Gram-positive organism occupy 35.5% (*Staph. aureus* 16.3%*, CONS* 12.1% and other *streptococcus* 2.3%, *Group D streptococcus* 1.7%, *S. Pneumonie* 0.5%,*Group A streptococcus* 0.2%, *Listeria spp.* 0.1% and others 0.7%.).[13] The spectrums of pathogens in developing countries including Nepal, in newborn are quite different

from that of developed countries where *GBS, E. coli* and *CONS* were the predominant. Researches from other parts of world also revealed *GBS* as the predominant organism causing early onset sepsis.[24, 25] Study done in Australia by Gowda H found that vast majority (73%) of late onset neonatal sepsis were caused by Gram positive bacteria, of which 39.8% of them were CONS.[26] Among Gram negative isolate *Klebsiella* was the most common causative agent followed by *E.coli* which is was similar to other studies.[10, 17]

The high rate of *Staph. aureus* and *Klebsiella* and other Gram negative organism found in our study even in EOS in hospital born babies may have been because of hospital acquired rather than maternal acquired infection. In such a situation, the cause of spread of Staph is the poor hand hygiene of health care workers. Similarly, high incidence of Gram negative bacteria including *Klebsiella spp*. to cause outbreak. Is that they thrive well in multiuse containers of medications, liquid soap, other antiseptic solutions, tap water and inadequately disinfected and sterilized health care equipment's. Hence, in order to control and prevent epidemic outbreaks, we have to consider all these facts and should take appropriate measures.

In this study almost 70% of Gram positive pathogens were resistant to Ampicillin which is WHO recommended 1st line antibiotic. Alarmingly they were even resistant to 3rd generation cephalosporin i.e. (Ceftazidim 67%, Cefotaxime 54%, Cefepime 47% and Ceftriaxone 47%). On the other hand they are sensitive to aminoglycosides and quinolone (Gentamicin 100%, Vancomycin 100%, Amikacin 92% and Ofloxacin 100%). They were also quite sensitive to Piperacillilin/Tazobactum, Imipenam and Tigecycline.

Regarding Gram negative bacteria they were highly resistant to Ampicillin (91.3%), Cefotaaxim (75%) Piperacillin/ Tazobactum (75%) Gentamicin (71%), Cetazidim (63.%). However, they were sensitive to Tigecyclin (100%), Chloroamphenicol (100%), Colistin (100%), Polymyxin B (83.%) .It has been pointed out that antibiotics resistance have reached an alarming level in developing countries in neonatal nurseries.[13] It has been estimated that almost 70% of organism in hospital setup are resistant to WHO recommended 1st line antibiotics i.e. ampicillin and gentamicin. Emerging resistant bugs have been reported even in 2nd and 3rd lines antibiotics such as cefotaxim resistant to *E. coli* (40%), and *Klebsiella* in (51%), likewise 56% of *Staph. aureus* has been reported as *MRSA*.[1]

Several factors like poor infection control practice, use of multidose vials antibiotics, use of stock intravenous fluids, gross overuse of empirical antibiotics, inappropriate and prolong use of antibiotics are some of the reasons for high prevalence of NNS and antibiotics resistance. In short, it can be considered as obvious outcome of the failure of the health care system.

Hence, in resource poor setting like ours, some cost cutting measures to reduce NNS would be national level program in antenatal care to reduce the rate of preterm and LBW delivery by providing good antenatal care, adequate nutrition to the pregnant mothers, preventing maternal anemia and infection. Intrapartum care like reducing number of p/v examination, treatment of chorioamnionitis, and various intervention that reduce the rate of perinatal asphyxia would also be important measures to reduce NNS. Postpartum care that would be useful to prevent NNS are early and exclusive breastfeeding , Kangaroo Mother Care, umbilical cord care, creation of "step down" neonatal care unit for LBW and stable babies and cut down of empirical antibiotics to three days if the neonates are healthy looking and septic screen are negative and blood culture are negative.[13]

CONCLUSION

Bacteriological profiles are similar in both early onset as well as late onset neonatal sepsis. Most of the pathogens were resistant to WHO first line antibiotics and there is increasing trends of drugs resistance even in third generation cephalosporin and beta lactam drugs. Retrospective nature and the incomplete antimicrobial testing are the main drawbacks of this study. Large scale multi-centric study within the country covering all the provinces is needed to formulate the antibiotic policy in our country.

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CONFLICT OF INTEREST:

None declared

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Sex- related morphometric difference in sternal index and dimensions amongst Nepalese adults

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ABSTRACT

Introduction: The comprehensive goal in forensic anthropology is the identification of skeletal remains for which researchers are constantly working to produce methods that are as accurate as possible. Because of distinct sexual dimorphism, bones of the pelvis and skull are preferred; however, when these bones are unavailable other bones like sternum have to be used as it holds a great deal of sexual dimorphism. **Objective:** To evaluate sexual dimorphism in the metric parameters of the sternum through MDCT images amongst Nepalese adults. **Materials and Methods:** Sternal dimensions of 105 study participants (62 male and 43 female) were measured using Computed Tomography (CT) images from Radiology Department of Dhulikhel Hospital. An independent *t* test was performed to assess the strength of association between different variables and genders. Differences were considered significant at $P < 0.05$. ROC curve analysis was done to determine the discriminating power of variables for sex determination. **Result:** The different measurements of sternal lengths were significantly greater in male than females($p<0.001$) except Sternal Index which was found to be higher in female ($p<0.001$). Despite this difference in mean, most of the sterna were in overlapping zone. The limiting point of 126 was determined for total sternum which could correctly classify majority of sternum. Using ROC curve the mesosternum and total sternum were found to be most accurate (>95%) in sex determination. Hyrtl's law could classify 91.9% of the male and Ashley's rule of 136 could 97.67% of the female. **Conclusion:** Hence this study made an effort in sexing the sternum in Nepalese population amongst which mesosternal length and total sterna length were found to be best estimators of sex whereas manubrium length and sternal index were not found to be satisfactory.

Key words: Manubrium; mesosternum; overlapping zone; sternal index

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INTRODUCTION

Identity of a person is important, both in living and dead.[1] It means finding a set of symptoms that leads to identifying one person from another.[2] Sometimes experts face a problem even in identifying whether the skeletal remains are of human or not.[3,4] Identification can become more difficult during mutilation of body parts and decomposition.[1,5,6] In these cases of dubious identity, fine differences also assume importance and identification has to be done from remnants.[5,7] Since the bones resist putrefaction and destruction by animals, they are cardinal clue for identification.[8-10] After ancestry, determination of sex can be undertaken as a prime gravity in identification.[1,11-13] Unlike stature, sex follows only one direction[1] and straight away excludes half of the population.[8,110]steometry is an effective method, preferred with respect to its simple and repeatable processing, low cost, and high accuracy rates.[7,13,14] Nonetheless, morphometric standards cannot be universally applied and standard rules must be implemented for every population and

region.[1,2,4,13,15-19] Human biology is simply not amenable to the precision of pure or exact science.[1] Variability are orchestrated by a complicated interplay of nutritional, environmental and climatic changes.[1,7,19]

Though, a number of bones such as pelvis, skull, femur etc., have contributed significantly in estimating sex,[2,7,10,20] in situations when these bones are missing, less sexually dimorphic bones as sternum should be taken.[2,7,9,14,15,21-24] The sternum having a robust structure can survive a great degree of compression and can be procured from cadavers without damage.[1,2,5,10,13,18] Many researchers have studied sternum in order to prove its usage as an indicator of sex in different populations.[1,5,23-26] Wenzel(1788)brought some information about sexual dimorphism in the sternum. His work led to Hyrtl's law (1878) which stated if Sternal Index is less than 50% in males and more than 50% in females.[4,7,25,29] Although this law is considered as a rule, there are many studies conducted in different populations, which have proved its unreliability.[17,18,26,29] Ashley, formulated "The 149 rule" and "The 136 rule" in European and East African population from total sterna length.[25] Computed virtual models by computed tomography of anatomical structures are proving to be in surge in Medical image data. They can be used to create high-resolution, anatomically accurate 3D models which are close to original bone shape and hence enable rapid measurement.[5,7,14,15]This is especially important in larger samples, where observer's efficiency and precision decrease while software efficiency increases.[10,13]

Thus, with this study we aim to determine the dimensions and index of the sternum to find out their reliability in sexual dimorphism in the Nepalese population by 3D Computed Tomography and apply Hyrtl's law. To the best of our knowledge, no study so far has assessed sexual dimorphism of the sternum Nepalese populations. This is important since results from other populations cannot be applied to the Nepalese population because of population specificity.

MATERIALS AND METHODS

All patients who presented to radiology department for thorax CT above 25 years of age according to their physician advice were included in the study for the period of six months. The study was conducted at Department of Radiology, Dhulikhel Hospital after getting approval from Institutional Review Committee, KUSMS with IRC-KUSMS number 75/20. Since we had limited number of bones, virtual models were collected. After excluding patients with sternal deformity, a history of thoracic trauma or surgery, sternal mass, or infiltration, morphometric measurements of the sternum from randomly selected 105 (62 males and 43 females) patients were carried out on MDCT images. No participant was made to undergo a CT scan for the sole purpose of this study. After identification of landmarks, following measurements were done using the inbuilt measurement tool in the software (fig 1).

- **Length of manubrium (LM):** distance between the midpoint of incisurajugularis and midpoint of the manubriosternal joint
- **Length of corpus sterni/mesosternum (LB):** distance between the midpoint of manubriosternal joint and xiphisternal joint
- **Length of totality sternum (LMB):** sum of LM and LB(LM + LB)
- **Manubrio corpus index/Sternal index (SI):** it is the division of LM by LB, then multiplied by 100 [(LM/LB) × 100]

Rule of 136, given by Ashley (1956)[25]was applied, which states that if the combined length is more than 136 mm then it was male and if the value is less than 136 ,it was female sternum. Hyrtl's rule[23,25] was applied which states that SI >50 in female and <50 in male. The identification point (IP)[20,21,23,26,29] was determined by the lowest value of a variable in males and highest value for the same in females. All the values less than the minimum value for the males was treated as female bone and the bones having values more than maximum value of females was treated as male bones. The range between these two values is known as overlapping zone. Variable having a broader overlapping zone is thought to be a bad estimator. The demarking point(DP) [20,21,26] was calculated by using ±3SD in mean. Mean±3SD ensured that 99% of the value fall within the range calculated. The minimum value in males will be taken as demarking point for female i.e. the value less than this point falls in female category. The Limiting Point (LP)[21,26]was calculated by dividing the sum of male and female identification points by two.

A receiver-operator characteristic (ROC) curve analysis was performed to identify the optimal cut-off points for sternal lengths and sternal index separately at which the sensitivity and specificity are maximum. The area under the curve was also determined for finding the overall accuracy of a variable and its sex discriminating performance.

The data obtained from the study will be analyzed by using Statistical Package for Social Sciences (SPSS/version 25.0). Descriptive analysis was summarized as Mean ± SD (standard deviation), range (min to max). Variables were compared by independent Student's t test. The value of $p<0.05$ was considered statistically significant. Data was analyzed for the

overlapping zone for all the three parameters to determine their reliability in determination of sex.

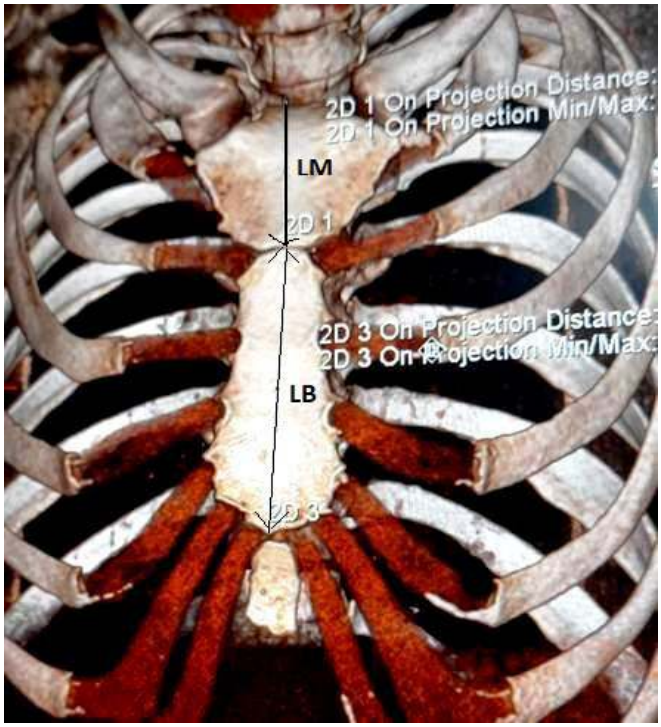

Fig 1: Image (128 slice MD CT Scan) of Chest showing measurements of sternum

RESULT

Table1: Statistical descriptive of various Sternal Measurements and Index

		Age	LM (mm)	LB (mm)	LMB (mm)	SI
Male N=62	Mean	44.95	42.73	97.34	140.07	44.18
	Std. Deviation	9.04	6.29	9.18	12.09	6.98
	Minimum	25	32	77.8	114.8	31.07
	Maximum	59	57.2	115.19	172.13	65.90
	Std. Error of Mean	1.1482	0.7983	1.1666	1.5353	0.8864
Female N=43	Mean	45.00	38.86	77.38	116.24	50.58
	Std. Deviation	8.93	5.09	6.27	7.83	8.01
	Minimum	27	23.79	66.6	92.12	33.41
	Maximum	59	47.7	92.41	138.02	68.34
	Std. Error of Mean	1.3619	0.7774	0.9565	1.1941	1.2220
	Mean difference		3.87	19.96	23.83	-6.4
	t-value		3.344	12.381	11.371	-4.3347
	p-value		0.001	0.001	<0.001	<0.001

A total of 105 participants above the age of 25 were included in the study. Amongst which 62(59.05%) were male and 43(40.95%) were female. The age of the participants ranged from 25 to 59 years. Mean age of male and female participants are shown in Table 1. The descriptive statistics of sternal measurements so that length of the manubrium (LM), length of mesosternum (LB), total length of manubrium and mesosternum (LMB), and calculated sternal index (SI) of both male and female are presented in Table 1. Men had significantly greater lengths of all sternal parameters except sternal index which was greater in females. Difference in the mean of LM,LB, LMB and SI between male and female are 3.87mm,19.96mm,23.83mm and -6.4, all of which are highly significant by student's t-test for equality of means (t<0.01) (table 1).

Though there was significant difference between the measurements of male and female, there is high percentage of overlapping amongst them (Table 2). Identification Point (IP), Demarking Point (DP) and Limiting Point (LP) were determined and are presented in Table 2. The better estimator was mesosternal length which could classify 41(66.13%) male and 21(48.84%) female correctly by using Identification Point. The Identification point of sternal index for male was 33.41 and female was 65.90, out of which 100% of female and 93.4% of female were in overlapping zone. The remaining sterna were in overlapping zone as per identification point. However, the better estimator by using demarking point was total length of manubrium and mesosternum which could correctly classify 27(43.54%) of male and 14(32.56%) of female. LM could not be used for sexing both by identification point and demarking point hence is concluded to be least sexually dimorphic. The Limiting Point calculated from Identification point could correctly classify 57(91.93%) of males and 38(88.37%) of females by LB correctly and 54(87.09%) males and 39(90.69%) females correctly by LMB. It could satisfactorily classify sternums by manubrial length as well. Hence, the Limiting Point can be used reliably in our population for determination of sex.

The optimal values for the discrimination of sex were determined from ROC curve analysis. The different dimensions of sternum showed the sensitivity ranging from 53% to 92%, specificity ranging from 58% to 91%, with overall accuracy of 63% to 96%. The best cut-off values for ML, CL, SL are listed in table 3 above which all sterna are meant to be male and below which all are meant to be female. However for Sternal Index the cutoff value was 48.64, above which all are meant to be female. Mesosternal length showed the best sensitivity and specificity with overall accuracy of 96.5% (table 3; Fig 2,fig 3).

Table 2: Sterna falling in Overlapping Zone, Identification, Demarking and Limiting Points

Variables	LM		LB		LMB	
	Male	Female	Male	Female	Male	Female
Original Range(mm)	32.0-57.0	23.79-47.70	77.80-115.19	66.60-92.41	114.80-172.13	92.12-138.02
Overlapping Zone by IP(mm)	32.0-47.0		77.80-92.41		114.80-138.02	
IP(mm)	47.7	32	92.41	77.8	138.02	114.8
No falling within IP	15	7	41	21	30	18
% classified by IP	24.19	16.28	66.13	48.84	48.38	41.86
% in overlapping zone by IP	74.81	83.72	33.87	51.16	51.62	58.14
Range by DP (mean±3SD)(mm)	23.88-61.59	23.57-54.16	69.78-124.90	58.56-96.19	112.44-167.63	92.75-139.74
Overlapping Zone by DP(mm)	23.88-54.16		69.78-96.19		92.75-112.44	
DP(mm)	54.16	23.88	96.19	69.78	139.74	112.44
No. classified by DP	3	1	26	5	27	14
% classified by DP	4.84	2.33	41.93	11.63	43.54	32.56
% in overlapping zone by DP	95.16	97.67	58.07	88.37	56.46	67.44
LP(mm)	39.85		85.11		126.40	
No classified by LP	40	20	57		54	
% classified by LP	64.52	46.51	91.93	88.37	87.09	90.69

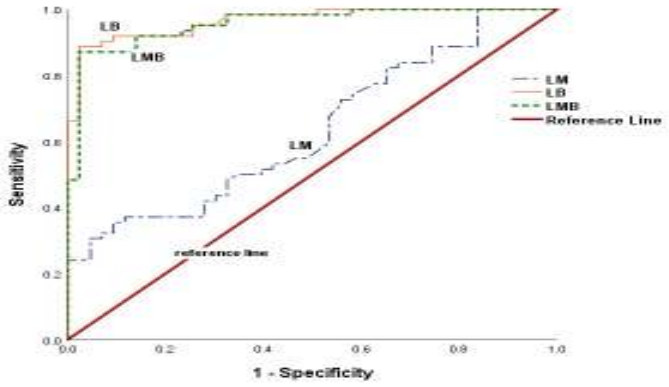

Fig 2: Receiver-operating characteristics (ROC) curves of sternal lengths for sex determination

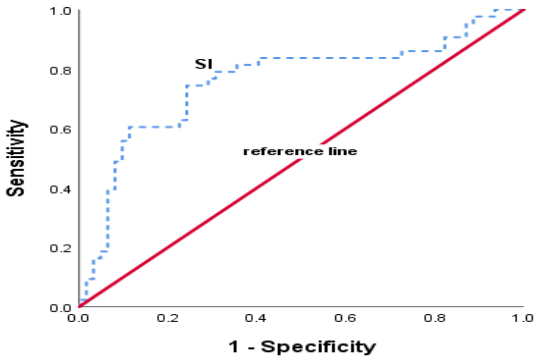

Fig 3: Receiver-operating characteristics (ROC) curve of sterna index for sex determination

Table 3: ROC curve analysis for sternal dimensions

Parameters	Cut-off value	AUC	SEE	P	Sensitivity%	Specificity%
LM	40.35	0.635	0.054	0.019	53.2	58.1
LB	85.35	0.965	0.015	<0.001	91.9	90.7
LMB	123.435	0.956	0.018	<0.001	91.9	86
SI	48.64	0.76	0.051	<0.001	72.1	65.8

(AUC-area under curve, SEE-Standard Error of Estimate)

Table 4: Application of "Rule of 136" and Hyrtl's Law

	Male	Female
Actual number	62	43
By Ashley's rule of 136	41	64
No. correctly classified	40	42
% correctly classified	64.52	97.67
By Hyrtl's law	74	31
No. correctly classified	57	26
% correctly classified	91.9	60.5

Table 5: Comparison of mean values of current study with different populations

Author	Population	Sex	LM	LB	LMB	SI
Ashley[25]	European	M	52.2	104.7	156.9	-
		F	47.9	90.8	138.7	-
Dahiphale et al[29]	Indian Maharastra	M	48.46±5.58	94.43±9.52	142.19±11.29	51.99±8.34
		F	43.78±5.24	70.19±8.54	113.87±12.02	63.01±8.51
Chowdhuri et al[5]	Indian Calcutta	M	48.22±5.17	87.84±11.78	-	56.10±10.25
		F	44.15±5.25	71.22±11.17	-	63.11±9.33
Toneva et al[18]	Bulgarian	M	53.7±5.1	107.5±10.9	-	50.4±6.8
		F	47.3±3.6	88.1±8.7	-	54.0±5.3
Tun et al[6]	Thai	M	48.04±4.55	98.12±9.1	146.20±9.64	49.06±6.4
		F	44.32±4.2	83.08±6.09	126.87±6.65	53.10±6.55
Ekizoglu et al[10]	Turkish	M	52.5±5.2	104.9±10.6	-	50.7±9.5
		F	48.2±4.5	89.1±9.2	-	54.7±8.1
Mittal et al[26]	Indian Haryana	M	48.94±4.70	93.07±13.40	-	53.69±9.88
		F	45.42±5.0	74.71±9.00	-	61.56±9.62
Macaluso et al[19]	Spanish	M	51.85±4.74	106.25±11.05	158.10±12.70	49.22±6.06
		F	45.85±4.76	87.77±9.61	133.62±11.22	52.80±7.59
Gupta et al[11]	Indian Delhi	M	40.64	87.31	127.95	46.81
		F	37.28	81.57	120.09	46.18
Changani et al[20]	Indian Kerala	M	45.6±6.7	92.49±10.72	138.10±11.63	50.15±10.69
		F	40.22±6.53	75.89±8.66	116.11±11.08	53.72±10.69
Present Study	Nepalese	M	42.73±6.29	97.34±9.18	140.07±12.09	44.18±6.98
		F	38.86±5.09	77.38±6.27	116.24±7.83	50.58±8.01

Ashley's"rule of 136" using total manubrium and mesosternum length (LMB) was applied in our study participants which could correctly classify most of the

females so that 42(97.96%), however only 40(64.2%) of male were correctly classified. Regarding Hyrtl's law applicability, it could correctly classify 57(91.9%) of the male and only 26 (60.5%) of female. By "trial and error" we applied the rule of 126 in our study population which could correctly classify 87.09% male and 90.69% female.

DISCUSSION

Many authors have studied sternum for estimation of sex by using dry bones.[1,6,12,17,23,29] However, current study and various other authors have tried to use morphometric analysis for studying the variations in sternum with MDCT as it generates images close to original bone shape and allows rapid measurement in any axis.[5,10,13,14,15] Though morphometric analysis can be done effectively with CT scans, certain measurement errors might occur due to orientation.[14] In the present study various lengths of sternum and sternal index has been used for determining the sexual dimorphism however, other measurements like width, length of xiphoid process, sternal area etc were included by various researchers with varying degree of accuracy.[2,8,10,14,15,19-21,29]

It is obvious from our study as well as various other studies done in different population that all sternal parameters have significantly higher value in male than in female showing sexual dimorphism both in dry sterna or from CT scans as shown in Table 5. The length of the sternum showed bigger difference in comparison with European population than with Asian population as well as amongst close population which have been compared in Table 5. However, sternal index was significantly greater in female than in male which was not agreed by some authors.[11,20] The greater sternal index in female is attributed to the fact that LM in female exceeds half the LB, whereas in males LB is at least twice the LM as seen in our study and various other studies.[1,10,18,20] However, this was not agreed by other researchers.[8,19] The manubrium length was shorter in our study population than the various other populations around the world (Table 5). It may be due to the difference in nutrition, geography, genes and environment amongst the different population.[6,15,18-21] Various values were determined for the correct classification of sternum like Identification Point, Demarking Point and Limiting Point. The best amongst these estimators was in our study was found to be Limiting Point which could satisfactorily classify the sternum whereas Identification Point and Demarking Point failed to classify most of the sternums. Most of them have fallen into the overlapping zones or range of the other sex in our study. This was consistent with the other studies.[4,8,26] Hence we would like to advocate for not using demarking point as a tool for sex determination in our population. This observation was agreed with Singh et al [21] who also found IP to be the satisfactory estimator and demarking point to be the least reliable estimator for various lengths. Manubrial length was found to be the least accurate for determining sex by using IP, DP and LP and other methods which was concurrent with other studies as most of the sterna fell into the range of other sex.[4,6,17,20,29] The most accurate dimension being mesosternal length and total length by IP and LP in our study which corroborated with some [19,20,26,29] but was disagreed with others.[4,11]

Ashley's rule of 136 used for East African's could classify 76.7% male and 80.4% female in their study.[25] We applied same rule in our study population which could classify majority 42(97.67%) of females but only 40(64.52%) of males. This was very close to the finding of Adhvaryu et al [4] who also observed 71.11% male and 96.34% female obeying the rule.Dahiphale et al[29] applied rule of 129 for North Indian population by which he could classify 91.66% male and 82.97% female. Atesoglu et al[15] formulated rule of 144 for Turks which could correctly classify most of the genders. The Limiting point of 126 was applied in our population which could be successfully applied in our population and classified 87.09% of males and 90.69% of females. However it can't be said if any particular sternum given is definitely male or female by these rules.[2,9]

The sternal index of female was significantly greater than the male in our study. However few authors found no significant difference between the SI of two sexes as both of the values were close and above fifty.[2,14] The sternal index of one sex had fallen within the range of other sex making determination of sex difficult as (100% female and 93.4% of male) which corroborated with other study.[18,29] Hyrtl's law for SI was also applied in our study population. It could classify majority of male 57(91.9%) of male and 26(60.5%) of female. This result was is close agreement with other studies in which 60-80% of female sterna obeyed the rule [15,18,24,25] but was farther from the finding of other authors that showed 90-100% female sterna obeying the rule.[23,26,29] For male our result was in disagreement with many studies which were not satisfactorily (30-60%) classified by this rule [15,18,22,23,25,29] but was close with Atal et al[24] where 89.28% male sterna obeyed the rule. Again these variations in the values can be attributed to differences in nutrition, race and geography amongst the population.

ROC curve analysis was done on variables to see their discriminating power. Various cut-off values were determined which showed high sensitivity and specificity for mesosternum (LM) and total sternum (LMB) with high overall accuracy >95%. Hence, can be used as best predictive factors of sex in our population. This result corroborated

with other study by several researchers showing >85% overall accuracy which also showed optimum sensitivity and specificity for mesosternal length.[10,14,27]However our study showed less sensitivity and specificity for sternal index and manubrium length with overall accuracy of 63.5% and 76% respectively. This was approximate to the result of other studies by Ekizoglu et al[10] and Yongue et al[27] but disagreed with few others[2,8,14] who showed good accuracy with manubrium length. Many authors using discriminate function analysis also found mesosternal length and total length to be highly sexually dimorphic.[5,6,10,19,28]

It should be noted that bones are population specific and various factors could cause variations on the phenotype of population even amongst close population.[5,18,19]

CONCLUSION

Hence, we demonstrated the metric features of sterna of Nepalese population in current study. We conclude that we can satisfactorily determine gender by using the sternal measurement like mesosternal length and total sterna length but we found sternal index and manubrium length less satisfactory. We used the rule of 126 for total length of manubrium and mesosternum for Nepalese population which could correctly sex majority of the sternum. We would like to emphasize the researchers to do additional study utilizing much larger sample and from other geographical region of Nepal to validate the result of this study using other parameters of sterna.

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Efficacy and cost-effectiveness analysis of steroid in treatment of Otitis Media with Effusion (OME) in children: A Randomized Trial

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ABSTRACT

Background: Otitis media with effusion (OME) is a common disorder in children and lacks international consensus for its treatment. Out of various treatment options, few studies have show promising benefits of steroids for this condition. The objective of this study was to find the efficacy of steroid in treatment of OME and compare effectiveness of various modalities of treatment for OME. Also, we conducted their cost-effectiveness analysis. **Methods**: In this experimental study, 160 children between one and 12 years of age having OME between September 2018 and January 2020 were randomized into four parallel groups and were managed with antibiotics-antihistamines-decongestant combination, nasal steroid spray, oral steroid, and watchful observation respectively. They were re-evaluated in one-month period for improvement in OME and appearance of any adverse effects. Improvement was compared with Chi-square test. **Results**: A total of 160 participants were randomly divided into four groups by block randomization. The group treated with nasal steroid spray showed statistically significant improvement. The group treated with oral steroid showed improvement but was not statistically significant. Improvement was significantly lower in observation group. Cost of treatment was in the decreasing order in antibiotics-combination, nasal steroid spray, oral steroid and observation groups respectively. **Conclusions**: Topical nasal steroid was the only efficacious treatment among the four modalities for OME. Furthermore, steroids were safe and cheaper than antibiotics combination.

Keywords: Antibiotics, antihistamines, children, otitis media with effusion, steroid

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INTRODUCTION

Otitis Media with Effusion (OME) is defined as "presence of fluid in the middle ear without signs or symptoms of acute ear infection".[1] It is a common ear problem in children. Almost all children (90%) develop this condition before age of five years. Then, they develop it multiple times a year.[2] As the symptoms are subtle, most of the cases do not seek medical attention until late. Screening of asymptomatic school going children in western part of Nepal revealed the prevalence of OME in 5.6%.[3] In the study, 17.3% of the children had ear wax and hence their status of tympanic membrane could not be evaluated. There is a lack of international consensus in treatment of OME.

Several medical and surgical options are in clinical practice. Medical treatment includes antibiotics, decongestants, anti-histaminics, mucolytics, nasal or oral steroids etc. Meta-analysis of most of these modalities showed they lack long-time benefit.[4] However, some studies have shown promising benefit of steroid, oral and/or nasal, as an option for treatment of OME.[5,6] Studies

have also shown that simple observation may be adequate for majority of cases to resolve itself.[7]

There are limited studies on the use of steroids, and to our knowledge there are no studies to compare cost-effectiveness for treatment of OME in our population. We attempted to find if steroid in the form of nasal spray or short-term oral use were efficacious for treatment of OME and compare their effectiveness to that of antibiotics-antihistamines-decongestants combination and watchful observation. Also, we did their cost-effectiveness analysis.

MATERIALS AND METHODS

Study type and study design, Place and duration of the study: This was an experimental study conducted in the out-patient clinic of Department of otolaryngology (ENT) of Lumbini Medical College and Teaching Hospital. The study was done from September 2018 till February of 2020. It was registered in the clinical trial registry (https://clinicaltrials.gov/show/NCT03590912).

Sample size calculation: In a study by Cengel et al,[6] OME was cured in 14% of children treated with placebo as compared to 42% treated with nasal steroid. Assuming same proportion, with alpha error = 5%, power = 80%, minimum sample size in each group is calculated as 39. We included 40 children in each group. Telephone calls were made in between to reduce loss to follow up.

Sampling method and Inclusion and exclusion criteria: All children between one year and 12 years of age during the study period visiting ENT outpatient department (OPD) and diagnosed to have OME were included in the study until participants were enough for the required sample size.

