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Fungal Infections (Mycoses): Dermatophytoses (Tinea, Ringworm)

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Medical Mycology, a study of fungal epidemiology, ecology, pathogenesis, diagnosis, prevention and treatment in human beings, is a newly recognized discipline of biomedical sciences, advancing rapidly. Earlier, the fungi were believed to be mere contaminants, commensals or nonpathogenic agents but now these are commonly recognized as medically relevant organisms causing potentially fatal diseases.

The discipline of medical mycology attained recognition as an independent medical speciality in the world sciences in 1910 when French dermatologist Raymond Jacques Adrien Sabouraud (1864 - 1936) published his seminal treatise *Les Teignes*. This monumental work was a comprehensive account of most of then known dermatophytes, which is still being referred by the mycologists. Thus he has laid down the foundation of the field of Medical Mycology. He has been aptly referred as the "Father of Medical Mycology".

There are significant developments in treatment modalities of fungal infections and we have achieved new prospects. However, till 1950s there was no specific antifungal agent available. Nystatin was discovered in 1951 and subsequently amphotericin B was introduced in 1957 and was sanctioned for treatment of human beings. In the 1970s, the field was dominated by the azole derivatives. Now this is the most active field of interest, where potential drugs are being developed to treat fungal infections. By the end of the 20th century, the fungi have been reported to be developing drug resistance, especially among yeasts.

Medical mycology has now completed one and half century (mid 19th and 20th) and entered into 21st century. There have been lots of developments during this period, particularly after the advent of modern molecular techniques. But still many issues remain unresolved before the mycologists. Dermatophytoses continues to be a major public health problem. The human pathogenic fungi are now recognized to cause morbidity and mortality among humans and also animals. They have emerged as important etiologic agents of opportunistic infections as well as full-fledged diseases as true pathogens.

There is a steady increase in the number of patients suffering from life-threatening fungal infections, and there is an emergence of newer fungal pathogens and drug resistance due to:

- Prolonged and indiscriminate use of antibiotic therapy
- Immunosuppressive corticosteroid therapy

- Aggressive use of anticancer drugs
- Bone marrow and organ transplantation
- Immunodeficiency (AIDS)
- Metabolic disorders (E.g., Diabetes mellitus)

Based on the wide spectrum of adaptability, various fungi causing human mycoses can be categorized into pathogenic fungi, opportunistic fungi, toxigenic fungi and allergenic fungi. According to the site of primary involvement, the fungal diseases of man can be classified into five types (Table 1).

Table 1: Various fungal diseases and their causative fungi

	Infection category	Fungal disease	Causative fungi
1	Superficial mycoses	Tinea nigra	<i>Hortaea werneckii</i>
		Black piedra	<i>Piedraia hortae</i>
		Dermatomycoses	<i>Scytalidium dimidiatum</i> , Dermatophytes
		Onychomycosis	<i>Scytalidium dimidiatum</i> , Dermatophytes
2	Subcutaneous mycoses	Keratomycosis	<i>Curvularia</i> sp, <i>Alternaria</i> sp, <i>Bipolaris</i> sp, <i>Fonsecaea pedrosoi</i> , <i>Aureobasidium pullulans</i>
		Eumycetoma	<i>Exophiala jeanselmei</i> , <i>Curvularia geniculata</i>
		Chromoblastomycosis	<i>Fonsecaea pedrosoi</i> , <i>Fonsecaea compacta</i> , <i>Philalophora verrucosa</i> , <i>Cladophialophora carrionii</i> , <i>Rhinochlaidiella aquaspersa</i>
		Rhinosporidiosis	<i>Rhinosporidium seeberi</i>
		Phaeohiphomycosis	<i>Wangiella dermatitidis</i> , <i>Exophiala jeanselmei</i> , <i>Cladophialophora bantiana</i> , <i>Chaetomium</i> sp
		Sporotrichosis	<i>Sporotrichum schenkii</i>
3	Systemic mycoses	Histoplasmosis	<i>Histoplasma capsulatum</i>
		Coccidioidomycosis	<i>Coccidioides immitis</i>
		Paracoccidioidomycosis	<i>Paracoccidioides brasiliensis</i>
		Blastomycosis	<i>Blastomyces dermatitidis</i>
4	Opportunistic mycoses	Mucormycosis	<i>Mucor</i> sp, <i>Rhizopus</i> sp, <i>Fusarium</i> sp.
		Pneumocystosis	<i>Pneumocystis jirovecii</i> (<i>P. carinii</i>)
		Candidiasis	<i>Candida albicans</i>
		Cryptococcosis	<i>Cryptococcus neoformans</i>
		Penicilliosis	<i>Penicillium marneffeii</i>
		Aspergillosis	<i>Aspergillus</i> sp.
5	Miscellaneous mycoses	Allergic rhinosinusitis	<i>Alternaria alternata</i> , <i>Bipolaris hawaiiensis</i> , <i>Curvularia lunata</i> , <i>Exserohilum rostratum</i>

SUPERFICIAL MYCOSES

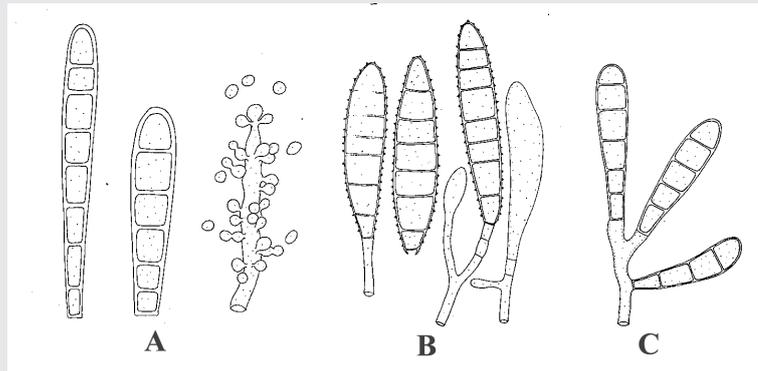
The superficial cutaneous fungal infections involve the outer most layers of skin and its appendages like hair and nails. These are among the most commonly encountered infections and prevalent in most parts of the world. The causative agents colonize cornified layer of epidermis or supra-follicular proteins of hair and do not penetrate into deeper anatomical sites. There is little tissue damage by the causative fungi and the immune response is also of a low threshold. The patients invariably neglect such types of infections and seek medical attention for cosmetic reasons. The dermatophytes are by far the most significant fungi because of their widespread involvement of population at large and their prevalence all over the world.

CUTANEOUS MYCOSES

Dermatophytoses are the most common types of cutaneous fungal infections seen in humans and animals affecting skin, hair and nails. These are caused by a group of filamentous fungi, closely related to each other antigenically, taxonomically, morphologically and physiologically; with a capacity to invade keratinized tissues of skin and its appendages and are collectively known as **dermatophytes**. Other frequently used terms like **tinea** and **ringworm** infections are synonyms of dermatophytoses. The infections caused by nondermatophytic fungi involving the skin are called as **dermatomycoses** whereas involving hair and nail are called **pedra** and **onychomycosis** respectively.

The dermatophytes are assigned to three main genera namely *Trichophyton*, *Microsporum* and *Epidermophyton*. All these three fungi belong to division *Deuteromycetes*, class *Hyphomycetes*, order *Moniliales* and family *Moniliaceae*. The three genera are differentiated by their conidial morphology.

1. **Genus *Trichophyton***: This genus includes 24 species, some of them are saprophytes. They produce microconidia abundantly that may be globose or pyriform and are borne singly along the sides of the hyphae or in grape like clusters. Macroconidia are rare, if present they are elongated, pencil shaped. They infect skin, hair and nails. Examples of human pathogenic species of this genus are *T. rubrum*, *T. mentagrophytes*, *T. violaceum*, *T. tonsurans*, *T. schoenleinii*, *T. verrucosum*, *T. concentricum*, *T. equinum*, *T. simii*, *T. soudanense* etc.
2. **Genus *Microsporum***: This genus includes 17 species, some of which are saprophytes. Macroconidia are abundant that are spindle or fusiform shaped with rough walls with 3 - 10 septa. Microconidia are scanty and are usually arranged singly along the sides of hyphae. They infect skin and hair; nails are not usually affected. Human pathogenic species are *M. audouinii*, *M. gypseum*, *M. canis*, *M. nanum*, *M. ferrugineum*, *M. equinum*, *M. gallinae* etc.
3. **Genus *Epidermophyton***: This genus includes only two species, out of which only one is pathogenic. Microconidia are absent. Macroconidia are abundant, borne in clusters with smooth, thick walls and two to seven septa. They are broadly clavate. They infect skin and hair but not nails. Human pathogenic species is *E. floccosum*.

Fig 1: Conidial morphology of dermatophytesA: *T. mentagrophytes* B: *M. gypseum* C: *E. floccosum*

All these fungi reproduce asexually and for some sexual states are also reported. The terms **anamorph** (asexual) and **teleomorph** (sexual) is often used to describe the taxonomic status of the organism. The anamorphs, those lack a known sexual state have been placed in a separate major high-level taxon called *Deuteromycetes* or *fungi imperfecti* or mitosporic fungi.

Epidemiology

The prevalence of dermatophytoses is governed by environmental conditions, personal hygiene, and individual's susceptibility from place to place. The isolation of different species of dermatophytes also varies markedly from one ecological niche to another depending on their primary natural habitat. Ecologically, dermatophytes have been divided into geophilic, zoophilic and anthropophilic species.

- 1. Geophilic dermatophytes:** The natural habitat of these species is the soil. Exposure to soil is the main source of infection for humans and animals. E.g. *T. ajelloi*, *T. terrestre*, *M. gypseum*, *M. nanum*, *M. cookie*, *M. persicolor*, *M. fulvum*.
- 2. Zoophilic dermatophytes:** They inhabit domestic and wild animals such as birds, dogs, cats, horses, cattle etc. Human infections are usually acquired by direct contact with infected animals. Certain zoophilic species may be isolated more often from soil and from fur of apparently healthy animals. E.g. *T. mentagrophytes*, *T. verrucosum*, *T. equinum*, *T. simii*, *M. canis*, *M. equinum*, *M. gallinae*.
- 3. Anthropophilic dermatophytes:** The fungal species exclusively affecting humans are known as anthropophilic. The migration of labor, troop movement, emigration and international travel played important roles in spreading of these fungi. E.g. *T. rubrum*, *T. mentagrophytes*, *T. violaceum*, *T. schoenleinii*, *T. tonsurans*, *T. concentricum*, *T. soudanense*, *M. audouinii*, *M. ferrugineum*, *E. floccosum*.

Many saprophytic soil fungi are closely related to dermatophytes, sharing the ability to utilize keratin as a growth substrate and it is believed that the dermatophytes have evolved from these keratinophilic soil fungi. During this evolutionary process various dermatophyte species have become adapted to a particular host and this has eventually led to the development of the epidemiological groups of anthropophilic, zoophilic and geophilic species. As dermatophytosis is prevalent throughout the world, it primarily depends on the

habits and living conditions of the people as infection is transmitted through fomites. This is the only true contagious fungal infection in real sense. The arthroconidia are parasitic propagules and survive in the environment for a pretty long time.

Some species of the dermatophytes are endemic in certain parts of the world and have a limited geographic distribution. *Trichophyton soudanense*, *T. gourvilii* and *T. yaoundei* are geographically restricted to Central and West Africa. *Microsporum ferrugineum* predominates in Japan and surrounding areas. *T. concentricum* is confined to islands in the South Pacific and a small area in Central and South America. However, the increasing mobility of the world's population is disrupting several of these epidemiological patterns. In recent times, *T. tonsurans* has replaced *M. audouinii* as the principal agent of tinea capitis in USA, may be because of mass migration of individuals from Mexico and other Latin American countries where *T. tonsurans* predominates. The most common etiologic agents of dermatophytoses in the Western countries are *T. rubrum* and *M. canis*. *Microsporum distortum* is a rare cause of tinea capitis in New Zealand and Australia and infection in animals such as dogs. It is similar to and possibly is a variant of *M. canis*.

Ring worm infections are very common among adults; may be attributed to increased physical activity and increased opportunity for exposure and hormonal pattern. Males are more commonly affected than females; may be due to increased outdoor physical activities as they are the ones who go out to earn for their families and increased opportunity for exposure to the fungi.

In general, dermatophytoses are found to be common among people of low socioeconomic status and in rural areas. This may be due to poor hygienic conditions i.e., common practice of sharing clothes and bathing towels of other ring worm patients without washing them properly and also due to poor nutritional value.

The disease occurrence was observed to be common in summer and minimum in winter, indicating that sweating in summer may be a predisposing factor for dermatophytoses.

The prevalence of dermatophytoses varies in India. In 1900, Dr. Powell reported the first case of dermatophytosis from Assam, India. In India the commonest species isolated are *T. rubrum* followed by *T. mentagrophytes* and *E. floccosum*. *T. violaceum* is the commonest species causing tinea capitis. Tinea corporis and tinea cruris are the commonest varieties seen in India. Tinea corporis is commonly seen around the waistline of Indian men and women who wear dhoti and sarees. Similarly tinea pedis is seen among those who wear shoes for long hours like athletes.

Clinical features

Infections caused by dermatophytes are clinically classified, on the basis of location of the lesions on the body. Although different body sites may be affected, each focus of infection is generally a result of local inoculation. The invading dermatophyte grows in a centrifugal manner, forming irregular rings with inflammatory borders with some clearing in central area of lesion. The term tinea (Latin: worm or moth) describes the annular (ring like) lesions that resemble a worm burrowing at the margin. The clinical manifestations are classified as follows.

- i. **Tinea capitis:** Ringworm of scalp involves infection of hair and scalp and presents as following two clinical types (Fig 1).
 - i. Inflammatory: Keroin, favus

ii. Non-inflammatory: Black dot, seborrheic dermatitis like

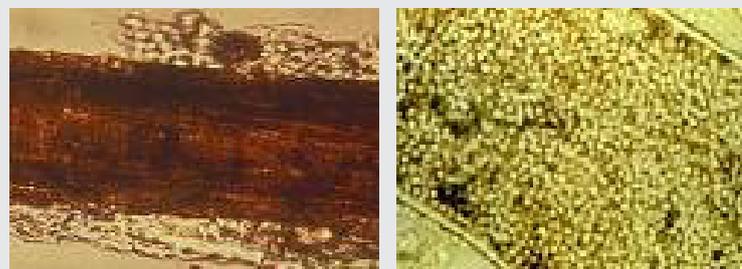
Favus is an acute inflammatory reaction of the hair follicle, which leads to the formation of dense crusts (scutula) around the hair follicles leading to alopecia and scarring. Some zoophilic dermatophytes induce a severe inflammatory and hypersensitivity reaction known as **keroin**. Hair invasion is of two types (Fig 2):

- a. **Ectothrix:** The fungus infects the hair shaft at midfollicle and forms a sheath of hyphae and arthroconidia 2 - 3 μm in diameter that surrounds the shaft. The infected hair become lustreless, brittle and hair filaments break off at the level of scalp to give an appearance of partial alopecia. Commonest species associated with ectothrix infection of hair are *M. audouinii*, *M. canis*, *M. ferrugineum*, *M. gypseum*.
- b. **Endothrix:** The hyphae invade hair follicle, then the hair shaft, and form numerous arthroconidia within the hair shaft. The infected hair becomes greyish white, breaks off easily to give black-dot appearance. *T. violaceum*, *T. tonsurans* are the common species causing this infection.

Fig 1: Tinea capitis



Fig 2: Ectothrix and endothrix infections



Tinea capitis is predominantly observed among children and young adults. This may be due to abstinence from application of oil to hair containing fatty acids which has inhibiting effect on fungi. In addition, it may also be due to the presence of thymus or its remnants and lack of fungicidal and fungistatic secretions by adrenal glands during childhood. The resistance of adults to tinea capitis may also be due to increased secretory activity of the sebaceous glands at puberty and the antifungal activity of the $C_7 - C_{11}$ saturated fatty acids in sebum (Undecylenic acid, an unsaturated C_{11} fatty acid widely used for topical therapy).

- ii. **Tinea corporis:** Ringworm of glabrous skin. The lesions are well marginated with raised erythematous borders. The annular, scaly patches may coalesce to form large area of chronic infection (Fig 3). Commonest species causing this type of infection are *T. rubrum*, *T. mentagrophytes*, *T. tonsurans*.

Tinea corporis is observed to be predominant among people with previous family history of disease. The disease may be transmitted by direct contact with other infected individuals. Tinea capitis is the second most important clinical type seen among people with previous family history of disease. It is because these diseases may be transmitted through fomites such as comb, hair brushes, bedding, pillows, clothes, towels or

furniture etc. In addition, tinea corporis can be attributed to poor personal hygiene and heavy manual work.

- iii. **Tinea cruris** (Jock itch, Dhobie's itch): Ringworm of inguinal area involving the groin, perianal, perineal areas often involving the upper thigh (Fig 4). Common species involved are *T. rubrum*, *T. mentagrophytes*, *E. floccosum*.

Tinea cruris is mainly seen among students as they mostly wear synthetic tight under-garments in which sweat does not get absorbed and long standing moisture predisposes to fungal infection.

Fig 3: Tinea corporis



Fig 4: Tinea cruris



- iv. **Tinea pedis** (Athlete's foot): Ringworm infection of feet involving interdigital webs and sole. The most common clinical manifestation is intertriginous form associated with maceration, scaling, fissuring and erythema which presents with itching and burning (Fig 5). Commonest infecting species are *E. floccosum*, *T. rubrum*, *T. mentagrophytes*.

Tinea pedis is common among athletes and office workers. It is due to constant wearing of shoes with synthetic nylon socks which does not absorb sweat.

- v. **Tinea manuum:** Ringworm infection of palms and interdigital areas of hands and lesions present as diffuse hyperkeratotic areas (Fig 6). Commonest etiologic agent is *T. rubrum*.

Fig 5: Tinea pedis
(Ringworm of foot, Athlete's foot)



Fig 6: Tinea manuum (Ringworm of palms)



- vi. **Tinea barbae** (Barber's itch): Ringworm infection of coarse hair of beard and moustache (Fig 7). The lesions are inflammatory and pustular. Commonest etiologic

agents are *T. verrucosum*, *T. mentagrophytes*.

Tinea barbae is exclusively seen only in males, and the disease may be acquired from barber shops through contaminated instruments.

- viii. Tinea faciei:** Ringworm infection of glabrous skin of face, excluding beard area (Fig 8). Commonest species associated with this disease are *T. rubrum*, *T. mentagrophytes*, *T. tonsurans*.

Fig 7: Tinea barbae
(Ringworm of beard and moustache, Barber's itch)

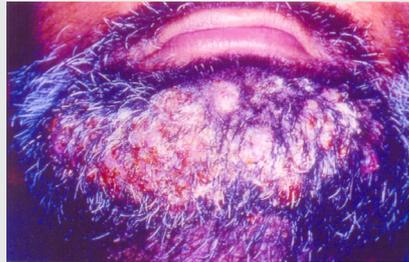


Fig 8: Tinea faciei
(Ringworm of face)



- vii. Tinea unguium:** Ringworm infection of nail plate. Distal subungual infection is the commonest pattern and involves nail bed and underside of nail in distal portion. The nail plate is brittle, friable, thickened and may crack because of piling up of subungual debris. The color of nail is often brown or black (Fig 9). Commonest species causing tinea unguium are *T. rubrum*, *T. mentagrophytes*, *E. floccosum*.

Tinea unguium is common among housewives and servant maids due to practice of cleaning the cowshed bare handed, washing the house hold utensils with ash and frequent dipping of hands in soap water; all of which enhance the chances of fungal infection.

Fig 9: Tinea unguium
(Ringworm of nails)



Fig 10: Tinea corporis and tinea unguium
(Mixed infection)



- ix. Tinea imbricata:** It is characterized by polycyclic, concentrically arranged rings of papulosquamous patches of scales scattered over and often covering most of the body. It is found in limited geographical areas (Pacific and Fizi islands) and caused by *T. concentricum*.
- xi. Dermatophytid or ID reactions:** The "id" reactions are allergic reactions to ring worm and occur in large variety of clinical forms. The most common location is that a patient with tinea pedis suddenly develops itching and burning of both hands, usually beginning at the sides of fingers near the digital crease. In a few days, vesicles appear that enlarge to bullae and lesions spread to palm. The vesicles are sterile. The reaction may be the result of fungal products being absorbed from the skin and itching is the only symptom (Fig 11).

Fig 11: Id reactions



Immunology

The host response to a dermatophyte plays a major role in the pathogenesis of dermatophytosis. The immune system and skin work together to prevent and cure infections at skin surface by inhibiting fungal growth and accelerating epidermopoiesis so that fungal hyphae are removed from the host by normal replacement process of skin, hair and nail. The clinical manifestations are mostly due to the immune response of the host to the invading fungal species. Some degree of acquired resistance both humoral and cellular has been noted following dermatophyte infection. The appearance of an acute inflammatory reaction in ring worm correlates with development of cell mediated immunity (Type IV delayed hypersensitivity) to the dermatophyte, which can be elicited by an intradermal test with trichophytin antigen.

Several factors, which can account for natural resistance (nonspecific defense) to dermatophytoses in humans and animals are known. Natural resistance to dermatophytes in humans clearly appears after puberty. The natural resistance is due to the presence of fungistatic long chain fatty acids in the sebum at puberty. Internal organs of humans and animals are naturally resistant to dermatophytoses. A fungistatic substance called serum factor of normal individuals and animals is believed to limit the growth of dermatophytes to the stratum corneum. The serum factor is an unstable, dialyzable, heat labile component of fresh serum and tissue fluid.

Laboratory diagnosis

Several standardized methods are available for the clinical diagnosis and laboratory diagnosis of dermatophytoses. The following specimens are collected by a sterile scalpel blade depending on clinical type. Infected hair is selected by exposure to Wood's lamp (UV light). Infected hair will fluoresce under Wood's lamp. Therefore, Wood's lamp is used for the diagnosis of tinea capitis. It is an UV lamp emitting radiation at 365 nm (Fig 12).

- Skin scrapings from edges of ringworm lesions
- Nail clippings
- hair stubs

Fig 12: Wood's lamp



The most important laboratory methods are direct microscopic examination in 10% KOH wet mount or calcofluor white mount (fungal cell wall stain viewed under fluorescent microscope) to demonstrate septate hyphae and arthrospores (In lesions/ clinical samples, dermatophytes appear as hyphae and arthrospores/ arthroconidia), study of colony characteristics by isolating organisms on Sabouraud's dextrose agar (SDA) with chloramphenicol and cycloheximide and microscopic examination of teased mounts in lactophenol cotton blue wet mount preparations to differentiate *Trichophyton*, *Microsporum*, *Epidermophyton* based on morphology of the microconidia and macroconidia.

Fig 13: Direct microscopic examination in 10% KOH wet mount

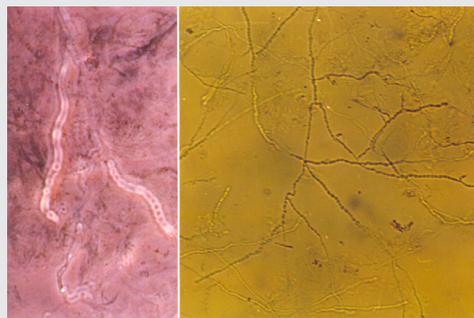
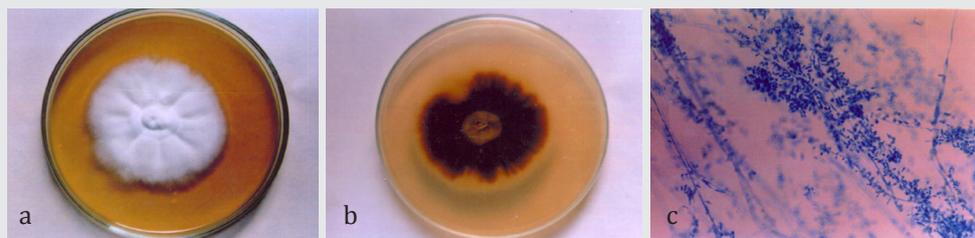


Table 2: Examination of colony characteristics

1	Colony characters on the obverse <ul style="list-style-type: none"> • Color (e.g., white, pearl, ivory) • Consistency (e.g., cottony, fluffy, woolly) • Topography (e.g., flat, folded, plicate, rugose)
2	Colony characters on the reverse <ul style="list-style-type: none"> • Presence or absence of pigment, whether diffusing or not

Fig 14: *Trichophyton rubrum*



a) Obverse b) Reverse on Sabouraud's dextrose agar c) Microconidia in lactophenol cotton blue wet mounts

Fig 15: *Trichophyton mentagrophytes*



a) Obverse



b) Reverse on Sabouraud's dextrose agar



c) Spiral hyphae, rat-tail like macroconidia in lactophenol cotton blue wet mounts

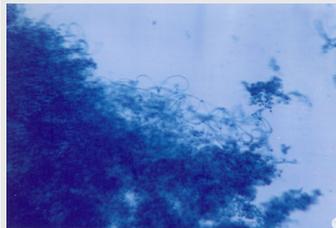


Fig 16: *Microsporum gypseum*



a) Fungal growth on Sabouraud's dextrose agar



b) Large, multicellular, spindle shaped macroconidia in lactophenol cotton blue wet mounts

Fig 17: *Microsporum audouinii*



a) Fungal growth on Sabouraud's dextrose agar

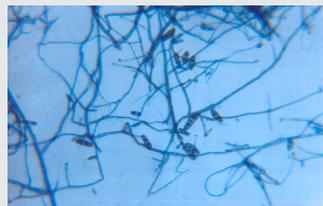


b) Chlamydospores with pectinate hyphae in lactophenol cotton blue wet mounts

Fig 18: *Epidermophyton floccosum*



a) Fungal growth on Sabouraud's dextrose agar



b) Macroconidia in clusters in lactophenol cotton blue wet mounts

A dermatophyte test agar medium (DTM) is used to isolate and distinguish dermatophytes from other fungal or bacterial contaminants found in cutaneous lesions. They turn the medium red by raising the pH through metabolic activity while most bacteria and fungi do not (Fig 19).

