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My right is to my work

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Reddy KR

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Nipah Virus (NiV) Infection: An Emerging Zoonosis of Public Health Concern

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**Journal of
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Nipah virus (NiV) infection is a newly emerging **zoonosis**, which was first recognized, isolated and identified in 1998 during an outbreak of encephalitis and respiratory illness among pigs and pig farmers and people with close contact with pigs in a village named **Kampung Sungai Nipah** in Malaysia. The virus was named after the village. This first recorded outbreak began in 1998 – 1999 and reached Singapore.

Nipah virus caused a relatively mild disease in pigs. By mid 1999, nearly 300 human cases of encephalitis, with 105 deaths were reported in Malaysia, and 11 cases of either encephalitis or respiratory illness with one fatality were reported in Singapore. In order to stop the outbreak, more than a million pigs were euthanized, causing tremendous trade loss for Malaysia. Since this outbreak, no subsequent cases (in neither swine nor human) have been reported in either Malaysia or Singapore.

During this first recognized outbreak in Malaysia and Singapore, most human infections resulted from direct contact with sick pigs or their contaminated tissues. Transmission is thought to have occurred via exposure to secretions from the pigs, or contact with the tissue of a sick animal. The NiV strain identified in this outbreak appeared to have been transmitted initially from bats to pigs, with subsequent spread within pig populations. Incidental human infections resulted after exposure to infected pigs. No occurrence of person-to-person transmission was reported in this outbreak. Thus, in the Malaysia and Singapore outbreak, Nipah virus infection was associated with close contact with Nipah virus-infected pigs.

NiV was again identified as the causative agent in an outbreak of human disease occurring in Meherpur District, Bangladesh in 2001. Genetic sequencing confirmed this virus as **Nipah virus**, but a strain different from the one identified in 1999. These outbreaks occur almost annually in Bangladesh since 2001 (Unlike the Malaysian NiV outbreak), and have been reported several times in India.

During the later outbreaks in Bangladesh and India, Nipah virus spread directly from human-to-human through close contact with people's secretions and excretions. In Silguri, India in 2001, transmission of the virus was also reported within a health-care setting, where 75% of cases occurred among hospital staff

or visitors (Nosocomial transmission). From 2001 to 2008, around half of reported cases in Bangladesh were due to human-to-human transmission through providing care to infected patients (Nosocomial transmission).

The outbreaks again appeared in 2003, 2004 and 2005 in Naogaon, Manikganj, Rajbari, Faridpur, and Tangail Districts, in Bangladesh in 2004. In these outbreaks, humans became infected with NiV as a result of consuming **date palm sap (Toddy)** that had been contaminated with urine or saliva from infected **fruit bats**.

In May, 2018 an outbreak of Nipah virus infection occurred in the Kozhikode District of Kerala state, India. On 20 May, 2018, Government of India notified this outbreak to WHO after test samples examined by National Institute of Virology, Pune, India. During this outbreak, 18 deaths have been recorded, including one health care worker. Those who have died are mainly from the districts of Kozhikode and Malappuram, Kerala, India, including a 31 year old nurse, who was treating patients infected with Nipah virus. As of 31 May, 2018, about 16 people are being quarantined because they had contact with the sick. This incident has caused panic throughout the state. More than 2000 people are under medical observation in the Malabar region of Kerala, India. The outbreak, which is the first to hit South India, raises fears of the disease becoming more far reaching. India is importing monoclonal antibodies to Nipah virus antigen from Australia, from University of Queensland.

In the majority of previous outbreaks in Bangladesh and India, the initial spillover of the virus was via contaminated food, typically **date-palm sap (Toddy)**. To collect the sap, people shave the bark off date-palm trees so it runs into a collection pot. The sap is then either consumed fresh as a sweet drink, or allowed to ferment. Humans may become infected with Nipah virus when bats come at night to lick the trunks of the trees as the sap is flowing down and as they enjoy a sugary drink, they contaminate the sap or underlying pot with saliva or urine carrying the virus.

Fig 1: The risk of exposure to Nipah virus infection from collection pots of toddy due to excreta of bats (Source: CDC > Nipah (NiV) Virus > Risk of Exposure)



Thus, besides Malaysia, Nipah cases have been found in Singapore, Bangladesh, and India. These outbreaks have been scattered and small so far, with around only 600 cases recorded between 1998 and 2015, according to WHO. Thankfully, these Nipah virus outbreaks have been self-limiting because the virus doesn't spread very easily from human to human. Outbreaks have tended to fizzle out after four or five chains of transmission in humans. But our worry each time a new strain from bats infects people, it is a new opportunity for a more highly transmissible strain to take off and

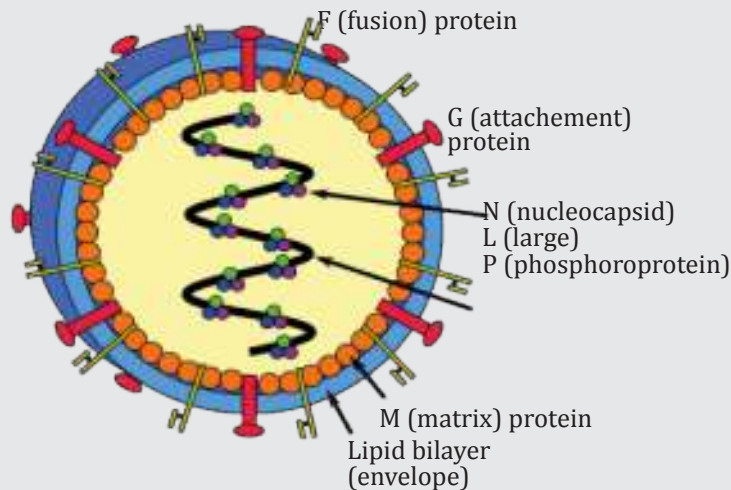
adapt to a human host, so that we might have another situation like Ebola in West Africa, which killed more than 11,000 people.

VIROLOGY

Nipah virus (NiV) is a RNA virus, a member of the family *Paramyxoviridae* (Order *Mononegavirales*), genus *Henipavirus* and is related to Hendra virus that infects horses.

Nipah virus is an enveloped virus measuring 40 – 600 nm in size and pleomorphic. Nipah virus genome is non-segmented, single-stranded negative-sense RNA. The genome is 18.2 kb in length and contain six genes corresponding to six structural proteins. They are nucleocapsid (N), phosphoprotein (P), matrix protein (M), fusion protein (F), glycoprotein (G) and polymerase (L).

Fig 2: The structure of Nipah virus (Source: en.wikipedia.com)



TRANSMISSION

NiV is a zoonotic virus, and infects animals such as pigs and fruit bats (*Pteropodidae* family), but they may be asymptomatic. It's now known that **fruit bats** belonging to the genus *Pteropus* (otherwise called **flying foxes**) are the native carriers of Nipah virus. Infected fruit bats sheds virus in their saliva or urine or body secretions, which infects pigs as well as other domestic animals, and humans get infection by direct contact with these animals.

Nipah virus can be transmitted to humans from animals:

1. By **direct close contact** with infected animals such as bats or pigs and/or humans (NiV infected people).
2. **Droplet infection:** by respiratory droplets, nasal or throat secretion of infected animals
3. **Eating contaminated fruits and juices** with body secretion of animals. Consumption of **raw date palm sap (toddy)** is a significant risk factor as bat excreta

often contaminates date palm sap. Bats are known to drink toddy that is collected in open containers, and occasionally urinate in it, which makes it contaminated with the virus.

4. Person to Person transmission with direct contact with infected persons, most commonly in the family and caregivers of Nipah virus-infected patients.

Fig 3: The transmission of Nipah virus (Source: medium.com)

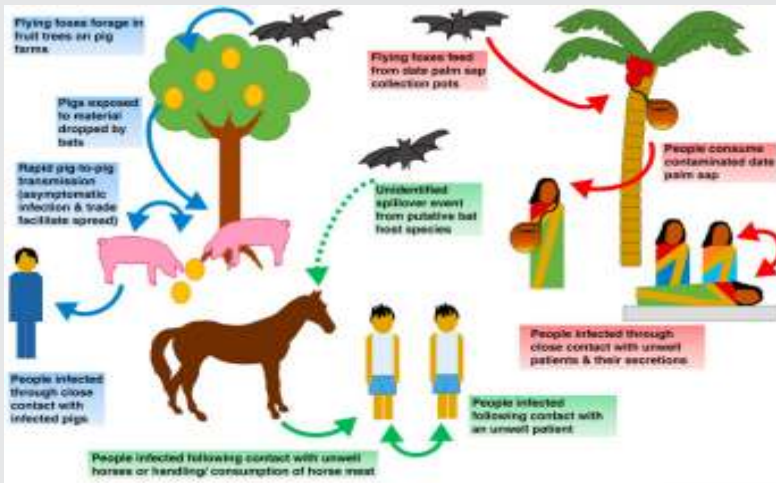


Fig 4: Flying foxes or fruit bats of the genus *Pteropus* (Source: thestatesman.com)



NATURAL HOST: FRUIT BATS

Fruit bats of the family *Pteropodidae*-particularly species belonging to the *Pteropus* genus – are the natural hosts for Nipah virus. There is no apparent disease in fruit bats.

It is assumed that the geographic distribution of Henipaviruses overlaps with that of *Pteropus* group. This hypothesis was reinforced with the evidence of *Henipavirus* infection in *Pteropus* bats from Australia, Bangladesh, Cambodia, China, India,

Indonesia, Madagascar, Malaysia, Papua New Guinea, Thailand, Timor-Leste.

African fruit bats of the genus *Eidolon*, family *Pteropodidae*, were found positive for antibodies against Nipah and Hendra viruses, indicating that these viruses might be present within the geographic distribution of *Pteropodidae* bats in Africa.

NIPAH VIRUS IN DOMESTIC ANIMALS

Outbreaks of the Nipah virus in pigs and other domestic animals such as horses, goats, sheep, cats and dogs were first reported during the initial Malaysian outbreak in 1999. The virus is highly contagious in pigs. Pigs are infectious during the incubation period, which lasts from four to 14 days.

An infected pig can exhibit no symptoms, but some develop acute feverish illness, labored breathing, and neurological symptoms such as trembling, twitching and muscle spasms. Generally, mortality is low except in young piglets. Nipah virus should be suspected if pigs also have an unusual barking cough or if human cases of encephalitis are present.

PATHOGENESIS

The contagious period for NiV infection likely begins during the incubation period and continues until the patient stops shedding the virus. In most patients, this occurs when the symptoms and signs of the infection are diminished or gone. Incubation period in infected pig ranges from 4 – 14 days. Infected pigs may develop clinical symptoms such as acute respiratory and neurologic illness resulting in economic losses for farmers. Nipah viruses are believed to infect respiratory tract epithelial tissue resulting in shedding of epithelial lining along with nasopharyngeal secretion. Although Nipah virus caused only a few outbreaks in Asia, it infects a wide range of animals and causes a severe disease and death in people, making it a public health concern.

During late stage, virus spread to lungs endothelium resulting in endothelial syncytium and mural necrosis. Nipah virus can then enter the blood stream and disseminate throughout the host in either free form or by binding host leucocytes. Nipah virus has been shown to bind to CD3+ leucocytes without entry or replication of the virus. The brain, spleen and kidneys are the other target organs. Nipah virus enters into CNS via olfactory nerve and/or via the hematogenous route through the choroid plexus and cerebral blood vessels. Infection of the CNS in humans is characterised by vasculitis, thrombosis, parenchymal necrosis, and presence of viral inclusion bodies.

The incubation period for NiV in humans usually varies about five to fourteen days. There have been a few cases with much longer incubation periods, as long as 45 days.

CLINICAL SYMPTOMS

Clinical illness in humans ranges asymptomatic subclinical infection to symptomatic acute respiratory infection (mild, severe) and fatal encephalitis (inflammation

of the brain). The case fatality rate may vary between 40% to 70% depending on epidemiological surveillance and clinical management.

Initially, infected people develop influenza like symptoms including fever, sore throat, headache, vomiting and myalgia (muscle pain). Some patients can also experience atypical pneumonia and severe respiratory problems, including acute respiratory distress. This can be followed by dizziness, drowsiness, altered consciousness, disorientation, mental confusion, and neurological signs that indicate acute encephalitis. Encephalitis and seizures occur in severe cases, progressing to coma within 24 - 48 hours and eventually death.

Most patients who survive acute encephalitis make a full recovery, but long term neurologic conditions have been reported in survivors. Approximately 20% of patients are left with long-term residual neurological sequelae such as seizure disorder and personality changes. A small number of people who recover may develop latent infections with subsequent reactivation or relapse or develop delayed onset encephalitis.

During the Nipah virus disease outbreak in 1998-99, 265 patients were infected with the virus. About 40% of those patients who entered hospitals with serious nervous disease died from the illness.

Latent infections with subsequent reactivation of Nipah virus and death have also been reported months and even years after exposure.

LABORATORY DIAGNOSIS

Initial signs and symptoms of Nipah virus infection are non-specific, and the diagnosis is often not suspected at the time of presentation. This can hinder accurate diagnosis and creates challenges in outbreak detection, effective and timely infection control measures, and outbreak response activities. In addition, the quality, quantity, type, timing of clinical sample collection and the time needed to transfer samples to the laboratory can affect the accuracy of laboratory results.

Nipah virus infection can be diagnosed with clinical history during the acute and convalescent stage of the disease by using a combination of tests. Virus isolation (by cell culture) attempts and polymerase chain reaction (RT-PCR) from throat and nasal swabs, cerebrospinal fluid, urine, and blood should be performed in the early stages of disease. Antibody detection by ELISA (IgG and IgM) can be used later on. In fatal cases, immunohistochemistry on tissues collected during autopsy may be the only way to confirm a diagnosis.

TREATMENT

There is no treatment or vaccine available specific for Nipah virus infection. The primary treatment for humans is limited to intensive supportive care to treat severe respiratory and neurologic complications. Because Nipah virus encephalitis can be transmitted person-to-person, standard infection control practices and proper barrier nursing techniques are important in preventing hospital-acquired infections

(nosocomial transmission).

The drug ribavirin has been shown to be effective against the viruses *in vitro*, but human investigations to date have been inconclusive and the clinical usefulness of ribavirin remains uncertain.

The anti-malarial drug chloroquine was shown to block the critical functions needed for maturation of Nipah virus, although no clinical benefit has yet been observed.

Passive immunization using a human monoclonal antibody targeting the viral G glycoprotein has been beneficial in a ferret model of the disease, but researchers have not studied the effects of this monoclonal antibody in humans.

PREVENTION

Nipah virus infection can be prevented by avoiding exposure to sick pigs and bats in endemic areas and not drinking raw date palm sap (Toddy).

Controlling Nipah virus infection in pigs

Based on the experience gained during the outbreak of Nipah involving pig farms in 1999, routine and thorough cleaning and disinfection of pig farms with appropriate detergents may be effective in preventing infection. If an outbreak is suspected, the animal premises should be quarantined immediately. Culling of infected animals with close supervision of burial or incineration of carcasses, may be necessary to reduce the transmission of infection to people.

Reducing the risk of infection in people

1. Reducing the risk of bat-to-human transmission

Keeping bats away from sap collection sites with protective coverings (such as bamboo sap skirts) and other fresh food products may be helpful. Freshly collected date palm juice should be boiled, and fruits should be thoroughly washed and peeled before consumption. Fruits with sign of bat bites should be discarded. Using water from wells infested by bats should be avoided.

International transmission via fruits or fruit products, such as raw date palm juice contaminated with urine or saliva from infected fruit bats can be prevented by washing them thoroughly and peeling them before consumption.

2. Reducing the risk of animal-to-human transmission

People should avoid being in contact with infected pigs, as much as possible. Gloves and other protective clothing should be worn while handling sick animals or their tissues, and during slaughtering and culling procedures.

3. Reducing the risk of person-to-person transmission

Close unprotected physical contact with Nipah virus infected people should be avoided. Regular hand washing should be carried out after caring for or visiting sick people.

Fig 6: A date palm sap (Toddy) collector uses a bamboo skirt to cover an area of shaved bark on the tree and protect the sap from fruit bats; a method of making date palm sap safer to drink that is being tested in Bangladesh (Source: <https://now.tufts.edu/articles/do-we-need-worry-about-nipah-virus>)



Controlling Nipah virus infection in health-care settings

Health care workers caring for patients with suspected or confirmed NiV infection, or handling specimens from them, should implement standard infection control precautions at all times. Contact and air-borne droplet precautions may be required in certain circumstances. Medical care givers should employ quarantine methods and use barrier methods such as gloves, masks, and disposable gowns, as they are at high risk of person-to-person transmission.

Additional efforts focused on surveillance and awareness will help prevent future outbreaks. Research is needed to better understand the ecology of bats and Nipah virus, investigating questions such as the seasonality of disease within reproductive cycles of bats.

A subunit vaccine, using the Hendra G protein, produces cross-protective antibodies against Hendra virus and Nipah virus has been recently used in Australia to protect horses against Hendra virus. This vaccine offers great potential for Henipavirus protection in humans as well.

In Nepal, the status of NiV infection is unknown. The fruit bats of genus *Pteropus* are present in Nepal. Health officials are put in high alert to prevent the entry of disease.

Pregnancy Outcome of Twin Pregnancy at Gandaki Medical College Teaching Hospital, Pokhara, Nepal

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Keywords

Complication, Pregnancy outcome, Preterm delivery, Twin pregnancy.

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ABSTRACT

Objectives: To evaluate maternal and neonatal complications and pregnancy outcomes of twin pregnancies.

Methods: The cross sectional study was conducted using retrospective data on the twin pregnancies with more than 28 weeks of gestational age. The study used data over a period of five years, from March 10, 2010 to March 9, 2015 in the Department of Obstetrics and Gynecology, GMC Teaching Hospital Pokhara.

Results: Of the 50 twin pregnancies, the most common maternal complication was preterm delivery (40%). Other maternal complications were anemia (36%), pregnancy induced hypertension (14%), premature rupture of membranes (14%), postpartum hemorrhage (12%) and antepartum hemorrhage (6%). Median gestational age at delivery was 37 weeks. Most common route of delivery was cesarean section (66%). Most common neonatal complication was low birth weight (48%) births first twin and second twin 56%.

Conclusion: Twin pregnancy has high maternal and neonatal complications, especially preterm delivery that increases the risk of significant neonatal morbidity and mortality.

INTRODUCTION

Twin pregnancy is usually associated with greater maternal and fetal risks than singleton pregnancy. Twin pregnancy still warrants special attention from obstetricians. Throughout the world, the prevalence of twin births varies considerably between two to 20 per 1000 births¹.

The dramatic rise in multiple gestations has been attributed to the increase use of ovulation inducing agents, use of assisted reproductive technologies, and a shift toward bearing children at older maternal ages when multiple gestations are more likely occur naturally². Multiple pregnancies are recognized as high risk pregnancy, associated with increased incidence of adverse pregnancy outcomes and risk for both maternal and fetal morbidity and mortality³.

Women with twin pregnancy have about two-fold increase

in the risk of death compared with women with a singleton gestation. Babies born from twin birth pregnancies are more likely to result in premature birth than those from single pregnancies. About half of twins are born with a birth weight of less than 2,500 g (5.5 lb)⁴. However, the chances of survival for very small twin babies are higher than for very small single babies⁵.

Major congenital abnormalities are more common in twin pregnancies as compared with singleton pregnancy. Twin to twin transfusion syndrome is a rare but potentially serious complication in identical twins these days. Survival rates are much higher due to early detection and also because of laser treatment, but the laser treatment is performed in few hospitals only, specialized in this procedure⁶.

Pre-eclampsia is two to three times more common in multiple than singleton pregnancy and it is likely to be more severe⁷.

METHODS

This was a cross sectional study conducted on the twin pregnancies with more than 28 weeks of gestational age delivered at Gandaki Medical College Teaching Hospital, Pokhara, Nepal. This study used the retrospective data of 50 twin pregnancy cases in the period from March 10, 2010 to March 9, 2015.

The data retrieved from the medical records included demographic data, complications of pregnancy, and maternal and neonatal outcomes. A record form was used to collect data concerning maternal and neonatal parameters including maternal complications, antepartum complications, intrapartum presentations, neonatal outcomes, neonatal complications, and perinatal mortality.

RESULTS

A total of 50 twin pregnancies were delivered during the study period.

Table 1: Twin pregnancy in relation to maternal characteristics (n=50)

Maternal characteristics	Frequency	Percentage
Maternal age in years		
18 - 20	7	14%
21 - 30	16	32%
31 - 40	27	54%
Parity		
Primi gravida	8	16%
Multi gravida	17	34%
Grand multigravida	25	50%

Higher percentage of women was in age group 31 - 40. Half of the women were of grand multi gravida.

Table 2: Mode of delivery in twin pregnancy

Mode of delivery	1 st twin (n=50)	2 nd twin (n=50)
Spontaneous vaginal delivery	20 (40%)	13 (26%)
Assisted breech delivery	1 (2%)	4 (8%)
Instrumental vaginal delivery	1 (2%)	0
Cesarean section	28 (56%)	28 (56%) + 5 (10%)

The higher percentage of twins was delivered by cesarean section. Five cases of second twin were delivered by cesarian section after vaginal delivery of first twin. The indications were large size of second twin in two cases and prompt closer of the cervix after delivery of the first twin in three cases.

Table 3: Lie and presentation in twin pregnancy (n=50)

Lie and presentation	Frequency	Percentage
Both vertex	28	56%
First vertex and 2 nd breech	10	20%
First breech and 2 nd vertex	7	14%
Both breech	5	10%
First vertex and 2 nd transverse	0	0%
Both transverse	0	0%

p=0.629 of 1st twin and 2nd twin was not significantly different. Fifty six percent of twins presented as both vertex presentation.

Table 4: Maternal complication and pregnancy outcome (n=50)

Maternal complication	Frequency	Percentage
Pre term delivery	20	40%
Anemia	18	36%
Polyhydramnios	8	16%
Pregnancy induced hypertension	7	14%
Premature rupture of membrane	7	14%
Postpartum hemorrhage	6	12%
Antepartum hemorrhage	3	6%
Placenta previa	2	4%
Abruptio placenta	1	2%
Cord prolapse	1	2%

Pre term delivery was observed as most common maternal complication followed by anemia.

Table 5: Neonatal outcome

Neonatal outcome	1 st twin (n=50)	2 nd twin (n=50)
Low birth weight	22 (44%)	25 (50%)
Very low birth weight	2 (4%)	3 (6%)
Apgar <7 in 5 minute	0	1 (2%)
Admission in NICU	24 (48%)	31 (62%)
Perinatal death	2 (4%)	5 (10%)

Low birth weight was more common outcome. Nearly half of the first twins were admitted in NICU and more than half of second twins were admitted in NICU. There was no twin-twin transfusion observed.

DISCUSSION

Twin pregnancy is high risk pregnancy associated with increased maternal morbidity, and increased perinatal morbidity and mortality. The highest incidence was found in women of age group 31 – 40 years (54%). The similar observation was found in the study conducted by Malik MS *et al*⁸.

In this study, 40% of the women presented with preterm Labor. Premature rupture of membranes occurred more frequently in twin pregnancy. Preterm labor and birth were frequent sequelae. Over distension of the uterus, polyhydramnios and premature rupture of the membranes

were responsible for preterm labor.

Anemia was more frequent in twin pregnancy than in singleton pregnancy. Thirty six percent of women suffered with anemia in present study. The greater increase in blood volume compared with red cell mass decreased in hemoglobin concentration, producing a more pronounced decrease in hemoglobin compared with singleton pregnancy. Fetal demands in a twin pregnancy are greater, particularly for folate. Deficiency of folic acid leads to increased incidence of megaloblastic anaemia. During the antenatal period; anemia, preterm labor, PIH and abruption placentae were the major complicating factors. However, in a study done by Shahela Khatiq, anemia was the most common complication followed by preterm labor, PIH and intrauterine growth restriction in that order; in twin pregnancy⁹.

Hydramnios is more common in monozygotic twins and usually involves the second sac, and may cause significant abdominal discomfort for the mother. The incidence of pregnancy induced hypertension, pre-eclampsia, and eclampsia is increased in twin pregnancy. Antepartum hemorrhage as a result of placenta praevia and placental abruption is increased in twin pregnancy. The increase incidence of placenta praevia is due to bigger size of the placenta encroaching on the lower segment. The separation of normally situated placenta may be due to increased incidence of pre-eclampsia, sudden escape of liquor following rupture of membranes, folic acid deficiency, following delivery of first baby. APH was found in six percent of cases in the present study. In our study spontaneous vaginal delivery was more common for first twin (40%), while for second twin it was 26%. Cesarean section rate was 56% for first twin and 66% for second twin. In mode of delivery, cesarean section was the most common route of delivery.

Multiple pregnancy puts mother at risk of miscarriage, pre-eclampsia, APH, PPH, iron and folic acid deficiency anemia, polyhydramnios, preterm labor, PROM and increased rate of cesarean section¹⁰. Today many pregnancies are the result of subfertility therapy. By limiting the number of embryo transferred can reduce the risk of having multiples and so reduce the risk associated with multiple pregnancies¹¹.

The reduction of perinatal mortality of twins may be due to better antenatal care, early diagnosis, early detection of complications, tocolysis and steroid administration for management of preterm labor and better neonatal care.

According to gestational age at delivery, perinatal death was decreased when gestational age increased.

CONCLUSIONS

Twin pregnancy has high maternal complications such as preterm delivery and anemia of mothers; and neonatal complications like low birth weight, increased NICU admission and perinatal deaths.

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Prevalence and Patterns of Thyroid Disorders Assessed from Neck Ultrasonography in Western Nepal

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Keywords

Neck ultrasonography, Thyroid disorders, Western Nepal.

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ABSTRACT

Background: Thyroid problems are rapidly increasing in the world. Thyroid ultrasonography may be a very simple tool to assess and screen thyroid problems. This retrospective study to assess the prevalence of thyroid disorders from neck ultrasonography in relation to age, gender and disease type was performed in Diabetes Thyroid and Endocrinology Care Center, Pokhara Nepal.

Methods: Five hundred computer saved datas from the Radiology Department of Diabetes Thyroid & Endocrinology Care Center from April 2017 to April 2018 were collected. Cases were reviewed for age, gender and disease type and statistical analysis was done using SPSS tool.

Results: Out of 500 patients 14% were males, 86% were females; age ranged from three days to 86 years. Hashimoto's thyroiditis was commonest problem and very prevalent in women.

Conclusions: Thyroid problems are so common in general population, especially in females. Simple diagnostic tool like neck ultrasonography gives clue to make clinical diagnosis.

INTRODUCTION

Thyroid related problems are very common these days. Females are affected more than the men as male to female ratio is 1 : 10. Thyroid dysfunction is a major public health problem among the Nepalese population too¹. It has been estimated that 0.2% of the deaths in Nepal result from endocrine disorders, among which thyroid problems has been a major cause². In earlier days iodine deficiency was the major cause for hypothyroidism in Nepal but now it is not the cause as autoimmunity is the major cause. The thyroid disorders may be due to congenital factors, a genetic predisposition, inadequate levels of dietary iodine intake, pregnancy, radiotherapy, viral infections, surgery, underlying diseases such as infiltrative disorders, or even autoimmunity³⁻⁵. Any age group can be affected by thyroid

problems. As thyroid disorders are major problems in present scenario, we tried to find the simple and cost effective tool to detect and treat thyroid disorders in underdeveloped country like Nepal.

MATERIALS & METHODS

The Study Design

This is a hospital based study conducted in the Department of Radiology of Diabetes Thyroid & Endocrinology Care Center, Pokhara, Nepal. In this retrospective study, the subjects who visited Diabetes Thyroid & Endocrinology Care Center from April 1, 2017 to April 1, 2018 were enrolled. These patients had some degree of clinical

suspicion of thyroid disorders and some of them even had performed the thyroid function test. The subjects with no clinical suspicion of thyroid disorders were excluded from the study. The variables which were collected were age, gender and the type of thyroid disorders.

RESULTS

Out of 500 patients 14% were males, 86% were females, age ranged from three days to 86 years. Hasimoto's thyroiditis was commonest problem and very prevalent in women.

Fig 1: Male to female ratio

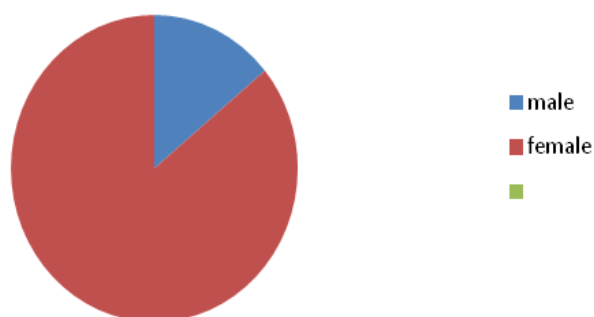


Fig 2: Age

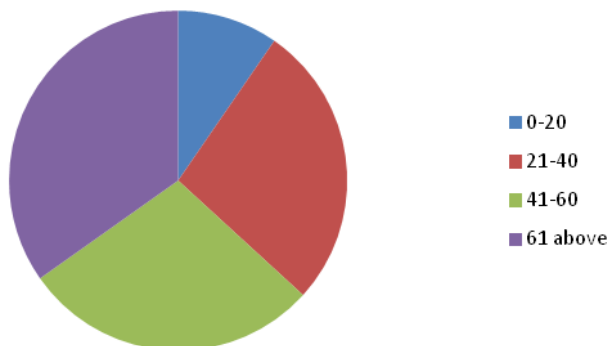
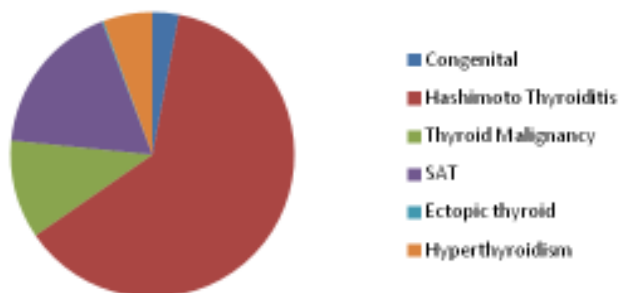


Fig 3: Disease type



DISCUSSION

Thyroid dysfunction is a major public health problem among the Nepalese population¹. It has been estimated that 0.2% of the deaths in Nepal result from endocrine disorders, among which Iodine deficiency has been a major cause². But nowadays thyroid problems are shifting from iodine deficiency to autoimmune thyroid disorders in Nepal. The thyroid disorders may be due to congenital factors, a genetic predisposition, inadequate levels of dietary iodine intake, pregnancy, radiotherapy, viral infections, surgery, underlying diseases such as infiltrative disorders, or autoimmunity³⁻⁵.