The following children were excluded from the study:

i. Child or parent/guarding not consenting to the study
ii. Cleft palate, down's syndrome or any cranio-facial developmental disorder
iii. History of ear surgery
iv. Systemic disorder like diabetes
v. Treated with steroids in last 6 weeks for any condition

Diagnostic criteria for OME: OME was diagnosed by consultant otolaryngologist based on history, clinical examination and tympanometry. History suggestive of OME included hearing loss, occasional mild ear ache, or deteriorating school performance over last few months. Examination included otoscopy; dull, lusterless, mild retracted tympanic membrane with visible blood vessels in pars tensa adjacent to annulus and absent mobility were features suggestive of OME. Tympanometry was done in children suspected to have OME from history and examination. Diagnosis of OME was made when tympanometry showed B type curve in children suspected to have OME from history and clinical examination.[1]

Diagnostic criteria for improvement: Children with A, As, or C curve in tympanometry in follow-up examination after a month of initial examination were labelled as improved. Children with B curve were considered to have persistent OME and were labelled as 'not improved'.

Randomization: The children who fulfilled the selection criteria were randomly divided into four parallel groups by block randomization, with blocks of four by a resident not involved in the study. The blocks were generated randomly by an author, who was not directly involved in treatment of patient, according to computer generated random numbers. The groups were as follows:

1. Group A: Antibiotics-antihistamines-nasal decongestant combination
2. Group B: Nasal spray of mometasone furoate
3. Group C: Oral steroid
4. Group D: Watchful observation

Children in Group A were given cefpodoxime at the rate of 10 mg/Kg body weight/day in two divided doses for one week, plus levocetirizine for one month at the rate of 1.25 mg once daily for up to six years of age and 2.5 mg for older children, plus oxymetazoline 0.025% at the rate of four drops in each of both nostrils twice daily for two weeks. Children in Group B were prescribed nasal spray of mometasone furoate 50 microgram/puff for a month. They were instructed to use one puff (50 microgram mometasone) per nostril per day. Parents/guardians and the children were taught on how to use the spray. Children in group C were prescribed oral prednisolone at the rate of one mg per kg per day in two divided doses for a week followed by 0.5 mg per day for next one week. Parent/guardian and participants of group D were counselled about the condition and its management options and were advised for observation for a month without active treatment. All the participants were advised for follow-up in one-month period. Telephone calls were made every week to reduce the loss of follow-up. Children were re-evaluated with clinical examination including otoscopy and tympanometry during follow-up by consultant otolaryngologist who were not aware whether the children were subjected to study. Children with A, As, or C curve were labelled as improved whereas those with B curve were considered to have persistent OME.

Most commonly used five brands (fewer if not available in market) of a particular molecule in the department in the last three months were listed. Mean cost of those brands for

each molecule for a course of treatment as described above was calculated in Nepalese Rupees (NRs). This mean cost was used for cost-effectiveness analysis.

Ethical approval and patient consent: It was approved by the Institutional Review Committee of the Hospital. Informed written consent was taken from the accompanying parent or guardian of each child. Verbal consent was taken from the children as appropriate.

Data were collected as per pre-formed proforma. Examination and tympanometry was done on first visit and after one month. The data were entered in Microsoft Excel™ 2008 and imported to SPSS™ 16 (Statistical Package for Social Sciences) for analysis. All the paper proforma were preserved for any future reference. Descriptive statistics were presented as mean, standard deviation (SD), frequency and percentages. Categorical data were analyzed with chi-square test. P value less than 0.05 was considered statistically significant.

RESULTS

There were a total of 160 participants in the study divided equally into four groups, thus each group consisting of 40 children. Age and gender of the participants is shown in Table 1. Their overall mean age was 6.84 years (SD = 2.97). Mean age of participants in the four study-group was comparable (p=0.21). Of all, 74 (46.25%) were male and 86 (53.75%) were female and this difference was not significant (X^2=0.9, p=0.34). Similarly gender distribution was also comparable between the groups (p=0.074).

Table 1: Age and Gender of the participants

		Treatment Groups				Statistics
		A	B	C	D	
Age (mean in years)		6.98	6	7.3	7.1	F=1.53, df=3, p=.21
Gender (n, %)	M	21 (53.5%)	14 (35%)	15 (37.5%)	24 (60%)	X^2=6.9, df=3, p=0.074
	F	19 (47.5%)	26 (65%)	25 (62.5%)	16 (40%)	

Improvement of the OME status in various study groups is presented in Table 2. It shows that the greatest improvement was in group B followed by group C and the least improvement was in group D. Further analysis with Bonferroni correction revealed that the rate of improvement in group B was significantly higher but was not so in group C. Similarly, rate of improvement was significantly lower in control group (group D).

Mean cost of treatment in each group is presented in Table 3. It shows that the cost was highest in group A followed by group B, C and D respectively. Further ad-hoc analysis by

Table 2: Improvement in OME status in various study groups

Group	Improvement		Statistics
	No	Yes	
A	27 (67.5%)	13 (32.5%)	X^2 = 26.6
B	13 (32.5%)*	27 (67.5%)*	df = 3
C	16 (40%)	24 (60%)	P < 0.001
D	33 (82.5)*	7 (17.5%)*	

* = statistically significant

Tukey method was done between each pair of groups which showed all the comparisons were statistically significant (p value <0.001 in each of all comparisons).

Table 3: Mean cost of treatment in each group in NRs

Group	Cost (mean, SD)	Statistics
A	681 (SD=75.92)	F=1405.58
B	400 (SD=0)	P<0.001
C	225 (SD=60.38)	
D	0	

Adverse effect of medication was reported from two (5%) cases in group A. Both were minor itching which resolved on its own without additional medical attention. One case (2.5%) from group B reported blood tinged nasal discharge which was managed with nasal ointment and counselling regarding proper way of using nasal spray. No adverse effect was reported from group C.

DISCUSSION

We conducted this study to know the efficacy of steroids, oral and topical nasal, in treatment of OME in children of age-group two to 12 years, their effectiveness, cost-effectiveness analysis and adverse effect as compared to those of other modalities. We found that nasal steroid spray was the only efficacious treatment of OME among the four modalitis.

There are many meta-analysis and national guidelines about management of OME, however, treatment of this condition is still difficult and vary widely.[4,8] There is no universal consensus on the management of this condition and an effort to find the best practice management is still going on.

Steroids were useful in resolving OME with greater efficacy in our study. Nasal steroid spray for a month was able to resolve OME in exactly two-thirds of the cases whereas oral steroids in tapering dose for a total duration of two week was able to resolve in 60% of the cases. The improvement with nasal spray was statistically significant but that with oral steroid was just short of significant. Oral antibiotics with oral anti-histaminics and nasal decongestant drops together were able to improve the cases in only one-third of the cases. In placebo group, there was improvement in less than one-

fifth of the cases and was statistically less as compared to other groups.

A study from Saudi Arabia found that oral steroid for a week and a combination of oral antibiotics for a week followed by nasal steroid spray for three months found remarkable improvement in OME of one or both ears in children as compared to watchful observation in 6 weeks and three months period. However, in six months and nine months period, the improvement was similar to that of watchful observation. They concluded that oral steroid was useful in resolving OME for a short-term period only and nasal steroid spray did not have a role in improvement.[5] These findings are somewhat comparable to that of our study. We found remarkable improvement with steroid when evaluated at one-month duration. There was improvement with oral as well as local nasal steroid though improvement with oral was just short of statistical significance. Another study from Egypt studied the role of oral steroid (three weeks) versus nasal steroid spray versus normal saline nasal spray as placebo for 3 months for treatment of OME in children aged six to 14 years of age and found that improvement with oral steroid or nasal steroid spray was statistically significant as compared to that with normal saline placebo. There was no difference in efficacy between oral steroid and topical nasal spray.[6] This study also support our finding that steroid, oral or nasal, has a role in treatment of OME.

A study from India showed significant improvement of OME with topical nasal steroid, used for six months, in children 2–12 years of age as compared to that of normal saline placebo. This study also revealed improvement in 38% of OME cases with initial three months of observation.[9] The findings support our study in terms that the nasal steroid spray significantly improves OME. However, we had a poor improvement (17.5%) with one month of observation. If we had observed for three months, our improvement rate might have gone up.

Clinical Practice Guidelines published by American Academy of Otolaryngology-Head and Neck Surgery Foundation in 2016 had recommended for watchful observation for three months for children with OME not at risk.[1] Similarly, it had recommended against using steroid, oral or intranasal, antibiotics, anti-histamines and decongestants. This guidelines partially supports our study in that antibiotics, anti-histamines and nasal decongestants do not improve OME. Their recommendation against steroids was, however, just opposite to our findings showing their efficacy in resolving OME. Improvement with observation was significantly less as compared to other modalities of treatment. This may be because we observed for only one month whereas they had done so for three months.

A Cochrane review in 2016 for the role of antibiotics for treatment of OME revealed that oral antibiotics was helpful in complete resolution of OME at various point of time.[10] In contrast, our study found that antibiotics along with antihistamines and nasal decongestant drops was able to resolve OME only in 17.5% cases. Antihistamines and nasal decongestants were not effective in treatment in OME according to a study published in 2014.[11] We had combined antihistamines with nasal decongestant and antibiotics and found similar results. A study published in 2017 concluded that there was no medical treatment for OME with proven benefit. They recommended observation for three months and if there was no improvement, proceed for surgical management.[12]

There have been studies on other invasive or minimally invasive techniques for treatment of OME. Although the role of oral or intra-nasal steroid has been a matter of debate with only some studies showing benefit, intratympanic steroid has also been found to be effective in resolving OME and preventing its recurrence over the period of six months.[13] Tympanostomy tube insertion for children with OME and hearing difficulty, and adjuvant adenoidectomy for children over four years of age with nasal obstruction has been recommended by an International convention conference in 2017.[4] A short-term improvement has been shown by tympanostomy tube placement. However, it has been found useful in prevention of OME in children having recurrent acute otitis media.[14]

Cost-wise, combination of antibiotics, antihistamines and topical nasal decongestants was the costliest regimen followed by topical nasal steroid and oral steroid. There was zero cost for watchful observation. Antibiotics combination, the costliest of the regimen, was not able to effectively resolve OME whereas topical nasal steroids was the most effective management in resolving OME and was cheaper compared to antibiotics combination. Topical nasal steroid was however costlier than oral steroid but was also more effective than the later. A study published in 2010 which claims itself as first economic evaluation of topical nasal steroid for treatment of OME found that the nasal steroid was not cost-effective as compared to normal saline spray placebo.[15]

LIMITATION OF STUDY

First, we studied a short-term outcome of treatment of OME. It is a condition which resolves itself in certain population over months. In other population it must be treated for months or may need surgical treatment if not resolved with maximum medical management. Our study would have been

more meaningful if we could have followed-up the cases for a longer duration to see the long-term effectiveness of the modalities of treatment. Second, there might be several factors that may play a role in etiology and improvement of the condition which we did not study in this research.

RECOMMENDATION

Though several studies have recommended against use of steroids for management of OME, we found that the topical nasal steroid was efficacious in resolution over a short duration. They should be considered as the initial treatment option after a period of observation. Further, more studies are needed to study the benefit of these modalities of treatment over short- and long-term efficacy.

CONCLUSION

Topical nasal steroid was the only efficacious treatment modality for OME with statistical significance when compared to oral steroid, antibioitics, antihistamines, and nasal topical decongestant combination, and watchful observation. Furthermore, it was safe and cheaper than antibiotics combination but costlier than oral steroids and watchful observation.

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Sonographic evaluation of Intima-Media thickness of carotid artery in healthy, hypertensive and diabetic Nepalese population

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ABSTRACT

Introduction: Hypertensionand Diabetes are two major risk factors for atherosclerotic disease. Carotid artery intima media thickness(cIMT) is considered a reliable surrogate measure for diagnosing subclinical atherosclerosis, its progression and regression. Paucity of available data regarding mean value of cIMT highlights the importance of defining the cut off value of cIMTin a specified population. Very limited studies have been done on sonographic evaluation of mean cIMT and carotid artery injury in hypertension and diabetes in Nepalese population. This study, therefore aims to determine mean cIMT in Nepalese population and to analyze effect of Hypertension and diabetes on cIMT. **Methods:** Cross-sectional hospital based study was conducted within the period of 18 months. B-mode ultrasound was used to measure cIMTin bilateral common carotid arteries. Comparison of mean cIMT was done amongst healthy, hypertensive and diabetes with hypertensive patients. Duration of disease was also considered. Data analysis was done with "R" analytical study. Results were expressed as mean ± standard deviation. **Results:** Total1005 (508 female and 497 male) adult patients with age range of 30 to 85 years were assessed.Among these 329(32.74%) were healthy adults, 341(33.93%) were hypertensive and 335(33.33%) were diabetes with hypertensive patients. The mean cIMT in cases was more than controls ($P < 0.001$) bilaterally with diabetes having an additive effect.There was also positive correlation of measured value with duration of disease and age of patients. **Conclusion:** The present study found that mean cIMT in cases was more than controls.There is an additional effect of Diabetes on cIMT in hypertensive patient. Age and duration of disease can accelerate atherosclerosis.

Keywords: Common Carotid artery, Intima media thickness, Nepalese population, ultrasound.

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INTRODUCTION

Chronic diseases with major health concern worldwide include hypertension, diabetes and chronic kidney diseases. Hypertension (HTN) and Diabetes Mellitus (DM) are the two most prevalent and major risk factors for atherosclerotic cardiovascular disease leading to death and disability.[1-4] Researches have shown that atherosclerotic process occurs in carotid, cerebral and coronary arteries at the same time leading to various complications like ischemic heart disease, cerebrovascular accidents and peripheral vascular disease.[4] Moreover, presence of DM has increased risk of coronary artery disease (CAD) and often causes silent ischemia.[1,5] Thus early detection of atherosclerotic changes can prevent serious complications thereby decreasing morbidity and mortality.[6]

Carotid artery intima-media thickness (cIMT) measurement is considered a reliable surrogate measure of the initial phases of vascular atherosclerosis and is a strong predictor of its

complications as it represents vessel wall alterations over time caused by different risk factors.[1,4,7] Newer imaging techniques using ultrasound with inte-grated backscatter, Magnetic resonance imaging and multi-slice computerized tomography can directly visualize atherosclerotic changes in the arteries .Further, these techniques give additional information about plaque (lipid core, calcified, or ulcerated).[8]Still B-Mode ultrasound is the modality of choice for cIMT measurement as it is non-invasive ,accurate, safe, cost effective and easily available tool.[1,4,8]

Multiple studies regarding the measurement of cIMT conducted in past have shown positive correlation between increased cIMT and cardiovascular risk factors and diseases, cerebrovascular accidents,however there is large variations of data regarding its mean diameter in the general population.[1,4,7,9]

Still limited researches have been done regarding the additional effect of DM on cIMT in hypertensive patient.[1,4] In context to Nepalese population ,very limited studies have reported mean cIMT for cardiovascular risk assessment and to the best of our knowledge, the exact data regarding duration of disease and atherosclerotic changes is still not available in our country.

Therefore the main objective of this study is to measure the mean cIMTin Nepalese population and to assess the incidence of carotid injury in hypertensive patient, analyze the additional effect of DM and finally to find the correlation of cIMT with duration of disease.

METHODS

Cross-sectional hospital based study was conducted in the department of Radiodiagnosis of National Academy of Medical Sciences (NAMS), Bir hospital, Kathmandu over a period of 18 months from August 2018 till February 2019. We included both male and female patients between the ages of 30 and 85 years attending Radiology department for ultrasonography after obtaining informed consent.Ethical approval was obtained from IRB of the hospital. Patients were categorized to healthy control group, hypertensive group and hypertension with diabetes group. Duration of the diseases was considered in hypertensive group and hypertension with diabetes group.These groups were further categorized with disease duration less than 5 years, 5-10 years and more than 10 years. Participants with diabetic complications (Retinopathy, Neuropathy and Nephropathy), Renal disease, Secondary HTN,Cardiac or Cerebral disease, Fatty liver were excluded from the study. Hitachi, Aloka Ultrasound machine of radiology department of Bir hospital with high frequency linear probe (5-12 MHz) was used to measure and calculate the intima media thickness of common carotid artery (CCA).

The measurements were carried out by a single observer with the subject lying down, neck extended and head slightly turned in the direction opposite to the carotid artery being examined. Measurement of cIMT were done bilaterally at one centimeter below (proximal) the bifurcation of common carotid artery.[10] The arteries were examined in the anterolateral, postero-lateral, and medio-lateral directions. Double-line density on an ultrasound image is identified allowing the definition of intima-media and media-adventitia interfaces.The distance between the intimal-luminal (LI) and the medial-adventitial (MA) is taken. Inter-faces is taken in a region without plaque as the cIMT measure as shown in Figure 1. Mean values of right and left CCA were calculated and expressed in millimeter. Data were entered in an word Excel and statistical analysis was performed with "R" analytical study and independent Z test was done to correlate between increased cIMTamong three groups and duration of the disease. Results were expressed as mean ± standard deviation for mean Carotid IMT bilaterally.

Figure 1: Intima-media complex in the CCA

RESULTS

Total 1005 adult patients who met the inclusion criteria were included in our study. 508 were female and 497 were male. Among them Normal healthy group were 329(32.74%), Hypertensive group were 341(33.93%), and Hypertensive along with Diabetic group were 335(33.33%).Table 1 shows number of cases according to sex in three different groups of study.

Table 1: No of cases according to sex in various study groups

Sex	Group		
	Normal	Hypertensive	Hypertensive + Diabetic
Male	170	152	175
Female	159	189	160

The mean cIMT in control group was 0.592±0.139mm with range of 0.4-1.2mm on right side and 0.594±0.151mm ranging from 0.3-1.2mm on left side.

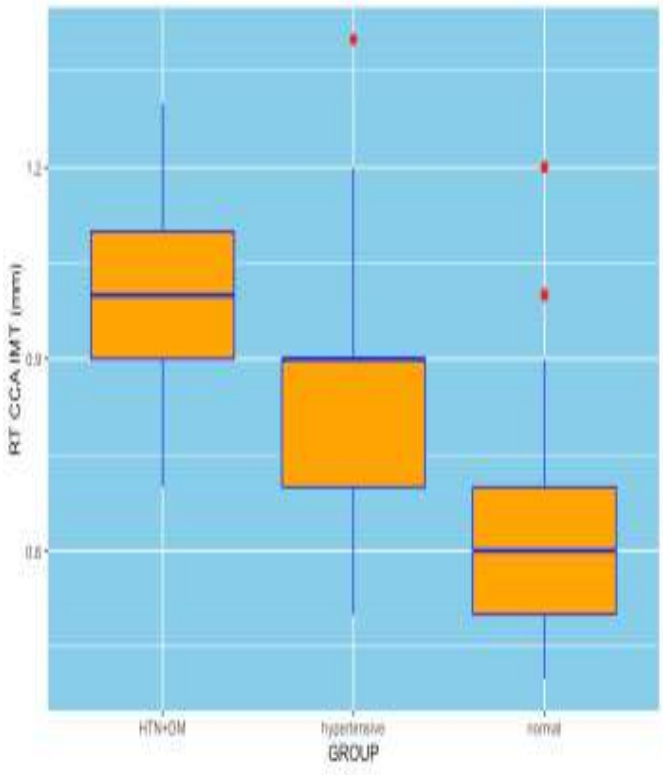
In-patients with HTN, the mean cIMT of Right CCA was 0.856±0.157 mm with range of 0.5 to1.4mm and of Left CCA is 0.871±0.163 mm ranging from 0.5-1.3mm.

Similarly, in patients having both HTN and DM, the mean cIMT on right side was 1.0±0.15 mm with a range of 0.7mm - 1.3mm and 1.02±0.148 mm, ranging from 0.7- 1.4mm on left side.Table 2 shows variation of Mean IMT of CCA in three-study groups.

Table 2: Mean intima media thickness (IMT) of CCA in three study groups

Group	Right CCA IMT				Left CCA IMT			
	Mean (mm)	SD	Minimum value (mm)	Maximum value (mm)	Mean (mm)	SD	Minimum value (mm)	Maximum value (mm)
Normal	0.592	0.139	0.4	1.2	0.594	0.151	0.3	1.2
HTN	0.856	0.157	0.5	1.4	0.871	0.163	0.5	1.3
HTN+DM	1.0	0.15	0.7	1.3	1.02	0.148	0.7	1.4

Similarly box plot in Figure 2 shows the distribution of right and left cIMT in three groups which shows in comparison to normal healthy individual, there is increase in cIMT in hypertensive patient independently and there is an additive effect of diabetes on cIMT in patient with hypertension.



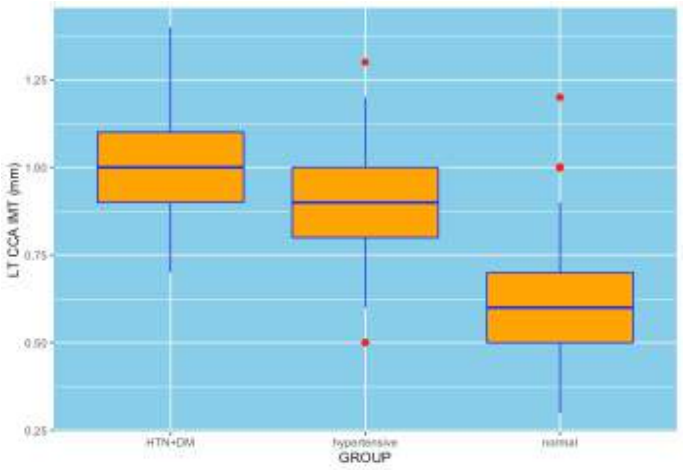


Figure 2: Box plot showing effect of HTN and DM on cIMT

The result also shows mean cIMT was directly affected by the duration of the disease.There is significant increase in cIMT with duration of the disease. Table 4 shows the effect of duration of HTN and HTN with DM on CCA IMT.

Table 4: Mean CCA IMT in correlation with duration of the disease

Duration of Disease (years)	Right CCA		Left CCA	
	HTN Mean ± sd(mm)	HTN+DM Mean ± sd (mm)	HTN Mean ± sd (mm)	HTN+DM Mean ± sd(mm)
<5	0.747±0.131	0.81±0.09	0.748±0.146	0.852±0.09
5-10	0.875±0.139	0.959±0.093	0.896±0.123	0.996±0.108
>10	0.946±0.131	1.12±0.09	0.968±0.136	1.13±0.09

In patients diagnosed as hypertensive for < 5years, cIMT was 0.747±0.131mm on right side and 0.748±0.146 on left sided, with duration 5-10years is 0.875±0.139mm on right side and 0.896±0.123 mm on left side and with duration >10 years 0.946±0.131mm on right side and 0.968±0.136 on left side. Similarly in patients with both hypertension and diabetes for <5years,Right cIMT was 0.81±0.09mm and Left cIMTwas 0.852±0.09mm,with duration 5-10years was 0.959±0.093mm on right side and 0.996±0.108 mm on left side and with duration >10 years was1.12±0.09mm on right side and 1.13±0.09 on left side. The data is statistically significant (P=<0.001).

The value of right cIMT in female was 0.80± 0.22mm (mean±Sd) and in males, 0.82±0.22mm(p-value=0.22).The value of left cIMT in females was 0.81± 0.23mm and males, 0.84±0.22mm (p-value=0.13).No significant difference was observed between males and females andin right and left cIMT.

There was significant correlation of mean cIMTwithage. We performed Simple regression of cIMTon age. Age was significant to predict cIMT (p-value= <0.001). It was found

that one-year increase in age increasescIMT by 0.01mm.

DISCUSSION

Increasing cIMT is an independent risk factor and a measurable one in the diagnosis of subclinical atherosclerosis.[3,6,7,11] The main aim of our study was to assess the intima media thickness of CCA in healthy Nepalese population, measure effect of HTN alone and DM with HTN on cIMT and finally to analyze relation of carotid injury with duration of the disease.

In our study, cIMT on right side ranged from 0.4- 1.2mm with mean of 0.592±0.139mm and 0.594 ± 0.151mm with the range was 0.3-1.2mm on left side which is similar to the study done by Mirza et al,[1] Stein et al[12] and Grobbee et al.[13] Value of mean cIMTin studies done by Baroncini et al,[2]Go´mez-Marcos et al,[9] Lee et al,[14] Lundbyet. al[15] and Djaberi et al[5] in healthy individual were 0.42 ± 0.05 mm ,0.686 mm, 0.73 mm , 0.679±0.105mm and 0.58 ±0.08 mm respectively .Study done by Sapkota et al[16] showed mean cIMT on right side was 1.1468 mm (SD 0.375), whereas mean cIMT on left side was 1.137 mm (SD 0.35). Similarly Touboulet al[17] shows meancIMT 0.773±0.142mm and 0.726±0.149mm, Fracanzaniet al,[18] AL-Auqbi et al[4] and Mahmoud et al[10] showcIMT range of 0.5 to 0.8 mm , 0.715mm (0.715–0.714mm) and 0.4-0.7mm respectively in controls. Similarly Oli et al[19] also found mean cIMT on right 0.73 mm and on left side 0.77mm. Our study is in tune with these studies. Howeverwide variations in the value of cIMT highlights the importance of defining the cut off value of mean cIMT in Nepalese population.

Despite the reference value of mean cIMT, various studies done in past found that cIMT was significantly higher in HTN not accounting for any treatment than that of the the healthy group.[1,3,9,14,17,19-22] The results of these studies are similar to our study. Also, the mean cIMT in study done by Mandal et al[22] for hypertensive patient is within the range of our result. Lianget al[23] also found that mean cIMT was increased in both smoking andHypertensive patient with increased the IMT/ Lumen ratio in HTN while smoking had no effect on this ratio proving that HTN has more additive effect on cIMT than other risk factors like smoking.

The variation in mean cIMT may also be attributed to differences in duration of the diseases. Various studies shows an annual increment in the thickness of cIMT in HTN and DM.[9,24-26] In our study, mean cIMT has significantly increased with the duration of the diseases and mean cIMT was highest in patient with both HTN and DM with disease duration>10years . Duration of disease thus increases the risk of carotid injury. Naseh et al[3] contradict our findings. It was found that there was no difference between the duration of HTN and mean cIMT.This may be due to differences in sample size, study groups with history of hypertension for at least five years, techniques and equipments used for the study.

In our study patients having both hypertension and diabetes had the highest mean cIMT. Other study also mentions that HTN and DM has the greatest effect on mean cIMTthereby increasing risk of atherosclerosis.[1,27] Considering duration of the disease also, diabetes has additive effect on cIMT which is similar to other studies.[9,20] Study shows that use of hypoglycaemic drugs along with change in lifestyle may help in decreasing intimal thickness and preventing atherosclerotic related complications.[1,28] Early detection of subclinical atherosclerosis may thus revert the process of atherosclerosis there by decreasing cardiovascular and cerebrovascular complications .

Considering right and left carotid arteries, mean cIMT was greater in cases in comparison to controls and no significant differences were found between right and left CCA.[1,3,29] This also supports our study where there is no difference in mean cIMT of right and left CCA.

Regarding the sex of the patient, no significant difference was observed in measurement of cIMT between male and female which is in tune with study done by Naseh Get al.[3] The correlation between age and mean cIMT was also found in our study which is similar to study done by Naseh et al[3] and Su et al.[30]

We measured and compared mean cIMT among healthy, hypertensive and HTN with DM groups, which showed significant differences between control and hypertensive groups with DM having an additive effect. Result also showed significant correlation between increased cIMT and duration of the disease. Our study is thus comparable with previous studies. This implies that using similar equipment, methods and if done by a qualified radiologist, the measurement of mean cIMT can be reliable and is reproducible.

There are certain limitations in our study .We did not take the parameters like height, weight, BMI. We could not avoid the observer and technical errors.Some of the study shows that only IMT of internal carotid had a significant relationship with arterial risk factors such as age, sex, dyslipidemia HTN, diabetes, and smoking.[3] Also Sapkota et al[16] shows patient with multiple risk factors had high cIMT of 1.2628 mm(SD 0.404).Further research should thus focus to determine the effect of these risk factors on CCA and its branches .Other limitation of the present study was that medical treatment administered to hypertension and diabetes was not considered. Lastly, the study was carried out only in patients who visited our hospital and may not be representative of the population.

CONCLUSION

The mean cIMT in Nepalese population , incidence of carotid injury in HTN with DM having additional effect on carotid artery and correlation of carotid artery injury with duration of the disease and age of the patient has been established in our study. The results are comparable with previous studies, so it can be used as a baseline for future population based studies and clinical decision-making to prevent complications related to vascular atherosclerosis. Moreover the variations of cIMT with weight, height , blood lipid and smoking if considered in the study will definitely increases the sensitivity and specificity of ultrasonography for early detection and prevention of various vascular complications .

Conflict of interest: None declared

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Psychiatric morbidities in patients with primary headache

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ABSTRACT

Background: Headache is a pain that occurs above the eyes or the ears, behind the head in the occiput or the cervical region of the neck. A primary headache is a type of headache that is caused by overactivity of, or the problems with pain-sensitive structures and is not a symptom of an underlying disease condition. This study highlights the association of Primary Headaches with psychiatric morbidities and stressful life events that may cause or increase its severity. **Method:** Descriptive, Cross-Sectional, Hospital Based study was done in 75 patients who met the diagnostic criteria for Primary Headache. **Results:** Patients presenting with primary headache were mostly from the age group of 26-30(26.7%). Most were female (57.3%) and 69.3% were married. 29.3% of the patients were housewives, 25.3% were into service and 21.4% were students. Anxiety and depression were the major diagnosis with 22.3 and 17.4 % respectively. Illness in the family and self or family member unemployment were the major stressful life events. There was a significant relation of Psychiatric Morbidity with Primary Headache. **Conclusion:** Anxiety disorder was the major psychiatric condition found in patients with Primary Headache followed by depression. Majority of this was seen in females, married and in the age group of 26-30 years. Thus it is necessary to screen Primary Headaches and reduce the stressful life events in these patients and limit the consequences and outcome of Primary Headache to prosper the health and living standard of the patients and the population as a whole.

Keywords: General Health Questionnaire, ICD-10 DCR, Presumptive Stressful Life Event Scale, Primary Headache, Self Reporting Questionnaire

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INTRODUCTION

Pain that occurs above the eyes or the ears, behind the head in the occiput or the cervical region of the neck can be called as a headache. Literatures on headache can be traced back to at least to the past 4000 years to Mesopotamian ritual texts, by which it can be observed that headache is one of the most common complaint of mankind.[1] The pain is produced by the stimulation of skin, subcutaneous tissue, muscle, arteries and periosteum of skull and has minimum impact from brain as a whole including ependymoma and choroid plexus, as they are insensitive to pain. Headaches can be Primary or Secondary. A primary headache is a type of headache that is caused by overactivity of, or the problems with pain-sensitive structures in our head and is not a symptom of an underlying disease condition in a patient. The activities of chemicals in our brain, the nerves or vessels surrounding the skull or the muscles of our head and neck plays an important role and mainly includes Cluster type headaches, migraine, tension type headache and

trigeminal autonomic cephalgia. Use of alcohol (particularly red wine), certain foods (eg: processed meats that contain nitrates), changes in sleep pattern, poor posture and stress can be some of the triggering factors of Primary Headache. Secondary Headaches are related to other biological disorders (eg: neoplasm, infection or toxin).