Fig 19: Dermatophyte test agar



Several tests such as urease test, *in vitro* hair perforation tests are performed to differentiate between *T. mentagrophytes* and *T. rubrum* as well as *M. canis* and *M. equinum*. *In vitro* hair perforation test is taken as positive when the dermatophyte species show wedge-shaped perforations in the hair (Fig 20). It is positive in *T. mentagrophytes* and *M. canis* and negative in *T. rubrum* and *M. equinum*.

Fig 20: *In vitro* hair perforation test



Therapy

Therapy of ring worm depends upon the site and the kind of lesion. Most infections can be treated with topical agents. Systemic therapy is used in tinea capitis, tinea unguium, wide spread invasive lesions, chronic, dry recurrent lesions or infections resistant to topical therapy.

Dermatophytes of the finger nails and toe nails in contrast to those at other body sites are particularly difficult to eradicate with drug treatment. This is the consequence of factors intrinsic at the nail i.e., hard, protective nail plate, sequestration of pathogens between the nail bed and plate and slow growth of the nail as well as relatively poor efficacy of the

antifungal agents.

Table 2: Commonly used antifungal agents

1. Antifungal antibiotics	
a) Polyenes	Amphotericin B i. Conventional amphotericin B ii. Lipid based formulations of amphotericin B Nystatin Pimaricin Hamycin
b) Others	Griseofulvin Pradimicin
2. Synthetic antifungal agents	
a) Thiocarbamates	Tolnaftate
b) Allylamines and benzylamines	Naftifine Terbinafine Butenafine
c) Azoles	i. Imidazoles Bifonazole, Clotrimazole, Fenticonazole, Miconazole, Oxiconazole, Butoconazole, Econazole, Ketoconazole, Omoconazole Sulconazole ii. Triazoles Fluconazole, Itraconazole, Voriconazole, Terconazole, Posaconazole, Ravuconazole
3. Miscellaneous antifungal agents	
	Flucytosine Ciclopiroxolamine Amorolfine Whitfield's ointment Potassium iodide Selenium sulfide Undecylenic acid Haloprogin Triacetin Echinocandin Nikkomycin Gention violet paint

Prevention and control

Prevention and control of dermatophyte infections must take into consideration the area invaded, the etiologic agent and the source of infection. The infection could be prevented by avoiding tight fitting clothes, synthetic or wollen undergarments and socks, and closed foot wear.

Further, it is recommended to

- i. Maintain good personal hygiene.
- ii. Use loose clothing and absorbent undergarments and socks.
- iii. Use open foot wear.
- iv. Use clothing and towels which are well-laundered in hot-water, dried and ironed.
- v. Dry thoroughly the intertriginous areas and apply a simple talcum powder or antifungal powder after a bath.
- vi. Encourage simultaneous treatment of contacts and family members.

Association between Fetal Gender and the Labor Curve at Term Pregnancy

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Keywords

Fetal gender, First stage of labor, Labor Curve

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ABSTRACT

Introduction: Animal and pathologic models have provided evidence for a fetal influence on the labor process; however, the potential impact of fetal gender on the labor curve has gone largely unstudied.

Objectives: To determine the association between fetal gender and first stage labor curve at term.

Methods: This was a retrospective study. There were 330 patients enrolled in this study, who gave birth from January 2011 to December 2012 by reviewing the charts. A total of 500 charts were reviewed.

Results: There were three hundred thirty (330) patients, out of which a total of 179 (54.2%) patients gave birth to males and 151 (45.8%) gave birth to females. Women who had a male fetus had a longer first stage of labor than women who carried a female fetus. The difference in the birth weight of the infants is statistically significant, male newborns were heavier at birth than female newborns.

Conclusions: Term labor in the first stage was found to be slower in women who carried a male fetus compared with those with female fetus which is not statistically significant.

INTRODUCTION

A scientific approach was begun by Friedman (1954), who described a characteristic sigmoid pattern for labor by graphing cervical dilatation against time. This graphic approach based on statistical observations, changed labor management. Friedman developed the concept of three functional divisions of labor to describe the physiological objectives of each division. During the preparatory division, although the cervix starts to dilate, its connective tissue components change considerably. The pelvic division commences with the deceleration phase of cervical dilatation. The classic mechanisms of labor that involve the cardinal fetal movements of the cephalic presentation-engagement, flexion, descent, internal rotation, extension, and external rotation-take place principally during the pelvic division. In actual practice, however, the onset of the pelvic division is seldom clearly identifiable¹.

Active labor that is uterine contractions, that brings about progressive cervical dilatation and delivery. Clinically, phase 3 is customarily divided into the three stages of labor².

1. The first stage begins when widely spaced uterine contractions of sufficient frequency, intensity, and duration are attained to bring about cervical thinning, termed effacement. This labor stage ends when the cervix is fully dilated, about 10 cm, to allow passage of the fetal head. The first stage of labor, therefore, is the stage of cervical effacement and dilatation.
2. The second stage begins when cervical dilatation is complete, and ends with delivery.
3. The third stage begins immediately after delivery of the fetus and ends with the delivery of the placenta.

Male fetal gender has been identified as a risk factor for

cesarean delivery³⁻⁵. This finding has been interpreted as a surrogate for fetal size because male fetuses tend to be larger on average compared with female fetuses. Animal and pathologic models have provided evidence for a fetal influence on the labor process⁶; however, the potential impact of fetal gender on the labor curve has gone largely unstudied.

Fetal gender is independently associated with adverse pregnancy outcome. Boys have higher rates of fetal and neonatal mortality and are more vulnerable to long-term neurological and motor impairments after preterm birth⁷⁻¹⁰. On average, a lower gestational age is observed among males compared with female babies. It has been suggested that a preterm delivery may be induced by fetal gender¹¹. These workers reported an excess of males among preterm babies, in agreement with previous findings¹², suggesting that male fetal gender, hormonally involved in the control of labor onset, might be responsible for the shortened duration of pregnancy. Possible determinants of the variation in the male to female ratio with pregnancy duration have been extensively discussed. In particular, a U-shaped variation has been suggested, which could be related to time of fertilization in the cycle¹³⁻¹⁴.

METHODS

This was a retrospective study. There were 330 patients enrolled in this study who gave birth at the Our Lady of Fatima University Medical Center from January 2011 to December 2012, by reviewing the charts. The researcher extracted detailed information on maternal socio-demographic, obstetric, and gynecologic history, medical and surgical history, prenatal history, antepartum records, and labor and delivery records. The labor and delivery records include labor type, dilation and station, length of labor stages, mode of delivery. Cervical dilation was documented in centimeters that ranged from 0 - 10 cm. Gender was defined as the gender assignment made by the pediatrician at delivery.

A total of 500 charts were evaluated using the inclusion criteria and 330 deliveries were included for this analysis. 170 patients were excluded because they were found to have undergone repeat cesarean section, had malpresentation, dystosia, non-reassuring fetal heart pattern, or they were preterm deliveries. Inclusion criteria were women whose gestational age was more than 37 weeks and 0 days at admission to labor and delivery, if they carried a singleton pregnancy in vertex presentation and the exclusion criteria were women who delivered preterm,

had fetuses with congenital anomalies, or delivered by cesarean before complete dilation. Statistical tools were chi square, fisher exact test, mean and standard deviation, Yates corrected test for the probability values.

RESULTS

There were three hundred thirty (330) patients enrolled in this study who gave birth at the Our Lady of Fatima University Medical Center from January 2011 to December 2012. A total of 179 (54.2%) patients gave birth to males and 151 (45.8%) patients gave birth to females. Women who carried a male fetus were similar, on average, to women who carried a female fetus with respect to maternal age, gravidity, labor type, and rates of cesarean delivery (Table 1). No significant difference was seen with regard to labor, rupture of membrane at admission, mode of delivery, hypertension at pregnancy and gestational diabetes mellitus.

The difference in the birth weight of the infants is statistically significant, male newborns are heavier at birth than female newborns.

Table 1: Characteristics of women who carried a male fetus compared with women with a female fetus

Variables	Males (n=179)	Females (n =151)	P value
Maternal age (in years)	27.4 ±5.5	27.5 ±5.8	0.8979
Gravidity	2 ±1	2 ±1	0.6389
Nulliparous (%)	46.9%	50.3%	0.5
Labor (%)			
Induction	5%	2%	0.5
Augmentation	50.8%	53.6%	0.5
Spontaneous	44.1%	44.4%	0.5
Rupture of membranes at admission (%)	4.5%	5.3%	0.5
Mode of delivery (%)			
Vaginal	98.3%	99.3%	0.5
Cesarean section	1.7%	0.7%	0.5
Hypertension of pregnancy (%)	1.1%	2%	0.5
Gestational diabetes mellitus (%)	0	0.6%	0.5
Birth weight (g)	3040 ±315	2895.7 ±350	0.0001 (S)

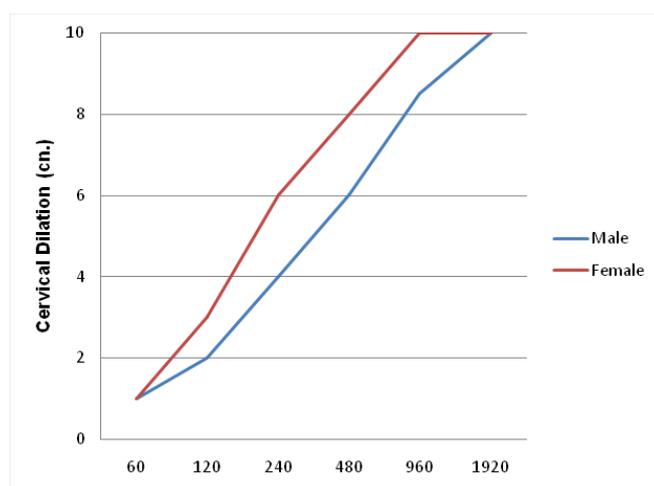
Table 2 shows the average duration of the first stage of labor of patients who delivered male babies and patients who delivered female babies. There is no statistical

significance between the duration of labor for both patients.

Table 2: Duration of first stage of labor (minutes)

Males	Females	P value
415.12 ±213	416 ±200	0.9697 (NS)

Fig 1: Duration of labor between the women carrying male and female fetuses



Women who carried a male fetus had a longer active first stage of labor than women who carried a female fetus (Fig 1).

Table 3: Comparison between the duration of labor (minutes)

Labor	Males	Females	P Value
Induction	391.2 ±317	306.7 ±155	0.5610 (NS)
Augmentation	437.4 ±202.7	434.6 ±198	0.9272 (NS)
Spontaneous	392.2 ±211.2	398.4 ±230.3	0.8665 (NS)

Table 3 shows the labor duration difference when compared between genders and stratified by whether labor was induced, augmented or spontaneous. The analysis showed no significant difference between the duration of labor of women who carried a male fetus and women who carried a female fetus.

The parity of the patients was stratified and the length of labor was compared. It showed that there is no statistical difference between the duration of labor for nulliparous women who carried a male fetus and nulliparous women who carried a female fetus. On average, it was also seen that there is no statistical difference between multiparous

women who carried a male fetus and multiparous women who carried a female fetus (Table 4).

Table 4: Comparison between the duration of labor and parity (minutes)

Parity	Males	Females	P Value
Nulliparous	460.7 ±240	442 ±201	0.5927 (NS)
Multiparous	374.8 ±178	391 ±197	0.5810 (NS)

DISCUSSION

The association of fetal sex with pregnancy induced hypertension and pre-eclampsia, the interaction between sex and risk factors for fetal growth restriction, and the increased likelihood of second stage arrest with male sex have all been studied. However, there are only a few studies on the effect of fetal sex itself on labor duration. This study set out to determine the effect of fetal sex on duration of labor.

This research shows that among the pregnant women who delivered male babies, the average duration of labor was 415.12 ±213 minutes as compared with pregnant women who delivered female babies with an average duration of labor of 416 ±200 minutes.

This study also compared the duration of labor whether it was induced, augmented or spontaneous. Women who carried male fetuses had a slightly longer duration of induced labor (391.2 ±317 minutes) than women who carried female fetuses (306.7 ±155 minutes). The duration of labor in both women subjects are generally the same with regard to augmented or spontaneous labor.

The parity of the subjects was also considered in resolving the difference of labor duration. It was found that on average, there is no statistical difference in the labor duration of nulliparous women who delivered male fetuses and nulliparous women who delivered female fetuses. There was also no statistical difference between the duration of labor for multiparous women who delivered male fetuses and female fetuses.

Within a large, retrospective cohort study of consecutive, reported by Cahill AG *et al* showed an incidence of 2400 women, 2373 women had complete labor information and were available for this analysis. Male gender was associated with both a statistically significantly longer active first stage of labor (4.6 vs 4.0 hours; P.002) and stratified analyses by parity and labor type¹⁵.

CONCLUSIONS

We found term labor in the first stage to be slower in women who carried a male fetus compared with those with female fetuses. This small, but statistically significant difference, in the duration of labor by fetal gender was seen when data were stratified by labor type and parity and when fetal size and other confounding factors were accounted for. Fetal gender, often known at the time of onset of labor, is one of many factors that might allow physicians to individualize the diagnosis of arrest in the first stage of labor and avoid unnecessary cesarean deliveries.

Other investigators have identified fetal gender as a risk factor for cesarean delivery. In a retrospective cohort study of >90,000 deliveries¹⁶, found that women who carried a male fetus were at a 20% increased risk to be diagnosed with an arrest disorder and undergo cesarean delivery in the first stage of labor compared with women who carried a female fetus.

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Urea-Fibrinogen Slide Coagulase Test – A Simple Alternative Method for the Rapid Identification of *Staphylococcus aureus*

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ABSTRACT

Introduction: The accurate identification of *Staphylococcus aureus* clinical isolates requires a series of tests. Morphological features and slide coagulase test are two criteria on which *S. aureus* are identified. Resort to tube coagulase test is sought when results of slide coagulase test are equivocal or doubtful. Both coagulase tests detect the enzymes that convert fibrinogen into fibrin. Human, rabbit or sheep pooled plasma is used as substrate for both tests. Slide coagulase test is simpler and faster as compared to tube coagulase test. The plasma could be carrier of many human and animal pathogens like HIV, HBV, HCV etc. Storage of plasma for longer duration is fraught with chances of contamination. Improperly stored plasma can lead to false positive or negative results. Citrated plasma may be unsuitable for this test if contaminated with citrate utilizing bacteria. Considering the role of *S. aureus* as a common etiological agent in nosocomial and community infections, there is a need of implementing rapid, easy and cost-effective phenotypic test.

Objectives: Considering the disadvantages and risks associated with fresh plasma, this study aims to launch for safer, more reliable substitute with longer shelf life that may provide reliable results for prompt identification of *S. aureus* by slide coagulase test.

Methods: The present work evaluates slide coagulase test (SCT), and urea fibrinogen slide coagulase test (UF-SCT) for *S. aureus* detection considering Tube coagulase test (TCT) as the reference method. Sensitivity, specificity, positive predictive value and negative predictive values of SCT and UF-SCT were calculated using TCT as gold standard.

Results: A total of 150 staphylococcal isolates from different clinical specimens were selected for the evaluation of coagulase tests. All the specimens were subjected to SCT, UF-SCT and TCT. The UF-SCT showed better sensitivity (95.04%), specificity (100%), PPV (100%), and NPV (82.85%) with reference to TCT. UF-SCT showed similar sensitivity and specificity to SCT. None of the isolates were negative in UF-SCT

Keywords

Slide Coagulase Test (SCT),
Staphylococcus aureus,
Tube Coagulase Test (TCT),
Urea-Fibrinogen Slide Coagulase Test (UF-SCT).

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and positive in SCT. Since UF-SCT does not incorporate plasma directly and at the same time has a very good sensitivity and specificity, it is recommended that UF-SCT could replace SCT for identification of *S. aureus*.

Conclusion: The findings of present study shall encourage laboratories to use the urea-fibrinogen slide coagulase test routinely for the rapid identification of *S. aureus*.

INTRODUCTION

Staphylococcus aureus is a common etiological agent in nosocomial and community infections, therefore its correct identification is essential¹. *Staphylococcus aureus* secretes coagulase enzymes which are not only virulence factors but also an important criterion for distinguishing it from coagulase negative staphylococci (CoNS). Several criteria like mannitol fermentation test, coagulase tests, agglutination test, DNase etc are proposed for discrimination of *S. aureus* from other staphylococci^{2,3}. However, these tests add to the cost and are not always available in developing countries.

In developing countries like Nepal, phenotypic tests are the mainstay in the diagnosis of staphylococcal infections, coagulase tests are usually accepted as confirmatory for *S. aureus*^{4,5,6,7,8}. Coagulase tests are performed using the slide (SCT) or the tube (TCT) methods⁹. The gold standard for *S. aureus* identification is demonstration of free coagulase by tube coagulase test, a test of choice because of its high sensitivity and specificity^{10,11}. Tube coagulase test may take as long as 24 hours. Therefore in resource limiting laboratories *S. aureus* is differentiated from CoNS mostly by slide coagulase test.

Although coagulase tests are invaluable for identification of *S. aureus*, few studies have evaluated their use in routine practice¹². The issues associated with utilizing fresh plasma for the coagulase tests include; possible presence of viral agents (HIV, Hepatitis B and C etc), non availability of fresh plasma, and possible contamination of plasma leading to erroneous results. The plasma poses risk to laboratory workers and prior to use, it must be screened for safety, an expensive proposition. The shelf life of fresh plasma is limited and chances of contamination very high. Procurement of fresh uncontaminated plasma regularly is not always possible.

The advantages of solutions of fibrinogen instead of plasma for carrying out the slide coagulase test were

pointed out by Berger¹³. Its use avoided false positives due to naturally occurring staphylococcal agglutinins in rabbit and human plasma, in addition to the fact that these solutions retained their activity considerably longer. Spencer published protocol on preparation and storage for solutions of crude fibrinogen for the slide coagulase test and found that 10% urea had a sufficiently strong antibacterial action to suppress almost all accidental contamination of the solution¹⁴. This study re-evaluated the role of UF-SCT method with slight modification for the rapid identification of *S. aureus* and compared its performance with SCT and TCT.

The results of this study shall encourage laboratories to use the UF-SCT method routinely for the rapid identification of *S. aureus*. It has a special interest for those laboratories which have no ready access to an animal house, or where procuring fresh plasma regularly may not be feasible.

METHODS

Study setting

This study was conducted in the Clinical Microbiology Laboratory of the Department of Microbiology, Manipal College of Medical Sciences, from April through October, 2014. This laboratory based study used stored *S. aureus* clinical isolates from blood, cerebral spinal fluid, urine, sputum, respiratory secretions, anterior nares, pus, and wound swabs of different outpatients and inpatients.

Phenotypic identification of *Staphylococcus aureus*

One hundred and fifty (N=150) specimens were inoculated onto 5% sheep blood agar and incubated at 37°C overnight. Staphylococci were identified by colony characteristics, cell morphology and arrangement, and catalase test¹⁰. All the strains were subjected to the SCT, UF-SCT and TCT in order to evaluate the performance of the SCT and UF-SCT for identification of *S. aureus*, using TCT as the gold standard.

Slide coagulase test

Smooth suspensions in sterile saline from test colony were prepared at two sites marked control and test on a slide. A small amount of fresh human plasma was added to the test side by a wire loop. The slide was rocked gently and observed for clumping within one minute. The test was considered positive when control did not show any clumping but clumping was observed on test side¹⁵.

Urea-fibrinogen slide coagulase test

Smooth suspensions in sterile saline from test colony were prepared at two sites marked control and test on a slide. The methodology was optimized by three different methods of applying UF solution to the smooth suspension; i) a drop of urea-fibrinogen (UF) solution, ii) a loopful of UF solution and iii) just touching the UF solution with a sterile straight wire and rub it in the smooth suspension of colony. All three methods of applying UF-solution for UF-SCT were equally effective giving clumps within 5 - 10 seconds with positive controls and no clumps with negative controls. Thus, in order to save the reagents as well as to make the method effective the third method of applying UF solution with straight wire was followed for further tests.

The UF solution was prepared and stored as suggested by Spencer¹⁴. Briefly, human citrated plasma was mixed with saturated ammonium sulphate solution in 4 : 1 ratio. Following thorough mixing, it was allowed to stand for 10 minutes and centrifuged at 3000 rpm for 20 minutes. The supernatant was poured off and the container was inverted on filter paper to allow it to drain for a few minutes. The precipitate was then taken up in 10% aqueous urea solution to a final volume of 5 ml. Thus prepared UF solution was stored at 4°C till use.

Tube coagulase test

For tube coagulase tests, colonies of test isolates were re-suspended in 2 ml of diluted citrated human plasma (plasma: saline, 1 : 5) in sterile glass test-tubes. Since citrate is utilized by enterococci¹⁶, pure colonies of Gram positive, catalase positive staphylococci were selected. Positive control tubes with citrated plasma and coagulase producing clinical isolate of *S. aureus* (which efficiently coagulates citrated plasma) were included. To rule out citrate utilization by other microorganisms, control TCTs containing citrated plasma with CoNS were included. In addition, reagent control tubes containing citrated plasma alone (with no cultures inoculated) were included. The

tubes were incubated at 37°C and observed for clot from one to four hours or, if clotting did not occur, the tubes were incubated at room temperature for an additional 18 hours⁹. Tubes were studied without agitation in order not to disrupt partially formed clots.

Quality Control

To minimize cross contamination, standard microbiological procedures were strictly followed. Positive and negative controls were always included in the test sets. Confirmed clinical isolate of *S. aureus* and CoNS were used as positive and negative control respectively.

Statistical analysis

The data were analyzed using a 2 × 2 contingency table for diagnostic specificity and sensitivity. Diagnostic sensitivities and specificities were calculated as follows:

Sensitivity (%) = [True positive/ (True Positive + False Negative)] × 100

Specificity (%) = [True Negative/ (False Positive + True Negative)] × 100

The positive predictive value (PPV) (%) = [True Positive/ (True Positive + False Positive)] × 100

The negative predictive value (NPV) (%) = [True Negative/ (True Negative + False Negative)] × 100.

RESULTS

Total of 150 staphylococcus isolates were included in the study based on their morphology and catalase tests. Among 150 isolates, 76.66% (115/150) were positive by all three tests and 4.00% (6/150) were positive by TCT but negative by UF-SCT and SCT whereas the remaining 19.33% (29/150) were negative by all three tests (Table 1).

Table 1: Comparative results of SCT, UF-SCT and TCT

SCT	UF-SCT	TCT	Number (%)
Negative	Negative	Positive	6 (4.00%)
Negative	Positive	Positive	0
Negative	Positive	Negative	0
Positive	Negative	Negative	0
Negative	Negative	Negative	29 (19.33%)
Positive	Positive	Positive	115 (76.66%)
Total			150 (100%)

Performance of different test methods for detection of *S.*

aureus were analysed for sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) considering TCT as gold standard (Table 2 and 3).

Among 150 isolates studied by SCT and TCT, 115 were positive by both, while 6 were positive by TCT but negative by SCT. Both tests revealed 29 isolates to be negative, but no isolates were negative by TCT and positive by SCT. With reference to TCT, the SCT had sensitivity 95.04%, specificity 100%, and predictive value of positive test 100%, predictive value of negative test 82.85%, percentage of false negative 4.95% and percentage of false positive 0% respectively (Table 2).