In this study, females showed a higher prevalence of thyroid dysfunction than males as 86% of the populations were female. This might be because of females are very prone to autoimmune disorders than males as many other studies also show this pattern⁶. However, a contrasting result was observed by Baral *N et al*, where they reported equal prevalence of thyroid dysfunction in males and females¹. It had been reported earlier that there was a 20% overall prevalence of thyroid dysfunction in Eastern Nepal in subjects who were above 20 years of age⁷.

Neck ultrasonography may be the simple tool to access thyroid problem in economically poor country like Nepal. Most of thyroid diseases are benign and just need medical treatment and follow up and very few may need surgical intervention. Clinical and laboratory assessment is not sufficient for identification of nature of thyroid diseases. So imaging is mandatory for these cases⁹. Ultrasonography is the most widely used application for diagnosis of thyroid diseases. It is safe, cheap, time saving and has high sensitivity and specificity for thyroid lesion characterization⁸. It can characterize most of thyroid lesions and detect small sized nodules less than 3 mm and can evaluate the other nearby neck structures like lymph nodes, carotid arteries, jugular veins, major salivary glands.

There is characteristic ultrasonography finding of different thyroid disorders⁸. Normal thyroid have homogenous bright gland; diffuse toxic goiter (Graves disease) have enlarged gland with homogenous to coarse texture and high vascularity, Hashimoto's thyroiditis have heterogenous echotexture with increased vascularity, multinodular nontoxic goiter have enlarged glands with large bright nodules and average vascularity, subacute thyroiditis have multiple patchy hypoechoic areas with

normal vascularity. Malignant nodules appear hypoechoic with intranodular flow with punctuate calcifications. Colloid cysts appear anechoic with few hyperechoic foci with comet tail artifacts due to thyroglobulin chains. By using simple ultrasonography major thyroid problems can be detected and treated.

CONCLUSIONS

Thyroid problems are very common in general populations, especially in females and in economically underprivileged country like Nepal. Simple diagnostic tool like neck ultrasonography give clue to make clinical diagnosis. It is safe, cheap, time saving and has high sensitivity and specificity for thyroid lesion characterization.

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A Multi-Center Assessment of Thyroid Function Test Precision in Chemiluminescence Immunoassay (CLIA) Systems

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ABSTRACT

Background: Chemiluminescence immunoassay (CLIA) is exclusively pragmatic technology for the analysis of biomarker for diagnosis of thyroid disorders. However, performance characteristics of different chemiluminescence immunoassay (CLIA) systems supplied by different manufacturers in diverse set up for thyroid function test (TFT) has not yet been studied well.

Objective: Our aim is to evaluate laboratory results by assessment of the reproducibility and repeatability of TFTs in three different diagnostic set up to assure the quality of thyroid hormone assay using chemiluminescence immunoassay (CLIA) instruments: Advia Centaur CP (Siemens), Access 2 (Beckman Coulter) and Liaison (Diasorin).

Materials and Methods: Among the adult male and female individuals visited for thyroid hormone assay, 51 normal individuals were selected for the study. Three aliquots of serum samples were distributed to assess the reproducibility of three different CLIA equipments operated in three diagnostic centers. Additional three aliquots of serum were analyzed weekly for TFT (fFT3, fFT4 and TSH) to check the repeatability of assay in ADVIA Centaur CP set up. Assay precision was determined by reproducibility and repeatability of test results.

Results: Results of TFTs of serum samples obtained from three different interlaboratory assays using different CLIA systems have achieved good precision showing minimal variance ($P > 0.05$) and acceptable reproducibility. Results are also precise with adequate repeatability showing minimal variance ($P > 0.05$) obtained from the three different intra-laboratory assays in a single CLIA system using ADVIA Centaur CP by same team.

Conclusion: Our study elucidates the thyroid hormone assay performance of CLIA systems in three centers, which has shown assay precision with good reproducibility and repeatability of thyroid hormone assay. Thus, the analysis of precision as an essential component of quality control is necessary to deliver precise diagnostic services.

Keywords

CLIA, Precision, Repeatability, Reproducibility, TFT.

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INTRODUCTION

Thyroid disorders are among the most prevalent endocrine disorders worldwide¹. Investigation of thyroid function test (TFT) is crucial for the management of thyroid disorders and associated metabolic syndrome^{2,3}. There is 30% prevalence of thyroid disease, and about 0.2% of death has been reported in Nepal results from endocrine disorders⁴. Hence, for the proper diagnosis and management of patients with thyroid disease, reliable laboratory reports on thyroid hormone assay plays vital role.

Thyroid tests are most commonly ordered laboratory tests in current clinical practice in which consistency of laboratory report in different set up determine the quality of health care^{5,6,7}. Recently, chemiluminescence immunoassay (CLIA) is most common immunoassay technique for high throughput hormone assay technique applied in clinical practice, however, variation of test results between laboratories due to compromised quality control is the current challenge in developing countries^{6,7}. The accuracy and reliability of the tests are of primary importance for patients and for all the professionals engaged in health care system. Thus, thyroid hormone assay evaluation is essential to ensure quality of laboratory results with sufficient precision for the diagnosis and monitoring treatment of thyroid disorders. This study was conducted to evaluate the precision in thyroid assays using different CLIA equipment in different diagnostic centers of Nepal. We performed Reproducibility (Different team, different experimental setup) and Repeatability (Same team, same experimental setup), of TFTs in current diagnostic set ups.

Assessment of reproducibility of TFTs has been performed by measuring TFTs using Liaison, Diasorin set up in Gandaki Medical College Teaching Hospital, Pokhara, Nepal, and ADVIA Centaur CP set up in Life Care Diagnostics and Research Center, Pokhara, and Access 2 set up in Life Care Diagnostics and Research Center, Dhangadi. Evaluation of repeatability is performed by measuring TFTs in Life Care Diagnostics and Research Center, Pokhara using ADVIA Centaur CP.

MATERIALS AND METHODS

Among the adults aged below 50 years including male and female visited for thyroid hormone assay, only selected 51 normal individuals were participated in this study. Serum samples were divided into six aliquots (0.5ml/tube) stored in -20°C. Three aliquots were distributed to assess the

reproducibility of three different CLIA based equipment operated in all three diagnostic centers including: Liaison, (Diasorin, Italy) set up in Gandaki Medical College Teaching Hospital, Pokhara, Nepal, ADVIA Centaur CP (Seimens, Grrmany) set up in Life Care Diagnostics and Research Center, Pokhara, and Access 2 (Beckman Culter, USA) set up in Life Care Diagnostics and Research Center, Dhangadi. Remaining three sample aliquots are used to analyze TFT (fT3, fT4 and TSH weekly for three weeks,) to check the repeatability in ADVIA Centaur CP set up in Life Care Diagnostics and Research Center, Pokhara. The evaluation of uncertainty of the results or assay precision was determined by reproducibility and replicability statistically measuring mean, variance and significant variation has been measured by one way analysis of variance (ANOVA)^{8,9,10,11} using statistical software Microsoft Excel with QI Macros 2018 (Microsoft Corporation) and Origin 6.1 (Origin Lab Corporation).

RESULTS

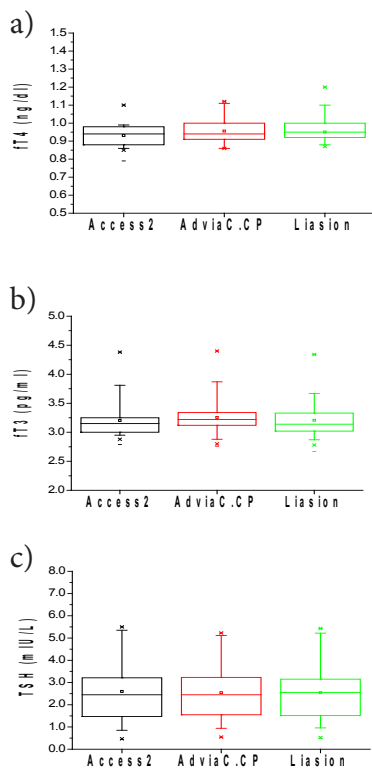
The study included sample from 51 adult participants below 50 years. Of them, the majority, 86.3% were females. Mean age of the study participants were 32.8 years. About half, 49.0% population were in the age group of 20 to 30 years. Participants with abnormal thyroid function test were excluded from the study based up on reference range set up in laboratories. Consistency of laboratory reports were evaluated by precision analysis as described in previous studies^{19,11}, including reproducibility (Inter-laboratory variation, in different team and set up: Liaison, Diasorin set up in Gandaki Medical College Teaching Hospital, Pokhara, ADVIA Centaur CP in Life Care Diagnostics and Research Center, Pokhara, and Access 2 in Life Care Diagnostics and Research Center, Dhangadi Nepal) and repeatability (intra-laboratory variation in same team, same experimental setup using ADVIA Centaur CP).

Table 1: Inter-laboratory variability of fT3, fT4 and TSH values generated from three different CLIA set up

Type of test	Numbers	Mean	Variance	F value	P value
fT3 Assay					
Access 2	51	3.20	0.098	0.472	0.624
Centaur-CP	51	3.25	0.094		
Liaison	51	3.20	0.091		
fT4 Assay					
Access 2	51	0.930	0.003	1.101	0.335
Centaur-CP	51	0.955	0.004		
Liaison	51	0.950	0.017		

		TSH Assay			
Access 2	51	2.59	1.98	0.026	0.0.974
Centaur-CP	51	2.54	1.82		
Liaison	51	2.54	1.82		

Fig 1: Box plot showing the distribution of mean value of fT3, fT4 and TSH produced from three different laboratory set up



Analysis of inter-laboratory precision (Reproducibility)

Inter-laboratory reproducibility was assessed by interpretation of data (Presented in Table 1) shows the means and variance of values of fT3, fT4 and TSH produced from the different team and different laboratory set up on seventh day. We found no significant difference in the mean values of fT3 analyzed on Access 2, ADVIA Centaur CP and Liaison Diasorin (3.20, 3.25 and 3.20, respectively) in the different laboratory set up with $P > 0.05$ obtained by one-way ANOVA. Similarly, the test for fT4 was also conducted and analyzed on Access 2, ADVIA Centaur CP and Liaison Diasorin in the different laboratory setting. The result also showed that there was no significant difference in the mean values of fT4 (0.930, 0.955 and 0.950, respectively) generated from the different laboratory setting ($P > 0.05$). Mean values of TSH analyzed on same day in the different setting were 2.59, 2.54 and 2.54. The result showed that there was no significant difference among mean TSH values of the results produced from different laboratories ($P > 0.05$). This finding shows precise reproducibility of the

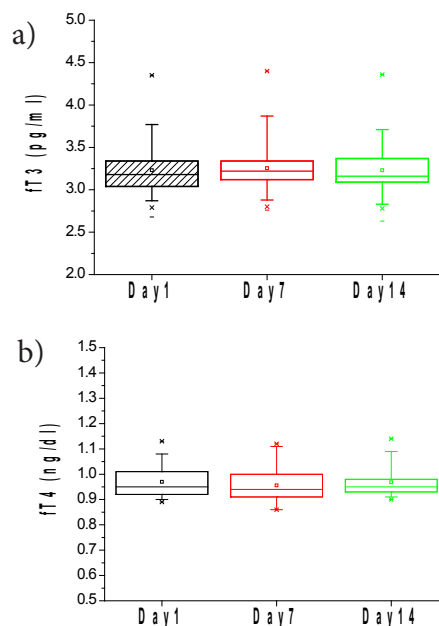
assay methods.

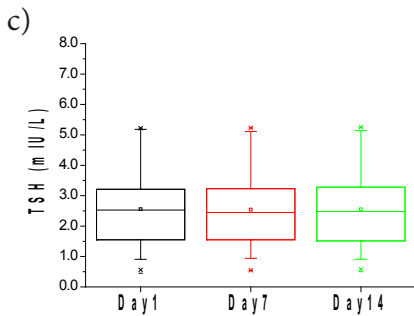
The box plot in Figure 1 also present the consistency of the fT3, fT4 and TSH values produced from the different laboratories. The box plot for fT3, fT4 and TSH for same day sample analysis was similar for its outliers, median and quartiles. It shows, there was similarity on the result with adequate reproducibility found on same day from different setting (Fig 1). Thus, the finding shows there was not significant variance in the mean value of all test in the study with acceptable reproducibility and good precision.

Table 2: Intra-laboratory variability of fT3, fT4 and TSH values generated on 1st, 7th and 14th days from the same laboratory using Advia Centaur-CP system

Type of test	Number	Mean	Variance	F value	P value
fT3 Assay					
1st day	51	3.22	0.098	0.116	0.890
7th day	51	3.25	0.094		
14th day	51	3.23	0.098		
fT4 Assay					
1st day	51	0.969	0.004	0.731	0.483
7th day	51	0.955	0.004		
14th day	51	0.968	0.003		
TSH Assay					
1st day	51	2.55	1.82	-0.512	0.600
7th day	51	2.54	1.82		
14th day	51	2.55	1.81		

Fig 2 : Box plot showing the distribution of mean values of fT3, fT4 and TSH produced on 1st, 7th and 14th days from the same laboratory using Advia Centaur-CP system





Analysis of intra-laboratory precision (Repeatability)

Intra-laboratory repeatability was assessed by interpretation of data presented in Table 2, which shows means and variances of fT3, fT4 and TSH values produced from the same laboratory on 1st, 7th and 14th days using ADVIA Centaur CP in Life Care Diagnostics and Research Center, Pokhara. The mean fT3 values of all samples on 1st, 7th and 14th days were 3.20, 3.25 and 3.23, respectively. It revealed that the variance of the mean values found on three different days was minimal. The results of one-way ANOVA test showed no significant difference in the mean value of fT3 analyzed on 1st, 7th and 14th days in the same laboratory set up ($P > 0.05$) showing adequate repeatability. The mean fT4 values of the samples on 1st, 7th and 14th days were also similar (means 0.969, 0.955 and 0.968, respectively) with minimal variance (Table 2). The results of one-way ANOVA test showed that results produced on three different days in the same laboratory setting were consistent. Thus, there was no significant difference in the mean value of fT4 produced on 1st, 7th and 14th days in the same laboratory set up ($P > 0.05$).

Similarly, the mean TSH values of the sample on 1st, 7th and 14th days were 2.55, 2.54 and 2.55, respectively. There was no significant difference in the mean value of TSH found on 1st, 7th and 14th days in the same laboratory set up ($P > 0.05$). In this way the results produced on three different days in the same laboratory setting were consistently repeatable.

The box plot presented in Figure 2 also showed the reliability or consistency of the fT3, fT4 and TSH values produced from the same laboratory on three different days. The box plots for fT3, fT4 and TSH for different day sample analysis were similar for its outliers, median and quartiles. This also shows there was not variation on the results produced by the same laboratory setting on the different day (Fig 2).

DISCUSSION

Thyroid hormones including TT3, TT4, fT3, fT4 and TSH (Third generation) assays are among the most frequently advised laboratory tests for the investigation of thyroid function and crucial for the management of associated endocrine disorders and metabolic syndrome^{2,3,5,6}. Due to the deficiency of iodine and autoimmune disorders, there is increased rate of prevalence of thyroid disease contributes mortality rate in Nepal⁴. Hence, for the proper diagnosis and management of patients with thyroid disease, reliable laboratory reports on thyroid hormone assay plays decisive role.

Recently, CLIA technology is most common immunoassay technique for high throughput hormone assay technique applied in clinical practice, however, variation of test results between laboratories due to compromised quality control is the current challenge in developing countries^{6,7,13}. Comparison of laboratory tests between different instrumental set up is essential component of quality health laboratory practice. A recent report on TSH analysis variation in two CLIA set up in India including Abbott Architect and Roche Cobas shows certain level of variation between the methods, however, majority of values found within the limit of agreement between two CLIA systems¹². Another study conducted in China shows acceptable linearity, relativity, accuracy and precision between the CLIA, radioimmune assay (RIA) and magnetic solid phase enzyme-linked immunosorbent assay (MSP-ELISA) performance of TFTs showing CLIA as a better performance compared to other methods¹³. Similarly, the results of thyroid hormone assay using electrochemiluminescence assay, Elecsys 2010 has shown good correlation with those measured by radioimmune assay (RIA) and enzyme-linked immunosorbent assay (ELISA)¹⁴. Thus, the accuracy and precision of the tests are of primary importance for patients and for all the professionals engaged in health care system. Quality of thyroid hormone assay can be assured by laboratory results using performance analysis routinely with sufficient precision which has high impact on the diagnosis and monitoring treatment of thyroid disorders.

Precision analysis is essentially required to establish the intra-laboratory and inter-laboratory quality performance. Our study evaluated the accuracy and precision in thyroid assays using different CLIA equipment in different diagnostic centers of Nepal. We demonstrated statistical

Reproducibility (Different team, different experimental setup) of thyroid hormone assay using CLIA systems including Access 2, ADVIA Centaur CP and Liaison. Acceptable Repeatability (Same team, same experimental setup), is shown by ADVIA Centaur CP performance of TFTs in one diagnostic set up. Replicability (Different team same experimental set up) is another component of precision analysis has to be performed in routine practice. Although we could not present replicability data of assay in this study, tests performed in participating laboratories are replicable as described in internal quality control data (Data not shown).

The limitation of this study is the achievement of good precision with minimal variance only using samples from normal individual, so further studies are required to elucidate the consistency of result of TFTs in hypothyroidism and hyperthyroidism patients. Thus, our data emphasize testing laboratories that reproducibility analysis should be added to uncertainty budgets, which should be accompanied with repeatability data to ensure how good the measurement results reproduced to assure quality of laboratory analysis.

CONCLUSION

Our study demonstrates precise assay performance of TFTs using CLIA systems in different centers, which has shown acceptable precision with good reproducibility and repeatability of thyroid hormone results. Thus, precision analysis is essential component of quality assurance of health laboratory set up for the reliable diagnostic services.

Disclosure

The authors declared no conflict of interest

Acknowledgements

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Functional Outcome of Intra-articular Fractures of Distal Radius: ORIF with Locking Plate vs CRPP

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ABSTRACT

Background: Distal radius fractures are common, costly, and increasing in incidence. Closed reduction and percutaneous K wires fixation and ORIF with locking plate fixation are two of the mostly used surgical treatments for dorsally displaced distal radius fractures. However, there is uncertainty which of these treatments is superior.

Methods: This is a prospective study on 40 patients. Twenty patients had closed reduction and percutaneous pinning (CRPP) with K wires (Group A) and 20 patients had open reduction and internal fixation (ORIF) with locking plate and screws (Group B). Evaluation were done in the means of DASH scores and ROM of operated wrist on 1.5 months, three months and six months follow up period.

Results: Though the overall functional outcome is comparatively better with Group B, the significant difference for most variables like DASH Scores, extension, supination and ulnar deviation were found at early part of treatment only. The flexion and radial deviation bear no significant outcomes at all intervals of evaluations. Superficial wound infection was more common in patients treated with K-wires but otherwise no difference in complication rates was noted.

Conclusion: Locking plate fixation provided lower DASH scores and reduced total postoperative complications compared to CRPP group over six months follow-up period. However, these differences were significant in early part of treatment. Further research is required to better delineate the confirmation.

Keywords

CRPP, Distal fracture of radius,
Functional outcome, ORIF.

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INTRODUCTION

Fractures of distal part of the radius are common and account for approximately 15% of all of the fractures in adults¹. Dispalced intra-articular distal radial fractures continue to pose challenges with regard to both decision making and management when treating wrist injuries. Striving for an anatomic reduction of the articular surface is accepted as a desirable goal because articular incongruities after fracture healing have been documented to adversely affect functional outcome and lead to early degenerative changes².

Most fractures of the distal radius are reducible with adequate stability and can be treated by closed reduction and casting. However, fractures that are unstable or involve the articular surfaces can jeopardize the congruence and kinetics of the wrist³. In complex intra-articular fractures of the distal radius, surgery allows more accurate reduction of articular surface and treatment of soft tissue injuries⁴.

We undertook this prospective study of intra-articular fractures of the distal radius to evaluate functional outcomes after reduction either by surgery (Open reduction and internal fixation with locking plate) or by

closed reduction and per cutaneous fixation with K-wires under fluoroscopy.

METHODS

A total of 40 consecutive patients, 18 females, 24 males, treated between December 1, 2015 and December 1, 2016 (15 Mangsir 2072 to 16 Mangsir 2073 B.S.) were included in the study. The study was conducted in Fishtail Hospital, Pokhara and Gandaki Medical College Teaching Hospital, Pokhara. They were assigned, based on convenient sampling for treatment. A written informed consent was obtained from each patient. Approval from the institutional review board was granted.

All patients had similar fracture characteristics. Those admitted to the study had an intra-articular fracture of distal radius (AO type- C1, C2 or C3) with a step off or gap greater than 2 mm. Patients with open fractures, multiple fractures, or associated with others upper extremity injuries were excluded. Patients with central nervous system disorders such as previous stroke or cerebral palsy were also excluded.

Twenty patients had closed reduction and percutaneous pinning (CRPP) with K-wires (Group A). This group included 10 males and 10 females with a mean age of 51 years (44 to 66 years). Twenty patients had open reduction and internal fixation (ORIF) with locking plate and screws (Group B). There were 12 males and 8 females with a mean age of 41 years (30 to 52 years) in Group B. The mechanism of injury was a fall on outstretched extremity in 30 patients and a motor vehicle accident in 10. The operations were performed under general or regional anesthesia.

In all patients of Group A, cast and K-wires were removed on first post operative month and asked to do exercise at home. In Group B, sutures were removed in interval of 10 to 14 post-operative days and asked to do exercises at home. All patients were requested to follow up on 1.5 months, three months and six months.

At 1.5 months, three months and six months post-operatively, all patients were examined using the Disabilities of the Arm, Shoulder and Hand (DASH) scores questionnaire and range of motion of operated wrist like Flexion (FX), Extension (EX), Supination (SU), Pronation (PR), Ulnar deviation (UD) and Radial deviation (RD). Antero-posterior and lateral radiograph of the distal radius were done during the diagnosis and in each follow

up period.

Global hand function was evaluated using the upper limb functional evaluation scoring system—the DASH score. The DASH is a validated 30-item, self-report questionnaire designed to measure physical function and symptoms in patients with musculoskeletal disorders of the upper limb, with a total score ranging between '0', indicative of normal use of the upper limb, to '100', indicative of a nonfunctional upper limb.

All data were analyzed by SPSS 17.0 and descriptive statistics were applied. Significant of the means were compared by using T test. The results were considered to be significant with p-value of <0.05.

RESULTS

Group A have DASH Scores of 75.4 ± 3.89 in 1.5 months follow up where as Group B have DASH scores of 26.2 ± 2.75 in same duration. Group B, comparatively has less DASH Scores than Group A at all follow up evaluations as shown in Table 1. But the significant difference is found to be at 1.5 months interval with p value <0.05. However, over all period of time, there is gradual reduction in DASH Scores in both Groups.

There is significantly different in flexion of wrist of Group A and Group B in 1.5 months follow up. But, in six months follow up, flexion of wrist of Group A is 61.1 ± 1.20 and flexion of wrist of Group B is 64.7 ± 1.49 . But extension of wrist of Group A is 4.95 ± 1.6 and that of Group B is 28.15 ± 2.90 in 1.5 months follow up, which is statistically significant (p value <0.05). Whereas the extension of wrist of Group A is 52.6 ± 2.50 and extension of wrist of Group B is 64 ± 2.95 in six months follow up (Table 3). Supination and pronation in both groups have significantly different in 1.5 months and three months follow up (p value <0.05) but there is no such different in six months follow up, as shown in Table 4 and 5.

In 1.5 months follow up, radial deviation of Group A is 3.45 ± 0.82 and 5.2 ± 0.95 in Group B. It gradually increased to 8.45 ± 0.51 in Group A and 9.3 ± 0.47 in Group B in six months follow up (Table 6). Ulnar deviation in Group A is 4.2 ± 0.83 and ulnar deviation in Group B is 5.7 ± 0.57 in 1.5 months follow up, which is statistically significant (p value <0.05).

Complications were encountered in two patients. In Group

A, two patients had superficial pin tract infection around a K-wire. This was resolved by oral antibiotics and early removal of the pins was done.

Table 1: DASH scores in each follow up

	DASH 1 ± SD	DASH 2 ± SD	DASH 3 ± SD
Group A	75.4 ±	36.4 ±	27.1 ±
Group B	26.2 ±	21.4 ±	17.4 ±
P value	0.04	0.01	0.57

Note: 1 = 1.5 months follow up; 2 = 3 months follow up; 3 = 6 months follow up

Table 2: Degree of flexion in each follow up

	Flexion 1 ± SD	Flexion 2 ± SD	Flexion 3 ± SD
Group A	8.45 ±1.66	49.2 ±3.91	61.1 ±1.2
Group B	31.2 ±1.5	54.15 ±1.49	64.7 ±1.49
P value	0.75	0.1	0.26

Table 3: Degree of extension in each follow up

	Extension 1 ± SD	Extension 2 ± SD	Extension 3 ± SD
Group A	4.95 ±1.6	13.75 ±3.1	52.6 ±2.5
Group B	28.15 ±2.9	42 ±3.29	64 ±2.95
P value	0.012	0.05	0.88

Table 4: Degree of supination in each follow up

	Supination 1 ± SD	Supination 2 ± SD	Supination 3 ± SD
Group A	9.1 ±3.2	33.55 ±5.4	68.1 ±3.69
Group B	23.15 ±3.29	50.3 ±4.06	71.9 ±1.65
P value	0.041	0.02	0.075

Table 5: Degree of pronation in each follow up

	Pronation 1 ± SD	Pronation 2 ± SD	Pronation 3 ± SD
Group A	9.45 ±3.05	35.15 ±6.51	76.45 ±3.48
Group B	24.35 ±3.26	51 ±3.74	78.75 ±1.40
P value	0.015	0.003	0.015

Table 6: Degree of radial deviation in each follow up

	Radial Deviation 1 ± SD	Radial Deviation 2 ± SD	Radial Deviation 3 ± SD
Group A	3.45 ±0.82	6.45 ±0.68	8.45 ±0.51
Group B	5.2 ±0.95	7.85 ±0.67	9.3 ±0.47
P value	0.13	0.41	0.09

Table 7: Degree of ulnar deviation in each follow up

	Ulnar Deviation 1 ± SD	Ulnar Deviation 2 ± SD	Ulnar Deviation 3 ± SD
Group A	4.2 ±0.83	15.05 ±1.57	19.2 ±1.36
Group B	5.7 ±0.57	19.3 ±1.17	20.7 ±0.97
P Value	0.03	0.55	0.24

DISCUSSION

Open reduction and internal fixation of fractures of the distal radius allows direct observation of articular surfaces. In particular, rotation of the fracture fragments, which is difficult to judge under fluoroscopy, may be detected and corrected on surgery. Irrigation to remove fracture hematoma and debris potentially reduces the inflammatory reaction and improves the range of movement⁴. Open surgery also allows for the management of associated acute soft-tissue injuries, whose treatment has a better prognosis than chronic lesions. Our study confirms this observation, as the patients in the ORIF group showed better results after immediate treatment of acute soft tissue injuries, not withstanding reports showing a discrepancy between radiological appearance and function⁵.

Treatment of displaced fractures of the distal radius aims to restore normal anatomy⁶. An intra-articular step of more than 2 mm will not be generally accepted⁷, and recent studies indicate that the critical tolerance may be as low as 1 mm⁸. Some advocate for computed tomography scan for articular incongruity in this fracture, but it is not possible to do computed tomography in all the cases. Johnston *et al*⁹ described their experience with computed tomography scanning in determining operative indications and preoperative planning for distal radial fractures, but their study did not determine if a computed tomography scan is better than or equivalent to radiographs in detecting fracture displacements and combination.

The incidence of associated ligament injuries had been variously reported: lesions of the scapholunate ligament in up to 40% of intra-articular fractures, lunotriquetral ligament injuries in 20%, and combined scapholunate and lunotriquetral injuries in 10% of fractures¹⁰. Finally, articular cartilage lesions have been noted in both the radiocarpal and midcarpal joints in up to 30% of distal radial fractures in young adults¹¹.

The operation time was significantly increased by approximately 45 minutes in the ORIF group, but there is no other study for comparison. There were also differences in hospital stay or time to mobilization in two groups. Although the range of movement was acceptable in both groups, this study shows the ORIF technique to be superior, at least in the early months. There was a statistically significant difference between the outcomes

in the two groups which decreased with time.

In our study, there was no correlation between the outcome score and type of fracture, age, gender or operative delay. Slight loss of movement and grip strength was the main reason for inferior results. All patients returned to their regular activities but this occurred earlier in the Group B patients. Differences regarding return to work were not statistically significant. In Group A, patients returned to work after a mean of four months (Three to five months) where as in Group B, patients returned to work after a mean of 2.5 months (Two to three months).

DASH scores tend to show similarity at the end of six months. No significant difference existed in DASH scores at six months in many recent studies¹². DASH scores were significantly lower (i.e. less impairment in upper limb function), for all time points of measurement over six months postoperatively, for patients who underwent ORIF with locking plate compared to patients with CRPP. The difference in DASH scores between the two groups, however, decreased over the time. It is possible that the higher DASH scores for patients with CRPP over the initial postoperative phase may be due to delayed onset of wrist ROM exercises. Therefore, the locking plate fixation technique could be considered for patients requiring a faster return to function after injury.