Tension Type Headache and Migraine are one of the most prevalent diseases in the world ranking second and third[2] and are considered distinct entities by the International Headache Society. There is a two to three fold greater risk of having a psychiatric morbidity in patients with headache than general population[3, 4] and studies over 25 years have consistently indicated that headaches and anxiety and depression are excessively co-morbid.[5-8] Headaches has also been found to severely affect the quality of life of the individual with exaggerated effects and disability.[9-11] Epidemiological studies have been done and has shown a strong association between primary headaches and psychiatric disorders[12] and the reported prevalence was about 66.1%.[13, 14] A study done in Italy compared anger and emotional distress in patients with migraine and tension type headache and showed higher level of angry temperament and anger among patients with tension type headache and in addition to this also showed high level of phobia, depression, anxiety, obsessive compulsive symptoms, emotional lability and other psychological disorders.[15] The study of prevalence of psychiatric morbidities with headache in Nepal has been limited. A study conducted by Risal et al.[16] showed high prevalence of both headache and psychiatric disorders, are excessively comorbid with anxiety and depression. Association with tension type headache and psychiatric co-morbidity as per diagnosis of tension-type headache has been missed out while being diagnosed as per depression or anxiety as these disorders have headache as one of their symptoms.[17] Another study has also showed that anxiety and depression as comorbid disorder among those presenting with Primary Headache in Nepal.[18]

Primary types of headaches are the most common types of problem reported in the OPD by the patients hence it is necessary for a proper study in this matter. The high prevalence of Primary Headache and its effects on work productivity, quality of life and socio-economic condition is a matter to be focused on. This study highlights on the association of Primary Headaches with psychiatric morbidities and stressful life events that may cause or increase the severity of Primary Headache and its psychiatric co-morbidities.

OBJECTIVES

The general objective of this study is to study the psychiatric morbidities in patients with Primary Headache. The specific objectives of this study is to study the prevalence and nature of psychiatric morbidity in patients diagnosed with Primary Headache, to study the relationship between stress of life and primary headache; and to study the socio-demographic profile and prevalence of Primary Headache.

MATERIALS AND METHODOLOGY

Study conducted at Department of Psychiatry, NMCTH, Jorpati, Gokarneshwor-8, Kathmandu, Nepal within a period of 1 year (1st November 2017- 31st October 2018). A descriptive, cross-sectional, hospital based study was done with a sample size of 75 people (n=75). Sample selected according to the inclusion and exclusion criteria. The inclusion criteria included patients diagnosed with Primary Headache by a consultant psychiatrist and requiring the diagnosis of Primary Headache according to International Headache Society classification[19] who gave informed consent to participate from any gender and age group of >10 years of age. Follow up cases, patients with comorbid medical illness, patients who did not give informed consent, patient who did not meet criteria for Primary Headache and patients suffering from other medical and surgical illness which are directly attributed to cause headache like head trauma, vascular disorder, substance abuse or withdrawal state, disorders of eye, ear, nose, sinuses and teeth were excluded from the study.

Ethical consideration: During the course of the study the privacy of the patient was maintained by taking interviews in a private and separate room, the patient's confidentiality was maintained with use of codes and an informed written consent was taken from the patient and spouse. Ethical approval was obtained from NMC Institution Review Committee (IRC)

The total number of patients (n=75) were selected by simple random procedure with the patients that attended the outpatient department of NMCTH. Informed written consent was taken from the patient. At first a proforma was filled with the required information of the patient. Then a detailed history of the patient was taken including a detailed psychiatric history, any other medical or surgical history and history of substance abuse from the patient. Psychiatric morbidity was made according to ICD-10 with the help of General Health Questionnaire (GHQ), Self Reporting Questionnaire (SRQ) and Stressful Life Event scales (PSLES). Nepali/ Indian version of GHQ, SRQ and PSLES was used.[20-22] Finally, the data was analyzed using SPSS version 16 and simple descriptive statistics (percentage, mean and Standard Deviation) were analyzed. For association, Chi-square test was used, p value of less than 0.05 was considered significant.

RESULTS

Table 1: Socio-demographic Profile of Patient (n=75)

Variables		Number (%)
Age Range (years)	16-20	10 (13.4)
	21-25	13 (17.3)
	26-30	20 (26.7)
	31-35	13 (17.3)
	36-40	6 (8)
	41-45	4 (5.3)
	>45	9 (12)
Sex	Male	32 (42.7)
	Female	43 (57.3)
Marital Status	Married	52 (69.3)
	Unmarried	23 (30.7)
Employment Status	Housewife	22 (29.3)
	Service	19 (25.3)
	Farmer	12 (16)
	Business	3 (4)
	Student	16 (21.4)
	Unemployed	3 (4)
Literacy	Illiterate	15 (20)
	Primary	12 (16)
	Secondary	15 (20)
	SLC	7 (9.3)
	Bachelors	24 (32)
	Masters	2 (2.7)
Religion	Hindu	63 (84)
	Buddhist	12 (16)
Caste	Brahmin	29 (38.7)
	Chettri	21 (28)
	Newar	9 (12)
	Gurung, Rai, Tamang, Lama	10 (13.3)
	Others	6 (8)

Table 2: Distribution according to different levels of Score

Scoring system	Scoring	Number (%)
GHQ	<16	43(57.4)
	16-20	19(25.3)
	>20	13(17.3)
SRQ	≤10	38(50.7)
	>10	37(49.3)
PSLES	<150	50(66.7)
	150-199	6(8)
	200-299	7(9.3)
	≥300	12(16)

As represented in table 1, most patients (26.7%), who were studied upon were from the age group 26 to 30 years. Most were female (57.3%) and 69.3% were married. A total of 29.3% of the patients were housewives followed by 25.3% patients who worked as service persons. 24% of the patients had studied up to bachelor's degree and they were mostly following Hinduism (84%). A total of 38% were Brahmins followed by 28% Chettris.

As seen in Table 2, 57.4% had GHQ scoring of <16 followed by 25.3% with 16-20 and 17.3% with >20 scoring. 50.7% had SRQ scoring of ≤10 and 49.3% had SRQ scoring of >10. 66.7% had PSLES scoring of <150 followed by 16% with ≥300, 9.3% with 200-299 and 8% with 150-199 scoring.

Table 3 : Distribution according to ICD-10 Diagnosis

ICD-10 diagnosis	Number (%)
None	57.3
Anxiety Disorder	21.3
Depression	17.4
Somatization	4
Total	100

As shown in Table 3, 57.3% of the patients had no ICD-10 diagnosis, 21.3% had anxiety disorder, 17.4% had Depression and 4% had Somatization.

Table no. 4: Distribution of ICD-10 diagnosis in relation to scores :

Scoring System	Score	Psychiatric Illness in patient		Total n (%)	p-value
		Normal n (%)	ICD-10 Diagnosis n (%)		
GHQ	≤15	31 (72)	12 (37.4)	43 (57.4)	0.004434
	>15-20	9 (21)	10 (31.3)	19 (25.3)	
	>20	3 (7)	10 (31.3)	13 (17.3)	
	Total	43 (100)	32 (100)	75 (100)	
SQR	≤10	31 (72)	7 (21.9)	38 (50.7)	<0.001
	>10	12 (28)	25 (78.1)	37 (49.3)	
	Total	43 (100)	32 (100)	75 (100)	

As represented by Table 4, the p-value of distribution of ICD-10 diagnosis in relation GHQ scoring and SQR scoring are 0.004434 and <0.001 respectively. Both of these values are <0.05 which indicates a significant value.

As shown in table 5, illness of family member and self or family member unemployment account for 12% each of the stressful life events in our patients followed by excessive alcohol or drug intake by a family member, pregnancy of wife/family members, death of close family member and financial loss or problem; which accounts for 9.3% each of stressful life events.

Table no. 5 : Types of stress according to PSLES:

Stressful Life Events	Male	Female	No. (%)
Illness of Family Members	1	8	9(12)
Excessive alcohol or drug use by family members	0	7	7(9.3)
Pregnancy of Wife/Family members	3	4	7(9.3)
Suspension or dismissal from job	1	0	1(1.3)
Going to pleasure trip	2	2	4(5.3)
Reduction in number of family function	2	4	6(8)
Gain of new family members	3	0	3(4)
Begin or end of schooling	3	0	3(4)
Detention in jail of self or close family member	0	1	1(1.3)
Lack of child	0	3	3(4)
Death of close family member	0	7	7(9.3)
Death of a friend	2	1	3(4)
Financial loss or problem	2	5	7(9.3)
Sexual Difficulties	0	1	1(1.3)
Self or family member unemployed	3	6	9(12)
Outstanding achievement	0	3	3(4)
Change or expenses of business	2	1	3(4)
Unfulfillment of commitments	1	2	3(4)
Getting married or engaged	1	0	1(1.3)
Appearing in examination or interview	3	0	3(4)
Failure in exam	2	2	4(5.3)
Family conflict	0	1	1(1.3)
Marriage of daughter	1	3	4(5.3)
Large loan	0	3	3(4)
Trouble at work with colleagues	0	1	1(1.3)
Poverty or crops damaged	2	4	6(8)

DISCUSSION

The study was conducted in Nepal Medical College Teaching Hospital in a study sample of 75 patients who visited Psychiatry OPD and who were diagnosed with Primary Headache. In this study, the majority of the patients were seen from the age group 26 to 30 (26.7%) followed by the age group of 22 to 25 and 31 to 35 (each with 17.3%). In a study done by Khalid et al,[23] headaches were more common in the age group 21 to 30 years (43.2%) followed by 31-40 years (20.43%). Another study done by Sharma,[17] showed headache to be common in age group 21-25 (25%) followed by 26-30 (22.5%). A study done by Kafle et al[18] showed most patients were from age 20 to 39 years (57.3%).

We also found out the predominant sufferers of Primary Headache were females (57.3%). Studies done in TUTH by Sharma[17] showed 62.5% females and study done by Khalid et al.[23] showed 61.92% female predominance. Study done by Kafle et al.[18] showed 78.7% of the sufferers were female.

This study also showed the majority of the cases were married 69.3%. In another study done by Khalid et al[23] 68.73% of patients were married and 30.65% unmarried. Study done by Sharma[17] in contrast showed 65% were unmarried. Koseoglu et al.[24] did a study where (24.3%) of the cases were married followed by divorced people (18.7%). Similarly, study done by Kafle et al.[18] showed 89.3% of the patients were married.

It was also observed in our study that most of the patients were educated up to Bachelor's level (32%) followed by secondary school level (20%). The least number of participants had a Master's level of education (2.7%). Koseoglu et al.[24] did a study where he found chronic type headache to be most prevalent in the lowest education level (26.5%). Another study done by Sharma[17], in patients with Tension Type headache, majority (32.5%) have passed matriculation exam, followed by those in intermediate level. Also study done by Kafle et al.[18] showed 34.7% of the people with secondary level education status which was the maimum number followed by primary school level (23.3%).

Majority of the cases in this study were housewives (29.3%) followed by service holders (25.3%) and least were unemployed (4%). Study done by Kafle[18] showed 56.7% of the patients worked as homemakers followed by 12% farmers. Koseoglu et al.[34] did a study where he found that tension type headache was more prevalent in housewives than working women. Another study by Sharma[17] showed the majority of the patients were students (40%) which also included married women who were still studying.

This study also showed 84% were Hindu and the rest were Buddhist. This data is mainly due to population demography of Nepal which constitutes 80.6% Hindus and 10.7% Buddhists of total population. 38.7% of the patients in this study were Brahmins followed by 28% Chettri. This data is also due to the predominance of those castes in our country. Among the 75 patients, ICD-10 criteria was used to diagnose psychiatric conditions among which it was found that 57.3% had no psychiatric diagnosis. But, among those 75 patients 42.7% had some form of psychiatric diagnosis and anxiety (50%), depression (40.6%) and somatization (9.4%) were the most common co-morbid conditions.

This study shows that among the 32 patients with some form of psychiatric illness, 16 were suffering from anxiety disorder, 13 from Depression and 3 from Somatization. A study done by Kafle[18] showed that Anxiety was the most common co-

morbid condition which was reported to be 31.3% followed by Depression (22%). Another study done by Beghi et al.[11] anxiety, mostly generalized type was reported by 9.3% of patients with tension type headaches and depressive episodes in 36.4% patients. Another study by Risal[16] also showed that having any headache was significantly associated with Anxiety (17.2%) compared to no headache (10.5%) but the study could not find any significant association between having headache and depression cases.

In this study, it was found that the major Stressful Life Event was illness of family members (12%) followed by excessive alcohol or drug use by a family member and death of close family members (9.3% each). A study done by Sharma[17] showed marriage and failure in exams were the main stresses.

CONCLUSION

Prevalence of psychiatric morbidity has been seen in patients with Primary Headache. Majority was seen in females and of the age group 26 to 30 years. Major co-morbidities seen were anxiety, followed by depression and somatization. Illness of family members was found to be one of the main stressful life events followed by alcohol use among males which was found to be a major stressful event in the corresponding females who may be the wife or mother. There was also a significant relation between the distribution of ICD-10 diagnosis with the GHQ and SQR scores. Thus, we can conclude that psychiatric morbidities can be seen in patients with primary headache in a low age group as low as 16 to 20 years old. So, it is necessary to screen patients at an early age to improve the quality of life in patients as well as improve the overall living standards. Married females are at greater risk of these morbidities and education level also seems to add to the risk. Need of higher education should thus be promoted and people should be made aware of the disease they are suffering from as well as the prognosis of it. Regular psychiatric evaluation must be done in these patients and early diagnosis and appropriate interventions should be done as early as possible.

LIMITATIONS

The sample size was small which is the major limitation of the study. The study sample is also only taken from the OPD so it might not represent the population of our country with other ethnic groups.

CONFLICT OF INTEREST

None declared.

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Functional outcome of the treatment of AO-ASIF type C distal humerus fracture using Lambda plate

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ABSTRACT

Introduction: Although the use of two plates for the treatment of type-C distal humerus fracture is popular, site of plate placement still is under debate. Use of Lambda plate for the fracture treatment can be easier and settle the dispute. This study aims to evaluate the functional outcome of the surgery using Lambda Plate. This can be a reference for surgeons and helps them make the decision about choice of implant for type C distal humerus fracture treatment among Nepalese people. **Methods**: This interventional study used Lambda plate for the treatment of type C fracture of distal humerus. Patients were examined at 4, 12, and 24 weeks respectively for the measurement of the outcome. Visual analogous scale was used for assessment of pain, range of motion for functional recovery and Mayo Elbow Performance Score was used for the assessment of functional outcome. Paired-samples t-test and linear regression was used to for data analysis. **Results:** Functional outcome at the last follow-up was excellent in 24(53.33%) patients, good in 18(40%) patients and fair in 3(6.67%) patients. Range of motion of elbow increased significantly with every follow-up (p-value <0.001). Average angle of flexion at last follow-up was 117.53°±11.74 while loss of extension was 7.53°±4.86. Average number of patients had their fracture union at 19.84±2.38 weeks. There was no association of age, sex and union weeks with functional outcome when measured with MEPS. **Conclusion:** Fixation of distal humerus fracture by using Lambda plate gave excellent and satisfying outcome in terms of pain, range of motion and objective functional outcome.

Key Words: Lambda plate, Distal humerus, Fracture.

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INTRODUCTION

Fracture of distal humerus accounts for 3% of all the fractures in adult.[1] Although the fracture is rare, it is challenging to treat due to complex anatomy of elbow joint and the adjacent neurovascular arrangement.[2,3] Improper management of type C fracture of distal humerus may lead to complications and disability. Immediate complications include limb threatening due to involvement of neurovascular structure while late complications include derailed functional status.[4] For the management of type C distal humeral fracture, consensus has been made in favour of surgery which enable to achieve stable osteosynthesis. However, surgical technique to be applied is still a matter of debate.[5-7]

Although the methods for the stable internal fixation and reconstruction of the articular surface was introduced by Arbeitsgemeinschaft Fu¨r Osteosynthesefragen (AO)-Association for the Study of Internal Fixation (ASIF), techniques have changed a lot making the results predictable.[8]

In line, open reduction with internal fixation by dual plate technique has been the most widely accepted surgical technique for the distal humerus fracture treatment. This is because two plate technique provides bi-columnar stabilization and hence excellent clinical outcomes.[9-12] Plates are either placed perpendicularly (orthogonal plane) as per the early description of AO-ASIF, or placed parallelly (at 180 degree) as proposed later by O'Driscoll.[13] Nevertheless, some surgeons also prefer Y plating in which two plates are placed as inverted 'Y' on the posterior surface of medial and lateral supracondylar ridges in coronal plane.[14] Further development of instrumentation in line of Y plating has presented 'Lambda Plate' which are already in use for the treatment with excellent result.[15,16]

Although few literatures are available which report functional outcome of the use of Lambda plate,[14,16-18] evidence is not sufficient. Gap remains regarding assessment of functional outcome with the use of lambda plate particularly in Nepalese population. Therefore, this study aims to evaluate and report the functional outcome of the distal humeral fracture treatment using Lambda plate in Nepalese population. Result of this study would be an evidence and help surgeons to make decision about the implant selection in favor of Lambda plate in the management of type C distal humerus fracture.

MATERIALS AND METHODS

Study population: This prospective interventional study was carried out in Gandaki Medical College Teaching Hospital and Research Center, Pokhara, Nepal amoung 45 participants. In this study, the age of the patients ranged from 20-60 years were admitted within 7 days of fracture and classified as AO-ASIF type C fracture of distal humerus and those who gave written consent and underwent surgery between January 2016 to January 2020 were included. Patients having other comorbidities, head injury, previous history of elbow surgery and vascular injury needing repair were excluded from the study. Ethical approval for the study was obtained from Institutional Review Committee of Gandaki Medical College.

Lambda Plate: Lambda plate is a compression plate with oval holes without locking screws. It is a sectile, Y shaped, single piece flat cast which can be contoured. Its diaphyseal branch in 3.6 mm thick whereas epiphyseal arms are 2.5 mm thick angled at 50 degree apart.[15] Lambda plates used in this study was obtained from Sharma Orthopedics (India).

SurgicalTechnique: Use of Lambda plate is uncommon in Nepal and hence we followed the surgical procedure according to the previous literatures.[19-20] Briefly, we followed triceps sparing posterior approach to the distal humerus for midline posterior incision. Affected arm was placed at 90^0 of elbow flexion on a support with patient in lateral decubitus position on operating table. Use of tourniquet was avoided. A midline posterior incision was given and extended 5-8 cm distal to the olecranon tip. Radial nerve passing from posterior to anterior compartment was identified and triceps was retracted exposing posterolateral humeral. Medially, ulnar nerve was identified and released it from cubital tunnel and then posteromedial aspect of the distal humerus was exposed. For intercondylar fracture component 4 mm cannulated cancellous screw was used for fixation. Then, fracture was reduced and fixed with Lambda Plate and screws. Arm was immobilized at 90^0 of elbow flexion with posterior slab for 2 weeks.

Outcome assessment tools and technique: All the patients were examined at 4, 12 and 24 weeks for the evaluation of progressive outcome. We used Visual Analog Scale (VAS) for the assessment of pain which has scale ranging from 0 "no pain" to 10 "worst imaginable pain". It is a self-assessed pain measuring tool. Functional recovery was assessed by measuring range of motion (ROM) of elbow. We measured, both flexion and extension-lag, at 4, 12 and 24 weeks to document range of motion (ROM) of elbow. For objective functional assessment, Mayo Elbow Performance Score (MEPS) was recorded at 24 weeks. MEPS is a four-part scale consisting of 100 points. A 100 points scale is classified as poor (<60), fair (60-74), good (75-89), and excellent (90-100). We also measured fracture union week to assess its effect over the outcome of surgery. Decision of choosing these scales and scores for measuring functional outcome of internal fixation by Lambda plate was based on previous literature. [16, 21-23]

Statistical Analysis: Descriptive statistics was assessed and presented in the form of either mean or median and as frequency. Inferential statistics 'Paired-samples t-test' was used to compare means of VAS and ROM. In order to see the association of MEPS with predicting variables such as age, sex and union of fracture, we used multivariable linear regression. All the data analysis was performed with statistical software STATA version 15.1.

RESULTS

The mean age of the participants in this study was 33.87±9.3. Fracture was reduced, fixed with Lambda Plate & screws and arm was immobilized at 90^0 of elbow flexion with posterior slab for 2 weeks (figure 1a-b). Statistics analysis shows that distal humerus fracture in adults were more common among females (60%) compared to males (40%). ROM showed

that angle of flexion kept on increasing from around $100^0$to 109^0 and then to 118^0 at 4,12 and 24 weeks, respectively. Conversely, loss of angle of extension declined till 7.53^0 at 6 months. Data also showed that the median number of weeks needed for the fractures to be united in this study was 20 weeks. In terms of MEPS score, 53.33% of the patients documented to have excellent (≥ 90) outcome and the good thing was that none of the patients had poor (<60) outcome (Table1).

Fig1: a- Pre-surgical radiograph of distal humerus fracture; b- post-surgical radiograph of fracture fixed using Lambda Plate.

Table 1: Distribution of variables of patients with distal humerus fracture (n=45)

Variables	Mean (SD)	Median (IQR)
Age (years)	33.87 (9.3)	33(26-39)
Sex		
Female	27 (60%)	
Male	18 (40%)	
VAS at 4 weeks	3.09 (0.95)	3 (2 - 4)
VAs at 12 weeks	1.36 (0.74)	1 (1 - 2)
VAs at 24 weeks	0.33 (0.52)	0 (0 -1)
ROM flexion at 4 weeks	100.44° (12.43°)	100° (90° - 113°)
ROM flexion at 12 weeks	108.89° (12.18°)	111° (101° - 119°)
ROM flexion at 24 weeks	117.53° (11.74°)	124° (108° - 129°)
ROM extension lag at 4 weeks	41.91° (5.66°)	41° (38° - 46°)
ROM extension lag at 12 weeks	11.98° (5.02°)	11° (8° - 16°)
ROM extension lag at 24 weeks	7.53° (4.86°)	5° (4° - 11°)
Time of Union of fracture (weeks)	19.84 (2.38)	20 (18 – 22)
MEPS	86.24 (8.95)	90 (80 – 95)
MEPS categorized		
Excellent (≥ 90)	24 (53.33%)	
Good (75-89)	18 (40%)	
Fair (60-74)	3 (6.67%)	
Poor (<60)	None	

Results of paired samples t-test as shown in table 2 provided strong evidence (p-value<0.001) that pain decreased after 12 weeks compared to 4 weeks [95% CI= -1.97, -1.5] and decreased further at 12 weeks follow-up [p-value <0.001, 95% CI= -1.22, -0.82)]. Comparison of ROM in terms of mean angle of flexion at different time of follow-up gave strong evidence that the ability to flex elbow increased by almost 8^0 [4 week to 12 weeks: p-value<0.001, 95% CI = 6.66, 10.44] in each follow-up [12 to 24 weeks; p-value<0.001, 95% CI = 6.88, 10.41]. Conversely, lag in extension of elbow decreased every time on follow-up, though by small degree (4.44^0) on 3rd follow-up at 24 weeks. Nevertheless, decline in lag while extension was significant (p-value <0.001) [Table2].

Table 2: Paired-samples t-test to find difference in mean of surgery outcome at different time (n=45)

Assessment tool	score measuring time	Mean difference	P-Value	95% CI	
Visual Analog scale (VAS)	12weeks-4weeks	-1.73	<0.001	-1.97	-1.5
	24 week - 12weeks	-1.02	<0.001	-1.22	-0.82
ROM Flexion (degree)	12 week -4 weeks	8.44°	<0.001	6.66	10.44
	24 week - 12 weeks	8.64°	<0.001	6.88	10.41
ROM extension lag (degree)	12 week -4 weeks	-29.93°	<0.001	-30.75	-29.11
	24 week - 12 weeks	-4.44°	<0.001	-4.97	-3.92

We also tried to find out the association of age and sex of patients with the objective functional outcome (MEPS) using multivariate linear regression. Result showed that there may or may not be the association of age because 95% confidence interval included null value (95% CI; -0.215, 0.402). P-value provides weak evidence of association with age (p-value=0.543). The evidence of association of MEPS with sex (p-value=0.714) or fracture union week (p-value=0.382) were also weak [Table3].

Table 3: Multivariable Linear Regression analysis to find the association of Mayo Elbow Performance Score (MEPS) with predicting variables (n=45)

MEPS	Coef.	P-value	95% CI	
Age	0.094	0.543	-0.215	0.402
Fracture union weeks	-0.513	0.382	-1.686	0.659
Sex Female	base			
male	1.057	0.714	-4.731	6.845

DISCUSSION

Stability of the medial and lateral columns are as important as congruity of elbow joint while fixing distal humerus fracture to regain excellent functional recovery. Two plate fixation techniques have been documented to have satisfactory outcome, but disputes still exist regarding site of fixing plate. This is because clinicians use one of the three models viz; parallel plating, perpendicular plating and Y plating, while all three models have shown that the stress related displacements were minimal.[24] Although not many and not in Nepalese people, literature suggested that Lambda plate fitted well with the shape of distal humerus

and provided good functional recovery along with early mobilisation.[14] Thus, this study was conducted to report the outcome of the use of Lambda plate for the fixation of type C humeral fracture among Nepalese people. This would help surgeons to make decision while selecting surgical protocol and would help bring uniformity in surgery technique. Strength of the study was that it used inferential statistics 't-test' and 'linear regression' draw the robust conclusion and adjust confounders while most of other studies used only descriptive statistics.[17,18]

The average age of the participants in this study was 33.87±9.3 years which was almost similar to the study of Mahapatra et al.[25] Percent of females (60%) in our study was higher than that of males (40%) which contradicted many other previous studies.[26,27] The probable cause may be the mode of injury as females in hilly regions like Pokhara and its periphery most often visit difficult hills for farming and animal husbandry while males are involve in official job and go abroad. On contrary, injured males in the previous studies were greater in percentage may be because of driving. Thus, further study is needed to verify the mode of injury. We found that pain decreased with time and almost vanished at 24 weeks with mean VAS 0.33±0.52 when range of motion was 117.53^0±11.74^0/7.53^0±4.86^0. This result was expected but it differed from Nouraei et al.[28] who found that mean VAS 3.3 when flexion was over 100 degree. The probable reasons that patients experienced higher pain in his study might have been the low tolerance capability of patients compared to Nepalese, moreover, VAS is a subjective measurement.

Although the normal angle of flexion is 140^0 to 150^0, researches have shown that minimum of 85% flexion is necessary to perform all the basic life activities.[29,30] Depending upon these previous studies, functional recovery in terms of range of motion was appreciable in our study (117.53^0) which was comparable to the previous studies reporting recovery of 120^0 or 130^0 or up to 112^0. Furthermore, loss of extension was only 7.53^0 in our study but extension loss was greater in other studies.[14,17,18]

Saragaglia et al.[16] reported that 89.5% of patients had excellent MEPS with mean MEP score of 97±7 for distal humerus fracture treatment with Lambda plate. In response to intercondylar fracture treatment with dual Y-plate, a study reported to have mean MEP score 80±10.5 and only 13.33% patients performed excellent whereas 66.67% scored good.[25] Participants of the study conducted by Mann et al. for the treatment of supracondylar and intercondylar fracture of distal humerus with pre-contoured plate reported that only 9% had excellent MEP score while 53% had good score.[17] On the contrary, our study showed that 53.33% of patients scored excellent, 40% scored good, 3% scored fair and none scored poor with mean MEP score of 86.24±8.95 and median MEP score 90 (80-95). Strength of this study was that we used inferential statistics for the data analysis which gave robust and reliable result while many other related studies used only descriptive statistics. However, limitation of our studied cannot be overlooked has it used small sample size and further study is needed with large sample size. Only one patient in this study got infected who was treated with antibiotics and average number of weeks required for the union of fracture was 20 weeks.

CONCLUSION

This study found that patients achieved excellent outcome and functional recovery when treated for AO-ASIF type C fracture of distal humerus with Lambda plate. Therefore, based upon evidence of this study regarding functional outcome, we report that Lambda plate can be used for the treatment of type C fracture of distal humerus.

Conflict of Interest: None

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Indications for removal of impacted mandibular third molars and associated pathologies

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ABSTRACT

Introduction: The purpose of this study was to assess the various indications of impacted mandibular third molar removal and pathologies associated with it. **Methods:** A retrospective cross-sectional study was conducted in the Department of Oral Surgery, Gandaki Medical College. The clinical case records from September 2016 to August 2019 were retrieved, reviewed, and analyzed. Surgically removed impacted mandibular third molars for which orthopantomogram were available and the lesions verified histologically were included in the study. Orthopantomograms were studied to determine the angular position of the impacted mandibular third molars and associated pathology. The data was entered in SPSS 20 and descriptive statistics was applied. **Results:** A total of 1344 impacted mandibular third molars (Male-709, 52.8%; Female - 635, 47.2%) were surgically extracted during the three-year period. The majority of patients (36.5%) were in the age groups of 25 - 34 years with a higher incidence of mesioangular impaction (33%). Recurrent pericoronitis (62.9%) was the most common indication followed by caries (11.7%). The radiographically detectable lesion was seen in 471 (35%) cases out of which 304 (64.5%) were symptomatic at the time of extraction. Among137 histopathologically diagnosed cases, chronic inflammatory lesion (76, 55.9%) was the most common finding. **Conclusion:** Awareness of the indications for removal of impacted mandibular third molars helps in proper management and prevention of future complications associated with retention and delayed extraction of such teeth. So, regular and periodic clinical and radiographic examination is required for patients with impacted mandibular third molars.

Keywords: Impacted mandibular third molar, indication, pathology, surgical extraction.