Table 2: Comparison of SCT with reference to TCT

SCT	Test and results	TCT		Sensitivity	Specificity	PV+	PV-	False -ve	False +ve	P value
		+ve	-ve							
	+ve	115	0	95.04%	100%	100%	82.85%	4.95%	0%	<0.05
	-ve	6	29							

Among 150 isolates studied by UF-SCT and TCT, 115 were positive by both, while six were positive by TCT but negative by UF-SCT. Both tests revealed 29 isolates to be negative, but none were negative by TCT and positive by UF-SCT. With reference to TCT, the UF-SCT had sensitivity 95.04%, specificity 100%, and predictive value of positive test 100%, predictive value of negative test 82.85%, percentage of false negative 4.95% and percentage of false positive 0% respectively (Table 3).

Table 3: Comparison of UF-SCT with reference to TCT

UF-SCT	Test and results	TCT		Sensitivity	Specificity	PV+	PV-	False -ve	False +ve	P value
		+ve	-ve							
	+ve	115	0	95.04%	100%	100%	82.85%	4.95%	0%	<0.05
	-ve	6	29							

Out of 130 isolates subjected to UF-SCT and SCT for the coagulase test, 115 isolates were positive by both tests and none were found to be positive only by SCT or UF-SCT, while 15 were negative by both tests. While comparing the UF-SCT with SCT as a standard, the sensitivity of UF-SCT was 100%, specificity was 100%, predictive value of positive test was 100%, predictive value of negative test was 100%, percentage of false negative was 0%, and percentage of false positive 0% respectively. No isolate was found to be positive by SCT and negative by UF-SCT (Table 4).

Table 4: Comparison of UF-SCT with reference to SCT

UF-SCT	Test and results	SCT		Sensitivity	Specificity	PV+	PV-	False -ve	False +ve
		+ve	-ve						
	+ve	115	0	100%	100%	100%	100%	0%	0%
	-ve	0	15						

DISCUSSION

Coagulase testing is the single most reliable method for identifying *S. aureus*⁹. Coagulase production can be detected using either the SCT or the TCT. Slide Coagulase Test detects bound coagulase (also called “clumping factor”)⁹, which reacts directly with fibrinogen in plasma, causing rapid bacterial cell clumping. Negative isolates following SCT require confirmation with the superior TCT, since strains deficient in clumping factor may produce free coagulase. Tube coagulase detects secreted, extracellular, free coagulase that reacts with a substance in plasma called “Coagulase-Reacting Factor (CRF)” to form a complex, which in turn reacts with fibrinogen to form fibrin clot⁹. Tube coagulase test (TCT) is considered gold standard for demonstration of coagulase enzyme of *S. aureus*. This study evaluated the performance of TCT, SCT and UF-SCT, the phenotypic methods commonly practiced for the identification of *S. aureus*. The role of the UF-SCT method for the rapid identification of *S. aureus* was reevaluated and compared with SCT and TCT.

Sensitivity and specificity were calculated to evaluate the performance of individual test in detecting *S. aureus*. The findings of this study showed that SCT had sensitivity 95.04%, specificity 100%, and predictive value of positive test 100%, predictive value of negative test 82.85%, percentage of false negative 4.95% and percentage of false positive 0% respectively with reference to TCT. Here, SCT and UF-SCT showed slightly lower sensitivity by failing to detect 6 (4%) of *S. aureus* strains in comparison to TCT. This data is in agreement with previous findings in which sensitivity of free coagulase test was higher than bound coagulase test^{17,18,19,20}. The tube coagulase test showed very good sensitivity (98.7%), specificity (98.1%), PPV (99.5%) and NPV (94.4%) than slide coagulase test and Slidex Staph Plus¹⁷. Van *et al*¹⁸ have reported similar findings with 98.2% sensitivity and 98.9% specificity of Slidex Staph Plus test. Tube coagulase has demonstrated the highest sensitivity (98.7%) and specificity (98.1%). Similarly in another study Luijendijk *et al*¹⁹ have evaluated free-coagulase test (Bacto coagulase plasma;

Difco Laboratories, Detroit, Mich.), bound coagulase test, and the Pastorex Staph Plus (Sanofi Diagnostics Pasteur, SA, Marnes-La-Coquette, France) for the detection of *S. aureus*. They found 98.0% sensitivity with free-coagulase test and 99.0% with bound coagulase test and 100.0% with Pastorex Staph Plus.

In current study SCT and UF-SCT were evaluated considering the TCT as gold standard for the identification of *S. aureus*. Overall, of the individual tests studied, UF-SCT test was found to be an ideal rapid test to detect *S. aureus* with 95.04% sensitivity, 100% specificity, 100% PPV, 82.84% NPV, 4.95% false negativity and 0% false positivity in comparison to TCT as gold standard. The SCT and UF-SCT had the similar sensitivity, specificity for the detection of *S. aureus* (95.04% sensitivity and 100% specificity). The slightly lower sensitivity of UF-SCT may partly be due to the non-specific detection of other coagulase positive staphylococci, such as *Staphylococcus schleiferi* subspecies *coagulans*, *Staphylococcus delphini*, *Staphylococcus intermedius* and *Staphylococcus hyicus*.

The accurate identification of *S. aureus* clinical isolates requires a battery of tests. *S. aureus* infections are more frequent than those by other bacteria, particularly in settings with high HIV/AIDS prevalence^{20,21,22}. Potential risk to laboratory workers while using whole plasma for the coagulase test and the need to screen plasma for infectious agents in resource limited settings, adds extra efforts and cost. Since SCT and UF-SCT have similar sensitivity and specificity with reference to TCT, UF-SCT could be safer, less expensive and more suitable alternative to SCT.

Use of UF-SCT avoided false positives due to naturally occurring staphylococcal agglutinins in rabbit and human plasma, in addition to the fact that UF solution retains its activity considerably longer¹³. The 10% urea solution used to prepare UF solution has a sufficiently strong antibacterial action to suppress almost all accidental contamination of the solution¹⁴. Since tube coagulase test provides results only after 4 - 24 hr and is burdensome while UF-SCT test is rapid and easy to perform, this disadvantage of tube coagulase is certainly outstripped by its better efficacy. The slide coagulase test should be complimented by tube coagulase test when required. It is recommended that UF-SCT could be an alternative to SCT in clinical microbiology laboratory. The urea fibrinogen solutions appears to be an interesting application, and

has a special interest for those laboratories which have no ready access to an animal house, or where sufficient amounts of fresh plasma may not be available or where screening of fresh plasma for pathogens is not practicable.

CONCLUSIONS

This study evaluated the performance of laboratory tests used routinely for the identification of *S. aureus*. Since use of fresh, unscreened, human plasma is inappropriate and risky it should be avoided. A very good alternative UF-SCT method is recommended.

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Conflict of interest

The authors declare that they have no financial or non-financial potential conflicts of interest.

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Sonographic Measurement of Spleen in Relation to Age: A Prospective Study among Adult Nepalese People in Western Nepal

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ABSTRACT

Introduction: Splenomegaly is an enlargement of the spleen which is a quite common problem in any part of the world. Spleen is enlarged in various clinical disorders e.g. infections, metabolism or storage disorders and hematological abnormalities. Splenomegaly is an indicator of pathologic process that may be of primary splenic origin but also may be a reflection of disease in virtually any other organ system. Thus, it is important to estimate the splenic size *in vivo* in the diagnosis, treatment and prognosis of a variety of disorders.

Objective: The objective of this study was to determine the normal dimension of the spleen in the adult Nepalese people.

Methods: This is a prospective study in which 320 adults subjects were scanned by using 3.5 MHz curvilinear probe. We used ultrasonography to examine 160 males and 160 females, not to have any condition likely to be associated with splenic enlargement. The measurement for the length and thickness of spleen were obtained in right lateral position.

Results: This study revealed the splenic dimensions for males were greater than in females. The men spleen length were (10.07 ±0.7 cm, 10.1 ±0.54 cm, 9.5 ±0.7 cm and 9.0 ±0.43 cm for age group of 16 - 30, 31 - 45, 46 - 60 and 61 - 75 years respectively). The females spleen length were (9.83 ±0.53 cm, 9.58 ±0.58cm, 9.2 ±0.64 cm and 8.8 ±0.36 cm for age group of 16 - 30, 31 - 45, 46 - 60 and 61 - 75 years respectively). The men spleen thickness were more (4.1 ±0.5 cm, 4.05 ±0.58 cm, 3.43 ±0.38 cm and 3.0 ±0.36 cm for age group of 16 - 30, 31 - 45, 46 - 60 and 61 - 75 years respectively). The females splenic thickness were 4.06 ±0.47 cm, 3.78 ±0.48 cm, 3.38 ±0.35 cm and 2.29 ±0.23 cm for age group of 16 - 30, 31 - 45, 46 - 60 and 61 - 75 years respectively. Thus significant differences between male and female splenic dimensions were found for each age group chosen (P <0.05).

Conclusions: The results show that the splenic length and thickness decreased with increase in age in both males and females and all the dimensions were greater in males than in females. This study established normogram that can be more reliably used as both a complementary modality to clinical evaluation and as a more sensitive means of evaluating and screening patients for splenic disorders for any pathological enlargement or reduction of size in clinical practice in a Nepalese populations.

Keywords

Spleen, Ultrasonography, Western Nepal.

Abbreviations

CT (Computed Tomography)

MRI (Magnetic Resonance Image)

USG (Ultrasonography)

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INTRODUCTION

Splenomegaly is an enlargement of the spleen which is a quite common problem in any part of the world. It may occur in the setting of acute or chronic disease though it is not a diagnosis in itself. Spleen is enlarged in various clinical disorders e.g. infections, metabolism or storage disorders and hematological abnormalities¹. Splenomegaly is an indicator of pathologic process that may be of primary splenic origin but also may be a reflection of disease in virtually any other organ system. Thus, it is important to estimate the splenic size *in vivo* in the diagnosis, treatment and prognosis of a variety of disorders. Prior to the advent of ultrasonography and other tomographically based imaging modalities, it was difficult to image the spleen. Clinical evaluation of the splenic size is difficult and unreliable due to the spleen being concealed in its anatomic location under the ribs and considerable enlargement needing to occur before the spleen is clinically palpable².

There are many modes of investigation to identify the enlarged spleen e.g. plane radiograph, sonography, computed tomography (CT), magnetic resonance image (MRI) and radionuclide scan. Out of these modalities sonography and computed tomography are most reliable for intra-abdominal organs³. Modern sophisticated CT scan and MRI can also be used for measuring splenic size accurately but they are very costly. Ultrasound has been found to be both accurate and reliable⁴. Indeed, it has made possible, direct visualization and assessment of abdominal organs and a cheap imaging modality that is realistic for developing nations like Nepal.

Due to lack of studies in normal range of spleen size in Nepalese adults by age, splenic measurements are based on referring to the data given by European or American studies. But we can't deny the established facts of variations in the anthropometric features of various populations, races and regions. The diverse climate of the zones and the socio-economic status of Nepalese people make the study population special. To the best of our knowledge, there is no prior comprehensive anthropometric study has conducted on the normal measurements of spleen by ultrasonography in Nepalese adults. Thus a normogram of splenic sizes based on a normal Nepalese population would provide more reliable values that would confidently detect minimal changes in splenic size and thus predicate early splenic pathology.

METHODS

Clearance from the institutional ethical committee was obtained prior to study. This is a prospective study in

which 320 adults subjects were scanned by using 3.5 MHz curvilinear probe with a model LOGIQ5 premium ultrasound machine. We used ultrasonography to examine random sample of 320 patients, including 160 males and 160 females from 16 to 75 years of age living in the Western region of Nepal who had visited Radiology Department of Gandaki Medical College Teaching Hospital, Pokhara, Nepal. Only the patients who did not have any condition likely to be associated with splenic enlargement were included in the study. All measured spleens had a normal position, shape and normal textures.

Ultrasound examination of spleen were performed according to Arora *et al* (2010)⁵. The length and thickness of spleen were obtained in right lateral position. Splenic measurement was taken during deep inspiration, to minimize masking by the lung. Splenic length was measured on longitudinal coronal image from dome to tip through the hilum (Fig 1) followed by thickness measurement taken in the longitudinal coronal plane at a point bisecting the line indicating length (Fig 2). To determine reproducibility, each measurement was repeated at least three times and most repeated value was recorded.

Fig 1: Showing measurement of length of spleen

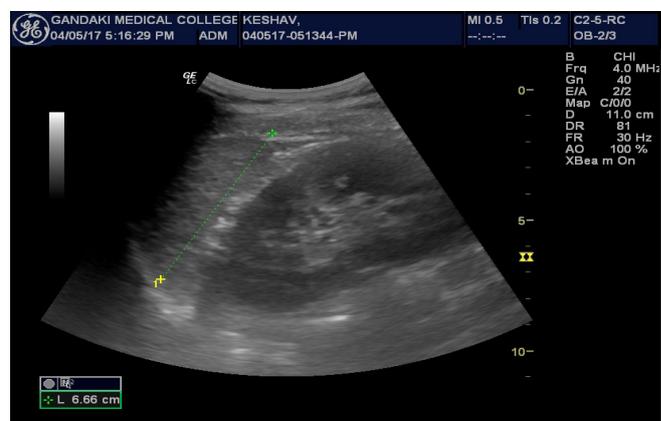


Fig 2: Showing measurement of thickness of spleen



STATISTICAL ANALYSIS

All samples data were tabulated in a master chart and entered in data sheet Graph pad prism version 6. Statistical analysis was carried out with Graph pad prism; a computer software program. The difference among the gender was analyzed by unpaired t-test. The difference among age groups was analyzed by one way ANOVA test and comparing each age group by Dunnett's multiple comparison test.

RESULTS

The splenic length and thickness were measured with respect to the age and sex with the help of ultrasound. There were 320 people subjected to this study who were from different parts of the Western region of Nepal. Among them 160 were males and 160 were females. It was observed that mean splenic length of age group 16 - 30 years was 10.07 ± 0.7 cm for males. The splenic length of age 31 - 45 years male group was 10.1 ± 0.54 cm. The splenic length for age 46 - 60 years male group was 9.5 ± 0.7 cm and splenic length for 61 - 75 years male age group was 9.0 ± 0.43 cm (Table 1). It was observed that mean splenic length for age 16 - 30 years female group was 9.83 ± 0.53 cm. The splenic length of age 31 - 45 female group was 9.58 ± 0.58 cm. The splenic length for age 46 - 60 years female group was 9.2 ± 0.64 cm and splenic length for age 61 - 75 years female age group was 8.8 ± 0.36 cm (Table 2).

Table 1: Length of spleen among male subjects

Age (Years)	Number	Mean (cm) \pm SD	Range (cm)
16 - 30	40	10.07 ± 0.7	8.9 - 11.9
31 - 45	40	10.1 ± 0.54	9.3 - 11
46 - 60	40	9.5 ± 0.7	8.3 - 10.5
61 - 75	40	9.0 ± 0.43	7.9 - 9.6

Table 2: Length of spleen among female subjects

Age (Years)	Number	Mean (cm) \pm SD	Range (cm)
16 - 30	40	9.83 ± 0.53	8.9 - 10.9
31 - 45	40	9.58 ± 0.58	9.0 - 10.6
46 - 60	40	9.2 ± 0.64	8 - 10.4
61 - 75	40	8.8 ± 0.36	7.9 - 9.5

It was observed that mean splenic thickness for age 16 - 30 years male group was 4.1 ± 0.5 cm. The splenic thickness

for age 31 - 45 years male group was 4.05 ± 0.58 cm. The splenic thickness for age 46 - 60 years male group was 3.43 ± 0.38 cm and splenic thickness for 61 - 75 years age group was 3.0 ± 0.36 cm (Table 3). It was observed that mean splenic thickness for age 16 - 30 years female group was 4.06 ± 0.47 cm. The splenic thickness for 31 - 45 years female group was 3.78 ± 0.48 cm. The splenic thickness of age 46 - 60 years female group was 3.38 ± 0.35 cm and splenic thickness for age 61 - 75 years female group was 2.29 ± 0.23 cm (Table 4).

Table 3: Thickness of spleen among male subjects

Age (Years)	Number	Mean (cm) \pm SD	Range (cm)
16 - 30	40	4.06 ± 0.47	3.3 - 4.8
31 - 45	40	3.78 ± 0.48	3 - 4.5
46 - 60	40	3.38 ± 0.35	3 - 4.1
61 - 75	40	2.29 ± 0.23	2.5 - 3.3

Table 4: Thickness of spleen among female subjects

Age	Number	Mean (cm) \pm SD	Range (cm)
16 - 30	40	4.1 ± 0.5	3.3 - 4.9
31 - 45	40	4.05 ± 0.58	3 - 5.2
46 - 60	40	3.43 ± 0.38	2.7 - 4.1
61 - 75	40	3.0 ± 0.36	2.6 - 4.0

Table 5: Showing ANOVA test for splenic length for males of different age groups

ANOVA table	SS	DF	MS	F (DFn Dfd)	P value
Between column	49.01	3	16.34	$F(3,156) = 51.85$	$P < 0.001$
Within column	49.16	156	0.315		
Total	98.17	159			

Table 6: Showing Dunnett's multiple comparison test for splenic length of males for different age groups

Dunnett's multiple comparisons test	Mean Diff.	95.00% CI of diff	Significant	Summary	Adjusted P value
Age 16 - 30 vs age 31 - 45 years	0.24	-0.05 to 0.54	No	ns	0.1370
Age 16 - 30 vs age 46 - 60 years	0.84	0.54 to 1.14	Yes	***	0.0001
Age 16 - 30 vs age 61 - 75 years	1.42	1.12 to 1.72	Yes	****	0.0001

Table 7: Showing ANOVA test for splenic length for females of different age groups

ANOVA table	SS	DF	MS	F (DFn Dfd)	P value
Between column	20.44	3	6.813	F(3,156) = 23.47	P <0.001
Within column	45.28	156	0.2902		
Total	65.72	159			

Table 8: Showing Dunnett’s multiple comparison tests for splenic length of males for different age group

Dunnett’s multiple comparisons test	Mean Diff	95.00% Cl of diff	Significant	Summary	Adjusted P value
Age 16 - 30 vs age 31 - 45 years	0.245	-0.04 to 0.56	No	ns	0.1102
Age 16 - 30 vs age 46 - 60 years	0.535	0.24 to 0.82	Yes	***	0.0001
Age 16 - 30 vs age 61 - 75 years	0.96	0.67 to 1.24	Yes	****	0.0001

The above Tables 5, 6, 7 and 8 showed that the splenic length decreased with increasing age in both males and females. This study shows that in both males and females splenic length was not significantly changed up to age of 45 years and after that age the splenic length decreased at a slow rate. The splenic length was significantly decreased after age of 60.

Table 9: Showing ANOVA test for splenic thickness for males of different age groups

ANOVA table	SS	DF	MS	F(DFn Dfd)	P value
Between column	18.06	3	6.02	F(2.2,41.97) = 30.13	P <0.001
Within column	3.83	19	0.201		P = 0.4659
Total	33.28	79			

Table 10: Showing Dunnett’s multiple comparison tests for splenic thickness of males for different age groups

Dunnett’s multiple comparisons test	Mean Diff	95.00% Cl of diff	Significant	Summary	Adjusted P value
Age 16 - 30 vs age 31 - 45 years	0.075	-0.26 to 0.41	No	ns	0.912
Age 16 - 30 vs age 46 - 60 years	0.695	0.35 to 1.03	Yes	***	0.0001
Age 16 - 30 vs age 61 - 75 years	1.16	0.82 to 1.49	Yes	****	0.0001

Table 11: Showing ANOVA test for splenic thickness for females of different age groups

ANOVA table	SS	DF	MS	F(DFn Dfd)	P value
Between column	29.81	3	9.938	F(3,156) = 63.13	P <0.001
Within column	24.56	156	0.1574		
Total	54.37	159			

Table 12: Showing Dunnett’s multiple comparison test for splenic thickness of females for different age groups

Dunnett’s multiple comparisons test	Mean Diff	95.00% Cl of diff	Significant	Summary	Adjusted P value
Age 16 - 30 vs age 31 - 45 years	0.15	-0.06 to 0.36	No	ns	0.2206
Age 16 - 30 vs age 46 - 60 years	0.68	0.46 to 0.89	Yes	***	0.0001
Age 16 - 30 vs age 61 - 75 years	1.08	0.87 to 1.29	Yes	****	0.0001

The above Table 9, 10, 11 and 12 showed that in both males and females splenic thickness was not significantly changed up to age of 45 years and after that age the thickness of spleen were decreased at slow rate. Likewise, the splenic thickness was decreased significantly after age of 60 years.

Table 13: Unpaired T test for splenic length for both males and females

Unpaired t-test	
P value	<0.0001
P value summary	****
Significantly different (P<0.05)?	Yes
One - or two - tailed P value	Two - tailed
T, df	t = 5.113, df = 318

The above Table 13 showed that splenic length was greater in males than those in females in each age group of this study.

Table 14: Unpaired t-test for splenic thickness for both males and females

Unpaired t-test	
P value	<0.0001
P value summary	****
Significantly different (P<0.05)?	Yes
One - or two - tailed P value	Two - tailed
T, df	t = 1.1397, df = 318

The above Table 14 showed that splenic thickness was greater in males than those in females in each age group of this study.

DISCUSSION

Splenomegaly is a well-known manifestation of several diseases that may involve the liver, immune system, and hematopoietic system. Accurate noninvasive assessment of splenic volume is used in the clinical treatment of patients with these diseases. Assessment of splenic size by physical examination is subjective and known to be inaccurate⁶⁻⁹; therefore, evaluation with radiologic imaging is common. Several prior studies have sought to develop the standards for measuring the splenic size such as CT scan, scintigraphy, MRI and sonography. Clinicians at our Institution commonly request sonography to evaluate patients for clinically suspected splenomegaly and because sonography is a rapid, accurate, easily operable, fast assessment and cost effective for evaluation of the spleen dimensions with no radiation exposure.

In the present study it was observed that splenic length decreased with age in both males and females. This study revealed that in both males and females splenic length and thickness not significantly changed up to age of 45 years and after that age the splenic length and thickness were decreased at a slow rate. The splenic length and thickness were significantly decreased after age of 60 years. The findings of this study were in agreement with the findings of Loftus and Metreweli (1997)¹⁰ who observed rapid growth in the splenic length up to the age of 20 years followed by a mild decrease up to the age of 50 years and then rapid fall after the age of 50 years. Similarly other studies also demonstrated that the splenic length decreased at a slower rate up to the age of 50 years, after that it decreased abruptly^{5,11}.

This study also demonstrated that the splenic length and thickness of males were greater than those in females in each age group of this study. In present study, the men spleen length were more (10.07 ±0.7 cm, 10.1 ±0.54 cm, 9.5 ±0.7cm and 9.0 ±0.43 cm for age group of 16 - 30, 31 - 45, 46 - 60 and 61 - 75 years respectively) than in females (9.83 ±0.53 cm, 9.58 ±0.58cm, 9.2 ±0.64 cm and 8.8 ±0.36 cm for age group of 16 - 30, 31 - 45, 46 - 60 and 61 - 75 years respectively). Similarly the men spleen thickness were more (4.1 ±0.5 cm, 4.05 ±0.58 cm, 3.43 ±0.38 cm and 3.0 ±0.36 cm for age group of 16 - 30, 31 - 45, 46 - 60 and 61 - 75 years respectively) than in females (4.06 ±0.47cm, 3.78 ±0.48 cm, 3.38 ±0.35 cm and 2.29

± 0.23 cm for age group of 16 - 30, 31 - 45, 46 - 60 and 61 - 75 years respectively). Thus significant difference between male and female splenic dimension was found for each age group chosen (P <0.05). The findings of this study were supported by other similar studies conducted in different parts of world^{12,13} who demonstrated that the spleen length was greater in males than in females by 0.2 cm and this difference was found to be significant. Perhaps this increased values in males than in females were due to general development of the organs in males or the differences in weight, height, body surface area and genetic factors^{5,14}.

In present study all spleen lengths were below 11 cm. Similar findings were observed by Frank K *et al* who demonstrated that 95% of the cases spleen length was less than 11 cm¹⁵. Likewise in another study it was revealed that the splenic length was below 12.80 cm in 95% subjects¹⁵. However, the splenic length was found below 8.7 cm with mean and SD, 5.5 ±1.4 in study conducted by Niederau C *et al*¹⁶. Racial differences in splenic length could result in inaccurate interpretation of the splenic size as noted by Lotus *et al*. The observation by Loftus *et al*, suggested that a population specific splenic normogram would provide more accurate standards¹⁷.

