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Research Article

1. **Gender Based Variation in Birth Outcomes in Terms of Mortality and Morbidity in Lumbini Province, Nepal** 1-5
   Bikash Lamichhane, Radha Darlami, Stuti Bhattarai, Bishal Pokhrel, Prashansa Gurung

2. **Readiness towards Self Directed Learning among Undergraduate Students in Teaching Hospital, Jumla** 6-10
   Ramu Maharjan, Ruchi Verma

3. **Prevalence and Patterns of Self-Medication among Undergraduate Students of National Medical College: A Cross-sectional Study** 11-15
   Binod Kumar Yadav, Khusboo Chaudhary, Diamond Dhungana, Aayush Joshi, Prashant Thakur

4. **Risk Factors, Prevalence and Assessment of the Degree of Pelvic Organ Prolapse: A Comparative Study in Secondary Level Hospital in Nepal** 16-23
   Sumitra Gautam, Dinesh Kumar Lamsal, Usha Rimal

5. **Comparative Ultrasonographic Assessment of Splenic Length in Non-Pregnant and Pregnant Women** 24-29
   Subodh Kumar Yadav, Renu Yadav, Anil Yadav, Abhishek Karn

6. **Prevalence of ESBL and MBL Producing Escherichia coli among Urinary Tract Infection Patients at Star Hospital** 30-35
   Sanish Karmacharya, Kiran Alle Magar, Suyog Pandit, Radha Tyata, Rupa Nepal, Rajesh Kumar Thakur,Ram Krishna Shrestha

7. **Histopathological Examination of Gallbladder in Cholecystectomy Specimens in Lumbini Medical College and Teaching Hospital** 36-41
   Laxmi Lama, Manisha Bajracharya Gubhaju, Dipesh Shrestha, Prasamsha Bajracharya Gubhaju

8. **Morphometric Study of Nose of Three Ethnic Groups of Rural Population of Jumla, Nepal** 42-46
   Ram Jiban Prasad, Subina Shrestha, Jyoti Mishal, Kumar Bhushal, Surendra Marasini, Umeshwor Prasad Thakur, Arunendra Kumar Amit

Case Report

9. **Management of Post- Partum Pulmonary Edema in an Intensive Care Unit of a Peripheral District Hospital: A Case Report** 47-51
   Satish Bijukchhe, Prashant Bidari, Ishwor Kumar Silwal, Subash Babu Lamichhane, Rupak Subedi, Samikshya Adhikari

10. **Proximal Tibial Bone Metastases in Patient with Breast Carcinoma: A Rare Case Report** 52-54
    Ajay Kumar Yadav, Amardeep Chaudhary, Asmita Raymajhi, Ganga Adhikari D

11. **Surgical and Orthodontic Management of Multiple Supernumerary and Impacted Teeth: A Case Report** 55-58
    Nabin Kumar Chaudhary, Sunil Kumar Singh, Suvin Chaudhary

Research Article

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Nepal Journal of Health Sciences

Gender Based Variation in Birth Outcomes in Terms of Mortality and Morbidity in Lumbini Province, Nepal

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Abstract

Introduction: Gender is a crucial factor in preterm outcomes and should be taken into account when designing clinical and experimental research. Fetal sex is an important risk factor for stillbirths and early neonatal mortality.

Objective: To assess the gender based variation in birth outcomes in terms of mortality and morbidity.

Methods: A descriptive cross-sectional study was conducted at maternity ward and NICU of Rapti Academy of Health Sciences. Records of 2326 neonates born from 17th July 2023 to 16th July 2024 were consecutively sampled and retrieved. Frequencies, mean and median of variables were calculated and for inferential analysis chi square test was used.

Results: Out of 2326 deliveries, majority of the women (66.3%) were aged 20-30 years. Most deliveries (91.5%) occurred at 37- 42 weeks, predominantly via normal vaginal delivery (66.8%). Of 2340 newborns, 55.1% were male, and 97.2% were live births, with 88% weighing 2500- 4000 grams. Neonatal morbidity was observed in 8.4% of cases, mainly caused by sepsis (29.6%) and jaundice (23.5%), among them almost two third (59.7%) were male. Only one male newborn had birth defect. Birth weight showed a significant association with gender (p=0.045).

Conclusion: This study found female neonates had higher rates of low birth weight, while male infants comprised 59.7% of morbidity cases. The findings emphasize the importance of antenatal monitoring for at risk pregnancies, particularly to address low birth weight in newborn, and targeted interventions for sepsis and jaundice as leading causes of morbidity. Multicentre studies are recommended to enhance the generalizability of these findings.

Keywords: Birth outcomes; gender; morbidity; mortality; newborns.

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Introduction

Gender specific medicine can be applied to the neonatal stage to assess sex differences related to diseases.[1] Gender is a crucial factor in preterm outcomes and should be taken into account when designing clinical and experimental research.[2] Fetal sex is an important risk factor for stillbirths and early neonatal mortality.[3] Male sex has been recognized as a risk factor for increased mortality in preterm neonates.[2,4,5,6] The male disadvantage in preterm outcomes is likely due to hormonal, genetic, and immunological differences.[2] They face higher risks of prematurity, growth restriction, respiratory and gastrointestinal complications [5,6] , neonatal death[7], still birth[8] and worse long-term neurological outcomes[9,10] Male fetuses are more prone to labor complications, including abnormal heart rate patterns, cord issues, and low Apgar scores at 5 minutes.[8]

Congenital anomalies like cleft lip and polydactyly are more common in males, whereas neural tube defects and cleft palate occur more in females.[11-13] Male infants face an elevated risk of neurological, pulmonary, cardiovascular, and infectious health issues, as well as a greater overall mortality rate, compared to female infants born at the same preterm gestation.[9] The neonatal mortality rate is 21 deaths per 1,000 live births.[14] Gender-based variations in perinatal outcomes, particularly among neonates, are gaining increasing attention in neonatal healthcare. Understanding these differences is essential for targeted interventions and equitable care. This study examines gender based variations in neonatal mortality and morbidity.

Methods

The study was descriptive cross-sectional study. Data collection was done through maternity register of maternity ward and NICU of Rapti Academy of Health Sciences. Around 3000 deliveries were registered at RAHS from 17th July 2023 to 16th July 2024 through the Maternity Register. After excluding estimated 1000 case records with missing/incomplete data, the calculated sample size was 2000 records. A final sample of 2326 neonatal records that met the inclusion criteria was selected using consecutive sampling. Ethical clearance letter was taken from IRC-RAHS with Ref. No. 378. Permission letter also obtain from Rapti Academy of Health Sciences with Ref. No. 357.

The inclusion criteria were neonates with available birth records and documented gender information and the exclusion criteria was cases with missing or incomplete data between the study periods. Data entry was done in Epidata and Data was analyzed on SPSS Version 16.0. Descriptive analysis was used to summarize the characteristics of the study variables, including frequencies, mean and median. Inferential analysis was employed to examine gender-based differences in neonatal outcomes, including mortality and mortality rates. P value of <0.05% is considered as statistically significant.

Results

Out of 2326 cases, about one- third of the women were between 20-30 (66.3%) years of age with mean age of 25.43 years. The majority (91.5%) of the women had delivery at gestational age between 37-42 weeks. Among 2340 newborns, 1562 (66.8%) were delivered through normal vaginal delivery, 683 (29.2%) through Caesarean Section and 95 (4.1%) through instrumental delivery. (Table 1). Almost all women (99.4%) had single fetus. Out of total 2340 newborn including 14 twins, more than half (55.1%) of newborns were male. (Table 2)

Table 1: Mother related variables.

Variables	Frequency (f)	Percentage (%)
Age of mother (n=2326)		
Less than 20 years	267	11.5
20-30 years	1543	66.3
30-40 years	499	21.5
40 years and above	17	0.7
Gestational Age (n=2326)		
Less than 37 weeks	177	7.6
37-42 weeks	2128	91.5
More than 42 weeks	21	0.9
Mode of Delivery (n=2340)		
Normal	1562	66.8
Caesarean Section	683	29.2
Instrumental	95	4.1

Table 2: Child related variables.

Variables	Frequency (f)	Percentage (%)
Number of fetus (n=2326)		
Single	2312	99.4
2 and more	14	0.6
Gender of Newborn (n=2340)		
Male	1290	55.1
Female	1050	44.9

Among 2340 newborns, the majority (97.2%) were live births while 65 were stillbirth (2.8%). APGAR score at 1 minute and at 5 minutes both 86.7% and 98.6% respectively fall under 7-10 scores of grading of APGAR. The majority (88%) of newborns had a birth weight between 2500-4000 grams. Additionally, only one newborn had birth defect. (Table 3)

Table 3: Neonatal outcome related variables.

Variables	Frequency (f)	Percentage (%)
Pregnancy Outcome (n=2340)		
Still birth	65	2.8
Live birth	2275	97.2
APGAR score at 1 minute (n=2275)		
0-3	36	1.6
4-6	266	11.7
7-10	1973	86.7
APGAR score at 5 minutes (n=2275)		
0-3	2	0.1
4-6	30	1.3
7-10	2243	98.6
Birth Weight (n=2275)		
<2500 grams	240	10.5
2500-4000 grams	2003	88
>4000 grams	32	1.4
Birth defect (n=2275)		
No	2274	99.95%
Yes	1	0.04%

About 191 (8.4%) neonates had morbidity, with the most common conditions being neonatal Sepsis (29.6%), neonatal jaundice (23.5%) and meconium stain liquor (15%). (Table 4). There were only 2 deaths (0.1%), with the major cause of neonatal mortality being intrauterine growth restriction accounting for 66.7%. (Table 5)

Table 4: Neonatal morbidity related variables.

Variables	Frequency (f)	Percentage (%)
Presence of Neonatal morbidity (n=2275)		
No	2084	91.6
Yes	191	8.4
Types of Morbidity (n=191) (Multiple response)		
Neonatal Sepsis	67	29.6
Neonatal jaundice	53	23.5
Meconium Stain Liquor	34	15
Birth Asphyxia	18	8
LBW	17	7.5
Congenital Pneumonia	10	4.4
IUGR	6	2.7
Others	21	9.3

Table 5: Neonatal Mortality related variables.

Variables	Frequency (f)	Percentage (%)
Neonatal Mortality (n=2275)		
No	2273	99.9
Yes	2	0.1
Cause of Neonatal mortality (n=2) (Multiple response)		
Intrauterine Growth restriction	2	66.7
Birth Asphyxia	1	33.3

Gender of newborn is statistically significant with birth weight of newborn (p=0.045), while other variables such as APGAR score at 1 minute and 5 minutes, birth defect, neonatal morbidity and mortality have no significant association with gender of newborn. (Table 6)

Table 6: Association between Gender of newborn and birth outcome, neonatal morbidity and mortality
n=2275

Variables	Gender of newborn		p value
	Male f (%)	Female f (%)	
APGAR score at 1 min			
0-3	21 (58.3)	15 (41.7)	0.779
4-6	142 (53.4)	124 (46.6)	
7-10	1091 (55.3)	882 (44.7)	
APGAR score at 5 min			
0-3	0 (0)	2 (100)	0.253
4-6	18 (60)	12 (40)	
7-10	1236 (55.1)	1007 (44.9)	
Birth weight			
LBW (<2500)	115 (47.9)	125 (52.1)	0.045*
Normal (2500-4000)	1119 (55.9)	884 (44.1)	
Overweight (>4000)	20 (62.5)	12 (37.5)	
Birth defect			
Yes	1 (100)	0 (0)	0.367
No	1253 (55.1)	1021 (44.9)	
Newborn morbidity			
Yes	114 (59.7)	77 (40.3)	0.185
No	1140 (54.7)	944 (45.3)	
Neonatal mortality			
Yes	1 (50)	1 (50)	0.884
No	1253 (55.1)	1020 (44.9)	

*Statistically Significant

Discussion

This study analysed 2,326 cases of delivery at Rapti Academy of Health Sciences over one year period, providing insights into

maternal and neonatal outcomes in a tertiary care setting in Nepal. The findings highlight several key trends in maternal demographics, delivery methods, neonatal health, and gender based differences in birth outcomes. In this study, the majority of mothers (66.3%) were between 20- 30 years of age with a mean age of 25.43 years, reflecting a predominantly young reproductive population, aligning with national demographic trends.[14] In addition, male newborns accounted for more than half of all births (55.1%). Most deliveries (91.5%) occurred at term (37-42 weeks) which suggests good antenatal surveillance and care, while 7.6% were preterm (<37 weeks), which shows the consistency with global data.[3] The caesarean section rate (29.2%) was notably high 5,8, possibly due to the study site is referral centre of this region.