We found range of wrist flexion, supination and pronation to be significantly better in patients with locking plate fixation at three and six months, again with no significant difference, compared to patients with CRPP at six months. There were no differences for other ROMs of the wrist between the two patient groups. In our study, we presumed that patient-reported functional satisfaction, as recorded by the DASH scores, was partially related to objective assessments of wrist and hand function (i.e. ROM and daily activities), which could explain statistical differences in ROM between the two patient groups over the early postoperative period. But the ROMs of the wrist and DASH scores between the two patient groups are also similar at six months. Even extension, radial deviation and ulnar deviation show difference at six months. The argument of improved ROMs at an earlier time is not entirely true. So the selective return of wrist movements may not benefit the patient much clinically. We did not include radiographic data in our study because the radiographic parameters did not necessarily correlate with subjective functional outcomes¹³.

According to the result of our study, ORIF with locking plate may be a superior fixation technique, over a CRPP technique, for the distal radius fracture. However, from a cost-analysis perspective, the cost of locking plate to be two to threefold higher than that of K-wire fixation. Hence, surgeons must weigh all evidence while determining the treatment options for distal radius fractures in collaboration with the patient. The surgeon must provide patients with evidence-based information regarding the risks and benefits of the two surgical fixation techniques, taking into consideration a patient's expectations, lifestyle and associated injuries in determining the most appropriate treatment approach.

This study has several clinical limitations. We had a follow up on 1.5 months, three months and six months post operatively. Although an average follow-up of six months is sufficient to evaluate the result of fracture distal radius treatment, the results of long-term follow-up remain to be clarified. We had included only 40 cases in our study, which is very less in numbers to evaluate the outcome. The relatively small number of participants limited the statistical power of findings. Hence, future studies are needed to improve the statistical outcomes.

CONCLUSION

ORIF with locking plate fixation provided lower DASH scores and reduced total postoperative complications, most specifically lowering the risk for postoperative superficial infection compared to CRPP group over six months follow-up period. ORIF with locking plate fixation also provides better ROM of wrist in the six month postoperative period. However, owing to the limitation and bias of the evidence in our study, all the above viewpoints require larger and more rigorously powered multicentre studies for confirmation.

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Application of Computed Tomography (CT) Attenuation Values in Diagnosis of Transudate and Exudate in Patients with Pleural Effusion

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ABSTRACT

Background: Pleural effusion is the pathologic accumulation of fluid in the pleural space. The fluid analysis yields important diagnostic information, and in certain cases, fluid analysis alone is enough for diagnosis. Analysis of pleural fluid by thoracentesis with imaging guidance helps to determine the cause of pleural effusion. The purpose of this study was to assess the accuracy of computed tomography (CT) in characterizing pleural fluid based on attenuation values and CT appearance.

Materials and Methods: This prospective study included 100 patients admitted to Gandaki Medical College and Teaching Hospital, Pokhara, Nepal between January 1, 2017 and February 28, 2018. Patients who were diagnosed with pleural effusion and had a chest CT followed by diagnostic thoracentesis within 48 hours were included in the study. Effusions were classified as exudates or transudates using laboratory biochemistry markers on the basis of Light's criteria. The mean attenuation values of the pleural effusions were measured in Hounsfield units in all patients using a region of interest with the greatest quantity of fluid. Each CT scan was also reviewed for the presence of additional pleural features.

Results: According to Light's criteria, 26 of 100 patients with pleural effusions had transudates, and the remaining patients had exudates. The mean attenuation of the exudates (16.5 ±1.7 HU; 95% CI, range, -33.4 - 44 HU) was significantly higher than the mean attenuation of the transudates (11.6 ±0.57 HU; 95% CI, range, 5 - 16 HU), (P = 0.0001). None of the additional CT features accurately differentiated exudates from transudates (P = 0.70). Fluid loculation was found in 35.13% of exudates and in 19.23% of transudates. Pleural thickening was found in 29.7% of exudates and in 15.3% of transudates. Pleural nodule was found in 10.8% of exudates which all were related to the malignancy.

Conclusion: CT attenuation values may be useful in differentiating exudates from transudates. Exudates had significantly higher Hounsfield units in CT scan. Additional signs, such as fluid loculation, pleural thickness, and pleural nodules were more commonly found in patients with exudative effusions and could be considered and may provide further information for the differentiation.

Keywords

Pleural Effusion, Computed Tomography (CT), Thoracentesis, Exudates and Transudates

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INTRODUCTION

Pleural effusion is the pathologic accumulation of fluid in the pleural space which results when forces that control the inflow and outflow of the space are disrupted¹. Pleural effusion can result from numerous pathologic conditions, such as congestive heart failure, pneumonia, pleuropulmonary malignancy, connective tissue diseases, and trauma^{2,3}.

The pleural effusion is evaluated by whether pleural fluid is a transudate or an exudate. Transudate is caused by imbalances in hydrostatic and oncotic forces. The main cause of transudates is usually congestive heart failure (CHF), kidney failure, and cirrhosis. In contrast, exudates occur when local factors influencing the accumulation of pleural fluid are altered. Exudates are due to the increased capillary permeability and/or impaired lymphatic drainage which results from the proliferative (e.g. malignancy) or inflammatory (e.g. parapneumonic effusions) processes⁴.

Diagnostic thoracentesis is performed to determine the specific cause of a pleural effusion and supplies biochemistry measurements (e.g. protein and LDH) that help to separate effusions into transudates and exudates. Further analysis such as cytology and cultures may help in establishing the specific cause of the effusion⁵. Though diagnostic thoracentesis is considered a relatively safe procedure, it is associated with risks such as pneumothorax and has several contraindications such as coagulopathy^{6,7,8}. Thus, a noninvasive method to characterize pleural fluid would be valuable for avoiding the potential risks associated with thoracentesis and may help to guide therapy. In addition, such a method could help with diagnosis in patients with a contraindication for the invasive procedure.

The differential diagnosis of pleural effusions can be conducted by means of thoracentesis, pleural biopsies, and occasionally diagnostic thoracoscopy⁹ and imaged by radiography¹⁰, ultrasonography¹¹ or computed tomography (CT)¹². Noninvasive procedure like CT scan be useful in determining the causes of pleural effusions^{13,14}. CT is commonly used to evaluate patients with pleural abnormalities related to neoplasm, pneumonia, and empyema¹⁵. Indeed, CT can be used to evaluate the nature of pleural effusions to avoid the complications of thoracentesis^{6,7}.

Features such as pleural nodules, pleural thickening, loculation, and effusion density can be evaluated by CT to discriminate between exudates and transudates¹⁶.

Analysis of pleural fluid by thoracentesis with imaging guidance helps to determine the cause of pleural effusion. In this regard, the objective of this study was to assess the utility of Multidetector Computed Tomography (MDCT) examinations in characterizing pleural effusions on the basis of attenuation values and CT appearance.

MATERIALS AND METHODS

Study design and patient selection

The study protocol was reviewed and approved by the Gandaki Medical College and Teaching Hospital's Institutional Ethics Committee. This prospective study included patients who had a chest CT followed by diagnostic thoracentesis within 48 hours who visited between January 1, 2017 and Feb 28, 2018. Informed consent was obtained from the each patient for this study.

The patients were categorized into transudates and exudates groups according to the types of pleural effusion by using Light's criteria¹⁷, which diagnoses exudates pleural fluid when one or more of the following criteria is met: (a) a pleural fluid total protein/serum total protein ratio >0.5, (b) pleural fluid lactic dehydrogenase (LDH)/serum LDH ratio >0.6, or (c) pleural fluid LDH >two-thirds of the upper limits of the normal serum LDH value. CT attenuation value (CTA) in Hounsfield Unit (HU) was taken using a region of interest on the CT chest with the greatest quantity of fluid. Each CT scan was also reviewed for the presence of additional pleural features such as pleural thickening, loculation and pleural nodule.

Inclusion Criteria

This study included patients with pleural effusions on CT scan and who underwent diagnostic thoracentesis within 48 hours.

Exclusion Criteria

The patients were excluded from this study who underwent insertion of intercostals drainage before CT examination, and who had uncertain final diagnosis, had contrast media allergy, had serum creatinine greater 1.5 mg/dl, or had pregnancy.

CT protocol and imaging analysis

The pleural fluid CT attenuation value (CTA) in Hounsfield Unit were taken by using the average measure of the

three slices with the greatest quantity of fluid, which was determined by the largest anteroposterior diameter of the pleural effusion. A region of interest was placed for measurement of Hounsfield unit values of the maximal amount of fluid on each (Fig 1, 2 and 3). The Radiologist took care not to include adjacent ribs, lung parenchyma, or areas of pleural thickening.

Fig 1: Enhanced axial chest CT scan of 67 years old female presenting right lung mass with right pleural effusion with pleural nodule and CT attenuation value is 17



Fig 2: Unenhanced axial chest CT scan of 60 years old male presenting left side empyema with loculation and CT attenuation value is 25.3



Fig 3: Enhanced axial chest CT scan of 72 years old female diagnosed as CCF (Congestive cardiac failure) presenting with right pleural effusion. CT attenuation value is 10



CT was performed on all patients using Toshiba Asteion 4 slice scanner, Japan. The protocol used for this scanning

was contiguous axial 4 mm; pitch of 1; 120 kV; and automated mAs. IV contrast material was not administered when renal function tests were abnormal, in patients with high risk for contrast nephropathy (Dehydration, diabetes mellitus etc.), in patients with an allergy to contrast material, or when the indication for CT did not necessitate the use of contrast material. IV contrast material was administered in standard injection protocol (100 mL of iohexol 350 mg I/ml) at 1 - 2 ml /kg with an injection rate of 3 mL/s.

Statistical Analysis

All samples data were tabulated in a master chart and entered in data sheet Graph pad prism version 7. Statistical analysis was carried out with Graph pad prism; a computer software program. The data were expressed as mean. Two tailed T-test were used for correlation between types of pleural effusion and mean attenuation value in pre and post contrast CT images. Receiver operating characteristic (ROC) curve was applied to find the CT attenuation values for exudates and cut-off point was identified using the ROC curve nearest to the point at which sensitivity and specificity were maximized. One way ANOVA test was applied for determining the correlation between subgroups of exudates pleural effusion and mean attenuation coefficient. Statistical significance was defined as P <0.05.

RESULTS

There were 100 people subjected to this study who were from different parts of the Western Region of Nepal. Among them 62 out of 100 were males (62%) and 38 out of 100 were females (38%). Among them youngest patient was 10 years old and oldest patient was 89 years old. The demographic and CT findings in patients with exudative and transudative effusions are shown in Table 1, Table 2 and Fig 4.

Table 1: Demographic and CT findings of the patients

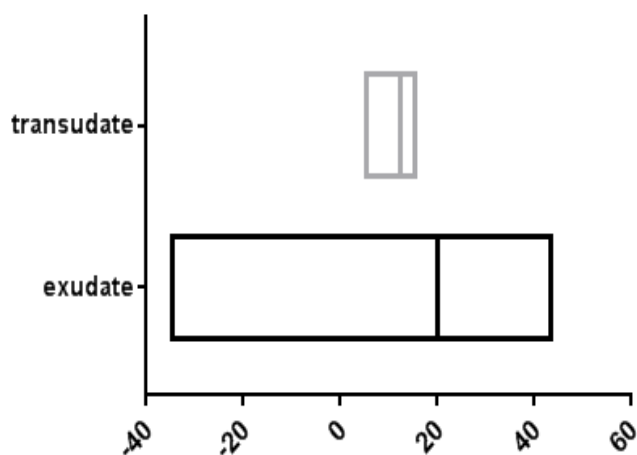
		Min - Max	
Age (Years)		10 to 89	
CT attenuation (HU)		- 32.4 to 44	
		Number (N)	Percentage (%)
Gender	Males	62	62%
	Females	38	38%
Pleural thickening		26	26%
Pleural nodules		8	8%

Loculation		31	31%
Empyema		14	14%
Tuberculosis		26	26%
Malignancy		32	32%
CHF		8	8%
Simple Pneumonia		18	18%
Lipoid Pneumonia		2	2%
Effusion	Transudates	26	26%
	Exudates	74	74%

Table 2: Demographic and CT Findings of the patients with exudative and transudative effusion

	Patient with transudates	Patient with exudates	P value
Gender (Male/Female)	17/9	45/29	
Age (Years)	10 - 65	17 - 89	
CT attenuation value (HU)	11.5 (5-16)	16.5 (-33.4-44)	<.0.0001****
Pleural nodule	0	8	0.70
Pleural thickening	4	22	0.70
Loculation	5	26	0.70

Fig 4: Box plots showing attenuation value for transudates and exudates groups. The vertical line across the each box is showing mean value



The mean HU values of the exudates were significantly higher than those of the transudates (P = 0.0001). Intravenous contrast agent was used in 18 of 26 patients with transudative effusions (69.23%) and 71 of 74 patients with exudative effusions (95.9%). In patients with exudates, mean attenuation was 16.5 ±1.7 HU for those who received a contrast injection (n = 71) and 15.5 ±0.5 HU for those who did not (n = 3).

In patients with transudates, mean attenuation was 11.6

±0.57 HU for those who received a contrast injection (n = 18) and 10.5 ±0.2 HU for those who did not (n = 8). The analysis revealed that the intravenous contrast agent did not much affect the HU values (P = 0.7925). When the cut off value for exudative effusion was accepted as ≥15.3HU, the sensitivity and specificity were 81.08% and 100%, respectively (AUC, 0.8784; 95% CI, 0.7 - 0.89).

Loculation was found in five of 26 (19.2%) patients who was diagnosed as transudate and 26 out of 74 (35.13%) who were diagnosed as exudative fluid. Pleural nodules were found in eight out of 74 (10.8%) patients who were diagnosed as exudative fluid especially on those patients who were suffer from lung malignancy.

Pleural thickening was found in four out of 26 (15.3%) who diagnosed as transudative whereas 22 out of 74 (29.7%) patients who diagnosed as exudative pleural effusion. As comparing between exudative and transudative pleural effusion, the exudative effusions had higher frequency of loculation, pleural thickening and pleural nodules.

The demographic and CT findings of patients with CHF, pneumonia, pulmonary tuberculosis (PTB), malignancy, and empyema are shown in Table 3. The diagnostic performance of the HU values in defining the subgroups of patients with pleural effusions was evaluated using ROC analysis. When the cut of value accepted as ≥ 15.3 HU, the sensitivity and specificity of PTB (80.7% and 100%), malignancy (81.2% and 100%) and empyema (92.8% and 100%) were obtained. Whereas cut off value transudative effusion was accepted as < 15.3 HU, the sensitivity and specificity of CCF (97% and 100%) and pneumonia (94.4% and 100%) were obtained.

One way ANOVA test was applied for determining the correlation among sub group of exudates empyema, pulmonary tuberculosis and malignancy and mean attenuation coefficient which showed there were no significant correlation between subgroups of exudative pleural effusion with its mean coefficient value (p=0.57).

Table 3: Demographic and CT findings of the patient with CHF, pneumonia, PTB, malignancy and empyema

	Patients with CHF (n = 8)	Patients with pneumonia (n = 20)	Patients with PTB (n = 26)	Patients with empyema (n = 14)	Patients with malignancy (n = 32)
Gender Male/female	5/3	13/7	20/6	9/5	21/11
Age (years)	40 - 72	10 - 55	17 - 75	33 - 71	43 - 89

CT attenuation HU	8.4	13.0	16.7	21.1	17.0
Pleural nodule	0	0	0	0	8
Pleural thickening	1	3	8	5	9
Loculation	1	4	7	14	5

DISCUSSION

The space between parietal and visceral pleura is known as pleural space. Normally 7 - 14 ml of pleural fluid is found in the pleural space¹⁸. Accumulation of pleural fluid more than normal limit occurs when rate of the fluid formation exceeds the rate of the fluid removal. This may mostly result from either of increase of hydrostatic pressure (transudate) or increase of permeability of the pleural vessel (exudates)¹⁹. Differentiation between exudative and transudative pleural fluid relies on chemical analysis of pleural fluid and blood, by using Light criteria¹⁷. CT is commonly used tool for assessing the patient presenting with pleural abnormalities¹⁵. CT scan is not only useful tool for detecting type of pleural effusion but also useful for detecting the causes of pleural effusion and its associated lung, mediastinal and heart disease^{13,14}.

There are several studies which found the clinical application of the CT scan for differentiation between transudative and exudative pleural effusion by using CT attenuation value. The previous studies conducted by Nandalur *et al*²⁰ and Cullu *et al*²¹ demonstrated the significant higher mean CT attenuation value of exudates (13.6 - 17.1 HU), compared with the transudates (6 - 12.5 HU). However Abramowitz *et al*²² demonstrated the lower mean attenuation values of exudates (7.2 ±9.4 HU), compared with transudates (10.1 ±6.9 HU) without statistical significant.

The results obtained in this study were similar to the prior studies^{20,21} which showed significant higher mean attenuation values of exudates (16.5 ±1.7 HU in post-contrast images and 15.5 ±0.5 HU in pre-contrast images), compared with the transudates (11.6 ±0.57 HU in post-contrast images and 10.5 ±0.2 HU in pre-contrast images). The mean attenuation values in post-contrast CT images were approximately one HU higher than those in pre-contrast images, which represented the small effect of intravenous contrast material to the mean attenuation values. Similar to the previous study done by Abramowitz *et al*²², this study also obtained negative attenuation

value in nine out of 74 exudative fluid, among them two cases were lipoid pneumonia and seven cases were lung malignancy.

There are different reasons for causing elevation of pleural cholesterol in exudates rather than elevation of serum cholesterol level. Best possible reason for increased pleural cholesterol level may be due to greater cellular degeneration or increased pleural permeability in underlying disease e.g. malignancy, pneumonia or tuberculosis²³. Other possible cause for elevating cholesterol levels can also result from chylothorax, mainly due to trauma or lymphoma, and from pseudochylothorax, mainly due to tuberculosis, rheumatoid arthritis, or empyema²⁴. Since fat tissue demonstrate negative attenuation values. Thus, the high concentration of protein in exudates that is expected to raise the attenuation values may be contradicted by the high cholesterol level that decreases the CT attenuation value. We could not determine whether our negative attenuation fluids had high levels of cholesterol because pleural cholesterol was measured in only seven out of the 100 patients.

Arenas-Jimenez *et al*¹⁶ reported that CT findings, such as loculation and pleural thickening, appeared more frequently in empyemas but also occurred in pneumonic effusions; therefore, these findings cannot be used as a distinguishing feature. However, Cullu *et al*²¹ found that patients with empyemas had a significantly higher frequency of loculation and pleural thickening than other patients. In our study, there was no statistically significant difference in the frequency of pleural loculation and pleural thickening between empyema patients and other patients. However, it was found that the frequency of loculation in patients with empyema was higher than that seen in patients without empyema, although this difference was not statistically significant (p=0.056).

The authors Aquino *et al*¹⁵, Arenas-Jimenez¹⁶ and Waite *et al*²⁵ found that the presence of pleural thickening, pleural nodules and loculation were highly specific for exudates. Similarly, Cullu *et al*²¹ reported that exudates had a significantly higher frequency of loculation and pleural thickening compared to that of transudates. However, Abramowitz *et al*²² found pleural thickening in 8 out of 22 transudates (36%) compared to 46 out of 78 exudates (59%), and loculated pleural effusion in eight of the 22 transudates (36%) compared with 45 of the 78 exudates (58%). Both pleural thickening and loculation were found in more than one-third of patients with transudates,

which was not in line with previous studies. In our study, similarly to Abramowitz *et al*²², we found that the presence of pleural thickening, pleural nodules and loculation were not reliable findings for characterizing pleural effusions though frequency of pleural thickening, loculation and pleural nodules were higher in exudative pleural effusion.

CONCLUSION

In conclusion, we believe that CT attenuation values may be useful in differentiating exudates from transudates. Although there is an overlap in the majority of effusions, exudates can be considered with CT attenuation values >15.3 HU. Because of overlapping HU values, close correlation with clinical findings is essential. Additional signs, such as fluid loculation, pleural thickness. Pleural nodule may provide additional information for the differentiation.

Conflict of Interest

The authors do not have any conflict of interest to declare.

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Use of Trochanteric Flip Osteotomy Improves the Outcome of Pipkin I and II Femoral Head Fractures

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ABSTRACT

Introduction: Annual incidence of femoral head fracture is constantly increasing due to increase in cases of road traffic accidents (RTA). Four to 17% of femoral head fractures are due to posterior dislocations of hip. Outcome of femoral head fracture associated with posterior dislocation of hip, the pipkin I and II fracture, is unsatisfactory due to lack of universally accepted protocol for its management and treatment.

Objective: To evaluate the patient outcome using relatively newer approach, the Trochanteric Flip (digastrics) Osteotomy (TFO), for the precise anatomical reduction of femoral head fractures associated with posterior dislocation of hip.

Methods: Between 2013 and 2017, 21 patients with sustained isolated femoral head fracture were admitted at our hospital. We used TFO approach for the management and treatment of femoral head fractures. The patients were followed up for 42 months at different intervals. Clinical outcome were evaluated using Merle d'Aubigne Postel and Thompson-Epstein scale.

Results: Retrospective analysis showed excellent, good, fair and poor results in five (23.8%) patients, 13 (61.9%) patients, two (9.5%) patients and one (4.7%) patient, respectively. Clinical outcomes included sciatic nerve injury (4.7%), moderate arthritis (95.3%), benign non-debilitating heterotrophic ossification (19%), avascular necrosis of femoral head (4.7%) and neuropraxia (4.7%).

Conclusions: Use of trochanteric flip osteotomy gives the favorable outcome for the treatment of this type of fracture. Most importantly, the vascularity of femoral head remains intact which makes TFO a very useful technique for pipkin I and II fracture treatment.

Keywords

Femoral head fracture,
Medial femoral circumflex artery,
Pipkin I and II,
Trochanteric flip osteotomy.

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INTRODUCTION

Femoral head fracture first described by Birkett in 1869 comprises a relatively rare injury¹⁻⁴. Though uncommon, its incidence is constantly increasing due to annual increase in road traffic accidents (RTA)⁵. Four to 17% of femoral head fractures are due to posterior dislocations of hip^{4,6,7}. Most common mechanism of this type of injury is dash board injury⁸. At present, there is no universally

accepted protocol for the treatment of femoral head fracture. Treatment strategies may range from simple closed reduction, open reduction and internal fixation, prosthetic placement to excision of fractured segment^{6,9-11}. Regardless of treatment approaches, serious long term consequences like post traumatic arthritis, avascular necrosis and heterotrophic ossification may complicate the natural course of healing and rehabilitation leading to unsatisfactory clinical outcome and variable degree

of disability. Currently, an approach using trochanteric flip osteotomy (TFO) for anatomical reduction of the fracture has been shown to provide long term satisfactory outcome^{9,11-13}.

Herein, we employed TFO for precise anatomical reduction and minimum vascular damage for pipkin type I and type II fracture.

The objective of this study is to validate an alternative newer technique to reduce pipkin type fracture for the better long term outcome with minimum perioperative and postoperative complications.

METHODS

Cases

Between June 2013 and Dec 2017, 21 patients; 16 male and five female with a mean age of 46.3 years (Range 18 - 67 years) with pipkin fracture underwent surgical treatment at our hospital. All the patients were associated with posterior hip dislocation. All of them were evaluated and treated by the attending orthopedics. Patients only with isolated femur head fracture (pipkin type I and type II) were included in the study. Patient with inadequate follow-up visits were excluded from the study.

Surgical approach

X ray and a computed tomography (CT) of hip joint were done for all patients (Fig 1). Definitive surgery was done within 72 hours except in one case in which the day of visit is at 60 after hip dislocation.

Fig 1: Pre-operative radiograph of a 37 year old female patient showing femur head fracture with pipkin type II fracture



The average operative time was 90 minutes. All cases were operated in lateral decubitus position, posteriolateral Kocher langenbeck incision was made and the fascia lata splitted accordingly. The leg was then internally rotated and the posterior border of gluteus medius identified. An incision was made from the posterosuperior edge of the greater trochanter extending distally to the posterior border of the ridge of vastus lateralis. Trochanteric flip osteotomy with maximum thickness of 1.3 cm was made along this line with an oscillating saw.

The osteotomy should exit just anterior to the most posterior insertion of gluteus medius to preserve and protect the profundus branch of the medial femoral circumflex artery (MFCA) which is the major blood supply of the femur head^{1,8}. The insertion of gluteus medius and vastus lateralis was preserved on the mobile trochanteric fragment. Then trochanteric fragment was mobilized and pushed interiorly. Joint capsule was exposed in the interval between piriformis and gluteus minimus. Great care was taken to avoid injury to the sciatic nerve which runs inferior to the piriformis muscle.

Z-shaped capsulotomy was done to visualize the hip joint. The capsulotomy remained anterior to the lesser trochanter to avoid damage to the main branch of the MFCA which is located just superior and posterior to lesser trochanter. This preserved the anastomosis between inferior gluteal artery and MFCA which runs along the distal border of the piriformis muscle and tendon⁸.

In order to dislocate the hip, the leg was flexed, externally rotated, brought over the front of the operating table and placed into a sterile bag. By manipulating the leg, acetabular cup and femoral head can be visualized in all directions. The stump of ligament teres can be removed from the head as the foveolar artery, which runs inside ligament teres, is not an important source of blood supply to the femoral head. After dislocation of the hip joint the acetabular cartilage and the labrum were carefully inspected for any damage.

The labrum was probed to inspect any labral tear. Small labral tear was debrided large tear was fixed with suture anchors. Detached fragment of the head was explored and put on the instrument table for later reassembly. Any soft tissue attachment on the fragment was preserved in order to avoid further devascularisation of these fragments. The detached fragment was brought into the best attainable relationship to the main fragment and secured with two

to three Kirschner wires (Fig 2). Head fragment was fixed using 4 mm titanium cannulated screw over the wires. The wires were then removed followed by countersinking of the head of the screws below the cartilage level (Fig 3). Alternatively, Herbert screw or absorbable pins could be used^{1,2,14}. C-arm fluoroscopy was used to confirm the stable fixation of the fracture.

Fig 2: Temporary fixation of fragments with k-wire and bone grafting



Fig 3: Fixation of head fragments with cannulated screws



Little Bone graft was taken from the trochanteric osteotomy site to fill any gap between the bone fragment and femoral head. Acetabulum was carefully inspected for any bone fragment, torn pieces of capsule and synovial tissue. After fracture fixation the hip was successfully reduced by manual traction on the flexed knee and internal rotation. Capsule was loosely approximated by using 2-0 absorbable suture to avoid any tension that damage of retinacular vessel to avoid potential drop in femoral head perfusion. The trochanteric osteotomy was reduced and fixed by using two 4.5 mm cortical screws. Finally, C-arm x-ray was done to confirm the screw placement. Drain was placed and wound was closed in layers.

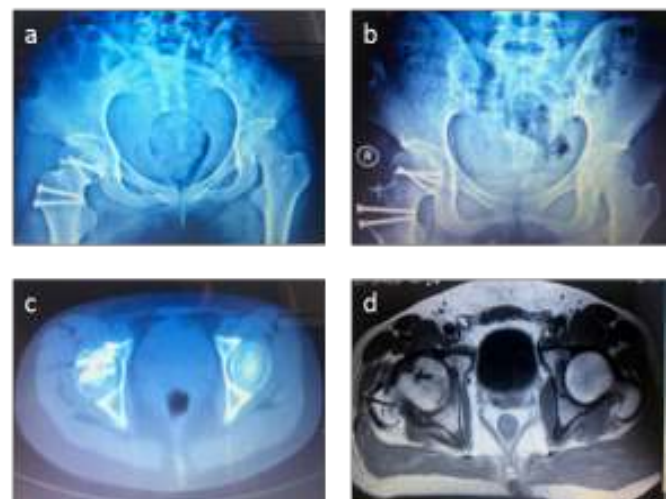
Perioperative and postoperative care

All surgically treated patients received standard dose of perioperative antibiotics. Postoperatively, they received a course of nonsteroidal anti-inflammatory drugs to prevent heterotrophic ossification, and low molecular weight heparin for six weeks starting from second postoperative day to prevent deep vein thrombosis.

Follow-up visit

Average hospital stay was four days (Range from two to seven days). Duplex ultrasound was performed to rule out any deep venous thrombosis before discharge. After discharge, patients were followed clinically and radiographically (X-ray, CT-scan or MRI scan) at four weeks (Fig 4a), eight weeks (Fig 4b - 4d) and every three months thereafter. At each follow up patients were examined by the operating orthopaedic surgeon for active and passive range of motion, power, gait assessment, activity of daily living assessment, pain assessment and oblique radiograph of the operated hip. Only touchdown weight bearing was allowed for six weeks followed by gradual weight bearing. Gait training and full weight bearing was allowed eight weeks after surgery.

Fig 4: Post-operative radiographs of the 37 year old female patient with femur head fracture with pipkin type II fracture. (a) One month post-operative X-ray (b) 32 month post-operative X-ray (c) 32 month post-operative computed-tomography (CT) scan (d) 32 month post-operative magnetic resonance imaging (MRI) scan



Assessment of clinical outcome

Clinical outcome scores were calculated by using Merle d' Aubigne-Postel and Thompson-Epstein scales. Thompson-Epstein scale is the measure for pain, function and radiographic appearance and is graded as excellent, good,

fair or poor whereas Merle d' Aubigne Postel scale is a numeric scale with a maximum score of 18 and accounts for pain and functional outcome.

RESULTS

Among 21 patients with pipkin type I and type II fractures, 16 were males and five were females with a mean age 44.3 years age (18 - 66). The patients were followed for 12 to 42 months (mean 29.6 months). Two patients were excluded from the study because of the inadequate follow-up (follow up less than 12 months).