CONCLUSION

The human spleen is an organ demanding constant attention from the anatomical, immunological and clinical point of view. Clinically spleen is an important organ as it becomes enlarged and reduced in many diseases. The values obtained in this study can be used as the standard reference for normal dimension of spleen in the Nepalese adults for Ultrasonographic measurement of the spleen size. Indeed the established normogram can be more reliably used as both a complementary modality to clinical evaluation and as a more sensitive means of evaluating and screening patients for splenic disorders for any pathological enlargement or reduction of size in clinical practice in Nepalese population.

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Study on Palmaris Longus Muscle Tendon Agenesis Among First Year Filipino Medical Students

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ABSTRACT

Introduction: In the recent years palmaris longus muscle tendon (PLMT) has become an extensively and intensively studied muscle all over the world. The main reason for this is the importance of PLMT which was recognized with development of plastic and reconstructive surgery. The possibilities of PLMT use has become bigger and bigger each day

Objectives: The study aimed to evaluate the incidence of agenesis of palmaris longus muscle tendon among first year Filipino medical students at OLFU.

Methods: This study was conducted at the Our Lady of Fatima University Medical Centre, Valenzuela City, Philippines. A semi-structured proforma was used to record the relevant data for the study. The Thompson's test was used for assessing palmaris longus muscle tendon. After taking consent total of 503 first year Filipino medical students were involved.

Results: Out of total 503 subjects, 170 (33.80%) were males and 333 (66.20%) were females. Percentage of frequency of agenesis of palmaris longus muscle tendon in both genders was 17.05%. There was no significant gender and laterality difference in the incidence of the agenesis of palmaris longus muscle tendon. That means there are equal chances of palmaris longus muscle tendon agenesis in both gender and the laterality.

Conclusions: There was no significant gender and laterality difference in the incidence of the agenesis of PLMT. This means that there are equal chances of PLMT agenesis in both gender and the laterality.

Keywords

Agenesis, Gender, Laterality, Palmaris longus.

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INTRODUCTION

People use their hands in both their daily activities and sports. Complex movements of hands are conducted due to the well-functioning coordination between a balanced muscular system and central nervous system.

In the recent years palmaris longus muscle tendon (PLMT) has become an extensively and intensively studied muscle all over the world. The main reason for this is the importance of PLMT which was recognized with development of plastic and reconstructive surgery.

The possibilities of PLMT use has become bigger and bigger each day¹³. It is easily accessible, and adequate in length and diameter. The absence of the muscle does not compromise flexion or any other motion at the wrist⁸.

PLMT is one of the superficial flexor muscles of the anterior anatomical compartment of the forearm and is one of the most variable muscles in the body. It is a slender, fusiform shaped muscle arising from the common flexor origin of the medial epicondyle of the humerus, passing between the flexor carpi radialis and flexor carpi ulnaris muscles,

it ends as a slender, flattened tendon passing superficially over the transverse carpal ligament and inserting into the palmar aponeurosis¹⁷.

The action of the PLMT is to weakly flex the wrist and tense the palmar aponeurosis, synergized by flexor carpi radialis, flexor carpi ulnaris and flexor digitorum superficialis muscles. It is supplied by the median nerve⁵.

PLMT is extremely variable both in number and form. Its absence alone is variably reported in different populations depending on the race or ethnicity studied³.

The variability in the prevalence of PLMT agenesis among various ethnic groups has been established, and the surgeon's awareness of the prevalence in a population or ethnic group is desirable. This means that it is important to become aware of the prevalence of PLMT agenesis in the population being treated^{19,20,21}.

There are various tests for examination of the presence or absence of the PLMT. For example; the Schaffer's test (1909)¹⁸, the Mishra's test (2001)¹², the Pushpa kumar's "two-finger sign" method (2004)¹⁶ and the Thompson's test (1921)²².

The incidence of PLMT agenesis has, to the best of our knowledge, not been reported in the Philippines. The purpose of this research is to evaluate the frequency of agenesis of PLMT among first year Filipino medical students at OLFU.

Scope and Limitations of the Study

Despite the obvious clinical importance of PLMT, there is a dearth of information in the literature on its occurrence in Filipino population. Hence, this study will be a landmark in assimilating the knowledge regarding the frequency of agenesis of the PLMT and its clinical relevance in general and its particular association in the Filipino population in terms of sex and the laterality. There may be several limitations in this study i.e. the study was conducted to determine the PLMT agenesis among first year medical students in Our Lady of Fatima University, Valenzuela City, Philippines, and generalizations cannot be made.

As the population size is small, the findings may not replicate in the general population of the Philippines.

METHODS

This is a qualitative and descriptive study done among first year Filipino medical students at Our Lady of Fatima University (SY, 2012 - 2013). In this study, 503 out of 648 students were included as 145 were not available during the period of data collection.

Inclusion criteria

1. First year Filipino medical students at OLFU (SY, 2012 - 2013), either sex, no history of known physical disabilities, any prior surgery (to the upper limbs) and any upper limb injuries leading to disruption of the anatomical structure.

A semi-structured proforma was formed to record the relevant data for the study. The Thompson's test was used for assessing PLMT²². The subjects were asked to make a fist and then flex the wrist and finally oppose the thumb and flex it over the fingers. Test was used too on both of the forearms of all individuals, where the PLMT was visually observed and palpated by an examiner. If PLMT is not visualized then it was taken as positive findings.

After explaining the nature of the study to the students in the classroom, an informed verbal consent was taken from those who fit in the inclusion criteria of the study. Thompson's test was demonstrated first to the participants, were asked to fill the proforma. After which, individual candidates were assessed on both the forearms using the test; then the findings were recorded in the sheet. The collected data were used for computation.

The descriptive analyses of the data were done by using SPSS-16 software and the difference among the sex and the sides of the limbs were analyzed by chi-square test.

RESULTS

In the total of 503 subjects, majority were females 333 (66.20%) and 170 (33.80%) were males. Palmaris longus muscle tendon (PLMT) agenesis was seen in 17.5%. PLMT agenesis in the right, the left and both fore arms were seven (1.39%), 15 (2.98%) and two (0.4%) respectively in the male subjects while the agenesis of PLMT in right, left and both forearms were 23 (4.57%), 28 (5.57%) and 13 (2.58%) respectively in the female subjects. The data collected also presents total agenesis (right, left and bilateral forearms) of male subjects comprising 24 (4.77%), and female subjects comprising 64 (12.70%). The overall agenesis of PLMT in the right, left and both the forearms were 30 (5.96%), 43 (8.55%) and 15 (2.98%) respectively in both the genders (See Table 1).

Table 1: Distribution of PLMT agenesis

Side of limbs	Males (n=170)	Females (n=333)	Total (n=503)
Right forearm	7 (1.39%)	23 (4.57%)	30 (5.96%)
Left forearm	15 (2.98%)	28 (5.57%)	43 (8.55%)
Bilateral forearms	2 (0.4%)	13 (2.58%)	15 (2.98%)
Total	24 (4.77%)	64 (12.72%)	88 (17.50%)

Using the two-tailed chi square test to determine the significant difference in the incidence of PLMT agenesis as to gender the computed χ^2 value is 2.029, whereas the tabular χ^2 value is 3.841 at 95% significant level and the degree of freedom as 1. The computed value is less than the tabular value and therefore, there is no significant difference of incidence of PLMT agenesis in both genders. Both genders have an equal chance of having a PLMT agenesis (See Table 2).

Table 2: Significant difference in PLMT agenesis as to gender (Chi- square test)

Gender	Agenesis of palmaris longus muscle tendon		Total
	Positive	Negative	
Males	24	146	170
Females	64	269	333
Total	88	415	503

Using the two-tailed chi square test to determine the significant difference in the incidence of PLMT agenesis as to laterality, the computed χ^2 value is 1.828 whereas the tabular χ^2 value is 3.841 at 95% significant level with degree of freedom as 1. The computed value is less than the tabular value, so the hypothesis is accepted. Therefore, there is no significant difference of incidence of PLMT agenesis in each side of forearm and there is no significant difference in the incidence of agenesis of PLMT as to laterality (See Table 3).

Table 3: Significant difference in PMLT agenesis as to laterality (χ^2 test)

Sides of the limbs	Positive PLM agenesis	Negative PLM agenesis	Total
Right forearm	45	458	503
Left forearm	58	445	503
Total	103	903	1006

DISCUSSION

In the recent years, palmaris longus muscle tendon has become an extensively and intensively studied muscle all over the world. The main reason for this is the importance of palmaris longus muscle tendon, which was recognized with the development of plastic and reconstructive surgery¹³. Many surgeons agree that the palmaris longus muscle tendon is the first choice as a donor tendon because it fulfills the necessary requirements of length, diameter and availability and can be used without producing any functional deformity to the hand²³.

This study was an attempt to determine the incidence of the agenesis of PLMT in the first year Filipino medical students. In the present study PLMT agenesis was recorded in 17.50% of the population. The incidence rate of agenesis observed in our study is comparable to what was observed in an Indian study and a Nigerian study with recorded rates of 17.2% and 12.6% respectively^{5,10}.

The highest prevalence rate in literature was observed to be 63.9% in a Turkish study⁴. Studies of Ahn in 2000 in Korea (0.9%), Gangata in 2009 in Zimbabwe (1.5%) and Igbigbiet *et al* in 1998 in Uganda (1.02%) have reported lower incidence rates of agenesis compared to the present study^{1,7,9}.

In our study, unilateral agenesis of PLMT (73 students) was common than bilateral agenesis (15 students). These findings are in agreement with the work done by many other researchers^{6,10,11}. However, there were no differences in the agenesis of the PLMT on either gender. The incidence of agenesis of palmaris longus is 17.50% (14.11% in males and 19.22% in females). This finding is supported by other published work².

Unfortunately, we did not find any previous study using the Filipino population to compare. All the comparative discussions above were based on the findings of other countries.

CONCLUSIONS

Based on the chi-square computation and the comparison of the critical value, there was no significant gender and laterality differences in the incidence of the agenesis of PLMT. This means that there are equal chances of PLMT agenesis in both gender and the laterality.

Recommendations

1. Surgeons must be aware of the agenesis of PLMT in the population being treated because this tendon provides a very useful graft in plastic and reconstructive surgeries as well as hand surgery. In case of agenesis of this muscle, the surgeons may prepare to look for the alternatives in their plan.

2. Researchers in this field will benefit from the findings of this study as there has not been any such study in the Filipino population. Further studies in larger samples will be more comprehensive. We presume cadaveric study may give additional information regarding other anatomical variations like; reversed, duplicated, bifid, or hypertrophied palmaris longus muscles.

Limitations of the Study

Since the study was conducted to determine the PLMT agenesis among first year medical students in Our Lady of Fatima University, Valenzuela City, Philippines, the findings cannot be generalized for population at large.

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Normal or Arthritic: Is 25-hydroxy Vitamin D status significant?

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ABSTRACT

Background: Vitamin D is required for proper skeletal development and function. However, the status of vitamin D in healthy subjects and those suffering from arthritis in Nepal is largely unknown.

Objective: This study measured vitamin D level in healthy and arthritic individuals of Western Nepal.

Methods: Vitamin D level in healthy and arthritic subjects were measured by using LIASION 25-hydroxy Vitamin D assay, a direct competitive chemiluminescence immunoassay (CLIA).

Results: Our result suggested that most of the subjects, irrespective of age and disease condition, have subnormal/normal level of vitamin D (≥ 16 ng/mL). Also, the data suggested that serum vitamin D level is significantly higher in males than in females. Moreover, the vitamin D level is higher in healthy individuals when compared with those suffering from arthritis. However, vitamin D level in normal subjects and arthritic patients could not be correlated.

Conclusion: Vitamin D level is higher in normal subjects compared to arthritic individuals. However, the level could not be correlated suggesting need of a pilot study to determine vitamin D level and its association with arthritis in Nepalese.

Keywords

Arthritis, Nepalese, Vitamin D.

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INTRODUCTION

Vitamin D (25-hydroxy-Vitamin D), the sum of 25(OH)D₃ and 25(OH)D₂ is recognized as a pro-hormone which has multiple roles in maintaining optimal musculoskeletal health. Vitamin D₃ (cholecalciferol) and Vitamin D₂ (ergocalciferol) are the most abundant forms of Vitamin D in the body. Vitamin D₃ is synthesized in the skin from 7-dehydrocholesterol in response to sunlight while Vitamin D₂ is best obtained from food sources like vegetables, yeast, and fish. Both forms of vitamin D undergo hydroxylation reactions to yield 25-hydroxyvitamin D [25(OH)D] in the liver and 1,25-dihydroxyvitamin D [1,25(OH)₂D] in the kidney. Although 1,25(OH)₂D is the biologically active metabolite of vitamin D, circulating

25(OH) Vitamin D generally represents the best marker of vitamin D status in body¹. Serum vitamin D level <16 ng/ml, 16 - 20 ng/ml, and >20 ng/ml were considered to be deficient, subnormal, and normal respectively².

Globally, rheumatic and musculoskeletal disorders are the major cause of disability^{3,4}. Of the reported disorders, arthritis is the principle cause for the disability^{5,6}. The 2010 - 2012 National Health Interview Survey conducted in the USA predicted that around 26% of adults suffer from arthritis by 2040⁷.

Arthritis advances with increasing age, thereby elderly populations were mostly affected. It was found that self-reported arthritis was highly prevalent among elders from the Caribbean and Latin America and older Mexican

Americans⁵. It was estimated that 23.8% Mexicans and 55.6% Havanans have arthritis⁵. Similarly, in the Asian countries increase in the proportion of aged population⁸ suggested an increase in arthritis cases.

A meta-analysis found that low level of vitamin D in rheumatoid arthritis (RA) patients⁹. Similarly, low level of serum vitamin D has been found in arthritis patients from Mexico² or Italy/Estonia¹⁰. However, the status of vitamin D and its association with arthritis in Nepalese, in particular those from Western region are unknown. Herein, we analysed vitamin D levels in healthy subjects and arthritis patients, and determined for its association with the disorder.

METHODS

Subjects

Patients were examined to rule out arthritis based on signs, symptoms and physical examination according to criteria described previously^{2,11}. Five ml of venous blood sample were collected from 90 arthritic patients attending outpatient department of Paschimanchal Community Hospital, Pokhara-9, Kaski and private clinics in Pokhara. Blood specimen was kept in serum separating tubes and allowed for complete clot formation prior to centrifugation. Serum samples free of fibrin, red blood cells, or other particulate matter was prepared by repeated centrifugation and used in the assay. Any serum specimens that were delayed more than 24 hours for testing were stored at 2-8°C and were analyzed on following day. Similarly, control samples were obtained from 83 healthy volunteer subjects that do not show any symptoms of joint involvement. The study protocol was evaluated and approved from the Board of Paschimanchal Community Hospital, Pokhara-9, Kaski.

Measurement of Vitamin D

Vitamin D status in healthy and arthritic subjects was determined by measuring total serum 25-hydroxy Vitamin D level using LIASION 25 OH Vitamin D Total assay (DiaSorin, Stillwater, MN, USA). The assay is an antibody-based, fully automated, direct competitive two-step chemiluminescent immunoassay (CLIA). In the closed automated system, during the first incubation, 25-OH-D in sample is dissociated from its binding protein and allowed to bind to the specific antibody on the solid phase for 10 minutes. Then the tracer (25-OH-vitamin D linked to an isoluminol derivate) is added automatically and incubated for a further 10 minutes. Finally, the unbound material is removed with a washing cycle and the starter reagents are added to initiate a chemiluminescent reaction which

is measured by a photomultiplier as relative light units (RLU) that is inversely proportional to the concentration of 25-OH vitamin D present in the sample.

Statistical analysis

All the statistical analyses were done using GraphPad Prism version 5.0 (GraphPad software). Datasets on age distribution between arthritic and normal subjects were analyzed by analysis of variance (ANOVA); while those of the level of vitamin D were analyzed by t-test. The correlation coefficients (r) between the groups were determined by Spearman test. *P*-values less than 0.05 were considered significant.

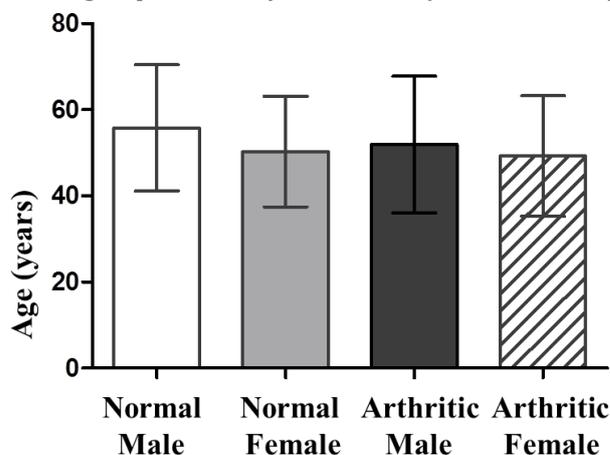
RESULTS

Distribution of age in arthritic and normal subjects

This study recruited 173 subjects of which 91 were males and 82 were females. Of 91 males, 42 were normal and 49 were arthritic. Similarly, of 82 females, 41 were normal and the remaining half was arthritic.

The mean age of normal males and normal females were 55.75 ±14.65 years (range 32 - 75 years) and 50.29 ±12.82 years (range 30 - 77 years), respectively. Similarly, the mean age of arthritic males and arthritic females were 51.91 ±15.85 years (range 30 - 83 years) and 49.22 ±14.02 years (range 32 - 79 years). As shown in Fig 1, the age of the subjects in the normal and arthritic group were similarly distributed (ANOVA, *P*=0.61).

Fig 1: Age wise distribution of study subjects. Histogram showed mean± standard deviation (SD) age of normal/arthritic male and female subjects. The age of the subjects in each group is similarly distributed (ANOVA; *P*=0.61)



Vitamin D level in normal and arthritic subjects

Vitamin D level in normal/arthritic males and females of age below 50 and above 50 were determined (Table 1).

We found that vitamin D level in normal males of age <50 years (Average = 22.62; range 12.44 - 29.36) were significantly lower than those in normal males of age >50 years (Average = 26.06; range 18.98 - 36.39) (t-test, $P=0.04$) (Table 1).

Similarly, vitamin D level in normal females of age <50 years (Average = 21.24; range 2.36 - 28.12) were significantly lower than those in normal females of age >50 years (Average = 27.69; range 10.15 - 38.95) (t-test, $P=0.02$) (Table 1).

It was found that vitamin D level in arthritic males of age <50 years (Average = 24.74; range 16.59 - 34.37) were significantly higher than those in arthritic males of age >50 years (Average = 19.45; range 3.0 - 44.62) (t-test, $P=0.01$) (Table 1).

On the other hand, vitamin D level in arthritic females of age <50 years (Average = 16.18; range 3.97 - 37.15) were indifferent from those in arthritic females of age >50 years (Average = 15.48; range 3.00 - 26.91) (t-test, $P=0.95$) (Table 1).

Table 1: Serum vitamin D level in normal and arthritic males/females aged below 50 years or above 50 years.

Disease status	Sex (M/F)	Serum vitamin D level (ng/ml)		P-value (t-test)
		< 50 years	> 50 years	
Normal	M	22.62	26.06	0.04*
	F	21.24	27.69	0.02*
Arthritic	M	24.74	19.45	0.01*
	F	16.18	15.48	0.95

Data indicated average vitamin D level in each group. M, males; F, Females

*Statistically significant using student's t-test ($P < 0.05$)

Comparison between vitamin D levels in normal and arthritic subjects

Further, we compared vitamin D levels in normal and arthritic subjects of age <50 years or >50 years. It was found that arthritic males and normal males of age <50 years have comparable level of vitamin D (Fig 2a) (t-test, $P= 0.45$). In contrast, normal males of age >50 years had significantly higher vitamin D levels compared with arthritic males of age >50 years (Fig 2b) (t-test, $P=0.01$).

Moreover, normal females had significantly higher level of vitamin D compared with arthritic females of age <50 years (Fig 2c) (t-test, $P=0.01$), or age >50 years (Fig 2d) (t-test, $P=0.0002$).

Further, we determined the correlation between vitamin

D levels in normal and arthritic subjects within the same age group. However, it was found that vitamin D levels in normal and arthritic subjects of age <50 years, or >50 years could not be correlated as determined by Spearman correlation test (Fig 3).

Fig 2: Comparison of vitamin D levels in normal and arthritic subjects. The serum vitamin D level from each subjects were measured. Scatter plot show mean \pm SD from each group. Data is statistically analyzed by student t-test (ns, $P>0.05$; *, $P<0.05$)

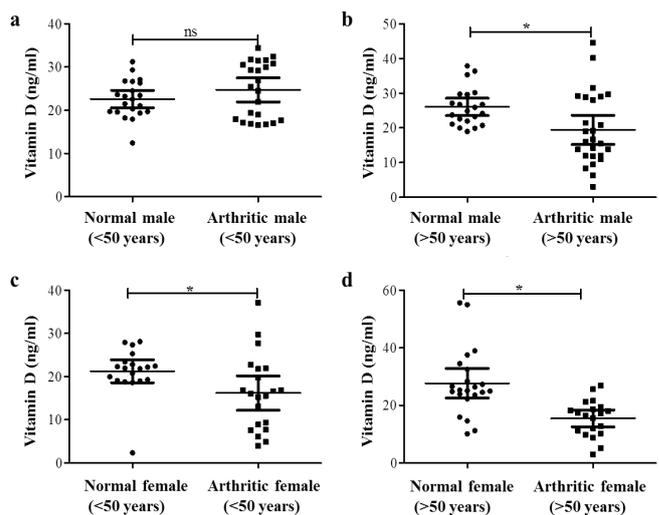
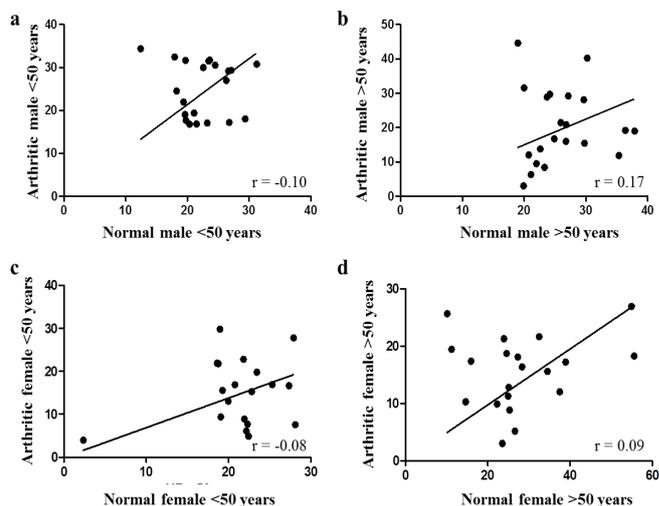


Fig 3: Scatter plot and correlation coefficient of vitamin D level in normal and arthritic subjects of indicated sex and age groups (r, correlation coefficient)



DISCUSSION

Subjects with serum vitamin D level below 16 ng/ml were considered as deficient; those above 20 ng/ml were considered as vitamin D sufficient while those in-between were insufficient². Our study found vitamin D as low as 3 ng/ml despite of gender and disease status.

Moreover, this study found that males (normal/arthritis) and normal females have in average sufficient vitamin D. However, arthritic females were deficient in vitamin D.

In general, our data suggested that vitamin D is lower in arthritic subjects compared to normal subjects. This is in concordance with previous observations wherein RA patients have significantly low level of vitamin D than healthy individuals^{9,10}.

Also, our data suggested that age factors could not be correlated with vitamin D levels in arthritic subjects suggesting that vitamin D level might be independent of age. However, more robust analysis is needed before reaching the conclusion.

Association between vitamin D levels and RA has been previously observed. Some group of investigators found negative association between serum vitamin D level and RA disease^{9,10}. In contrast, we could not find any correlation between vitamin D levels in normal and arthritic subjects. This is similar to previous observation which did not find any association between vitamin D and RA¹².

Serum vitamin D level varies among arthritis patients from different locations within the same region. It was found that RA patients from North Europe (Estonia) had significantly lower level of vitamin D than those from South Europe (Italy)¹⁰. Therefore, it would be of great interest to determine the status of vitamin D in people from different regions of Nepal, and find its correlation with arthritis.

Conflict of Interest

No conflict of interest to disclose.

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Superficial Parotidectomy by Retrograde Facial Nerve Dissection

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Keywords

Facial nerve, Parotidectomy, Retrograde dissection.

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INTRODUCTION

The parotid gland is the most common site for salivary tumors, mostly arising in the superficial lobe, presenting as painless slow growing tumor of which 80-90% are benign with pleomorphic adenoma¹.