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INTRODUCTION

An impacted tooth can be defined as one that is prevented from erupting up to the occlusal level because of malposition, interference, or lack of space in the arch. Since the mandibular third molars are the last teeth to erupt in the arch there is a higher prevalence of them being impacted.[1] The impacted mandibular third molar may be associated with pathological changes including pericoronitis, an increased risk of caries and periodontal disease in adjacent teeth, and orthodontic problems in later life or remain asymptomatic. There is always a debate on whether to retain or extract an asymptomatic impacted mandibular third molar. Most of the time third molars are considered as a troublemaker and functionally non-essential thus extracted most frequently.[2]

The decision of retaining or removing of impacted mandibular third molars often may become very complex. Surgical removal of the impacted third molar may expose the patients to the risks of surgery such as nerve damage, dry socket, infection, damage

to the adjacent teeth, bleeding, fracture of the mandible, and rarely death.[3] At the same time, retention of the impacted third molar may lead to the development of pathologies requiring more extensive surgery that too at an older age when surgery itself is more complicated due to systemic conditions. Therefore, a surgeon must weigh the risk-benefit ratio before choosing the appropriate treatment option.[3,4]

There is paucity of literature on the common indications of surgical removal and common pathologies associated with impacted mandibular third molar in Nepal. So, this study was conducted with an objective to assess the various indications of impacted mandibular third molar removal and pathologies associated with it.

METHODS

A retrospective cross-sectional study was conducted from November- December 2019 using the records of all the patients who underwent surgical removal of impacted mandibular third molars during a three years period (September 2016 to August 2019) in the Department of Oral and Maxillofacial Surgery, Gandaki medical college, Pokhara, Nepal. Ethical approval for the study was obtained from the Nepal health research council (Approval no. 342/2019). The records of all the patients who underwent surgical removal of impacted mandibular third molar under local anesthesia during the study period were retrieved, reviewed, and analyzed. Impacted third molars which were either fully covered with bone or partially erupted, but prevented from reaching the occlusal plane and those cases for which orthopantomogram were available and the pathological cases in which lesions were verified histologically were included in this study. Mandibular third molars that were fully erupted to the level of the occlusal plane and those patients in whom a surgical removal was performed after failure of forceps extraction were excluded from the study. Cases in which lesions were not verified histologically were also excluded from this study. Each case record was reviewed to determine the reason recorded by the operating surgeon for the removal of the third molar. The following indications of removal of impacted mandibular 3rd molar were recorded: periapical pathology, caries of impacted mandibular 3rd molar, pericoronitis, fracture of the tooth, disease of follicle including cyst/tumor, resorption of the adjacent tooth, teeth impending reconstructive jaw surgery, the tooth involved in or within the field of tumor resection and periodontitis. Orthopantomogram of the cases included were examined to determine the angular position and any associated pathologies. The angular position of the impacted mandibular 3rd molar with reference to the angle formed between the intersected longitudinal axes of the second and third molars included in this study was determined using Winter's classification.[5] The following radiographic lesions were recorded: caries, pericoronal radiolucent areas around the impacted mandibular third molar, periapical radiolucent areas related to the impacted and partially erupted mandibular third molars, and external resorption of adjacent tooth. A single investigator viewed each radiograph, and to check for the diagnostic reproducibility of the examiner, a second observer examined 40 radiographs with detectable radiographic lesions daily for 5 consecutive days in random orders. No difference between the 2 observers was found. The data was entered in SPSS 20 and descriptive statistics were applied.

RESULTS

A total of 1344 impacted mandibular third molars were surgically extracted during a three year period. The female to male ratio of the patients who underwent removal was 1:1.2 (Male-709, 52.8%; Female - 635, 47.2%). The age of the patients ranged from 18-80 years and the majority (n=491, 36.5%) of the extracted impacted mandibular 3rd molar were from the age range of 25 to 34 years. Recurrent pericoronitis was the most frequent indication for removal of the teeth (846, 62.9%). A significant number of impacted mandibular third molars studied showed either caries (157, 11.7%) or adjacent tooth resorption (126, 9.4%) and 52 (3.9%) of the cases were disease of the dental follicle involving cyst, or tumors (as shown in Table 1). The mesioangular impacted mandibular third molar was most frequently extracted (443, 33%) followed by vertical (423, 31.5%) (as shown in Table 2). Among 1344 impacted mandibular third molar removed, 471 (35%) cases showed radiographically detected lesions out of which 167 (35.5%) were asymptomatic at the time of extraction (as shown in Table 3).

Table 1. Indications of removal of impacted mandibular 3rd molar

Indications for removal	Frequency (%)
Caries involving mandibular 3rd molar	157 (11.7)
Periapical pathology	84 (6.3)
External resorption of the adjacent tooth	126 (9.4)
Repeated episodes of pericoronitis	846 (62.9)
Fracture of tooth	28 (2.1)
The disease of follicle including cyst or tumor	52 (3.9)
Tooth/teeth impending surgery or reconstructive jaw surgery	18 (1.3)
Tooth involved in or within the field of tumor resection	9 (0.7)
Chronic Periodontitis	24 (1.8)

A total of 136 specimens associated with impacted third molars were diagnosed histologically. Among them, the most common cystic lesion was a radicular cyst (8, 5.9%) followed

by dentigerous cyst (5, 3.7%). The most common histological finding was chronic inflammatory lesion (76, 55.9%) which was followed by dental follicle (36, 26.4%). Four cases (2.9%) were associated with ameloblastoma and three cases (2.2%) with squamous cell carcinoma (as shown in Table 4).

Table 2. Angulation and side of impacted mandibular 3rd molar

Angulation	Frequency (%)
Mesioangular	443 (33.0)
Horizontal	182 (13.5)
Vertical	423 (31.5)
Distoangular	278 (20.7)
Others*	18 (1.3)
Side	
Right	705 (52.5)
Left	639 (47.5)

Others*= Lingoversion, buccoversion, and inverted

Table 3. Radiographic lesion as observed in the orthopantomogram and their association with clinical symptoms

Pathologies observed	Frequency (%)	Clinically symptomatic n (%)	Clinically Asymptomatic n (%)
Caries in impacted mandibular 3rd molar	157 (33.3)	113 (72.0)	44 (28.0)
Periapical radiolucency	84 (17.8)	56 (66.7)	28 (33.3)
External resorption of adjacent 2nd molar	126 (26.7)	58 (46.0)	68 (54.0)
The disease of follicle including cyst and tumor	52 (11.0)	34 (65.4)	18 (34.6)
Fractured teeth	28 (6)	27 (96.4)	1 (3.57)
Chronic periodontitis	24 (5)	16 (66.6)	8 (33.4)
Total radio-graphically detected lesions	471(35)	304 (64.5)	167(35.5)

Table 4. Histological findings of the lesions associated with impacted mandibular third molars

Lesion	Type	Frequency	%*	%#
Cyst	Radicular cyst	8	5.9	1.7
	Dentigerous cyst	5	3.7	1.06
	Odontogenic keratocyst	4	2.9	0.84
	Total	17	12.5	3.8
Periapical inflammation	Chronic inflammatory lesion	76	55.9	16
Dental follicle	Dental follicle	36	26.4	7.6
Tumors	Ameloblastoma	4	2.9	0.84
	Squamous cell Carcinoma	3	2.2	0.6
	Total	7	5.1	1.5

*Percentage of total histological findings (n=136)

#Percentage of the mandibular third molar with radiographic lesions (n=471)

DISCUSSION

Third molars are the last teeth to erupt in the oral cavity and this usually happens between the age of 18 to 24 years. Impaction may be associated with pathological changes including pericoronitis, an increased risk of caries and periodontal disease in adjacent teeth, and orthodontic problems in later life or remain asymptomatic. The prevalence of impacted mandibular third molar ranges from 16.7% to 96.5%.[1,6,7] Despite the substantial amount of literature dedicated to the debate on whether or not to prophylactically remove third molars, there is still disagreement and controversy among general dental practitioners and oral surgeons as to what constitutes best practice.[4]

Guidelines for the management of third molars proposed by the National Institute for Clinical Excellence (NICE) advises against the routine prophylactic removal of pathology-free impacted third molars. According to the NICE guidelines, surgical removal of impacted third molars should be limited to patients with evidence of pathology which includes un-restorable caries, non-treatable pulpal and/or peri-apical pathology, cellulitis, abscess and osteomyelitis, internal/ external resorption of the tooth or adjacent teeth, recurrent episodes of pericoronitis, fracture of the tooth, disease of follicle including cyst/tumor, tooth/teeth impending surgery or reconstructive jaw surgery, chronic periodontitis and when a tooth is involved in or within the field of tumor resection.[8] However, J Mansoor et al[9] blamed NICE guidelines for not being based on sound clinical evidence and not considering the consequence of non-extraction of impacted third molars.

The presence of partial and/or soft tissue impacted third molar is associated with a significantly increased risk of increased plaque accumulation and pericoronitis. Recurrent pericoronitis was the most common indication of surgical removal of impacted mandibular third molar in the current study. Similar findings were reported in the literature.[10,11] The first episode of pericoronitis unless very severe is not considered as an indication of surgery and is managed conservatively in our institution. However, the second or subsequent episode of pericoronitis is considered as an indication of third molar removal. This might be the reason for the highest incidence of impacted third molar removal under the age group of 25 to 34 years in the current study. There was a slightly higher prevalence of impacted mandibular third molar removal in males (52.8%) as compared to females. Similar frequencies were reported by previous studies.[12,13]

There is a higher caries risk in partially impacted third molar and the distal surface of the second molar due to relative inaccessibility of cleaning. The food gets trapped between the second molar and occlusal surface of the third molar making it more prone to dental caries development. Often caries involves the occlusal surface of the third molar and the radicular portion of the second molar making it difficult to restore. In cases of late presentation, the third molar and second molars both end up on extraction. Caries involvement of the third molar was the second most common indication of extraction in the current study similar to the previous studies.[14,15] The increased risk of distal carries on the second molar supports the prophylactic removal of the impacted third molar to avoid future complications.[14,15] At the same time Mettes et al[16] in their review reported that due to the lack of randomized control trials and long-term cross-sectional studies insufficient evidence was found to support or refute routine prophylactic removal of asymptomatic impacted third molars in adults and suggested watchful monitoring may be a more prudent strategy. In our institute, none of the asymptomatic disease-free impacted third molars were removed prophylactically.

In the current study, a relatively higher frequency of the root resorption (9.4%) of the adjacent second molar was seen. The root resorption of the second molar was more frequently associated with class II level B mesioangularly impacted mandibular third molars. This finding is supported by other previous studies of Nitzanet al[17] and Oenning AC et al[18] and is in disagreement with other studies too.[19] There is very limited clinical evidence suggesting the impacted mandibular third molar as a contributing factor for the late incisors crowding and it is always a matter of debate.[20-22] In our institute, none of the third molars were extracted for orthodontic purposes.

In the earlier studies, the prevalence of cyst formation associated with the impacted mandibular third molars was variable and, therefore, difficult to interpret. This might be due to different diagnostic criteria. According to Stephens et al,[23] a pericoronal radiolucency greater than 2.5 mm was diagnostic criteria of the follicular cyst which leads to a false-positive result and a higher prevalence rate. In the present study, we used both radiographic and histopathological findings to define a cyst. The prevalence of cyst and tumor formation associated with the impacted mandibular third molar in this study (3.9%) was higher than that reported previous studies [12, 24] and lower than reported by El-Khateebet al[25] in their radiographic assessment of impacted teeth and associated pathology. However, this result of the prevalence of cyst formation was similar to the mean probability of 3.51% of cystic changes calculated based on a comprehensive review of the literature.[26] Among cystic lesions, the most frequent pathology was the radicular cyst associated with decayed third molar followed by the dentigerous cyst and lastly odontogenic keratocyst. On histopathological examination, most of the periapical pathologies were chronic inflammatory tissue and most of the pericoronal lesions were dental follicle. In the current study association of impacted third molar with tumors was less than 1% which was in concurrence with previous studies.[24]

The prevalence of radio-graphically detected pathology was 35% in the current study. Among them, only 64.5% were symptomatic at the time of presentation. This result suggests that the absence of symptoms associated with impacted mandibular third molars does not mean that they are not associated with disease or pathology. Similar findings were reported in the systematic review of Marciani RD.[27] Therefore a regular periodic radiological and clinical examination should be carried out for patients whose impacted third molars are not removed surgically even in absence of symptoms.

The normal development and path of eruption of the mandibular third molars are in the anterosuperior direction.[28] This might be the reason for the highest number of the impacted mandibular third molar to be impacted in the mesioangular pattern in this study similar to the previous studies.[9,10,29] A new parameter of indication for impacted mandibular third molar extraction was preparation for orthognathic surgery. Although, limited clinical evidence is available supporting the association between the presence of impacted mandibular third molar and incidence of a bad split during osteotomy, impacted mandibular third molars are extracted six months before bilateral sagittal split osteotomy in our institute.[30]

CONCLUSION

There was a high prevalence of mesioangular mandibular third molar impaction and recurrent pericoronitis was the most common indication for surgical removal. Awareness of the indications for removal of impacted mandibular third molars will help in the proper management and prevention of future complications associated with retention and delayed extraction of such teeth. The absence of symptoms does not necessarily mean the absence of pathology, therefore, regular and periodic clinical and radiographic examination is required for patients with retained impacted mandibular third molars.

Reccomendation: We would recommend further prospective research involving multiple tertiary hospitals all over Nepal. We would also like to recommend to conduct a randomized control trials in the future comparing prophylactic removal of impacted third molars with management by deliberate retention will be more helpful in decision making for prophylactic removal of impacted third molars

Limitations of the study: The limitations of the study were the retrospective nature of the study, which did not allow us to study how the impacted third molars respond to conservative management on long term follow-up and this was a single institutional experience which limits the generability of the result.

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Conflict of interest: None

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The prevalence of Diabetic Retinopathy in a Tertiary Centre in Western Region, Nepal

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ABSTRACT

Background: Diabetes mellitus is a multisystem disease. It has multiple complications like retinopathy, neuropathy, nephropathy, diabetes ketoacidosis, and stroke. Diabetes retinopathy (DR) is one of the blinding complications of diabetes. This study was done to find out the prevalence of diabetic retinopathy among diabetic patients attending in the outpatient department (OPD) of internal medicine, Gandaki Medical College and Teaching Hospital (GMCTHRC), Pokhara, Nepal. **Materials and Methods:** A hospital based cross-sectional study was performed among the 200 diabetes mellitus patients attending in the medicine OPD from 15th December 2017 to 15thDecember 2018. They were referred to eye OPD of GMC. The detailed eye examination including fundus evaluation under mydriasis was done to all the patients. The diagnosis of DR was graded using the Early Treatment Diabetic Retinopathy Study classification(ETDRS). Patients having hypertension and other retinal diseases were excluded from the study. Data analysis was done using statistical package for social sciences (SPPS) version 11.20. **Results:** The mean age of the patients was 63.02 ±11.8 years. In our study 60.5% of the patients were male and 39.5% were female. Diabetes retinopathy was seen in 29.5% patients, of which non proliferative diabetes retinopathy (NPDR) was present in 19.5%, proliferative diabetes retinopathy (PDR) in 9.5% and 0.5% had diabetes maculopathy. **Conclusion:** The prevalence of DR is quite significant in the people with diabetes. Early diagnosis and management of retinopathy will help to avoid blindness due to the diabetic retinopathy.

Key words: Awareness, Diabetic Retinopathy, Fundus, Prevalence, Tertiary Centre.

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INTRODUCTION

Diabetes Mellitus occurs throughout the world but more common in the more developed countries. In 2019, approximately 463 million adults (20-79 years) were living with diabetes; by 2045 this will rise to 700 million.[1] Average medical expenditure among people with diabetes are about 2.3 times higher.[2] Increase in the overall diabetes mellitus prevalence rates largely reflect as incidence in the risk factors.

Diabetes Mellitus is a multisystem disease. Therefore it has multiple complications like retinopathy, neuropathy, nephropathy, diabetes ketoacidosis, and stroke. Diabetes retinopathy is a common complication and responsible for visual impairment and blindness worldwide.[3-5] According to WHO, it is estimated that DR accounts for 4.8% of the total number of cases of blindness worldwide.[6]

Diabetic retinopathy occurs due to damage of the microvasculature of the retina as a result of the prolonged exposure to the metabolic changes induced by diabetes. There are different classifications of diabetes retinopathy, but the most widely accepted is ETDRS classification. According to

this classification, there are three types of DR - NPDR, PDR and diabetes maculopathy. NPDR is associated with microaneurysms, superficial and deep retinal hemorrhages, hard exudates, and macular edema. PDR involves the growth of new blood vessels in the retina that may cause scarification of the retina and vitreous. Maculopathy involves oedema and exudates in macula. Different methods of diagnosing DR clinically include ophthalmoscopy, optical coherence tomography, retinal photography, and fluorescein angiography.[7, 8]

Different treatment modalities for DR are- laser, intravitreal avastin, steroids, and vitrectomy. PDR if timely treated can decrease the loss of vision up to 90%.[9] Early diagnosis and prompt treatment helps to minimize diabetes-related visual impairment. Patients with diabetes require regular follow-up with physicians to optimize their glycemic, blood pressure and lipid control to prevent development and progression of DR and other diabetes-related complications.

Diabetes and DR is increasing day by day. Nepal is a developing country where knowledge and awareness of diabetes is very poor and not adequate studies have been done regarding its state. Gandaki Medical College (GMC) being a pioneer tertiary centre in Western Nepal, we performed this study to find out the prevalence of diabetic retinopathy.

METHODS

A hospital based cross sectional study was done from 15th December 2017 to 15th December 2018. A total of 200 patients attending the OPD of medicine of GMC diagnosed as diabetes mellitus were included in the study. They were then referred to the department of ophthalmology. Diagnosis of diabetes was done on the basis of either on use of hypoglycemic agents or according to the American Diabetic Association (ADA) which defines diabetes as having fasting blood sugar level of 126 mg/dl or higher recording. All diabetic patients having fasting blood sugar level of 126mg/dl or higher were included in our study. Ocular evaluation was conducted by a team of ophthalmologists and ophthalmic assistants. Visual acuity was taken by Snellen chart and refraction was done when needed. The anterior segment examination was done using slit lamp. Retina was examined after pupil dilatation with tropicamide eye drop installed three times at interval of ten minutes. Fundus was evaluated with 90 Dioptre and 20 Dioptre aspheric lens. The stages of DR were classified according to the ETDRS classification. All the data were entered and analyzed bySPSS version 11.20

RESULTS

A total of 200 patients were included in our study. In our study, 60.5% (121) patients were male while 39.5% (79) were female. The mean age of the patients was 63.02±11.8 years. Details of the different age distribution of the patients are shown in table 1.

Table 1: Age distribution of the patients

Age interval in years	No. of patients (%)
40-49	31 (15.5)
50-59	40 (20)
60-69	70 (35)
70-79	36 (18)
80-89	20 (10)
>90	3 (1.5)
Total	200 (100)

Regarding duration of diabetes, 80.5% (161) had diabetes for less than 10 years, 12.5% (25) had diabetes for 11 to 20 years and 07% (14) had diabetes for 21 to 30 years. Details are shown in table 2.

Table 2: Duration of diabetes and retinopathy

Duration (Years)	No of cases (%)
<10 years	161 (80.5)
11-20 years	25 (12.5)
21-30 years	14 (7)
Total	200 (100)

In our study, diabetes retinopathy was seen in 29.5% (59) patients of which NPDR was seen in 19.5% (39), PDR in 9.5% (19) and maculopathy in 0.5% (1). Details are shown in table 3.

Table 3: Types of diabetes retinopathy

Condition	No. of patients (%)
No DR	141 (70.5)
NPDR	39 (19.5)
PDR	19 (9.5)
Maculopathy	1 (0.5)
Total	200 (100)

DISUSSION

Diabetic retinopathy is a medical condition which damages the retina of the eyes due to diabetes mellitus. It is a leading cause of blindness in the developed countries.[10, 11]

In our study, 60.5% (121) patients were male while 39.5% (79) were female. This is similar to other studies elsewhere.[3,12-14] In our study, majority of the patients were in sixth decade while other studies showed more patients in fifth decade of life.[13, 14]

In our study, 80.5% (161) of the patients had diabetes for less than 10 years which is similar to study done by Shrestha R[14] in Nepal, while other studies showed diabetes for more than 10 years. [13, 15]

We found 29% of the patients with DR, which was similar to study done by R Maskey et al.[16] which showed DR in 27.7%. Meanwhile, a study done by Paudyal G et al.[12]showed diabetes retinopathy in19.4%.Varying prevalence has been seen in different studies in Nepal. High prevalence, upto 78% was seen in a study by R Thapa etal.[13], 47.3% in a study by Rizyal[17] while a study done by Shrestha R[14] showed prevalence of 20.3%. Studies done abroad also showed varying prevalenceof DR, ranging from 15.4% to 33.9%.[18-20]

In our study, NPDR was seen in 19.5%, PDR in 9.5% and maculopathy in 0.5%. Other studies done in Nepal also showed varying prevalence of NPDR ranging from 13.28% to 14.7%, PDR ranging from 7.3% to 6.9% and maculopathy in 4.6%.[12, 14]

The higher prevalence of DR in our study may be due to late presentation of the diabetic patients to the hospital and lack of awareness of DR.The difference in the prevalence of DR and different stages of retinopathy in different studies from Nepal and from other parts of the world could have resulted due to the variation in diabetic patients attending these institutes. The prevalence of retinopathy could have been higher in the studies which included participants from the area with poor health facilities or the institutes where referral is more from primary and secondary institutes such as in our study.

CONCLUSION

The prevalence of DR is quite significant in the people with diabetes. Regular eye examination and follow up regularly with proper management will help to reduce the blindness due to retinopathy.

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Extracorporeal Septoplasty for anterior septal deviation and deviated nose

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ABSTRACT

Background: Deviated nose and septum is challenging, which results in functional and cosmetic problems. It blocks the nose and makes person ugly. The classical septoplasty approach becomes unsuitable for such severe deviations. Extracorporeal septoplasty is a surgical technique for correcting a severely deviated nasal septum, which also corrects the aesthetic part of the nose. The objective of this study was to describe extracorporeal septoplasty for Deviated nose and anterior septal deviation. **Methods:** A prospective observational outcome study was done in patients with Deviated nose and anterior septal deviation who underwent extracorporeal septorhinoplasty. Preoperative and post-operative evaluation was performed using a photographs, computerized tomography (CT) scan, and Nasal obstruction symptoms evaluation scale. **Results:** A total of 38 consecutive patients were enrolled, out of which majority were male (24, 63.2%) with only 14 (36.8%) female. The ratio of male female was 1.7:1. All the subjects had deviated nasal septum. Among these, nose deviation was externally noticeable in 20 (52.6%) cases, whereas in remaining cases it was inconspicuous. There were 21(55.3%) patients where Nasal Septum was deviated to the right side followed by 17(44.7%) with left side deviation. There was a significant improvement in mean nasal obstruction symptoms evaluation postoperatively (71.2 versus 22.7 with p value equal to 0.01). According to the pre and postoperative photographs 17(44.7%) patients had good improvement, nine (23.6%) showed excellent improvement and the result was fair in six (15.7%) patients. **Conclusions:** Extracorporeal septoplasty is effective in improving both nasal airway function and aesthetics in patients with severe Nasal Septal deviation.

Key words: Deviated nose, Extracorporeal septoplasty, Rhinoplasty.

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INTRODUCTION

Deviated nose and anterior septal deviation are some of the challenging conditions. it gives functional and aesthetic problems to patients.[1] In some patients, the causes of nasal airway obstruction include narrow nasal valve and high septal deflection. It may be associated with a deviated nose and inferior turbinate hypertrophy. However, standard septoplasty is inadequate in such cases of severe anterior septal deviation.[2, 3] Furthermore, the septum in anterior septal deviation is often accompanied by a narrow valve angle, Rhinoplasty alone will not address the functional problem to patients.[4] Although, Inferior turbinoplasty with conventional septoplasty will improve nasal function but will not address aesthetic issues.[5] Additionally, Placement of spreader grafts has been well described, however, this technique alone does not address significant deviation of the anterior-caudal nasal septum.[6]

Extracorporeal septoplasty is a surgical technique for correcting a severely deviated nasal septum and also corrects the

aesthetic part of the nose. In such a situation it needs fixation of quadrangular cartilage and nasal bone (keystone area).[7]

Therefore, the procedure to modify extracorporeal septoplasty with keystone region fixing and to do osteotomy to correct nasal bone was planned. Through ECS, the entire septum must be detached, reshaped, and re-implanted back into its original position. It stabilizes by fixing quadrangular cartilage at the keystone region with nasal bone, and medial crura of upper lateral cartilage. It was also affixed in Maxilla's anterior spine through making a hole on it by use of nylon 5-0 suture.

The objective of this study was to evaluate the quality of life and to provide cosmetic and functional outcomes by modified extracorporeal septoplasty technique in anterior septal deviation and deviated nose.

MATERIALS AND METHODS

The study was conducted at Gandaki Medical College Teaching Hospital, Pokhara, from July 2017 to June 2019. This study was approved by the Institutional ethical committee (GMC IEC Ref No.01-03-2074). Patients of at least 18 years of age with symptoms of nasal obstruction since one-year duration and anterior nasal deviation on examination were included. We also looked at the status of external nose deviation and inferior turbinate hypertrophy. Patients with a history of active nasal disease, atrophic rhinitis were excluded from this study.

Consent was taken from all patients. Preoperative photographs (frontal view, lateral, and basal view) were taken from the patients (figure.1 A, B, C) and a Computerized tomography scan was done (Figure 2).

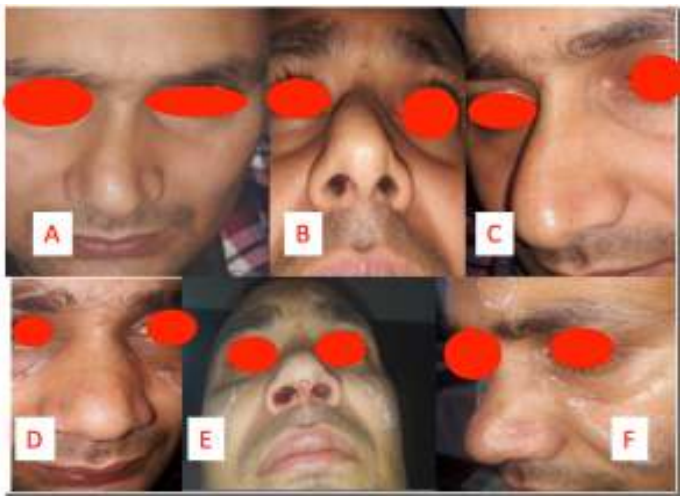

Fig 1: Preoperative evaluation of deviated nose A. Frontal B. Basal C. Lateral view Postoperative evaluation. D. frontal, E. Basal F. Lateral view

Fig 2: CT scan paranasal coronal view showing marked deviation of anterior septum toward right.

All the patients were treated with perioperative intravenous antibiotics. They were given ceftriaxone 1 to 2 gram or clindamycin 600 to 800 milligram, if the patient is allergic to penicillin, and administered according to the patient's body weight. Antibiotics therapy was continued postoperatively in prophylactic doses with cefpodoxime (Cepox) 200 milligram BD per day for one week.

Surgical Technique

Traditional septoplasty technique is inadequate in case of severe deviation of the nose and anterior nasal septum, because it cannot provide support to the lower two-third of the cartilaginous part of the nose. Removing this without appropriate reconstruction results in a nasal collapse.

The septum was exposed through the hemitransfixion incision. Flap was elevated from the concave side of deviated nasal septum by using hook and cautery rather than using Killian speculum. The caudal border of the quadrilateral cartilage was exposed by continuing dissection up to the nasal spine area (Figure 3A).

Fig 3: A. Deviated anterior septum, B. intraoperative pic 5-0 nylon fixed neoseptum in key stone area

The bilateral submucoperichondrial flap was elevated. The septum was freed from the caudal and dorsal border. The

entire quadrilateral cartilage was taken out and reconstructed into an L shaped frame or other desired framework and kept back into its position (Figure 4). Then it was stabilize by fixing it into two areas. First at the keystone region with nasal bone, medial crura of upper lateral cartilage above and Maxilla's anterior nasal spine below by 5-0 nylon suture (figure 3B)

Figure 4: A. L strut neoseptum, B. measuring of quadrangular cartilage.

Sometimes Spreader grafts were also prepared from the remaining nasal septum and are placed unilaterally or bilaterally, and fixed with the septum with horizontal mattress suture. Osteotomies (lateral, medial, intermediate, and superior) were given whenever required. Upper lateral cartilages were attached to the graft-septum complex. The mucoperichondrial flap was reposited. The columellar incision site was closed. Merocele pack was kept in both nasal cavities and the nasal cast was applied. The Merocele pack was removed after 72 hours. The nasal cast was removed after 7 days.

Patients who have inferior turbinate hypertrophy were treated with endoscopic turbinoplasty using cautery or microderider technique.

NOSE scale was used to assess disease-specific Quality Of Life (QOL) and is scaled from 0 to 100, with higher scores meaning more severe nasal obstruction.[8] Baseline Nose scores were obtained at the preoperative visit. Follow-up NOSE scores were obtained at the post-operative visit.

The NOSE scale is used to assess disease-specific Nose Score (Table 1)

0=not a problem

1= very mild problem

2 = moderate problem

3 = fairly bad problem

4 = severe problem

Table 1: Nasal obstruction symptom evaluation (NOSE) Score

Not a problem	Very mild problem	Moderate problem	Fairly bad problem	Severe problem
0	1	2	3	4
0	1	2	3	4
0	1	2	3	4
0	1	2	3	4
0	1	2	3	4

Assessment of deviation improvement was done by comparison between the preoperative and postoperative photographs. According to this, outcomes were classified as 0 = no change 1= fair, 2 = good, 3 = excellent

The subjective satisfaction of patients was classified as excellent, good, fair, or poor by the use of questionnaires answered at office visits or in telephone interviews by patients.

Post-operative histories were reviewed to assess complications including infection, post-operative deformity (for example, saddling or notching), recurrence of deviation, and loss of tip support or projection.

Statistical analysis

All data entered in the Excel spreadsheet. This data was fed into SPSS version 26. Percentage and mean were calculated by using frequency statistics. Disease-specific quality of life i.e. Nose score compared pre- and post-operative value by paired T-test.

RESULTS

This study includes 38 consecutive patients with deviated nasal septum, who also had nasal functional and aesthetic complaints, with an age range between 18 to 40 years. The mean age was 24.7 ± 6.26 years. 24 (63.2%) patients were below 25 years of age followed by 11(28.8%) between 26 to 35 years of age. Out of 38 patients, male predominated females with 24 (63.2%) and 14(36.8%), respectively. The male to female ratio was 1.7:1. Externally visible deviated nose found in 20(55.3%) cases. Anterior nasal septum was deviated to the right side in 21(55.3%) and left side in 17(44.7%) cases. Deviated nasal septum with anterior dislocation was found in 17(44.7%) cases. Inferior turbinate hypertrophy was found in 6(15.8%) and concha bullosa in 2(5.26%) of cases. Septorhinoplasty was done in 23 (60.5%) followed by septoplasty in 13(34.2%) as shown in Table 2.