The live birth was high (97.2%), with a stillbirth of 2.8%, which is similar to the data of National Demographic Health Survey.[14] Majority of new-borns had normal APGAR scores (86.7% at 1 minute, 98.6% at 5 minutes), indicating effective intrapartum and immediate postpartum care. Birth weight distribution showed that 88% of new-borns were normal weight (2500-4000g), while 10.5% were low birth weight (LBW), a known risk factor for neonatal complications.[4] Only one case of congenital birth defect was reported, which contrasts with studies suggesting higher rates of structural anomalies.[11,13] Importantly, statistical analysis revealed a significant association between gender and birth weight ($p = 0.045$), with a higher proportion of female neonates presenting with low birth weight. This finding aligns with other studies suggesting that male infants generally have higher birth weights than females.[1,4] However, no significant gender differences were found in APGAR scores, morbidity, or mortality, contradicting some studies suggesting male preterm infants has worse outcomes.[2,9]

Neonatal morbidity was reported in 8.4% of live births, with neonatal sepsis (29.6%), neonatal jaundice (23.5%), and meconium-stained liquor (15%) being the most common complications. This result contrasts with another study where pulmonary morbidity dominated along with intracranial haemorrhage and urinary tract infection.[5] Despite this, neonatal mortality was extremely low (0.1%), with both deaths linked to intrauterine growth restriction (IUGR) and birth asphyxia. This contrasts with higher mortality rates in another study[5], and aligns with previous studies linking IUGR and birth asphyxia to adverse outcomes in resource-limited settings.[3] The study was based on a single hospital record. Therefore, findings cannot be generalized at the district and national level.

Conclusion

This study provides valuable insights into maternal and neonatal health in a Nepalese setting. While most newborns had normal APGAR scores and birth weights, a significant gender-based difference was observed in birth weight, with female neonates more likely to be low birth weight (LBW). However, no significant gender disparities were found in morbidity or mortality, despite male infants constituting a higher proportion (59.7%) of neonatal morbidity cases. Since this study was conducted at a single centre, its findings may not be widely applicable, in order to strengthen generalizability. Further research with larger sample size in a multi-center approach is recommended to enhance the generalizability of these findings.

Conflict of Interest: None

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Readiness towards Self Directed Learning among Undergraduate Students in Teaching Hospital, Jumla

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Abstract

Introduction: Self-directed learning means self-managed learning that plays important role in facilitating adult learning and upgrading knowledge and skills of individual's independently. Readiness for self-directed learning implies that the learners are responsible for their own learning through a student centered learning method. Self-directed learning strategies empower students to handle their academic work effectively and adapt to challenging situations.

Objective: To assess the readiness toward self-directed learning among undergraduate students in teaching hospital Jumla.

Methods: A cross-sectional study was conducted among 277 undergraduate students of Karnali Academy of Health Sciences using total enumerative sampling technique to select sample. Self-Directed Learning Readiness Scale tool was used to collect the data. All collected data was analyzed using descriptive statistics and inferential statistics.

Result: This study finding revealed that majority (72.9%) of undergraduate students had high level of readiness towards self- directed learning whereas more than one fourth (27.1%) have low level of readiness. There was statistically significant association between level of readiness towards self- directed learning and age (p=0.003), academic program (p=0.004), and academic year (p=0.018).

Conclusion: Although the findings were encouraging, indicating that students had high level of readiness towards self-directed learning, there remains need to implement strategies that strengthen student's readiness for self- directed learning, with particular attention to areas on subscales where students scored comparatively lower score such as self-management and self- control.

Keywords: Readiness; self -directed learning; students.

Introduction

Self-directed learning (SDL) first introduced by Malcolm Knowles in 1960s, is a process in which individuals take initiative with or without the help of others, in diagnosing learning needs, formulating goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies and evaluating learning outcomes.[1] Readiness of SDL means learners are responsible for their own learning through student-centered learning.[2] It allows learners to take ownership of their education, promoting responsibility and confidence to plan and organize their learning effectively.[3] With constantly evolving new practices and guidelines based on evidences; medical professionals needs to remain updated.[4,5] It is essential to develop independent

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learning abilities, enhanced responsibility, assertiveness, and accountability that fosters self-confidence in practice, promotes greater independence, and encourages self-discipline.[6,7]

Study conducted in Malaysia revealed 65% of students were ready for SDL whereas India showed 59.3% had low level of readiness.[8,9] Study conducted in Pokhara and Banke showed 72.7% and 87.2% have readiness respectively.[10,12] High readiness level empowers critical thinking, problem-solving, and adaptability.[3] Whereas, low readiness can lead to poor motivation, low academic performance, limits critical thinking, weak time management, and reduces confidence.[8,9] Hence, study aims to assess level of readiness towards SDL among the undergraduates students.

Methods

A cross-sectional study design was adopted to find out readiness toward self-directed learning among undergraduate students in teaching hospital, Jumla. The study was conducted among the undergraduate students studying at Karnali Academy of Health Sciences (KAHS) Jumla, Nepal from 25th May 2025 to 13th June 2025. Non-probability total enumerative sampling technique was used to select 277 students from Bachelor of Medicine and Bachelor of Surgery (MBBS), Bachelor of Public Health (BPH), Bachelor of Pharmacy (B. Pharm). All students willing to participate and give informed written consent were included in study and those who were absent during data collection were excluded from the study. Pretesting was done in 10% of the population prior to the conduction of final study among the undergraduate nursing students who were not involved in the final study. Data collection tool comprised of two parts .i.e. Part I consisted questionnaire related to socio-demographic information and academic information of the students and Part II consisted Self Directed Learning Readiness Tool. It comprises three subscales: self-management (13 items, maximum score 65), desire for learning (12 items, maximum score60), and self-control (15 items, maximum score 75). The scale has a total of 40 items scored on a 5-point Likert scale, with a maximum score of 200. A score above 150 indicates a high level of SDL readiness, while a score below 150 reflects low readiness.[11]

After providing each student with a clear explanation of the study's objectives and purpose, informed written consent was obtained and then data was collected. Anonymity was preserved by coding each questionnaire and asking students not to mention name in tool. Confidentiality was maintained by using data only for research purposes, giving code number to each student and storing all the information securely in a cabinet as well as password protected computers. To protect their rights, students were allowed to withdraw the study at any time. Data were used solely for research purpose. The study protocol was approved by the Institutional Review Committee of Karnali Academy of Health Sciences, Jumla Ref: 2025/037. Data were coded and entered into SPSS version 20 for statistical analysis. Descriptive statistics such as mean, median, standard deviation, frequency and percentage were used to summarize variables. Association between level of readiness and sociodemographic and academic variables were analyzed by using Chi-square test.

Results

Among 277 respondents, minimum age was 18 years and maximum was 34 years with the mean age of 21.53+ 2.581 where 65% were male. Regarding marital status 95.3% of respondents were unmarried and 73.6% belonged to nuclear families. Most (65%) of the respondents were from families with monthly income of NRS ≥50000 with mean income of 80277.98. (Table 1)

Table 1: Socio demographic information of the respondents.

Variables	Frequency (f)	Percentage (%)
Age (Years)	**Mean + SD = 21.53+ 2.581**	
Gender		
Female	97	35
Male	180	65
Current place of residence		
Home	9	3.33
Hostel	86	31
Rental rooms and Home	182	65.7
Marital Status		
Married	13	4.7
Unmarried	264	95.3
Family Type		
Joint	73	26.4
Nuclear	204	73.6
Monthly Family Income (in NRS)		
<50000	97	35
≥50000	180	65

Academic information of the respondents, where academically 61.7% of the respondents were from MBBS. Less than half (46.9%) are in their 2nd academic year and 51% had their school level education from private school. The choice of program was voluntary for majority (89.9%) of respondents. (Table 2). About 72.9% demonstrated a high level of readiness whereas 27.1% of respondents scored low level of readiness for SDL. (Table 3)

Table 2: Academic information of the respondents.

Variables	Frequency(f)	Percentage (%)
Academic Program		
Bachelor of Public Health	42	15.2
Bachelor of Pharmacy	64	23.1
Bachelor of Medicine Bachelor of Surgery	171	61.7
Academic year		
1st Year	77	27.8
2nd Year	130	46.9
3rd Year	50	18.1
4th Year	20	7.2
Type of Previous School		
Government	135	49
Private	142	51
Voluntary Selection of program		
No	28	10.1
Yes	249	89.9

Table 3: Respondents level of readiness for self-directed learning.

Level of readiness	Frequency (f)	Percentage (%)
High level	202	72.9
Low level	75	27.1

Table 4: Association between level of readiness and socio-demographic variables.

Variables category	Level of readiness		p-value
	Low level f (%)	High level f (%)	
Age (Years)			
≤20	39(37.15)	66(62.85)	**0.003***
>20	36(20.9)	136(79.1)	
Gender			
Female	29(29.9)	68(70.1)	0.438
Male	46(25.56)	134(74.44)	
Residence			
Hostel	23(26.75)	63(73.25)	0.934
Rental and others	52(27.22)	139(72.78)	
Marital Status			
Married	4(30.77)	9(69.23)	0.759
Unmarried	71(26.9)	193(73.1)	
Family Type			
Joint	22(30.13)	51(69.87)	0.493
Nuclear	53(25.9)	151(74.1)	
Monthly Family Income (in NRS)			
<50000	24(24.75)	73(75.25)	0.521
≥50000	51(28.33)	129(71.67)	

*Chi square test, p<0.05: statistically significant.

There is statistically significant association between level of readiness toward self-directed learning and age (p=0.003) which reflects that higher the age of students higher the readiness towards self-directed learning. Whereas other socio-demographic variables have no significant association with level of readiness toward self-directed learning. (Table 4).

B-pharmacy students had significantly high level of readiness towards SDL then BPH and MBBS students (p=0.004), and with increase in academic year the level of readiness towards SDL also increases (p=0.018). Whereas, there is no significant association between level of readiness toward self-directed learning and other academic variables. (Table 5)

Table 5: Association between level of readiness and Academic variables.

Variables category	Level of readiness		p-value
	Low level f (%)	High level f (%)	
Academic Program			
BPH	12(28.6)	30(71.4)	**0.004***
B-Pharmacy	7(10.94)	57(89.06)	
MBBS	56(32.75)	115(67.25)	
Academic Year			
1st Year	30(38.96)	47(61.04)	**0.018***
2nd Year	33(25.38)	97(74.62)	
3rd Year	7(14)	43(86)	
4th Year	5(25)	15(75)	
Type of Previous School			
Government	35(25.92)	100(74.08)	0.675
Private	40(28.17)	102(71.83)	
Voluntary Selection of program			
Yes	65(26.1)	184(73.9)	0.343
No	10(34.5)	19(65.5)	

*Chi square test, p<0.05: statistically significant.

Discussion

A cross-sectional study was conducted to identify level of readiness towards self-directed learning among 277 undergraduate students selected by using total enumerative sampling technique. In the study majority (72.9%) of the respondents had high level of readiness towards SDL whereas less than half (27.1%) of respondents scored low level of readiness for SDL. This result is similar to the study conducted in Pokhara, Kathmandu and Eastern Nepal where 72.7%, 69.2%, 79.3% respectively have demonstrated high level of readiness towards SDL.[10,13,14] The findings of the study is in contrast to a study conducted in Banke where 87.2% of demonstrated a high level of readiness for SDL.[12] Similarly, the finding of this study is in contrast to a study conducted in Malaysia showed 65% had only scored high scores of SDL.[8] The finding of the study is in contrast to a study conducted in Pondicherry, India showed only less than half (44%) had high scored of SDL.[15]

This study reveals that there was statistically significant association

between level of readiness towards self-directed learning and socio-demographic variable like age (p=0.003). This finding were similar to a study conducted in Banke showed statistically significant association between students who were above 20 years of age had a significantly higher level of readiness for self-directed learning compared to those below 20 years (χ^2 = 5.225, p = 0.022). Whereas there is no significant association between gender, residence, marital status, family type and monthly family income. The findings of the study is in contrast to study conducted in Banke there was a significant association between type of family (p = 0.026) had a higher level of readiness for self-directed learning with Nuclear family compared to joint family.[12]

This study reveals that there was significant association between level of readiness toward self-directed learning and academic program (p=0.004), and academic year (p=0.018). This finding is similar to the study conducted in Banke and Kathmandu (p= 0.004 and p= 0.045) respectively which showed that level of readiness for self-directed learning were significant association with academic year.[12,14] There is no any other significant association between level of readiness towards self-directed learning and other academic variables such as type of previous school and voluntary selection of program. The limitation of the study is that the study was conducted in a single institute so the findings may not be generalizable to students in other institutions or regions of Nepal. Data were collected using a self-administered questionnaire, which might introduce response bias, as respondents might have overestimated or underestimated their level of readiness for self-directed learning.