Parotidectomy is a common surgical procedure for the treatment of benign and malignant lesions of the parotid gland. On account of the fact that the terminal branches of the facial nerve are closely related to the parotid gland, identification, protection, and preservation of the facial nerve are the central points for successful parotid surgery. There are two basic techniques for the identification and dissection of the facial nerve. The first technique is antegrade dissection where approach to the main facial trunk is the initial step followed by tracing to the bifurcation and peripheral branches². In the second technique, retrograde dissection, peripheral branches

are identified first and proceeding towards main trunk³. Superficial parotidectomy is the most preferred method treating lesions of the parotid^{4,5}.

METHODS

This study includes all patients who underwent superficial parotidectomy at Western Regional Hospital, Pokhara during August 2006 to August 2016. All together 60 patients underwent retrograde parotidectomy. Mean duration of surgery was calculated and intraoperative, postoperative complications were noted. The complications included were temporary facial nerve weakness, permanent facial nerve damage, wound infection, Frey's syndrome and salivary fistula.

ABSTRACT

Introduction: Tumors of the salivary gland are relatively uncommon and represent less than two percentage of all head and neck neoplasms. Parotid gland tumor comprises 85% of the salivary gland tumors of which 80% are being benign. Superficial parotidectomy is the commonest procedure done for parotid tumors which can be performed by either anteretrograde or retrograde facial nerve dissection technique.

Methods: Outcome of 60 patients after superficial parotidectomy with retrograde facial nerve dissection has been studied.

Results: Total of 60 patients had been studied. Complications like facial nerve weakness, Freys syndrome, salivary fistula, and wound infection were taken into account. Among them, 13.33% patients developed temporary facial nerve weakness, followed by temporary salivary fistula, 1.6%. None of the patients developed any severe complication.

Conclusion: Superficial parotidectomy by retrograde facial nerve dissection is an easy technique to carry out with low complication rate and without compromising surgical outcome.

RESULTS

Among 60 patients 24 were males and 36 were females of age between seven to 73 years (Fig 1). Average duration of surgery was 90 ± 10 minutes. Temporary facial nerve weakness was developed in eight patients. One patient developed temporary salivary fistula. None of these patients developed other complications such as wound infection, permanent facial nerve damage and Frey's syndrome (Table 1). Histopathological study of biopsy specimens revealed 59 to be pleomorphic adenoma and one to be low grade mucoepidermoid carcinoma (Table 2).

Fig 1: Chart showing distribution of patients undergone superficial parotidectomy

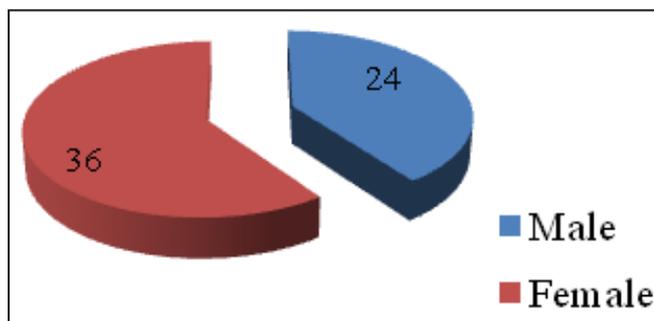


Table 1: Complication observed in the patients post surgery

Complications	Total no of patients
Temporary facial nerve weakness	8 (13.33%)
Permanent facial nerve damage	0
Frey's syndrome	0
Salivary fistula (temporary)	1 (1.6%)
Wound infection	0

Table 2: Histopathological report of biopsy specimen of the patients

Histopathological report	Total no of patients
Pleomorphic adenoma	59
Mucoepidermoid carcinoma (low grade)	1

DISCUSSION

Tumors of the salivary gland are relatively uncommon and represent less than two percent of all head and neck neoplasms. Parotid gland tumor constitutes 85% of the salivary gland tumors, 80% being benign¹. Superficial

parotidectomy is the preferred method treating lesions of the parotid^{4,5}. Identification and protection of the facial nerve is central to successful parotid surgery. Two approaches antegrade² and retrograde³ dissection are commonly used to identify and dissect the facial nerves. The antegrade approach involves identification of the facial nerve as it leaves the stylomastoid foramen. This is accomplished through identification of the nerve trunk via its relationship with the tympanomastoid suture, the targal pointer or the posterior belly of the diagastrics⁶. It is well known that the location of the nerve trunk may challenge even an experienced surgeon who operates on obese patients, especially those with large tumors or during revision surgery⁷. The retrograde approach involves identification of the peripheral branches of the facial nerve, using soft tissue landmarks. It has been observed that soft tissue landmarks of the peripheral branches are easier to identify than is commonly thought, especially with the aid of the facial nerve stimulator^{8,9}.

This study includes all 60 patients who underwent superficial parotidectomy by retrograde facial nerve dissection at Western Regional Hospital during 10 years time period. Similar to our study Patel DK *et al* performed superficial parotidectomy among 214 cases with retrograde dissection of the facial nerve for clinically benign parotid tumor and found low facial nerve morbidity and optimal tumor clearance, irrespective of tumor size¹⁰. In another prospective study performed by O' Regan B *et al* in 138 patients with retrograde facial nerve dissection for benign parotid tumor, 66% had facial nerve weakness in first week, 38% had remained with the complication up to first month and of these 99% were fully recovered within six months⁸. A recent study by Scarpini M *et al* found that retrograde parotidectomy, reducing the extent of normal parotid gland removal, permit a more conservative approach than standard parotidectomy, with the same complication rates and surgical effectiveness¹¹. Taken account, all of these studies including our study showed that retrograde facial nerve dissection technique had low complication rate.

CONCLUSION

This study shows that retrograde facial nerve dissection for superficial parotidectomy is an easy technique to carry out with minimum complications, less duration of

surgery and without compromising surgical outcome.

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Role of Alfuzosin in Ureteral Stent Related Urinary Symptoms Score: A Comparative Study

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Keywords

Alfuzosin, Alpha blocker, Ureteral stent, Urinary symptoms.

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ABSTRACT

Background: Ureteral stent placement is a routine urological procedure. However, patients inserted with ureteral stent exhibited increased urinary symptoms that compromise patients' quality of life.

Objective: To assess the efficacy of alpha blockers (Alfuzosin) in the management of ureteral stent related urinary symptoms.

Methods: Total of 60 patients after ureteral stent insertion was randomly divided into two equal groups; 30 in alfuzosin group and the remaining 30 in control group. Urinary symptoms questionnaire was filled after two weeks and results were statistically analyzed.

Results: Urinary symptoms like urgency, frequency and flank pain were significantly less in the alfuzosin group when compared with control group.

Conclusion: Alpha blocker (Alfuzosin) was found to be effective in reducing ureteral stent related urinary symptoms.

INTRODUCTION

Ureteral stent was first introduced by Zimskind in 1967¹. With the development of double J (DJ) stent and pigtail stent by Finney² and Hepperlen³ in 1978, placement of ureteral stent emerged as one of the most common procedures in urology. However, its placement results in different symptoms resulting in poor quality of patients' life. DJ stent is associated with different ureteral stent related symptoms like frequency, urgency, flank pain, suprapubic pain and hematuria^{4,5}. The incidence varies from 19 - 76%⁶⁻⁸.

The exact mechanism of DJ stent related symptoms have yet to be elucidated. It has been postulated that frequency

is due to mechanical stimulation from bladder coil while urgency is due to direct presence of stent⁹. Ureteral stent cause a rise in intrapelvic pressure that might give rise to flank pain during vesicle filling or voiding^{10,11}. Suprapubic pain was postulated to be due to local irritation of trigonal mucosa by the stent¹². Hematuria results from insertion of the stent itself¹².

Various approaches were taken to reduce ureteral stent related urinary symptoms in patients. Size, length and position of the stent play vital role in minimizing stent related urinary symptoms. Generally, alpha blockers (α -blockers) were used and found to be effective in reducing urinary symptoms in patients after ureteral stent insertion. However, the efficacy of alfuzosin, an

alpha blocker in the management of ureteral stent related urinary symptoms in our setting needs to be determined.

METHODS

Study subjects

A randomized, prospective, comparative and experimental clinical trial was conducted between March 1, 2015 to November 30, 2016 at Western Regional Hospital, Pokhara, Kaski, Nepal. All the patients who underwent open surgery for renal stones, pyeloplasty, ureteric stones and after URSL with DJ stent placement were included in the study; while all the patients of pediatric age group were excluded. A total of 60 patients were divided into 2 equal groups; control group, and alfuzosin group those receiving alfuzosin 10 mg OD. Antibiotics were given to both groups. Patients in alfuzosin group received alfuzosin (10 mg OD) on second day of surgery and continued for two weeks. All the patients were called on 14th day of surgery and were asked to fill up a questionnaire addressing ureteral stent related urinary symptoms like frequency, urgency, flank pain, suprapubic pain and hematuria. The study protocol was evaluated and approved by the Department of Surgery, Western Regional Hospital, Pokhara, Kaski, Nepal.

Statistical analysis

Data were plotted using Graph Pad Prism version 5.0 (Graph Pad software Inc., La Jolla, CA). Chi-square test was used to analyze the data set. A P-value <0.05 was considered statistically significant.

RESULTS

Total 60 patients were recruited in this study (30 in each group; alfuzosin group and control group). Ureteral stent related symptoms are summarized in Table 1. Symptoms were compared between the alfuzosin and control groups for all 60 study subjects. Total five urinary symptoms were measured. It was found that the symptoms were reduced in alfuzosin group compared with control groups. In particular, use of alfuzosin significantly reduced three of the five urinary symptoms; specifically frequency (58.35%, $P= 0.044$), urgency (69.99%, $P= 0.028$) and flank pain (87.51%, $P= 0.011$) (Table 1). This suggested that alfuzosin helps in reducing urinary stent related symptoms in patients.

Table 1: Urinary stent related symptom scores in patients

Urinary symptoms	Alfuzosin group (n= 30)	Control group (n= 30)	Percent reduction (Alfuzosin vs control)	P value
Frequency	5 (16.66%)	12 (40%)	58.35	0.044*
Urgency	3 (10%)	10 (33.33%)	69.99	0.028*
Flank Pain	1 (3.33%)	8 (26.66%)	87.51	0.011*
Suprapubic pain	4 (13.33%)	6 (20%)	33.35	0.488
Hematuria	0	2 (6.66%)	100	0.158

*Statistically significant using chi-Square test ($P < 0.05$)

DISCUSSION

In management of ureteral stent related urinary symptoms α -blockers were used and found to be effective. Herein, we assessed the efficacy of α -blocker, alfuzosin in our setting. To judge the therapeutic benefit of alfuzosin, patients (alfuzosin group or control group) inserted with DJ stent were asked to fill a questionnaire addressing five ureteral stent related urinary symptoms.

It has been shown that DJ stent insertion is associated with increased urinary symptoms. This study showed that DJ stent insertion has increased the frequency, flank pain and suprapubic pain to 40, 33.33 and 20%, respectively. This is in agreement with previous meta-analysis wherein frequency, urgency and suprapubic pain has been shown to be 50 - 60%, 57 - 60% and 30%, respectively^{7,13}.

Moreover, this study showed that urgency and hematuria has been experienced by 33 and 7% of cases, respectively. This is lower than what had been observed previously, i.e. 57 - 60% and 25% of cases experienced urgency and hematuria, respectively^{6,7}. The discrepancy might be due to limited number of cases in the present study (60) compared with >1,500 cases in those study^{6,7}. Also, the questionnaires were filled at two weeks in the present study compared with six weeks in the other study⁶.

Although the use of α -blocker significantly reduced most of the ureteral stent related urinary symptoms compared with control groups, robust study that recruits a large number of cases needs to be studied for a better conclusion. Moreover, other factors like size, length and position of the stent that were shown to affect patients' quality of life after ureteral stent insertion should be considered along with use of α -blockers in the management of ureteral

stent related urinary symptoms.

Conflict of interest

No conflict of interest to declare

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Medical Waste Storage Practice in Health Care Institutions of Pokhara Sub-metropolitan City

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ABSTRACT

Introduction: Medical wastes include all the waste generated by health care establishments, research facilities, and laboratories. Medical waste is any waste that is generated in the diagnosis, treatment or immunization of human beings or animals, in research pertaining there to or in the productions or testing of biological culture.

Methods: The fourteen numbers of health care institutions (HCIs) having inpatient facilities, were sampled for the study. After taking observation, the collected information was entered into a computer. Basically, the percentages, projection analysis, simple average, and scenario analysis were used as an analysis tools.

Results: Out of the HCIs surveyed, only 21.43% of them had a separate room assigned for primary storage of all sorts of waste and remaining 78.57% of them had open storage facilities for un-segregated mass of waste nearby the incineration area or open burning area.

Conclusion: There was lack of appropriate information on waste storage practices, and unaware of designing central storage system in HCIs. In most of the HCIs, a separate storage room was not assigned for storage of all sorts of waste.

Keywords

Health care institutions, Medical waste, Pokhara sub-metropolitan city.

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INTRODUCTION

WHO mentioned, medical wastes includes all the waste generated by health care establishments, research facilities, and laboratories. Medical waste is any waste that is generated in the diagnosis, treatment or immunization of human beings or animals, in research pertaining there to, or in the productions or testing of biological culture.

Environment and development are the two sides of the same coin yet, the impact of development on environment is very nominal if their dimension is same. A good environment is necessary for healthy living. Contrary to

this fact, people are facing various problems regarding health, environment, and sanitation due to poor management of health care waste. The major portion of waste generated in health care activities consists of general waste that can be treated in the same way as domestic or municipal waste; therefore not all of health care wastes are harmful, and hazardous. This remains true only when proper segregation and separation of waste is practiced according to type at the source. Health care waste can be a source for transmission of infectious diseases like AIDS, hepatitis B, hepatitis C, tetanus, diarrhea, tuberculosis, cholera, and as well as serious environmental problems in

terms of air, water and soil pollution, whenever handled improperly¹⁻³.

OBJECTIVES

The main objective of this research is to study the present practices of medical waste storage in health care institutions in PSMC.

METHODS

The fourteen numbers of health care institutions (HCIs) having inpatients facilities, were sampled for the study. Out of 14 HCIs, one community hospital, one Government hospital, one NGO run hospital, one INGO run hospital, one nursing home, eight private hospitals and one teaching hospital were surveyed for the study.

After taking observation, the collected information was entered into computer. Basically, the percentages, projection analysis, simple average, and scenario analysis were used as an analysis tools.

RESULTS

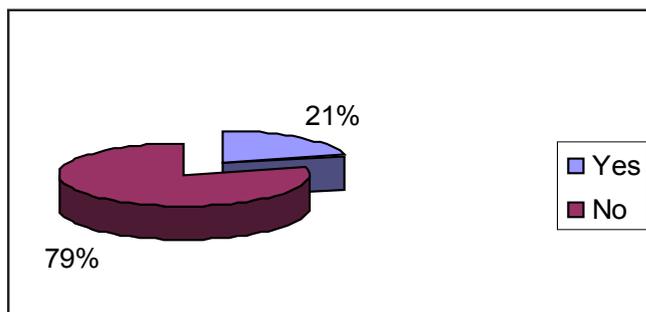
Out of the HCIs surveyed, only 21.43% of them had a separate room assigned for primary storage of all sorts of waste, and remaining 78.57% of them had open storage facilities for un-segregated mass of waste nearby the incineration area or open burning area allowing easy access to birds, and other scavenger. This open mass storage practices could cause air/water pollution as well as risk of spreading epidemic diseases. Those HCIs having storage room were provided with facilities like, impermeable floor, good drainage, and easy to clean surface where as water supply was poor, no provisions of warning signs, and the area was not protected against rodents, insects, and birds.

Waste storage facilities available in health care institutions (HCIs) in pokhara sub-metropolitan city (PSMC) are given in Table 1.

Table 1: Waste Storage Facilities Available in HCIs

Availability of waste storage room	No	Percentage
Yes	3	21.43%
No	11	78.57%
Total	14	100%

Fig 1: Waste storage facilities available in HCIs

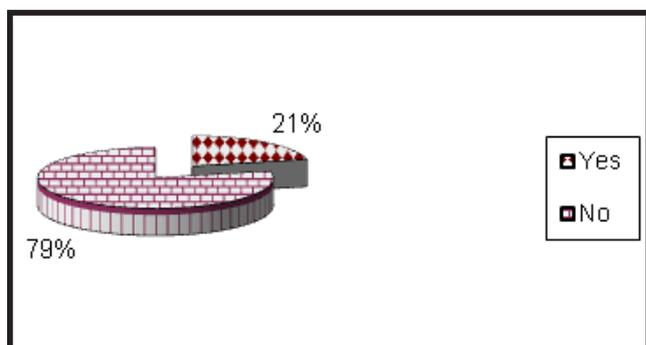


Out of HCIs surveyed, only 21.43% of them were segregating their waste in storage area, and rest 78.57% were not segregating any sort of waste in storage area. This may cause problem while incinerating the infectious waste. The waste storage period was not fixed and defined, which depend upon municipality services in most of the HCIs. Segregation of waste in storage area is presented in Table 2.

Table 2: Segregation of waste in storage area

Waste segregation practiced	No of HCIs	Percentage
Yes	3	21.43%
No	11	78.57%
Total	14	100%

Fig 2: Segregation of waste in storage area



The time period of disposal of segregated waste after storage in HCIs is given in Table 3.

Table 3: Time period of disposal of segregated waste in HCIs

Time period of disposal	No of HCIs	Percentage
Within 24 hrs	5	35.71%
24 hrs - 48 hrs	3	24.43%
48 hrs - 72 hrs	1	7.14%
Municipal services	5	35.71%
Total	14	100%

Among the surveyed HCIs, time period of disposal of segregated waste in HCIs was found 35.71% within 24 hours, 21.43% within 24 hours – 48 hours, 7.14% within 48 hours – 72 hours, and rest 35.71% rely on municipal services. Storing of waste for longer period can lead the spread of disease as well as production of offensive smell where as access to scavengers in case of open storing.

DISCUSSION

There is no proper and scientific health care waste storage system due to the lack of awareness, accountability from actors in health care waste management, and well elaborated control mechanisms presently reigning in almost all the HCIs in the PSMC. The current medical waste storage practices of hospital solid waste does not guarantee the risk to environment and public health. Health care waste generated from the HCIs should be properly stored to avoid the hazards on health, and environment.

In present study, out of the HCIs surveyed, only 21.43% of them had a separate room assigned for primary storage of all sorts of waste, and remaining 78.57% of them had open storage facilities for un-segregated mass of waste nearby the incineration area or open burning area allowing easy access to birds, and other scavenger. This open mass storage practices could cause air/water pollution as well as risk of spreading epidemic diseases. Those HCIs having storage room were provided with facilities like, impermeable floor, good drainage, and easy to clean surface where as water supply was poor, no provisions of warning signs, and the area was not protected against rodents, insects, and birds.

The segregation of waste in storage area was not practiced in most of the HCIs. Out of HCIs surveyed, only 21.43% of them were segregating their waste in storage area, and rest 78.57% were not segregating any sorts of waste in storage area. This may cause problem while incinerating the infectious waste. The waste storage period was not fixed and defined, which depend upon municipality services in most of the HCIs.

From this review, it can be concluded that concerned health care institutions does not have any policies, legislation and technical guidelines to guide and regulate hospital solid waste storage. In future, there should be integrated waste management system and centralized waste management system within HCIs with uniform standards and policies under health care waste management act, which may need to be planned and implemented to solve the gravity of problems⁴⁻⁶.

CONCLUSION

There was lack of adequate information on waste storage practices, and unaware of designing central storage system in HCIs. In most of the HCIs, a separate storage room was not assigned for storage of all sorts of waste.

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A Healthy City Project: A Case Study of Wonju City, South Korea and its Relevance to the Cities in Nepal

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ABSTRACT

Introduction: One of the goals of sustainable development is to make cities inclusive, safe, resilient and sustainable. The healthy city approach is becoming increasingly important in addressing a large number of urban health problems and promoting healthy lifestyles in city dwellers.

Objectives: We performed a case study of the healthy city project in Wonju, South Korea to find out its characteristics and approaches, and to explore its relevance to the cities in Nepal.

Methods: We conducted a case study of the healthy city Wonju project by reviewing relevant published articles and web pages of the city (<http://healthycity.wonju.go.kr>), alliance for healthy cities, Korean statistical information service and World Health Organization. We also reviewed articles and documents related to healthy cities in South-East Asian countries and Nepal.

Results: The healthy city Wonju project, started in 2004, executed its five-year plan between 2006 and 2010, and is currently running with its 10 year long-term plan (2011- 2020). For its success, Wonju City has been awarded six times by WHO. Recently, Wonju city organized the seventh global conference of the AFHC in August, 2016 in Wonju with the main theme of "our cities, our health, our future". Key features of the healthy city Wonju project included: Strong political commitment of local government, financing the healthy city initiative with tobacco consumption tax, partnerships with universities, well organized healthy city teams under city administration, coordination with national and regional healthy cities alliance, community participation, and involvement in research for evidence-based planning and evaluation. Nepal, one of the fast urbanizing countries in South-East Asia faces large number of urban health problems.

Conclusions: Though numbers of cities and city dwellers are increasing rapidly, Nepal lacks healthy city projects and networking. The approaches of healthy city Wonju might be useful for developing countries such as Nepal to initiate and develop healthy cities projects in a sustainable way.

Keywords

Case study, Developing countries, Healthy City, Nepal, Wonju.

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INTRODUCTION

Concept of healthy city

The World Health Organization (WHO) defines a healthy city as one that is continually creating and improving physical and social environments, and expanding community resources that enable people to mutually support each other in performing all the functions of life and to reach their maximum potential¹. Currently, more than 50% of the world's population lives in urban areas, and it is estimated that 70% of the world's population will be living in towns and cities by 2050; Africa and Asia are urbanizing faster than the other regions^{2,3}. The healthy city approach is becoming increasingly important in addressing a large number of urban health problems arising due to urbanization and globalization in both developed as well as developing countries. "Make cities inclusive, safe, resilient and sustainable" is one of the goals of sustainable development (SDGs)⁴. This is the first time that cities have been prioritized on the global development agenda. Municipal and local Governments have the ability to act on urban health issues in a responsive manner to make a significant impact at national and global level⁵.

Health challenges particularly obvious in cities relate to water, environment, violence and injury, non-communicable diseases (NCDs), unhealthy diets, physical inactivity, harmful use of alcohol, and outbreak of diseases. Participation in physical activity is obstructed by a variety of urban factors including overcrowding, high-volume of traffic, heavy use of motorized transportation, poor air quality, and lack of safe public spaces and sports facilities². On the other hand, acting on urban health inequities requires the involvement of organized communities and all levels of Government; local, and national⁶.

Healthy cities program is a long-term international development initiative that aims to place health on the agendas of decision makers and to promote comprehensive local strategies for health protection and sustainable development through community participation, empowerment, intersectoral partnership, and equity. Healthy cities projects, starting in 1986, first were launched in developed countries; developing countries also started to implement around 1994. A healthy city aims to create a health-supportive environment, to achieve a good quality of life, to provide basic sanitation and hygiene needs, and to supply access to health care⁷.

The healthy city Wonju project

In Korea, the healthy cities project was started in Kwachon in 1998⁸. Since then, Korea has developed a unique program for healthy cities; it has developed a healthy city act, a health impact assessment program, an award system, and domestic networking system. A bottom-up approach for the development of healthy city policies and plans is promoted⁹. The healthy city Wonju project started in 2004 joined the alliance for healthy cities (AFHC) as a founding member in the same year, and announced the healthy city Wonju declaration in 2005¹⁰⁻¹². In 2006, the project succeeded in launching its five-year plan; executed between 2006 and 2010. Wonju City joined the Korea Healthy Cities Partnership (KHCP) as a founding member in 2006. The indicators and home page with database have been developed to monitor and evaluate the program implementation since 2006. A 10 year long-term plan, vision 2020 (2011- 2020) is currently being implemented, and will run until 2020^{11,12}. Recently, Wonju City organized the seventh global conference of the AFHC, running from 29th August to 1st September 2016, in Wonju. About 550 participants attended the conference from more than 50 cities over 15 countries and two administrative regions. The main theme of the conference was our cities, our health, our future¹³.

Rationale of healthy city projects in developing countries

While the current sustainable cities debate focuses on the problems for the world's largest urban settlements, the majority of all urban dwellers continue to reside in far smaller urban settlements¹⁴. If rapid urbanization focuses only on short-term economic development rather than sustainability, the situation is likely to lead down development paths that exacerbate global climate change, with a wide range of negative implications for global health and health equity. The decisions taken by cities in developing countries should support a preventive environmental health agenda and a goal of promoting health and well-being¹⁵. There is a considerable need of interventions such as the healthy cities project in developing countries¹⁶.