Table 2: Types of extracorporeal septoplasty

Type of extracorporeal septoplasty	No. of cases (%)
Septorhinoplasty	20 (52.6)
Septoplasty	10 (26.3)
Septorhinoplasty &Turbinoplasty	3 (7.9)
Septoplasty with Turbinoplasty	3 (7.9)
Septoplasty with the removal of the lateral lamella of concha bullosa	2 (5.3)
Total	38 (100)

While comparing Pre and postoperative photographs of patients, 17(44.7%) were found to have good improvement, 9(23.6%) showed excellent improvement and 6(15.7%) showed a fair result. The anteroposterior photographic view was found to be better in the majority of the patients.

The patient satisfaction was excellent in 20 (52.6%) of patients, good in 12(31.8%), and fair in 6(15.8%) of patients.

NOSE scale was used to assess disease-specific QOL. The patient showed improvement in nasal function after extracorporeal septoplasty which was statistically significant (Table. 3)

Table 3: Preoperative and postoperative NOSE Score

	Mean	Standard Deviation	P-value
Pre-operative	71.2	7.7	0.001
Post-operative	22.7	6.1	

Out of 38 patients, 6 complained of pain at the tip of the nose. One patient had a wound infection. Saddling and recurrence were not seen during the follow-up period.

DISCUSSION

Correction of the severely deviated nasal septum with nasal airway obstruction and external deformity has been recognized for more than 50 years.[1] It is important to address each issue separately in case of anteriocaudal septal deviation to get aesthetic and functional results. This can be solved by extracorporeal septoplasty, rhinoplasty, and turbinoplasty. Numerous surgical techniques have been proposed for deviated nasal septum. Deviated bony pyramids can be corrected using several osteotomy methods. In severe deviation of Antero-caudal septal cartilage, extracorporeal septoplasty is effective.[9, 10]

Gubisch[11] had done more than 3000 extracorporeal septal reconstructions throughout the three-decade with minimal minor complications. We have to focus on both functional and aesthetic components of the nose; extracorporeal septoplasty with rhinoplasty addresses both components. For the functional purpose, any intranasal abnormality like inferior turbinate hypertrophy, the correction was done with inferior turbinoplasty

Septorhinoplasty is a better option for those patients with the most deviated external nose which we performed in 23 (60.5%) cases. According to this study, extracorporeal septorhinoplasty was the best choice for the severely deviated nose which was similarly found in the study by Gubisch et al.[12]

Technique wise it should be very meticulous. Hook and mac dyne cautery tip in a low cautery setting was used to give caudal incision. Flap was raised from the concave side of the deviated nasal septum. Fixing at anterior nasal spine and crest of the maxilla was utmost importance in decreasing the saddling of the nose. Nylon 5-0 suture was used for this purpose. Although permanent sutures, it has the theoretical risk of suture extrusion or infection. Permanent sutures are not affected by the local environment and generally maintain their position and the level of structural support.[13] The various modifications have been described like barber suturing for spreader graft [14] and anterior septal reconstruction.[2] All these modifications lead to decreased complications of the procedure.

We did not get any revision surgery in our study. This procedure can be carried out in situations where adequate craniocaudal septal cartilage is not available by harvesting rib cartilage. Nose score showed the subjective improvement of patients with statistically significant result as seen in one of the study.[10] The complication rate in our study was 1(2.6%). The patient developed wound infection. Matt and Mobly[15] also had complication in 2(4%) patients.

CONCLUSION.

Extracorporeal septoplasty is an important surgical option for the correction of the markedly deviated nasal septum. Rhinoplasty techniques can be implemented in the same setting. The fixation of neo septum in the nasal spine and dorsal border with upper lateral cartilage is essential. With these procedures, improvement of Quality of life along with the aesthetic and functional of the nose can be maintained.

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Age estimation based on appearance of pisiform bone in selected Nepalese children of Gandaki Province Nepal

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ABSTRACT

Background: Age estimation is based on general physical examination, radiological examination of bones and dental examination. The appearance of ossification center of pisiform bone is one of the important evidence for estimating age among young children between nine to 13 years. The objective of this study is to estimate the age of appearance of pisiform among the Nepalese children. **Materials and methods:** It is a cross sectional descriptive study conducted at the department of Radiology, Pokhara Academy of Health Sciences, Western Regional Hospital on the month of July 2020. The Antero posterior view of X Rays of either hand (left or right) including the carpal bones of the patients aged seven to 15 years of 183 Nepalese children archived at the department of Radiology were taken as samples. The X rays were checked for the appearance or non appearance of Pisiform and the age of appearance analysed. **Results:** One hundred and twenty seven (69.40%) of total 183 cases were males and 56 (30.60%) were females. The minimum age of appearance of pisiform was 9 years in females and 10 years in males. All the subjects had pisiform bone appeared at the age of 13 years and above. **Conclusion:** The minimum age of appearance of Pisiform in the study subjects was 9 years in females and 10 years in males. All the cases have pisiform ossified at the age of 13 years and above.

Key words: Age estimation, ossification center, Pisiform

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INTRODUCTION

The bones of the human skeleton are pre-formed in hyaline cartilage. This soft tissue model is gradually converted into hard osseous tissue by the development of osteogenesis, mostly from the center, from which the process of transformation spreads, until the whole skeleton is ossified. The appearance of such centres of ossification is spread over a long period of time. A large number are first seen in embryonic life, some appear much later in prenatal life, and others after birth. Some bones are ossified from a single center, for example, carpus and tarsus. Most bones are ossified from several separate centres, one of which appears near the middle of the future bone. This center is concerned with progressive ossification towards the bone ends. These terminal regions are ossified by separate centres, sometimes multiple; they are said to be secondary centres.[1]

There are variations in the age dependent changes and there may be maturity imbalance between bones from different parts of the same individual. There is only a central tendency with a normal range of variability and the variability increases with age. As a rule, the ageing

of bones is more accurate with respect to the appearance of centres of ossification, that is with respect to the union of epiphyses.[1]

In most of the countries, the proof of an individual being under or over the age of legal definition is needed for several legal decisions and proceedings. If there are any doubts about the age of individual, authorities and courts may request a medical age certificate issued by an expert.[2] In our setting, age reports are prepared mainly by forensic physicians, and they may consult radiologists and dentists as well.

Age estimation is based on general physical examination, radiological examination of bones and dental examination. The assessment of bone age is most commonly based on X-rays of the hand and wrist, which are compared to one of two different but similar reference atlases by Greulich and Pyle (GP)[3] and Tanner and Whitehouse (TW3).[4]

Pisiform is ossified at the age of nine to 13 years as evident from different studies.[5, 6] The appearance of ossification center of pisiform bone is one of the important evidence for estimating age among young children between nine to 13 years. The objective of this study is to estimate the age of appearance of pisiform among the Nepalese children. Our part of the world are also using the same data as used by other countries but we don't have enough researches in our part of world. Therefore, this study was deemed important for our context.

MATERIALS AND METHODS

The present cross sectional descriptive study was conducted at the department of Radiology, Pokhara Academy of Health Sciences, Western Regional Hospital. The duration of study was in the month of July 2020. We studied 183 digital X Rays of the hand archived in the department. Males comprised of 127 and females 56 cases for the study purpose. The age of the study participants were categorized in the range of one year. Separate analysis was done for males and females.

The Antero posterior view of X Rays of either hand (left or right) including the carpal bones of the patients aged seven to 15 years archived at the department of Radiology were taken as samples. The X rays were done for various surgical and orthopedic problems of the hand. There is provision of inclusion of name and age of the patients in the digital X rays which were retrieved for research proposes. As the study was conducted based on the review of records, the patients' information is not revealed and the consent was not required. Ethical approval was taken from the Institutional Review Committee of Pokhara Academy of Health Sciences.

Inclusion criteria: Nepalese Children in the age group of above seven to 15 years of both sexes were included in the study. Exclusion criteria: The X rays with obvious congenital and other skeletal abnormalities of the hand were excluded. The cases with fracture of carpal bones were also excluded from the study.

The X ray was read by a Radiologist for the appearance of pisiform. When the ossification center of pisiform was evident, it was categorized as "Appeared", and if there was no any evidence of the appearance in the X ray, it was categorized as "Not appeared".

The data was collected in a standard proforma. The proforma was validated by experts in the field of Radiology and Forensic Medicine and suggested changes were implemented. The interobserver reliability was checked. A total of 20 radiographs were reassessed by another radiologist without any knowledge of the scoring by earlier radiologist. To assess intra-observer reliability, 20 X rays were re-observed after a week. The data so obtained was entered in Microsoft Excel spreadsheet and further analysis was done using SPSS version 16.0. Descriptive statistics was used to determine mean and standard deviation. The appearance and non-appearance of the center of ossification was expressed in the form of frequency and percentage. Wilcoxon signed ranks test was performed to assess the difference of inter and intra examiner variability. P value of <0.05 was regarded significant.

RESULTS

The present study aimed to estimate age from appearance of ossification center of pisiform consisted of 183 X rays of hand of Nepalese children. The Wilcoxon signed ranks test showed no significant intra-observer and interobserver differences on evaluation of X rays. One hundred and twenty seven (69.40%) of them were males and 56 (30.60%) were females. Mean age was 11. 2022 years with standard deviation of 2.032. As there is difference in punishment depending upon the age of the culprit, a narrow range of age group was done. The distribution of age group and sex is represented in table 1.

Table 1: Distribution of age and sex of the participants

Age (Years)	Sex		Total n(%)
	Male	Female	
7-8	10	4	14 (7.65)
8-9	6	2	8 (4.37)
9-10	15	5	20 (10.93)
10-11	9	5	14 (7.65)
11-12	28	6	34 (18.58)
12-13	24	12	36 (19.67)
13-14	24	12	36 (19.67)
14-15	11	10	21 (11.47)
Total	127	56	183 (100)

Table 2 shows the age of appearance of Pisiform in males.

It is evident that the center of ossification of pisiform is not formed in male child up to the age of 10 years and it has started to appear in the children of above 10 years. It has appeared in all the children of age more than 13 years.

Table 2: Age of appearance of Pisiform in males

Age in years	Appeared Number (%)	Not appeared Number (%)	Total
7-8	0 (0)	10 (100)	10
8-9	0 (0)	6 (100)	6
9-10	0 (0)	15 (100)	15
10-11	3 (33.3)	6 (66.67)	9
11-12	5 (21.74)	23 (78.26)	28
12-13	14 (58.34)	10 (41.67)	24
13-14	24 (100)	0 (0)	24
14-15	11 (100)	0 (0)	11

Table 3 shows the age of appearance of Pisiform in females. It is evident that the center of ossification of pisiform is not formed in female child up to the age of nine years and it has started to appear in the children of above nine years. It has appeared in all the female children of age more than 13 years.

Table 3: Age of appearance of Pisiform in females

Age in years	Appeared Number (%)	Not appeared Number (%)	Total
7-8	0 (0)	4 (100)	4
8-9	0 (0)	2 (100)	2
9-10	2 (40)	3 (100)	5
10-11	3 (60)	2 (40)	5
11-12	3 (50)	3 (50)	6
12-13	6 (50)	6 (50)	12
13-14	12 (100)	0 (0)	12
14-15	10 (100)	0 (0)	10

DISCUSSION

This present study is aimed to estimate the time of appearance of ossification of Pisiform in Nepalese children. This will contribute to the existing literature and be useful for forensic age estimation targeted to the age group of nine to 14 years or so. Importantly the age of ossification of bones may differ in different population and hence data from different population has to be generated.

The age group of our interest has several medico legal importances. The outstanding importance of this age group in Nepal is presented in the table 4.[7, 8]

Table 4: Medico legal importance of age of 10 to 14 years in Nepal

Age	Importance	Relevant Law
Below 10 years	If a child below 10 years commits any act, it is not considered as an offence	National criminal code 2074, No 13
	No punishment is awarded to the person if at the time of committing the crime, the age is less than 10 years.	National criminal code 2074, No 45 (1)
	If the victim of rape is below 10 years, the punishment for the offender: imprisonment for 16 to 20 years	National criminal code 2074, No 219 (3)
Above 10 years	A person of age 10 years and above should not expose his or her genitals or perform any sexual activities at public except that require for medical or treatment purposes.	National criminal code, 2074: No 122
10 to 14 years	If the age is 10 to 14 years, if imprisonment is done, it should be for maximum six months or kept at reform homes for up to one year only.	National criminal code, 2074 No 45 (2)
	If the victim of rape is above 10 and below 14 years, the punishment for the offender: imprisonment for 14 to 16 years	National criminal code 2074, No 219 (3)
14 to 16 years	For a child of age 14 to 16 years, the punishment will be half as of the adults and for the child aged 16 to 18 years, it will be two thirds to that of adults.	National criminal code 2074 No 45 (2) and (3)
	If the victim of rape is above 14 and below 16 years, the punishment for the offender: imprisonment for 12 to 14 years	National criminal code 2074: No 219 (3)

Age estimation is based on the observation of multiple parameters. The age of ossification of Pisiform can also be an important evidence to supplement for the estimation of age at the range of 9 to 14 years from our observation at our setting. The hand – wrist region consists of numerous small bones which have a predictable and scheduled pattern of appearance of centers of ossification and union of epiphysis from birth to maturity. Hence, this region is one of the important parts to be examined for the proposes of age estimation.[9]

The usefulness of carpal bones in estimation of age has been demonstrated in other settings also.[10-15] Srivastav et al[6] carried out radiographic study on pediatric subjects of Rajasthan, India from birth to 12 years of age of both sexes. They observed that Pisiform was the last carpal bone to appear. It had appeared in age of 10 years and above in both sexes, which is comparable to our study.

As presented by Patil et al,[5] the minimum age of appearance of Pisiform was eight years in both sexes, in the children of Vijaypur, India. Although the proportion of females which had the appearance of the carpal bone at the age of eight to nine years was more than that of males. All the boys of age 12 to 13 years had appearance of the bone and all the girls of age 11 to 12 years had appearance of Pisiform. Overall, this study has shown that the Pisiform appears earlier in female than in male children. Our study has also shown that the minimum age for appearance of Pisiform is earlier in females

(nine to 10 years) than in males (10 to 11 years). Although the age to have all the children of both sexes to have pisiform bone appeared is more (13 to 14 years) in our study than in the Indian counterparts.[5, 6]

The delayed appearance of Pisiform in the study population could be related to genetic and environmental factors. It can also be attributed to biological inter-ethnic differences, so it can be a major bias in age estimation if database from different population is used. This is also an important trigger to conduct larger and inclusive population based study in our settings.

CONCLUSION

The minimum age of appearance of Pisiform in the study subjects was nine years in females and 10 years in males. All the cases have pisiform ossified at the age of 13 years and above. The information from the present findings can be used as an additional parameter for forensic age estimation in Nepal.

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Perceived risk, preventive behavior and enabling environment among health workers during COVID-19 pandemic in Nepal: an Online Survey

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ABSTRACT

Introduction: Perceived risk, preventive behavior and enabling environment play vital role to prevent COVID-19 transmission in health care settings. The study aimed to assess perceived risk, preventive behavior and enabling environment among healthcare workers of different cadre during COVID-19 pandemic in Nepal. **Methods:** A cross sectional online survey was conducted among 427 health workers from April 25 to June 10, 2020. A structured questionnaire was prepared in Google form. Perceived risk was measured using 10 items scale, value ranging from 10 to 50. Descriptive and inferential statistics were computed at 5% level of significance. Ethical approval was taken from Nepal Health Research Council. **Results:** Of total, 49.6% respondents were male; 38.4% were from government organizations and 48.0% were doctors. Mean perceived risk was 31.8, 32.8, 31.3 among doctors, nursing professionals and others respectively; and it did not have significant difference among them. However, significant differences were observed in different items of perceived risk across difference cadre of health workers. Most of the health workers reported practice of preventive behavior always or most of the time. Of total, 5.4% doctors and 6.9% other health workers reported they had sometimes access to soap and water. 11.7% doctors, 7.5% nursing professionals and 7.8% other health workers had sometimes access to hand sanitizer; 18.0% doctors, 10.4% nursing professionals and 12.1% other health workers had sometimes access to face mask. **Conclusion**: Perceived risk of COVID-19 was high, preventive behavior was satisfactory; but access to enabling environment was poor. Therefore, adequate attention should be given to ensure the availability of protective equipment at work place.

Key words: Enabling environment, health workers, perceived risk, preventive behavior.

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INTRODUCTION

The 2019 coronavirus disease (COVID-19) pandemic started from Wuhan, China has created a global immense threat to all people in the world[1]. The World Health Organization (WHO) confirmed the outbreak of a new coronavirus disease, COVID-19, as a public health emergency of international concern in January and considered it as a pandemic in March 2020.[2] The COVID 19 created challenges in all aspects of life including mental health and psychological resilience.[3,4] The emergence of the COVID-19 and its consequences has led to fears, worries, and anxiety among individuals worldwide.[5] Most of the health workers who work in the frontline against the COVID-19 pandemic are at increased risk of its infection, and perceive higher risk of transmission. Additionally, healthcare workers unfortunately are facing isolation, avoidance and neglect by their family or community owing to stigma or fear. This can make an already challenging situation far more difficult.[6,7]

COVID prevention at hospital and health care setting is associated with risk perception, adoption of public health preventive

practices and accessibility to the enabling environment for health workers to practice those behaviors.[6,7] Previous study reports that risk perception significantly associated with reported adoption of preventative health behaviors.[8] The risk perception of COVID-19 also differs significantly across populations and places, indicating that risk perception is potentially a significant factor of the pandemic and as it can influence the number of new positive cases.[9]

Adoption of preventive public health measures is most vital for prevention of COVID-19 in health care and community settings. The adoption of such behaviors is influenced by many factors such as knowledge of the facts, positive attitude toward the facts, availability and accessibility of basic facilities and equipment essential to practice them.[10] Government of Nepal has also envisioned ensuring adequate availability of personal protective gears to all health workers as per protocol.[11] In addition, perceived risk of the situation motivates willingness to adopt those measures.

A little information is known about perceived risk of COVID-19, adoption of public health preventive behaviors and enabling environment of the organization to adopt the behavior among the health workers of different cadre during the emergency of the COVID-19 Pandemic. Thus, assessment and quantification of such aspects is essential to prevent COVID-19 transmission at health care settings and to fight COVID-19 in long turn in the community. Therefore, the study aimed to assess perceived risk, preventive behavior and enabling environment among healthcare workers of different cadre during COVID-19 Pandemic in Nepal.

METHODS

Study design, setting and population: A cross sectional online survey was conducted among the health workers currently working in Nepal. The study is a part of a study entitled perceived risk of covid-19 and psychological distress among health workers during covid-19 pandemic in Nepal: an online survey. The information was collected from April 25 to June 10, 2020.

Sample size and sampling technique

Sample Size: Sample size was calculated based on the formula recommended by Naing et al. (2006), for the prevalence study.[12] where Z value at confidence interval 95% (Z) = 1.96, prevalence (p) = 0.50and permissible error (d)= 0.05 . Calculated sample size was 384. After adding non response rate of 10%, total sample size was 422. Through online survey, 432 samples were collected, 5 samples were excluded from analysis because they were not health workers or were not paid workers. A convenient sampling method was applied to select the respondents. Online survey questionnaire was sent to the respondents through email and social media (messenger, viber, whatsapp).

Measurement of variables: Age, sex, marital status, ethnicity, religion, educational level, number of family members, type of organizations involved, job cadre, department, years of work experience, current working province were assessed through structured questionnaire. Preventive practices of COVID-19 were asked in the past 14 days. Five questions were asked to assess enabling environments related to preventive behaviors. Perceived risk was measured using 10 items scale developed by Chong, et al, 2004 for SARS.[13] The participants indicated their level of agreement with the statements using a five-item Likert type scale such as "strongly disagree," "disagree," "neither agree nor disagree," "agree," and "strongly agree". The minimum score possible for each question is 1, and the maximum is 5. A total score was calculated by adding up each item score (ranging from 10 to 50) indicating the higher the score, the greater the risk perception of COVID-19. For the analysis purpose, "strongly disagree," "disagree," "neither agree nor disagree were grouped into one category and "agree," and "strongly agree" into another.

Data collection tool and techniques: Data was collected through Google forms using online survey questionnaire. Five preventive practices against COVID-19 in the past 14 days were included. They were: covering mouth when coughing and sneezing; washing hands immediately after coughing, rubbing nose, or sneezing; wearing mask regardless of the presence or absence of symptoms; washing hands before examining or touching patients; washing hands after touching contaminated objects. Enabling Environments were measured in term of adequate supply of appropriate personal protective equipment ; access to soap and water ; access to hand sanitizer ; access to face masks ; and emotional support from your organization to work against COVID-19. Options provided were always, most of the time, sometime, rarely, never. Perceived risk was measured using 10 items scale developed by Chong, et al, 2004 for SARS.[13]Link was sent to study population using email and social media. Google forms provide security and anonymity to respondents.

Data analysis: Statistical package for social science (SPSS) version 22.0 was used for data editing and data analysis. Descriptive and inferential statistics was computed. Chi-square test and Anova test were applied. The significance level was set at 5% for all analysis.

Ethical consideration: Ethical approval was taken from ethical review board of Nepal Health Research Council (Reference number 2191; ERB number 310/2020). Informed consent form was placed at the first page of the

online questionnaire form. Objective of the study, statement of confidentiality and autonomy was declared before starting the survey. Written digital consent was taken from participants prior to starting the survey. Health worker agreed to participate by ticking the agreed option could proceed to reply the questions included in the survey.

RESULTS

Almost half, (49.6%) respondents were male; 58.8% respondents were in the age group of 19 to 29 years; 63.5% were from nuclear family; and 92.0% were Hindu. Of the total respondents, 38.4% participants were from government organization and 29.7% were from medical college. Nearly half of the respondents (48.0%) were doctors and about one fourth (24.8%) were nursing professionals. Regarding education, 31.6% respondents had education bachelor or above (Table 1).

Table 1: Characteristics of the study population (n=427)

Characteristics	Number	Percentage (%)
Sex		
Male	212	49.6
Female	215	50.4
Age group (in years)		
19-29	248	58.1
30-39	143	33.5
≥40	31	7.2
Missing	5	1.2
Religion		
Hindu	393	92.0
Buddhist and others	34	8.0
Educational level		
Bachelor and below	292	68.4
Masters and above	135	31.6
Job cadre		
Doctors	205	48.0
Nursing professionals	106	24.8
Health assistant and axillary health workers	65	15.2
Laboratory workers	30	7.0
Pharmacy and public health workers	21	4.9
Types of organization		
Government	164	38.4
Medical College	127	29.7
Other non-governmental organization	136	31.9

Table 2 shows perceived risk of COVID-19 among different health workers of different job cadre. Majority of health workers of all cadre believed that their job was putting them at risk of COVID-19.Although the proportion of this belief was slightly higher among nursing professional, there was no statistically significant association among different group of health workers. More than half of the health workers felt more stress at work, and the level was not statistically significant among different job cadre. About 80% health workers in all cadres accepted the risk of caring for COVID-19 patients.

There was significant difference in the fear of falling ill with COVID-19 among type of health workers. Doctors and nurses had high proportion of reporting of fear of falling ill with COVID-19 (p=0.017). There was also significant difference in the feeling that they had little control over if they would get infected or not. Nursing professionals had high proportion of reporting the feeling that they had little control over if they would get infected or not (p=0.026). Similarly, there was also significant difference in their thinking they would be unlikely to survive if they got COVID-19 among different cadre of health workers (p<0.001). Nursing professionals had high proportion of reporting the thinking they would be unlikely to survive if they got COVID-19. In addition, 7.8% of doctors and 14.2% nursing professional also thought about resigning because of COVID; there was no significant difference in such feeling among difference cadre of health workers. Doctors had higher proportions of reporting fear that they would pass COVID on to others (72.2%); and there was significant difference in such feeling among difference cadre of health workers. Nursing professional had higher proportions of their family and friends were worried that they might get infected through them; however this reporting proportion did not significantly vary across difference cadre of health workers (Table 2).

Higher proportions of doctors reported that people avoid their family because of their job; and this reporting proportion significantly vary across difference cadre of health workers. Significant differences were observed in different items of perceived risk across difference cadre of health workers. However, there was no significant difference in mean risk which was 31.8 among doctors, 32.8 among nursing professional and 31.3 among other health workers (Table 2).

Table 3 shows the practices of preventive behavior among health workers during COVID-19 pandemic. Among health workers, 99.5% of doctors, 98.1% nursing professionals and 96.6% other health workers covered their mouth when coughing and sneezing.

Table 2: Perceived risk of COVID-19 among health workers of different cadres during COVID-19 pandemic

Item No.	Items of perceived risk	Doctors	Nursing professional	Other health workers	Chi-square value	P value
1	Believing that my job is putting me at great risk.					
	Strongly disagree/disagree/ neutral	59 (28.8)	25 (23.6)	38 (32.8)	2.292	0.318
	Agree/strongly agree	146 (71.2)	81 (76.4)	78 (67.2)		
2.	Feeling more stress at work					
	Strongly disagree/disagree/ neutral	84 (41.0)	41 (38.7)	55 (47.4)	1.958	0.376
	Agree/strongly agree	121 (59.0)	65 (61.3)	61 (52.6)		
3.	Accepting the risk of caring for COVID-19 patients					
	Strongly disagree/disagree/ neutral	35 (17.1)	21 (19.8)	25 (21.6)	1.032	0.597
	Agree/strongly agree	170 (82.9)	85 (80.2)	91 (78.4)		
4	**Afraid of falling ill with COVID-19**					
	Strongly disagree/disagree/ neutral	63 (30.7)	37 (34.9)	54 (46.6)	8.123	0.017
	Agree/strongly agree	142 (69.3)	69 (65.1)	62 (53.4)		
5.	Feeling I have little control over whether I will get infected or not					
	Strongly disagree/disagree/ neutral	74 (36.1)	24 (22.6)	44 (37.9)	7.269	0.026
	Agree/Strongly agree	131 (63.9)	82 (77.4)	72 (62.1)		
6	**I think I will be unlikely to survive if I am to get COVID**					
	Strongly disagree/disagree/ neutral	188 (91.7)	80 (75.5)	91 (78.4)	17.52	<0.001
	Agree/Strongly agree	17 (8.3)	26 (24.5)	25 (21.6)		
7	**I think about resigning because of COVID**					
	Strongly disagree/disagree/ neutral	189 (92.2)	91 (85.8)	100 (86.2)	4.135	0.127
	Agree/Strongly agree	16 (7.8)	15 (14.2)	16 (13.8)		
8	**I am afraid I will pass COVID on to others.**					
	Strongly disagree/disagree/ neutral	57 (27.8)	38 (35.8)	55 (47.4)	12.532	0.002
	Agree/Strongly agree	148 (72.2)	68 (64.2)	61 (52.6)		
9	**My family and friends are worried that they might get infected through me**					
	Strongly disagree/disagree/ neutral	73 (35.6)	27 (25.5)	45 (38.8)	4.863	0.088
	Agree/Strongly agree	132 (64.4)	79 (74.5)	71 (61.2)		
10.	**People avoid my family because of my work**					
	Strongly disagree/disagree/ neutral	171 (83.4)	77 (72.6)	81 (69.8)	9.283	0.010
	Agree/strongly agree	34 (16.6)	29 (27.4)	35 (30.2)		
		Mean (SD)	Mean (SD)	Mean (SD)	F value	
	Average perceived risk, (Range: 10 to 50)	31.8 (±5.55)	32.8 (±6.09)	31.3 (±6.95)	1.882	0.154

Similarly, 90.7% doctors, 93.4% nurses and 92.2% other health workers washed their hands immediately after coughing, rubbing nose, or sneezing. Regarding mask use, 94.1% of doctors, 95.3% nurses, and 94.0% other health workers reported that they wore mask most of the time regardless of the presence or absence of in last 14 days. In addition, 92.2% doctors, 97.2% nurses and 94.0% other health workers washed their hands before examining or touching patients/suspected always or most of the time. Almost all health workers of all cadres washed their hands after touching contaminated objects always or most of the time. None of the behaviors were significantly associated with difference cadre of health workers (P>0.05)

Table 3: Preventive behavior among health workers of different cadres during COVID-19 pandemic

S.N	Preventive behavior	Doctors	Nursing professional	Other health workers	Chi-square value	P value
		n (%)	n (%)	n (%)		
1	Covering mouth when coughing and sneezing					
	Always/most of the time	204 (99.5)	104 (98.1)	112 (96.6)	NA	NA
	Sometime/rarely/never	1 (0.5)	2 (1.9)	4 (3.4)		
2.	Washing hands immediately after coughing, rubbing nose, or sneezing					
	Always/most of the time	186 (90.7)	99 (93.4)	107 (92.2)	0.700	0.705
	Sometime/rarely/never	19 (9.3)	7 (6.6)	9 (7.8)		
3.	Wearing mask regardless of the presence or absence of symptoms					
	Always/Most of the time	193 (94.1)	101 (95.3)	109 (94.0)	0.222	0.895
	Sometime/rarely/never	12 (5.9)	5 (4.7)	7 (6.0)		
4.	Washing hands before examining or touching patients/suspected					
	Always/most of the time	189 (92.2)	103 (97.2)	109 (94.0)	3.02	0.220
	Sometime/rarely/never	16 (7.8)	3 (2.8)	7 (6.0)		
5.	Washing hands after touching contaminated objects					
	Always/Most of the time	203 (99.0)	106(100)	114 (98.3)	1.78	0.411
	Sometime/rarely/never	2 (1.0)	0 (0.0)	2 (1.7)		

Table 4 shows the enabling environment reported by health workers during COVID-19 pandemic. More than three fourth health workers of all cadre reported that supply of appropriate personal protective devices was rare or never when they were at work; and there was a significant association between the health workers' reporting about the availability of appropriate personal protective and health workers group. Only 5.4% doctors and 6.9% other health workers reported that they had sometimes access to soap and water when they need. None of the nursing professionals reported that they had access to soap and water when they need them. Similarly, 11.7% doctors, 7.5% nursing professionals and 7.8% other health workers reported that they had sometimes access to hand sanitizer when they

need them. Regarding mask, 18.0% doctors, 10.4% nursing professionals and 12.1% other health workers mentioned that they had sometimes access to face mask when they need them; there was a significant association between this reporting and health workers group. Similarly, 29.8% doctors, 24.5% nursing professionals and 24.1% other health workers reported that they sometimes got emotional support from the organization, there was a significant association between getting emotional support and health workers group (Table 4).