Conclusion

Majority of undergraduate students of teaching hospital, Jumla had high level readiness toward SDL, which is important for lifelong learning and professional development. Statistically significant association was found between readiness for SDL and socio-demographic variables like age and academic variables like academic program, and academic year. A large scale studies can be done to assess the level of readiness towards self-directed learning of undergraduate students and influencing factors and comparative study can be done in different health institutional setting.

Conflict of Interest: None

AUTHOR'S CONTRIBUTION AND ORCID IDS

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Prevalence and Patterns of Self-Medication among Undergraduate Students of National Medical College: A Cross-sectional Study

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Abstract

Introduction: Self-medication refers to the use of medicines by individuals to manage symptoms or illnesses that they identify themselves without consulting a healthcare professional. In Nepal, easy access to medicines contributes to the widespread practice of self-medication. Self-medication behavior among young people may also be influenced by peer pressure.

Objective: To assess the prevalence and patterns of self-medication among undergraduate medical students.

Method: A descriptive cross-sectional study was conducted among undergraduate bachelor of medicine and bachelor of surgery students at National Medical College, Birgunj, from March to June 2022. The calculated sample size was 235 students. Semi-structured questionnaire was used and analyzed using Microsoft Excel 2016 and statistical package for the social sciences version 26.

Results: The prevalence of self-medication among students was found to be 32.8% (n = 77). The majority of respondents were male (63.4%), the most common age groups were 20-21 years (79, 33.6%) and 22-23 years (73, 31.1%). Second-year students constituted the largest group 81 (34.5%). Fever, headache and cough were common symptoms showing 39(50.6%), 36(46.8%) and 26(33.8%) respectively. Forty-nine (63.6%) participants confirmed the medication's prescription and its expiration date. Only 19 (24.7%) had government sponsored insurance.

Conclusion: Self-medication was common among undergraduate medical students. Fever, headache, and cough were the most frequently reported symptoms, while saving time and old prescriptions were the main reasons. Most students used allopathic medicines. Despite medical knowledge, some experienced adverse effects and many lacked health insurance, highlighting the need to promote rational drug use and appropriate healthcare-seeking behavior.

Keywords: Fever; headache; self-medication.

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Introduction

World Health Organization defines self-care as 'the ability of individuals, families and communities to promote their own health, prevent disease, maintain health, and to cope with illness with or without the support of a health or care worker'.[1] Increasing practice of self-medication poses a challenge to healthcare systems as more people gain access to medical information and pharmaceutical products. Compared to other regions of the world, the mean prevalence of self-medication was higher in Eastern European and Asian nations[2] with 57% in the USA and 68% in Europe, and significantly higher rates in underdeveloped countries with Kuwait having the highest rate at 92% of adolescents. Likewise 31% of Indians, 51% of Pakistanis, and 59% of Nepalese self-medicate.[3]

Several studies have been conducted in Nepal, with 26.2% of medical students in Pokhara, 35.1% of dental students in Kathmandu, and 50.7% of nursing students in Chitwan. Ninety-one percent of health sciences students have self-prescribed paracetamol, according to a study conducted at the B. P. Koirala Institute of Health Sciences.[4] However, limited studies have explored patterns of self-medication in relation to safety practices, academic year, and health-insurance status. It is imperative to assess the prevalence and patterns of self-medication among medical students.

Methods

A cross-sectional study was conducted among undergraduate MBBS students at National Medical College. The study period was from March-June 2022, after receiving Institutional Review Committee ethical approval with Ref. F-NMC/586/078-079. A total of 480 students from first to fifth year were enrolled in the MBBS program. Assuming that proportion of student having self-medication was 50% and taking 95% Confidence interval and 5% error sample size was calculated using formula $N_1= z^2pq/ d^2$, where z = z score for desired confidence interval (1.96 for 95%), p = 50%, q = 1-p= 50%, d =5%, N_1= Estimated sample size

n=Final sample size

= 1.96 X1.96X0.50X0.50/0.05X0.05

= 0.9604/ 0.0025

= 384.16

For the finite population N=480,

$n=N_1/1+ (N_1-1)/N$

=384.16/ 1+ (384.16-1)/480

=213.6447

Final sample size of 235 was taken after adding 10% attrition rate.

A pre-tested semi-structured questionnaire was adopted from previously published studies.[5,6,8] Participants were selected using simple random sampling. The questionnaire was pre-tested among 10% of students i.e. 25 participants to assess clarity and reliability. Written informed consent was obtained from all participants. The study evaluated a number of factors, such as demographic characteristics, the causes of self-medication, related signs and symptoms and their presence of health insurance. Data were entered using Microsoft Excel 2016 and analyzed using Statistical Package for the Social Sciences (SPSS) version 26. The data was summarized using descriptive statistics. Frequencies and percentages were presented in tables and figures were used to interpret the results.

Results

A total of 235 MBBS students had participated in the survey. Among them, the majority of respondents were male 149 (63.4%) whereas females were 88(36.6%). About 25 (10.6%) were aged between 18-19 years, 79 (33.6%) were aged 20-21 years, 73 (31.1%) were aged 22-23 years, and 43 (18.3%) belonged to the 24-25 years age group. A smaller proportion, 15 (6.4%), were older than 25 years. The highest proportion were second year students 81 (34.5%), followed by first-year students 56 (23.8%), fourth-year students 49 (20.9%), third-year students 25 (10.6%), and fifth-year students 24 (10.2%). (Table 1)

Table 1: Demographic characteristics of students.

Variable	Frequency (n)	Percentage (%)
Age		
18-19 Years	25	10.6
20-21 Years	79	33.6
22-23 Years	73	31.1
24-25 Years	43	18.3
>25 Years	15	6.4
Sex		
Male	149	63.4
Female	86	36.6
Religion		
Hindu	212	90.2
Muslim	16	6.8
Others	7	3
MBBS Academic Year		
I	56	23.8
II	81	34.5
III	25	10.6
IV	49	20.9
V	24	10.2

In the span of three months, 77 (32.8 %) students self-medicated, 9 (3.8%) were unsure and 149 (63.4%) reported not practicing self-medication. From the 77 participants who went for medication it was found that 29 (37.7 %) answered the cause being saving times. Around 19(24.7%) participants had followed their old prescription as shown in Figure 1. Among the 77 participants, 9 (11.7%) had medicines of family member. Nine (11.7%) reported

that the doctor or clinic was far from home, 8(10.3%) followed the pharmacist advice without doctor consultation, 7(9.1%) stated high fees for doctor and doctor being too busy 2(2.5%). Students who reported using medical knowledge gained through text books or peers were 22(28.5%).

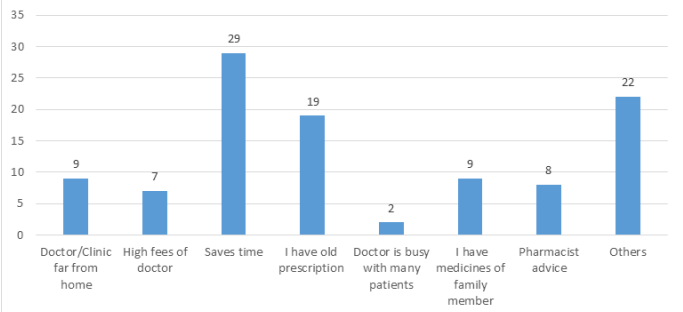

Figure 1: Reason of participants for self-medication practices.

Table 2: Signs and Symptoms for which self-medication was practiced among participants.

Sign and symptoms	Frequency (n)	Percentage (%)
Fever	39	50.6
Headache	36	46.8
Cough	26	33.8
Runny nose	23	29.9
Acidity	17	22.1
Diarrhea	11	14.3
Body pain	9	11.7
Vomit	8	10.4
Menstruation problem	7	9.1
Dandruff	5	6.5
Migraine	4	5.2
Hair fall	3	3.9
Asthma	3	3.9
Dental pain	3	3.9
Muscle pain	3	3.9
Rash	2	2.6
Wounds	2	2.6
Nausea	2	2.6
Eye infection	2	2.6
Ear pain	1	1.3
Diabetes	1	1.3
Skin disease on open area	1	1.3
Urination problem	1	1.3

The use of medication for various signs and symptoms, showing that fever 39 (50.6%) and headache 36 (46.8%) were the most frequently reported conditions. This was followed by cough 26 (33.8%) and runny nose 23 (29.9%). Gastrointestinal symptoms such as acidity 17 (22.1%) and diarrhea 11 (14.3%) were moderately reported. Other complaints including body pain, vomiting, menstrual problems, dandruff, migraine, hair fall, and muscle pain were less common. Very few participants reported for conditions such as asthma, dental pain, rash, wounds, nausea, eye or ear infections, diabetes, skin diseases on open areas, and urination problems, indicating that it was predominantly for common and minor health conditions. (Table 2)

Among the participants, 49 (63.6%) reported verifying their prescription and checking the expiration date of the medication. Additionally, 24 (31.2%) stated that they checked sometimes, while 4 (5.2%) did not confirm their prescription details, as illustrated in Figure 2.

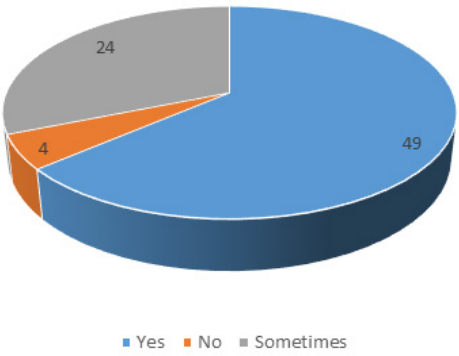

Figure 2: Practice of checking prescribing information prior to self-medication.

A total of 13 (16.9%) participants reported experiencing adverse events after taking the medication. Self-medication towards chronic diseases lasting more than 3 months was done by 7 participants 9.1%. Participants used allopathic medications being 60(77.9%), followed by ayurvedic medicines 11(14.3%) and homeopathic medicines 6 (7.8%). Of the total self-medicated participants, 45 (58.4%) had no health insurance coverage. Government-sponsored insurance was reported by 19 (24.7%), while 3 (3.9%) had rural insurance. Private medical insurance and other forms of insurance were each reported by 5 (6.5%) of students. (Figure 3)

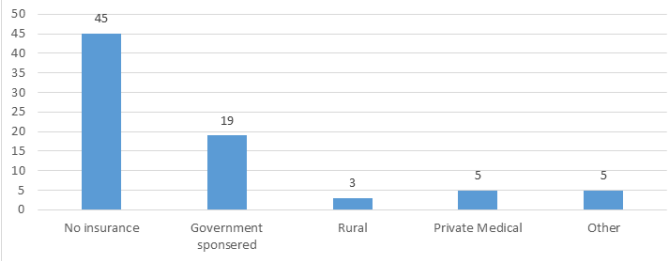

Figure 3: Health insurance coverage of self-medicated participants.

Discussion

Out of the total participants, 77 students (32.8%) reported

practicing self-medication, indicating that nearly one-third of the respondents engaged in self-medication. Students at Imam Abdulrahman Bin Faisal University (previously the University of Dammam), which is situated in the city of Dammam in the Eastern Province of Saudi Arabia, participated in a descriptive research. According to reports, 19.61% of pharmacy college students self-medicate. The medical college reported a 49.3% prevalence of self-medication.[7] similarly, a study conducted at Kathmandu Medical College Teaching Hospital (KMCTH), Duwakot, among basic science medical students, revealed a 67.7% prevalence.[8] According to the Janaki Medical College and Teaching Hospital (JMCTH) research, 90.3% of students have self-medicated within the previous six months.[12] The variation in prevalence between studies may be due to differences in sample size, study population, and study duration. Nineteen percent of medical university students self-medicated, prevalence of self-medication varies by nation because of cultural, political, and economic factors.[9]

Male respondents made up 63.4% of the second year respondents in our study who were between the ages of 20 and 23. According to a study by Banerjee et al. in West Bengal, female students were more likely than male students to use self-medication[9], medical college in Maharashtra, India where self- medication practice was higher 72.1% and significantly higher in females.[10] In general second year students belongs to the age group and male population were higher due to greater participation of the study. In the present study, fever was the most common reason for self-medication (50.6%), followed by headache (46.8%) and cough (33.8%). Regarding the reasons for practicing self-medication, the majority of participants reported convenience and prior experience with similar symptoms as it saves time, with 29 (37.7%) indicating this as the primary reason. Additionally, 19 (24.7%) participants relied on old prescriptions, 8 (10.3%) sought advice from pharmacists, 9 (11.7%) reported that the doctor was far from home, doctor are too busy 2(2.5%) and 7 (9.1%) mentioned high consultation fees as contributing factors.