The major cause of the injury was RTA (12) and the other were fall from height (Seven), and sports injury (Two). According to pipkin's classification, 14 cases were type I and remaining seven were type II. All of the cases with surgical dislocation were treated using TFO. None of them had an earlier traumatic or iatrogenic dislocation. Mean operating time from incision to closure was 90 minutes. The reduced fragments were within 2 mm in all operated cases as revealed by multiple radiographs and/ or post-operative CT scans. All the fractures were healed within 10 weeks. None of the cases showed trochanteric fixation defect.

The mean Merle d'Aubigne-postel score was 15.1 (Range 9 - 18) (Table 1). According to Thompson-Epstein criteria, five (23.8%) patients had excellent, 13 (61.94%) had good, two (9.5%) patients had fair and one (4.7%) patient had poor result (Fig 5).

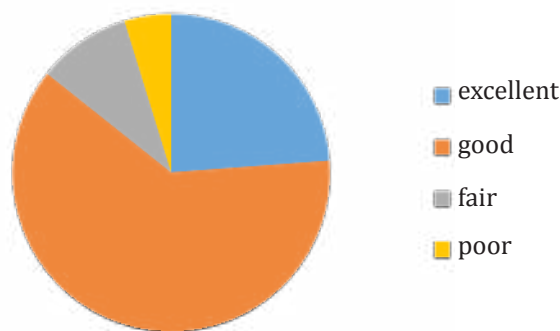
Table 1: Summary of patient history and clinical outcome after TFO

Case	Age /sex	Cause	Pipkin type	Complication	Follow-up (months)	TE	Outcome MA	Concurrent injury
1	55/M	RTA	I		36	Good	15	
2	60/M	Fall	I		30	Good	15	
3	47/M	Fall	II		38	Excellent	18	
4	33/F	RTA	I	HO	31	Good	15	
5	45/M	RTA	II		24	Excellent	17	
6	58/M	RTA	II	Mild PTA	27	Good	16	
7	54/M	Fall	II	Nerve injury	20	Fair	13	Rib fracture
8	67/M	Fall	II	mild PTA	33	Good	15	
9	30/F	RTA	I	HO	35	Good	15	
10	40/M	Sports Injury	I		12	Excellent	18	
11	41/M	Fall	I	Moderate PTA	18	Fair	14	
12	55/F	RTA	II		23	Good	17	
13	59/M	Fall	I	Mild PTA	28	Good	16	
14	37/F	Fall	II	HO	32	Good	16	
15	42/M	RTA	II		38	Excellent	17	

16	20/M	Sports injury	I		36	Good	16	Humerus fracture
17	18/M	RTA	I	HO	24	Good	17	
18	39/M	Fall	II		27	excellent	18	
19	40/F	RTA	II	PTA	28	Good	15	
20	66/M	RTA	I		41	Good	15	
21	26/M	Fall	I	AVN	42	Poor	9	Head injury

TE: Thompson and Epstein, MA: Marle d'Aubigne Postel, PTA: Post Traumatic Arthritis, HO: Heterotrophic Ossification, AVN: Avascular Necrosis of femoral head

Fig 5: Pie chart showing the clinical outcome after TFO therapeutic approach in 21 patients



Six out of 21 (28.5%) developed mild to moderate level of post traumatic arthritis (PTA). Heterotrophic ossification (HO) was seen in four (19%) patients. None of the patients developed hip ankylosis. One (4.7%) patient developed partial neurapraxia of sciatic nerve after operation. Six months after the surgery the patient showed gradual recovery of the nerve injury. There was complete recovery of the injury within nine months as proved clinically and by nerve conduction studies. One (4.7%) patient developed avascular necrosis of femoral head.

DISCUSSION

Femur head fracture results from traumatic injury, and most frequently associated with posterior hip dislocation^{10,13,15}. Available literature reported good or excellent outcome only in 40 to 70% of patients who underwent TFO therapy^{5,9,10,15,12,16}. Herein, we adopted TFO therapeutic protocol for patients with femur head fracture with posterior hip dislocation and assessed the clinical outcome.

Femoral head fracture with posterior dislocation represents a few of the orthopedic emergencies. Several authors agreed that early reduction leads to better outcome than the reduction delayed by more than 24 hours. Relationship between delayed reduction and

increased incidence of femoral head osteonecrosis is well established^{7,12,17}.

Treatment of femoral head fracture poses a potential risk of iatrogenic femoral neck fracture or necrosis. Potential iatrogenic femoral neck fracture was avoided by giving good muscle relaxants. Moreover, to avoid iatrogenic damage anatomical knowledge of course and location of the deep branch of MFCA is very important. Principal blood supply for the femoral head, particularly the weight bearing portion is from the terminal branch of the MFCA^{11,18}. Medial epiphyseal artery through the ligamentum teres supplies only the perifoveal area and rarely supplies significant portion of the head. Lateral femoral circumflex artery has little or no contribution to the femoral head blood supply^{11,18}. Deep branch of MFCA, a branch of profunda femoris artery, travels posteriorly and lies outside the capsule towards the intertrochanteric crest between iliopsoas laterally and pectineus medially along the base of femoral neck. Trochanteric branch that rises adjacent to the proximal border of quadrates femoris, travels across the lateral surface of the greater trochanter. Posterior to the tendon of obturator externus passes the main vessels that perforates the capsule of hip joint slightly superior to the insertion of the superior gamellous tendon and divides into several terminal branches which enter the femoral head just lateral to the articular junction^{10,19}. Deep branch of MFCA can easily be damaged during the posterior approach to the hip joint resulting primary loss of blood supply to the femoral head. However, the approach, the greater trochanteric flip osteotomy, performed in this study helps to preserve the short external rotators. Intact short external rotators protect the deep branch of MFCA thus helps to avoid the femoral head necrosis.

Treatment of these types of injuries is complex and should be dealt by expert surgeon. Different surgical approaches have been used for the treatment of femoral head fractures including anterior (Smith Patterson), anterolateral (Watson Jones), lateral, medial (Ludloff), posterior (Kocher Langenbeck), modified posterior (Trochanteric flip osteotomy). With anterior approach femoral head dislocation can be performed but the exposure is much limited and the acetabulum cannot be inspected fully. It also makes the screw fixation more difficult. Similarly anterolateral and direct lateral approach also allow the dislocation of femoral head but the drawback of these approaches is difficult and incomplete view of acetabulum.

In classical posterior approach, tenotomy of external rotator muscles affect anastomosis of inferior gluteal artery and deep branch of MFCA which lead to high occurrence of femoral head necrosis. Also the reattachment of external rotator muscles may not be stable.

According to Ganz, trochanteric flip osteotomy is a safe method for the surgical dislocation of the femur head^{10,19}. We chose TFO for the surgical reduction of Pipkin I and II fractures as it allows surgeons to view femur head and acetabulum completely. Also, the posterior wall, femur head fracture and the dome area are well exposed with this technique. This enabled precise reduction of the fracture.

With posterior approach, the abductors would be forcefully retracted to view dome area which may cause loss of abductor strength. However, TFO approach allowed easy dislocation with no detachment of external rotator muscle, so that the abductor strength is preserved.^{20,21}

The scoring systems we used are Merle d'Aubigne-Postel and Thompson-Epstein. With little modification of already established surgical dislocation of hip (see methods), we received clinically excellent outcome compared to the previous findings (40 - 70% compared to 86% in this study)^{5,9,10,12,15,16}.

In Pipkin fracture there is usually significant gap between the fractured segments because of destruction of cartilage and cancellous bone at the region of fovea. Since the outcome of this type of fracture significantly depends upon the level of anatomical reduction of the fractured segments, role of autograft is very important to accelerate the healing of fracture. The firm packing of the gap between the fractured segments with the use of autograft is not only the important step to accelerate the bone healing but also the necessary step to reduce severe post-operative arthritis. This helps to smooth the hip joint movement. With other approach bone graft can't be taken from single-stage surgery. However, TFO allowed us to obtain the necessary amount of bone graft from the osteotomy site avoiding multi-stage surgery as seen with other approaches.

In our procedure, we used stainless steel and titanium screw to fix the bone fragments. With the use of metal screw we can achieve better fixation of the bone fragments. The lag effect of the metal screw is found to be stronger than that

of absorbable. Previous studies reported adverse tissue reaction to fixation implants made of polyglycolic acid^{14,22}. With the use of metal implants none of the cases were reported to have adverse tissue reaction. In five cases we used titanium screw to reduce the cost of surgery. Because of this we couldn't perform follow up MRI in those cases which is very important and relevant diagnostic tool to diagnose the femur head necrosis. In those cases we relied on plane x-ray, CT scan and PET scan to see the status of femur head necrosis. Important recommendation is to use titanium screw for the fixation of both head fragment and the trochanteric fragments.

Avascular necrosis is a major complication which occurs due to extra-capsular and extra-osseous injury to nutrient vessels^{1,6,23}. Depending on the severity of trauma to the hip and time span after the traumatic dislocation, avascular necrosis of femur head is more likely. In TFO external rotator muscle is not interrupted which in turn protects MFCA. Thus reducing the chances of necrosis and allowing MFCA to perfuse femoral head adequately. Considerable amount of blood loss occurs from drill hole in femoral head. Postoperative assessment by using MRI scan suggests adequate perfusion. None of the cases in our study showed avascular necrosis during their follow-up.

Heterotrophic ossification following fracture of the femoral head is quite common; reported incidence varies from six to 64%^{12,24-26}. The potential risk is due to aggressive muscular stripping from the ileum during the approach. Anterior approach to the hip has been reported to be risk factor for the development of the heterotrophic ossification²⁷. With TFO approach the mobilization of the muscles from ileum is much less than any previous approaches resulting less case of heterotrophic ossification.

Minimum complications occur if TFO is done keeping the landmark in view. Sciatic nerve injury occurs if care is not taken as the sciatic nerve lies beneath the piriformis and proximal to the external rotator muscle. One of the case developed neurapraxia of the sciatic nerve. However, in that particular patient definitive surgery was done 60 days after the injury. Because of such a long delay in visit to the centre, there was adherence of the nerve. We presume that mobilisation of the adhered nerve during the surgical procedure was most likely the cause of neurapraxia. This could be minimized with timely surgical intervention. In delayed cases, careful surgical dissection and adequate exposure of the sciatic nerve before dislocation of the

femur head was suggested. This is one of the crucial steps to avoid iatrogenic injury to the nerve. Moreover, after the exposure of the nerve it can be secured under piriformis muscle. Care should be taken at placing the retractors at the time of traction. Also, post-operative rehabilitation and physical therapy is also an important step for the timely recovery of the injured nerve. In our typical case, the nerve function returned to normal after six months.

Trochanteric non-union which is one of the commonly reported complication of the classical trochanteric osteotomy is a rare complication with TFO as digastrics muscle helps stabilize the trochanteric fragment. Also, the gluteus minimus is manipulated under vision and excessive retraction of the gluteus medius is not required, the heterotrophic ossification is much less with TFO.

The limitation of the study is relatively few number of cases due to rarity of the fracture. However, the common surgical approach used showed promising result for management and treatment of femur head fracture by TFO. To better understand the clinical outcome of the procedure, a large multi-centre study is needed.

CONCLUSIONS

In conclusion, TFO allows complete view of femur head and acetabulum. It leaves MFCA intact reducing avascular necrosis and hypertrophic ossification. Moreover, labral and cartilaginous pathology which were unclear on MRI can be easily viewed during this surgical technique. Most importantly, the vascularity of the femur head remains intact which makes TFO a very useful technique for treatment of Pipkin I and II fracture, and even in cases with delayed surgical interventions, if measures to prevent sciatic nerve injury were taken in consideration.

Conflict of Interest

The authors do not have any conflict of interest to declare.

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Factors Associated with Poor Self-rated Health in Machhapuchhre Rural Municipality of Kaski District, Nepal: A Cross-sectional Survey

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ABSTRACT

Introduction: Self-rated health reflects respondents' overall perceptions of their general health status. It is a simple and reliable measure of general health status of the population.

Objective: The objective of the study was to assess prevalence and associated factors of poor self-rated health among adult population in Machhapuchhre Rural Municipality of Kaski District, Nepal.

Methods: A cross-sectional household survey was conducted among adult population at Machhapuchhre Rural Municipality. A structured questionnaire was used for the face to face interview. Household survey was conducted in July 2018. Self-rated health was measured by using a single question such as 'In general, how would you rate your health?' Responses were arranged along a five-point Likert-type scale: 'excellent', 'good', 'fair', 'poor' and very poor. The outcome variable was dichotomized as 'good' (excellent, good or fair) or 'poor' (poor or very poor). Chi-square test and multiple logistic regression analysis were performed; and odds ratios with corresponding 95% confidence intervals for poor self-rated health were presented.

Results: Of total respondents, 13.2% respondents reported that they perceived their health as poor. Of the total, 14.3% respondents stated themselves as overweight and 8.8% mentioned they were unhappy. The study found that illiterate respondents, respondents with smoking habit and the individuals with poor psychological conditions were more likely to perceive their health as poor. Illiteracy, current smoking, perceived overweight, unhappiness, suicidal ideation and having depressed feeling were significant factors associated with poor self-rated health in the study.

Conclusion: Education, health behavior and psychosocial health variables has important influences on self-rated health.

Keywords

Happiness level, Health behaviors, Self-rated health, Perceived body weight.

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INTRODUCTION

Self-rated health (SRH), also known as self-perceived health reflects respondents' overall perceptions of

their general health status. SRH is a simple and reliable measure of general health^{1,2}. It is typically obtained by a simple question such as "How is your health status?" or "How do you perceive your health situation?" SRH

predicts morbidity patterns, future health status, health service utilization and quality of life³⁻⁵. It is a widely used health status indicator which has been shown to be a good predictor of objective health outcomes, including mortality⁶⁻⁸. Previous study states that poor SRH is a strong predictor of subsequent mortality in all subgroups studied, and that SRH therefore may be a useful outcome measure⁹. It is regarded as an inclusive and popular measure in health surveys and clinical studies¹.

Identifying factors associated with SRH in a specific context has public health implication because it helps to better address specific characteristics of the population through public health policies and more targeted interventions. Several socio-demographic, socioeconomic, health behaviors, health condition and psychosocial factors are found to be associated with self-perceived health in different populations^{6,10-12}. After controlling for age, sex and region, all socio-demographic factors were related to SRH⁶. Being a non-smoker was associated with more positive SRH levels across all groups across the adult life course¹¹. Perceived body weight was also found to be associated with SRH in a previous study^{13,14}. Poor SRH and unhappiness were found highly positively correlated within individuals; and communities that were healthier tend to be happier in a study among adults in USA¹⁵.

SRH can be a good screening tool for general health assessment, especially in poor countries where medical facilities for examining risk factors are not widely available and accessible to the general public. It is that SRH may be a proxy method to assess the health status of a population because of its simplicity and its well-established links with different health indicators in various studies¹². It is found that very few studies have been conducted on SRH health among general population in Nepal. Understanding on how the people in rural area perceive their own health and which factors influence the perceived health status has meaningful implication in the study area.

Thus, the objective of the study was to assess the prevalence and associated socio-demographic, behavioral and psychological factors of poor SRH among adult population in Machhapuchhre Rural Municipality of Kaski District.

METHODS

Study design

Rivan is located at latitude of 28°30' N - 28°33' N and longitude of 83°87' E - 83°89' E, which is at a distance of about 19.4 km from Prithivi Chowk, Pokhara. It has a total of 395 households and population of 1,563 according to the Ward office. A cross-sectional study was conducted among adult population in Rivan using household survey. The information for the study was collected as part of community health diagnosis program. Household survey was conducted in July 2018.

Sampling method

Out of the total nine wards of Machhapuchhre Rural Municipality/ Machhapuchhre Gau Palika, Rivan, ward number five was randomly selected for the study. Census method was applied to collect the required information from the ward. The total listed households in the ward were 395 according to the ward office profile. However, during the information collection period, the respondents only in 183 households were present. One household was excluded from the study as the respondent of the household did not show willingness to participate in the survey. A large number of households were found empty during home visit as they had migrated to other areas. A total of 182 households were surveyed for the study and included in the analysis.

Information collection method

A structured questionnaire was used for the face to face interview. The information was collected by three trained enumerators at the field. They were the students of Bachelor of Public Health Program (BPH). They were trained on the technique of interview and taking consent from the respondents, objective of the study and type of questions. The questions were prepared and asked in Nepali language. The enumerators visited all households of the ward with the structured questionnaires to conduct the face to face interview. The households where eligible respondents were not available for two consecutive visits were left. The eligible respondents were heads of the households or persons above 18 years who could provide necessary information.

Measurement of variables

The dependent variable was SRH. It was defined by the question that 'In general, how would you rate your health?' Responses were measured on a five-point Likert-type scale as 'excellent', 'good', 'neither good nor bad/fair', 'poor' and 'very poor', as it was measured in the survey by WHO (2002) and others^{6,16}. Responses were dichotomized as

'good' (excellent, good or fair) versus 'poor' health (poor or very poor) as it was done by Supiyev and his colleagues in their study⁶.

To assess the current smoking status, "Do you smoke at present?" was asked to the respondents. Alcohol consumption status was also assessed in the same way. 'How do you feel about your body weight?' was asked to assess perceived body weight. The options 'very underweight' or 'underweight' were categorized into 'underweight', and 'slightly overweight', 'overweight' or 'very overweight' were categorized into 'overweight'. 'How do you feel about your life?' was asked to assess life happiness. Responses of 'very happy', 'happy' or 'a bit happy' were categorized as 'happy' and 'a bit sad', 'sad' or 'very sad' were categorized as 'unhappy'. "During the past 12 months, did you ever seriously consider attempting suicide?" was asked to assess the suicidal ideation. Similarly, suicide plan was measured by the following question, "During the last 12 months, have you made any plan of how you would try to kill yourself?" "In the last 12 months, have you had depressed feeling such as: feel yourself with little interest, sad, problems with sleep, tired without reason, distracted, or with little appetite during two continuous weeks?" was asked to measure depressed feeling.

Data analysis

The sample data were entered and analyzed using SPSS for Windows, Version 24. The χ^2 test was applied to assess any associations between independent variables and SRH at a 5% level of significance. All significant variables in the bivariate analysis were then entered into a multivariate logistic regression analysis. Unadjusted odds ratios (ORs) and adjusted odds ratios (AORs) with 95% confidence intervals (CIs) were computed to determine the effect sizes of the independent variables on SRH. A Hosmer-Lemeshow test was applied to determine model's goodness-of-fit.

Ethical consideration

Approval was taken from the Institutional Ethical Committee of Gandaki Medical College. Approval was also taken from the Machhapuchhre Rural Municipality/ Machhapuchhre Gau Palika for the study. Informed consent was taken from all respondents before the interview. The objective of the study was made clear to them before interview. They were not forced to participate or continue the interview. Confidentiality of the information was ensured.

RESULTS

Of the total respondents, 69.8% were females and 37.9% were in the age group of 30 to 49 years. Of the total respondents, 25.8% respondents were illiterate. Regarding the marital status, 85.7% respondents were married and 74.4% were involved in agriculture. Of the total, 18% smoke and 13% drank alcohol currently. Of the total, 32.4% respondents had monthly income more than Rs. 25, 000, and 36.8% were Brahmin/ Chhetri in the study. Of the total respondents, 13.2% reported that they perceived their health condition as poor or very poor. Similarly, 14.3% respondents stated they were overweight and 8.8% reported that they were unhappy or very unhappy.

Table 1: Characteristics of the study population

Variables	Number	Percent
Sex		
Male	55	30.2%
Female	127	69.8%
Age group (in years)		
18 - 29	57	31.3%
30 - 49	69	37.9%
50 - 65	56	30.8%
Education status		
Illiterate	47	25.8%
Literate	135	74.2%
Marital status		
Married	156	85.7%
Others	26	14.3%
Monthly income (in Nepali Rupees)		
< 15000	66	36.3%
15000 to 25000	57	31.3%
>25000	59	32.4%
Ethnicity		
Brahmin/ Chhetri	67	36.8%
Gurung/ Magar	62	34.15%
Disadvantage caste	53	29.1%
Occupation		
Agriculture	134	74.4%
Others	46	25.6%
Smoking		
Yes	33	18.1%
No	149	81.9%
Alcohol use		
Yes	24	13.2%
No	158	86.8%
Tobacco use		

Yes	30	16.5%
No	152	83.5%
Self-rated health		
Excellent/good/ fair	158	86.8%
Poor/very poor	24	13.2%
Perceived body weight		
Underweight/ normal	156	85.7%
Overweight	26	14.3%
Self-rated happiness		
Happy	166	91.2%
Unhappy	16	8.8%

Table 2 shows bivariate analysis of the independent variables with SRH. Statistically, we did not find any significant association of sex, age group, marital status, and occupation with SRH. However, it shows that lower the education, higher the poor SRH; there was a significant association between education and SRH among the adult population in the study area. In addition, there was a statistically significant relationship between current smoking and poor SRH among the study population.

Table 2: Association of socio-demographic factors with self-rated health

Factors	Poor self-rated health		Chi-square value	P value
	No	Yes		
Sex				
Males	47 (85.5)	8 (14.5)	0.127	0.721
Females	111 (87.4)	16 (12.6)		
Age group (in years)				
18 - 29	53 (93.0)	4 (7.0)	5.371	0.068
30 - 49	61 (88.4)	8 (11.6)		
50 - 65	44 (78.6)	12 (21.4)		
Educational level				
Illiterate	35 (74.5)	12 (25.5)	8.435	0.004
Literate	123 (91.1)	12 (8.9)		
Marital status				
Married	137 (87.8)	19 (12.2)	0.968	0.325
Others	21 (80.8)	5 (19.2)		
Ethnicity				
Brahmin/Chhetri	61 (91.0)	6 (9.0)	5.85	0.054
Gurung/Magar	56 (90.3)	6 (9.7)		
Disadvantage caste	41 (77.4)	12 (22.6)		
Smoking				
Yes	24 (72.7)	9 (27.3)	6.98	0.008
No	134 (89.9)	15 (10.1)		
Alcohol use				
Yes	18 (75.0)	6 (25.0)	3.370	0.066
No	140 (88.6)	18 (11.4)		

Table 3 shows bivariate analysis of psychological health variables with SRH. A significant association was found between SRH and perceived body weight among the study population. In the same way, there was a significant association between SRH and happiness level among the respondents. Suicidal ideation, suicide plan and having depressed feeling also had significant association with SRH. It shows that poor psychological health had negative impact on SRH.

Table 3: Association of psychological health status with self-rated health

Factors	Poor self-rated health		Chi-square value	P value
	No	yes		
Perceived body weight				
Underweight	17 (89.5)	2 (10.5)	12.183	0.002
Normal	124 (90.5)	13 (9.5)		
Overweight	17 (65.4)	9 (34.6)		
Self-rated happiness				
Happy	152 (91.6)	14 (8.4)	37.264	0.000
Unhappy	6 (37.5)	10 (62.5)		
Suicidal ideation				
Yes	3 (50.0)	3 (50.0)	7.345	0.007
No	155 (88.1)	21 (11.9)		
Suicide plan				
Yes	3 (42.9)	4 (57.1)	12.287	0.000
No	155 (88.6)	20 (11.4)		
Feeling depressed				
Yes	20 (66.7)	10 (33.3)	12.736	0.000
No	138 (90.8)	14 (9.2)		

Illiterate respondents were 3.5 times more likely to have poor SRH as compared to literate respondents in the unadjusted analysis. However, education was not found to have any significant effect on the adjusted analysis. Smoking was found to be a significant factor in both unadjusted and adjusted analysis. Current smoker were 3.8 times more likely to feel poor SRH as compared to non-smokers in the adjusted analysis. The respondents who were unhappy had increased likelihood of perceiving their health status as poor while compared to those who expressed themselves as happy. Unhappy respondents were 9.6 times more likely to report poor SRH in the adjusted analysis. Suicidal ideation had significant association with SRH in unadjusted analysis. Respondents who had depressed feeling in last 12 months were also more likely to express poor SRH in the unadjusted analysis. Likelihood of poor SRH was fivefold higher among those who perceived themselves as overweight as compared to

those who perceived themselves as normal (AOR, 5.4; 95% CI, 1.6- 18.6) (Table 4).

The adjusted analysis showed that 36.4% variance in the SRH was predicted by the factors included in the analysis. The model was fit for the factors included as Hosmer & Lemeshow Test was not significant ($p>0.05$).

Table 4: Logistic regression analysis of independent variables with self-rated health

Factors	Unadjusted analysis		Adjusted analysis	
	OR (95% CI)	P value	AOR (95% CI)	P value
Education (Illiterate vs. literate)	3.51 (1.4 - 8.5)	0.005	1.5 (0.48 - 4.7)	0.472
Current smoking(Yes vs. No)	3.35 (1.3 - 8.5)	0.011	3.8 (1.2 - 12.4)	0.023
Self-rated happiness (Unhappy vs. Happy)	18.09 (5.7 - 57.1)	0.000	9.6 (2.0 - 44.5)	0.004
Suicidal ideation (Yes vs. No)	7.38 (1.4 - 38.9)	0.019	1.9 (0.17 - 22.3)	0.586
Feeling depressed (Yes vs. No)	4.9 (1.9 - 12.5)	0.001	2.12 (0.60 - 7.5)	0.243
Perceived body weight Normal vs. overweight	1.1(0.23 - 5.40)	0.886	0.62 (0.09 - 4.0)	0.620
Thin vs. overweight	5.0(1.8 - 13.5)	0.001	5.4 (1.6 - 18.6)	0.007
P value (Hosmer & Lemeshow Test)			0.977	
Nagelkerke R Square			0.364	

ORs: odds ratios, AOR: adjusted odds ratios, CI: confidence interval

DISCUSSION

The prevalence of poor SRH was found to be 13% in the study area. The study revealed that poor psychological health had negative impact on SRH; and current smoking also increased the likelihood of poor SRH. A study conducted in Kailali District had found that 19.7% perceived their health as poor which is higher than the figure found in our study¹². However, the difference was due to the difference in the measurement scale of SRH; the mentioned study included only 'excellent health' and 'good health' into the category of good. In contrast to the study, the prevalence of poor/very poor self-rated health was 5.3% in Kazakhstan⁶.

Our study found that current smoking increased the likelihood of poor SRH in the study area. The finding is consistent with previous finding that shows being a non-smoker was associated with more positive SRH levels

across the adult life course¹¹. Another study conducted in Kailali district also found that non-smoking status and higher level of happiness were associated with better self-perceived health¹². It indicates that unhealthy behavior like smoking might be associated with morbidities that cause poor perceived health status.

In the study, perceived overweight was significantly increased the likelihood of perceiving themselves as poor health status. Similar results were observed in other previous study¹³. The obese adults rate their health more negatively than non-obese when using overall SRH. The study conducted by Altman provided indirect evidence that the relationship between obesity and SRH is socially patterned according to exposure to information about obesity and the availability of resources¹³. In contrast to our study, a study conducted among school going adolescents in South America had found no significant association between perceived body weight and SRH¹⁴. The difference might be due to difference in the study population and the study area.

Health and happiness share important similarities with respect to their determinants. Disease itself might be a reason of unhappiness. Similar to the study, a study by Siahpush *et al* (2008) found that happiness was positively associated with excellent, very good, or good health¹⁷. Poor SRH and unhappiness were found highly positively correlated within individuals; and communities that were healthier tend to be happier in a study among adult in USA¹⁵. Life satisfaction significantly predicted SRH in other previous studies too^{18,19}. However, a bidirectional relationship between SRH and life satisfaction could be present, each predisposing the other²⁰. These results suggest that SRH is greatly affected by psychological factors and health behaviors than the socio-demographic factors.

CONCLUSION

Prevalence of poor SRH was found relatively high in the study area i.e. 13.2%. The study found that current smokers and respondents with poor psychological conditions were more likely to perceive their health as poor. Illiteracy, current smoking status, perceived overweight, unhappiness, having depressed feeling, suicidal ideation were significantly associated with poor SRH. Psychosocial health variables have important influences on SRH.

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A Critical Analysis on Hospital Waste Management at Bandipur Hospital, Bandipur, Tanahu District, Nepal

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ABSTRACT

Background: Hospitals generate large volumes of wastes as a by-product of a variety of health services and procedures carried out such as surgery, dressing of the wounds, dialysis, deliveries, laboratory and dental procedures, postmortem procedures etc. Such a waste may be infectious or non-infectious. If such a waste is not collected, transported and disposed off, it not only results in causation of ‘Hospital Acquired Infections’ but also poses a major public health hazard by causing pollution of air, water and soil.

Objective: This study objective was to critically analyze current waste management system in Bandipur Hospital, Tanahu District, Nepal and critically review the findings.

Methods: For the critical analysis on waste management, literature review on hospital waste management was done. The techniques used for critical analysis were observation using observation checklist and interview with hospital manager, doctors, staff nurses, and local people living nearby the hospital. Tool of this critical analysis was SWOT analysis.

Results: It can be seen from SWOT analysis that, most of the waste of the hospital is not managed in an appropriate way. Appropriate segregation and disposal of biodegradable and non biodegradable, infectious and non-infectious wastes is important to avoid health hazards caused by poor waste management such as vector borne diseases, pollution of air, water and soil contamination. In Bandipur Hospital, waste disposal is not according to WHO standard. Physical infrastructures do not meet the requirements. Available dustbins are not according to WHO color coding, no basin at Emergency room, no trolley to carry waste and open dumping practice. The reason behind most of these problems is the management of the hospital, staffs of the hospital and the stakeholders who are not giving any attention to proper waste management process. The other reason beyond this is inadequate budget allocation for waste management in the hospital.

Conclusion: If the waste management of the hospital is done properly, environment of the hospital will become clean and hospital can provide quality health services to the patient. For this there is necessity of strong committment from the hospital management, the hospital staffs, hospital development committee and the Government.