Table 4: Enabling environment reported by health workers of different cadre during COVID-19 pandemic

S.N	Enabling environment	CADRE OF HEALTH WORKERS: Doctors	Nursing professional	Other health workers	Chi-square value	P value
1.	Adequate supply of appropriate personal protective devices when you are at work					
	Sometimes	55 (26.8)	20 (18.9)	25 (21.6)	15.02	0.005
	Rarely	106 (51.7)	50 (47.2)	44 (37.9)		
	Never	44 (21.5)	36 (34.0)	47 (40.5)		
2.	Having access to soap and water when you need					
	Sometimes	11 (5.4)	0 (0.0)	8 (6.9)	NA	NA
	Rarely	62 (30.2)	18 (17.0)	24 (20.7)		
	Never	132 (64.4)0	88 (83.0)	84 (72.4)		
3.	Having access to hand sanitizer when you need it					
	Sometimes	24 (11.7)	8 (7.5)	9 (7.8)	6.713	0.152
	Rarely	81 (39.5)	31 (29.2)	41 (35.3)		
	Never	100 (48.8)	67 (63.2)	66 (56.9)		
4.	Having access to face mask when you need it					
	Sometimes	37 (18.0)	11 (10.4)	14 (12.1)	11.056	0.026
	Rarely	94 (45.9)	41 (38.7)	42 (36.2)		
	Never	74 (36.1)	54 (50.9)	60 (51.7)		
5.	Getting emotional support from your organization to work against COVID-19					
	Sometimes	61 (29.8)	26 (24.5)	28 (24.1)	14.751	0.005
	Rarely	93 (45.4)	36 (34.0)	38 (32.8)		
	Never	51 (24.9)	44 (41.5)	50 (43.1)		

DISCUSSION

The study revealed high perceived risk of COVID-19 and satisfactory preventive behavior among health workers of all cadres, and poor enabling environment at the organizations they worked. Mean risk perception level was found 31.8 among doctors, 32.8 among nursing professional and 31.3 among other health workers. The risk perception might influence the adoption of preventive public health measures and case management at the hospital and health care settings. It is reported that the spread of the COVID-19 is influenced by people's willingness to adopt preventive behaviors, which in turn are associated with risk perception of the diseases.[8] Study reports that risk perception of COVID-19 varies significantly across populations and places, indicating that risk perception is potentially a significant determinant of the pandemic evolution, as it can influence the number of new positive cases.[9]

In the study, five types of preventive practices were measured for last 14 days. Preventive measures were applied most of the time or always by more than 90% health workers during COVID-19 pandemic. For example, 99.5% of doctors, 98.1% nursing professionals and 96.6% other health workers covered their mouth when coughing and sneezing. A study conducted in Nepal reported that participants with a medical degree had statistically significant better practice against COVID 19 compared with the general population.[14] Health worker had good knowledge as compared to the previous study.[14] Similarly, majority of respondents had adequate knowledge and high-performance in preventive behaviors towards COVID-19.[15] It is also reported by a study conducted in Bangladesh that participants with adequate knowledge of COVID-19 had higher likelihood of good practices to prevent it.[16]

Most of the health workers of all cadre reported that accessibility of basic facilities such as soap and water, hand sanitizer, face mask was also very limited; 5.4% doctors and 6.9% other health workers agreed that they had sometimes access to soap and water when they need and none of the nursing professionals reported that they had access to soap and water when they need them. Regarding hand sanitizer, 11.7% doctors, 7.5% nursing professionals and 7.8% other health workers reported that they had sometimes access to hand sanitizer when they need them. Such situation may hamper the adoption of public health preventive behavior at the hospital and health care setting. In Health Sector Emergency Response Plan of COVID-19, government has provisioned ensuring adequate availability of personal protective gears to all health workers.[11] In addition, to fight for the COVID-19; another important aspect is providing emotional support to health workers. The study revealed

that only one fourth of the health workers agreed that they sometimes got emotional support from your organization, and there was a significant association between getting emotional support and health workers group. This might hamper the prevention and management of COVID-19 in long run in Nepal.

One of the limitations of the study is that, as there were a few studies reported regarding enabling environment and risk perception of COVID-19 in Nepal, we could not compare result with other similar findings. Second, number of cases ranged from 49 in April 25 to 4085 in June 10 including 15 deaths during the data collection period.[17] Therefore, this fact should be considered while interpreting the results. It is also found that initial emotional concerns and trust can play an essential role in improving the perceived risk of a pandemic and increasing public participation in adopting preventive measures.[18]

CONCLUSION

Mean perceived risk ranged from 31.3 to 32.8 out of 50 maximum among health workers. Most of the health workers of all cadre reported practice of preventive behavior most of the time in last 14 days preceding the survey. Enabling environment was found poor: very few health workers reported that they had sometimes access to soap and water; only about one in ten health workers had sometimes access to hand sanitizer; and 18.0% doctors, 10.4% nursing professionals and 12.1% other health workers had sometimes access to face mask when they need. Only one fourth of the health workers agreed that they sometimes got emotional support from your organization. Perceived risk of COVID-19 was high, preventive behavior was satisfactory; but access to enabling environment was poor. Adequate attention should be given to ensure availability of soap and water, sanitizer, masks and others to practice preventive behavior at work place.

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CONFLICT OF INTEREST

Authors declare no conflict of interest.

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Patterns of Dermatological manifestation in patients attending Pediatric outpatient department

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ABSTRACT

Background: Dermatological manifestations in children contribute to significant morbidity and psychological distress. Children with dermatological problems constitute a major bulk of the patients presenting to the Outpatient department. The study was conducted with an objective to find out the pattern of skin disease among the various pediatric age group. **Method:** We analyzed epidemiological data of 612 patients, aged 1 months to 15 years, who were referred to the Dermatology outpatient from the Pediatric outpatient between 2nd Baisakh 2075 to 31 Chaitra 2076. Demographic data and the frequency of the various diagnoses in various age groups were studied. **Result:** The most common category of diagnosis was infection in 35.78%, followed by allergic reaction in 33.50% and infestations in 14.22%, other dermatosis in 13.07%, while multiple diagnosis was found in 3.43%. Among all diagnostic groups, Scabies was the most common (14.22%) followed by Urticaria (11.92%). **Conclusion:** Comparison of the common dermatosis with the age group showed a strongly significant effect on occurrence of common dermatosis. Their incidence can be brought down by improving nutrition and personal hygiene of children. Health and wellness of school going children reflects the health status of a community. Our study provides a preliminary baseline data for future epidemiological and clinical research.

Keywords: Dermatology, infections, infestations, pediatrics

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INTRODUCTION

Of the total outpatients visit in pediatric facility more than 30% is contributed by dermatological manifestations.[1,2] Ethnic, socioeconomic, and environmental factors influence their incidence. Chronic skin diseases such as psoriasis, xeroderma pigmentosum, neurofibromatosis are a source of social stigmatization with widespread belief that these problems are contagious and related to impurities in the blood.[3] According to the Ministry of Health and population in Nepal, skin manifestations are the cause of morbidity with about 2,700,000 and 2,680,000 outpatient visits of skin disease in 2009 and 2010.[4] The prevalence of skin disease in children in Western Nepal was found to be at 13.46%.[5] The pattern of skin diseases is known to differ in different countries of the world and in different region in the country.[6] The aim of this study was to estimate the incidence rates of pediatric skin diseases in our region that can subsequently serve as reference material for future comparative studies.

METHODS

This was a retrospective study conducted in outpatient units of department of pediatrics at Gandaki Medical College Teaching Hospital, a tertiary care referral hospital situated in Pokhara Metropolitan of Gandaki Province of Nepal. The data from registry of the departments, was reviewed and data of the year 2075 Baisakh to Chaitra 2075 was collected after due ethical clearance from the Gandaki Medical College Institutional Review Committee. The collected data included all the patients visiting the pediatric OPD from the age of one month to 15 years who presented with dermatological disorder and further referred to the department of dermatology for diagnosis and management. The diagnosis was recorded in pediatric OPD. The patients below the age of 1 months were excluded due to the possibility of various birth marks and rashes occurring due to the birthing process and above 15 years of age were not seen in pediatric OPD.

The patients were grouped on basis of gender and into four age group categories as: Infants 1 to 12 months, toddler >1 to 3 years, preschool >3 to 6 years, school going >6 to 12 years and rest as others >12 to 15 years of age. The diagnosis made by the consultant Dermatologist in the department of dermatology was taken into account and the various diagnosis was grouped as infections, Infestations and others dermatosis. The data was analyzed for the demographic variables, and the various statistical tools applied by using SPSS version 25 for Mac (IBM Corp.).

RESULTS

During the period of one year, 612 children were examined for the first time in the department of pediatrics and hence referred to the department of dermatology. Six hundred and twelve patients with various diagnosis, consisted of males 321 (52.5%) and females 291 (47.5%).

Based on the age group, 73 were infants (11.93%), 134 were toddlers (21.90%), 54 were preschoolers (8.82%), 298 (48.69%) were school going and 53 (8.66%) were of the others age group category. Based on the geographical distribution, 404 were from urban area of inhabitance (66%), and 208 were from rural area of inhabitance (34%). Based on different ethnic groups, 154 were Brahmin (25.2%), 78 were Chettri (12.7%), 154 were Dalit (25.2%), 162 were Janajati (26.5), 4 were Muslim (0.7%), 44 were Newar (7.2%) and 16 were others (2.6%) including Marwari, Bengali, Jain.

Table 1 shows the type of dermatitis with the most common being infection (35.78%) followed by allergic reaction (33.5%), infestation (87), other dermatosis (13.07%) and multiple diagnosis (3.43%). The most common type of infection was Impetigo (Table 2). Table 3 shows the most common type of allergic reaction was urticaria (11.93%). The most common type of dermatitis among other dermatosis was acne (6.7%) (Table 4).

Figure 1 shows the distribution of various dermatosis based on age group. It can be seen that incidence of allergic reactions was most common in infants, followed by infestations and infections. While in the toddlers, allergic reaction was commonest followed by infection, infestation and other dermatosis. In the preschooler age, same pattern was observed except with increase in the incidence of infectious diseases. Among school going and others group of children, infectious disease was the most common followed by allergic reaction, other dermatosis and infestations.

Table 1: Spectrum of dermatosis

Type of diagnosis	Frequency (%)
Infection	219 (35.78)
Allergic Reaction	205 (33.50)
Infestation	87 (14.22)
Other Dermatosis	80 (13.07)
Multiple	21 (3.43)
Total	612 (100)

Table 2: Patient distribution based on different dermatosis (Infections)

Infections	Frequency (%)
Impetigo	21 (3.43)
Abscess	3 (0.49)
Balanitis	2 (0.33)
Cellulitis	2 (0.33)
Candidal Intertrigo	3 (0.49)
Chicken pox	41 (6.70)
Furuncle	3 (0.49)
Herpes Zoster	7 (1.14)
HFMD	19 (3.10)
Molluscum contagiosa	17 (2.78)
Omphalitis	1 (0.16)
Onchomycosis	4 (0.65)
P.alba	11 (1.80)
P. versicular	9 (1.47)
P. rosea	4 (0.65)
Pyoderma	2 (0.33)
T. cruris	13 (2.12)
T. manum	5 (0.82)
T. Pedis	15 (2.45)
T. Capitis	8 (1.31)
T. Corporis	15 (2.45)
T. incognito	4 (0.65)
Veruca plana	3 (0.49)
Veruca vulgaris	3 (0.49)
Vulvo vaginal candidiasis	2 (0.33)
Viral exanthoma	2 (0.33)
Total	219 (35.78)

Table 3: Patient distribution based on different dermatosis (Allergic reaction)

Allergic Reaction	Frequency (%)
Angioedema	6 (0.98)
Contact Dermatitis	41 (6.70)
Eczema	31 (5.07)
Palmo plantar Hypersensitivity	3 (0.49)
Pompholyx	1 (0.16)
Pruritis	5 (0.82)
Seborrheic Dermatitis	45 (7.35)
Urticaria	73 (11.93)
	205 (33.50)

Table 4: Patient distribution based of different dermatosis (Other)

Other Dermatoses	Frequency (%)
Acne	41 (6.70)
Alopecia areta	3 (0.49)
Chilblains	3 (0.49)
Eepidermal Naevus	2 (0.33)
Icthyosis	3 (0.49)
Milaria	5 (0.82)
Porphyria	1 (0.16)
Post inflammatory hyperpigmentation	2 (0.33)
Post inflammatory hypopigmentation	3 (0.49)
Psoriasis	3 (0.49)
Segmental nevus	3 (0.49)
SLE	1 (0.16)
Tuberous sclerosis	2 (0.33)
Vitiligo	8 (1.31)
Total	80

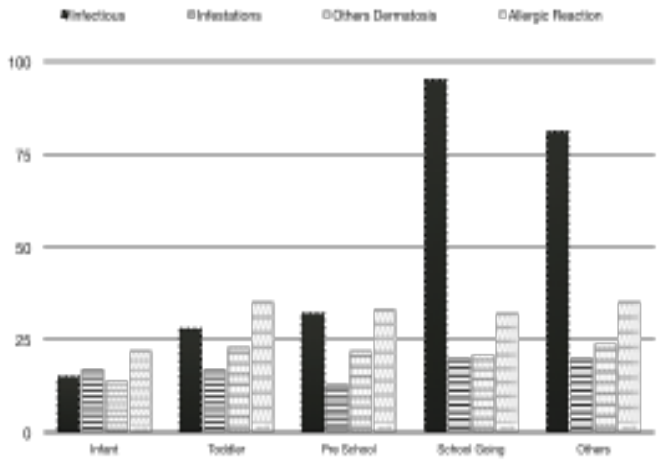

Figure 1: Distribution of various dermatosis based on age group

DISCUSSION

There is a huge gap of epidemiological data in pediatric dermatoses in our region. This retrospective study was done to find out the prevalence of different dermatological manifestations in the pediatric age group in a tertiary care hospital in Gandaki state of Nepal. We also tried to categorize the various diagnosis based on the age group of the pediatric population also.

Dermatological manifestations have been found to vary from one geographical location to another, one state to another and also among various socioeconomic classes of the individuals also. With the paucity of data in pediatric dermatosis, we have tried to compare our data with various studies done in and around Indian subcontinent as we have multiple similarities socially and culturally. The male : female ratio of 1.1 : 1 was found in our study. This corresponds with the findings of a similar study done in Western Nepal. [7] Among the infections the most common was Chicken pox (6.70%) followed by Impetigo n21 (3.43%) which also corresponds to a similar study.[8]

In the allergic reaction group of diagnosis the most common was dermatitis n86 (14.05%) followed by urticaria n73 (11.93%) and eczema n31 (5.07%) which was similar to results as found in other studies of the region.[8-12] The most common dermatological manifestation observed was comparable to western studies [13] rather than to south Asian studies[14], the derivation of majority of our patients were from the urban areas, which could have lead to the similar presentation as the study performed in Kathmandu Nepal.[8] Among all the diagnosis, infestations still made of a high frequency, scabies was found at n87(14.21%), as the population of our study consisted of both rural and urban population and from various socioeconomic classes, could be a reason for the higher incidence.

The prevalence of scabies ranged from 0·2% to 71·4%.[15] All regions except for Europe and the Middle East included populations with a prevalence greater than 10% which corresponds to findings of our study. The uncommon presentations of the pediatric population were also noted in our study, ie. tuberous sclerosis n2 (0.33%), alopecia areata n3 (0.49%) which was more common in pediatric females as presented by study,[16] SLE n1 (0.16%), porphyria n1 (0.16%) which was not found commonly among the various similar studies, and have a similar prevalence in international studies.[17]

Though in most of the studies, be it institution based or community based, the infections and infestations were the main group of dermatoses. The higher frequency of allergic reaction in our study could be due to the large urban population attending our hospital.

CONCLUSION

The present study undertaken shows that there is a higher

prevalence of infectious dermatological manifestations in the school going age, along with a high prevalence of infestations and allergic manifestations distributed throughout the age groups. Their incidence can be brought down by improving nutrition and personal hygiene of children. Health and wellness of school going children reflects the health status of a community. Our study provides a preliminary baseline data for future epidemiological and clinical research.

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A Study of Anatomical Shape of arch projected by Alveolar Process of Maxillary and Mandibular Bone

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ABSTRACT

Introduction: Maxilla and Mandible have an alveolar process that bears socket for root of teeth. When the teeth fall or gets extracted there is resorption of alveolar process. The teeth alignment determines the shape of alveolar process. The objectives of the study was to assess the distribution pattern of anatomical shape of arch projected by alveolar process in Maxilla and Mandible and to compare the anatomy of arch amongst the population of Aryan and Mongoloid communities. **Methodology:** A total number of 856 people with intact anatomy of alveolar arch were included in the study. Anatomy of alveolar arches were assessed and noted for all. The brass wire was contoured according the shape of alveolar arch of patients and the shape was observed and noted down. **Result:** The study result showed there was significant difference in frequency distribution of 'U', 'V' and 'Ovoid' shape alveolar arch form in maxilla and mandible. There was significant difference in distribution of 'U' and 'V' shape alveolar arch form in maxilla and 'U', 'V' and 'Ovoid' shape arch form in mandible between mongoloid and Aryan communities. **Conclusion: '**U'shape alveolar arch was seen more frequently in mandible where as "V" shape and 'Ovoid' shape arch in maxilla. 'U' shape alveolar arch was more frequently seen in Mongoloid communities and 'V' shape was more frequently seen in Aryan communities. There was no significant difference in comparison of frequency percentage of various types of arch form between the Male and Female.

Key words: Anatomy of alveolar arch, Aryan, Mongoloid

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INTRODUCTION

The alveolar process is that part of maxilla and mandible that forms and supports the sockets of teeth. The roots of teeth are suspended in the socket by the attachment of periodontal ligament. The joint between the alveolar socket and the root of teeth is called 'Gomphosis' which is fibrous joint. The alveolar bone is a projection from basal part of jaw to accommodate the roots of teeth. That is why it is called alveolar process. The curvilinear alignment of teeth confirms the anatomical shape of alveolar process which is known as 'alveolar arch'. Anatomy of alveolar arch deals with morphology of alveolar arch in terms of shape. It is an anthropometric study as the study is exploring the distribution of anatomical form of alveolar arch in population. The basic pattern of tooth position in the arch is the alveolar arch form. The curving structures are formed by a line described by the buccal surfaces or through the central grooves of the molars and bicuspids of the teeth in their normal position viewed from the incisal and occlusal aspect. The maxillary teeth are positioned on the maxilla, as are the mandibular teeth on the mandible in such a way as

to produce a curved "arch" when viewed from the occlusal surface.[1]

Anthropometrically anatomy of face and anatomy of alveolar arch can be related. Square or U-shape alveolar arch can be seen in brachy-facial people, tapered or V-shape in dolicho-facial where as elliptical or ovoid shape is seen in meso-facial people. It is the gene of an individual that determines the anatomy of his/her alveolar arch and facial form.

Rationale of the present study: There is no anthropometric study on anatomy of alveolar arch in population so far. Nepalese as well as global data banking is very poor on the subject thus the present study has been undertaken so as to contribute the Nepalese data base.

Importance of present study: Knowledge of alveolar arch forms present among Nepalese population will be useful for anatomists, forensic experts, anthropologists, orthodontists, prosthodontists, and manufacturer of orthodontic appliances. This information will not only highlight the pattern of various alveolar arch forms but also will enable researchers to work and explore the further opportunity in this field. The study will help develop strategies for control of abnormal arches, planning the treatment and implementation of preventive dento-facial orthopedic programmes.

OBJECTIVES

General Objective of Study: To Study of Anatomical Shape of arch projected by Alveolar Process of Maxillary and Mandibular Bone.

Specific objectives of study:

1. To assess the distribution pattern of anatomical shape of arch projected by alveolar process in Maxilla and Mandible.
2. To compare the anatomy of arch projected by alveolar process amongst the population of Aryan and Mongoloid communities.
3. To compare the anatomy of arch projected by alveolar process sex wise.

METHODS

The study was conducted in Kaski district of Nepal from December 2013 to May 2019. It was a cross-sectional study. Convenient non-probability sampling technique was adopted. All people coming to the health camps were studied. The study was conducted at health camps at various places of Kaski District like Tarkang, Bhadaure, Riwan, Ghachowk, Armala, Lwang Ghalel, Ghandruk, Dhampus, Taprang and Siklesh village development committees at various period of time from December 2013 to May 2019. It included various communities of Aryan and Mongoloid communities (like Brahmin and Chhetri belonging to Aryan communities as well as Gurung and Magar belonging to Mongoloid communities). A total number of 1000 people of those communities were included in the study, out of which 143 subjects were excluded because they could not meet the inclusion criteria. Thus, total valid sample number was 857.

Inclusion criteria

All the measurements for this study were collected from people having intact anatomy of alveolar arch from Aryan and Mongoloid communities like Brahmin, Chhetri, Gurung and Magar communities residing in Kaski district of Nepal. Such people were with history of no teeth extractions and without severe decay of teeth. There was possibility of mixing of genes in persons born to parents who had intercast marriage and such mixed gene results imperfect characters for specific community in anthropology thus they were avoided in study.

Exclusion criteria: People with growth disorders or having trauma on facial region or belonging to intermingling communities (i.e. people whose parents and grand- parents had inter-cast marriage) were excluded. People with history of teeth extractions and with severe decayed of teeth were also excluded as such conditions affect the anatomy of alveolar arch.

Reliability and validity of research: Adequate sample size, adaptation of proper research methodology, due care given during data collection and entry, correct use of statistical tests etc enhanced the reliability and validity of present study. For the sake of good reliability and validity of research, single observer assessed the anatomy of alveolar arch in all subjects.

Evaluation of alveolar arch form: The brass wire was contoured according the shape of alveolar arch of patients into the oral cavity and the shape of brass wire was observed and noted down. (figures 1, 2, and 3)

Instruments and Materials: The brass wires were used. They were highly flexible and easily can be contoured according to shape of alveolar arch.

Some operational definitions used in present research study are:

Alveolar arch: It is the arch projected by alveolar process of maxillary and mandibular bone. **Shape of alveolar arch:** It is the morphological contour of alveolar arch. **Statistical design and analysis**

The collected data was entered into computer using microsoft windows' access software and after purification of data,

analysis was done into SPSS (Statistical Package for Social Sciences) version 16: 00 software. Frequency, proportion and percentage was calculated to summarize the collected information. "Chi-square" statistical tests were used to test the significance of the variables depending upon the nature of data collected. Evidence based conclusions were drawn from the study-based results. For the data quality control during present research study, measures taken were adopting correct method of data collection; screening and verifying the collected data; selecting appropriate computer software; coding and entering the data into computer and recheck it; processing the data; constructing a data base for data management and appropriate data analysis and review over it.

Figure 1: Contouring brass wire according to shape of alveolar arch of mandibular bone.

Figure 2: Contouring brass wire according to shape of alveolar arch of maxillary bone.

Figure 3: Contoured brass wire according to shape of alveolar arch.

RESULT

One thousand subjects were studied for this study. Out of which 143 subjects were excluded because they could not meet the inclusion criteria. Thus, total valid sample number was 857. The sex, age, and community wise distribution is given in Table 1 and Table 2. Table 3 shows there was significant difference in frequency distribution of 'U', 'V'and 'Ovoid' shape alveolar arch form in maxilla and mandible. 'U' shape alveolar arch was seen more frequently in mandible where as "V" shape and 'Ovoid' shape arch in maxilla. Table 4 shows the frequency percentage of various types of arch form in various communities (n=857).

Table 5 reveals there was significant difference in distribution of 'U' and 'V' shape alveolar arch form in maxilla and in mandible between Mongoloid (Gurung and Magar) and Aryan (Brahmin and Chhetri) communities. 'U' shape alveolar arch was more frequently seen in Mongoloid communities and 'V' shape was more frequently seen in Aryan communities. Table 6 shows there was no significant difference in comparison of frequency percentage of various types of arch form between the Male and Female.

Table 1: Distribution of valid subjects sex wise:

Sex	Frequency (%)
Male	429 (50.05)
Female	428 (49.95)
Total	857 (100)

Table 2: Distribution of valid subjects community wise:

Communities	Communities	Frequency (%)
Aryan race(n=425)	Brahmin	201 (23.4)
	Chhetri	224 (26.2)
Mongolian race(n=432)	Magar	208 (24.2)
	Gurung	224 (26.2)
	Total	857 (100)

Table 3: Comparison of frequency distribution of types of alveolar arch form in the population (n=857)

Arch	"U"	"V"	"Ovoid"
Upper or Maxillary alveolar arch	19% (n=163)	23% (n=197)	58% (n=497)
Lower or Mandibular alveolar arch	60% (n=514)	10% (n=86)	30% (n=257)
P value	0.01	0.04	0.03

(Statistically significant, $p<0.05$)

Table 4: Frequency percentage of various types of arch form in the various communities:(n=857)

	Arch types	Brahmin	Chhetri	Magar	Gurung
Upper or Maxillary alveolar arch	"U"	12% (n=24)	11.5% (n=26)	31.5% (n=66)	33% (n=74)
	"V"	28.5% (n=57)	28.5% (n=64)	13.5% (n=28)	12.5% (n=28)
	"Ovoid"	59.5% (n=120)	60% (n=134)	55% (n=114)	54.5% (n=122
Lower or Mandibular alveolar arch	"U"	52% (n=104)	49.4% (n=110)	78.6% (n=163)	78.3% (n=175)
	" V"	29.3% (n=59)	32% (n=72)	8.2% (n=18)	11% (n=25)
	"Ovoid"	18.7% (n=38)	18.6% (n=42)	13.2% (n=27)	10.7% (n=24)

Table 5: Comparison of frequency percentage of various types of arch form in between the Aryan and Mongoloid communities:(n=857)

	Arch types	Aryan (n=425)	Mongoloid (n=432)	P value
Upper or Maxillary alveolar arch	"U"	11.7% (n=50)	32.4% (n=140)	0.03
	"V"	28.4% (n=121)	13% (n=56)	0.04
	"Ovoid"	59.7% (n=254)	54.6% (n=236)	0.08
Lower or Mandibular alveolar arch	"U"	50.3% (n=214)	78.2% (n=338)	0.02
	" V"	30.8% (n=131)	10% (n=43)	0.03
	"Ovoid"	18.8% (n=80)	11.8% (n=51)	0.07

(statistically significant, p<0.05)

Table 6: Comparison of frequency percentage of various types of arch form in between the Male and Female:(n=857)

	Arch types	Male (n=429)	Female (n=428)	P value
Upper or Maxillary alveolar arch	"U"	19.3% (n=83)	18.6% (n=80)	0.09
	"V"	22.6% (n=97)	23.3% (n=100)	0.09
	"Ovoid"	58.0% (n=249)	57.9% (n=248)	1.00
Lower or Mandibular alveolar arch	"U"	59.6% (n=256)	60.2% (n=258)	0.09
	" V"	10.7% (n=46)	9.3% (n=40)	0.08
	"Ovoid"	29.6% (n=127)	30.3% (n=130)	0.09

(Statistically significant, p<0.05)

DISCUSSION

There is great variation among human alveolar arch form. A persistent search for the ideal arch form is still going on. There has been a different technique for its individualization. However, there is still no characteristic forms for the human alveolar arch.[2] Different investigators have classified the alveolar arch shape in different way such as**:** Nakatsuka M *et al.* classified as round, round-V, round square, square-shaped arches.[3] But Nojima et al.[4] classified alveolar arch shape as square, ovoid and tapered. In this study it was observed that 60% of the upper arch were ovoid, 22.5% "V" shape, 17.5% "U" shape while in the lower arch, 62.5% were "U"shape, 25% were ovoid and 12.5% were "V" shape. Izard found the distribution of alveolar arch as ellipse 75%, parabola 20%, U-square shape 5%. He also noticed that maxilla was more elliptical and mandible was parabolic.[5] De Castro LA et al. [6] observed that in maxilla, 68.6% was round upper arch and 31.4% was triangular upper arch was 31.4% but in mandible, U shape lower arch was 92% and square shape lower arch was 8%. However there are other factors also which influence the alveolar arch shape like thumb sucking, tongue thrusting which results in narrow-V shaped maxillary alveolar arch. Subjects having conditions like obstructive sleep apnea also have narrower more tapered and shorter maxillary alveolar arch. Facial form also determines the alveolar arch form like dolico_cephalic person has long narrow face and narrow alveolar arch while brachycephalic person has broad short face and broad round alveolar arch and mesocephalic person has average face with parabolic alveolar arch form.

There was also racial variation in distribution of alveolar arch form as revealed by present study, There was significant difference in distribution of 'U' and 'V' shape alveolar arch form in maxilla and U', 'V' and Ovoid shape alveolar arch form in mandible between mongoloid and Aryan communities. 'U' shape alveolar arch was more frequently seen in Mongoloid communities and 'V' shape was more frequently seen in Aryan communities. There was no significant difference in distribution of various types of arch form between the Male and Female. This finding is significant for anthropologists and forensic experts.

LIMITATIONS OF STUDY:

The study was conducted only in kaski district with sample size of eight hundred and fifty seven which may not represent entire population. Such type of studies should be carried out in various places and meta-analysis of all those studies should be done in future.

CONCLUSION

There was significant difference in frequency distribution

of 'U','V'and 'Ovoid'shape alveolar arch form in maxilla and mandible. 'U'shape alveolar arch was seen more frequently in mandible where as "V" shape and 'Ovoid' shape arch in maxilla. There was significant difference in distribution of 'U' and 'V' shape alveolar arch form in maxilla and in mandible between Mongoloid and Aryan communities. 'U' shape alveolar arch was more frequently seen in Mongoloid communities and 'V' shape was more frequently seen in Aryan communities. There was no significant difference in comparison of frequency percentage of various types of arch form between the Male and Female.

Conflict of interest: None

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Clinical profile of end stage renal disease in patients on maintenance haemodialysis in a tertiary hospital

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ABSTRACT

Introduction and Objectives: Chronic kidney disease is an increasing health problem worldwide and the burden of such patients is increasing in developing countries like Nepal as well. The final treatment for End Stage Renal Disease is only renal replacement therapy. The objective was to study the demographic and clinical profile of patients with End Stage Renal Disease undergoing haemodialysis. **Methods:** This was a prospective, observational study carried out in a tertiary hospital after obtaining ethical consent from the Institutional Review Board. The study period was from June 1st to August 31st, 2019. Thirty seven patients, older than 15 years who were on maintenance haemodialysis on regular basis in the hospital for at least 3 months were selected for the study. Patient's records were used for the data collection as well as direct questionnaire to the patients on follow up for routine haemodialysis. Data were entered into Statistical Package for the Social Sciences 21 and descriptive analysis was done. **Results:** Twenty-six patients were under 50 years with male: female ratio of 1.64:1. Mean duration of haemodialysis of patients was 3.82 years. Most common cause for end stage renal disease was hypertension followed by idiopathic cause. Anaemia and hypocalcaemia were found to be the common complications associated with the patients. **Conclusions:** Prevention and early treatment may be the key to decrease the incidence of chronic kidney disease patients and also halt the progression to End stage renal disease.