A similar pattern was observed in a study conducted at Kathmandu Medical College Teaching Hospital, where fever (48.62%), headache (46.33%), and cough (25.69%) were the most common conditions for which participants practiced self-medication. The primary motivation reported in that study was saving time (44.5%), which was identified as the main reason for self-prescription. This was followed by the use of old prescriptions (32.11%) and seeking advice from pharmacists (18.8%). Other reasons included the doctor being far away (12.39%), high consultation fees (7.34%), using medicines prescribed for family or friends (7.34%), and doctors being busy with many patients (1.83%). Most prevalent source of drug information was by pharmacist with 52.99% at JMCTH.[12] These findings are comparable to the results of the present study, indicating similar patterns and motivations for self-medication going through hectic schedules.

Self-medication is an important component of self-care, involving the selection and use of medicines, including herbal and traditional products, to treat self-identified illnesses or the continued use of previously prescribed medications for chronic or recurrent conditions.[13] Allopathy, Ayurveda and homeopathic medication as 60 (77.9%), 11(14.3%) and 6(7.8%) respectively in our study. Consistent with previous research, the majority of people practiced allopathic treatment, followed by Ayurveda and homeopathic medicine.8 The study shows that the population under examination, which was probably made up of medical students, has a clear and strong preference for contemporary medicine (allopathy), with a smaller and secondary preference for traditional systems.

About 19 (24.7%) had government-sponsored insurance, 3 (3.9%) had rural insurance, 5 (6.5%) had private medical insurance, and 5 (6.5%) had other insurance. Only 45 participants nearly 58.4% did not have any kind of insurance. This displays the clues to draw attention to the significant coverage gaps. All medical students ought to be required by their schools to hold a current health insurance policy.[14] This could be because students and their parents are unaware of their health insurance knowledge. Health insurance directly involves the government and communities.[15]

This study has some limitations. It was conducted among undergraduate MBBS students from a single medical college, which may limit generalizability. The reliance on self-reported data could introduce recall bias, and detailed information on medications used, duration of use, and symptom timelines was not extensively collected, limiting a full understanding of participants' health and medication practices.

Conclusion

The present study found that self-medication was a common practice among undergraduate medical students. Fever, headache, and cough were the most frequently reported symptoms leading to self-medication. The main reasons for practicing self-medication included saving time, prior experience with similar symptoms, and the use of old prescriptions. Most students relied on allopathic medicines, although a proportion also used Ayurvedic and homeopathic treatments. Despite having some medical knowledge, a notable number of students experienced adverse effects and many lacked health insurance coverage. Therefore, increasing awareness about the rational use of medicines and encouraging appropriate healthcare seeking behavior among medical students is essential to minimize the potential risks associated with self-medication and future studies involving a larger and more diverse population with more detailed data collection are recommended.

Conflict of Interest: None

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Risk Factors, Prevalence and Assessment of the Degree of Pelvic Organ Prolapse: A Comparative Study in Secondary Level Hospital in Nepal

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Abstract

Introduction: Pelvic organ prolapse is the commonest morbidity worldwide. It is one of the leading reproductive health problems among Nepalese women, particularly among the women in rural Nepal.

Objective: To determine the prevalence, associated risk factors, and degree of pelvic organ prolapse among women attending a secondary level hospital in Nepal.

Methods: A comparative cross-sectional study was conducted at Bhaktapur Hospital, from January to June 2023. A total of 256 women aged 40-60 years were enrolled in the study consisting of 121 in study group and 135 in control group using purposive sampling method. Pessary use, past medical and surgical history, obstetric and non-obstetric risk factors were noted. General, systemic, and pelvic examinations were part of the clinical evaluation, and pelvic organ prolapse was graded using the simplified Pelvic Organ Prolapse Quantification system. Frequencies of variables were calculated, and comparisons between groups were evaluated using chi square tests.

Results: The prevalence of pelvic organ prolapse was 17.82% among women aged 40-60 years, while it was 3.09% among all gynecological cases. Risk factors such as age at first vaginal birth <20 years, multiparity, vaginal delivery, short pregnancy gap, home birth of large infants, smoking, and insufficient postpartum rest, were identified. Common symptoms were something coming out per vagina (98.3%), heaviness in vagina (96.7%), feeling of lump at introitus (95.9%), Backache/dragging sensation (59.5%) and chronic cough/respiratory infection (56.2%). Majority (54.55%) had stage III prolapse and multi- compartment prolapse (43.8%).

Conclusion: Raising awareness about delaying marriage and childbirth, contraceptive use, adequate rest, and proper nutrition may help reduce pelvic organ prolapse burden.

Keywords: Pelvic organ prolapse; risk factor, nepal.

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Introduction

Pelvic orgran prolapse is a condition characterized by the descent of pelvic organs, including the bladder, uterus, rectum, or vaginal apex, into or beyond the vaginal canal due to weakening of the supporting muscles, fascia, and ligaments.[1] Globally, the prevalence of pelvic organ prolapse (POP) is estimated at 2-20% among women under 45 years of age,[2] while in Western populations, it has been reported to reach as high as 41%.[3] In 2002, Women's Health Initiative study reported that almost 14.2% women in USA had genital prolapse.[4]

POP has a lifetime risk of 30-50% and its incidence increases with age.[5] It is a significant public health problem in Nepal as well as in India and it is prevalent in all states and ecological regions, across all castes and ethnicities.[6] Between 600,000 and more than 1 million of reproductive age group Nepali women suffer from genital prolapse and about 40% of women developed it after birth of their first child.[7,8] In Nepal, although uterine prolapse appears to be widespread, little data have been published about its etiology.[9] Understanding its prevalence, associated risk factors, and severity is essential for planning effective prevention, awareness, and management strategies. This study therefore aims to determine the prevalence, risk factors, and degree of POP among women aged 40-60 years.

Methods

This comparative cross-sectional study was conducted at Bhaktapur Hospital, a secondary level hospital, from January to June 2023. Women aged 40-60 years attending the Gynecology Outpatient Department (GOPD) and who were referred out from different hospitals for gynecological problems through health camp were enrolled using non-probability purposive sampling method. The sample size for this study was 256 participants including study group (121) and control group (135). The minimum required sample size for this study was calculated using the standard formula for prevalence studies: $n=Z^2 \cdot p \cdot (1-p)/d2n = Z^2 \cdot p \cdot (1 - p) / d^2n=Z^2 \cdot p \cdot (1-p)/d2$, where Z=1.96Z = 1.96Z=1.96 (95% confidence interval), p=0.218p = 0.218p=0.218 (estimated prevalence of pelvic organ prolapse), and d=0.05d = 0.05d=0.05 (margin of error). Based on this calculation, the required sample size was approximately 262 participants. However, due to logistical constraints and participant availability during the study period, a total of 256 women were enrolled. This slight reduction is unlikely to materially affect the precision of prevalence estimates, as the sample remains close to the calculated requirement and provides adequate statistical power for the study objectives.

The sample size was based on preliminary GOPD data, where 412 women aged 40-60 years attended in one month, and 90 had pelvic organ prolapse (p=21.8%) Using the formula for prevalence studies:

$$n = \frac{Z^2.p.(1-p)}{d^2}$$

where, Z=1.96 (95% CI) and d=0.05 (5% margin of error):

$$n = \frac{(1.96)^2.0.218.0.782}{0.05^2} = 256$$

All women, aged 40-60 years, attending GOPD, were recruited for the study. Among them, patients who gave the history of POP or symptoms related to POP were grouped as group I and those patients who belonged to same age group but did not give the history of prolapse or symptoms related to prolapse, rather attended OPD with other gynecological problems were grouped as control in group II. Patients were excluded if they were attending the GOPD only for pregnancy checkup or confirmation, had a wound infection, were visiting for post-operative follow-up, had vesicovaginal fistula, carcinoma of the cervix, or severe critical medical conditions such as congestive heart failure or myocardial infarction, or if they had recurrent prolapse or vault prolapse.

All participants provided written informed consent before enrollment. Pretesting was conducted on 10 cases. So, a pretested proforma was used to collect demographic data (age, ethnicity, education, residence, occupation), obstetric history (parity, mode and place of delivery, complications, birth spacing, instrumental deliveries, baby weight, labor duration, postpartum work resumption), and non-obstetric risk factors (smoking, chronic cough, constipation). Medical and surgical history, including prior prolapse treatment and pessary use was also recorded. Clinical assessment included general examination, systemic evaluation, and pelvic examination. POP was graded using the simplified POP-Q system10 for anterior, posterior and apical compartments which is given as:

Stages	Descriptions
I	Prolapse is at least 1 cm above the hymenal remnants.
II	Prolapse extending from above to 1 cm below the hymanal remnants.
III	Prolapse greater than 1 cm past the hymenal remnants but does not represent complete vaginal wall eversion.
IV	complete vaginal vault eversion or complete procidentia

Stress urinary incontinence, levator ani tone, perineal integrity, and rectovaginal anatomy were assessed. Bimanual examination evaluated uterine and adnexal structures. Data was recorded in a standardized proforma and securely stored in Microsoft Excel 365. Statistical analysis was performed using the Statistical Package for the Social Sciences (SPSS) version 17.0. Frequencies of relevant variables were determined. Each group was compared with the reference group and statistical difference between the two groups were evaluated by using chi-square tests.

Results

Total number of gynecological cases who visited in gynecological outpatient department during the period of 3 months was 7117. Among them, 1234 cases were in the 40-60 years age group, and there were 220 cases of prolapse. According to this data, prevalence of pelvic organ prolapse during that period in the 40-60 years age group was found to be 17.82%. However, prevalence of prolapse among total gynecological cases was found to be 3.09%. Altogether, total 256 cases were enrolled in this study and among

them, 47% of patients had pelvic organ prolapse (n=121), which were grouped as group I and 53% of patients of same age group without pelvic organ prolapse (n=135) were grouped as group II.

Age distribution differed significantly between the groups, with Group I having a higher proportion of participants aged 51-60 years, while Group II predominantly included those aged 40-50 years ($p < 0.001$). Ethnicity, education level, place of residence, and occupation were similarly distributed between the two groups, with no statistically significant differences observed ($p > 0.05$). (Table 1)

Table 1: Demographic Profile of Study Participants.

Parameter	Group I (n=121)		Group II (n=135)		p value
	N	%	N	%	
Age (years)					
40-50	48	39.7	101	74.8	<0.001
51-60	73	60.3	34	25.2	
Ethnicity					
Brahmin	23	19.0	34	25.2	0.12
Chhetri	34	28.1	36	26.7	
Newar	19	15.7	24	17.8	
Others	45	37.2	41	30.3	
Education					
Graduate and above	2	1.7	5	3.7	0.101
Secondary	1	0.8	8	5.9	
Primary school/literate	13	10.7	15	11.1	
Illiterate	105	86.8	107	79.3	
Place of residence					
Terai	38	31.4	34	25.2	0.214
Hills	57	47.2	57	42.2	
Mountain	13	10.7	8	5.9	
Valley	13	10.7	36	26.7	
Occupation					
Service	2	1.7	5	3.7	0.458
Professional	2	1.7	2	1.5	
Business	5	4.1	10	7.4	
Farmers	54	44.6	48	35.6	
Laborers	23	19.0	22	16.3	
Housewife	35	28.9	48	35.6	

The table compares obstetric and reproductive risk factors between Group I and Group II. Group I had significantly earlier age at first childbirth, shorter birth spacing, higher parity, and earlier onset of POP, mostly after the first to third deliveries.

Table 2: Obstetrical risk factors of pelvic organ prolapse.

Parameter	Group I (n=121)		Group II (n=135)		p value
	N	%	N	%	
Age at 1st child birth (years)					
15-20	98	81.0	45	33.3	<0.001
21-25	17	14.0	74	54.8	
26-30	5	4.1	13	9.6	
31-35	0	0.0	2	1.5	
>35	1	0.8	1	0.7	
Type of delivery					
Spontaneous vaginal birth	103	85.1	107	79.3	<0.001
Vaginal breech delivery	4	3.3	10	7.4	
Forceps and vacuum delivery	7	5.8	5	3.7	
Cesarean delivery	7	5.8	13	9.6	
Birth spacing (years)					
<3	119	98.3	105	77.8	<0.001
≥3	2	1.7	30	22.2	
Parity					
1-3	43	35.5	101	74.8	
4-7	70	57.9	34	25.2	
>7	8	6.6	0	0.0	0.001
Onset of POP in relation to order of childbirth and menopause					
After 1st delivery	50	41.3			
2nd-3rd Delivery	41	33.9			
After 4th delivery	17	14.0			
After menopause	13	10.7			
Baby weight (Kg)					
<3.5	43	35.5	112	83.0	0.001
≥3.5	78	64.5	23	17.0	
Resumed work after delivery (days)					
<15	100	82.6	28	20.7	<0.001
15 or more	21	17.4	107	79.3	
Labor pain (hours)					
<24	64	52.9	119	88.1	0.001
≥24	57	47.1	16	11.9	
Place of delivery					
Home	105	86.7	82	60.7	<0.001
Hospital	16	13.1	53	39.2	
Birth attended by skilled birth attendants					
Unattended	89	73.6	59	43.7	0.001
Attended by medical person at home	16	13.2	53	39.3	
Hospital	16	13.2	23	17.0	

Spontaneous vaginal delivery, home delivery, unattended births, early resumption of work, prolonged labor, and higher baby birth weight were significantly more common in Group I. In contrast, Group II more often had later age at first childbirth, adequate birth spacing, lower parity, hospital deliveries, and skilled birth attendance. (Table 2)

Most women in both groups had a BMI <30, with 89.3% of cases and 88.9% of controls. There was no statistically significant difference between the groups. (p = 0.001). (Table 3)

Table 3: Non-Obstetrical risk factors of pelvic organ prolapse.