In the South-East Asia Region, the healthy cities Initiative was launched in 1994 with some cities of Bangladesh (Chittagong, Cox's Bazar, Rajshahi), Thailand (Bangkok), Sri Lanka (Badula), Nepal (Kathmandu), India (New

Delhi); a comprehensive review of the program was carried out in 1998, and a healthy cities framework for action was developed for the region in 1999^{17,18}. Review studies show that the slow progress in developing healthy cities was due to unclear concepts among local authorities, lack of coordinated urban infrastructure and lack of community participation, preventive services being a low Government priority, and poor empowerment of local Government^{17,19}.

Nepal is a developing country situated in South-East Asia with a human development index of 0.548, and a life expectancy of 69.6 years²⁰. Nepal has a total population of 28 million, with an average annual population growth rate of 1.35%. Estimated per capita GDP is 762\$, with a GDP growth rate of 3.04 for the year of 2014/2015^{21,22}. Nepal currently has 217 municipalities and 3157 village development committees. An increasing number of municipalities indicates the rapid urbanization in Nepal; there were 58 municipalities until 2014, 133 new municipalities were established in 2014, and 26 were added in 2015. About 30% of the total population has been living in municipalities^{21,47}.

The objective of the current study is to review initiation, implementation, approaches, and achievements of the healthy city Wonju project as a case; and discuss the relevance of healthy city projects in cities in Nepal.

METHODS

Primarily, the study is a review-based case study of the healthy city project executed in Wonju city, Gangwon Province, Korea. We extensively reviewed the literature and web pages relating to the healthy city Wonju project. Most of the information we obtained from relevant published articles and homepage of healthy city Wonju, and the proceedings of the seventh global conference of the AFHC. We also searched online website for appropriate information from Korean Statistical Information Service (KOSIS), AFHC, and WHO publication. In addition, we reviewed published articles and documents related to healthy city projects in developing countries. For additional relevant information, we searched the website of the Central Bureau of Statistics (CBS) of Nepal, project report of Asian Development Bank (ADB) and National Nepalese News papers.

RESULTS

Wonju city profile

Korea is located on the East Asia, Southern Korean peninsula. The total population of Korea is 51,649,552 as of August 2016, with an annual fertility rate of 1.24, and a life expectancy of 82 years^{23,24}. Wonju City, located in central Korea, in the South West of the Gangwon province is approximately 140 kilometers East of Seoul, and has a total area of 867.76 per square km²⁵. It is the biggest city in Gangwon-do; it has a total population of 330,134, with 164,246 males, and 165,888 females, and has a fertility rate of 0.8% (Table 1)²⁶.

Table 1: Demographic profile of Wonju city

Indicators	Magnitude
Size	867.76 km ²
Total population	330,134
Males	164, 246
Females	165,888
Population over 65 years	39862
Population growth rate	0.8%
Population density	380.4 persons/km ²
Total area	867.97 km ²

The healthy city Wonju: History of development

Korea has national guidelines, local Government acts and the Korea healthy city partnership (KHCP) for the implementation of healthy city projects. The Korean health promotion healthy city act plays a key role in healthy city project implementation^{9,27}.

The healthy city Wonju project was initiated in 2004 by establishing a healthy city team and a healthy city advisory committee. It joined the AFHC as a founding member in the same year. The AFHC is an international network aiming at protecting and enhancing the health of city dwellers. The Alliance is a group of cities and other organizations that try to achieve the goal through an approach called "Healthy cities" in the close collaboration with the WHO¹⁰. In 2005, Wonju city announced the 'healthy city Wonju declaration' to give municipal commitment to make each citizen lead healthy and active life through healthy city Wonju. As founding member, it joined KHCP, national network of Korean healthy cities in 2006. In 2006, it initiated a five year plan (2006 - 2010), with the main objective of setting out systematic policies

for healthy city projects through the effective investment of tobacco consumption tax. The plan generally focused on life style modification, disease prevention and rehabilitation, and setting healthy industry, infrastructure and environment^{11,12}. The first plan of the healthy city was evaluated through a community survey and key informants' interviews. Both processes as well as output indicators were used. The SPRIT checklist was used for the process evaluation²⁸. Vision 2020, a 10-year plan (2011 - 2020), includes two approaches: An individual approach and a socio-environmental approach. The individual approach includes life style modification and diseases prevention, and rehabilitation. The socio-environmental approach comprises: Setting, infrastructure, environment, and health industries. Here, settings include healthy schools, healthy work places, healthy hospitals, healthy communities, healthy markets and food safety, and healthy farming villages. Infrastructure includes transportation, culture and welfare, and safety and social marketing. Environmental planning and environmental education are included under environment. Advanced health technology, smart healthy city, and health tourism are included in health industries^{11,12}. These priorities were decided after collecting and analyzing the responses from healthy city experts and Government officials²⁹. The chronological development events are shown in Table 2.

Table 2: Historical development of healthy city Wonju

Contents	Year
Starting of healthy city Wonju project	2004
Joining the AFHC	2004
Announcement of "Declaration of healthy city Wonju"	2005
Joining KHCP	2006
Enactment of healthy city advisory committee	2005
Development of first five year plan (2006 - 2010)	2006
Development of 10-year plan, "Vision 2020"	2010
Organization of "the seventh global conference of the AFHC"	2016

Examples of healthy city projects of Wonju city

Several setting oriented healthy city projects were conducted by citizens between 2011 and 2016; 25 were supported by the city. Most of the activities were focused

on health promotion, such as establishing physical activity clubs, gardening, and food education¹². Table 3 shows some examples of healthy city projects of Wonju city.

Table 3: Healthy city projects of Wonju city

Name of the projects	Interventions
1. Sport and medicine center: Evidence-based	Physical checkup, exercise prescription, health education
2. Environment-friendly streamside park	Construction of a flood-control dam, and providing various themed spaces
3. Culture street project	Cultural space for citizens and pedestrians with amenities: Installation of fountains, land purchased for performance spaces, and building purchased for exhibitions
4. Climate change response education and research center	Education and research center Renewable energy exhibition facility
5. Walkable city	Safe road for both drivers and pedestrians: One-way traffic with three lanes, underground distribution line and pedestrian path extension

Monitoring and evaluation

The Project has developed its own indicators, database, and monitoring system. The database includes information regarding demographic, health status, life style, physical and social infrastructure, and socio-economic status¹¹. The database was developed in 2006 and updated in 2009. The evaluation of web database quality was performed; some indicators were added and some were deleted from web database for the better management of information based on the finding of the study³⁰. A comparative study of healthy cities, Liverpool in England and Wonju in Korea showed that fifteen of twenty-five programs were similar, and Wonju mostly used quantitative analysis with some qualitative analysis for the evaluation and vice versa in Liverpool²⁸.

Awards for good practice

The WHO and the AFHC recognize and award outstanding work in certain defined areas to encourage cities to

innovate and establish effective and efficient ways of promoting and protecting the health of urban populations. Based on the good practice, Wonju city has been awarded for the following works (Table 4)^{10,12}.

Table 4: Awards for good practice

Year	Awards	Organizations
2008	Good practice award : Comprehensive no-smoking program	WHO
2008	Best proposal award : Climate change and response	WHO
2010	Good practice award: Physical activities	WHO
2010	Creative development award: Evaluation of Healthy City	AFHC
2008	Good Dynamic Award	AFHC
2012	Good Practice Award: Safe city	WHO
2014	Good Practice Award: Woman friendly city	WHO
2016	Good Practice Award: Out of school youth	WHO

Investing tobacco tax for healthy city

Wonju is the first municipality in the Republic of Korea to fund the healthy city project through collection of the local tobacco consumption tax. For effective collection and allocation of the tobacco consumption tax, strong leadership from local authorities, particularly from the Mayor, was found to be the most important element in securing tobacco consumption tax revenues to fund the healthy cities Initiative^{9,31}. The healthy city Wonju is sustainably financed by the revenues collected from local tobacco consumption tax, which has legal approval from the city council⁹. At present (2015), 34% of the total budget for the healthy city Wonju project comes from tobacco consumption tax, whereas it was 59% in 2010. Its discrepancy is due to the total budget for the project being doubled by city administration in 2015¹².

Strong political commitment

In Korea, healthy city projects have been voluntarily initiated by local Governments. Support from the central Government and funding from the health promotion fund is supposed to boost the projects. One study conducted to find the challenges of healthy city projects in Korea stated three main challenges that the head of the city should commit to healthy city projects to succeed:

investing more funds and human resources in projects, local government should provide administrative support to implement multi-sectoral collaborative projects, and central Government should encourage and support local Government's healthy city projects. The healthy city Wonju project is under the stewardship of Wonju city hall^{12,32}.

Collaboration with Universities

Since 2004, the project has been working in collaboration with the Yonsei healthy city research center for evidence based planning and execution¹². The healthy city Wonju project has published scientific articles in different national and international journals collaborating with the healthy city research center. It helps the project in Wonju, as well as those in other cities, with evidence based planning, implementation and, evaluation of projects^{9,28,30-32}.

Innovative and enterprise city

Wonju city has stated new concept as innovative and enterprise city since 2010, based on the concept of the healthy city. The innovative city zone comprised of headquarters of the national health insurance service, health insurance review and assessment service, Red Cross society, and the national forensic service in Wonju city. Enterprise city has built medical device complex in Wonju¹².

Healthy city program in Nepal: Situation and possibilities

The Bangkok declaration held in 2010 on 'Urbanization and health' recommended member states of South-East Asian region to tackle urbanization and health using healthy city approaches, which focuses intersectoral collaboration and an increased role of municipalities in ensuring infrastructures for health and development³³. Some cities such as Delhi (India), Bangkok metropolitan administration and Phanat Nikhom town municipality (Thailand), Jakarta (Indonesia) have already implemented healthy city approach to address the urban health problems and inequality in health³⁴.

Nepal is experiencing 3.18% rate of urbanization (2010 - 2015) annually. The population density of Nepal is estimated to be 180 persons per km² with urban population density of 693 persons per km². However, some municipalities have high population densities; the population density of the top five municipalities is more

than 6000 persons/km² including 19726 persons/km² in Kathmandu metropolitan area²¹. Most of the cities in Nepal are facing challenges of safe drinking water, sanitation facilities and waste management, limited access to quality health services; slum and squatters settlements³⁴. According to the global burden of disease study 2015, Nepal is at 158th rank of 188 countries. Health-related SDGs indicators such as hygiene, water, disaster, occupational risk burden, mean PM 2.5, malaria, air pollution mortality, road injuries, household air pollution, and sanitation shows very low status in Nepal. For achievement of health-related SDGs, Nepal needs to invest to improve basic living condition of the citizens³⁵.

The Ministry of urban development created in 2012 is responsible for urban planning; developing and managing basic urban infrastructure and services such as water supply, sanitation, solid waste management; and housing³⁶. Recently, national urban health policy 2015, developed by Ministry of Health, got final legal approval; and the development of urban health strategy is on the process³⁷. ADB have supported some municipalities to implement urban development program, for example, "Nepal Cities: Clean and healthy urban development", a project implemented with ADB support in Bharatpur municipality, one of the fastest growing municipalities. The project established in 2005 promoted sustainable urban development through better municipal planning and upgrading of infrastructure for clean water supply, drainage, and sanitation³⁸.

In spite of such efforts, cities in Nepal has not initiated and developed healthy city projects, have not created any national networking system or joined international networks of healthy cities as per the concept, except few initial programs that were implemented in the Kathmandu valley^{10,17,39}.

DISCUSSION

In the era of sustainable development, "if cities do not act, the SDGs will not be achieved". The WHO Regional Director for the Western Pacific Region stated that a city must do to be a healthy city: It need to focus on the poorest and most vulnerable, address water and sanitation, manage municipal waste; create resilient health facilities; preserve green spaces and heritage sites, plan for clean air; encourage physical activities and other healthy behaviors⁴⁰.

Since the official initiation of healthy city projects by WHO in Europe in 1986, the healthy cities movement has spread across the six WHO regions, thousands of cities worldwide are part of the healthy cities network and exist in all WHO regions⁷. WHO has developed guidelines for establishing healthy city projects in low income countries in 1995, and it aims to develop role of local government in public health and encourage them to implement health for all policy at city level³⁹. However, the effectiveness of healthy cities has largely been confined to industrialized countries⁴¹.

A key political challenge to urban health development is the general weakness of municipal structures in South-East Asian Region^{19,42}. A study evaluating healthy city projects in developing countries shows that there was limited political commitment to the projects, perhaps due to the fact that most of the municipalities had not requested the projects⁴³. In contrast to this, the healthy city Wonju project is under the stewardship of the Wonju city administration. An evaluation study states that Wonju city was equipped with the resources, plans, infrastructure, cooperative organizations, and the healthy city networks, enabling the consistent implementation of the project based on strong political commitment⁴⁴. The lesson from this case of Wonju, is that the involvement and leadership of municipality in collaboration with cooperative organization and comprehensive planning may improve urban health and living environments. There is a need to generate political commitment and community participation in preparing and implementing a municipal health plan; to increase awareness of health issues in urban development efforts by municipal and national authorities; and to create a network of cities that promotes information exchange and technology transfer. An evaluation study of healthy cities projects conducted in 2002 in cities in India, Nepal, Sri Lanka, and Thailand indicated that the exposure and commitment of decision-makers, particularly local politicians; clarity of vision and mission, with a strong planning and management team; sense of ownership of policies; high degree of stake holder involvement; and institutionalization of healthy cities programs, are the factors contributing to successful implementation¹⁸.

Community participation is an essential part of the process of good local governance, and empowerment remains at the heart of effective health promotions. These processes must be seen as fundamental values of healthy

cities and so must be developed as an integral part of long-term development⁴². Even though health is the entry point of the healthy cities approach, its underlying rationale has always been based on a model of good urban governance, which includes political commitment, intersectoral planning, city wide partnerships, community participation, and monitoring and evaluation⁴¹. The healthy city Wonju is not limited to the public health field; it emphasizes the concept of health in the overall planning of urban developments. The 'Vision 2020' plan for Wonju has established multiple programs, including infrastructure development; health promotion, disease prevention, and rehabilitation, welfare; and improvement of the physical environment and health industries^{9,11,12}.

Tobacco consumption tax has a dual advantage: Tobacco controlling strategy and a sustainable funding source for healthy city projects^{31,45}. As the healthy city Wonju project is being financed in a sustainable way through the revenues collected from tobacco consumption tax, cities in Nepal could adopt this strategy to reduce the prevalence of tobacco consumption and fund healthy city initiatives^{31,46}. Healthy cities principles are drawn on the social determinants of health, such as improvements in living and working conditions, public education, medical science, democratic governance, public health practices, and human rights⁴¹. The socio-demographic, economic, political and cultural backgrounds of countries vary greatly, which may influence the implementation of healthy city projects. However, the approaches used by the healthy city Wonju, such as securing the leadership of local Government; sustainable financing from local resources; participation of cooperating community organizations; multi-sectoral approaches may be effective strategies for many developing countries hoping to move forward with healthy city initiatives. Thus, the healthy city movement can contribute toward promoting health as well as urban development through healthy city networks between cities and countries.

CONCLUSIONS

The healthy city Wonju project has been continuing since 2004 under the leadership of the Wonju city administration in collaboration with the healthy city advisory committee, and Yonsei healthy city research center. The project carries out a variety of activities promoting the health of citizens and sustainable city development, based on both individual and socio-environmental approaches. In the last 10 years, Wonju city has been awarded for its good

practice on different areas by the WHO and the AFHC. The approaches of the healthy city Wonju project included: The strong political commitment of local Government, funding from tobacco consumption tax, partnerships with Universities, a well-organized healthy city team under city administration, community participation through cooperative organizations, comprehensive multisectoral planning, coordination with the AFHC and KHCP and involvement in research activities for evidence based planning. Such strategies maybe useful and crucial for developing countries like Nepal to tackle the existing urban health and development problems by initiating and developing healthy city initiatives.

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Prevalence of Substance Use and Associated Factors Among High School Adolescents in Rithepani, Lekhnath-2, kaski, Nepal

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ABSTRACT

Background: Substance use is a major public health concern in global settings, and is very common during adolescence period leading to physical and/or mental health complications. This study assessed the prevalence of substance use and associated factors among high school adolescents in Rithepani 2, Lekhnath, Kaski, 2073.

Objectives: The study was designed to provide estimates of substance use by school-going adolescents in Lekhnath and to identify risk factors associated with.

Methods: A school based cross-sectional study was conducted from 17th October to 21st October, 2016 among eighth to 12th grade high school students in the Rithepani-2, Lekhnath. Participants were selected by purposive sampling techniques, and data were collected using questionnaire. Frequency, percentage, means, SD and chi-square test was performed to identify factors associated with substance use.

Results: Majority of the respondents 93 (56.4%) belonged to the age group 15 - 18 years. Majority of the respondents 88 (53.3%) were males and 50 (30.3%) were studying in grade 11. Majority of the respondents 140 (84.8%) were Hindus and 104 (63%) of the respondents belonged to upper caste group. In terms of education of the respondents' parents, majority of the respondents' mothers 68 (41.2%) had completed their secondary education and similarly, majority of the respondents' fathers 78 (47.3%) had completed their secondary education. Majority of the respondents' mothers 129 (78.2%) were housewives and majority of the respondents' fathers 48 (29.1%) were businessmen. Majority of the respondents 136 (82.5%) belonged to nuclear family and 93 (56.4%) had per month family income more than Rs 15,000. Among 165 respondents prevalence of substance use was found to be 10 (6%).

Regarding the associated factors majority of the respondents 162 (98.2%) had good relation with their parents, 101 (61.2%) respondents' family members do not use substance, 128 (77.6%) respondents reported that substance use was not accepted in their culture. the prevalence of substance use by the respondents is 6.1% in which five (50%) respondents consume alcohol, eight (80%) take cigarette, one (10%) use tobacco and two (20%) take ganja. Among the substance users, four (40%) reported imitating parents and four (40%) reported curiosity as the cause for them to initiate substance use. Regarding the accessibility of the substances among the respondents who use substances, three

Keywords

Adolescents, Prevalence, Substance use.

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(30%) respondents said that it's very difficult whereas one (10%) said that it's very easy for them to have access to the substances. Majority of the respondents who use substances 6 (60%) avail the substance/s from their friends.

Regarding the Association, there is a significant association between prevalence of substance and substance use by family members with the χ^2 value of 7.61 and p-value 0.006 which is less than 0.05 significant level. There is also a significant association between the prevalence of substance use and its cultural acceptance with the χ^2 value of 4.65 and p-value of 0.031 which is less than 0.05 significant level.

There is a significant association between the prevalence of substance abuse and ethnicity with the χ^2 value of 11.81 and with the p-value 0.037 which is less than 0.05 significant level.

Conclusions: The prevalence of substance use among high school adolescent students in selected higher secondary school was found to be 6.1%. There was significant association between prevalence of substances use and cultural acceptance of participants, ethnicity and use of substances by the family members. Based on the findings of the study researcher suggests to initiate awareness and co-ordination program between the school and parents.

INTRODUCTION

The World Health Organization defines addiction as the state of physiological or psychological addiction to any psychoactive substance; the state is characterized by changes in behavior and other psychological reactions, always including the compulsive need for occasional or regular substance use, guided by the pleasant psychological effect of the substance or avoiding the symptoms of abstinence¹.

Adolescence is marked by considerable existential conflicts as well as exposure and vulnerability to substance abuse². Young people have greater problems regarding alcohol intake³. Moreover, early initiation in alcohol use is one of the most important predictors of future health, socio-cultural and economic problems⁴. The following factors are considered facilitators of alcohol use among adolescents: lifestyle, high levels of stress and anxiety, low self-esteem, depressive symptoms, susceptibility to peer pressure and problems associated with school⁵.

Adolescents are particularly susceptible to involvement in substance use due to the underdeveloped state of the adolescent brain, which can lead to reduced decision-making ability and increased long-term effects of drugs and alcohol. Understanding the causes of adolescent substance use is vital for successful prevention and intervention programs.

Data from the National Institute on Drug Abuse (NIDA) and the Centers for Disease Control and Prevention (CDC) reveal high numbers of adolescent substance use in the

United States. Substance use among adolescents can lead to increased risk of transmission of sexually transmitted infections, vehicular fatalities, juvenile delinquency, and other problems associated with physical and mental health.

About 230 million people, or five percent of the world's adult population, are estimated to have used an illegal drug at least once in 2010. Alcohol and other drug (Khat and tobacco) users number about 27 million, which is 0.6 percent of the world adult population. What is more surprising is that, alcohol alone kill around 0.2 million people each year, shattering families and bringing misery to thousands of other people. Similarly, reported that, alcohol and drug use undermines economic and social development and contributes to crime, instability, insecurity and the spread of HIV. Not only that, alcohol and drug abuse is major burdens to society; causing economic costs, health cost, crime-related costs and losses in productivity⁶.

Use of substances such as different alcohols, chewing khat leaves and smoking cigarette has become one of the rising major public health and socio-economic problems worldwide. Recent trends indicate that the use of substances, mainly alcohol, chewing khat and smoking cigarette have dramatically increased particularly in developing countries. Alcohol, especially in high doses, or when combined with khat or tobacco, continues to claim the lives of many people. It is estimated that 9% of the global population aged 12 or older are classified with

dependence on psychoactive substances such as alcohol. Heavy consumption of alcohol when shared with chewing khat is associated with many psychological problems including euphoria, hyperactivity, anorexia, insomnia, lethargy and depression. In addition, the combined use of alcohol and khat increase sexual risky behavior contributing to the spread of HIV infection⁷.

The problem of alcohol and drug abuse among College or University students remains an important area of research due to the implications of early substance dependence on the future of the youth⁸.

Alcohol and drug abuse is a common public health risk that peaks in persons between 18 and 25 years of age and is highly prevalent among University and college students. There have been limited studies in developing countries like Nepal⁹.

This study therefore sought to assess the prevalence and factors associated with drug abuse among high school students.

OBJECTIVES

- To determine the demographic characteristics of participants
- To assess the prevalence of substance use among high school adolescents in Rithepani-2, Lekhnath, Kaski, Nepal
- To explore the prevalence of substance use and associated factors among high school adolescents in Rithepani-2, Lekhnath, Kaski, Nepal

METHODS

A high school based cross-sectional study was conducted from 17th to 21st October, 2016 amongst 8th to 12th grade high school students in Rithepani-2 Lekhnath, Kaski, Nepal. Participants were selected by purposive sampling techniques, and data were collected using a semi structured questionnaire related to substance use. The study sample was recruited from grade 8 to 12 adolescent students in Triveni Public Higher Secondary School, Rithepani-2, Lekhnath, Kaski, Nepal. Three part structured questionnaire were developed to cover the entire aspects of study.

Part I: This part included demographic characteristics of the participants: Age, gender, religion, ethnicity, education of father and mother; occupation of mother and types of family.

Part II: This part included the associated factors of drug use, like: Economic factors, social factors, family factors, which are the key influencing indicators of substance use.

Part III: It included association between the prevalence of substances use and demographic variables, as well as the prevalence of substances use and the associated factors.

I. Demographic variables of the respondents

Table 1: Demographic variables of the respondents (n=165)

Demographic variables	Frequency	Percentage
Age(in years)		
<13	9	5.5%
13 - 15	52	31.5%
15 - 18	93	56.4%
>18>18	11	6.7%
Gender		
Males	88	53.3%
Females	77	46.7%
Grade		
8	15	9.1%
9	31	18.8%
10	23	13.9%
11	50	30.3%
12	46	27.9%
Religion		
Hindu	140	84.8%
Christian	3	1.8%
Muslim	1	0.6%
Buddhist	21	12.7%
Ethnicity		
Dalit	8	4.8%
Disadvantaged janjatis	2	1.2%
Disadvantaged non-dalit terai caste group	1	0.6%
Religious minorities	10	6.1%
Relatively advantaged janjatis	40	24.2%
Upper caste group	104	63.0%
Education of mother		
Illiterate	15	9.1%
Primary	55	33.3%
Secondary	68	41.2%
Higher secondary	19	11.5%
Graduate and above	8	4.8%
Education of father		
Illiterate	8	4.8%
Primary	32	19.4%
Secondary	78	47.3%
Higher secondary	31	18.8%
Graduate and above	16	9.7%

Demographic variables	Frequency	Percentage
Occupation of mother		
Housewife	129	78.2%
Service	3	1.8%
Business	19	11.5%
Agriculture	11	6.7%
Others	3	1.8%
Occupation of father		
Self employee	27	16.4%
Service	19	11.5%
Business	48	29.1%
Agriculture	26	15.8%
Others	45	27.3%
Types of family		
Nuclear	136	82.5%
Joint	24	14.5%
Extended	5	3%
Monthly family income		
≤5000	14	8.5%
5001 - 10,000	23	13.9%
10,001 - 15000	35	21.2%
≥15000	93	56.4%

Table 1 shows that majority of the respondents 93 (56.4%) belonged to the age group of 15 - 18 years. Likewise, majority of the respondents 88 (53.3%) were males and 50 (30.3%) were studying in grade 11. The table also depicts that majority of the respondents 140 (84.8%) were Hindus and 104 (63%) of the respondents belonged to upper caste group. In terms of education of the respondents' parents, majority of the respondents' mothers 68 (41.2%) had completed their secondary education and similarly, majority of the respondents' fathers 78 (47.3%) had completed their secondary education. Majority of the respondents' mothers 129 (78.2%) were housewives and majority of the respondents' fathers 48 (29.1%) were businessmen. Majority of the respondents 136 (82.5%) belonged to nuclear family and 93 (56.4%) had family income more than Rs 15,000.