Keywords: anaemia, chronic kidney disease, diabetes mellitus, haemodialysis, hypertension

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INTRODUCTION

End-stage renal disease represents a stage of Chronic Kidney Disease (CKD)where the accumulation of toxins, fluid, and electrolytes normally excreted by the kidneys leads to death unless the toxins are removed by renal replacement therapy, using dialysis or kidney transplantation.[1] The incidence of End Stage Renal Disease (ESRD) patients in USA is projected to increase by 29% to 68% to between 971,000 and 1,259,000 in 2030.[2]

There is wide geographic variation in the cause of kidney disease. In developed countries, hypertension and diabetes are the most frequent causes of CKD, especially in the elderly. Specialized diagnostic testing, such as kidney biopsy or invasive imaging studies are performed only when it is essential to confirm some diagnoses and the benefits justify the risks and cost. It is anticipated that cause of disease will not be known with certainty for many patients with CKD but can be either inferred or not known.[3]

Studies have been carried out in Nepal,[4] however limited in number in this part of Nepal. Hence this study was carried out

to assess the demographic and clinical profile of patients undergoing haemodialysis. The objective of this study was to assess the demographic and clinical profile of patients with ESRD undergoing haemodialysis.

MATERIALS AND METHODS

This was a prospective observational study conducted in the haemodialysis unit of medicine department of Gandaki Medical College Teaching Hospital and Research Center over a period of three months from June 1st to August 31st, 2019. Convenient sampling method was used and included all ESRD patients undergoing haemodialysis in the hospital unit for at least three months periods. Data collection was started after taking ethical approval from the institutional review committee. Data were collected after taking written informed consent from the patients as per the proforma. The Proforma included socio-demographic characteristics, details of haemodialysis and laboratory parameters. The data were analysed using Statistical Package for Social Sciences (SPSS) software and descriptive analysis was done and expressed as percentages, ratios and mean values.

RESULTS

Most (26) of the patients were under 50 years with range from 22 to 67 years. Male: female ratio of 1.64:1. Mean duration of haemodialysis of patients was 3.82 ±1.84 years. (Table 1)

Table 1: Age and sex distribution of ESRD N=37

Age group	Male n (%)	Female n (%)	n (%)
21- 30	2 (5.4)	1 (2.7)	3 (8.1)
31-40	9 (24.3)	5 (13.5)	14 (37.8)
41-50	2 (5.4)	7 (18.9)	9 (24.3)
51-60	6 (16.2)	1 (2.7)	7 (18.9)
61-70	4 (10.8)	0	4 (10.8)
Total	23 (62.2)	14 (37.8)	
Mean Age: 44.95 (S.D=10.93)			

Table 2. Causes of CKD N=37

Cause of CKD	Number
Hypertension	19
Diabetes Mellitus	3
Chronic Glomerulonephritis	2
Obstructive	2
Unknown	11

Most common cause for end stage renal disease was hypertension (19) followed by diabetes mellitus. However approximately one-third (11) of the patients hadn't an established cause which may be due to late presentation to the tertiary hospital or due to delay in seeking treatment at an early CKD stage. (Table 2)

The mean haemoglobin level was 8.5 gm%. Large variation in the levels of haemoglobin, phosphate and potassium were also observed. (Table 3)

Table 3: Lab parameters N=37

Lab Values	Mean	S.D	Minimum	Maximum
Haemoglobin (gm %)	8.5	1.5	5.4	11.3
Sodium(mmol/L)	138	3	131	146
Potassium (mmol/L)	5.1	0.89	3.3	7.5
Phosphate (mg/dL)	4	1.1	2.0	8.8
Uric acid (mmol/L)	0.29	0.07	0.12	0.52
Calcium (mmol/L)	2.1	0.14	1.6	2.4

Anaemia and hypocalcaemia were found to be the common complications associated with the patients. (Table 4)

Table 4: Complications/Electrolyte disturbances in ESRD cases N=37

Complications	Number
Anaemia	37
Hypocalcaemia	23
Hyperkalaemia	10
Hyponatremia	5
Hyperuricemia	2
Hyperphosphatemia	3

DISCUSSION

Out of 37 patients in the study, 23 patients were male which were similar to the study done in Nepal Medical College in 2008 A.D.[5] This is also similar to the study done in India by Sandip et al. in 2017 A.D.[6] A study done in Iran in 2009 A.D also had male majority in presentation.[7] This shows that male are frequently seeking treatment facilities for their problems and females may be neglected for the treatment purpose.

The variation in age presentation of ESRD patients to the hospital is an alarming sign. Presentation of ESRD at age low as 22 years is a challenging issue to the health system of Nepal. Three-fourths of the patients on haemodialysis were under 50 years of age is a key message that the productive age-group are affected by CKD and needs early attention and prevention measures to prevent progression to CKD and eventually to ESRD and replacement therapy. This finding is similar to other studies done in India, Iran, Cameroon and

Nepal.[5-8] A systemic review analysing the epidemiology of CKD in sub-Saharan Africa revealed mean age of 37 years.[9] This is different to the studies done in different states of United States of America (USA) where the mean age of presentation was above 62 years.[10-12] The variation in age of presentation is likely a reflection of health status, health availability and accessibility in different regions of the world.

Mean duration of haemodialysis suggests that patients were on regular haemodialysis; however, comparison or longer duration of study would provide us with more findings related to follow-up and complications too. This was similar to the study done in Iran.[7]

This study showed hypertension as a leading casus of ESRD which is similar to the study done in Kathmandu.[5] The study done in Cameroon also showed similar finding.[8] Due to the availability of haemodialysis as free treatment under the Government of Nepal throughout the country, more and more patients who previously couldn't afford haemodialysis are getting this service. As of late presentation most are hypertensive at time of presentation with hypertensive organ damages. Second to hypertension, most had unknown cause. This is similar to the study done in Kathmandu where idiopathic was the third most common cause of ESRD.[5] Late presentation to a tertiary care center, the unavailability of nephrologists throughout the country and unavailability of standard lab for processing the sample could have overestimated idiopathic as a cause for ESRD. This finding is also similar to the study done in India.[6] Diabetes mellitus was the third most common cause reported. These findings show that prevention, early diagnosis and regular treatment of hypertension and diabetes mellitus can halt the progression to CKD and eventually to ESRD. Hence government of Nepal should give more focus on prevention and basic treatment availability and accessibility to the Nepalese people.

Anaemia is one of the complications frequently encountered in ESRD patients. Anaemia is caused by multifactorial factors and its correction can help to cause decrease in morbidity and mortality. This study showed that all patients had anaemia. This is similar to the study in Kathmandu in which 85% were anaemic.[5] The cause is that anaemia of CKD is multifactorial and its correction needs use of different therapies.[13] However due to cost issues, patients can't afford such therapy regularly. Most patients rely more on blood transfusion for anaemia correction.

Electrolyte disturbances were not seen in majority of the patients. This is inconsistent with the findings in other studies.[6] This is likely due to regular haemodialysis as advised, regular follow-up and doing as per the advice by the doctors. Hyperkalaemia was seen in more cases as compared to hyponatremia possibly due to dependence on blood transfusion for correction of anaemia. Other possible reasons could be not strictly adhering to the dietary advices.

Mineral and bone disorders are also common complications seen in ESRD patients.[14] Hypocalcaemia was also a common finding in the patients. Dietary pattern and medical therapy are measures to correct hypocalcaemia. Financial constraints may have a role in this. It would have been better if there was availability of other biochemical parameters like Parathyroid hormone.

The limitations of this study are that the sample size was small. Multicentre study could have added more value to its findings.

CONCLUSIONS

Timely diagnosis of known risk factors of CKD mainly hypertension and diabetes mellitus and their early and prompt treatment can halt the progress of patients to ESRD stage. Besides, timely referral of patients with unexplained cause for CKD can provide the patient with better options for treatment.

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Clinical and laboratory profile of dengue fever in children from a tertiary care centre of Gandaki Province, Nepal

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ABSTRACT

Introduction: Dengue, the arthropod borne viral disease is serious public health problem in Nepal. The clinical diagnosis of dengue has become challenging in children as it is presented with nonspecific symptoms. The objective of present study was to assess different clinical presentations and outcomes of dengue fever in tertiary care centre. **Methods:** A record based observational cross-sectional study was carried out on all dengue positive patients of aged 11 months to 15 years presented in Gandaki Medical College from July to November 2019. Total 74 patients with history of fever with dengue seropositive were included in the study. All the clinical and haematological findings were recorded in semi-structured questionnaire form. **Results:** Of 74 patients 40 (54.1%) males and 34 (45.9%) were females. Fifty-one (68.9%) were cases of dengue without warning sign, 18 (24.3%) were dengue with warning signs and 5(6.8%) cases had severe dengue symptoms. Most of the patients (78.38%) were from Kaski district. Fever (100%) was the most common clinical presentation followed by headache (36.5%), vomiting (25.7%), and retro orbital pain (20.3%). Common laboratory findings included thrombocytopenia (59.4%) and leukopenia (35.1%). Among 74 cases, 68 were in stable condition and treated in OPD or in ward, and 6 were admitted in ICU of which one developed warning signs and other 5 had severe dengue. All the enrolled children recovered well and there was no mortality during this period. **Conclusions:** Fever, headache, vomiting, thrombocytopenia and leukopenia were most common presentation of dengue fever among children. Appropriate clinico-laboratory diagnosis and management is relatively simple, inexpensive and very effective in saving lives as long as correct and timely interventions are instituted.

Keywords: Severe dengue; Thrombocytopenia; Warning signs; WHO.

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INTRODUCTION

Dengue fever is the most common arboviral febrile illness caused by flavivirus of four serotypes: DENV-1, DENV-2, DENV-3 and DENV-4.[1] The spread of dengue is attributed to expanding geographic distribution of four dengue virus and their mosquito vectors predominantly by Aedes mosquito.[2] The global prevalence of Dengue fever has grown dramatically in recent decades and outbreaks been reported from both developed and developing countries that is now classified as major health threat by WHO.[3] WHO currently estimates 50 million cases of dengue infection worldwide every year. An estimated 500,00 cases are severe dengue infection require hospitalization each year, of which very large population are children. The WHO revised the guidelines for dengue disease classification in 2009 as Dengue without warning signs, Dengue with warning signs and Severe Dengue.[3]

DENV occurs in tropical and subtropical region worldwide with Asia always remaining as high endemicity.[3, 4] Nepal being

surrounded by the India and China, the dengue endemic countries [5, 6] reported the first case of dengue disease in 2004.[7,8] Major outbreaks occurred in 2010 with 917 cases and in 2013 with 683 cases and in 2016 with 1473 cases.[8-10] Since then the sporadic cases and the outbreaks suggestive of dengue fever illness is seen in Nepal from time to time. Dengue cases were initially reported from lowlands of southern Terai Nepal and has now expanded to urban highlands of Nepal like Kathmandu and Pokhara.[11]

Dengue fever is the self-limited disease but the mortality in severe dengue is as high as 20-30% if left untreated.[3] Early recognition, careful monitoring and appropriate fluid therapy has resulted in reduction of case fatality with excellent outcome. The aim of our study was to assess clinical and laboratory profile and outcome of dengue cases in tertiary care centre of hilly region of Western Nepal for strategic alteration of public health programs.

METHODS

This was a record based observational study carried out in Paediatric department of Gandaki Medical College Teaching Hospital, tertiary centre. Seventy-four complete medical records of all laboratory confirmed dengue cases who were presented or admitted in Gandaki Medical College from 1st July 2019 to 30th November 2019 were retrieved. The clinical features with NS1 positive and/or IgM positive were labelled as Dengue confirmed. WHO classification and case definitions were used to classify the disease as Dengue without warning signs, Dengue with warning signs and Severe Dengue.[3] Patients' demography, signs and symptoms, findings of laboratory investigation like complete blood counts, serum electrolytes, Liver function test, Renal function test, USG abdomen and pelvis, Chest x-ray recorded in semi structured questionnaire forms. BeneSphera Dengue NS1 and IgG/IgM rapid card test (lateral flow) kit was used for serology. Statistical analysis was done using SPSS 25. Descriptive analysis is expressed as numbers and percentage in tables. Median is calculated for quantitative variable (age).

RESULTS

Total number of cases was 74, the minimum and maximum age of our respondent were 11 months and 15 years respectively with median age 10 years. Among the patients of Dengue Without Warning Signs, more than one-third (37.3%) were from age group 8 to 11 years whereas 44.5 % of patient of age group 12 years and more had Dengue With Warning Signs. Forty percent of patients with Severe Dengue were from age 8 to 11 years. The classification of dengue with gender distribution is shown in table 1.

Table: 1 **Classification of Dengue cases with gender**

Classification of Dengue	Male n (%)	Female n (%)	Total n (%)
Dengue without warning sign	26 (51)	25 (49)	51 (68.9)
Dengue with warning sign	10 (55.6)	8 (44.4)	18 (24.3)
Severe dengue	4 (80)	1(20)	5 (6.8)
Total	40 (54.1)	34 (45.9)	74 (100)

Fifty-nine patients out of 74 were admitted in hospital. Out of them, 53(89.2%) were admitted in ward and 6 (10.2%) were admitted in ICU where 5 were Severe dengue and 1 was dengue with warning signs.

Place distribution

Most of the dengue cases were from Kaski district of ward no.9 followed by Tanahun, Syangja as shown below in the table 2.

Table 2: Place distribution of the Dengue cases

District	Number	Percentage
Kaski	58	78.38
Tanahun	11	14.88
Syangja	3	4.05
Baglung	2	2.70
Total	74	100

As the cases were more from ward no. 9 from Pokhara, effective program for preventive measures can be launched and enhance the knowledge of dengue among the population residing in these areas.

Clinical findings of dengue in children

Fever was present in all (100%) the patients with headache (36.5%), vomiting (25.7%), and retro orbital pain (20.3%) being the common symptoms of dengue in children as shown in Table:3.

Vomiting (100%), Headache (60%), Abdominal pain (60%) were most common presenting symptoms and common signs were low blood pressure (100%) and hepatomegaly (60%) among Severe Dengue cases.

Laboratory findings

In dengue fever, common laboratory findings were thrombocytopenia, leukopenia and raised haematocrit level. NS1Ag positive cases were more as the most (77%) of the patients were presented within 3 days of fever while12.2 % of patient presented within 4-5 days of fever and 10.8% presented after 5 days of fever.

Table: 3 Clinical presentation of Dengue cases and SEVERE Dengue

Clinical features	Total dengue cases (n=74) n (%)	SEVERE Dengue (n=5) n (%)
Fever	74(100)	5(100)
Headache	27(36.5)	3(60)
Vomiting	19(25.7)	5(100)
Abdominal Pain	11(14.9)	3(60)
Retro-orbital pain	15(20.3)	2(40)
Myalgia	12(16.2)	1(20)
Rash	9(12.2)	0
Hepatomegaly	9(12.2)	3(60)
Hypotension	5(6.8)	5(100)

Among Severe Dengue, the common laboratory findings were thrombocytopenia, leukopenia, raised alkaline transaminases, and raised haematocrit level.

Table:4 Laboratory findings on dengue types (column total)

Laboratory Test		Dengue without warning(n=51) n(%)	Dengue with warning sign(n=18) n(%)	Severe dengue (n=5) n(%)	Total N=74 n(%)
Total Leukocytes count cell/mm^3	Leukopenia <4000	13(25.5)	9(50)	4(80)	26(35.1)
	Normal (4000-11000)	38(74.5)	9(50)	1(20)	48(64.8)
ALT U/L	Normal (0-40)	47 (92.2)	17 (94.4)	1(20)	65(87.9)
	High (>40)	4 (7.8)	1(5.6)	4(80)	9(12.1)
Total Platelet count /mm3	>1.5,00,000/ mm3	19 (37.3)	5 (27.8)	0	24(32.4)
	1,00,000-1,50,000	23(45.1)	9(50)	2(40)	34(45.9)
	75,000-99,000	9(17.6)	1(5.6)	0	10(13.5)
	<75000	0	3(16.7)	3(60)	6(8.10)
Hematocrit	30.1-35%	4 (7.8)	4 (22.2)	0	8(10.8)
	35.1-40%	28 (54.9)	7 (38.9)	4(80)	39(52.7)
	40.1-45%	19(37.3)	7 (38.9)	1(20)	27(36.5)
Serology positivity	NS1	43 (84.3)	13 (72.2)	1(20)	57 (77)
	IgM, NS1	5 (9.8)	5 (27.8)	3(60)	13(17.6)
	IgM	3 (5.9)	0	1 (20)	4 (5.4)

Management and Outcome

Among 74 cases, 68 cases were in stable condition and treated on OPD basis or in ward, and 6 were admitted in ICU and treated. All the enrolled children recovered well and there was no mortality during this period. Hence, the early recognition of signs and symptoms of dengue fever is very important for successful outcome.

DISCUSSION

Global incidence of dengue fever has increased dramatically in the recent decades.[6] There are very few studies based on the revised new dengue classification. Based on the WHO TDR 2009 dengue guidelines, in our study, the total number of cases analysed was 74, out of which 51(68.5%) were categorized as cases of Dengue without warning signs, 18(24.3%) were Dengue with warning signs and 5 (6.80%) were cases of Severe dengue which was similar to the observation made in the study done in south Rajasthan, India.[12] The maximum numbers of cases were seen in the group >8 years of age and the least affected age group was infants which was similar to study done by Mishra et al.[13] Gender distribution of cases showed there were 40 (54.1%) males and 34 (45.9%) females in our study which similar to study done by Moinuddin et al.[14]

Regarding symptoms, in our study fever was present in all the patients with headache, vomiting, and retro orbital pain being the common symptoms in dengue fever which is concordant with study done by Banerjee et al.[15]

In this study low platelet count, and leukopenia were observed which important clues to the diagnosis of dengue fever. Elevated liver enzymes were observed in all patients with Severe Dengue had similar high values of enzymes was noted in previous studies done in southern India.[16]

Our study also showed that in Severe Dengue, Vomiting (100%), Abdominal pain (60%) were most common presenting symptoms and low blood pressure (100%), hepatomegaly (60%) were common physical findings .Similarly,80 % had leukopenia and 60% had platelet count less than 75000 mm/3 among Severe Dengue cases. These finding are concordant with the study done by Pothapregada et al[17] and Jairaj et al .[18]

In our study, more than three-fourth (77%) of patients were positive for only NS1 followed by NS1 and IgM were (17.6%) and IgM only were (5.4%) as most (77%) of the patients were presented within 3 days of fever while12.2 % of patient presented within 4-5 days of fever and 10.8% presented after 5 days of fever. Non-Structural protein 1 antigen positive indicate high sensitivity of the test for early diagnosis of disease.as in the study of Jain et al[12] and Kumarasamy et al.[19]

In our study, most of the dengue cases were from Kaski district of ward no.9 followed by Tanahun, Syangja and the reason for it may be that our hospital is in Kaski district ward no.8 so more the nearby patients visited the hospital and the other reason may be that the bus park area and slum areas are more in this ward.

Among 74 cases, no mortality was observed during this study period. In our study 68 cases were in stable condition and treated on OPD basis or in ward, and 6 were admitted in ICU as had severe dengue. The overall mortality of

dengue infection is low if treated appropriately, however the mortality associated with severe dengue is high as these patients need ICU settings and ventilator support which is not available in every health care facility. The knowledge regarding its presentation, clinical and biochemical features and best management practices are the key to successfully manage these patients. Similarly, public awareness regarding preventive strategies is essential to fight against this disease

CONCLUSIONS

Children with the median age of 10 years was commonly affected by dengue. Fever, headache, vomiting, thrombocytopenia and leukopenia were common clinical-laboratory finding in dengue cases**.** Children with these findings in Gandaki province should be suspected of having dengue fever and managed accordingly. Our document will hopefully be useful to Nepalese government agencies to help strengthen mosquito surveillance and disease diagnosis and treatment programs.

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Knowledge regarding endotracheal suctioning among Nurses of a teaching hospital of Kaski District

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ABSTRACT

Introduction: Endotracheal suctioning (ETS) is an essential procedure that involves removal of accumulated lung secretions from tracheobronchial tree through an artificial airway. It is crucial that this procedure is performed with professional competence based on updated scientific evidence and guidelines that guarantee efficiency and safety of the patient to prevent the common infection like ventilator associated pneumonia (VAP). **Objectives:** To identify the level of knowledge regarding ETS among nurses and to measure the association between knowledge level and selected demographic variables. **Methods:** Descriptive cross-sectional research design was adopted for this study which was conducted in Gandaki Medical College Teaching Hospital and Research Centre of Kaski, Nepal. The study population were all the nurses working in in-patient department of the hospital. Sample size was calculated through standard formula and probability simple random sampling technique was used to select 92 nurses. Semi- structured self-administered questionnaire was used to collect data. Collected data was entered, coded and edited into Statistical Package for Social Science (SPSS) version 16. Data was analyzed by employing both descriptive and inferential statistical methods. **Result:** Only 4.3% of the total respondents had good knowledge on ETS whereas 52.2% had fair knowledge and 43.5% had poor knowledge. There was significant association between respondent's level of knowledge on ETS and ethnicity (p=0.049) and professional qualification (p=0.028). **Conclusion:** Nearly half of the nurses had poor knowledge on ETS. Therefore, it is necessary to upgrade nurse's knowledge on ETS through inservice education programs.

Keywords: Endotracheal Suctioning, Knowledge, Nurses

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INTRODUCTION

Endotracheal suctioning (ETS) is an essential procedure which involves removal of accumulated lung secretions from tracheobronchial tree through an artificial airway with the help of mechanical suction device.[1] ETS is an element of bronchial hygiene therapy and mechanical ventilation.[2,3] It is a patient-based care that involves preparation of patient, suctioning event and post-procedure care. The primary purposes of ETS are to provide adequate oxygenation, maintain airway permeability and gaseous exchange, increase alveolar ventilation and prevent ventilator-associated pneumonia.[4]

It is crucial that this procedure is performed with professional competence based on updated scientific evidence and guidelines that guaranties efficiency and the safety of the patient. Nurses whose responsibility is to provide care to patients must perform ETS efficiently and effectively by maintaining sterility in order to avoid infections.[1,5] Different complications such as

cardiac and respiratory failure, hemodynamic instability, tracheobronchial injury, increased intracranial pressure and hypoxemia; especially infection Ventilator Associated Pneumonia (VAP) may occur if the procedure is performed incorrectly.[1-6]

In the present context, risky practices of ETS remains the global problem. Although scientific guidelines for ETS are available, many of these recommendations have not been applied in nurses' clinical practices which may be due to the lack of good knowledge.[7] Regardless of established ETS evidence-based recommendations nurses rather perform procedures traditionally or routinely.[4,8] A study conducted among staff nurses in Nellore revealed that 7%, 73% and 20% had inadequate, moderate and adequate knowledge level regarding ETS respectively.[2] Similarly, another study conducted among 42 ICU nurses in Khartoum teaching hospital, Sudan identified that majority (85.7%) had poor knowledge level on ETS.[6] In the context of Nepal, Shrestha and Shrestha[3] revealed that a total of 44.2% of the nurses had inadequate knowledge whereas Dahal and Kunwar[1] found fair knowledge among 39.3% of nurses regarding endotracheal suctioning. Assessment of knowledge regarding ETS among nurses working at Gandaki medical college has not been explored yet. Therefore, the researcher aimed to assess knowledge regarding ETS among nurses.

METHODS

Descriptive cross-sectional research design was adopted for this study**.** Gandaki Medical College Teaching Hospital and Research Centre (GMCTHRC) was selected as the setting for the study. The targeted population of the study consisted of all nurses working in in-patient department of GMCTHRC whose total number was 204. Sample size was 92 based on sample size estimation formula. Simple random sampling technique was used to select the sample from the sampling frame of 204 nurses using lottery method. All the PCL and Bachelor level nurses working for at least 3 months in in-patient department of GMCTHRC were included in the study.

A semi-structured self-administered questionnaire in English language was used as an instrument which was developed on the basis of extensive review of the literature, standard recommendations and protocols for endotracheal suctioning along with consultation with experts. The instrument was organized into 2 parts:

Part I: Consisted of questions related to demographic and job-related characteristics of respondents such as nurses' age, religion, ethnicity, place of residence, marital status, professional qualification, working units, designation, duration of work experience and training.

Part II: Consisted of 22 questions related to knowledge regarding ETS, 20 of which were single response questions and 2 were multiple response questions with 4 options in each, so the total score was 28.

The level of knowledge on ETS among nurses was categorized in 3 levels: (Elbokhary et al., 2015; Dahal & Kunwar, 2018)

Good knowledge (22-28): >75%

Fair knowledge (15-21): 50-75%

Poor knowledge (0-14): <50%

Validity of the instrument was maintained by extensive review of related literature and consultation with research advisors and subject matter expertise in the field of nursing before and during the construction of the tool.

Reliability of the tool was tested by using Split-half method in which reliability coefficient score was 0.7 indicating the tool as reliable. To identify accuracy, clarity and consistency of the tool, pretesting of the instrument was done among 10% of the sample size.

The study was carried out after the approval of the research proposal from the concerned authority of Gandaki Medical College. Informed written consent was taken from each participant after explaining the purpose of study to the respondents. None of the respondents were forced to participate in the study. Respondents' dignity and confidentiality were maintained by not disclosing the name and other information of the respondent except its use in the study. Data was collected by researcher herself from June 30 to July 13, 2019. Average of 6-8 nurses were approached from different departments in each day. The collected data was organized, coded and entered into Statistical Package for Social Science (SPSS) version 16 daily and then analyzed by employing both descriptive and inferential statistical methods. In descriptive statistics, frequencies, percentage, mean and standard deviation were calculated to analyze demographic data. In case of inferential statistics, Chi-square test, Fishers Exact Test and Likelihood Ratio was used to find the association between selected variables with knowledge score. The level of significance was considered at 5% with *p* value <0.05 and 95% confidence interval.

RESULTS

Table 1 reveals the demographic and job-related characteristics of the respondents which shows the mean age of the respondents was 23.55 years (SD ± 2.66 years). Two third of the respondents (66.3%) belonged to age group 21-25 years. Around four-fifth of the respondents (79.3%) were Hindus and 45.7% were Brahmin/Chhetri. Majority

(93.5%) were residing in urban area. More than half of the respondents (56.5%) were unmarried. Majority of the respondents (82.6%) had PCL level of education. Half of the respondents were working in critical units of the hospital with more than two-thirds working as staff nurse (77.2%). More than three-fourth (77.2%) had working experience of more than one year and very few (8.7%) had received the training on endotracheal suctioning.

Table 1: Demographic and Job-related Characteristics of the Respondents **(n=92)**

Variables	Number	Percentage
Age in years		
15-20	10	10.9
20-25	61	66.3
25-30	20	21.7
30-35	1	1.1
Mean age ± SD in years= 23.55 ± 2.66; Min.=18, Max.=30		
Religion		
Hinduism	73	79.3
Buddhism	16	17.4
Christianity	3	3.3
Ethnicity		
Dalit	7	7.6
Janjati	43	46.7
Brahmin/Chhetri	42	45.7
Type of Residence		
Urban (residing in urban municipality)	86	93.5
Rural (residing in rural municipality)	6	6.5
Marital Status		
Unmarried	52	56.5
Married	38	41.3
Divorce/Single	2	2.2
Professional Qualification		
PCL Nursing	76	82.6
BN/BNS	8	8.7
B.Sc. Nursing	8	8.7
Working Units		
General Units	46	50.0
Critical Units	46	50.0
Designation		
Nursing Incharge	3	3.3
Senior Staff nurse	18	19.6
Staff Nurse	71	77.2
Duration of Work Experience		
<1 year	21	22.8
≥1 year	71	77.2
Training on Endotracheal Suctioning		
Yes	8	8.7
No	84	91.3

Table 2 illustrates the overall respondents' level of knowledge on endotracheal suctioning. Among 92 participants, more than half of the nurses (52.2%) had fair knowledge with 43.5% of them having poor knowledge. Only 4.3% of the nurses had good knowledge on endotracheal suctioning.

Table 3 shows statistics of overall scoring on knowledge on ETS among nurses. The mean score of the overall knowledge on ETS was 14.33 (51.2%).

Table 2: Overall Respondents' Level of Knowledge on Endotracheal Suctioning (**n=92)**

Level of Knowledge	Number	Percentage
Good Knowledge (>75%)	04	4.3
Fair Knowledge (50-75%)	48	52.2
Poor Knowledge (<50%)	40	43.5

Table 3: Statistics of Overall Scoring on Knowledge on ETS among Nurses **(n= 92)**

Variables	Total Possible Score	Mean (S.D.)	Median	Minimum	Maximum
Overall knowledge score on ETS	28	14.33 (3.6)	14	07	23
Percentage of Knowledge score on ETS	100	51.2 (12.9)	50	25	82

Table 4 shows that there is statistically significant association between respondents' level of knowledge on endotracheal suctioning and their ethnicity (p= 0.049) and professional qualification (p= 0.028). For the ease in computing association, respondents' good and fair knowledge were merged to make a class of adequate knowledge (i.e. ≥50%) whereas poor level of knowledge was classified as inadequate knowledge (i.e. <50%).

Table 4: Association between Respondents' Level of Knowledge on Endotracheal Suctioning and Selected Variables **(n= 92)**

Variables	Level of Knowledge		χ^2	*p*-value
	Adequate No. (%)	Inadequate No. (%)		
Age (in years)			0.004	0.948
≤ 25	40 (76.9)	31 (77.5)		
>25	12 (23.1)	9 (22.5)		
Religion				
Hinduism	43 (82.7)	30 (75)	1.098	0.578*
Buddhism	8 (15.4)	8 (20.0)		
Christianity	1 (1.9)	2 (5.0)		
Ethnicity				
Dalit	2 (3.8)	5 (12.5)	6.034	**0.049***
Janjati	21 (40.4)	22 (55.0)		
Brahmin/Chhetri	29 (55.8)	13 (32.5)		
Type of residence			0.228	0.174€
Urban municipality	47 (90.4)	39 (97.5)		
Rural municipality	5 (9.6)	1 (2.5)		
Marital status				
Unmarried	29 (55.8)	23 (57.5)	3.594	0.166*
Married	23 (44.2)	15 (37.5)		
Divorce/Single	0 (0.0)	2 (5.5)		
Professional Qualification			4.819	**0.028**
PCL Nursing	39 (75.0)	37 (92.5)		
Bachelor	13 (25.0)	3 (7.5)		
Working Unit			0.000	1.000
General Units	26 (50.0)	20 (50.0)		

Critical Units	26 (50.0)	20 (50.0)		
Designation				
Nursing In-charge	2 (3.8)	0 (0.0)	0.503	0.317€
Staff Nurse	50 (96.2)	40 (100)		
Duration of Work experience			0.004	0.948
<1 year	12 (23.1)	9 (22.5)		
≥ 1 year	40 (76.9)	31 (77.5)		
Training on Endotracheal Suctioning				
Yes	4 (7.7)	4 (10.0)	0.724	0.488€
No	48 (92.3)	36 (90.0)		

*Significant level of P-value at 0.05; *Likelihood Ratio; €-Fishers Exact Test*

DISCUSSION

The present study assessed the level of knowledge on endotracheal suctioning among 92 nurses working in general and critical units of GMCTHRC. Based on the obtained results, only 4.3% of the nurses had good knowledge whereas 52.2% and 43.5% had fair and poor knowledge respectively. These findings are in line to the study done by Elbokhary et al.[6] which revealed that only 4.8% of nurses had good knowledge level. Shrestha et al[3] also found that 44.2% of Nepalese nurses working in ICU had inadequate knowledge regarding ETS. However, the findings are inconsistent with the study of Dahal and Kunwar[1] in which level of knowledge was good among 60% and fair among 39.3% of nurses. This discrepancy may be due to the lack of in-service education and training on endotracheal suctioning.