Parameter	Group I (n=121)		Group II (n=135)		p value
	N	%	n	%	
Prolapse in relation to BMI					
<30	108	89.3	120	88.9	0.001
≥30	13	10.7	15	11.1	

In group I 49% of cases were active smokers and 51% were passive smokers and in group II majority of them were non-smokers. This finding was significant as 49% of women were active smokers in group I. (Figure 1)

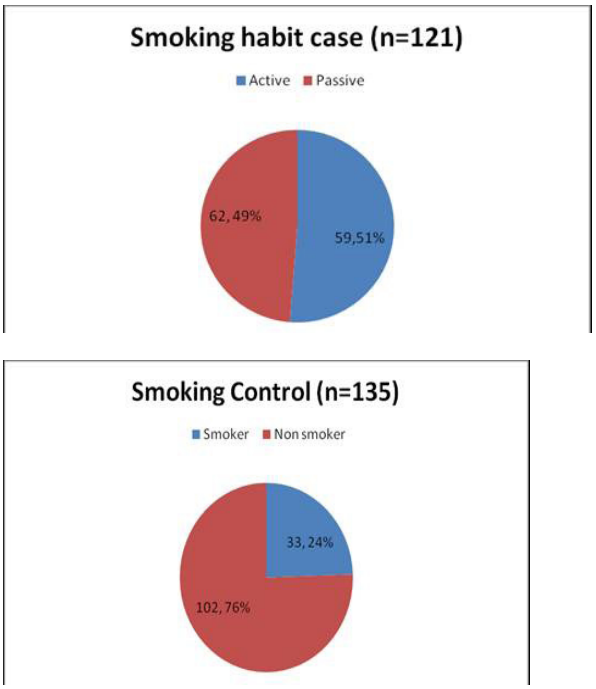

Figure 1: Smoking habit.

The most common symptom was something coming out per vagina, reported by 98.3% of patients. This was followed by heaviness in the vagina in 96.7% (n=117) and feeling of a lump at the introitus in 95.9% of cases. Backache or dragging sensation was reported by 59%, while bleeding or discharge per vagina was noted in 19%. Chronic cough or respiratory infections were present in 56.2% of patients. Among urinary symptoms, urinary incontinence affected 35.5%, burning and frequency of micturition 23.1%, and difficulty in passing urine 14.9%. (Table 4)

The majority of patients had a long duration of illness 10-20 years which was 35.2%. About 24.8% suffered from POP for more than 20 years. Duration of illness of 5-10 years was noted for 23% of cases and this was relatively shorter for 16.5% who are presented within 5 years of illness. (Figure 2)

Table 4: Presenting Symptoms of patients.

Symptoms	Case (n=121)	
	N	%
Something coming out PV	119	98.3
Heaviness in vagina	117	96.7
Feeling of lump at introitus	116	95.9
Backache/dragging sensation	72	59.5
Chronic cough/respiratory infection	68	56.2
Painful intercourse	46	38.0
Urinary incontinence	43	35.5
Difficult to void urine	42	34.7
Burning and frequency of micturition	28	23.1
Bleeding PV/discharge	23	19.0
Inability to pass urine suddenly	18	14.9

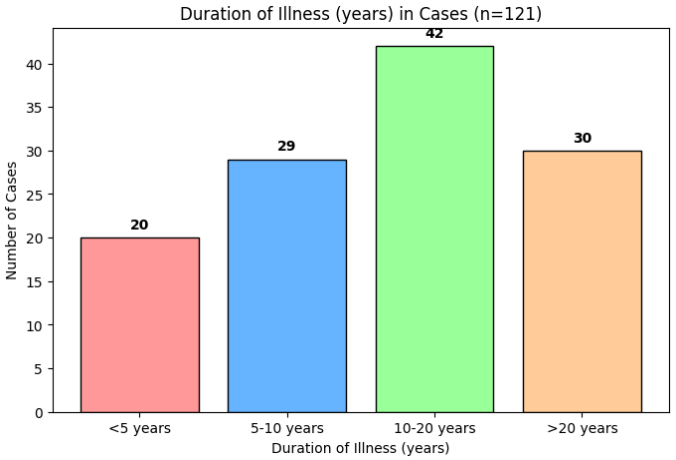

Figure 2: Duration of illness.

Majority of POP cases had prolapsed of all compartments i.e., 43.8%. The percentage of women presenting with anterior, posterior and middle compartment prolapse were 33%, 4.13% and 15% respectively. Only 3.31% of POP cases had enterocele. Comparing different stages of prolapse i.e., anterior, posterior, middle and all compartments prolapse, majority of the patients presented at stage III prolapse, 54.55%, 23.14% at stage IV, 16.53% stage II and Only 5.79% patients presented at early stage (stage I). Across all stages, combined prolapse was more frequently observed, particularly in Stage III and Stage IV prolapse. However, when the distribution of prolapse type was compared across different stages, no statistically significant association was found between the stage of prolapse and the type of prolapse (p = 0.616). (Table 5)

Table 5: Grading of pelvic organ prolapse.

Stage	Anterior only		Posterior only		Middle only		Enterocele		Combined all		Total	%	p value
	n	%	N	%	N	%	n	%	N	%			
I	2	1.65	0	0.00	1	0.83	1	0.83	3	2.48	7	5.79	0.616
II	8	6.61	2	1.65	4	3.31	0	0.00	6	4.96	20	16.53	
III	21	17.36	1	0.83	10	8.26	3	2.48	31	25.62	66	54.55	
IV	9	7.44	2	1.65	4	3.31	0	0.00	13	10.74	28	23.14	
Total	40	33.06	5	4.13	19	15.70	4	3.31	53	43.80	121	100.00	

Discussion

The prevalence of pelvic organ prolapse was found to be 17.82% among the age group 40-60 years but it was 3.09% of total 7117 gynecological cases who attended GOPD during that period. A hospital-based study from maternity hospital, Thapathali, in 1997, reported that prevalence of POP was 9.6% among one thousand one hundred and forty-seven patients attending gynecological clinic.[11] Another community-based study, the CAED study reported the average prevalence of uterine prolapse in Siraha and Saptari district was 37%.[12] According to various studies, the prevalence of prolapse ranged from 7% and up to 51.6%. in Nepal.[13] The prevalence of prolapse shown in various studies is comparable with the prevalence of POP found in this present study. However, there are limited hospital and epidemiological studies to compare our findings. In contrast when compared other different community based and camp-based studies, prevalence is quite comparable as most of these studies were done in various regions of Nepal, variations of finding could be due to number of cases enrolled in the study and number of women who visited in that type of health camps.[14]

In our study 37.2% of women with POP were from others ethnicity category (janajati and Dalits), 28.1% were Chhetri, 19% Brahmins, and Newar 15.7%. This finding is quite contrast to findings of a study conducted in western Nepal by UNFPA (2002) where 90% of women were Brahmin and Chhetri, relatively advantaged and better-informed ethnic group in Nepal compared to janajatis and Dalits who are socially more excluded and disadvantaged group. Similarly, a rural development project response on uterine prolapse conducted in year 2005 and 2008 reported that among women enrolled,60% were Brahmins, Chhetri and Newars, 28.7% Janajatis, and 11 % Dalits.[15] A study of Iwamura hospital showed that majority of women with uterine prolapse were of Newari origin 84%.[16] While observing racial variations in developed countries reported by Steven E. Swift in South Carolina, 52% women with POP were Black and 47% were white and 1% was other racial background Steven, Hendrix et al, in his study compared the incidence of POP with the American and African women which showed that white women had higher risk of POP as compared to American Indian women.[4,17] Asian women had the higher risk of cystocele and rectocele and no uterine prolapse.[4]

In study group were illiterate in both study and control group (86.8% and 79.4% respectively) though relatively more in prolapse group. ARROW study reported 77.27% women with POP were illiterate, and only 10% women had completed their primary school level. In other hand community based large morbidity study reported that literacy level in rural Nepali women of different eight district of Hills, Terai, Mountain, 32.4% in Saptari district were illiterate with highest among 8 districts and lowest illiteracy level in Bajhang.[18] Likewise in current study, majority of women were farmers, housewives and laborers 44.6%, 35.6% and 19.0% respectively versus 35.6%, 28.9% and16% in control group. In a study by Darsan A, et al, majority of women (48.48%) with POP were farmers whereas 18.19% of them were wage laborers together with farming.[19] In Nepal, women typically work 11 to 16 hours a day, combining hard home and agricultural labor, which often continues into pregnancy and the early postpartum period. Pelvic organs prolapse is more likely in women who work hard and return to work soon after giving birth, according to published research.

In the current study, 81.0% of women with POP and 33.3% of women without POP gave birth for the first time between the ages of 15 and 20. This result is in line with other research (CAED, 2006; Subba et al., 2003; IOM/UNFPA, 2006; Darshan et al., 2009) that found a high frequency of POP among women whose first pregnancy and childbirth happened during adolescent (<19 years).[7, 20,8] Early pregnancy combined with heavy physical work, poor nutrition, limited skilled care, and inadequate postpartum rest substantially contributes to the development of POP.[21] The finding in the present study is consistent with other studies in this country.8 Multiparity is often attributed as one of the risk factors for developing prolapse. Around 57.9% of patients with POP had parity four or more in present study. In the clinical review by Anjum Doshani, it was mentioned that increasing parity was associated with increasing incidence and severity of prolapse.[22] Similarly, Oxford family planning epidemiological study also supported parity as the strongest risk factors for the pelvic organ prolapse and those with history of two vaginal deliveries were 8.4 times more likely to have surgery for prolapse than those with no such history.[23]

In the study done by Catherine et al, elderly parous women are more likely to have progressive pelvic organ prolapse.[24] In context of Nepal, various studies have supported parity as risk factor for prolapse. The Arrow study showed that maximum number of women (37.9%) had prolapse after having more than four children but about 27.27% had prolapse after birth of only one child. Moreover 85% of prolapse occurred in cases among women who had given birth for more than three times. This study also showed that 6.07% of women were pregnant between10-13 times.[8] In a

research conducted in a camp, Padam R. Pant et al. found that 68% of women with uterine prolapse had complete procidentia, and their parity ranged from two to thirteen.[9] Similarly, Geeta Gurung et al reported that was among prolapse case 5.1%, 9.2%,10.1% and 18% were para one, para two, para three and more than para four respectively.[18] Only 1.9% of women with genital prolapse were nulliparous in this study. Similar findings were reported by Messerschmidt L, that among the women who visited the health camps, forty percent had one child while twenty-two percent had two children.[15] Increasing parity was associated with increased incidence of POP was consistent with other studies.[9]

In the present study, 41.3%, 33.9%, 14.0% had prolapse after their first, second and third childbirth respectively, and only 10.7% had prolapse developed after menopause. CAED study that large number of women had given birth one or more than five even after prolapse. Madhusudan Subedi reported that 30.4% had prolapse after first child birth, 44.9% noted after 2nd child birth and the mean age of women developing prolapse was 27.91 years.[13] According to Bonette et al, onset of prolapse after first pregnancy was 18.3% and 2.3% were nulliparous.[6] Similarly, many studies have shown that prolapse was present right after first child birth.[8] Many research findings showed that uterine prolapse can result from prolonged labor, too early or too closely spaced pregnancies which is quite similar to this present study.[13]