Keywords

*Bandipur Hospital,
Hospital waste,
Waste management.*

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INTRODUCTION

Hospital waste is a special type of waste produced in small quantities carrying a high potential of infection and injury. Inadequate and improper handling may have serious public health consequences and a significant impact on the environment¹. Hospital waste management means the management of waste produced by hospitals using techniques that will check the spread of diseases². In developing countries, awareness regarding hospital waste management in terms of its segregation, collection, storage, transportation and disposal is lacking³⁻⁶. Hospital waste refers to all waste generated, discarded and not intended for further use in hospital. Biomedical waste is any solid fluid and liquid or liquid waste including its container and any intermediate products which is generated during the diagnosis, treatment or immunization of human beings or animals, in research pertaining there to or in the production or testing of biological or animal waste from slaughter houses or any other similar establishment. In hospital, it comprises of 15% of total hospital waste⁷⁻¹².

Classification of hospital waste

1. **General waste:** It is non-hazardous to human beings. Largely composed of domestic or household type of waste. E.g. kitchen waste, papers, wrappers, plastics etc.
2. **Pathological waste:** It is hazardous waste consisting of tissues, organs, body parts, human fetus, blood and body fluids etc.
3. **Infectious waste:** It is hazardous waste containing pathogens in sufficient quantity that could cause disease. E.g. culture and stocks of infectious agents from laboratories, waste from surgery and infectious patients.
4. **Sharps:** Material causing the person a cut or puncture of the skin. Eg. Broken glass, needle, nail, blade, and scalpel etc.
5. **Pharmaceutical waste:** Includes pharmaceutical products, drugs and chemicals that have spilled, returned from ward, outdated or contaminated.
6. **Chemical waste:** Comprises of discarded solid, liquid and gases chemicals. E.g. Cleaning, housekeeping and disinfecting product.
7. **Radioactive waste:** Includes solid liquid and gases waste that is contaminated with radio nucleoids and generated from *in vitro* of body tissues and fluids, *in vivo* body organ imaging and tumor localization.
8. **Genotoxic waste:** Waste containing substances with genotoxic properties E.g. waste containing cytostatic drugs (often used in cancer therapy), genotoxic chemicals.
9. **Pressurized containers:** Gas cylinders, gas cartridges, aerosol cans.

Rationale of hospital waste management

Hospital waste management is a part of hospital hygiene and maintenance activities. In fact only biomedical waste is hazardous and when hazardous waste is not segregated at the source of generation and mixed with non-hazardous waste then 100% waste becomes hazardous. It is essential that health care waste is collected, stored and disposed of in a proper and scientific manner. General hygiene is a prerequisite for good medical waste management in health care institutions. It is also vital that the whole health care institutions be kept clean and on a satisfactory state of hygiene. Bandipur hospital is nearby Bandipur bazaar and the hospital waste is disposed openly and burned down. The hospital is not having separate placental pit and they are burying the placenta under the sand bank. The hospital is not following the system of dumping the waste in dust bins as per the color coding given by WHO. There is lack of segregation practices. Though hospital has sufficient space within its premises for management of wastes, the waste management is poor. For this reason, I felt that the hospital has much room for improvements in terms of management of hospital waste. Hence, I decided to explore the strengths, weaknesses, opportunities and threats regarding the waste management of Bandipur Hospital.

OBJECTIVES

General objective

To critically analyze current waste management system in Bandipur Hospital and critically review the findings

Specific objectives

- To identify the infrastructure for waste management in Bandipur Hospital
- To evaluate the quality in terms of its strength and

weaknesses of waste management by comparing it with a standard

METHODS

For the critical analysis on waste management literature review on hospital waste management was done. The techniques used for critical analysis were observation using observation checklist and interview with doctors, staff nurses, and local people living nearby the hospital. Method of this critical analysis was SWOT analysis.

RESULTS

Findings and comparisons

Physical facilities

There is no incinerator in the hospital. There are no placental pits. There is a dumping site nearby the hospital approximately 50 meter away from the hospital.

Human resources

There are five sweepers in the hospital which are inadequate for cleaning of the hospital.

Logistics

Table 1: Waste management logistics in Bandipur hospital

Infrastructures	Bandipur hospital
Placental pits	Absent
Dumping sites	Present
Dustbins for separation of waste	Absent
Incinerator	Absent
Basins	Present but not maintained
Drainage for liquid waste	Present
Tractor for carrying waste to dumping site	Absent
Color coding containers	Absent

As it can be seen from the table that most of the necessary logistics required for the waste management is not available. Tractor for carrying the solid waste from the hospital to the dumping site is absent. Incinerator is absent in the hospital. Liquid waste is managed by disinfecting them first in sodium hypochlorite and then flowed into the

wash basin. The dumping site is nearby the market place approximately 50 meter away from the Hospital. Safety box for syringe disposal is not present at all; however, the syringes are cut in the needle cutter and burnt down after use. In the emergency room there are dustbins for the collection of wastes but not color coded and there are no wash basins.

SWOT Analysis Matrix

Table 2: SWOT matrix for hospital waste management in Bandipur hospital

Infrastructure	STRENGTH	WEAKNESS	OPPORTUNITY	THREATS
Dumping site	Present	- Quite near to the hospital - Not walled from any side	- Management of safe and secure area by the help of community for management of healthcare waste	- Community denial for help
Space	Present	- Inadequate space - Lack of adequate fund for land purchase	- Land can be managed in collaboration with community people	- Local residents may not support
Trolley		- No trolley	- Trolley can be purchased - Tractor can be taken on lease	
Tractor		- No tractor	- Tractor can be purchased or can be taken on lease	
Dustbins and puncture	- Adequate dustbins present	- Dustbins are not according to WHO color coding - Degradable and non degradable waste are not separated - Infectious and non-infectious waste are not separated; Not covered - Available dustbins are not in use - Puncture proof containers are not present	- WHO color coded dustbins implementation can be done - Staff can be trained to separate infectious and non infectious and degradable and non degradable waste	- Dustbins not used properly by patient and visitor due to lack of awareness
Plastic bags		- Are not available	- It can be purchased	
Special autoclavable bags		- Not present	- Can be purchased	
Recording and reporting		- Not present	- Maintenance of record registers - Advanced software for management of records	- Skilled manpower may not be present to operate the software

Equipments				
Autoclave/ steam sterilizer	- Present	- Not used for sterilizing waste	- Collaboration with community & NGOs and INGOs to buy more autoclaves	- Helping organization may not be able to help consistently
Chemical disinfectants	- Liquid wastes are disinfected with sodium-hypochlorite solution			
Needle destroyer	- Present	- Insufficient number	- More needle destroyers can be purchased	- Availability of needle destroyers maybe limited
Manpower				
Sweepers	- Present	- Not sufficient in number Not trained	- Training of concerned staff can be done	- Inadequate trainers and training materials
Waste handlers		- Not present	- Hiring waste handlers on contract basis	
Waste management committee		- Not present	- Establishment of waste management committee	- Lack of coordination among committee members
Plan & policies				
Waste management policy	- Solid waste management policy present (National level)	- No special legislation, guidelines related to waste management	- Establishment of comprehensive system of healthcare waste management	- Political instability
Financial issues				
Budget resources		- Hospital income insufficient Lack of sufficient fund	- Collaboration with waste recyclers	- Chances of misutilization of budget

It can be seen from above tool used as SWOT analysis that, most of the waste of the hospital is not managed in an appropriate way. Appropriate segregation and disposal of biodegradable and non biodegradable, infectious and non-infectious wastes is important to avoid health hazards, and this hospital did not do so. In Bandipur hospital waste disposal is not according to WHO standard. Physical infrastructures do not meet the requirements. Available dustbins are not according to WHO color coding, no basin at Emergency room, no trolley to carry waste and open dumping practice. There is also under utilization of logistics such as dustbins.

DISCUSSION & CONCLUSION

Bandipur Hospital has a large catchment area. Due to high patient flow waste produced in the hospital is also

in greater amount. Due to poor waste management in the hospital it will create bad effects not only to patients but also to doctors, hospital staffs and the residents nearby the hospital. This can ultimately increase the disease burden in the Tanahu District. The reason behind most of this problem is the management of the hospital, staffs of the hospital and the stakeholders who are not giving any attention. The other reason beyond this is inadequate budget allocation for waste management in the hospital. Similar type of study done in a Teaching hospital in Karachi Shahida Rashid¹³ *et al* shows that waste management is not done in a proper way where segregation of biodegradable and non-biodegradable waste was not done. A study done by Choudhary¹⁴ *et al* and Paudel¹⁵ *et al* showed that health care waste management practice in the hospitals of Nepal were unsatisfactory because of the lack of waste management plan and carelessness of patients, visitors and staffs.

If the waste management of the hospital is done properly, environment of the hospital will become clean and hospital can provide quality health services to the patient. For this there is necessity of strong commitment from the hospital management, the hospital staffs, hospital development committee and the government.

Recommendations

A separate placental pit should be constructed. Waste management should be done far away from the town of Bandipur. Dustbins should be maintained according to the WHO coding standards. All dry refuse from hospital should be burnt in an incinerator.

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Decreased Level of Vitamin D is Associated with Rheumatoid Arthritis Patients from Western Region of Nepal

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ABSTRACT

Background: Rheumatoid Arthritis (RA) is a progressive, chronic type of autoimmune disease and the role of vitamin D in the pathogenesis of RA is under investigation.

Objective: The objective of this study was to determine the vitamin D deficiency in patients with RA as compared to healthy controls and to assess the relationship between serum vitamin D and anti-cyclic citrullinated peptide (anti-CCP) antibody levels in patients with newly diagnosed rheumatoid arthritis.

Methods: The study was conducted between January 2017 to February 2018 at Fishtail Hospital and Research centre. A total of 63 patients with early RA diagnosed and a control group of 56 healthy participants, not on vitamin D supplements were recruited from Department of Internal Medicine. Five ml of blood samples were drawn from cubital veins. Blood glucose, creatinine, uric acid, calcium, RA factor, 25-hydroxy vitamin D, anti-CCP antibody, and erythrocyte sedimentation rates were measured in a centralized laboratory of Fishtail Hospital and Research centre.

Results: The level of serum 25-hydroxy vitamin D were significantly lower in RA group (20.03 ±9.97 ng/mL) in comparison to the control group (24.46 ±8.45 ng/mL) (p<0.003). Our result indicates the prevalence of vitamin D deficiency was more in RA group compared with control group (47.61% vs. 33.16%, p <0.002). The level of Anti-CCP is significantly high in RA group than control group. In RA patients serum 25-hydroxy vitamin D levels were negatively correlated to anti-CCP antibody levels (rs = 0.72, p <0.001), and erythrocyte sedimentation rate (rs = 3.95, p <0.005).

Conclusion: In RA patient vitamin D deficiency is quite common and serum 25-hydroxy vitamin D level was negatively correlated to anti-CCP antibody level. Our results suggest that vitamin D level is a motivation factor rather than a consequence of RA activity.

Keywords

Anti-CCP, RA Factor, Rheumatoid arthritis, Vitamin D.

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INTRODUCTION

Rheumatoid Arthritis (RA) is a progressive, chronic type of autoimmune disease characterized by joint pain, stiffness

in hands, feet and other parts of the body¹. Worldwide prevalence of RA is one percent which has been found to be more common in females than in males. The patients with RA shows the symptoms of morning stiffness, joint

pain, swelling, anemia, loss of appetite and weight loss. Its pathogenesis is still under investigation, although the role of genetic susceptibility, environmental factors, and immune activation is indispensable^{1,2,3,4}. However, in more severe case it can cause irreversible damage of joints and can also cause damage in other body organs such as eyes, lungs, blood vessels and skin. Therefore, biomarkers are required for early diagnosis to prevent the damage. RA factor and anti-cyclic citrullinated peptide (anti-CCP) antibody are most commonly used biomarkers to diagnose RA. But anti-CCP antibody has been found to be more specific for RA than RA factor⁵. Anti-CCP antibodies, auto-antibodies found in sera of RA patients has been found to be more reliable than RA factor for diagnosing rheumatoid arthritis which is detectable in very early stage of the disease⁶. Early diagnosis may help to prevent the irreversible damage of joints^{7,8}.

Vitamin D, also known as secosteroid is a fat-soluble hormone, which can be generated following ultraviolet light irradiation of the skin and plays vital role in metabolism of bone and calcium. Furthermore, it also plays role in modulation of cell growth, neuromuscular and immune function, and reduction of inflammation. 25-hydroxy vitamin D deficiency is linked to rickets among children and osteomalacia and osteoporosis among adults⁹. Deficiency of vitamin D is involved in the pathogenesis of RA, as well as activity of RA. The decrease of vitamin D is related to older age, female gender and a higher degree of RA activity^{10,11}. Hilger J *et al.* reported that prevalence of vitamin D level in the context of Asia/Pacific region is significantly lower level¹². Song *et al.* found that in a meta-analysis, involvement of vitamin D at the onset of RA¹⁰. They found that individuals with the highest level of vitamin D intake from food had a 24% lower risk of developing RA than those in the lowest group. However, in another study vitamin D intake was not associated with the risk of RA¹³. Thus, present study aimed to determine the level of 25-hydroxy vitamin D in RA patients and assess the relationship between serum vitamin D and anti-CCP antibody levels in patients with newly diagnosed RA.

METHODS

The study subjects of 63 RA patients (29 males and 34 females) were recruited in between January 2017 to February 2018, from the Internal Medicine Department, Fishtail Hospital and Research Centre, Pokhara, Nepal.

Newly diagnosed RA patients with disease duration of less than one year and had not been treated with non-steroidal anti-inflammatory drugs. All enrolled patients fulfilled the American college of Rheumatology or European league against rheumatism RA classification criteria. Apparently 56 healthy individuals (26 males and 30 females) of the region having either no health problem or not receiving any therapeutic treatment were used as the normal control group. All the subjects in RA group and control group were consented by the Institutional Review Board of the Hospital to participate in the study. At the time of sample collection information regarding demography, lifestyle and health/medical history was recorded in the predesigned questionnaire.

The following blood tests were evaluated in the blood serum at the Department of Laboratory of Fishtail Hospital and Research Centre. Blood sample were drawn aseptically from cubital vein. A total of 5.0 ml of venous blood was drawn from each subject. Blood samples were allocated in plane tube and EDTA tube. EDTA blood used for erythrocyte sedimentation rates (ESR) by automated machine, sedy-12 ESR analyzer, unique diagnostics. Clotted bloods allocated in plane tube were then centrifuged at 2000 rpm for 10 minutes to separate serum samples and glucose, creatinine, uric acid, and calcium were measured using standard protocol in both RA and control group by fully automated biochemistry analyzer. RF test, 25-hydroxy vitamin D, and anti-CCP antibody were measured in serum sample of RA group, however, only serum 25-hydroxy vitamin D levels were measured in the control group. Qualitative RF in serum was determined by latex agglutination method (Medsorce Ozone Biomedicals). Serum 25-hydroxy vitamin D levels and Anti-CCP levels were measured by an automated electrochemiluminescent immunoassay from Siemens Immunoassay system. Vitamin D status was defined as follows: ≥ 30 ng/mL, sufficiency; < 29 ng/mL, ≥ 21 ng/mL, insufficiency; ≤ 20 ng/mL, deficiency and for anti-CCP testing, a level of ≥ 25 relative units IU/mL was considered positive^{14,15}.

Statistical analysis

The statistical analysis was under taken using SPSS version 20.0 software. Quantitative data were expressed as mean \pm SD. Student t-test was used to compare quantitative data of two groups. Chi square test was applied for qualitative data analysis and one way ANOVA was used to compare the differences between different sub groups. The level

of significance was considered when p value <0.05 was considered as cut off value for significance.

RESULTS

Total of 63 RA patients fulfilled the American college of Rheumatology or European league against rheumatism RA classification criteria and age, sex matched 56 healthy control groups was included in the study. Out of 63 RA patients, males were 29 (46%) and females were 34 (54%), whereas, in control group 26 (41%) males and 30 (48%) were females. The comparison of anthropometric parameters age, SBP, DBP, BMI, Waist/Hip ratio are summarized in Table 1. The mean age of the RA patient 52.8 ±13.6 and control group 49.7 ±11.9 showed a non-significant difference (P=0.09). Systolic blood pressure (SBP) and diastolic blood pressure (DBS) was noted statistically non significant between RA and control group. The mean of both BMI and waist hip ration was noted statistically non significant in between two groups.

Table 1: Anthropometric parameters of fatty liver and healthy control persons

Parameters	RA group Mean ±SD (n-63)	Control group Mean ±SD (n-56)	P-value
Age	52.8 ±13.6	49.7 ±11.9	NS
Systolic	123.7 ±14.9	126.9 ±12.4	NS
Diastolic	88.2 ±7.5	87.5 ±10.1	NS
Height	165.5 ±8.7	166.5 ±7.7	NS
Weight	73.4 ±11.5	72.6 ±9.2	NS
BMI	26.3 ±3.5	25.7 ±4.7	NS
Waist/Hip ratio	0.93 ±0.1	0.91 ±0.1	NS

NS=Non-significant, SD = Standard deviation, p value <0.05 is considered significant

Comparison of serum biochemical profiles means between RA group and control group are shown in Table 2. Fasting blood sugar (FBS), HbA1C, creatinine, AST and ALT were compared in between RA and control group, and result shows there were no statistically difference between these groups. Serum uric acid level were not higher than normal range in both RA and control groups, however, there was significantly higher level of uric acid in RA group than control group (5.63 ±0.81 Vs 4.28 ±0.59, P=0.04). Interestingly, ESR is higher in RA group in comparison to the control group (24.35 ±11.26 Vs 9.71 ±7.09, P=0.001). Moreover, Anti-CCP antibody was significantly increased in RA group (37.4 ±26.3) than control group (17.7 ±12.8), giving p

value 0.02. Interestingly, the mean of 25-hydroxyvitamin D concentration in RA group (20.0 ±9.7) is significantly lower than control group (24.4 ±8.5) (P=0.003). The vitamin D level in males and females were calculated. In both RA and control group the mean level of vitamin D is not different by sex (Table 3). Interestingly, vitamin D deficiency was more prevalent in RA group compared with control group (47.61% vs. 33.16%, p=0.002) (Table 3). In RA group, correlation coefficients of different variables with serum vitamin D level were presented in Table 4. Multiple linear regression tests indicates that there is an inverse relationship between serum 25 hydroxyvitamin D and Anti-CCP antibody (p=0.002).

Table 2: Biochemical parameters of rheumatoid arthritis (RA) group and control group

Parameters	RA group Mean ±SD (n-63)	Control group Mean ±SD (n-56)	P-value
Glucose	98.18 ±13.60	96.40 ±10.38	NS
HbA1C	5.72 ±0.78	5.61 ±0.59	NS
Creatinine	1.13 ±0.19	1.07 ±0.18	NS
Uric Acid	5.63 ±0.81	4.28 ±0.59	0.04
AST	32.51 ±14.26	31.26 ±10.58	NS
ALT	30.06 ±12.57	29.41 ±13.70	NS
ESR (mm/1 st hr)	24.35 ±11.26	9.71 ±7.09	0.001
Anti-CCP antibody (IU/ml)	35.4 ±26.37	17.7 ±12.83	0.02
25-hydroxyvitamin D (ng/mL)	20.03 ±9.97	24.46 ±8.45	0.003

SD = Standard deviation, NS = Non significant, p value <0.05 is considered significant. AST = Aspartate transaminase, ALT = Alanine aminotransferase, ESR = Erythrocyte sedimentation rate, Anti-CCP antibody = Anti cyclic citrullinated peptide antibody

Table 3: The level of 25-hydroxyvitamin D in RA group and Control group

Parameters	RA group Mean ±SD	Control group Mean ±SD	P-value
25-hydroxyvitamin D (In males)	20.17 ±9.23	25.75 ±8.92	0.001
25-hydroxyvitamin D (In females)	19.91 ±10.25	23.17 ±7.97	0.001
25-hydroxyvitamin D Deficiency ratio	47.61	33.16	0.002
25-hydroxyvitamin D Insufficiency ratio	34.92	46.48	0.01
25-hydroxyvitamin D Sufficiency ratio	17.46	20.36	0.09

SD = Standard deviation, p value <0.05 is considered

significant

Table 4: The correlation coefficient of different variables with serum 25-hydroxyvitamin D levels within rheumatoid arthritis (RA) group

Variables	Mean \pm SD	Estimated coefficient	P-value
Age (years)	52.8 \pm 13.6	-0.61	0.001
Gender	-	0.17	0.38
ESR (mm/1 st hr)	24.35 \pm 11.26	-3.95	0.005
Anti-CCP anti-body (IU/ml)	35.4 \pm 26.37	-0.72	0.001

SD = Standard deviation, NS = Non significant, p value <0.05 is considered significant. ESR = Erythrocyte sedimentation rate, Anti-CCP antibody = Anti cyclic citrullinated peptide antibody.

DISCUSSION

The comparison of anthropometric parameters age, SBP, DBP, BMI, waist/hip ratio are not statistically significant in between RA and control group suggesting that these parameters are not associated with rheumatoid arthritis. There was significantly higher level of uric acid in RA group than control group (5.63 \pm 0.81 Vs 4.28 \pm 0.59, P=0.04) suggested that uric acid play a role in the pathogenesis of arthritis. Anti-CCP antibody, are used as highly sensitive marker in the diagnosis and severity evaluation of RA. In the present study, we found that increased anti-CCP and decreased ESR in RA than control are accepted results.

We have found that vitamin D deficiency (25-hydroxyvitamin D) values <20 ng/mL is common in RA patients affecting 47% of the entire cohort. Our results are similar to various report presented in smaller sizes, with a prevalence of vitamin D deficiency ranging from 30 - 63%^{16,17,18}. In the present study 25-hydroxyvitamin D levels were in insufficiency level (24.46 \pm 8.45) even in control groups, suggesting that the level of vitamin D is slightly lower in Nepalese population, which may be due to food and personal behavior. Also the normal ranges of vitamin D we use are acquired from Western counties. Our results shows significant decrease of vitamin D in RA than control group, confirms the correlation between rheumatoid arthritis and vitamin D. We suggest that vitamin D may play the crucial role in the formation of arthritis and recent studies have highlighted on the immunological activity of vitamin D, which is independent

of its classical role in the regulation of calcium¹⁹.

We demonstrated negatively correlated serum 25-hydroxyvitamin D levels to the anti-CCP antibody levels. Anti-CCP antibody, early marker of RA can be used as an indicator for supplementation treatment of vitamin D in the early rheumatoid arthritis patients. However, anti-CCP antibodies were shown to have no correlation with serum 25-hydroxyvitamin D in chronic RA patients²⁰. In our study, we have enrolled the first diagnose early RA patients and our results are as similar to the recent work, where serum 25-hydroxyvitamin D levels were reduced in patients with RA and negatively associated with disease activity²¹. Moreover, intake of vitamin D can lower the risk of RA¹⁰.

CONCLUSION

In RA patient vitamin D deficiency is quite common and serum 25-OH-D level was negatively correlated to anti-CCP antibody level. Our results suggest that vitamin D level is a motivation factor rather than a consequence of RA activity. Further studies on the role of vitamin D in the pathogenesis of RA are required.

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Clinical Profile of Injuries due to Paragliding Accident Attended in a Tertiary Hospital of Western Region of Nepal

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ABSTRACT

Introduction: Paragliding is an adventurous aerial sport which is performed regularly in and around Pokhara. The Western Region of Nepal (Especially Pokhara, Parbat, Baglung and Syanja) is famous not only for its natural beauty but for adventurous sports like paragliding, ultraflight and bungee jumping etc. The growing popularity of paragliding sport has led to a steady increase in the number of associated injuries.

Objectives: The main objective of this retrospective review is to find out characteristic of injuries in different of paragliding accidents.

Methods: This is a retrospective review of paragliding injury cases who attended emergency department of Gandaki Medical College, Pokhara, Nepal from June 2009 to May 2016. Demographic profile (Age, sex, address), type of flight, timing of accident, severity and pattern of injuries were collected and analyzed using the frequency table.

Results: Among 60 people who faced accidents and brought to hospital, four of them with severe multiple trauma were declared dead in the emergency department at the time of arrival. Fifty six patients were injured with varieties of injury. Among 56 survived patients, 14 (25%) were minor injuries and discharged from the Emergency Department after treatment for soft tissue trauma like abrasion or sprain. Twelve patients with polytrauma (Including four chest injury, two abdominal injury with multiple bone fractures) and rest of the patients were admitted and treated/referred/discharged.

Conclusion: Lower limb especially foot and ankle injury were the commonest type of injury followed by spine fracture in paragliding accidents.

Keywords

Accidents, Foot, Injury, Paragliding, Pokhara.

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INTRODUCTION

Many studies are performed in different parts of world regarding causes and pattern of injuries in paragliding accident. Till now we don't have such studies performed in our setup.

The main objectives of this retrospective review was to find out the characteristic (Pattern and severity) of injuries

in different paragliding accident cases who attended Emergency Department of Gandaki Medical College so that management protocol can be planned in hospital. This study also aimed to find out mode and timing of accident (Takeoff, lidair, landing) so that certain protective measure and precaution can be recommended to pilots and paragliding company to prevent and reduce number of accident in coming days.

METHODS

This is a retrospective review of paragliding injury cases who attended Emergency Department of Gandaki Medical College, Pokhara, Nepal from June 2009 to May 2016. Demographic profile (Age, sex, address), type of flight, timing of accident, severity and pattern of injuries were collected and analysed using the frequency table. Severity as minor (no need for hospitalization), serious (need for hospitalization) and mortal (dead at arrival or during resuscitation in Emergency Department)¹. Sixty patients who were injured in 48 paragliding accident and brought to Gandaki Medical College Emergency Department were included in this study. Paragliding accidents victims who were treated and discharged from accidents site or in other hospital of Pokhara were excluded from this study.

RESULTS

Among 60 people who faced accidents and brought to hospital, four of them with severe multiple trauma were declared dead in the Emergency Department at the time of arrival. Fifty six patients were injured with varieties of injury. Forty eight (80%) were males and 12 (20%) were females. Their mean age was 35 years (18 – 56). Sixteen (26.6%) people were from Nepal and 44 (73.3%) were tourists from other countries. Twelve were tandem flights and 36 were single (Solo) flights ended with an accident. Four were single flights of all 48 accidents that caused death. Twenty four patients were injured during tandem flights and 36 were injured during solo flights. Of all patients who were recorded, 20 were injured during take-off (33.33%), 30 were injured in mid-air (50%), and 10 (16.66%) were injured during landing (Table 1). Among 56 survived patients, 14 (25%) were minor injuries and discharged from the Emergency Department after treatment for soft tissue trauma like abrasion or sprain. Twelve patients with poly-trauma (Including four chest injury, two abdominal injury with multiple bone fractures) and rest of the patients were admitted and treated/referred/discharged.

In total 72 fractures were seen in survived injured case (Table 3). The most common were fractures around the foot and ankle (n=20, 27.77%), lumbar fractures (n=12, 16.6%), and wrist and hand fracture (n= 8, 11.1%).

Table 1: Distribution of patient in different flight phase

Flight Phase	Numbers of injured
Take-off	20
Mid-air	30
Landing	10
Total	60

Table 2: Type of injury and number of cases

Type of injury	Numbers of injured
1 Polytrauma	16 includes 4 deaths
2 Isolated lower extremities injury	16
3 Isolated upper extremities injury	8
4 Isolated spine Fracture	6
5 Soft tissue injury	14
Total	60

Table 3: Number of fracture in different location

Location of fracture	Number of cases
A Vertebra	
Thoracic	6
Lumbar	12
Pelvis	4
B Lower extremities	
Femur	4
Tibia	6
Foot and ankle	20
C Upper extremities	
Shoulder-humerus	4
Elbow	4
forearm	4
Wrist and hand	8

Fig 1: Photograph of Compound fracture dislocation of right ankle in paragliding accident





Fig 2: Radiograph of the same patient



DISCUSSION

Paragliding is an adventurous aerial sport which is performed regularly in and around Pokhara. The growing popularity of paragliding sport has led to a steady increase in the number of associated injuries^{4,5}. Certain studies⁶ have shown accidents cases due to paragliding were reduced in comparison to other adventurous aerial sports probably due to availability of protective measures and precautions.

In our series, 80% of patients were males and 20% were females. Gender distribution of our patients was consistent with that of Fasching *et al* reports about accidents in modern aerial and adventure sports^{4,7}. The mean age of the patients was also consistent with that reported in the Gauler *et al* study^{2,8}. In our study, 25% of survived patients had minor injury and they were discharged from the Emergency Department on the same day with or without medication. Among Orthopedic injury there were 72 fracture in survived patient in which lower extremity

fracture rate was 40.2% (n=30), which was similar to the Canbek *et al* study of 39.8%¹. and (29% - 56%) in other similar studies^{3,5}. In this study, the paragliders did not use protective equipment except a simple helmet. Reports suggested that by refinement of pilot education, deliberate use of protective equipment, and better understanding of inherent aerodynamics of paragliding, the injury rates can be lowered³.

There was more number of solo flight accidents (36) than tandem flight (12). This may be due to in tandem flight pilots were more concerned about airbase condition during landing and take-off, maneuvering the flight according to the weather and avoids unnecessary acrobatic moves¹. In this study, all mortality cases occurred in mid-air accident phase in solo flight which may be due to uncontrolled acrobatic manoeuvre. The injury rate of paragliding was found to be lower than that of other adventure and extreme sports, but the accidents were more fatal in paragliding⁴. The most frequent detectable causes of the accidents were human errors and folding of the parachute during flight in bad weather conditions^{1,9}.

The paragliding injury rate varies from 120 to 360 per 100,000 jumps in different studies^{4,10-12} but we could not calculate the rate as this was the single centre retrospective review. We could not collect all data from different paragliding company and even from the different hospital of this region, which is a major drawback and limitation of this study.

CONCLUSION

Lower limb especially foot and ankle injury were the commonest type of injury followed by spine fracture in paragliding accidents. To decrease the injury risk of extremities, proper protective equipment should be used by pilots and tandem paragliders. More studies should be conducted to obtain countrywide results and build a database about paragliding accidents.