Fig 1: Prevalence of substance use (n=165)

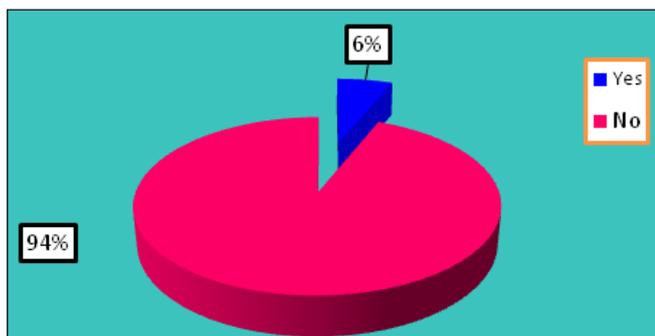


Figure 1 shows that the prevalence of substances use among the respondents was 6%.

II. Associated factors of substances use among adolescents

Table 2: Associated factors of substance use among adolescents

Associated factors	Frequency	Percentage
Relation with parents		
Good	162	98.2%
Poor	3	1.8%
Substance use by family members		
Yes	64	38.8%
No	101	61.2%
Cultural acceptance of substance use		
Yes	37	22.4%
No	128	77.6%
Types of substances used by the students		
Alcohol	5	50%
Cigarette	8	80%
Tobacco	1	10%
Ganja	2	20%
Cause for initiating the use of substances		
Imitating parents	4	40%
Peer pressure	2	20%
Curiosity	4	40%
Accessibility of substances		
Impossible	2	20%
Very difficult	3	30%
Fairly difficult	2	20%
Fairly easy	2	20%
Very easy	1	10%
Access to the substances		
Friends	6	60%
Pocket money	3	30%
Other	1	1%

Table 2 shows that majority of the respondents 162 (98.2%) had good relation with their parents; 101 (61.2%) respondents' family members do not use substance, 128 (77.6%) respondents reported that substance use was not accepted in their culture. Fig 1 also shows that the prevalence of substance use by the respondents is 6.1% in which five (50%) respondents consume alcohol, eight (80%) take cigarette, one (10%) use tobacco and two (20%) take ganja. Table 2 shows that among the substance users, four (40%) reported imitating parents and four (40%) reported curiosity as the cause for them to initiate substance use. Regarding the accessibility of the substances among the respondents who use substances, three (30%) respondents said that it's very difficult

whereas one (10%) said that it's very easy for them to have access to the substances. Table 2 also depicts that the majority of the respondents who use substances 6 (60%) avail the substance/s from their friends.

III. Association between the prevalence of substance abuse and the demographic variables.

Table 3: Association between the prevalence of substance abuse and the demographic variables

Variables	χ^2 value	df	p value
Grade	6.82	4	0.145
Age	4.99	3	0.172
Gender	0.19	1	0.663
Religion	7.25	3	0.064
Ethnicity	11.81	5	0.037*
Education of mother	6.96	4	0.138
Education of father	3.11	4	0.540
Occupation of mother	4.40	4	0.354
Occupation of father	2.34	4	0.672
Type of family	2.27	2	0.518

*Significant

Table 3 shows that there is a significant association between the prevalence of substance abuse and ethnicity with the χ^2 value of 11.81 and with the p-value 0.037 which is less than 0.05 level of significance.

IV. Association of the prevalence of substance use and the associated factors

Table 4: Association between the prevalence of substance use and the associated factors

Associated factors	χ^2 value	df	p-value
Monthly family income	5.42	3	0.143
Relation with parents	0.19	1	0.657
Substance use by family members	7.61	1	0.006*
Cultural acceptance of substance use	4.65	1	0.031*
Difficulty in the access to substances	3.60	4	0.463

*Significant

Table 4 shows that there is a significant association between prevalence of substance and the substance use by family members with the χ^2 value of 7.61 and p-value 0.006 which is less than 0.05 level of significance. There is also a significant association between the prevalence of

substance use and its cultural acceptance with the χ^2 value of 4.65 and p-value of 0.031 which is less than 0.05 level of significance.

DISCUSSION

The study was aimed to provide estimates of substance use, and to identify associated factors associated with by school-going adolescents in Rithepani-2, Lekhnath, Kaski, Nepal at selected higher secondary school.

Majority of the respondents 93 (56.4%) belonged to the age group 15 - 18 years. Likewise, majority of the respondents 88 (53.3%) were males and 50 (30.3%) were studying in grade 11. Majority of the respondents 140 (84.8%) were Hindus and 104 (63%) of the respondents belonged to upper caste group. In terms of education of the respondents' parents, majority of the respondents' mothers 68 (41.2%) had completed their secondary education and similarly, majority of the respondents' fathers 78 (47.3%) had completed their secondary education. Majority of the respondents' mothers 129 (78.2%) were housewives and majority of the respondents' fathers 48 (29.1%) were businessmen. Majority of the respondents 136 (82.5%) belonged to nuclear family and 93 (56.4%) had per month family income more than Rs 15,000.

Among the 165 respondents prevalence of substances use was found to be 10 (6%).

Similar study was conducted in Thailand, 2012, to assess the prevalence of alcohol use and associated factors among adolescent students in Thailand. The prevalence was found to be 14.8%.

Associated factors

Majority of the respondents 162 (98.2%) had good relation with their parents, 101 (61.2%) respondents' family members do not use substance, 128 (77.6%) respondents reported that substance use was not accepted in their culture. the prevalence of substance use by the respondents is 6.1% in which five (50%) respondents consume alcohol, eight (80%) take cigarette, one (10%) use tobacco and two (20%) take ganja. Among the substance users, four (40%) reported imitating parents and 4 (40%) reported curiosity as the cause for them to initiate substance use. Regarding the accessibility of the substances among the respondents who use substances, three (30%) respondents said that it's very difficult whereas one (10%) said that it's very easy for them to have access to the substances. Majority of the respondents who use substances six (60%) avail the substance/s from their friends.

Similar study was conducted in Thailand, 2012, to assess the prevalence of alcohol use and associated factors among adolescent students in Thailand⁷. Efforts to prevent and control substances use may need to address a cluster of risk behaviors including cigarette smoking, and illicit drug use, easily accessibility of substances, parental behavior to initiate it and friends. A parent school co-ordination and co-operation could support parents and/or guardians to become more understanding and caring of their children.

Association between the prevalence of substance use and demographic variables as well as associated factors

The study found that there was a significant association between prevalence of substance and substance use by family members with the χ^2 value of 7.61 and p-value 0.006 which is less than 0.05 level of significance. There was also a significant association between the prevalence of substance use and its cultural acceptance with the χ^2 value of 4.65 and p-value of 0.031 which is less than 0.05 level of significance. There was a significant association between the prevalence of substance abuse and ethnicity with the χ^2 value of 11.81 and with the p-value 0.037 which is less than 0.05 level of significance.

Similar study was conducted in Ethiopia in 2014, to assess the prevalence of substance use and associated factors among high school adolescents⁸. The finding showed that there was significant association between prevalence of substance use and family history of substance use.

CONCLUSIONS

The prevalence of substance use among high school adolescent students in selected higher secondary school was found to be 6.1%. There was significant association between prevalence of substance use and cultural acceptance of participants, ethnicity and use of substances by the family members. Based on the above findings of the study researcher suggests to initiate awareness and co-ordination program between the school and parents.

Acknowledgement

We would like to express our sincere gratitude whole heartedly to Mr. Rajendra Mani Paudel, Principal, Triveni

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Challenges in Conducting MBBS Program in a Nepalese Medical College

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ABSTRACT

The medical education in Nepal faces many challenges. Medical education, in order to keep up with the times, needs to adapt to the changing attitudes of society. We need a change for better. The curriculum is outdated to the clinical needs, and the students are rarely taught any skills and innovations or creativity to think for the future, and whoever wishes to change the system will be isolated. A serious shortage of talents, subject knowledge, technical skills and communication skills in teachers is affecting the future of medical students. Many medical teachers teach in local language making students poor communicators.

Nepal, a developing country in South Asia is in transition had suffered from a decade long violent conflict and the country is in the implementation of its new constitution and suffers from political instability which may contribute several challenges like general shutdowns, frequent bandhs, shortage of electricity, load shedding, voltage fluctuation and problems with internet in conducting MBBS program in a Medical College.

At the moment, there is no foreseeable future effort by parents, teachers, educationists, policy makers and politicians to correct this and courageously bring in radical reforms in medical education. These challenges can be overcome by cooperation and working together to create a peaceful and stable climate. Nepal has been going through tremendous changes in the last few years. Medical teachers have a great role to play and stand against many odds.

Keywords

Challenges, MBBS program, Medical College, Nepal.

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INTRODUCTION

A medical college is a tertiary educational institution or part of such an institution that teaches medicine, and awards a professional degree for physicians and surgeons. In other words, only institutions offering MBBS course in its curriculum are referred to as medical colleges.

Medical education in Nepal started in 1933 when the Nepal Rajakiya Ayurved Vidyalaya opened at Kathmandu for the training of Ayurvedic health workers. A year later, the Civil Medical School was set up at Kathmandu, for the training of basic level health care workers (Compounders and dressers). The Institute of Medicine (IOM) was started in 1972 and began the process of training different basic,

middle and higher levels of human resources for health. After the Jana Andolan in 1989/90, health services education in Nepal developed almost by leaps and bounds¹.

The medical education in Nepal faces many challenges. Medical education, in order to keep up with the times, needs to adapt to the changing attitudes of society. We need a change for better. The curriculum is outdated to the clinical needs, and the students are rarely taught any skills and innovations or creativity to think for the future, and whoever wishes to change the system will be isolated. Medical teachers have a great role to play and stand against many odds.

A serious shortage of talents, subject knowledge, technical skills and communication skills in teachers is effecting the future of medical students resulting in lack of technical knowledge and critical thinking. Many medical teachers teach in local language making students poor communicators and lack of English proficiency.

Nepal, a developing country in South Asia is in transition had suffered from a decade long violent conflict and the country is in the implementation of its new constitution and suffers from political instability which may contribute several challenges like general shutdowns, frequent bandhs, shortage of electricity, load shedding, voltage fluctuation and problems with internet in conducting MBBS program in a Medical College.

GANDAKI MEDICAL COLLEGE

Gandaki Medical College Teaching Hospital and Research Center Pvt. Ltd. (GMC) is a health educational institution located at Lekhnath, Kaski District of Nepal, was established in 2007 AD with the aim of imparting high quality medical education to the students from different parts of the world. The emphasis is on developing attitude, skills and habits of life-long learning and to produce the world leaders in medicine. The focus is on the needs of today’s medical students and the requirements of tomorrow’s doctors in the challenging healthcare environment².

Presently, Gandaki Medical College is conducting MBBS, BDS, B.Sc. Nursing, B.Sc. MIT, B.Sc. MLT and BPH Programs with the affiliation of Tribhuvan University-Institute of Medicine (IOM). The college has been successfully running in its aim of providing high quality medical education and health care services to the people. Gandaki Medical College proposes a 750 bedded teaching hospital with all activity of clinical and medical facilities, to provide excellent health care facilities. The college admitted the first batch of MBBS students in 2010 and has recently admitted the seventh batch of students.

CURRICULUM

The MBBS (Bachelor of Medicine and Bachelor of Surgery) course is of four and half years duration followed by one year compulsory rotating internship. The college follows the curriculum prescribed by Tribhuvan University Institute of Medicine (IOM). The salient features of the curriculum are emphasis on common health problems of Nepal, early clinical and community exposure with adequate community based learning and integrated approach in teaching and learning³.

The MBBS program aims to produce socially responsible physicians, who are willing and able to meet the existing and emerging challenges of national and international healthcare system, and highly competent and scientifically literate clinicians, equipped to practice patient-centred medicine in a constantly changing modern world, with a foundation in the basic medical and social sciences.

On completion of the MBBS course and one year of compulsory rotating internship, the medical graduates must acquire the following core competencies^{4,5}.

1. Patient care: Must be able to provide appropriate, compassionate and effective treatment of health problems and the promotion of health.
2. Medical knowledge and skills: Must be able to demonstrate knowledge about established and evolving biomedical, clinical and cognate sciences and the application of this knowledge to patient care. Must understand the clinical relevance of scientific research and demonstrate the ability to evaluate emerging knowledge and research as it applies to diagnosis, treatment and the prevention of disease.
3. Practice-based learning: Must be able to investigate and evaluate and improve their patient care practices
4. Interpersonal communication skills: Must be able to exchange information effectively with patients, and their families, professional associates and society at large.
5. Professionalism: Must demonstrate a commitment to carry out professional responsibilities, adherence to ethical principles and sensitivity to a diverse patient population
6. Systems-based practice: Must understand the interdependence of the component parts of the healthcare system and appropriately use system resources to provide optimal patient care.

Table 1: Curriculum outline and implementation modality in MBBS program

First Year	Integrated basic medical science and community medicine
Second Year	Integrated basic medical science
Third Year	Community medicine (Applied epidemiology, family health exercise), forensic medicine, clinical subjects
Fourth Year	Clinical subjects, community medicine (District health service management)
Four and half Year	Clinical subjects
Final (one year)	Rotating internship

The first phase of MBBS program

The curriculum is divided into three phases³. The first phase is of two years duration and covers the six basic science subjects of anatomy, physiology, biochemistry, pathology, microbiology, and pharmacology along with community medicine in horizontal integrated organ system-based manner. Basic concepts and the musculoskeletal and neurosensory organ systems are taught in the first year and respiratory, cardiovascular, gastrointestinal, renal and electrolyte, endocrine and reproductive systems during the second year. During the first year, community medicine includes epidemiology, biostatistics, sociology, family health, communication skills, information technology, community health laboratory and community health diagnosis.

Students will have community field visit for one month in first year for an early exposure to community based learning. Students visit the hospital for two weeks in second year for early clinical exposure for vertical integrated learning. The emphasis is on history taking, communication skills, and physical examination.

Students are required to have at least 75% attendance in theory and practical sessions of all the disciplines and also in early clinical exposure to appear in the University examinations of the respective disciplines.

The second phase of MBBS program

In the second phase, during third year of MBBS program, the teaching includes disciplines of forensic medicine, community medicine (Applied epidemiology, family health exercise), internal medicine, surgery, obstetrics and gynecology and pediatrics.

The third phase of MBBS program

In the third phase, during fourth year and fifth year (First half year) the teaching is mainly concentrated on the clinical subjects: Internal medicine, surgery, obstetrics and gynecology, pediatrics, ophthalmology, ENT, orthopedics, dentistry, psychiatry, dermatology, radiology, anesthesiology, accident and emergency medicine, community medicine (District health system management) and clinical rotation in major clinical areas. Information technology, ethics and research will be covered during this phase.

SKILLS LAB

The basic clinical skills will be learnt in clinical skills laboratory. Skills lab will be an important learning resource for students during the period of learning to take histories and examining the patient. Students will learn

basic skills of certain clinical examination and performing common medical procedures. The great majority of clinical skills are learnt by seeing the seniors do it multiple times and by slowly doing it oneself. Working in a skill lab will supplement this and is not a substitute for practicing these in the different wards, in accident and emergency and in the surgery in real patients. Students will be posted in skills lab during second year, junior internship and in the beginning of internship.

INTERNSHIP

During one year of compulsory rotating internship, the interns are rotated across various specialities including internal medicine, general surgery, orthopedics, pediatrics, obstetrics and gynecology, anesthesia, accident and emergency medicine, ophthalmology, ENT etc. Interns obtain hands-on training in the wards and out-patient departments, where they interact with real patients. Besides standard clinical care, the interns also obtain a thorough experience of ward management, staff management, and thorough counseling skills³.

TEACHING-LEARNING METHODOLOGY

The predominant teaching-learning methodology is didactic lectures, but as per the IOM curriculum, Gandaki Medical College is adopting the SPICES model of instructions during the implementation of curriculum as far as possible and practicable³.

Table 2: SPICES model of instruction

Student centered
Problem based
Integrated
Community oriented
Electives
Systematic approach

Thus, following approaches will be followed while implementing the curriculum³:

- Organ-system based integrated teaching and early clinical and community exposure
- Teaching and learning in rural community settings (community based learning)
- Periodic review of basic medical sciences related to common and important clinical problems

- Self directed learning to inculcate the habit of life-long learning
- Problem based learning (PBL)
- Didactic lectures or structured interactive sessions
- Ambulatory teaching in outpatient departments for better exposure and understanding of commonly encountered medical problems
- Bedside teaching learning in wards
- Acquiring certain clinical examination and procedural skills in a skill laboratory
- Demonstrations, role plays, practice on simulated patients wherever applicable
- Presentation of reports on community diagnosis, family health exercise and district health service management

MEDICAL EDUCATION DEPARTMENT

In order to make the students learn better, Teacher training programs and continuing medical education (CME) programs are conducted periodically to update the knowledge of teachers regarding new advances and new teaching methods to facilitate students' learning. This is usually held for two to three hours in the afternoon session, once in a month, so that the regular academic and clinical activities are not hampered. The CME workshop concentrates on the roles and responsibilities of a medical teacher, principles of learning, educational objectives, teaching-learning aids, communication skills, and microteaching.

ACADEMIC CALENDER

We prepare a calendar of operation for every academic year (December to November) at the beginning of November (Table 3). The possibility of bandhs, shutdowns and other problems will always be considered while preparing academic calendar. During the last six years we have been able to complete the sessions within the requisite time frame. Two years ago due to blockade we had to shorten the time period allotted. In the first year we set apart a month for the community diagnosis program where students spend in rural areas.

We are conducting theory and practical sessions in a professional manner. We occasionally miss few sessions due to adverse circumstances because of political instability in Nepal. Therefore we ensure sufficient flexibility in the academic program (Teaching schedule) to ensure that days which are lost do not adversely affect the academic calendar.

There are regular meetings of Heads of the departments to discuss academic schedule (Teaching schedule), plan of conducting learning in different organ systems in an integrated manner, correlation seminars etc.

The major challenge is allotting theory and practical classes for different departments so that the curriculum and organ system progresses in an integrated manner. We usually ask each department to give us the number of theory and practical classes they need for a particular organ system so that the required number of classes can be allotted each week.

Respective departments develop their own teaching schedules and calendar of operation for teaching learning activities based on the curriculum guidelines. The curriculum implementation committee reviews, evaluates and monitors teaching methodology.

CORRELATION SEMINARS

Correlation seminars⁶ are conducted at the end of covering each organ system during the first and second year. For correlation seminar, a common disease or problem involving the organ system just covered is selected. The College holds a meeting of Professors/Heads from each of the basic science departments, community medicine under the chairmanship of Principal for selecting the topics for correlation seminars. Topics are selected based on the importance of the disease condition, its public health relevance, and its ability to integrate learning objectives from the maximum number of subjects. The concerned departments are asked to generate two to six objectives for each seminar topic, if possible.

After learning objectives have been framed, they are distributed to all students. The college admits 110 students to the MBBS course each year. Therefore 110 learning objectives are framed for each correlation seminar and a particular learning objective is assigned to each student. The students prepare a five minute power point presentation of the objective assigned, using the assigned text books, reference books available in the college library, notes from faculty lectures, and help from the faculty members of the relevant departments. Students also use articles and images obtained through Google search.

The evaluation of correlation seminar is done by one faculty member (usually Professor/Head) from each basic science department and one from community medicine. A Senior Professor was entrusted the responsibility of being the team leader and coordinates the proceedings of correlation seminar.

EXAMINATIONS

There are regular assessments at the end of every month (monthly tests) and three term examinations (Internal assessments) at the end of each term, and students are counseled to improve their performance. The internal assessments follow the University examination pattern and there are integrated question papers in basic sciences. The total time allotted for integrated basic sciences examination is four hours and the maximum number of marks obtainable is 120, each basic science subject accounting for 20 marks. Each department is requested to submit their question papers on University pattern about one week before the date of examination. The marks obtained in assessment examinations account for about 20% of marks during the University examinations.

The University examinations are conducted by the Institute of Medicine (IOM), Tribhuvan University. The theory examinations are based on common question paper and examinations are held at different medical colleges simultaneously with external observers from the University. The practical examinations are conducted in different affiliated colleges with an external examiner and an internal examiner appointed by the University³.

At the end of the first year there is an integrated question paper in all basic science subjects and two question papers in community medicine and practical examination in each basic science subject and community medicine separately. At the end of second year there are three integrated question papers in basic science subjects, one question paper in respiratory system and cardiovascular system, the second one in gastrointestinal and hepatobiliary system, and the third question paper is in renal and electrolyte system, and reproductive and endocrine systems; and a practical examination in each basic science subject separately³.

The practical examination includes objective structured practical examination (OSPE), clinical case presentation, objective structured clinical examination (OSCE) and other evaluation modalities applicable to the subjects concerned³.

COMMUNICATION SKILLS

Behavioral sciences, ethical issues, information technology and communication skills knowledge have become an essential part of medical education/practice. At Gandaki Medical College, we are providing a communication skills program, to enable the graduates to communicate clearly, sensitively, effectively and efficiently with patients, peers

and also with colleagues from a variety of health and social care professions in their clinical and community practice. Good communication enables one to collect information about a patient's problems that is comprehensive, relevant and accurate. It helps medical graduates to make an accurate, comprehensive diagnosis.

COMMUNITY BASED LEARNING

During the first year of MBBS program, students will have one month community health diagnosis field visit in rural areas of Kaski district studying community health problems and involving the community in solving the health problems that they observe (Table 4). Students observe various determinants of health, prepare a written report and present the same to the community for discussion and action. The determinants could be social, economic and health service-related. Social determinants could be community beliefs about diarrhea like restricting fluid intake during the illness, economic determinants could be poverty and purchasing medicines while health service-related could be problems in accessing health facilities. Students are examined and evaluated in their community health diagnosis project during the community medicine practical examination. Students may go back to the communities during their third and fourth year of MBBS program and follow up on the changes suggested.

Early exposure of the learners to community medicine makes them aware of the importance of the course of the study, and enables them to become motivated towards self-learning. Placement in the community surroundings that are located in the mountain, the hills and the plains of Nepal gives ample opportunities to learners to be accustomed to the reality that exists in the community so that they can face real-life situations after graduation.

During the third year of MBBS program, students will have family health exercise, designed to enable the students to understand the social, cultural, psychological, gender and economical aspects of illness, the interactions of ill persons with different members of family and community health service, role of family members and family environment in patient care to produce competent family physicians. Students will understand the natural history of disease and importance of patient follow up. Students will be able to differentiate the nature of the problems while seeing the patients in the family from the nature of the same problems when the patient is seen in clinic or hospital.

During the fourth year of MBBS program, students will be posted in the field (District health system management) for nine weeks in small groups by rotation to the various health institutions at the zonal and district levels; three weeks in each Institution. The students will build rapport with different officials of health and other Institutions. They will visit different health service facilities and other relevant Institutions like DDC, VDC, NGOs, INGOs, local groups etc., participate in different activities and interact with different people. The students will collect information from different sources, analyze and interpret them and present at the district to relevant audience.

EARLY CLINICAL EXPOSURE

We provide early clinical exposure to our students during second year, enabling vertical integrated learning also. The emphasis is on history taking skills, communication skills, and physical examination. The major clinical departments of medicine, surgery, pediatrics, obstetrics and gynecology, ophthalmology, family medicine, orthopedics and otorhinolaryngology (ENT) are involved. Students rotate in batches for fifteen days.

MEDICAL ETHICS

Healthcare decisions are based not only on clinical and technical grounds, but also on ethical grounds. Through the teaching/learning exercises in this medical ethics module, we aim to instill in the medical students, knowledge, skills and attitudes necessary to guide their conduct and decision making as a practicing doctor. The general aim of this medical ethics module is to help medical students to recognize the importance of being sensitive to ethical issues within everyday clinical practice and develop in them the ability to effectively address ethical concerns of patients as well as participants in research.

INFORMATION MANAGEMENT

In order to use information and communication technology to assist in diagnostic, therapeutic and preventive measures and for surveillance and monitoring health status, and also to maintain records of patients for future use and medico-legal purpose, we provide a brief training to our medical graduates.