Clinical evaluations have shown macrosomia as a major risk factor, along with extended labor and obstetric procedures.[22] Given that women with POP gave birth to larger kids than controls, this association is further supported by the current study. Furthermore, 82.6% of women resumed intensive home and agricultural work within 15 days of giving birth. Inadequate postpartum rest is a significant cause of POP, according to similar results from other Nepalese studies.[25,13] The majority of the women in this study had symptoms that lasted five to twenty years, including vaginal heaviness, a lump or something coming out of the vagina, trouble voiding, backache, urine incontinence, dyspareunia, persistent cough, and bleeding from ulcers. The Institute of Medicine and other hospital- and community based investigations have shown similar complaints, such as lower abdomen pain, backache, discharge, dyspareunia, frequent micturition, and persistent constipation.[8] The sensation of something coming out of the vagina was more common in earlier studies that covered a larger age range (23-80 years) and more younger individuals, which may explain variations in symptom patterns. The majority of POP patients in the current investigation had an illness duration of 10-20 years, which is in line with results published by Bonetti et al.[6]

About 89.3% of women with POP in the current study had a BMI of less than 30, whereas only 10.7% had a BMI of more than 30. Both groups' BMI distributions were identical. Although overweight and obesity have been identified as important risk factors for prolapse in earlier research, BMI did not seem to play a significant role in this study.[22] This could be because the majority of participants were from hilly areas where heavy physical labor was a more significant risk factor than obesity. Women with pelvic organ prolapse were active smokers over past several years 49% in contrast to 76% in control group and 51% were passive smokers in study group they were not directly smoked but they were exposed to smoke during cooking on firewood or their husbands and family members were smokers. In Oxford Family Planning Association Jonathan study, showed that a contradictory findings history of conditions suggestive of deficient connective tissues (varicose veins, hernia, hemorrhoids) was associated significantly with symptomatic prolapse. Current or previous smoking status was not associated with symptomatic prolapse, nor was the number of cigarettes smoked. [23]

In current study 54.55% of women ad stage III prolapse, 23% had stage IV, 16.53% had stage II, and 5.79% had stage I, according to POP staging using the standard and simplified POP-Q approach. In addition, 25.6% developed urinary incontinence and 39% had vaginal atrophic alterations. In research from Seoul, Korea, showed a similar pattern, with stage III accounting for 55% of cases, followed by stage II (25%) and stage IV (20%).[26] Most of the studies conducted in Nepal were prolapse quantified by other traditional methods except this study so could not compare these findings. In study done in IMHARC and at free health camps in this area, 83% patients were diagnosed with third-degree prolapse, while 17% patients had second degree prolapse.[27] In Geeta Gurung at al study 37.3% had first degree, 12.6% second degree prolapse and 16.8% had third degree prolapse.[18] In IOM study, 28% women had first degree, 24% had second degree and 47% had third degree prolapse.[8] POP-Q method to ascertain degree of prolapse is yet not widely used in Nepal, leading to difficulties in comparing staging of prolapse.

There are a number of limitations to this study. The results may not be entirely representative of the community because the study was conducted on a small sample over a brief period of time and was hospital based, encompassing women between the ages of 40 and 60 years. Thorough assessment was limited because not all obstetric and non-obstetric risk variables could be evaluated. Because participants were asked to report past experiences with pregnancy, labor, nutrition, postpartum rest, and returning to work, recall bias may have occurred.

Conclusion

Pelvic organ prolapse remains a significant public health issue. Targeted interventions including delaying early childbirth, promoting institutional delivery, and improving postpartum care are recommended.

Conflict of Interest: None

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Research Article

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Comparative Ultrasonographic Assessment of Splenic Length in Non-Pregnant and Pregnant Women

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Abstract

Introduction: The spleen is the largest organ of the reticuloendothelial and lymphatic systems and plays a crucial role in immune function and blood filtration. During pregnancy, increased blood volume and altered hemodynamics represent normal physiological changes that lead to an increase in spleen size. However, limited data are available regarding trimester wise changes.

Objective: To compare ultrasonographic assessment of splenic length in non-pregnant and pregnant women.

Methods: This comparative cross-sectional descriptive study was conducted in the Department of Radiology at Birat Medical College and Teaching Hospital, over a two-month period. About 200 healthy women were included, comprising 150 pregnant women (50 in each trimester) and 50 age and height matched non-pregnant controls. Splenic length was measured using a 3.5 MHz curvilinear transducer, with participants positioned supine or in the right lateral decubitus position as required. Descriptive and comparative analysis were performed using SPSS version 24.

Results: This study showed the mean splenic length in non-pregnant women as 96.60 ± 7.40 mm whereas 94.20 ± 7.60 mm, 99.0 ± 7.50 mm, and 106.20 ± 7.80 mm for pregnant women of 1st, 2nd and 3rd trimesters. Statistically significant increment in splenic length in women were noted, comparing control with 3rd trimester ($p < 0.001$), 1st with 2nd trimesters ($p=0.01$), 1st with 3rd trimesters ($p < 0.001$), and 2nd with 3rd trimesters ($p < 0.001$). There was non-significant difference observed comparing control with 1st ($p=0.39$) and 2nd ($p=0.39$) trimester of pregnancy.

Conclusion: Splenic length increases progressively with advancing gestation, especially in the second and third trimesters, reflecting normal physiological adaptations of pregnancy rather than pathology.

Keywords: Pregnancy; splenic length; ultrasound.

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Introduction

The spleen is an organ present in nearly all vertebrate species. It is considered the largest mobile reticuloendothelial system organ, situated intraperitoneally located in the superolateral region of the left upper quadrant of the abdomen.[1] This lymphatic organ is part of both the reticuloendothelial and lymphatic systems, playing a vital role in the body's immune responses and acting primarily as a blood filter.[2] The size of the spleen varies, approximately 7 to 14 cm in length.[3] During pregnancy, the spleen has more workload or increased demand for immune responses against microorganisms among other functions. Some researchers have reported that maternal blood volume could depend on the splenic size and pregnancy hormones.[4] Thus pregnancy has been identified as a contributing factor to splenomegaly. One of the primary reasons for this is the significant increase in maternal blood volume, cardiac output, production of erythrocytes and plasma in the bone marrow and increased clotting factor contributes to a significant rise in maternal blood volume.[5]

Evaluation of splenic size plays a crucial role in the diagnosis and management of various medical condition, including liver disease, immune disorders and hematological malignancies.[6] Thus, the objective of our study was to assess and compare spleen size in non-pregnant women and in pregnant women across all three trimesters.

Methods

This comparative analytical study aimed to evaluate splenic dimensions in healthy pregnant women and non-pregnant healthy individuals attending the Radiology department at Birat Medical College and Teaching Hospital from 20th October to 19th December 2025. The study was conducted over a period of two months. The sample size was determined using the two-sample comparison formula: $n=2(Z\alpha/2+Z\beta)2\ \sigma2)/\Delta2$ where, $Z\alpha/2$ = Z-value for 95% confidence (two-tailed) =1.96, $Z\beta$ = Z-value for 80% power = 0.84, σ = Standard deviation (from pilot data, sample size= 146 individuals) = 8.55 mm (from non-pregnant group), Δ = Minimum detectable difference in mean spleen length = typically 5 mm difference (clinically meaningful threshold).[7,8] Therefore, n=46 participants per group. For potential dropouts (an approximate 8% dropout adjustment), final adjusted sample size = 50 per group. This two-sample formula appropriate for primary pairwise comparisons may underestimate requirements for a four-group ANOVA. Therefore, ANOVA sample size was recalculated using stats models assuming a conservative Cohen's f ≈ 0.253 for detecting a 5 mm difference in one group while others remain equal. This resulted a total n ≈ 174 (≈44 per group) for 80% power at α=0.05. This aligned with the original calculation, supporting the use of n=50 per group post-adjustment.[8]

One hundred and fifty pregnant women were recruited having 50 participants in each trimester, along-side an equal number (50 control) of age and height matched non-pregnant women, resulting in a total sample size of 200 participants after obtaining written informed consent. Age and height was matched to reduce potential confounding factor. Demographic data; age, height and gestational period were systematically collected via structured questionnaires for all the participants as applicable. Ultrasound examinations were performed using a SONACE X4 ultrasound system (Medison Inc., Korea, 2009) equipped with a 3.5 MHz curvilinear transducer. Subjects were positioned supine on the examination couch with the head supported by a pillow for comfort. In cases of advanced pregnancy, the right lateral decubitus position (left side elevated) was utilized to optimize visualization. The abdomen was exposed from the xiphisternum extending down to the pubic symphysis. Scans were recorded during deep inspiration with a relaxed anterior abdominal wall to ensure consistent measurements which was performed by expert radiologist. Splenic length (SL) was measured longitudinally through the splenic hilum, spanning from the superior dome to the inferior tip. Participants were randomly selected based on the following inclusion criteria: women with confirmed singleton pregnancies between 8 and 38 weeks of gestation and age matched non-pregnant women as a control. Exclusion criteria included the history of febrile illness during the current pregnancy, malaria, portal hypertension, kala-azar, hemoglobinopathies such as sickle cell disease, previous splenectomy, or multiple gestations.

Ethical approval was granted by the institutional review committee of Birat Medical College and Teaching Hospital (Ref. 29-2082/83). All demographic and ultrasound data were entered into excel and imported to SPSS software version 24 for statistical analysis. One-way ANOVA Test was applied for comparing mean splenic length across four groups (non-pregnant and 3 trimesters). It was followed with Tukey's HSD post-hoc test for pairwise comparisons (adjusted p-values).

Results

This study was a descriptive statistical analysis of splenic length which was conducted among age and height matched non-pregnant and pregnant women attending Radiology department of BMCTH. Age (p=0.93) and height (p=0.95) of the non-pregnant and pregnant women of different trimester were comparable (Table 1). No statistically significant difference in age or height was observed among these groups.

Table 1: Comparing demographic variables of non-pregnant and pregnant women (n=200).

Variable	Non-Pregnant (n=50, mean ±SD)	1st T. (n=50, mean ±SD)	2nd T. (n=50, mean ±SD)	3rd T. (n=50, mean ±SD)	Test Statistic	p-value
Age (years)	29.0 ± 7.8	28.5 ± 7.5	29.2 ± 8.0	28.8 ± 7.6	F=0.15 (ANOVA)	0.93
Height (cm)	160.0 ± 5.0	159.5 ± 4.8	160.2 ± 5.1	159.8 ± 4.9	F=0.12 (ANOVA)	0.95
T=Trimester, cm=centimeter						

Table 2: Descriptive statistics and 95% confidence intervals for splenic length of non-pregnant and pregnant women (n=200).

Group	N (no. of sample)	Mean (mm)	SD (mm)	95% CI (mm)
Non-Pregnant	50	96.6	7.4	94.5 - 98.7
1st T.	50	94.2	7.6	92.0 - 96.4
2ndT.	50	99.0	7.5	96.9 - 101.1
3rd T.	50	106.2	7.8	104.0 - 108.4
T=Trimester, mm=millimeter.				

Observed splenic length at 95% CI ranged 94.5 - 98.7 mm (mean ± SD: 96.6 ± 7.4 mm) in non-pregnant healthy women, whereas it ranged 92.0 - 96.4 mm (mean ± SD: 94.2 ± 7.6 mm) in first trimester of pregnancy, 96.9 - 101.1 mm (mean ± SD: 99.00 ± 7.5 mm) in second trimester of pregnancy, and 104.0 - 108.4 mm (mean ± SD: 106.2 ± 7.8 mm) in third trimester of pregnancy (Table 2).

Significant differences in splenic length were observed between non-pregnant women and 3rd trimester women, 1st trimester women and 2nd trimester women, 1st trimester women and 3rd trimester women, and 2nd trimester women and 3rd trimester women. No significant differences were observed between non-pregnant women and 1st trimester women or non-pregnant women and 2nd trimester women. The 3rd trimester group had notably higher means compared to the others.(Table 3)

Table 3: Comparative analysis using Tukey HSD Post-Hoc test of splenic length between non-pregnant and pregnant women (n=200).