Acknowledgement

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Conflict of Interest

We declared that we have no competing interest and have not received any funding or benefit to conduct the study.

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Is Routine Histopathological Examination of Appendix Mandatory?

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ABSTRACT

Introduction: No age is immune for appendicitis and appendicectomy. Appendicectomy is one of the most common operations done all over the world. Emergency surgeries are more common than elective. Histopathological examination of every excised tissue is strongly recommended but trained manpower and laboratory for histopathological examination is not available in every hospital in our country.

Methods: It is a prospective observational study of appendectomy performed at Bir Hospital, Kathmandu, Nepal country over a period of three years. Histopathological examination reports and peroperative findings were collected. Histopathological examination was performed by postgraduate pathologist at different hospitals and laboratory centres. Peroperatively appendices were categorized as non malignant looking appendix and suspicious malignant looking appendix by operating surgeons at different hospitals. Histopathological examination reports were compared with peroperative categorization.

Results: Eight hundred and fifty five appendectomies performed during the study period were analysed. Eight hundred thirteen (95.1%) cases had non-malignant looking appendix and 42 (4.9%) cases had malignant looking appendix peroperatively. Seven (0.8%) cases were found malignant and 848 (99.2%) cases were found non-malignant on histopathology report. All seven (16.67%) malignant cases were from 42 suspicious malignant looking cases.

Conclusion: Routine histopathology examination is mandatory for only peroperative suspicious malignant looking appendix.

Keywords

Appendix, Histopathological examination, Remote areas.

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INTRODUCTION

Appendicectomy is one of the most common operations done all over the world. Emergency surgeries are more common than elective. No age is immune for appendicitis and appendicectomy. Histopathological examination of every excised tissue is strongly recommended but trained manpower and laboratory for histopathological examination is not available in every hospital in our country.

This study has been designed to ameliorate confusions on which specimens are recommended for histopathological examination especially in areas where no laboratory services are available and transportation to deliver specimens to equipped laboratory is expensive.

METHODS

It was a prospective observational study conducted at Bir

Hospital, Kathmandu, from January 2012 to December 2014. Ethical clearance was obtained from Institutional Review Board.

Eight hundred and fifty five patients were included in the study. Their peroperative findings were categorized into normal looking appendix and suspicious malignant looking appendix. Peroperative finding were compared with histopathological reports. A performa was prepared by the principal author and was filled by the principal author and the coauthors while working at Bir Hospital. All the appendectomies performed by the authors for whom histopathological investigation was done were included in the study. All patients for whom either Histopathological examination were not done or did not report with same were excluded.

Data were analysed as percentage of the total in the respective categories as presented.

RESULTS

There were 855 cases. Maximum numbers of cases were in 20 - 40 year age group among both the sexes. Five hundred fifty four (64.8%) were males and three hundred one (35.2%) were females. Eight hundred thirteen (95.1%) cases had non-malignant looking appendix and 42 (4.9%) cases had malignant looking appendix peroperatively. Seven (0.8%) cases were found malignant and 848 (99.2%) cases were found non-malignant on histopathology report. All seven (16.67%) malignant cases were from 42 suspicious malignant looking cases. The results have been summarized in Table 1.

Table 1: Comparative data of peroperative findings with histopathology examination report

Histopathology examination report	Peroperative finding		Total
	Non malignant looking appendix	Suspicious malignant looking appendix	
Non-malignant	813	35	848
Malignant	0	7	7
Total	813	42	855

Table 2: Age and sex distribution

Sex	Age					Total
	<20 years	21 – 40 years	41 – 60 years	61 – 80 years	>80 years	
Males	130	350	53	15	6	554

Females	79	181	25	9	7	301
Total	209	531	78	24	13	855

Fig 1: Malignant looking Appendix specimen



Fig 2: Normal appendix



Fig 3: Histopathology of appendix



DISCUSSION

An appendectomy is the surgical removal of the vermiform appendix. This procedure is normally performed as an emergency procedure, when the patient is suffering from acute appendicitis. The first recorded successful appendectomy was on December 6, 1735 at St. George's Hospital in London, when French surgeon Claudius Amyand described the presence of a perforated appendix within the hernial sac of an 11 year old boy who had undergone successful herniotomy¹. Appendicectomy can be performed by open technique or laparoscopically. Histopathological examination of the appendix is routinely

performed because there are still a number of unusual diagnoses found in appendectomy specimens supporting the continued use of routine histology^{2,3}. In our study only 0.8% was found malignant, and 99.2% were found to be non-malignant. High number of appendicitis in adolescents and young adults were found in our study, which is similar to other studies. Routine histopathological evaluation after appendectomy had identified unexpected findings among pediatric patients including carcinoid tumor, pinworm, granuloma, eosinophilic infiltrates, and others, but reoperation for carcinoid tumors were not needed due to complete surgery⁴. To avoid missing of any clinically important and treatable conditions, routine histopathological examination is useful although no malignant diseases were found among 480 resected appendices in a study of Jat *et al*⁵. Retrospective analysis of 238 histopathological report of appendectomy specimens performed at single UK center recommend and justify the current practice of routine histopathological examination of resected appendix⁶.

In our study only 42 (4.9%) cases were suspicious malignant looking peroperatively and out of them seven (16.67%) cases were malignant proved histopathologically. No malignant cases were reported among non-malignant looking appendix peroperatively. Operating surgeons' bias may have occurred to categorise appendix specimen peroperatively because different surgeons were included in the study. In a study conducted at Germany, when 595 appendectomy cases, with no suspicion of malignancy pre and peroperatively, were included; three cases were found to be carcinoid tumour at tip of the appendix with size below 2 cm.

The study concluded that routine histopathological analysis did not help in the management and patients' outcome of any of the cases⁷. Similar results were given in an Iranian study⁸. Selectively sending specimens for histopathological examination can result in reduced workload on the histopathology department without compromising patient safety⁹⁻¹².

CONCLUSION

Routine histopathological examination for all appendectomy specimens is not necessary but mandatory for peroperative suspicious malignant looking appendix specimens even when equipped laboratory is far, thereby reducing the cost to the patient and overload to the

laboratories. It is however recommended that standard criteria to classify malignant and non-malignant looking appendices are designed to reduce operator bias.

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Effectiveness of Planned Teaching Program on Knowledge Regarding Effects of Alcoholism among Adults

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ABSTRACT

Background: Alcoholism is chronic progressive and often fatal disease. It is a primary disorder and not a symptom of other disease or emotional problems. The chemistry of alcohol allows it to effect nearly every type of cell in the body, including those in the central nervous system.

Objectives: The main objectives of this study are 1) to assess the level of knowledge regarding effects of alcohol among rural adults, 2) to assess the post test knowledge regarding effects of alcohol among rural adults, and 3) to evaluate the effectiveness of planned teaching program on knowledge regarding effects of alcoholism.

Methods: A Quasi-experimental one group pre-test post-test research design was adopted for the present study. The structured interview schedule was developed to collect data. The study was conducted at Challaghatta Village, Bangalore, Karnataka State, India and the data collected was analyzed and interpreted based on descriptive and inferential statistics.

Results: The assessment of knowledge level of adults regarding effects of alcoholism revealed that the mean pretest was 9.6 with SD 3.06. Mean post-test was 20.04 with SD 1.6 and enhancement mean score 10.8 with SD 1.08 and paired t value 9 which shows statistically significant at p >0.05 level.

Conclusion: The present study attempted to assess the effectiveness of planned teaching program (PTP) on knowledge of rural adults regarding effects of alcoholism and found that the developed PTP was effective in improving the knowledge of rural adults regarding effects of alcoholism.

Keywords

Effects of alcoholism, Knowledge, Planned Teaching Program.

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INTRODUCTION

Alcoholism is a significant problem all over the world. Chronic alcoholism causes severe health problem like liver disorder, gastrointestinal problem, diabetes, skin, muscle, bone disorder and reproductive problem. Prolonged heavy use of alcohol can lead to addiction¹.

Extensive alcohol intake is likely to produce withdrawal symptoms including severe anxiety, tremor, hallucination

and convulsion. In addition mother who drinks alcohol during pregnancy may give birth to infant with fetal alcoholic syndrome. These infant may suffer from mental retardation and other irreversible physical abnormality².

Drinking is considered harmful when alcohol consumption has actually caused physical or psychological harm. People with alcohol abuse have one or more of the alcohol-related problems over a period of one year like failure to fulfill work or personal obligations, recurrent use in potentially

dangerous situations³.

Alcoholism (alcohol dependence) is a chronic illness marked by dependence on alcohol consumption. It interferes with physical or mental health, and social, family or job responsibilities. This addiction can lead to liver, circulatory, and neurological problems⁴.

METHODS

A quantitative research approach was considered most suitable for this study, as the objective was to find out the knowledge regarding effects of alcoholism among adults, Quasi-experimental one group pre-test post-test design⁵ was used to assess the effectiveness of planned teaching program.

Table 1: Schematic representation of Research design

Group	Pre-test	Nursing intervention	Post-test
Adults	Structured interview schedule	Planned teaching program	Structured interview schedule

Variables

1. Dependent variables: The level of knowledge regarding effects of alcoholism among rural adults.
2. Independent variables: "Planned Teaching Programs" regarding effects of alcoholism among rural adults

Study setting

The study was conducted in selected rural community namely Sullikere, komaghatta village under Sullikere primary health centre, Bangalore, Karnataka State, India among the rural adults aged between 20 - 50 years, with sample size of 20. Simple random sampling technique was used for selection of samples.

Plan for data analysis

Data collected was analyzed by using descriptive and inferential statistics

Descriptive statistics

Range, mean, standard deviation and mean percentage was used to assess the level of knowledge regarding effects of alcoholism in rural adults.

Inferential statistics

Paired t test was used to compare the pre-test and post-

test level of knowledge regarding the effects of alcoholism among adults.

RESULTS

Organization and Presentation of data

Section 1: Assessment of level of knowledge regarding effects of alcoholism

Section 2: Assessment of effectiveness of planned teaching program on knowledge regarding effects of alcoholism among rural adults

Presentation of data

Section 1: Assessment of level of knowledge regarding effects of alcoholism

Table 1(a): Assess the pre-test level of knowledge regarding the effects of alcoholism among rural adults in selected rural community, Bangalore, India (n=20)

Domain	Level of knowledge					
	Inadequate (>50)		Moderate (50 - 75)		Adequate (<75)	
Knowledge	No	%	No	%	No	%
		16	80	4	20	0

Table 1(a) shows the assessment of the pre-test level of knowledge in that 16 (80%) are having inadequate knowledge and four (20%) are having moderate knowledge regarding effects of alcoholism.

Table 1(b): Assessment of the mean and the standard deviation of pre-test level of knowledge regarding effects of alcoholism among rural adults (n=20)

Domain	Max. score	Range	Mean	SD	Mean %
Pre-test	17	6 - 17	9.6	3.04	48

This table 1(b) shows that mean and standard deviation of effects of alcoholism among rural adults. In that mean is 9.6 and standard deviation is 3.04.

Table 2(a): Assessment of the post-test level of knowledge regarding effects of alcoholism among rural adults in selected rural community (n=20)

Domain	Level of knowledge					
	Inadequate (>50)		Moderate (50 - 75%)		Adequate (>75%)	
knowledge	No	%	No	%	No	%
		0	0	0	0	20

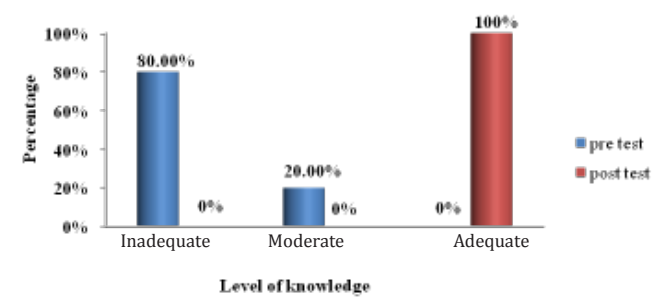
Table 2(a) shows the assessment of the post test level of knowledge in that 20 (100%) are having adequate knowledge regarding effects of alcoholism.

Table 2(b): Assessment of the mean and the standard deviation of post-test level of knowledge regarding effects of alcoholism among rural adults(n=20)

Domain	Max. score	Range	Mean	Standard Deviation	Mean %
Post-test	23	17-23	20.4	1.6	102

This table 2(b) shows that mean and standard deviation of effects of alcoholism among rural adults. In that mean is 20.4 and standard deviation is 1.6

Fig 1: Comparison of percentage distribution of adults according to pre-test and post-test level of knowledge



Section 2: To evaluate the effectiveness of planned teaching program on knowledge regarding effects of alcoholism among rural adults

Table 3: Effectiveness of planned teaching program on knowledge regarding the effects of alcoholism among rural adults (n=20)

Domain	Pre test		Post test		Enhancement		Paired 't' test
	Mean	SD	Mean	SD	Mean	SD	
Knowledge	9.6	3.04	20.4	1.6	10.8	1.08	9

This Table 3 shows that enhancement means 10.8 and SD is 1.08 and paired t value is 9. It shows that statistically significant at $p > 0.05$ level.

DISCUSSION

Present study aims to assess the effectiveness of planned teaching program on knowledge regarding effects of alcoholism among adults which shows the assessment of the pretest level of knowledge in that 16 members (80%) are having inadequate knowledge and four members (20%) are having average knowledge regarding effects of

alcoholism.

The findings are consistent with the study conducted by Godley SN, Williams JK¹⁰. They concluded that the knowledge of rural adults about the topic alcohol and alcoholism is very less compared to urban area.

The similar study was conducted regarding alcohol use and its harmful effects among high school children at Municipal Corporation School in Tirupati, Andhra Pradesh, India. The study findings revealed that among 60 high school children 15 (25%) had inadequate knowledge, 24 (40%) had moderate knowledge and 21 (35%) had adequate knowledge in pretest after administration of structured teaching program, the posttest findings revealed that eight (13.3%) had inadequate knowledge 28 (46.7%) had moderate knowledge and 24 (40%) had adequate knowledge which indicates that the high school children had gained knowledge on alcohol use and its harmful effects after the structured teaching program⁶.

A similar study conducted to assess the knowledge and attitude of 50 pre university students regarding effect of alcohol in Chamarajpet, Bangalore, India by simple random technique. The data was collected by using knowledge questionnaire. The study revealed that 33.2% students had inadequate knowledge about effect of alcohol. The study concluded by recommendation of an effective teaching intervention for the students to improve knowledge on adverse effects of alcoholism⁷.

A study was conducted to assess the effectiveness of street play on alcoholism among 50 young adults regarding alcoholism in Raichur, Karnataka State, India by simple random sampling. The structured interview schedule was used for the data collection. The study revealed that the mean of overall knowledge score in pre test was increased from 19.4 to 28.6 in post test⁸.

In our study the findings of the posttest level of knowledge is 20 (100%) are having adequate knowledge regarding effects of alcoholism after the planned teaching program. Table 3 shows that enhancement mean 10.8 and SD is 1.08 and paired t value is 9. It shows that statistically significant at $p > 0.05$ level. Based on the findings planned teaching program was found to be effective in improving the knowledge regarding effects of alcoholism among adults.

The findings of our study have been supported by a similar study which was conducted on improvement of

knowledge, attitude and behavior about oral health in a population of alcohol addicted persons. The study helps to improve the knowledge, attitude about oral health and oral cancer prevention in a population of alcohol addicted persons. A pre post test questionnaire was used to assess the short time effectiveness among 76 individuals. At one year from the intervention, 42 participants who reached follow up showed a great improvement in knowledge and attitude towards oral health⁹.

Limitations of the study

1. Time constraint is a limitation as a researcher took 20-30 minutes to interview each sample
2. Difficulty to establish rapport and cooperation from some family members.

CONCLUSION

The study was conducted to assess the level of knowledge regarding the effects of alcoholism among the rural adults in the selected rural community, in that, 16 members (80%) were having inadequate knowledge and 4 members (20%) were having average knowledge regarding effects of alcoholism before the planned teaching program but after the intervention 20 members (100%) were having adequate knowledge regarding effects of alcoholism. This study also attempted to assess the effectiveness of Planned Teaching Program (PTP) on knowledge of rural adults regarding effects of alcoholism and found that the developed PTP was effective in improving the knowledge of rural adults regarding effects of alcoholism.

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Dental Prosthetic Status and Prosthetic Needs of Patients Visiting Gandaki Medical College, Western Nepal

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ABSTRACT

Introduction: The study of prosthetic status and prosthetic need will help us to find out the degree of treatment required in the population which will help to frame the health care services.

Objective: The objective of the study was to find out the prosthetic status, prosthetic need in different age groups and their correlation with socio-economic status in patients visiting Department of Prosthodontics, College of Dental Surgery, Gandaki Medical College, Pokhara, Nepal.

Materials and Methods: The patients visiting Department of Prosthodontics, College of Dental Surgery, Gandaki Medical College, Pokhara, Nepal were screened. The demographic profile of the patients was obtained and clinical examination for prosthetic status and prosthetic need was done based on WHO method.

Results: There were total of 309 patients who visited the department during the study period. There were 133 (43%) male and 176 (57%) female patients. The majority of patients had no prosthesis in upper arch 78.6% and 83.8% in lower arch. The number of patients with replacement of missing teeth in upper arch was 66 (21.4%) and in lower arch were 50 (16.2%). There were 159 (51.5%) of patients requiring one or the other form of prosthesis in upper arch and 161 (52.1%) of patients in lower arch.

Conclusion: The majority of patients had no prosthesis 78.6% in upper arch and 83.8% in lower arch. The need of prosthesis was 51.5% in upper arch and 52.1 % in lower arch.

Keywords

Prosthetic need, Prosthetic status, Socio-economic status

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INTRODUCTION

Oral health is a state of being free from mouth and orofacial pain, oral and throat cancer, oral infection and sores, periodontal (gum) disease, tooth decay, tooth loss and other diseases and disorders that limit an individual's capacity in biting, chewing, smiling, speaking and psychosocial wellbeing¹.

Poor oral health and loss of teeth affects the dietary intake, nutritional status, phonetics and esthetics in addition to general health².

Oral health is a gateway to the general health and both are determined by the socioeconomic status of an individual. Studies in the past have shown correlation between socioeconomic factors and oral health³⁻⁵.

The prosthetic status and need of population of this area has not been studied. This study aims to find out the prosthetic status and need of patients visiting Out Patient Department of Prosthodontics, Gandaki Medical College.

MATERIALS AND METHODS

This is a hospital based cross sectional descriptive study carried out at outpatient department of Prosthodontics, Colege of Dental Surgery, Gandaki Medical College Teaching Hospital and Research Center, Lekhnath, Pokhara. The duration of the study was a period of six months from Nov 2017 to April 2018. All the patients attending outpatient Department of Prosthodontics above 18 years of age were screened after obtaining consent. Ethical clearance was obtained from the Institutional Review Committee. Those patients who denied giving the consent were excluded from the study. Total 309 patients were screened. Data relating to age, sex, socio-economic status, prosthodontic status and prosthetic need were obtained. The prosthetic status and needs were recorded by a single examiner based on WHO Oral health assessment form 1997⁶.

Prosthetic status

- Code 0: No prosthesis
- Code 1: Bridge
- Code 2: More than one bridge
- Code 3: Partial denture
- Code 4: Both bridge(s) and partial denture(s)
- Code 5: Full removable denture

Prosthetic need

- Code 0: No prosthesis needed
- Code 1: Need for one-unit prosthesis
- Code 2: Need for multi-unit prosthesis
- Code 3: Need for a combination of one -and/or multi-unit prosthesis
- Code 4: Need for full prosthesis (replacement of all teeth)

Modified Kuppuswamy socio-economic scale in context of Nepal was used to classify subjects according to socio-economic status⁷. The obtained data were entered in Microsoft Excel 2003 and further analyzed by SPSS version 25 to study the distribution of patients according to age and sex and to find out the prosthodontic status and need of the population.

RESULTS

There were total of 309 patients who visited the Department during the study period. There were 133 (43%) male and 176 (57%) female patients (Table 1). The majority of the patients had no prosthesis 243 (78.6%) in upper arch and 259 (83.8%) in lower arch (Table 2, 3). There was statistically significant difference between prosthetic status of upper arch and the age groups (P<0.001). The number of patients with replacement of missing teeth in upper arch was 66 (21.4%) and in lower arch were 50 (16.2%) (Table 2,3).

There were 159 (51.5%) of patients requiring one or the other form of prosthesis in upper arch and 161 (52.1%) of patients in lower arch. There was statistically significant difference between prosthetic need in upper and lower arch in relation to age groups (P<0.001) (Table 4,5). The upper middle class group of patients visited the department more 218 (70.6%) (Table 6).

Table 1: Distribution of subjects according to age and gender

Age (years)	Male N (%)	Female N (%)	Total N (%)
18 - 30	9 (29)	22 (71)	31 (10)
31 - 40	11 (30.6)	25 (69.4)	36 (11.7)
41 - 50	40 (47.1)	45 (52.9)	85 (27.5)
51 - 60	23 (35.9)	41 (64.1)	64 (20.7)
>60	50 (53.8)	43 (46.2)	93 (30.1)
Total	133 (43)	176 (57.0)	309

P>0.01

Table 2: Prosthetic status of upper arch according to age groups

Age groups (years)	Prosthetic status N (%)					
	Code 0	Code 1	Code 2	Code 3	Code 4	Code 5
18 - 30	31 (100)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
31 - 40	27 (75)	8 (22.2)	0 (0)	1 (2.8)	0 (0)	0 (0)
41 - 50	73 (85.9)	6 (7.1)	1 (1.2)	5 (5.9)	0 (0)	0 (0)
51 - 60	45 (70.3)	4 (6.3)	2 (3.1)	9 (14.1)	0 (0)	4 (6.3)
>60	67 (72.0)	10 (10.8)	3 (3.2)	8 (8.6)	0 (0)	5 (5.4)
Total	243 (78.6)	28 (9.1)	6 (1.9)	23 (7.4)	0 (0)	9 (2.9)

P<0.001

Table 3: Prosthetic status of lower arch according to age groups

Age groups (years)	Prosthetic Status N (%)					
	Code 0	Code 1	Code 2	Code 3	Code 4	Code 5
18 - 30	29 (93.5)	2 (6.5)	0 (0)	0 (0)	0 (0)	0 (0)

31 - 40	31 (86.1)	3 (8.3)	2 (5.6)	0 (0)	0 (0)	0 (0)
41 - 50	69 (81.2)	11 (12.9)	0 (0)	5 (5.9)	0 (0)	0 (0)
51 - 60	53 (82.8)	2 (3.1)	2 (3.1)	6 (9.4)	0 (0)	1 (1.6)
>60	77 (82.8)	3 (3.2)	1 (1.1)	9 (9.7)	0 (0)	3 (3.2)
Total	259 (83.8)	21 (6.8)	5 (1.6)	20 (6.5)	0 (0)	4 (1.3)

P<0.053

Table 4: Prosthetic need of upper arch according to age groups

Age groups (years)	Prosthetic need N (%)					
	Code 0	Code 1	Code 2	Code 3	Code 4	Code 5
18 - 30	16 (51.6)	8 (25.8)	7 (22.6)	0 (0)	0 (0)	0 (0)
31 - 40	20 (55.6)	9 (25.0)	5 (13.9)	2 (5.6)	0 (0)	0 (0)
41 - 50	43 (50.6)	25 (29.4)	9 (10.6)	8 (9.4)	0 (0)	0 (0)
51 - 60	34 (53.1)	10 (15.6)	10 (15.6)	3 (4.7)	7 (10.9)	0 (0)
>60	37 (39.8)	13 (14.0)	14 (15.1)	10 (10.8)	17 (18.3%)	2 (2.2)
Total	150 (48.5)	65 (21.0)	45 (14.6)	23 (7.4)	24 (7.8)	2 (0.6)

P<0.001

Table 5: Prosthetic need of lower arch according to age groups

Age groups (years)	Prosthetic need N (%)					
	Code 0	Code 1	Code 2	Code 3	Code 4	Code 5
18 - 30	14 (45.2)	13 (41.9)	3 (9.7)	1 (3.2)	0 (0)	0 (0)
31 - 40	20 (55.6)	8 (22.2)	6 (16.7)	2 (5.6)	0 (0)	0 (0)
41 - 50	48 (56.5)	12 (14.1)	19 (22.4)	6 (7.1)	0 (0)	0 (0)
51 - 60	32 (50)	4 (6.3)	16 (25)	7 (10.9)	5 (7.8)	0 (0)
>60	34 (36.6)	8 (8.6)	20 (21.5)	11 (11.8)	17 (18.3)	3 (3.2)
Total	148 (47.9)	45 (14.6)	64 (20.74)	27 (8.7)	22 (7.1)	3 (1.0)

P<0.001

Table 6: Prosthetic status of upper arch according to socio-economic status

Socio-economic status / N (%)	Prosthetic status N (%)					
	Code 0	Code 1	Code 2	Code 3	Code 4	Code 5
Upper / 24 (7.8)	17 (70.8)	6 (25)	0 (0)	1 (4.2)	0 (0)	0 (0)
Upper-middle / 218 (70.6)	168 (77.1)	18 (8.3)	6 (2.8)	20 (9.2)	0 (0)	6 (2.8)
Lower-middle / 64 (20.7)	55 (85.9)	4 (6.3)	0 (0)	2 (3.1)	0 (0)	3 (4.7)
Upper-lower / 2 (0.6)	2 (100)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Lower / 1 (0.3)	1 (100)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Total	243 (78.6)	28 (9.1)	6 (1.9)	23 (7.4)	0 (0)	9 (2.9)

P<0.798

Table 7: Prosthetic status of lower arch according to socio-economic status

Socio-economic status	Prosthetic status N (%)					
	Code 0	Code 1	Code 2	Code 3	Code 4	Code 5
Upper	22 (91.7)	1 (4.2)	0 (0)	1 (4.2)	0 (0)	0 (0)
Upper-middle	176 (80.7)	20 (9.2)	4 (1.8)	16 (7.3)	0 (0)	2 (0.9)

Lower-middle	58 (90.6)	0 (0)	1 (1.6)	3 (4.7)	0 (0)	2 (3.1)
Upper-lower	2 (100)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Lower	1 (100)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Total	259 (83.8)	21 (6.8)	5 (1.6)	20 (6.5)	0 (0)	4 (1.3)

P<0.798

Table 8: Prosthetic need of upper arch according to socio-economic status

Socio-economic status	Prosthetic need N (%)					
	Code 0	Code 1	Code 2	Code 3	Code 4	Code 5
Upper	14 (58.3)	4 (16.7)	6 (25)	0 (0)	0 (0)	0 (0)
Upper-middle	116 (53.2)	47 (21.6)	28 (12.8)	14 (6.4)	11 (5)	2 (0.9)
Lower-middle	20 (31.3)	11 (17.2)	11 (17.2)	9 (14.1)	13 (20.3)	0 (0)
Upper-lower	0 (0)	2 (100)	0 (0)	0 (0)	0 (0)	0 (0)
Lower	0 (0)	1 (100)	0 (0)	0 (0)	0 (0)	0 (0)
Total	150 (48.5)	65 (21)	45 (14.6)	23 (7.4)	24 (7.8)	2 (0.6)

P<0.01

Table 9: Prosthetic need of lower arch according to socio-economic status

Socio-economic status	Prosthetic need N (%)					
	Code 0	Code 1	Code 2	Code 3	Code 4	Code 5
Upper	17 (70.8)	2 (8.3)	5 (20.8)	0 (0)	0 (0)	0 (0)
Upper-middle	112 (51.4)	35 (16.1)	43 (19.7)	17 (7.8)	8 (3.7)	3 (1.4)
Lower-middle	16 (25)	8 (12.5)	16 (25)	10 (15.6)	14 (21.9)	0 (0)
Upper-lower	2 (100)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Lower	1 (100)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Total	148 (47.9)	45 (14.6)	64 (20.7)	27 (8.7)	22 (7.1)	3 (1.0)

P<0.001

DISCUSSION

There have been no studies done in this Western part of Nepal to evaluate the prosthetic status and need of the population. This study tried to find out the prosthetic status in the Department of Prosthodontics at College of Dental Surgery, in Gandaki Medical College.

The present study showed majority of patients had no prosthesis in upper arch 78.6% and 83.8% in lower arch. This is similar to study done by Choudhury *et al*² in India 80.89% in upper arch and 84.71% in lower arch. Nadgere *et al*⁸ too showed similar results with 88% of population did not had prosthesis. In other study done at Jizan, Saudi Arabia by Peeran *et al*⁹ similar results were found with majority of population had no prosthesis, 79.1% in upper arch and 81% in lower arch.

This study showed that the need of prosthesis was 51.5%

in upper arch and 52.1% in lower arch which is in contrary to findings of study done by Choudhury *et al*² and Shah *et al*¹⁰. Choudhury *et al*² showed 67.49% and 64.31% need of prosthesis respectively in upper and lower arch. Similarly Shah *et al*¹⁰ showed relatively higher need of prosthesis 72%. This could be attributed to low prevalence of partial and complete edentulous in patients visiting outpatient Department of Prosthodontics at College of Dental Surgery, in Gandaki Medical College which is 2.42%, which was shown in study done by Tuladhar SL *et al*¹¹.

In the present study 70.6% of the patients were from the upper middle class group of socio- economic status (Table 6, 7, 8, 9). Even though the patients were from upper middle class group there were more patients with no prosthesis, upper arch 78.6% and lower arch 83.8%. It can be co-related that patients are not pursuing prosthodontic treatment not because of financial constraints but it could be due to lack of awareness towards treatment.

This is a preliminary study; this study can be further extended to the general population with larger sample size and multiple centers so that the data obtained can be utilized to frame the policies by the provincial Government of this region to address the unmet prosthetic need.

CONCLUSION

The majority of patients had no prosthesis 78.6% in upper arch and 83.8% in lower arch. The need of prosthesis was 51.5% in upper arch and 52.1% in lower arch.