CONCLUSIONS

We conduct regular meetings to discuss and plan teaching schedules, plan of conducting teaching learning process in different organ systems, correlation seminars, academic calendar etc. The challenges we face in running the MBBS program are general shutdowns, frequent bandhs, shortage of electricity, load shedding, voltage fluctuation and problems with internet and political instability. Therefore we prepare a very flexible academic schedule and try to adjust the sessions wherever possible. We are fully committed to conduct the community health diagnosis residential field to enable the students to have a community based learning and also early clinical exposure. These challenges can be overcome by various factors (political and nonpolitical) and working together in cooperation and creating a peaceful and stable political climate.

As medical teachers and educationists we should strive to develop the innate talent of future doctors that can help them do better in life, get their creative juices flowing and contribute to the society. Teachers should encourage multiplicity of ideas, richness of thought and acceptance of differing view point. We teachers must allow minds to flower, not atrophy.

The medical education system must give students the courage to question what they learn, infer from intelligent reasoning and become thinking individuals. One definite way is to stimulate their minds and reasoning by throwing ideas at them, so that they will be forced to think, analyze and comprehend.

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Case Report on Secondary Peritonitis Caused by Jejunum Perforation

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Keywords

Dudeno-jejunal flexure, Focus abdominal sonography for trauma, Peritonitis.

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ABSTRACT

The small intestine is third in frequency intraperitoneal organ injured after blunt trauma of abdomen. Peritonitis caused by isolated jejunum perforation is very rare. As most of these cases are accompanied with injuries with other structures in the abdomen, hence it is not suspected. Therefore failure in diagnosis and delay in treating these injuries significantly increase the morbidity and mortality of these patients. Here, we report a case of a 60 year old gentleman admitted in surgery department with severe abdominal pain, multiple episodes of vomiting followed to fast breathing and reduced consciousness. Our patient presented in septic shock, with toxic looks and clear cut rigid abdominal wall. To the best of our knowledge this is the first time we describe a case report on isolated jejunum perforation as a result of physical assault.

INTRODUCTION

Peritonitis is defined as the inflammation of peritoneum and peritoneal cavity, usually caused by a localized or generalized infection¹. Secondary peritonitis is the inflammation of the peritoneum due to loss of integrity of gastro-intestinal tract i.e. GI perforation². In blunt abdomen trauma, in majority of cases multiple abdominal organs are involved but isolated injury of jejunum perforation is extremely rare. As per the literature review on isolated jejunum perforation, it has been reported in only <1%³. The vast majority cases of intestinal perforation following blunt abdomen trauma is caused by motor vehicle accident, physical assault, fall injury, sport injury.

A sudden increase in intra-luminal pressure in a fluid or air filled bowel loop cause punctate or slit like perforation on the anti-mesenteric border. Most of the time these perforations are not surrounded by damage tissues because perforation occurs due to raised intra-luminal pressure not due to crushing⁴. In unconscious patients with multiple injuries, the diagnosis of single isolated jejunum perforation is great dilemma. We can miss isolated jejunum perforation in blunt abdomen trauma cases because these days most of the solid organs injuries in hemodynamically stable patient managed conservatively⁵. Delay in diagnosis enhances significant

morbidity and mortality. The clinical suspicion and early exploration in present case led to prompt surgical intervention and improve the prognosis of the patient.

CASE PRESENTATION

A 60 year old gentleman was referred to Emergency Department of Gandaki Medical College Teaching Hospital, Pokhara, Nepal, with history of abdominal pain and greenish vomiting for three days. He has been undergoing at the local hospital and managed under conservative treatment and as there was no improvement he was referred to our hospital. In emergency room, our patient was in septic shock with GCS of 10/15. Vitals: pulse: 108/min, B/P: 100/60 mmHg, temperature: 97.4° f, respiratory rate: 26/min, saturation of 84% on room air. Pain score of 8/10. Per abdominal examination-inspection: absent abdominal movement, no external injury and bruises present, palpation: generalized tender all quadrant of abdomen, percussion: tympanic sound present, auscultation: absent bowel sound. Emergency resuscitation was started and routine investigations were performed. The chest x-ray showed gas under diaphragm (Fig 1). Ultrasound scan of abdomen showed moderate ascites with dilated bowel loops present.

After thorough explaining of the problem and further management options with the relatives, we planned

for emergency exploratory laparotomy and informed consent was taken from his son. Midline incision given above the umbilicus and abdomen was found to be filled of bilious fluid with feces and inflamed bowel. There was a perforation at 70 cm distal to duodeno-jejunal flexure at anti-mesenteric surface measuring about 1 X 1 cm. We had to extend the incision to infra-umbilical area. The perforation was repaired and peritoneal lavage was done. No further injury was present with normal abdominal viscera seen on operative findings. Abdominal drain tube was inserted. Post operatively patient developed symptoms of alcohol withdrawal.

On first post-operative day after patient consciousness was normal he explained the mechanism of his trauma was due to hit by elbow blow on his abdomen when there was dispute with a friend while he was drinking alcohol. He remembered the symptoms developed about an hour after the fight. On 18th post operative day he was discharged and he followed up after two weeks with feeling almost back to normal.

Fig 1: Chest x-ray view shows crescent shape radiolucent shadow (Gas under diaphragm)



DISCUSSION

The abdomen is third most commonly injured part of body involved trauma. Early recognition of small bowel injury is important in the prevention of morbidity and mortality. Seventy five percent of blunt abdomen trauma is caused by motor vehicle accidents and rest by other mechanisms as explained⁵. Jejunum perforations occurs either due to physical assault by human being (in our case) or due to animal injury on abdomen, or due to bicycle handle bar injury are the most common etiology known in the literature. Single isolated jejunum perforation in blunt abdomen trauma is less than one percent⁶.

Mechanism of small bowel disruption with blunt trauma include shearing forces, compression forces between abdominal wall and vertebral column and blowout injury due to sudden increase in intra-luminal pressure of bowel loop⁴. The incidence of small bowel injury varies according to age group. For the early diagnosis of isolated jejunum perforation, detailed history and frequent clinical

examination of abdomen are extremely useful, particularly in unconscious patients with other intra-abdominal solid organ injuries. Continuous abdominal pain, generalized abdominal tenderness and rigidity, repeated vomiting are the important signs of small bowel perforation.

Only physical examination is not sufficient for the diagnosis, as it is reliable in only 30% of blunt trauma injuries⁶. In early hours of injury, less than 50% of cases show free air, thus limiting the usefulness of erect x-ray chest or abdomen film. Apart from physical examination there are several methods for diagnosis of bowel perforation including Focused Abdominal Scan for Trauma (FAST). In our case we used it along with physical findings, computed tomography, diagnostic peritoneal lavage and diagnostic laparoscopy are other useful methods.

CONCLUSIONS

The present case report highlights the importance of detailed history and the specific mode of injury in the case of jejunum perforation. Immediate surgical exploration done by the Department of General Surgery in our hospital, although our patient presented after more than 72 hours of abdominal injury appropriately saved the life.

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Micro Health Project

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Keywords

*Community health diagnosis,
Micro health project, Prioritization.*

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ABSTRACT

Community health diagnosis is a comprehensive assessment of health status of the community in relation to its social, physical and biological environment. The purpose of community health diagnosis is to define existing problems, determine available resources and set priorities for planning, implementing and evaluating health action, by and for the community.

The community health diagnosis program began on 4th September 2015 and continued till 13th September 2015 in ward no 1 and 5 Rupakot VDC, Kaski, Nepal. The program was organized in following phases: data collection, data analysis, first community presentation, prioritization of need and planning of micro health project (MHP), implementation and evaluation of MHP, and final community presentation.

On the basis of the observed and the felt needs of the community, we found the real needs and prioritized them as follows.

For community: Proper water purification, information about common diseases, KAP on diseases, knowledge on TB and DOTS.

For school-going children: Education on environmental sanitation, education on personal hygiene - teeth brushing and hand washing, adolescent health education.

We launched micro health project (MHP) on these topics, conducting school-based as well as community-based programs.

INTRODUCTION

Community health diagnosis, the very first exposure of first year medical students with the community people, is in fact one of the best practical-oriented learning periods in medical life.

The community health diagnosis program began on 4th September 2015 and continued till 13th September 2015 in ward no.1 and 5 Rupakot VDC, Kaski. The program was organized in the following phases:

- Data collection
- Data analysis
- First community presentation
- Prioritization of need and planning of micro health project (MHP)

- Implementation and evaluation of MHP
- Final community presentation

We visited houses, interviewed, discussed with the community people, conducted free health camp, participated in community functions, attempted to sort out the health problems and did MHP on the basis of available resources. We took a little step, which might not have solved much of the problems. We don't expect our small steps to bring any radical changes. Our study and report may help the planner and administrative person to prioritize the real needs in planning of the village developmental works.

Rupakot VDC ward no. 1 and 5 governed 192 houses and a total population of 1164. Though Muslims and Gurungs are the major ethnic groups, the main religions are

Muslim and Hindu. CBR and CDR are 2.74 per thousand and 9.45 per thousand respectively, which are both lower than the national figure. PGR is 3.55% per annum. Thus, the population doubling time is 19.7 years. Median age of the population is 24.1 years.

The total literacy rate is 69%. About 17% and 8.3% of people smoke and drink respectively. The rates are particularly higher in indigenous and underprivileged communities according to our HH survey. Agriculture is the main occupation about 52% of the people executed it, followed by 24% that rely on foreign employment.

Majority of people (92%) preferred health institutions as their first place of treatment, which may owe to the easy accessibility to the only sub-health post. Most of the women were provided ANC though only 27% of deliveries were conducted at health institutions.

Immunization and nutritional status of children is good as malnutrition is not prevalent according to both Gomez and IAP classification.

The knowledge, attitude and practice (KAP) of the people were found to be satisfactory. Out of 200 household respondents, 142 responded to lack of cleanliness as the cause of diseases. About 84.29% of respondents had heard about diarrhea, and a majority of 74.54% explained the proper way of preparing *Jeevanjal*. Seventy five percent of the total respondents were familiar with worm Infestation and 79.5% of people have heard about typhoid. More than 50% of the people have heard about HIV/ AIDS (63.68%), goitre (66.67%) and TB (53.36%). However, maybe because of the lack of TB patients, only 8% of the people know about the treatment of TB i.e. directly observed treatment short-course (DOTS). This rate was low for malnutrition, where only 42.5% of the people were found to have heard of it. After analyzing, joint pain, typhoid and gastritis were found as the top three diseases.

On the basis of the observed and the felt needs of the community, we found the real needs and prioritized them as:

For community people:

- Proper water purification
- Information about common diseases
- KAP on diseases
- Knowledge on TB and DOTS

For school-going children:

- Education on environmental sanitation

- Education on personal hygiene: Teeth brushing and hand washing
- Adolescent health education

We launched micro health project (MHP) on these topics, conducting school-based as well as community-based programs.

To sum up, Rupakot (Ward no 1 and 5) is taking gradual steps towards awareness and development. Despite the dark clouds of ignorance and superstitious beliefs among the uneducated and underprivileged people, there exists a silver lining of education among the newer generations. Those who are already aware must themselves adopt a healthy behavior and should persuade others for the same. Only the combined effort of all the people can help Rupakot make a significant advancement towards attaining 'Panacea'-a state of complete health.

MICRO HEALTH PROJECT

Micro health project (MHP) is a small scale project that is planned, implemented and evaluated in the community setting to minimize the prominent health problems within limited resources and time.

MHP is a short term project designed to develop the health related awareness, skills and self reliance among the people on the priority basis of real needs involving resources with their maximum use.

The three phases of conduction of MHP:

- Planning and preparation
- Implementation
- Evaluation

PLANNING AND PREPARATION

Planning is the process of identifying key objectives and choosing alternative ways to accomplish a determined purpose. It was done in following steps.

1. Defining objectives and target groups
2. Resources collection
3. Fixing date and place for the implementation

Needs

During our community health diagnosis field visit, we observed various needs in that community (**Observed needs**) and through the focus group discussions and interviews, we found about their **felt needs**. Then by discussing with the community leaders at focus group

discussion and first community presentation, we came to conclude the **real needs** of the community.

Table 1: The observed, felt and real needs of the community

Observed needs	Felt needs	Real needs
Health education on environmental sanitation	Road	Examination of purity of water and knowledge to treat water
Safe drinking water	Drinking water	Knowledge about personal cleanliness
Knowledge on various diseases	Health service	Health awareness on environmental sanitation
Health services	School	Knowledge on common diseases
Sanitation	Higher education	Maternal and child health education
Water	Irrigation	
	Agricultural development	
	Employment	

RATIONAL FOR SELECTION OF MHP

1. Drinking purified water

83.3% of respondents drink water without any form of purification.

2. Hand washing

More than 50% of children didn't know the steps of hand washing.

3. Brushing teeth

29% of elderly and around 40% of children were not brushing teeth twice a day.

BASIS OF PRIORITIZATION

1. Limited resources and time
2. Limited knowledge
3. Willingness/ interest of the target group
4. Sustainability
5. Cost-effectiveness
6. Magnitude and severity of the problem
7. Availability of the target group

Table 2: Basis of prioritization

Teeth brushing and hand washing	Environmental sanitation	Adolescent health education	Knowledge on TB and DOTS	Safe drinking water	KAP on diseases
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Resources	++	-	++	+	+	+
Our knowledge	++	+	++	+	++	++
Target group	++	++	+	+	++	+
Sustainability	+	+	+	+	++	+
Cost effectiveness	+	+	+	+	+	++
Magnitude of the problem	++	+	+	+	+	+
Severity of the problem	++	-	++	+	++	+
Total +/-	12/0	6/2	10/0	7/5	11/0	9/0
Rank	1	6	3	5	2	4

The above Table 2 is the prioritization matrix. Here we have given the positive sign "+" and "-" signs to determine which health problem needs immediate attention and can be achieved. Here, we can easily see that teeth brushing and hand washing, safe drinking water and adolescent health education received the maximum + signs thus were categorized as the prioritized needs. On the basis of prioritization table, the following MHP topics were selected and then grouped under community and school based.

Table 3: Planning and implementation

	Target group	Activities	Evaluation
Safe drinking water	Community people	Demonstration of SODIS and charts	Feed back and questionnaire
Teeth brushing and hand washing	Primary and secondary students	Demonstration by using pie-charts, graphs and role play	Competition and observation

IMPLEMENTATION

As shown in the above figure, after completing the planning of our MHP we concluded to carry out the MHPs on: i) Safe drinking water and ii) Teeth brushing and hand washing.

As per the planning, to implement MHP

- (i) We demonstrated the SODIS method of water purification and presented various water purification

techniques with the help of charts and posters to a large mass of people.

- (ii) Secondly, we demonstrated the correct method of brushing teeth and the steps of hand washing to the school students of primary and secondary level. Also, we had prepared charts with lots of drawings that we stuck to their classroom walls for future reference.

EVALUATION

After conducting the MHP, we questioned the community people and the children to make sure that they had understood the message we were trying to convey. We also conducted competitions and observations to know how much of the learnt knowledge was being implemented by the people. Also, we understood that the sudden change in water purification may not be possible so we will conduct follow-up programs in the upcoming years to ensure that the methods we taught are being implemented.

CONCLUSIONS

Our ten days stay at the village was an eagle's eye to reveal its minute status. We had chance to put our theoretical knowledge into practice which was much harder than our expectations. Anyway, we learnt to overcome the hardships and achieve the target. Unity in diversity was the main theme in our group. Though being from different nook of the country with different opinion and abstract idea, a thought of learning together was always present in our heart. Whenever any conflict arose, we tried our best to solve it. We learnt to tackle with those people who were completely new to us. In the unfamiliar place, we ourselves learnt to seek help in many regards. The village appeared to be a desert and we turned ourselves as cactus, just adapted to the harsh situations and miseries of village life. We learnt to be acquainted with the problems due to sharp geographical variations. We learnt to respect and appreciate others. We got an opportunity to see, hear, touch, taste and feel the Nepalese village life.

Our community health diagnosis was of 10 days but it was love of people and the entire Bhirchowk that it passed like a moment to treasure through all our life.

First few days were difficult to cope up. An entire new ambience created around us, a complete new world for us. However it didn't create a hurdle for long. People were so candid, cooperative and helpful that we couldn't prevent ourselves from melting and molding in Bhirchowk's way. Bhirchowk and its people entirely lured us.

Nonetheless, we, medical students, learnt a lot and are really benefitted by CHD. We are indebted to the whole

community, villagers and department of community medicine for this opportunity.

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Community Survey Report: Lekhnath 2, Rithepani

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ABSTRACT

Community diagnosis is defined as the pattern of disease in a community described in terms of the important factors which influence the pattern -King Maurice ed (1982). It is based on collection and interpretation of the relevant data such as age, sex, population distribution by social groups, vital statistics and incidence and prevalence of important diseases of the area.

As per the curriculum of Tribhuvan University, B.Sc Nursing 1st year, we were provided an opportunity to fulfill the practicum of community health nursing in the city of seven lakes of Rithepani-2, Lekhnath, Kaski from July 17th to Aug 11th 2016. Total population of Rithepani ward no 2 was 4529, male population was 2100 and female population was 2429 respectively. Each of the five students was assigned with ten 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 community as a whole.

All the findings were presented among the key members of the community. On survey total population of 50 houses was found 239, among them 126 were male population and 113 were female population. Sanitation of the community was found appropriate. Moreover immunization services among under five children was adequate. Likewise, antenatal, intranatal and postnatal care was found appropriate and effective in all the houses. This signifies that people are utilizing the all health services in an appropriate manner.

Keywords

B. Sc Nursing, Community, Community diagnosis,

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INTRODUCTION

Community diagnosis is defined as the pattern of disease in a community described in terms of the important factors which influence the pattern -King Maurice ed (1982). It is based on collection and interpretation of the relevant data such as age, sex, population distribution by social groups, vital statistics and incidence and prevalence of important diseases of the area.

As per the curriculum of Tribhuvan University, B.Sc Nursing 1st year, we were provided an opportunity to fulfill the practicum of community health nursing in the city of seven lakes of Rithepani-2, Lekhnath, Kaski from July 17th to Aug 11th 2016. Total population of Rithepani ward no 2 was 4529, male population was 2100 and female population was 2429 respectively. Each of the five students was assigned with ten 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 community as a whole.

- Find out the services provided by the selected health related institutions through observation visits
- Carry out community diagnosis in the assigned community
- Communicate effectively with all concerned in providing client-centered care
- Prepare a list of the existing facilities in the community concerning environmental sanitation
- Apply the epidemiological approaches in solving the identified problems
- Carry out the responsibilities of a community health nurse in the health promotion of community people through environmental sanitation

Table 1: Plan of action

Date	Program	Place
17 th July - 19 th July, 2016	Tool orientation	College
17 th July - 25 th July, 2016	Community orientation	Community
17 th July - 31 st July, 2016	Community map	College and community
19 th July - 27 th July, 2016	Data collection	Community
21 st July- 31 st July, 2016	Data analysis and interpretation	College
26 th July - 12 th Aug, 2016	Home visiting	Community
27 th July - 7 th Aug, 2016	Health teaching	Community
1 st Aug, 2016	Data presentation	Community
8 th Aug, 2016	Health action	Community
9 th Aug - 12 th Aug, 2016	Follow up	Community
11 th Aug - 12 th Aug, 2016	Evaluation	College and community

RESULTS

Table 2: Demographic variables

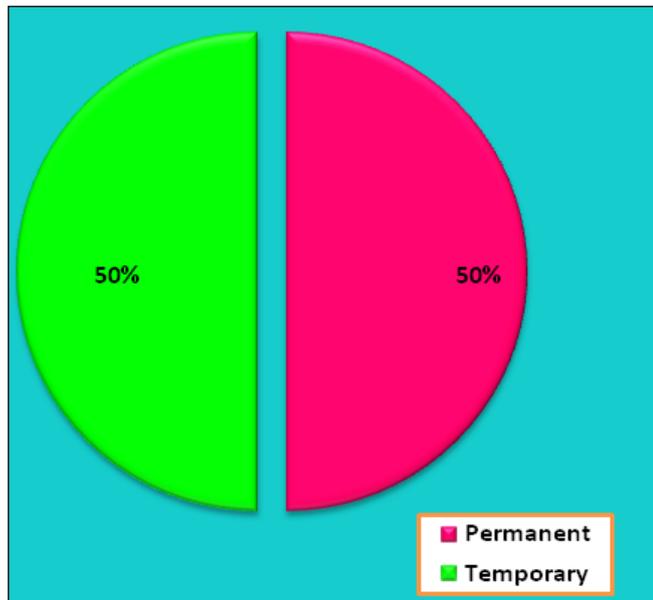
Variables	Frequency (f)	Percentage (%)
1. Gender		
Males	126	53%
Females	113	47%
2. Types of family		
Nuclear	35	70%
Extended	15	30%
3. Religion		
Hindu	47	94%
Buddhism	3	6%
4. Caste		
Upper caste group	20	40%
Relatively disadvantages Janajati	19	38%
Disadvantages Janajati	8	16%
Dalit	3	6%
5. Types of Houses		
Kachha	19	38%
Pakka	31	62%
6. Ventilation		
Well ventilated	36	72%
Poorly ventilated	14	28%
7. Latrine		
Water Sealed latrine	50	100%
8. Drainage system		
Closed	41	82%
Open	9	18%
9. Hand washing Habits		
Soap	48	96%
Ash	1	2%
Mud	1	2%
10. Treatment of water		
Treated	42	84%
Not treated	8	16%
11. Method of purification of water		
Boiling	20	40%
Filter	30	60%

In the data depicted in Table 2 shows more than half (53%) of the respondents were male population whereas more than one third (47%) were female population. Median age of population was 44 and the sex ratio was 4 : 3 male and female respectively. The dependency ratio was 28% and literacy rate was 92%. Disability rate was found to be zero. Similarly, majority (70%) of the family lives in the nuclear family. Regarding religion, majority (94%) of the respondents are Hindus and only 6%of respondents were Buddhist. In terms of caste, less than the half (40%) of the respondents were of upper caste group. More than the half (62%) of the families live in pakka type of houses. Similarly, majority (72%) families have well ventilation and all the families were found to use water sealed latrine. In terms of drainage system, majority (82%) of

the families used closed drainage system. Regarding hand washing practices, majority (96%) families use soap. Similarly majority (84%) of the families were found to treat water before drinking and more than half (60%) of the families drink water by filtering it.

Maternal Health on Lekhnath-2, Rithepani

Fig 1: Family planning (Eligible couples = 20)



From the above pie-chart it is depicted that among eligible couples half (50%) of the population were using permanent family planning methods whereas remaining half (50%) were using temporary family planning methods.

All the pregnant women of the Rithepani-2 have received antenatal care services from the respected health care institutions. And all the pregnant women had received tetanus toxoid during antenatal visit from the respected health care institutions.

Majority of the population went to health care centers during illness. Majority (92%) of the population follow the non-vegetarian food habits. Most of the families (62%) have separate kitchen and majority (78%) of the families have kitchen garden in their houses. Environmental sanitation was found to be good. Majority of the houses (86%) were found to have insects like cockroaches,

mosquitoes, houseflies which clearly indicate the risk for diseases.

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. As a health action, drama on the theme of diarrhoeal disease, alcohol addiction, smoking, care during pregnancy and postnatal period and domestic violence was conducted. Nutritional exhibition was also carried out along with real articles.

Acknowledgement

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कर्मण्येवाधिकारस्ते
My right is to my work



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

INTRODUCTION

Journal of Gandaki Medical College-Nepal (J-GMC-N) is an official, open access, peer reviewed, biannual, biomedical, scientific Journal published and owned by Gandaki Medical College Teaching Hospital & Research Centre Pvt Ltd.

SCOPE OF THE JOURNAL

The J-GMC-N publishes scientific articles related to research done in the field of biomedical sciences related to all the disciplines of the Medical Sciences, Public health, Medical education, Health care management, including ethical and social issues pertaining to health. The Journal will publish original articles, systematic reviews and meta-analyses, case reports, editorial articles, images, viewpoint, and letters to the editor.

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The editors review all submitted manuscripts initially. Manuscripts with serious scientific and technical flaws, insufficient originality, 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. Manuscripts are sent to two expert reviewers without revealing the identity of the contributors to the reviewers. Each manuscript is meticulously reviewed by the J-GMC-N editorial board based on the comments from the reviewers and takes a final decision on the manuscript. The contributors will be informed about the reviewers' comments and acceptance/rejection of manuscript. Articles accepted would be copy edited for grammar, punctuation, print style, and format.

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Introduction should be short and tell the reader why you undertook the study. Divide the introduction into three paragraphs. The first paragraph should be a very short 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.

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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.

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