Group Pair	Mean Difference (mm)	95% Simultaneous CI (mm)	Adjusted p-value	Cohen's d (effect size)
Non-Pregnant vs. 1st T.	2.4	-1.53 to 6.33	0.390	0.32 (small)
Non-Pregnant vs. 2nd T.	-2.4	-6.33 to 1.53	0.390	0.32 (small)
Non-Pregnant vs. 3rd T.	-9.6	-13.53 to -5.67	<0.001	1.26 (large)
1st T. vs. 2nd T.	-4.8	-8.73 to -0.87	0.010	0.64 (medium)
1st T. vs. 3rd T. -12.0 -15.93 to -8.07 <0.001 1.56 (large)				
2nd T. vs. 3rd T.	-7.2	-11.13 to -3.27	<0.001	0.94 (large)
T=Trimester, mm=millimeter				

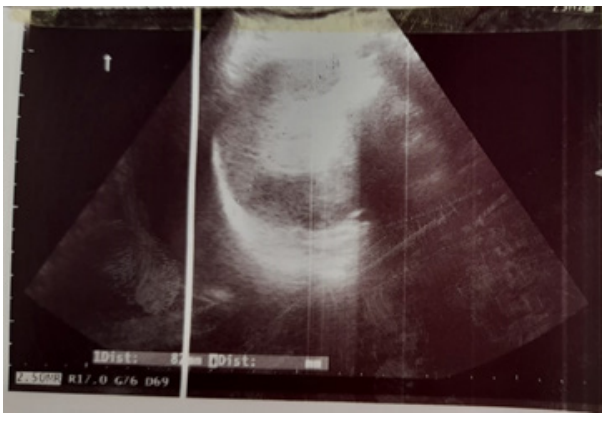

Figure 1a: Spleen size of non-pregnant control

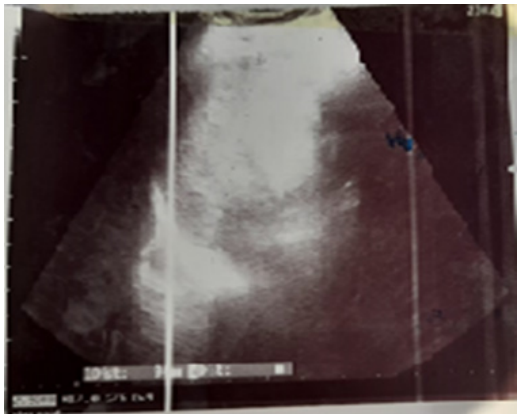

Figure 1b: Spleen size of 1st trimester pregnant women

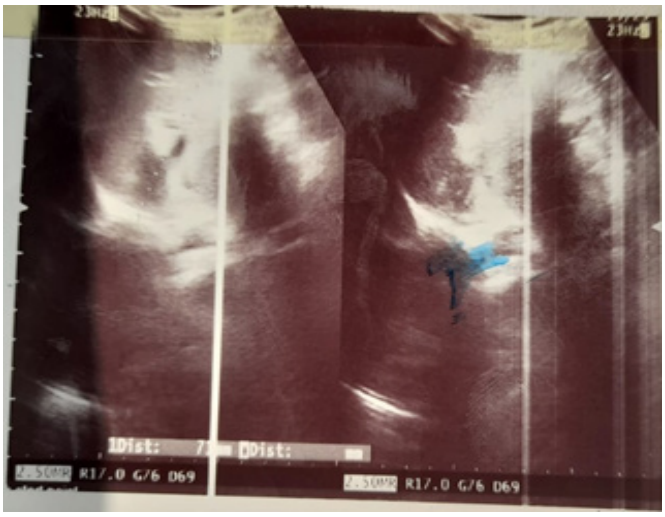

Figure 2a: Spleen size of 2nd trimester pregnant women

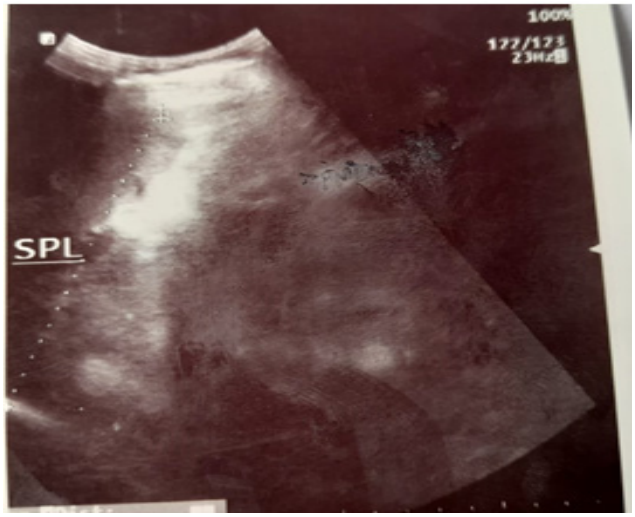

Figure 2b: Spleen size of 3rd trimester pregnant women

Discussions

This analytical study was conducted among age and height matched non-pregnant and pregnant women attending Radiology department of BMCTH having comparable age and height. The analysis of splenic length in present study documented 94.50 mm to 98.70 mm, with a mean value of 96.60 ± 7.40 mm in non-pregnant healthy women. The splenic length for pregnant women were reported as 92.00–96.40 mm (mean ± SD: 94.20 ± 7.60 mm) in first trimester of pregnancy, 96.90-101.10 mm (mean ± SD: 99.00 ± 7.50 mm) in the second trimester of pregnancy, and 104.00- 108.40 mm (mean ± SD: 106.20 ± 7.80 mm) in the third trimester of pregnancy. There was significant difference observed while comparing splenic length between non-pregnant with 3rd trimester (p= 0.001), 1st with 2nd trimester of pregnancy (p<0.01), 1st with 3rd trimester (p=0.001), 2nd with 3rd trimester (p=0.001).

Among general population, the spleen length was documented by Celiktas et al.[9] and Loftus et al.[10] having 9.87 cm and 9.52 cm respectively which were quite close to the splenic length (96.60 ± 7.40 mm) observed for the control group (non-pregnant) in present study. However, normal splenic length in the non-pregnant female reported slightly larger value by Ugboma et al.[11] and Maymon et al [12] where the length were 10.0 ± 1.8 cm and 10.9 ± 1.5 cm respectively. Another study by Spielmann, et al., spleen length was 10.3 ± 1.3 cm. [13] Mittal et al.[14] obtained a slightly lower value of 9.34 ± 0.95 cm, while, Marco et al.[15] observed a range of 8-11 cm with a median of 9.5 cm of spleen length. In healthy athletes, the mean (SD) splenic length was reported as 10.65 (1.55) cm.[16] Reports indicated variable splenic length but quite close which can be due to the differences in sample size, demographic, anthropometric, geographic or socioeconomic status. The mean splenic length throughout pregnancy in Ugboma et al among Nigerian pregnant women was found to be 10.0±1.8 cm with a median value 9.7 cm. Although, there was no significant increase in mean length across various trimesters, the highest length recorded was 10.08±1.83 cm and lowest length 8.94±0.89 cm occurring in the third trimester. There were changes observed but not significant because of small sample size which was the limitation of the study.[11]

A study in two hundred and eighty-eight women by Maymon et al. reported overall linear increase in splenic size throughout normal pregnancy and presented a statistically significant increment in splenic length (P = 0.039) across pregnancy from first trimester to third trimester and significant positive correlation between gestational age and splenic length: (R = 0.486; p < 0.001).[12] The increase in splenic length observed in the present study was similar to the findings of above study. However, the referenced study was longitudinal, whereas the present study was cross-sectional. Therefore, although the findings are comparable, the difference in study design is limitation.

The mean splenic length for controls were 9.6 ± 1.00 cm in a study by Erohubie OA in Nigeria.[17] The mean splenic length, width and thickness for pregnant subjects were 10.3 ± 1.2 cm. Pregnant subjects were observed to have higher mean splenic length (P = 0.001).[17] A study conducted in Lahore, Pakistan, the splenic length observed during 6-12 week of gestational period was 9.22 ± 1.09 cm followed by 9.74 ± 1.38 cm during 13-27 week and 9.94 ± 1.42 cm during 28-40 weeks suggesting gradual increment in length with advancement of gestational period.18 The mean splenic length was assessed as 9.3±0.6 cm, 9.8±0.3 cm, 9.8±0.3 cm during gestational age 6-12 weeks, 13-27 weeks and 28-40 weeks respectively which was statistically significant (r= 0.37, p= 0.001) suggestive of gradual increase in length with advancement of pregnancy.[4]

Since mild splenic enlargement during pregnancy is inevitable it should be considered as physiological rather than pathological finding. These findings help to establish a normative physiological range for splenic length. Studies demonstrate a small but statistically significant increase in splenic length, particularly during the second and third trimesters, with measurements returning to baseline in the postpartum period. Recognizing these normal physiological changes can assist clinicians in differentiating expected pregnancy related variations from pathological enlargement, thereby aiding in the evaluation of conditions such as anemia, infection, liver disease, and hematologic disorders. Since the study assessed different individuals across trimesters rather than following the

same subject longitudinally throughout pregnancy, individual level changes in splenic length over time could not be evaluated more accurately, and causal inferences cannot be made.

Conclusion

This study revealed measurable changes in splenic length with advancing gestational age. A significant change in splenic length was observed while comparing first with second trimester, first with third trimester and second with third trimester of pregnancy. Awareness of these normal changes is important for radiologists and clinicians to avoid misinterpretation of splenic measurements during pregnancy. Awareness of these normal changes is important for radiologists, clinicians and should interpret splenic length measurements in pregnant women with consideration of gestational age, as a progressive increase in splenic length particularly during the second and third trimesters. It represents a normal physiological adaptation of pregnancy rather than pathology.

Conflict of Interest: None

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Prevalence of ESBL and MBL Producing *Escherichia coli* among Urinary Tract Infection Patients at Star Hospital

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Abstract

Introduction: Urinary tract infection is among the most common bacterial infections worldwide, with Escherichia coli being the predominant causative organism. The increasing emergence of antimicrobial resistance in *Escherichia coli*, particularly through the production of extended-spectrum beta-lactamases and metallo-beta-lactamases, has significantly complicated treatment strategies and clinical outcomes.

Objective: This study aimed to determine the prevalence of extended spectrum beta-lactamases and metallo-beta-lactamases producing *Escherichia coli* among patients with urinary tract infection and to evaluate the antimicrobial resistance patterns of these isolates.

Methods: A total of 300 urine samples collected from patients clinically suspected of urinary tract infection at Star Hospital, Lalitpur, Nepal, were processed using standard microbiological techniques. *Escherichia coli* isolates were identified by conventional methods. Antimicrobial susceptibility testing was performed using the Kirby Bauer disc diffusion method following Clinical and Laboratory Standards Institute guidelines. Multidrug resistant isolates were screened and phenotypically confirmed for extended-spectrum beta-lactamases and metallo-beta-lactamases production.

Results: Bacterial growth was observed in 220 samples, of which 150 isolates were identified as *Escherichia coli*. Infections were more frequent among females, with the highest prevalence in the 21-30 year age group. High resistance rates were observed against amoxicillin, cefalexin, ceftazidime, cefotaxime, and cefixime. Half of the isolates exhibited multidrug resistance. Among these, a substantial proportion produced extended-spectrum beta-lactamases, while a smaller proportion produced metallo-beta-lactamases. Extended-spectrum beta-lactamases producing isolates showed highest susceptibility to tigecycline, meropenem, and amikacin.

Conclusion: A high prevalence of extended-spectrum beta-lactamases producing Escherichia coli was observed. Routine antimicrobial susceptibility testing and phenotypic detection of beta-lactamase production are important for guiding appropriate therapy and supporting antimicrobial stewardship.

Keywords: Antimicrobial resistance; beta-lactamases; drug resistant, Escherichia coli; urinary tract infections.

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Introduction

Urinary tract infection is one of the most common bacterial infections affecting individuals of all ages and both sexes. However, UTIs occur more frequently in women due to anatomical and physiological factors such as a shorter urethra, absence of protective prostatic secretions, increased risk of fecal contamination, and pregnancy.[1] Globally, there is a growing concern regarding increasing resistance of uropathogens to both conventional and newer antimicrobial agents.[2] Uropathogenic *Escherichia coli* remains the predominant etiological agent in both uncomplicated and complicated UTIs, accounting for approximately 60–80% of cases.[2,3]

Among the various antimicrobial resistance mechanisms in *E. coli*, the production of ESBLs and MBLs is of particular clinical importance. ESBLs confer resistance to penicillins, cephalosporins, and aztreonam but are inhibited by β-lactamase inhibitors such as clavulanic acid.[5] In contrast, MBLs hydrolyze a broad range of β-lactam antibiotics, including carbapenems, except monobactams.[6] The emergence of ESBL and MBL producing *E. coli* has led to significant therapeutic challenges and increased risk of treatment failure.[7] Studies from India have reported ESBL and MBL prevalence rates ranging from 35.16% to 54.5% and 3.9% to 10.98%, respectively.[8] These trends highlight the need for continuous surveillance and antimicrobial susceptibility testing.[9] The present study aims to identify antimicrobial resistance patterns and to assess the ability of *E. coli* isolates to produce ESBLs and MBLs.

Methods

This cross-sectional study was conducted at Microbiology laboratory of Modern Technical College, Sanepa, Lalitpur Nepal, over a four month period from September to December 2019. The sample size was calculated using the standard formula for a single population proportion. Taking a prevalence of 62.92% from Yadav et al study[1], 95% confidence level (Z = 1.96), and 5% margin of error, the calculated sample size was 358. However, due to feasibility and study duration, a total of 300 urine specimens were included. Samples were collected using a consecutive sampling technique from patients clinically suspected of urinary tract infection. Patients presenting with clinical features suggestive of urinary tract infection were included in the study. Samples from patients receiving antibiotic therapy at the time of specimen collection, improperly collected specimens, and contaminated samples were excluded from analysis.