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Prenatal and Perinatal Risk Factors for Autism at National Children's Hospital

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ABSTRACT

Background: Autism, or autism spectrum disorder, refers to a broad conditions characterized by challenges with social skills, repetitive behaviors, speech and nonverbal communication.

Objectives: To determine the demographic profile of patients diagnosed with ASD, determine the significant prenatal and perinatal risk factors associated with ASD.

Results: A total of 116 subjects were included in the study with 58 cases and 58 controls. They belong to the age ranging from 4 to 16 years old. Every case had a confirmed diagnosis of autism at NCH. There was a significant association noted between neonatal jaundice, nulliparity (OR=2.38; 95% CI, 0.85-6.8) and family history of autism (OR=5.30; 95% CI, 1.29-25.1) with ASD. Exposure to x-ray, medical problems, medicine intake and maternal complications during pregnancy were not significantly associated with ASD with OR 0.74; 95% CI, (0.12-4.15), OR 1.00; 95% CI (0.38-2.61), OR 1.49; 95% CI, (0.63-3.53), and OR 1.27; 95% CI, (0.28-6.05), respectively.

Conclusion: The current study indicates that the only significant predictor of ASD is a family history of autism. However, neonatal jaundice, maternal age of >40 years old, smoking during pregnancy and nulliparity showed a trend towards being risk factors for ASD. None of the other prenatal and perinatal characteristics significantly predicts ASD.

Keywords

Autism, Perinatal, Prenatal.

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INTRODUCTION

Autism is the prototypical form of a spectrum of related, complex neurodevelopmental disorders referred to as the autistic spectrum disorders¹. There is strong evidence from neuropathological studies that ASD has its origins in abnormal brain development early in prenatal life². Atypical neurodevelopment continues postnatal, with a unique pattern of acceleration in brain growth as measured by head circumference³, which correlates with enlarged grey matter volumes observed in MRI studies by two to three years of age⁴. Advances in neonatal intensive care have dramatically increased survival in preterm infants, most strikingly among the sickest and

most preterm^{5,6}. Unfortunately, this decrease in mortality has not been matched by a comparable decrease in long-term neurodevelopmental morbidity⁷. Although autism is typically not diagnosed until late in the preschool years, there are marked neurodevelopmental abnormalities that are present at birth and continue to evolve from the earliest months of life. We now know that professionals can diagnose children with autism when they are as young as two years of age⁸. Screening and the role of the pediatrician have become even more critical as we have recognized the stability of early diagnosis over time and the importance of early intervention.

The literature is not always consistent in regards to which

with autism. Thus, this study is proposed to determine the prenatal and perinatal risk factors for autism at National Children Hospital, which may be helpful in identifying high-risk groups for ASD and will have significant role in early diagnosis and intervention.

METHODS

This was a case control study. The study was conducted at National Children’s Hospital, a tertiary Government Hospital under the Department of Health. Cases were patients diagnosed to have Autism Spectrum Disorder at National Children Hospital. Controls were taken from patients with similar age and sex who visited the general OPD clinic. A standard pretested and validated questionnaire with presence or absence of important prenatal and perinatal risk factors was used. The questionnaire was prepared by conducting a focus group discussion with ten mothers of children diagnosed with ASD. This was further pretested and validated randomly with forty other mothers who visited our neurodevelopment and general OPD Clinic after signing of informed consent. The number of samples to be collected was computed using a 95% level of confidence and 80% power of the study. A sample size of at least 114 was reached to detect a 13% difference in the occurrence of prematurity among cases and controls. The questionnaire was distributed among at least 57 parents of patients with ASD and 57 parents of patients visiting in general OPD. Consent was provided for all parents who allowed their children to be part of the research. All information obtained from the participants in the study would be kept confidential. Data were encoded and tallied in SPSS version 17 for windows. For nominal data, frequency and percentage were generated. For numerical data, mean +/-SD was computed. Data was analyzed using chi-square, Fisher Exact test, and logistic regression analysis.

RESULTS

A total of 116 subjects were included in the study, with equal numbers of cases and controls. Table 1 shows the association of the demographic characteristics with autism spectrum disorder (ASD). The results showed that there was a significant association noted between the number of pregnancies and family history of autism with ASD as proven by the p values <0.05 and 0.007 respectively. For the number of pregnancies, nulliparity showed a higher

risk for ASD and a higher risk was noted among those with a family history of autism (OR=5.30; 95% CI, 1.29-25.1). On the other hand, there were no significant associations noted between age and family history of psychiatric illness with ASD as proven by all p value>0.05.

Table 1: Association of the different demographic characteristics with autism spectrum disorder (ASD)

	Cases (n=58)	Controls (n=58)	OR (95% CI)	*p-value
Number of times pregnant before				
Never	16 (27.6%)	8 (13.8%)	2.38 (0.85-6.80)	0.04 (S)
Once	14 (24.1%)	11 (19.0%)	0.64 (0.17-2.36)	0.44 (NS)
>Once	28 (48.3%)	39 (67.2%)	0.36 (0.12-1.05)	0.06 (NS)
Age				
<40 y/o	54 (93.1%)	57 (98.3%)	0.24 (0.01-2.40)	0.36 (NS)
>40 y/o	4 (6.9%)	1 (1.7%)	4.22 (0.42-102.4)	0.36 (NS)
Family history of autism				
Yes	13 (22.4%)	3 (5.2%)	5.30 (1.29-25.1)	0.007 (S)
No	45 (77.6%)	55 (94.8%)	0.19 (0.04-0.78)	0.007(S)
Family history of psych illness				
Yes	6 (10.3%)	5 (8.6%)	1.22 (0.31-4.99)	1.00 (NS)
No	52 (89.7%)	53 (91.4%)	0.82 (0.20-3.32)	1.00 (NS)

Chi-square test otherwise, Fisher Exact test *p-values >0.05 - Not significant; p-values ≤0.05 - Significant

Fig 2: Distribution of subjects with and without and according to the number of times pregnant before

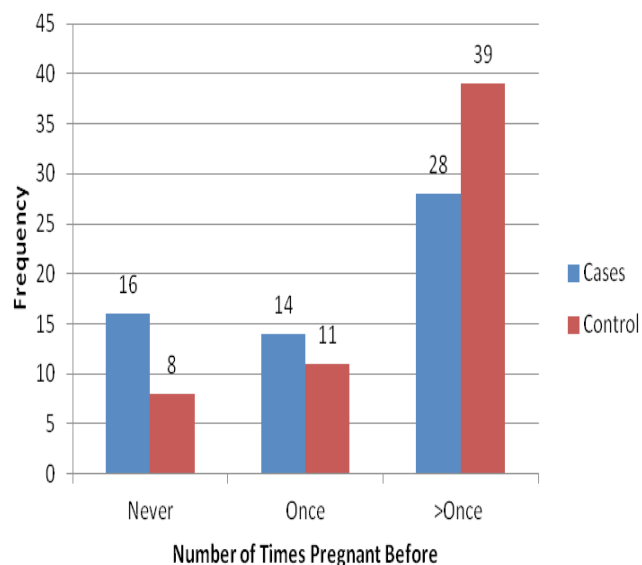


Fig 3: Distribution of subjects with and without ASD according family history of autism

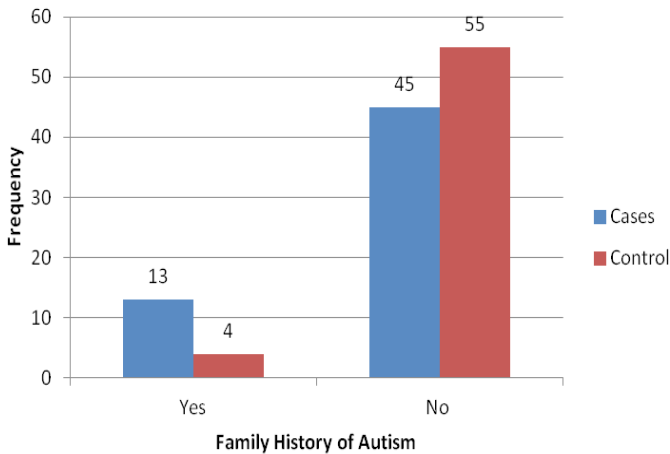


Table 2, shows the association of the prenatal characteristics with ASD. Exposure to x-ray, medical problems, medicine intake, history of smoking and maternal complications during pregnancy were not significantly associated with ASD ($p > 0.05$).

Table 2: Association of the prenatal characteristics with autism spectrum disorder (ASD)

	Cases (n=58)	Controls (n=58)	OR (95% CI)	*p-value
Smoking exposure during pregnancy				
Yes	17 (29.3%)	21 (36.2%)	0.73(0.31 – 1.71)	0.42(NS)
No	41 (70.7%)	37 (63.8%)		
Smoking during pregnancy				
Yes	5 (8.6%)	1 (1.7%)	5.38(0.58 – 125.7)	0.20(NS)
No	53 (91.4%)	57 (98.3%)		
Exposed to X-ray during pregnancy				
Yes	3 (5.3%)	4 (6.9%)	0.74(0.12 – 4.15)	1.00(NS)
No	55 (94.8%)	54 (93.1%)		
Medical problems during pregnancy				
Yes	13 (22.4%)	13 (22.4%)	1.00 (0.38 – 2.61)	1.00(NS)
No	45 (77.6%)	45 (77.6%)		
Medication intake during pregnancy				
Yes	21 (36.2%)	16 (27.6%)	1.49(0.63 – 3.53)	0.32(NS)
No	37 (63.8%)	42 (72.4%)		
Maternal complications during pregnancy				
Severe hyper-emesis	5 (8.6%)	4 (6.9%)	1.27 (0.28 – 6.05)	1.00(NS)
Edema	11 (19.0%)	9 (15.5%)	1.27 (0.44 – 3.72)	0.62(NS)
PROM	5 (8.6%)	11 (19.0%)	0.40(0.11 – 1.38)	0.10(NS)
Others	0	1 (1.7%)	0 (0 – 17.54)	1.00(NS)

Chi-square test otherwise, Fisher Exact test *P-values > 0.05 - Not significant; p -values ≤ 0.05 - Significant

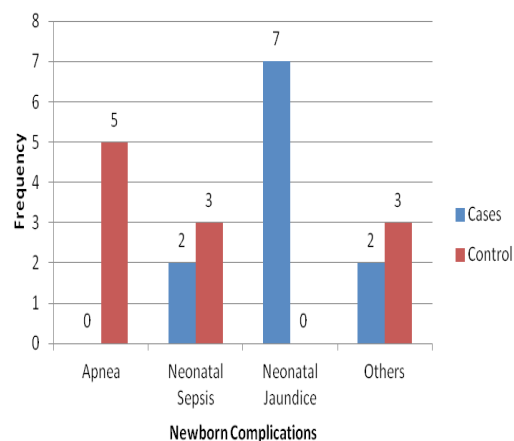
Table 3 shows the association of the perinatal characteristics with autism spectrum disorder (ASD). The results showed that there was a significant association noted between neonatal jaundice ($p=0.01$) with ASD. On the other hand, there were no significant associations noted between the other perinatal characteristics with ASD as proven by all p values > 0.05 .

Table 3: Association of the perinatal characteristics with autism spectrum disorder (ASD)

	Cases (n=58)	Controls (n=58)	OR (95% CI)	*p-value
Gestational age				
37 – 42 weeks	42 (72.4%)	49 (84.5%)	0.48 (0.17 – 1.31)	0.11 (NS)
<37 weeks	11 (19.0%)	8 (13.8%)	1.60 (0.53 – 4.88)	0.35 (NS)
>42 weeks	5 (8.6%)	1 (1.7%)	5.83 (0.62-137.3)	0.10 (NS)
Birth weight				
≥ 2.5 kg	50 (86.2%)	53 (91.4%)	0.59 (0.15 – 2.17)	0.38 (NS)
<2.5 kg	6 (10.3%)	5 (8.6%)	1.27 (0.32 – 5.20)	0.70 (NS)
<1.5 kg	2 (3.4%)	0	---	0.24 (NS)
Manner of delivery				
CS	20 (34.5%)	16 (27.6%)	1.38 (0.58 – 3.30)	0.42 (NS)
NSD	38 (65.5%)	42 (72.4%)		
Exclusive breastfeeding for 6 months				
Yes	30 (51.7%)	29 (50.0%)	1.07 (0.48 – 2.37)	0.85 (NS)
No	28 (48.3%)	29 (50.0%)		
Newborn complications				
Apnea	0	5 (8.6%)	0 (0 – 1.12)	0.05 (NS)
Neonatal Sepsis	2 (3.4%)	3 (5.2%)	0.65 (0.07 – 5.08)	1.00 (NS)
Neonatal Jaundice	7 (12.1%)	0	---	0.01 (S)
Others	2 (3.4%)	3 (5.2%)	0.65 (0.07 – 5.08)	1.00 (NS)

Chi-square test otherwise, Fisher Exact test * p -values > 0.05 - Not significant; p -values ≤ 0.05 - Significant

Fig 4: Distribution of subjects with and without ASD according to the neonatal complications



In the univariate analysis, three variables were significantly associated with ASD, namely neonatal jaundice, nulliparity and family history of autism. However, in the multivariate analysis using logistic regression, only family history of autism was the significant predictor of ASD ($p=0.02$). The risk of subjects with a family history of autism for ASD was almost 5x higher than those without a family history of autism (OR=4.72; 95% CI, 1.20- 18.54, $p=0.02$). In the univariate analysis, three variables were significantly associated with ASD, namely neonatal jaundice, nulliparity and family history of autism.

However, in the multivariate analysis using logistic regression, only family history of autism was the significant predictor of ASD ($p=0.02$). The risk of subjects with a family history of autism for ASD was almost 5x higher than those without a family history of autism (OR=4.72; 95% CI, 1.20- 18.54, $p=0.02$).

Table 4: Predictors of ASD

Variable	OR	95% CI	P value
Smoking during pregnancy	7.28	0.81 – 65.90	0.08 (NS)
Premature rupture of membrane	0.39	0.10 – 1.48	0.16 (NS)
Abnormal AOG of baby	1.91	0.66 – 5.53	0.24 (NS)
Apnea	0	0 – 2.8E+19	0.76 (NS)
Neonatal jaundice	2542	0 – 4.9E+21	0.72 (NS)
Number of times pregnant before (Never)	2.04	0.74 – 5.65	0.17 (NS)
Family history of autism	4.72	1.20 – 18.54	0.02 (S)

Logistic Regression Analysis

p-values >0.05 - Not significant;

p-values ≤0.05 -Significant

DISCUSSION

A case-control study, frequency-matched on gender and birth year, to investigate prenatal and perinatal risk factors for autism in our hospital was conducted. The current study determines the association between the different demographic characteristics, prenatal and perinatal factors of autism. Most of the perinatal and prenatal factors examined in multiple studies have shown inconsistent results and the preponderance of findings overall have not been statistically significant. In previous studies, the factors with the strongest evidence for an association with autism risk included abnormal fetal presentation, umbilical-cord complications, fetal distress, birth injury or trauma, multiple birth, maternal haemorrhage, summer birth, low birth weight, small for gestational age, congenital

malformation, low 5-minute Apgar score, feeding difficulties, meconium aspiration, neonatal anemia, ABO or Rh incompatibility, and hyperbilirubinemia. However, not all of these factors were examined in this study. In a previous study, the strongest prenatal factors included advanced maternal and paternal age at birth, maternal gestational bleeding, gestational diabetes, being first born versus third born or later, maternal prenatal medication use, and maternal birth abroad. In the present study, aside from prenatal and perinatal characteristics, the demographic characteristics were also investigated. The results showed that in the univariate analysis, family history of autism was significantly associated with ASD. Nulliparity showed trend towards being a risk factor. Several previous studies have found that ASD individuals tend to be first or fourth born more commonly than controls¹⁷. Rather than having a role in the cause of autism, this phenomenon is widely believed to be a result of alterations in the reproductive behavior of parents in response to the birth of a handicapped child, also known as the “reproductive stoppage rules”¹⁸.

Among the perinatal characteristics, neonatal jaundice ($p=0.01$) was significantly associated with ASD. In previous studies, history of jaundice in neonates was associated with increased risk of disorders of psychological development for children born at term. The excess risk of developing a disorder in the spectrum of psychological development disorders among those who had neonatal jaundice was between 56% (HR: 1.56 [95% confidence interval [CI]: 1.05–2.30]) and 88% (HR: 1.88 [95% CI: 1.17–3.02]). The excess risk of infantile autism was 67% (HR: 1.67 [95% CI: 1.03–2.71])¹⁹.

Multivariate analysis using logistic regression showed only family history of autism as the significant predictor of ASD. However, the tendency of smoking during pregnancy and never been pregnant before as potential risk factors for ASD was also noted. This study suggests that only family history of autism is the strongest predictor of ASD. The risk of subjects with family history of autism for ASD was almost five times higher than those without family history of autism (OR=4.72; 95% CI, 1.20-18.54, $p=0.02$).

The finding in this study supports ASD to be a possible genetic problem. Previously, Genetic studies in the field of autistic disorder have mainly focused on molecular genetic studies, assessment of chromosomal abnormalities, twin studies and family studies. In families having an autistic child the recurrence rate has been reported as 3-8%²⁰.

The studies on twins and adopted children are important in identifying the actual importance of genetic factors. Concordance among twins enables to measure heritability, and thus to assess what percentage of the phenotype is affected by genetic factors. Monozygotic (identical) twins share 100% of the genetic material, whereas dizygotic (fraternal) twins share 50% of the genetic material. Monozygotic twins higher rate of concordance compared to dizygotic twins may be used for calculation of heritability. Twin studies generally showed a higher concordance rate for monozygotic twins compared to dizygotic twins. The concordance rate of monozygotic twins is at least 60% when diagnostic criteria for autism (DSM-IV) are used, whereas the number is as high as 71% for autism spectrum and 92% for a broader spectrum of verbal/social interaction disorders²¹. On the other hand, the concordance rate of dizygotic twins has been reported as 1-30%. Twin studies demonstrated an average autism inheritance of 90%. On the basis of these studies autism is considered to be among the most inherited psychiatric diseases.

The correlated occurrence of many of the complications limits the ability to determine which factors, if any, are independently associated with autism. For example, Cesarean deliveries are more common in pregnancies with abnormal fetal presentation, fetal distress, and multiple birth^{22,23}. Congenital malformations, low birth weight, abnormal presentation, and low Apgar score also are interrelated²⁴. In most studies, multivariate analyses were not used to simultaneously control for all obstetrical factors examined, and a different set of factors was examined in each study. It is possible that increasing rates of some obstetrical factors, such as Cesarean delivery, low birth weight, multiple birth, and neonatal resuscitation, may be contributing factors to the rising prevalence of autism²⁵. The obstetrical complications that have emerged as significant risk factors for autism in a meta-analysis study suggest a possible role of fetal and neonatal hypoxia. In particular, growth retardation, fetal distress, umbilical-cord wrapping around the neck, low Apgar score, respiratory distress, resuscitation, meconium aspiration, and Cesarean delivery are all potential risk factors that also may be associated with an increased risk of hypoxia²⁶. Although some brain abnormalities observed in individuals with autism may reflect a potential role of oxygen deprivation during development, this possibility requires additional examination. Hypoxia also has been shown to increase dopaminergic activity, and there is evidence for dopamine overactivation in autism²⁷.

However in this study related obstetrical problems like exposure to x-ray, medical problems, medicine intake and maternal complications during pregnancy were not significantly associated with ASD with OR 0.74; 95% CI, (0.12-4.15), OR 1.00; 95% CI (0.38-2.61), OR 1.49; 95% CI, (0.63-3.53), and OR 1.27; 95% CI, (0.28-6.05) respectively. Our study indicates that among the prenatal and perinatal risk factors only family history of autism is a significant predictor of ASD. None of the other prenatal and perinatal characteristics significantly predicts ASD.

CONCLUSION

The current study indicates that the only significant predictor of ASD is a family history of autism. However, neonatal jaundice, maternal age of >40 years old, smoking during pregnancy and nulliparity showed a trend towards being risk factors for ASD. None of the other prenatal and perinatal characteristics significantly predicts ASD.

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Evidence Based Medicine: A Paradigm for Clinical Practice

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ABSTRACT

Evidence based medicine (EBM) is the integration of best research evidence with clinical expertise and patient values. In the practice of EBM it is the physician's duty to find the best and most current information and apply it judiciously for the benefit of the patient.

The practice of EBM involves formulating a clear clinical question from a patient's problem, searching the literature to acquire the evidence, then critically appraising the evidence for its validity and usefulness, and applying the results by implementing useful findings into clinical practice, and finally evaluating this application of evidence on patient. An important rule in EBM is that it starts with the patient and ends with the patient.

Evidence based medicine requires new skills of the physician, including efficient literature searching and the application of formal rules of evidence evaluation from the clinical literature.

Incorporation of EBM into one's practice will not only make one a better clinician, it also allows one to provide the best possible quality of medical care to his or her patients. Thus EBM can be incorporated as an integral part of the medical curriculum.

INTRODUCTION

The idea of EBM appeared at the McMaster University in Canada in 1988, but during the 1990s became known throughout the world. The term "evidence based" was first used in 1990 by David Eddy. The term "Evidence based medicine" first appeared in the medical literature in 1992 in a research article by Guyatt *et al*¹. The explicit methodologies used to determine "best evidence" was established by the McMaster University research group in Ontario, Canada, led by **Dr David Sackett**² and Gordon Guyatt.

Though Dr David Sackett² (An American Canadian Medical Doctor) and his colleagues proposed evidence based medicine (EBM) as a new way of teaching, learning and practicing medicine, the founder of EBM is considered to be an English epidemiologist, **Professor Archie Cochrane**.

Cochrane's work was honored through the naming of centers of evidence based medical research as Cochrane Centers, and an international organization, the Cochrane collaboration³.

Evidence based medicine is a form of medicine that aims to develop decision-making by emphasizing the use of evidence from well designed and conducted research. It is an interdisciplinary approach to clinical practice to make decisions about how to promote health or provide care by integrating the best available evidence with practitioner expertise and other resources.

Evidence based medicine is the most intellectual advance in the process of clinical decision making⁴. It is a movement which aims to increase the use of high quality clinical research in clinical decision making. EBM application means relating patient's clinical signs and doctor's clinical

experience with the best scientific evidences obtained by clinical research. Its good application brings cost-effective and better healthcare³. Taking an evidence based approach to the care of patients is an intellectually exciting style of practice, which leads you down a path of exploration and life-long learning⁵.

The principles of EBM are not only applicable to medicine, but also to nursing, physiotherapy, occupational therapy and all other fields of healthcare. Hence the term **Evidence based health care (EBHC)** emerged⁴.

EBM is now formally taught in many centers of higher education, such as McMasters University, Oxford University, The University of North Carolina, and Duke University⁶.

DEFINITION

Evidence based medicine is defined as the conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients².

In other words, EBM is a systematic approach to clinical problem solving which allows the integration of the best available research evidence with clinical expertise and patient values³.

Thus, evidence based medicine (EBM) is the integration of best research evidence with clinical expertise and patient values (Fig 1).

Fig 1: Three dimensions of evidence based medicine



By **best research evidence** we mean clinically relevant research, often from the basic sciences of medicine, but

especially from patient centered clinical research into the accuracy and precision of diagnostic tests (including the clinical examination), the power of prognostic markers, and the efficacy and safety of therapeutic, rehabilitative, and preventive regimens. New evidence from clinical research both invalidates, previously accepted diagnostic tests and treatments and replaces them with new ones that are more powerful, more accurate, more efficacious, and safer.

By **clinical expertise** we mean the ability to use our clinical skills and past experience to rapidly identify each patient's unique health status and diagnosis, their individual risks and benefits of potential interventions, and their personal values and expectations.

By **patient values** we mean the unique preferences, concerns and expectations each patient brings to a clinical encounter and which must be integrated into clinical decisions if they are to serve the patient.

When these three elements are integrated (Fig 2), clinicians and patients form a diagnostic and therapeutic alliance which optimizes clinical outcome and quality of life.

Fig 2: Evidence based medicine triad (Source:meduottawa.ca)



You do not have to become a researcher or epidemiologist to practice EBM. Focus on how to use research reports. However, you must have a solid understanding of basic research principles and study designs in order to understand and interpret the evidence.

Instead of routinely reviewing the contents of dozens of journals for interesting articles, EBM suggests us to target our reading to issues related to specific patient problems. Developing clinical questions and then searching current databases may be a more productive way of keeping current with the literature.

THE PRACTICE OF EVIDENCE BASED MEDICINE (THE PROCESS OF EBM)

The practice of EBM is a process of life-long, self-directed, problem based learning and requires the judicious integration of **individual clinical expertise** with the **best available external clinical evidence** from systematic research, and **patient understanding and values** (Fig 3, 4, 5). In the practice of EBM it is the physician’s duty to find the best and most current information and apply it judiciously for the benefit of the patient.

Fig 3: Three major components of evidence based medicine

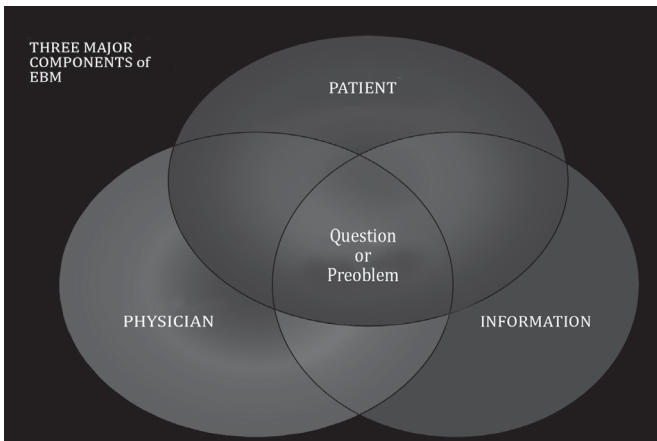


Fig 4: Added details to the three major components of evidence based medicine

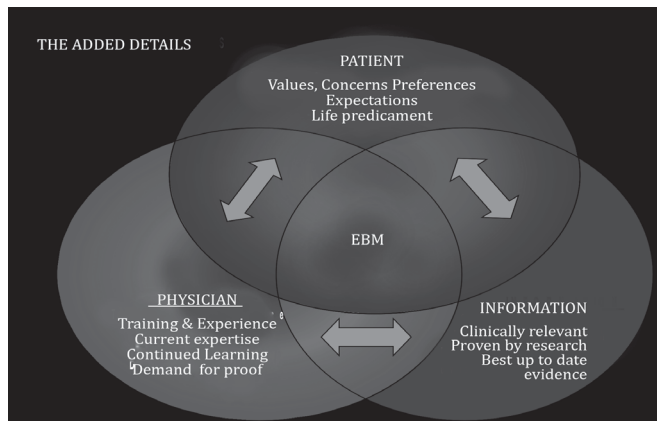
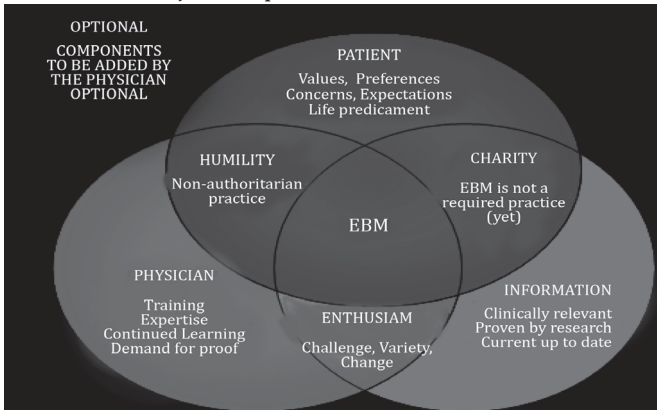


Fig 5: Optional components to be added by the physician to the three major components of evidence based medicine



Incorporating best evidence into clinical practice requires a systematic approach in order to be manageable. A clear series of five basic steps must be followed by each individual physician in the application of this EBM process⁷.

Table 1: Steps to practice EBM

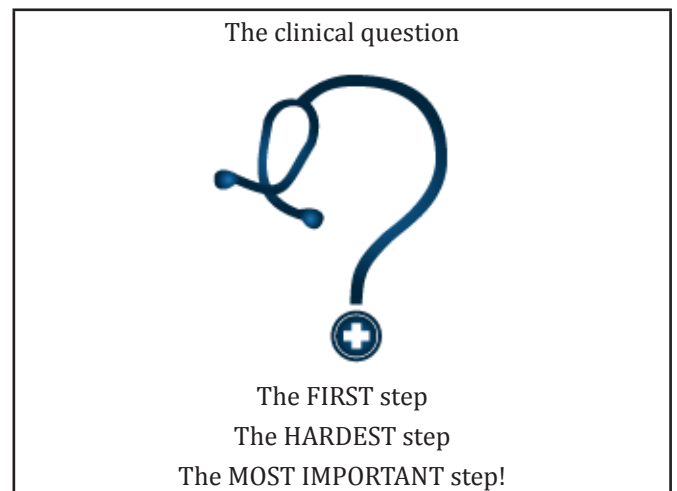
1. Formulating a well-built clinical question
2. Searching the best evidence from literature by identifying articles and other evidence based resources that answer the question
3. Critically appraising the evidence to assess its validity
4. Applying the evidence into decision making
5. Efficacy evaluation of this application of evidence on a patient and areas for improvement

Fig 6: EBM process (Source: slideshare.net)



1. Formulating the clinical question (Clinical question development)

The first critical step is to clarify one or two key issues that come up in the course of caring for your patient and to develop a focused clinical question. However, without this critical first step, the rest of the steps are immaterial.



Ask a clear, patient-oriented, relevant, answerable question about the health status and context of patients or populations. A good clinical question is focused and

relevant, provides clear communication, clarifies your goal or need and should be specific and answerable and should contain multiple aspects structured in the **PICO** format.