Endotracheal suctioning as the 'procedure to reduce ventilator associated pneumonia' was known by 76.1% of nurses. Less than half (44.6%) of the respondents knew that it must be done while withdrawing the catheter. Just more than one-fourth (29.3%) of the nurses knew the nerve that is stimulated during ETS. Majority (70.7%) of the nurses knew semi-fowlers as the best position for ETS. Less than half (48.9%) knew the recommended duration (10-15 second) for each ETS. Around half knew the appropriate size (43.5%), recommended pressure (58.7%), length of suction catheter (44.6%) and number of suctions to be performed per suctioning (30.4%). The most important action while endotracheal suctioning is hyperoxygenation before and after the procedure. This knowledge was known to 48.9% of the respondents. The correct volume of air to inflate endotracheal tube cuff was known by 54.3% of the nurses. About one-third of the respondents (23.9%) knew that ETS should be discontinued immediately if heart rate either increases or decreases. Majority of the nurses (84.8%) knew that hypoxia is the most serious complication that occurs during endotracheal suctioning. Less than half of them (46.7%) answered that a suction catheter should be disposed after single use.

There was statistically significant association of respondents' knowledge on endotracheal suctioning with their ethnicity (p=0.049) and professional qualification (p= 0.028). A study conducted by Shrestha, et al[3] showed no association of level of knowledge with professional qualification (p=0.424) and ethnicity (p=0.481).

CONCLUSION

The study concludes that only few nurses had good knowledge and nearly half of the nurses had poor knowledge on ETS. The significant influencing variables for level of knowledge on ETS were professional qualification and ethnicity. Therefore, it is necessary to upgrade the nurses' knowledge on ETS through in-service education programs.

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Choices of Post-graduation Medical specialization among final year medical students, interns and medical officers working in different hospitals in Pokhara, Nepal

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ABSTRACT

Background: The intricate decision to pursue finally one speciality following post bachelor's medical degree is affected by many factors in Nepal. The aim of the study was to elucidate the preference of specialty among final year medical students, interns and medical officers currently working in Pokhara city of Nepal. **Methods:** Observational cross-sectional survey, conducted from 1st Feb to 30th April, 2020. 127 participants including doctors working in private and government hospitals of Pokhara, Nepal. Structured questionnaire was prepared and distributed to participants. Data were entered, validated in Microsoft Excel 2017 and analyzed in SPSS, version 25. Chi-squared and t-tests were applied for categorical and continuous variables respectively to test the statistical significance at 95% confidence level. **Results:** Of the total respondents, 30.46% reported clinical subjects as their preferences, followed by any clinical and basic subjects (20.31%). For clinical, Internal medicine was preferred by 15.6%, Surgery by 9.3%, Dermatology by 6.25%, Orthopedics by 4.68%, Pediatrics, Health care management, Psychiatry, Otorhinolaryngology, Gynecology and Ophthalmology were reported by 3.9%, 2.3%, 1.5% and rest 0.7%, respectively. 64% of the participants chose their speciality based on their keen interest, and while 17.9%, 12.5% and 3.1% closed due to pressure from family members, experience while working and anticipation of good quality of life respectively. **Conclusion:** High proportion of the respondents' preferred clinical speciality. Most opted clinical speciality was Internal Medicine. This may lead to saturation in those areas of specialization and as a result leave the population underserved in other important areas basic science involving clinical teaching and learning.

Keywords: Medical speciality, career choices, Pokhara.

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INTRODUCTION

Career choices in medical field likely to change overtime as the students understand better as they move forth from first year to last year internship period of medical schooling. While on their medical officer/house officer tenure, the doctors usually plan for the career ahead they are likely to follow. For some it is a straightforward decision whereas for others it is a dilemma and a tough decision to choose what path to pursue.[1] In the neighboring country, a study quoted that a majority of students preferred to choose a postgraduate career in medicine and Pediatrics followed by Surgery.[2] Usually after MBBS a fresh graduate has multiple different paths and careers to choose ranging from clinical sciences, applied medical sciences, pharmaceutical, information technology and other non-clinical fields.[3]

Medical graduate's choice of specialty also relies heavily on the field that interests them the most during their internship rotation period to various departments. Around the globe we see

different trends for medical students choosing a particular set of career choices after completing their bachelor degree with various reasons pertaining to their decisions.[4]

Most medical schools have limited residency programs to satisfy the postgraduate career preference, limited role on current and future possibilities (enhancing participation for collective and individual learning) including in providing career and social orientations to medical students.[5-7] The needs of the medical graduates do not seem to have been addressed.

In most cases, it is observed that students never wishes to take up basic science speciality, as their knowledge and skills become limited to teaching and learning activities and is very restricted.[8] There is need to find out what motivates the students to take up certain speciality of their choice so that the balance in medical doctors among various specialties is maintained. Research studies conducted in India observed that educational loans and life style factors may be the determining factors for the choice of specialty by the students.[9] It has been observed that choices of particular specialties in medical field vary from region to region. Little research has been done in Nepal to explore the demographics of specialty choices. These types of studies can be helpful in career counseling and policymaking. In Nepal, all medical schools offer a five year program, with basic health sciences as the primary focus during the first two years, with gradually increasing exposure to clinical rotations over the next three years, followed by a one year compulsory internship in a teaching hospital. Some private medical institutions are following a problem-based learning system, whereas the government medical institutions follow a conventional lecture-based curriculum. The objective of this research was to determine the choices of Post-graduation Medical specialization among final year medical students, intern and medical officer working in different hospitals in Pokhara, Nepal.

METHODS

Study design and study setting

An observational cross-sectional survey study was conducted over period of three months from 1st February to 31st April 2020. The study was conducted in three Private hospitals, two medical colleges and one government hospital of Pokhara Metropolitan, Kaski.

Study Sample

Final year students, Interns and Medical officer doctors were included in this study. Students till 4th year were excluded because of limited exposure to clinical work in the early years of medical career.

Data collection tool and techniques

The authors developed a self-administered questionnaire in English language, which is the not an official language of Nepal but is convenient for communication as English is widely spoken and understandable language among medical students, as well as medical curriculum is in English language in Nepal. The participants were recruited randomly and those who were interested to participate were enrolled from different hospitals, including government, private sectors and medical colleges. This was done voluntarily. An anonymous, paper-based questionnaire was used to collect data which include demographic variables, preferred subject or speciality, factors determining the preference, possible time frame of entering the post-graduate program and choice of country preference. In total we had 22 respondents working in government hospitals, 68 respondents from private hospitals, 17 from Gandaki Medical College and 20 were final year student's and interns. The questionnaire was anonymous to ensure the confidentiality of the data.

Statistical analysis

A structured questionnaire was prepared and distributed to participants and was completed by them. Data were entered and validated in Microsoft Excel 2017. Data analysis was performed in SPSS, version 25. A self-reported choice of different clinical and non-clinical specialties was the defined outcome. Chi-squared and t-tests were applied for categorical and continuous variables respectively to test the statistical significance at 95%confidence level.

RESULTS

The response rate was 100 percent with 127 doctors/ undergraduates completing and returning the questionnaire form. There was predominance of male doctors (66/51.9%) with no statistically significant difference with p=0.65 (table 1). The participants were between the ages 21-35 years, with majority from 21 to 26 years age (80.3%). Majority of the participants were either undergraduates or MBBS graduates found to have been studied from personal financial source (93.7%). Forty-nine and 44 out of 127, planned to enter the postgraduate program within one and two year, respectively, with almost equal distribution in males and females. Most of the participants were working in private hospitals (68 out of 127, 53.5%), followed by government hospitals (22 out of 127, 17.3%). Eighty four participants 66.1%, (male: 47, female:37) would choose medical speciality because of keen interest in that subjects(table 3), Out of 16, 11 were females who chose specialty due to work experience whereas 18 females out of 24 respondents were flexible for any subjects. There were only three participants who would choose

specialty for family wish (table 3). About 25.2% (32/127) of the participants wish to study post-graduation in foreign countries whereas majority of participants preferred to study in home country Nepal which was dominated by 70.8% (table 4). Hospital based specialty were the most attractive, majority of participants chose clinical specialty 100 vs 27(table 5), age 24 to 26 were among the most interested in clinical subjects. Most opted clinical specialty was Internal Medicine 19.6 % followed by Surgery, Pediatrics and so on (table 2).

The study compared the different variable factors that affect the choice of specialty. Age between 24 to 26 years demonstrated highest interests in clinical specialty (Table 5). Thirty four out of 49 and 28 out of 44 participants plan to enter post-graduate program within one and two years respectively. All the 22, participants working in government hospital interested in one particular specialty. The main reason to choose one particular specialty was keen interest (55/73, 75.3%) when compared to work experience.

Table-1: Characteristics of the study population

Characteristics	Number	Percentage
Age Distribution		
21-23 years	31	24.4
24-26 years	71	55.9
27-29 years	19	14.9
>30 years	6	4.7
Sex		
Male	66	52
Female	61	48
Type of under graduation funding		
Partial Scholarship	3	2.36
It is Full Scholarship	5	3.93
Full Payment	119	93.7
Current work station and affiliation		
Government Hospital	22	17.3
Private Hospital	68	53.5
Medical Colleges	17	13.3
Undergraduates	20	15.7

Table 2: Different medical specialties preferred by study participants

Medical speciality preferred by study	Male (n=61)		Female (n=66)	
Population	**n**	**%**	**N**	**%**
Any clinical subject	7	11.4	20	30.3
Internal Medicine	12	19.6	6	9.1
Pediatrics	4	6.5	6	9.1
Surgery	10	16.3	2	3.0
Otorhinolaryngology	1	1.6	0	0.0
OBGYN	1	1.6	4	6.1
Orthopedics	4	6.5	2	3.0
Psychiatry	2	3.2	0	0.0
Dermatology	2	3.2	6	9.1
General Practice and Emergency Med	0	0	2	3.0
Public Health	1	1.6	0	0.0
Neurosurgery	1	1.6	0	0.0
Ophthalmology	1	1.6	0	0.0
Pathology	0	0	0	0.0
Health care management	2	3.2	1	1.5
Microbiology	0	0	1	1.5
Not decided	1	1.6	1	1.5
Any subjects including basic science	12	19.6	15	22.7

Table 3: Reasons of subject preferences

Characteristics	Sex of the respondents				P value
Reason for opting particular speciality	**Male (n=61)**		**Female (n=66)**		
	N	**%**	**n**	**%**	
Keen interest	47	77.1	37	56.1	0.04
Work experience	5	8.1	11	16.6	0.65
Flexible to choose	6	9.8	18	27.27	0.38
Family wish	3	5	0	0	

Table 4: Preferred country for PG study

Preferred country for PG study	Number	Percentage
Nepal	90	70.8
Abroad	32	25.2
Anywhere	5	3.93

Table 5: Characteristics of the study population associated with medical specialty preference

Characteristics	Subject preference		Chi-square value	P value
	Clinical n (%)	Others n (%)		
Age (in years)				
21-23	22(71)	9(29)	4.501	0.033
24-26	54(76)	17(24)	14.880	<0.001
>27	24(96)	1(4)	11	<0.001
Sex				
Male	49(80)	12(20)	15.73	<0.001
Female	51(77)	15(23)		
Type of under graduation funding				
Partial Scholarship	3(100)	0		
Full scholarship	4(80)	1(20)	1.059	0.3
Full payment	93(78)	26(22)	28.064	<0.001
Current work station and affiliation				
Undergraduate and internship	15(75)	5(25)	3.8	0.05
Medical collage	12(70)	5(30)	2.185	0.139
Private hospital	51(75)	17(25)	13.4	<0.001
Government hospital	22(100)	0		

DISCUSSION

Our study surveyed the choices in specialization and factors affecting the choices among doctors working in tertiary

centers, teaching hospitals and government hospitals. Those students who cannot secure seats in scholarship exam have no other choice than to take up MBBS program in full payment in private medical colleges. That can be the reason; the number of private medical college across the globe is on the rise. Because of high demand of medical seats private medical college takes heavy fees in MBBS. Due to high fee structure for MBBS program which can be a huge burden to the family, the medical students develop eagerness to earn money to pay back their dues and uplift the family's financial state.[10-12] which becomes a matter of preference for clinical science subjects in postgraduate and earn more through private practice and repay back the loan for which they are indebted.[13] We did not collect the data on merit position of the participants. We did not examine the reasons for not preferring a particular field. But some important aspect of decision to choose medical specialty was unleashed in this study.

Reduced working hours means a better quality of life. This was the most important reason for selecting medical and allied as a career choice. Most of the individuals choosing for Family medicine also had the same reason.[1,14,16] In this study, we found only two female doctors opted General Practice/ Family medicine. But majority of the doctors would like to take post-graduate training in any clinical subjects (21.2%) followed by medicine (14.1%) and Surgery (9.4%). Similarly, participants who graduated from private medical schools were more likely to choose one particular clinical specialty 56.3% of 119. When considering the age determinants, age above 24 years respondents were more likely to choose one particular specialty rather than keeping options of any clinical or non-clinical speciality and age above 27 years showed more preference for one particular subject. In this study, 25.1% doctors prefer to go abroad for further study but the country of origin also is an important factor in selecting any given specialty, as the chances of an individual getting into highly competitive field such as Surgery and allied may be difficult in some countries such as USA and Canada. So their candidates tend to apply in the residency in specialties which are easier to get into.[16,17] This study shows doctors prefer to get training in the medical speciality of their keen interest (43.3% of 127), as 70.8% of 127 doctors prefer to study post-graduate in Nepal. There is a decline in the number of students to pursue a post-graduate career in basic science subjects in comparison to clinical subjects. So, in Nepal, Kathmandu University have started enrolling Bachelor of Dental Surgery graduated for MD in basic science subjects. However, in this study, 21.2% respondents want to study any clinical subjects, with same percentage of doctors opted any clinical or basic science subjects.

Here, in this research when it comes to choosing one particular specialty, 42 males predominate over 31 females. Similarly, females (20/27) were more liberal in choosing any clinical specialty. Study conducted by Subba et al[18] showed that male medical students opt for Surgery and females opt for OBGYN and internal medicine which concurred with our study. Another study in India, observed male medical students choosing internal medicine and Surgery as their specialization, compared to female choosing OBG and Pediatrics.[19] Doctors working in government hospital were more likely to enter post-graduate program in one or two year and more likely to choose one particular medical specialty compared to doctors working in private hospitals or medical colleges. With no surprise, undergraduates plan to enter post-graduate training in three to four year.

Study limitations

There were few limitations of this study. Since this is a cross-sectional study with small sample size, it only gives small view of choices and the factors that influence the preference. The sample drawn from interns and from medical officer working in different instates of Pokhara and may not be generalizable to other provinces and countries. Participants were not scrutinized whether they were from rural or urban areas, lifestyle, and marital status and expected working hours and salary would affect the choice of with particular specialty.

CONCLUSION

Most respondents prefer to study clinical specialty followed by few respondents prefer for either clinical or basic medical science subjects, which ever they get. Doctors working in government hospital were more focused on choosing and entering specialty of their interest within one to two years. Majority of respondents preferred to pursue their postgraduate training in their home country Nepal. Similar studies with better knowledge of the demographics and need for medical specialties across Nepal is needed to determine educational direction and policy making. This capability will better prepare developing countries to meet their present and future medical needs.

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Peritoneal flap mesh hernioplasty: A reliable option for difficulty in closure of complex ventral hernia: A case report

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ABSTRACT

Peritoneal flap mesh hernioplasty is a technique to deal with complex ventral hernias in which primary closure of the defect is not attainable. We are here presenting a case report of a 50-year-old gentleman with huge complex ventral hernia with loss of domain. The patient also had overlying ulcerated and blackish colored skin. Botulinum toxin was infiltrated into the muscles of anterior abdominal wall and was followed by peritoneal flap mesh hernioplasty after one month. The final outcome was complete closure of the midline with a healthy skin with no evidence of abdominal compartment syndrome. There was no evidence of early recurrence on follow up.

Owing to the favorable outcome in this case, suitability of peritoneal flap mesh hernioplasty technique in treatment of complex ventral hernia could be explored further where closure of the primary defect is difficult.

Keywords: Complex ventral hernias; Component separation techniques; Peritoneal flaps

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INTRODUCTION

European society of hernia has defined any hernia as complex hernia which meets the following criteria. 1) Hernia with width >10cm, Loss of domain of >20%, 2) contaminations and soft tissue condition, 3) Recurrent hernia with use of mesh previously, comorbidities, history of abdominal dehiscence 4) clinical scenarios such as emergency operation with bowel resection.[1]

Complex ventral hernia repair has been a challenging task because of the difficulty in primary closure of the defects. Peritoneal flap mesh hernioplasty is one of the techniques to deal with such problem. It utilizes redundant tissue from the hernia sac to bridge the fascial gap, and it increases the abdominal domain by expanding the abdominal wall at the site of herniation without inducing weakness laterally which is one of the flaws present in component separation techniques (CSTs).[2] It can also be used for certain wide defects especially those arising from non-midline incision where component separation technique is not applicable.[3]

In most of the cases of long standing complex ventral hernias, loss of domain is found. It refers to the loss of abdominal viscera right to 'belong' inside the abdominal cavity. Infiltration of abdominal muscles preoperatively with Botulinum toxin bilaterally and progressive preoperative pneumoperitoneum (PPP) are the techniques to deal with. Botulinum toxin lengthens

and relaxes the laterally retracted abdominal muscles and enables easy closure of large complex ventral hernias.[4]

Assessment of increase in domain is done by preoperative non contrast computed tomography (NCCT) of abdomen and pelvis before adopting such techniques and repeating the same at the time of surgery. NCCT of abdomen and pelvis also helps us to rule out chronic abdominal abscess and malignancy that are sometimes confusing with chronic long standing ventral hernia.

In this case report, we aim to describe the use of transposed flaps of preserved sac which effectively extend the fascial layers to support and envelop the mesh, sandwiching it between two layers of autologous tissue in a relatively tension free manner.

CASE REPORT

A 50-year-old gentleman presented with huge midline anterior abdominal wall swelling involving the epigastric, umbilical and hypogastric region for 4 years duration. He had undergone exploratory laparotomy and Graham's omental patch repair for duodenal ulcer perforation 8 years back. The swelling was gradually progressive in size and used to increase while doing strenuous exercise. Initially the swelling was completely reducible on its own, but for last one year it became incompletely reducible. On examination, there was a huge bulge in abdomen with blackish discoloration of overlying skin along with ulcerations at places (Fig 1a, 1b). On palpation, cough impulse was positive, herniated bowel loops as well as widely separated sheath could be felt. Content of the hernia was not completely reducible. As this was the long standing ventral hernia NCCT was done, which revealed the size of fascial defect around 21cm.

Abdominal muscles were infiltrated bilaterally with Botulinum toxin 150 IU. On reassessment after 1 month, size of fascial defect reduced to around 15 cm on NCCT. The patient was then planned for peritoneal flap mesh hernioplasty.

Firstly, a vertical midline incision to the skin was given and abdomen was opened. There was mild adhesion for which adhesiolysis was done. Skin flaps were raised bilaterally preserving the sac of the hernia. Flaps were raised till the sheath was reached bilaterally (Fig 2a). Subsequently, retrorectus space on right side was entered after incising the anterior sheath. Similarly, retrorectus space on left side was entered after incising the posterior sheath. Peritoneal flap was then sutured with posterior sheath of right side to the posterior sheath on left side (Fig 2b). A 30×25cm light weight prolene mesh was kept over the above structure. Mesh was only fixed superiorly to xiphoid cartilage. Romovac suction drain of number 16 was placed. After placement of mesh, peritoneal flap was sutured with anterior sheath of left side to anterior sheath on right side which resulted in neo linea alba (Fig 2c). Another Romovac suction drain of number 16 was placed below the skin. Ulcerated and necrotic skin was removed and was approximated with skin stapler (Fig 3). The patient didn't develop abdominal compartment syndrome, surgical site infection during hospital stay. Both the drains were removed on 5th post-operative day and patient was discharged on the same day. Patient was followed up to 6 months and there was no any evidence of recurrence of hernia.

Fig 1a. Supine view of hernia

Fig 1b. Lateral view of hernia on erect position

Fig 2a. Raised peritoneal flap

Fig 2b. Approximation of raised posterior flap with posterior sheath

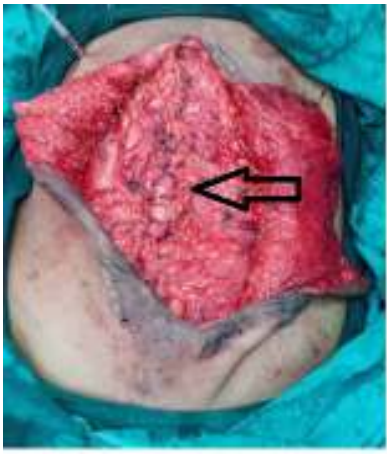

Fig 2c. New lineal alba

Fig 3. Final appearance of wound after approximation of healthy skin

DISCUSSION

In 2014, Malik et al.[5] described the peritoneal flap hernioplasty technique, in which flaps of the hernia sac are created by entering the hernia sac in the midline and retro muscular space through the posterior rectus fascia on one side and the anterior fascia on the other side. This technique increases abdominal domain by expanding the abdominal wall at the site of herniation without inducing weakness laterally. This is in contrast to the CSTs where tension is maximum laterally. It also reduces the need for extensive dissection, resulting in fewer complications.[2] A lower incisional hernia recurrence rate for this technique as compared to retromuscular technique has been observed the study done by Petterson[5] in 2019.

This technique has less evidence with troublesome bowel adhesions, erosion, fistulation, mesh infection or chronic sinus formation because the mesh is excluded from subcutaneous plane.[4] As opposed to CSTs, which is only applicable to midline defects, the peritoneal flap technique may be used for reconstruction of both transverse and oblique as well as paramedian and midline incisional hernia.[4]

The importance of restoration of the midline rectus musculature to regain physiological function of the abdominal wall remains open to debate. A main objective for CSTs is to achieve midline fascial closure, but peritoneal flap hernioplasty doesn't attempt this. Even so, it does approximate them to a considerable degree.

It is our contention that abdominal wall function relies more on an intact circle or ring of abdominal muscle/fascia, and that it does not matter if the gap between the muscles is several centimeters wide as long as it is firm and strong, providing a firm ridge of fibrous tissue against which the

recti and lateral obliques can pull. CSTs has the potential to affect the function of the abdominal wall from fibrosis induced by the mesh or from the extensive dissection itself. The peritoneal flap repair for midline hernias obviates these problems. There is no doubt that the triple layer neo-linea alba produced in a peritoneal flap repair provides this. Indeed, as the results from the 3-month clinical review appointment reveal, there is a high degree of patient satisfaction after the peritoneal flap repair, with very few complaints of bulge or other complaints related to the appearance or weakening of the abdominal wall.[2]

CONCLUSION

Owing to the favorable outcome in this case, suitability of peritoneal flap mesh hernioplasty technique in treatment of complex ventral hernia could be explored further where closure of primary defect is difficult, high risk of exposure of mesh is present and development of abdominal compartment syndrome can occur. We, therefore, recommend further studies which can establish this technique as a suitable option for management of complex ventral hernia.

CONFLICT OF INTEREST

None

CONSENT FROM PATIENT

The patient has provided consent for publication of the case.

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Double inferior vena cava with multiple interconnections – a rare case report

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ABSTRACT

Duplication of the inferior vena cava (IVC) has been estimated to occur in 0.2% to 3% of the population. Although rare, the presence of double inferior vena cava is important to recognize as it has important implications. Diagnostic confusion in interpreting imaging results can arise when a venous anomaly is mistaken for a pathologic process like lymphadenopathy. If such patient were to need an IVC filter placement, separate filters would be required, one for the right and one for the left IVCs. A vascular surgeon would need to be aware of these anomalies to perform safe surgery of the retroperitoneal organs. We present a case of duplicated IVC, which was observed during routine dissection of a 58-year-old male cadaver. Left IVC was communicating with left renal vein superiorly. The left renal vein was running obliquely behind the abdominal aorta. Also, the left IVC was connected to right IVC by one transverse anastomosing vessel. The two-retroaortic communication between right and left IVC make this case report unique.

Keywords: Double, inferior vena cava, renal vein, retroaortic

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INTRODUCTION

The inferior vena cava (IVC) conveys blood to the right atrium from almost all the structures below the diaphragm. It is formed by the union of right and left common iliac veins at L5 vertebral level, ascends anterior to the vertebral column to the right of the aorta, grooves the posterior surface of liver, passes through the central tendon of the diaphragm and drains into the right atrium. Incidence of double IVC has been estimated to occur in 0.2% to 3% of the population and occur due to the persistence of left supracardinal veins and its anastomosis with the right IVC.[1, 2] Most of the double IVC remain clinically silent and found accidently for other reasons. There has been report of increased incidence of deep vein thrombosis in such patient.[3] During surgery over lumbar vertebra and pelvic region such anomaly could produce unexpected hemorrhage.[4] Knowledge of these anatomical variations is necessary to reduce surgical risk and to determine strategy in interventional radiology. We are presenting a case report in which double inferior cava is associated with multiple interconnections. Embryological basis and clinical significance has also been discussed.

CASE REPORT

During dissection for medical students at Weill Cornell Medicine New York anatomy lab, on a 58-year-old male cadaver we observed double IVC. The right IVC was 21.66mm in diameter whereas the left IVC was almost half the size (11.18mm in

diameter). The right common iliac vein joined the left common iliac vein at the level of fifth lumbar vertebra and formed the right IVC. The left IVC had a superior connection with the left renal vein. It was also connected to the right IVC by two communicating anastomosing veins, of which the superior one was more obliquely placed than the inferior one, which was more horizontally placed. Superior anastomosing vein was 9.15mm in diameter and 34.56mm in length whereas inferior one was 13.39mm in diameter and 20.05mm in length. Both the anastomosing vessels were retroaortic. The right IVC was 70.01mm in length from beginning to the upper margin of oblique anastomosis. The left IVC was 89.88mm in length from its beginning to the upper margin of oblique anastomosis.

Fig. 1: Double IVC with abdominal aorta between them. a – Right IVC, b – Abdominal aorta, c – Left IVC

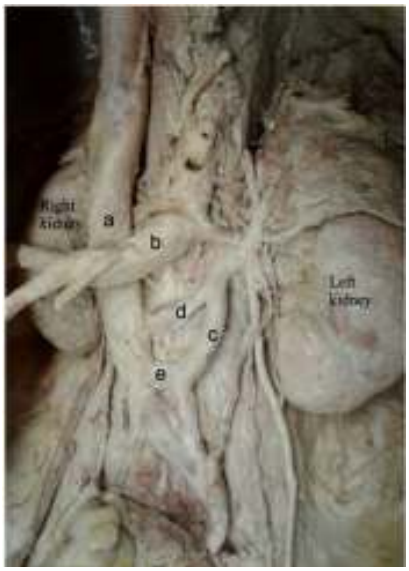

Fig. 2: Double IVC (common iliac arteries along with the distal abdominal aorta cut and reflected to the right to show anastomosing veins). a – right inferior vena cava, b – abdominal aorta, c – left inferior vena cava, d – oblique anastomosis between right and left inferior vena cava, e – transverse anastomosis between right and left inferior vena cava

DISCUSSION

IVC is a composite vein. Its formation is a result of the development, regression, anastomosis and replacement of the three-paired embryonic veins.[4,5] In order of appearance, they are the posterior cardinal vein, the subcardinal vein and the supracardinal vein. This process begins at the sixth week of gestation and is completed by the tenth week. The posterior cardinal veins develop on the posterior aspect of the embryo. While most of it undergoes regression, the distal part persists and form common iliac vein. This is followed by the appearance of the subcardinal veins anterior and medial to the posterior cardinal vein. The right subcardinal vein persist and form the suprarenal part of the inferior vena cava, while the left subcardinal vein completely regresses. Subsequently, the supracardinal veins appear dorsal to the subcardinal veins. The right supracardinal vein forms the infrarenal segment of the IVC, while the left one regresses. Therefore, the normal IVC develops from four embryonic veins: 1. The infrarenal segment from the right supracardinal vein, 2. The renal segment from the right supracardinal anastomosis, 3. The suprarenal segment from the right subcardinal vein and 4. The hepatic segment from the right vitelline vein.

The anomalies of the IVC arise from the failure of normal embryogenesis. The most commonly described anomalies of IVC include circumaortic left renal vein (1.5%-8.7%), azygos or hemiazygos continuation of IVC (0.6%), retroaortic left renal vein (2.1%), double IVC (0.2%-3%) and isolated left sided IVC (0.2%-0.5%).[4] The double IVC is considered to be due to the persistence of both supracardinal veins.[5] The duplicated left IVC usually drains into the left renal vein, which then crosses anterior to aorta and joins the right IVC in a normal fashion.[6] In our present case report, persistence of left supracardinal vein which should have been disappeared, is responsible for the left IVC. Most of the anastomosis between right and left supracardinal veins regress, but sometime they persist (as in our case report) and cause multiple interconnections between right and left IVC.

It has been reported from radiological study that the IVC anomalies were more common in men (39 of 3821 cases) than in women (12 of 2473 cases); men/women ratio is 2:1.[4] The result from our study was in line with these findings.

There are numerous case reports of the duplicated IVC published in the literature. Most cases are incidentally diagnosed on imaging for other reasons. However, this venous

anomaly has significant clinical implications, especially during retroperitoneal surgery and venous interventional radiology. Thus, familiarity with these anatomical anomalies is vital for vascular surgeons, spinal surgeon, urologists to reduce risk of serious hemorrhage during surgical treatment and to avoid operative complications.[7-10] These variations cannot be classed as pathological findings, and should not be confused with lymphomas and has to differ from secondary collateral venous pathways.[11] Detailed knowledge of these anomalies is crucial for IVC filter placement, spermatic cord embolization, and adrenal or renal venous sampling.[2,8]

CONCLUSION

Anomalies of the IVC and renal veins occur infrequently but if unidentified can lead to misdiagnosis, significant morbidity during surgical exploration.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest

INFORMED CONSENT:

Not required

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