P Patient – Describe the most important characteristics of the patient or population (E.g. age, disease/condition, gender)

I Intervention – Describe the main clinical intervention (E.g. medication, procedure, diagnostic/screening test, surgery, radiation, drug, vaccine) or **Exposure** - Environmental, personal, biological (E.g. tobacco, drug, diet, pregnancy or menopause, MRSA, allergy)

C Comparison – Describe the main alternative treatment being considered (E.g. placebo, standard therapy, no treatment, the gold standard)

O Outcome (Clinical outcome of interest) – Describe what you are trying to accomplish, measure, improve, affect. (E.g. reduced mortality or morbidity, improved memory, accurate and timely diagnosis, decreased infections, fewer hospitalizations)

Quantitative questions provide solid evidence of measurable answer or response necessary for scientific study and necessary for the practice of EBM.

Qualitative questions provide fuzzy data such as impact on daily life, work, family (Quality of life) etc. These qualitative questions may be very important and influential to decisions - especially for the patient and may create added challenge or twist to the practice of EBM.

The patient’s questions must be considered, often qualitative (Feelings, ideas, experiences, preferences, concerns, fears, beliefs, ethnicity) and usually based on limited background (perception of problem, self-diagnosis, treatment wanted or needed, alternatives (read, heard, considered, tried), what patient is hoping to avoid, what benefits does the patient want or need most etc.).

2. Searching the best evidence from literature

Armed with well-built clinical question, our attention next turns to efficiently **acquire** the best evidence in the medical literature that will provide the answer to the question. Many resources are currently available (Table 2). Potential literary sources include text books, journals, review articles (summaries, abstracts), systematic reviews (prepared in systematic, rigorous manner E.g. Cochrane collection), meta-analyses, clinical practice guidelines, electronic resources, data bases, internet (E.g. Medline,

PubMed, Medscape, HDCN etc.).

Identify primary and secondary sources of data. A **primary source** is first hand testimony or direct evidence concerning a topic under investigation. Primary sources are generally articles that appear in peer-reviewed journals and are found primarily by searching MedLine and PubMed. **Secondary sources** describe, discuss, appraise, interpret, comment upon, analyze, evaluate, summarize, and process pri sources. Secondary source materials can be articles in newspapers or popular magazines, book or movie reviews, or articles found in scholarly journals that discuss or evaluate someone else’s original research⁸.

Brian Haines^{9,13} has proposed the **4S Resources**, namely Systems, Synopses, Syntheses, and Studies, which redefine the earlier primary and secondary sources.

Table 2: Some of the leading EBM resources

Journals
<ul style="list-style-type: none"> • ACP Journal Club • American Family Physician • Bandolier • The Journal of Family Practice
Evidence summaries
<ul style="list-style-type: none"> • Clinical Evidence • The Cochrane Database of Systematic reviews • Dynamed • FIRSTconsult • InfoRetriever • SUMsearch • TRIP database (Turning Research Into Practice) • The York Database of Abstracts of Reviews of Effects (DARE)
Clinical guidelines
<ul style="list-style-type: none"> • Institute for Clinical Systems Improvement (ICSI) • National Guideline Clearinghouse • U.S. Preventive Services Task Force (USPSTF)
Other
<ul style="list-style-type: none"> • DailyPOEMs

The ideal information source must be valid (contains high quality data), relevant (clinically applicable, comprehensive (has data on all benefits and harms of all possible interventions), and is user-friendly (is quick and easy to access and use).

The best evidence is i) External from outside resources (Researchers, experts), ii) Current (most recent, not out of date), iii) High quality (accurate, precise, effective, safe), and iv) Patient focused (applicable and appropriate for

individual patient).

Search and retrieve the best evidence and learn and practice various search strategies to find useful information quickly and to eliminate irrelevant, inappropriate or weak information. One of the greatest achievements of EBM has been the development of systematic reviews and meta-analyses, methods by which researchers identify multiple studies on a topic, separate the best ones and then critically analyze them to come up with a summary of the best available evidence⁵.

There are several study designs as shown in Table 3

Table 3: Study designs

I. Observational/ non-experimental	
Descriptive Studies	Case studies Case series Ecological studies
Analytical Studies	Cross-sectional studies Case-control Cohort
II. Experimental (Interventional) Studies	
	Randomized control trial Quasi-experimental studies/ Non-randomized control trial Community trial Pretest-posttest study design

Classify the clinical question in to various domains such as diagnosis, therapy, prognosis and harm or casualty and find out which study design fits it best⁸.

Table 4: What type of evidence best addresses the question, problem or issue?

Type of question	Ideal type of study*
Therapy	Randomized control clinical trials (RCT)
Prevention	RCT > Cohort study > Case control
Diagnosis	Prospective, blind controlled trial comparison to gold standard
Prognosis	Cohort study > Case control > Case series/ Case report
Etiology/Harm	RCT > Cohort study > Case control
Miscellaneous	Basic science, Genetics, Immunology
Cost analysis	economic analysis

*Meta-analyses and systematic reviews provide the best answers to clinical questions

3. Critical appraisal of the evidence

With a potential literary source in hand, the clinician must appraise the evidence to further examine its worth and reliability. Evaluate the evidence for quality and usefulness by assessing validity, reliability, relevance and

clinical importance.

Table 5: Evaluation of evidence by assessing validity, reliability, relevance, clinical importance

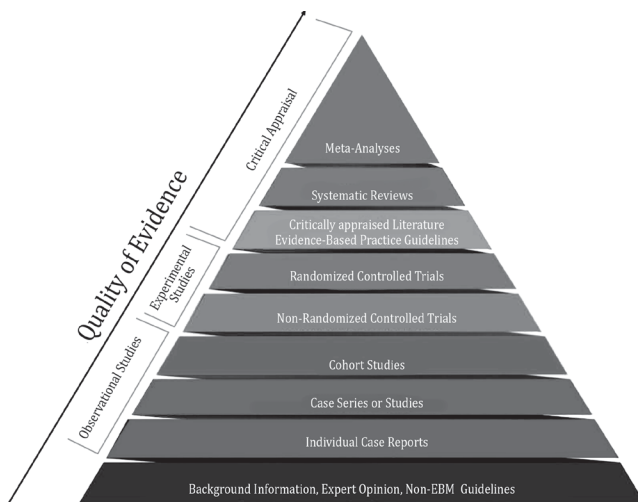
Validity	<ul style="list-style-type: none"> What was the original purpose of the study? When was it prepared? By whom it was prepared? (Credentials, affiliations) <p>Sample Population</p> <ul style="list-style-type: none"> Did the subjects represent appropriate test group? How were they selected? Were controls used? How was the information gathered and processed? Was the study completed? Did the study account for all test subjects? <p>Information</p> <ul style="list-style-type: none"> Does the information accurately represented Does it represent truth? Does the paper support its claims <p>Results</p> <ul style="list-style-type: none"> Are the results believable? To what degree of confidence? <p>Comprehensiveness</p> <ul style="list-style-type: none"> Size: Was it large enough to yield credible results? Thoroughness: Was it complete enough? Duration: Was it long enough?
Reliability	<ul style="list-style-type: none"> Was the type of study design used proper for the question? Are the measurements and results reproducible? Is there consistency among researchers in measurement methods and interpretation of results? Is there any evidence of bias (Patient bias or researcher bias)?
Relevance	<ul style="list-style-type: none"> Does the problem address the questions raised? Are the study patients are comparable to your patient? Are the study professionals comparable to you?
Clinical importance	<ul style="list-style-type: none"> Is the information clinically relevant?

Evidence based medicine pyramid

Evidence based medicine pyramid is simply a diagram created to understand how to weigh different levels of evidence in order to make health related decisions. It helps us to put the results of each study design into perspective, based on the relative strengths and weaknesses of each study design⁸.

Evidence based medicine pyramid is divided into levels. Each ascending level represents a different type of study design and corresponds to increasing rigor, quality, and reliability of the evidence. In other words, as we ascend through these different study designs, we become more confident that their results are accurate, have less chance of statistical error, and minimize bias from confounding variables that could have influenced the results⁸.

Fig 7: Evidence based medicine pyramid (Source: sciencebasedmedicine.org)



4. Applying evidence to the patient

The clinician has to decide whether it is appropriate to apply the evidence to the particular patient and their unique values and circumstances. Evidence alone is never sufficient to direct decision making. Rather, it must be put into context with a patient's values.

Each piece of evidence that we review adds something to our understanding of our patient's situation. However, we need to consider how to generalize the results from clinical trials to our individual patient. We must consider whether the patient populations and treatments or interventions are comparable to our setting. The final challenge is to combine the evidence and clinical expertise with compassion and patient values¹⁰.

The personal priorities of a patient may conflict with physician. Recognize the needs, choices, preferences, values, socio-economic concerns of the patient. Respect the personal priorities of the patient. Help the patient to understand and interpret available information and negotiate a decision on intervention, treatment¹⁰.

An important rule in EBM is that it starts with the patient

and ends with the patient. Patient's preferences must be considered.

5. Efficacy evaluation of EBM application on a patient

The final step is the evaluation of evidence based approach and efficiency of its application to a specific patient. During this process it is important to assess whether certain evidence which is applied to the patient, caused changes to better and that to the extent that is confirmed by research. If the data differ significantly, it would be necessary to investigate why some patients did not respond to the changes introduced in the expected way and what can be done to change it.

DISCUSSION

Evidence based medicine is conscious, specific, reasonable use of modern, best evidences in making decisions about treatment of individual patients⁷. Its real purpose is that by the use of the best possible evidence doctor chooses for his/her patient the best possible solution, wanting to provide optimum healthcare to patient. Good doctors apply their clinical observation and experience, together with the best scientific evidence from medical literature. EBM requires new knowledge from physicians, primarily knowledge of English language and work on the computer, which provides access to medical databases, the ability to search medical literature and basic skills in the interpretation of epidemiological and statistical results¹¹. The physicians should master the search technique and the use of EBM. The proper use of EBM saves doctors time and raises his/her level as well as the quality of provided medical services, and increases satisfaction of health professionals¹². The shift from traditional clinical practice to EBM is not easy and requires a personal attitude and an internal commitment to change¹¹.

Advantages of EBM¹⁴

- Clinicians update knowledge base routinely
- Improved understanding of research methods
- Physician becomes more critical in use of data
- Increased confidence in management decisions
- Increased computer literacy, data search technology
- Better reading habits
- Provides framework for group problem solving, team generated practice
- Transforms weakness or paucity of knowledge into positive change

- Integrates medical education, research and clinical expertise
- Can be learned by non-clinicians and other health care workers

Disadvantages of EBM¹⁴

- Time consuming
- Information overload
- Time to learn and practice
- Time may be needed for team conferencing, planning and review
- Requires financial sources to establish resource infrastructure – library, office, computers, peripherals etc.
- Internet costs
- Programs, software information, CD-ROMS
- Subscription costs – online and paper resources
- May increase cost of care
- Online references made to unavailable journals or references
- Exposes gaps in the evidence (but provides ideas for researchers!)
- Requires computer skills (but can be done with minimal computer literacy and skill)
- May expose your current practice as obsolete or dangerous (loss of authority and respect)

Limitations of EBM¹⁴

- Lack of evidence (shortage of studies)
- Difficulty in applying evidence to care of a particular patient
- Barriers to the practice of high quality medicine
- Lack of skills (search, appraise, etc.) (Foster development of new skills!)
- Lack of time to learn and practice EBM (Promotes lifelong learning through better focus)
- Lack of physician resources for instant access to evidence (EBM has worldwide applicability)
- Language barriers – available evidence may be unreadable
- Physician attitude can be the greatest limitation

CONCLUSION

EBM is a set of principles, tools and methods intended to ensure that to the greatest extent possible medical decisions, guidelines, and policies are based on and consistent with good evidence of effectiveness, and serve

to provide better patient care.

EBM emphasizes on practicing medicine based on evidence derived from well designed and well conducted research. It not only helps in treating an individual patient more effectively but also in forming policies related to health care which influences an entire community. The influence of evidence based medicine on clinical practice and medical education is increasing. EBM has made a clear and probable permanent mark on the face of medicine.

Incorporation of EBM into one's practice will not only make one a better clinician, it also allows one to provide the best possible quality of medical care to his or her patients. Thus EBM can be incorporated as an integral part of the medical curriculum. It also helps in creating effective teaching programs for medical students and continued medical education (CME) programs for medical professionals.

EBM reduces variations in medical practice among clinicians, errors in clinical reasoning, lacunae in evidence, weaknesses in decision making and unnecessary procedures.

Recommendations

To promote the understanding and practice of EBM, yearly workshops can be conducted. The medical schools must develop an infrastructure that allows problem-based, self directed learning methods to develop within the didactic, lecture-based curriculum.

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Anaphylaxis to Ceftriaxone – Evaluation of Two Cases

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Keywords

Anaphylaxis, ARDS, Ceftriaxone.

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ABSTRACT

Allergic reactions to beta-lactamase antibiotics are the most common cause of adverse drug reactions mediated by specific immunological mechanism. Anaphylaxis is diagnosed clinically. In two of our cases, patients developed acute respiratory distress syndrome (ARDS) secondary to anaphylaxis, which was however managed successfully without residual deficits.

INTRODUCTION

Ceftriaxone is a broad spectrum, third generation cephalosporin commonly used for treatment of wide range serious infections like bacterial meningitis, multidrug resistant typhoid, urinary tract infection, septicemia¹. Its bactericidal action is through inhibition of cell wall synthesis. The incidence of ceftriaxone induced hypersensitivity reaction is 1-3% however the incidence of anaphylaxis accounts to 0.1-0.0001% only². Features of anaphylaxis can range from mild skin lesions to fatal reactions like severe hypotension and bronchospasm³. Intraoperative antibiotic administration is a common practice and hence anaphylaxis can present as real challenge to anesthesiologists. Here we present two similar cases of ceftriaxone induced anaphylaxis in spite of negative intradermal skin testing.

CASE REPORT

Our first case, Piyari Sunar, 31 years old female who held from Dulegauda was brought to Emergency Department of Gandaki Medical College Teaching Hospital on July 23, 2015 A.D. with history of generalized body rash after ceftriaxone injection an hour back, for her fever in a nearby health post. Subsequently, she developed hemoptysis and became hypoxic. Her chest x-ray showed

bilateral pulmonary infiltrates and hence was diagnosed with acute respiratory distress syndrome (ARDS). In due course of time, she developed respiratory acidosis, multi-organ dysfunction involving her liver and kidneys.

However, with ARDS ventilator strategies, higher antibiotics and proper nursing care, she started improving and on August 1, 2015, her weaning was started. After 10 days of intensive limb physiotherapy and good nutrition, she was off ventilator support and finally was discharged on August 15, 2015 from the hospital with no residual deficit.

Our second case, 21 years old female Bipana Tamang, was posted for ureteroscopic lithotripsy (URSL) on March 1, 2017 A.D. for her right proximal ureteric calculus with mild hydroureteronephrosis. All her pre-operative investigations were within normal limits and hence she was planned for the procedure under spinal anesthesia. Pre-operative ceftriaxone test dose revealed negative intradermal test thus full dose antibiotic was given slowly through intravenous route. Monitors were attached which included electrocardiogram, non-invasive blood pressure and oxygen saturation probe. Spinal anesthesia was given with 0.5% bupivacaine 15 milligrams, after preloading (20 ml/kg) with normal saline. Spinal level was fixed at thoracic level 8 (T8) and there was no immediate hypotension or restlessness, no distinct cardiac or pulmonary abnormality. The entire

procedure was uneventful. However at the end of the procedure, patient developed dyspnea and restlessness. Acute pulmonary edema was suspected as her chest had diffuse creptitation. She was suspected to have developed allergic response to ceftriaxone and treatment was started in this line with steroids, antihistaminic and diuretics. Intra-operative chest x-ray showed diffuse infiltrates so the patient was managed in the line of acute respiratory distress syndrome (ARDS) with lung protective ventilator strategy. She improved clinically on third day and was extubated and discharged on eighth post-operative day. Hence, we concluded that this might have occurred due to the delayed anaphylactic response to ceftriaxone injection.

DISCUSSION

Anaphylaxis is an acute life threatening type I hypersensitivity reaction³. The signs and symptoms of anaphylaxis typically develop within few minutes of exposure to the offending agent but can occur as late as 72 hours post exposure⁴. Biphasic reactions which occur within one to 72 hours after the initial attack with an asymptomatic period of one to eight hours in between have been reported. This type of reactions are seen in 20% of total cases⁵. Anaphylaxis is usually but not always mediated by immunologic mechanism that results from sudden systemic release of mediators such as histamine, leukotrienes, prostaglandins from mast cells and basophils^{3,6}.

Rash is the most common clinical presentation¹ however its absence doesn't exclude the diagnosis of anaphylaxis⁷. It can present as acute life threatening reactions involving various systems however cardiovascular and respiratory compromise are of greatest concern to us as they are associated with fatalities³. The rapidity of occurrence of anaphylaxis signifies the severity of the process hence the more acute the onset of multisystem involvement, higher the chance of mortality⁴. The incidence of anaphylactic reactions during anesthesia has been reported to be 1:6000 to 1:20,000. Out of various agents implicated, antibiotics are responsible in 8.3% of cases⁸.

Ceftriaxone is widely used broad spectrum antibiotic. Severe allergic reactions due to ceftriaxone has been found to be around 1-3%^{1,6}. The diagnosis of anaphylactic drug reaction is based on the history of exposure to offending agent and clinical presentation. Intradermal skin test is sensitive, rapid and inexpensive however it is associated

with higher false positive and false negative results⁹. Intradermal drug test can be altered by prior ingestion of antihistamine drug, steroids, beta blockler or due to co-existing skin diseases like eczema. Cephalosporin skin test use native molecules but on intravenous administration, it undergoes degradation and generate unique haptens or neo-antigens thus skin test can be false negative as well¹⁰. Other methods for detection of allergic reactions are serum tryptase level and serum IgE level⁶. In both of our cases, the diagnosis was made on the basis of clinical presentation and history of exposure to the drug. Laboratory diagnosis was not made due to the unavailability of those tests in our hospital setup.

Vasodilation and leakage of plasma from capillaries due to increased permeability by prostanoids, leukotriens and kinins is the physiology behind acute cardiovascular collapse in anaphylaxis¹¹. Epinephrine inhibits the release of vasodilatory mediators from basophils and mast cells and hence improves cardiac output by increasing the vascular tone. With its action on beta receptors in respiratory bronchioles, epinephrine causes bronchodilation, decreases mucosal edema and airway resistance^{7,9}. Thus epinephrine and intravenous fluid support are the mainstay in management of anaphylaxis. Various other treatment modalities depends on the system involved in due course of time. The management of patient who present with anaphylaxis suddenly or later differ from one another. It can be self-limited and it is also possible that the patient presents to us when epinephrine is no longer required⁷.

Both of our patients presented to us with delayed symptoms and signs. It is nearly impossible to predict the kind of reactions of the insulting agent in humans. Diagnosis on the basis of history and skin testing can also be misleading as both false positive and negative reports exist pertaining to the fallacies in the technique or the material. Anaphylaxis to ceftriaxone is highly unpredictable ranging from simple rash to full blown cardiovascular collapse and death. In reviewing the literature, various deaths have been reported following ceftriaxone injection^{2,12,13}.

In conclusion, intradermal skin test is must in all the patients receiving any drug and after negative test, the drug is given as slow intravenous infusion to prevent sudden and dreadful cardiovascular collapse. Antibiotics are given within an hour of incision as prophylaxis to post-operative infection but it is wise to avoid the drug with the initiation of anesthesia there can be diagnostic delimma¹⁴. Those patients who survive anaphylaxis should be informed and

referred to an allergy specialist so that future mishaps can be prevented.

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Community Survey Report: Pokhara-Lekhnath, Ritthepani-27, Nepal

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ABSTRACT

Community diagnosis is defined as a comprehensive assessment of the state of an entire community in relation to its social, economic, physical and biological environment¹. It is a process of examining the patterns of disease or health status in the community in order to promote health, prevent disease and manage health services for the community people².

As per the curriculum of Tribhuvan University, B.Sc. Nursing first year, we were provided an opportunity to fulfill the practicum of community health nursing in the assigned area Shanti Tole and Teentara Tole, Pokhara, Lekhnath, Ritthepani-27 from 18th June to 14th July 2017. Total population of Ritthepani was 4529, male population was 2100 and female population was 2429. Each of the 13 students was assigned with 10 different families for community diagnosis in order to promote the health of the individual, family and community.

The main objective of community diagnosis was to find out the health related aspects and to provide preventive, promotive, curative and rehabilitative services to the individual and the community as a whole.

All the findings were presented among the key members of the community. On survey, total population of 130 houses was found 565, among them 296 were male population and 269 were female population. Sanitation of the community was inappropriate. People were not using the health facilities effectively so they were found suffering from different kinds of diseases most commonly gastritis. The common health seeking practice was going to governmental hospital and traditional healers.

Keywords

Community survey, Maternal health, Ritthepani.

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INTRODUCTION

Community diagnosis is defined as a comprehensive assessment of the state of an entire community in relation to its social, economic, physical and biological environment¹. It is a process of examining the patterns of disease or health status in the community in order to promote health, prevent disease and manage health services for the community people. It is based on collection and interpretation of the relevant data such as age, sex, population distribution, incidence and prevalence of important diseases of the area².

As per the curriculum of Tribhuvan University, B.Sc. Nursing first year, we were provided an opportunity to fulfill the practicum of community health nursing in the assigned area Shanti Tole and Teentara Tole, Pokhara Lekhnath, Ritthepani-27 from 18th June to 14th July 2017. Total population of Ritthepani was 4529, male population was 2100 and female population was 2429. Each of the 13 students was assigned with 10 different families for community diagnosis in order to promote the health of the individual, family and community.

OBJECTIVES OF THE FIELD VISIT

The main objective of community diagnosis was to find out the health related aspects and to provide preventive, promotive, curative and rehabilitative services to the individual and the community as a whole.

- To identify health need, problems and resources in defined areas population
- To carry out community diagnosis in the assigned community i.e. Pokhara-Lekhnath, Rithepani-27
- To communicate effectively with all concerned in providing client-centered care
- To prepare a list of existing facilities in the community concerning environmental sanitation
- To find out the services provided by the selected health related institutions through the direct contact with the community people
- To apply the epidemiological approaches in solving the identified problems through health action and exhibition programs
- To carry out the responsibilities of a community health nurse in the health promotion of the community people through health teaching and environmental approaches

Table 1: Plan of action

Date	Program	Place
18 th June - 20 th June, 2017	Tool orientation	GMC College Premises
18 th June - 25 th June, 2017	Community orientation	Community
18 th June - 30 th June, 2017	Community map	College and community
21 st June - 30 th June, 2017	Data collection	Community
2 nd July - 7 th July, 2017	Data analysis and interpretation	Community
20 th June - 5 th July, 2017	Home visiting	Community
22 nd June - 11 th July, 2017	Health teaching	Community
7 th July, 2017	Data presentation	Community
9 th July, 2017	Health action	Community
12 th July - 14 th July, 2017	Follow up	Community
13 th July - 14 th July, 2017	Evaluation	Community

RESULTS

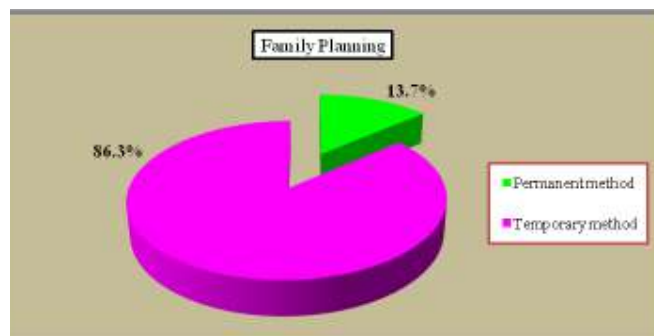
Table 2: Demographic variables

Variables	Frequency (f)	Percentage (%)
1. Gender		
Males	296	52%
Females	269	48%
2. Types of family		
Nuclear	87	67%
Extended	43	33%
3. Religion		
Hindu	377	67%
Buddhism	138	24%
Christian	50	9%
4. Caste		
Upper caste group	21	16.5%
Janajati	54	41.5%
Dalit	55	42%
5. Types of houses		
Kachha	25	19%
Pukka	105	81%
6. Ventilation		
Well ventilation	53	41%
Poorly ventilation	77	59%
7. Latrine		
Water sealed latrine	122	94%
Bore hole latrine	8	6%
8. Drainage system		
Closed	15	11.5%
Open	115	88.5%
9. Types of refuse disposal		
Burning	52	40%
Composting	9	7%
Burning and composting	28	22%
Throwing	42	32%
10. Types of kitchen		
Separate	95	73%
Attached	35	27%
11. Drinking water		
Public tap	110	85%
Spring	13	10%
Boring water	7	5%

In the data depicted in Table 2 shows that majority (52%) of the respondents were male population and remaining (48%) were female population thus the sex ratio was 1.1 : 1 male and female respectively. The dependency rate was (57%) and the literacy rate was (77%). Similarly, more than half (67%) of the family lived in nuclear family. Regarding religion, more than half (67%) of the respondents were Hindus, 24% were Buddhist and 9% were Christian. With regards to caste, minority (16.5%) of the respondents were of upper caste group. Beside these, majority (81%) of the people live in pukka type of house. Furthermore, less than half (41%) of the houses were well ventilated and majority (94%) of the families were found to use water sealed latrine. In case

of drainage system, minority (11.5%) of the families used closed drainage system and minority (7%) of the families used composting type of refuse disposal. Regarding types of kitchen, more than half (73%) of the families used separate kitchen. Similarly, majority (85%) of the families were drinking water from public tap.

Fig 1: Maternal Health on Pokhara-Lekhnath, Ritthevani -27 (Eligible couple=132)



From the above pie-chart it is illustrated that among 132 eligible couples, majority (86.3%) of them were using temporary method of family planning such as diaphragm, oral pills, condoms, Intra-uterine contraceptive devices and remaining (13.7%) were using permanent method.

More than half (75%) of the pregnant women have received antenatal care including tetanus toxoid from the respected health care institutions.

The data of current morbidity revealed that people are suffering from different diseases like back ache, sinusitis, leg pain, common cold, diarrhea, fever with the percentage of 35%, then 28% from gastritis, 17% from hypertension, 11% from headache, six percent from diabetes and remaining (Three percent) from asthma. In case of health seeking practice, most of the people (43%) go to governmental hospital and traditional healers.

Among 130 different houses, vital events i.e. birth, death, migration and marriage took place in only 15 houses with the more than half 60% of birth and 20%, 13.3%, 6.7% of marriage, migration and death respectively.

On the day of health action all the key members from the community, faculties from the college and community people were invited and the program was conducted in formal manner. Data presentation was done successfully. As a health action, drama on the theme of difference between the educated family and uneducated family along with early marriage, alcoholism and its consequences was conducted. Nutritional exhibition was also carried out

effectively along with real articles.

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Journal of Gandaki Medical College- Nepal (J-GMC-N)

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The editors review/screen all submitted manuscripts initially for format and style as per the guidelines and if not matched, paper will be returned for resubmission as per the guidelines. Manuscripts with insufficient originality, serious scientific and technical flaws, or lack of a significant message are rejected. If good articles are written poorly, then authors will be requested to revise and resubmit according to the J-GMC-N format.

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- English composition

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Manuscripts must be prepared in accordance with "Uniform requirement for Manuscripts submitted to Biomedical Journals" developed by the International Committee of Medical Journal editors (October 2006) (<http://www.icmje.org>). The uniform requirements and specific requirements of J-GMC-N are summarized below.

summary of the existing knowledge of your research area. This should lead directly into the second paragraph that summarizes what other people have done in this field, what limitations have been encountered, what questions still need to be answered? This in turn, will lead to the last paragraph, which should clearly state what you did and why.

Materials and Methods

This section should describe how and why a particular study was done in a particular way. Basically, it should include three questions: How was the study designed? How was the study carried out? And how was the data analysed? Mention the following, in order of their appearance, and writing in past tense or passive verb.

1. Study type and study design e.g. randomized clinical trials, cross sectional study, retrospective study, experimental study, cohort study, survey etc. Investigators embarking on Randomized clinical trial reports should present information based on the CONSORT (Consolidated Standards of Reporting Trials) statement (<http://www.consort-statement.org>).
2. Place and duration of the study.
3. Setting for the study.
4. Sample size and sampling method.
5. Inclusion and exclusion criteria.
6. Methods of data collection.
7. Technical information about methods, apparatus, and procedures should be provided in detail to allow other workers to reproduce the results. Give references to established methods.
8. Ethical approval and patient consent.
9. Protocols followed, if any.
10. Statistical analysis and computer software used.

Ethical approval

Ethics committee approval (for both human as well as animal studies) from respective institution is obligatory for manuscript submission. A statement on ethics committee permission and ethical practices must be included under the 'Materials and Methods' section.

Written informed consent must be obtained from the patient (or parent or guardian) for publication of any details or photographs that might identify an individual.

Results

The main outcome of the study and data obtained should be summarized in the Results section, in logical sequence in the text, tables and graphs. Remember that data and results are not the same thing. Results should be presented in a concise manner avoiding data that are already given in tables and figures. The tables and figures used in the manuscript should be precisely incorporated in sequential order in the result section. In this section, generally the minimum, maximum and mean values of the parameters should be mentioned. Likewise, statistical values should also be mentioned.

Discussion

In this section, at first the findings of the research should be elaborated giving citation of previous works supporting the hypothesis and present findings. Compare and contrast the results with other relevant studies. Describe the new and important aspects of the study. Do not repeat the data or other information given in the introduction or results section. State the limitations of the study.

Conclusions

State the conclusions that are linked with the objectives of the study, directly supported by the evidence and explore the implications of the findings for future research and for clinical practice.

Acknowledgements

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Book

Reddy KR. Text book of Immunology. Delhi, India: AITBS Publishers; 2016.

Chapter

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- Relevance of discussion
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- Does the author(s) indicate what the objective of the study is, what is being researched, how it was carried on and what are the main findings, conclusions and implications?

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- Does it accurately describe what the author main objectives to achieve?
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