Midstream urine samples were collected following standard aseptic procedures and processed using conventional microbiological methods. Specimens were inoculated onto Cystine Lactose Electrolyte Deficient agar (HiMedia) and incubated aerobically at 37 °C for 18-24 hours. Bacterial isolates were identified based on colony morphology, Gram's staining characteristics, and conventional biochemical tests. Among the isolates recovered, *Escherichia coli* strains were included for further analysis. Antimicrobial susceptibility testing was performed using the Kirby Bauer disc diffusion method on Mueller-Hinton agar (HiMedia), following Clinical and Laboratory Standards Institute guidelines.[10] Zones of inhibition were measured in millimeters, and results were interpreted as susceptible, intermediate, or resistant according to established criteria.[10] Multidrug resistance was defined as resistance to at least three different classes of antimicrobial agents.[11]

Screening and phenotypic confirmation of extended-spectrum beta-lactamase production were carried out using ceftazidime and cefotaxime discs, followed by the combined disc test with clavulanic acid.[11] Metallo-beta-lactamase production was detected among imipenem-resistant isolates using the imipenem ethylenediaminetetraacetic acid combined disc synergy test.[12] Data were entered and validated using Microsoft Excel and analyzed using Statistical Package for the Social Sciences software version 20. Descriptive statistics were used to summarize demographic variables, prevalence rates, and antimicrobial susceptibility patterns. Appropriate statistical tests were applied where relevant, with a p-value of less than 0.05 considered statistically significant. Ethical approval for the study was obtained from the Nepal Health Research Council (Reference No. 652). Written informed consent was obtained from all participants prior to sample collection, and patient confidentiality was strictly maintained throughout the study.

Results

Table 1: Distribution of organisms in urinary tract infections (n=220)

Organism	Frequency (n)	Percent (%)
Escherichia coli	150	68.2
Klebsiella epneumonia	20	9.1
Citrobacter spp.	7	3.2
Enterobacter spp.	5	2.3
Proteus mirabilis	5	2.3
Proteus vulgaris	1	0.4
Pseudomonas aeruginosa	5	2.3
Acinetobacter spp.	5	2.3
Morganella morganii	1	0.4
Staphylococcus aureus	5	2.3
Coagulase-negative *Staphylococcus*	10	4.5
Enterococcus spp.	5	2.3
Candida albicans	1	0.4

Out of 300 urine specimens processed, significant bacterial growth was observed in 220 (73.3%). Among culture positive samples, Escherichia coli was the predominant isolate, accounting for 150 (68.2%), followed by Klebsiella pneumoniae in 20 (9.1%). Other organisms recovered included *Citrobacter species, Enterobacter species, Proteus mirabilis, Proteus vulgaris, Pseudomonas aeruginosa*, *Acinetobacter* species, *Morganella morganii*, *Staphylococcus aureus*, coagulase-negative *Staphylococcus*, *Enterococcus* species, and *Candida albicans*. (Table 1)

The age distribution of *Escherichia coli* isolates showed the highest prevalence in the 21-30 years age group (53.3%), followed by 31-

40 years (16.7%). Lower frequencies were observed in other age groups. (Table 2)

Table 2: Age-wise distribution of *Escherichia coli* isolates (n = 150)

Age group (years)	Frequency (n)	Percent (%)
< 10	5	3.3
11–20	10	6.7
21–30	80	53.3
31–40	25	16.7
41–50	5	3.3
51–60	10	6.7
>60	15	10

Among the 150 *Escherichia coli* isolates, females accounted for 112 (74.7%) while males accounted for 38 (25.3%). Antimicrobial susceptibility testing demonstrated high resistance rates to amoxicillin (85.3%), cefalexin (76.0%), ceftazidime (74.0%), cefotaxime (70.6%), and cefixime (70.0%). The highest susceptibility was observed for tigecycline (97.3%), followed by meropenem (79.3%), chloramphenicol (76.0%), and amikacin (68.7%). Moderate susceptibility was observed for nitrofurantoin (60.0%). (Table 3)

Table 3: Antimicrobial susceptibility pattern of *Escherichia coli* isolates (n = 150)

Antibiotic	Sensitive n (%)	Resistant n (%)	Intermediate n (%)
Nitrofurantoin (NIT)	90 (60.0)	22 (14.7)	38 (25.3)
Co-trimoxazole (COT)	55 (36.7)	91 (60.7)	4 (2.6)
Cefotaxime (CTX)	31 (20.7)	106 (70.6)	13 (8.7)
Ciprofloxacin (CIP)	40 (26.7)	80 (53.3)	30 (20.0)
Cefalexin (CN)	36 (24.0)	114 (76.0)	0 (0.0)
Ofloxacin (OF)	63 (42.0)	75 (50.0)	12 (8.0)
Cefixime (CFM)	40 (26.7)	105 (70.0)	5 (3.3)
Amoxicillin (AMX)	15 (10.0)	128 (85.3)	7 (4.7)
Meropenem (MRP)	119 (79.3)	10 (6.7)	21 (14.0)
Amikacin (AK)	103 (68.7)	27 (18.0)	20 (13.3)
Amoxicillin clavulanate (AMC)	40 (26.7)	70 (46.6)	40 (26.7)
Tetracycline (TE)	49 (32.7)	77 (51.3)	24 (16.0)
Chloramphenicol (C)	114 (76.0)	18 (12.0)	18 (12.0)
Tigecycline (TGC)	146 (97.3)	0 (0.0)	4 (2.7)
Ceftazidime (CAZ)	22 (14.7)	111 (74.0)	17 (11.3)
Imipenem (IPM)	105 (70.0)	45 (30.0)	0 (0.0)

Half of the isolates (75/150) were identified as multidrug resistant. Initial screening suggested extended-spectrum beta-lactamase production in 142 isolates, of which 65 (46.0%) were phenotypically confirmed. Among confirmed producers, most isolates were detected using both indicator antibiotic combinations. Resistance to imipenem was observed in 45 isolates, among which 10 (22.2%) were confirmed as metallo-beta-lactamase producers. Tigecycline demonstrated the highest activity against extended-spectrum beta-lactamase and metallo-beta-lactamase producers.

Meropenem showed significantly higher susceptibility among extended-spectrum beta-lactamase producers compared with metallo-beta-lactamase producers ($p < 0.001$). Metallo-beta-lactamase-producing isolates exhibited reduced susceptibility to most antimicrobial agents. (Table 4)

Table 4: Comparison of antimicrobial resistance between ESBL and MBL isolates

Antibiotic	Sensitivity of ESBL producers n (%)	Resistance of ESBL producer n (%)	Sensitivity of MBL producers n (%)	Resistance of MBL producer n (%)	Odds Ratio (OR) (MBL vs ESBL resistance)	95% CI	p-value
Amikacin	44 (67.7)	21(32.3)	4 (36.4)	6(63.6)	3.14	0.80-12.33	0.154
Ciprofloxacin	17 (26.2)	48(73.8)	2 (18.2)	8(81.8)	1.42	0.27-7.32	1.000
Meropenem	51 (78.5)	14(21.5)	0 (0.0)	10(100)	74.58	4.12-1350.0	<0.001
Tigecycline	62 (95.4)	03(4.6)	9 (81.8)	1(18.2)	2.30	0.21-24.60	0.443
Ofloxacin	26 (40.0)	39(60)	3 (27.3)	7(72.7)	1.56	0.37-6.57	0.732

Discussion

In the present study, significant bacterial growth was detected in 73.3% (220/300) of urine samples, reflecting a substantial burden of urinary tract infections (UTIs) in the study population. *Escherichia coli* was the most frequently isolated uropathogen, accounting for 68.2% of cases, followed by *Klebsiella pneumoniae* (9.1%). These findings are comparable to those reported by

Muhammad et al., who documented *E. coli* and *K. pneumoniae* isolation rates of 65.4% and 11.2%, respectively, among urinary isolates.[13] The predominance of *E. coli* is biologically plausible due to its strong uropathogenic potential, including adhesion to uroepithelial glycol-conjugate receptors via virulence factors such as P fimbriae (Gal–Gal receptors), facilitating colonization and persistence within the urinary tract.[14]

Similar dominance of these organisms has been consistently reported in UTI studies worldwide.[15] A significantly higher prevalence of *E. coli* infection was observed among female patients (74.7%) compared with males. This finding aligns with observations by Maji et al., who reported a female predominance of 72.4%, and Chander et al., who documented rates exceeding 70% in women.[16] The increased susceptibility in females is attributed to anatomical and physiological factors, including a shorter urethra, proximity of the urethral opening to the anal region, and a higher likelihood of periurethral colonization by enteric organisms.[14]

Antimicrobial resistance among uropathogens remains a major public health challenge, largely driven by irrational antibiotic use, self-medication, and inadequate antimicrobial stewardship.[17,18] In the present study, 50.0% of *E. coli* isolates were multidrug resistant (MDR), which is comparable to MDR rates reported by Muhammad et al. (52.9%)[13] and Nepal et al. (52.9%).[19] Studies conducted in different regions of Nepal have reported MDR prevalence ranging from 38.2% to as high as 95.5%, underscoring significant geographic and institutional variability in resistance patterns.[21-23]

Tigecycline demonstrated the highest *in vitro* efficacy against *E. coli* isolates, with a susceptibility rate of 97.3%, corroborating findings by Malik et al. (98.1%) and Parajuli et al. (96.7%).[23,24] Carbapenems such as meropenem and imipenem also retained high activity, along with amikacin, indicating their continued role as effective therapeutic options. In contrast, marked resistance was observed to amoxicillin (85.3%) and ceftazidime (74.0%), consistent with resistance rates reported by Kibret et al. (82.5%) and Malik et al. (79.4%).[23,25] Resistance to amoxicillin is primarily mediated by β-lactamase enzymes, including TEM-1, SHV-1, OXA-1, and AmpC β-lactamases, as well as by non-enzymatic mechanisms such as efflux pump overexpression and biofilm formation.[17,26,27] Nitrofurantoin resistance was relatively low (14.6%), closely matching the 12.8% resistance reported by Pathak et al., supporting its continued utility as a first-line agent for uncomplicated UTIs.[9]

In the present study, 46.0% of *E. coli* isolates were confirmed as extended-spectrum β-lactamase (ESBL) producers, while 22% were metallo-β-lactamase (MBL) producers. The ESBL prevalence was higher than that reported by Babypadmini and Appalaraju (41.0%)[29] and Rimal et al. (25.5%)[18] but remains within the range reported across South Asia. In comparison, Ghadiri et al. from Iran documented ESBL and MBL rates of 22.3% and 7.0%, respectively, indicating a substantially higher ESBL burden in the present setting.[30] Such variations may reflect differences in antimicrobial prescribing practices, diagnostic capacity, and infection control measures. Among ESBL-producing isolates, tigecycline, meropenem, and amikacin exhibited the highest susceptibility, whereas MBL-producing isolates demonstrated preserved sensitivity primarily to tigecycline, highlighting the severely restricted therapeutic options for these infections. These findings emphasize the growing threat posed by β-lactamase-producing *E. coli* and underscore the urgent need for routine phenotypic detection, continuous surveillance, and evidence-based empirical antibiotic policies to mitigate treatment failure and curb the spread of resistance.

This study has several limitations that should be considered while interpreting the findings. First, the study was conducted at a single tertiary care center, which may limit the generalizability of the results to other healthcare settings or community populations. Second, the sample size, although adequate for preliminary analysis, may not fully capture seasonal or regional variations in antimicrobial resistance patterns. Third, only phenotypic methods were employed for ESBL and MBL detection; molecular characterization of resistance genes was not performed, which restricts precise identification of underlying genetic mechanisms. Additionally, clinical correlation, including prior antibiotic exposure and patient outcomes, was not assessed. Despite these limitations, the study provides valuable insights into the local epidemiology and resistance trends of uropathogenic *E. coli*.

Conclusion

A high prevalence of multidrug resistance was observed among *Escherichia coli* isolates, with half exhibiting a multidrug-resistant phenotype. Nearly half of the phenotypically suspected isolates were confirmed as extended-spectrum beta-lactamase producers, indicating widespread beta-lactamase mediated resistance. Although carbapenem resistance was detected, confirmed metallo-beta-lactamase production remained relatively low. Aminoglycosides, carbapenems, and tigecycline demonstrated comparatively better antimicrobial activity, whereas resistance to fluoroquinolones was substantial. These findings highlight the urgent need for routine antimicrobial susceptibility testing and systematic detection of beta-lactamase-mediated resistance mechanisms in clinical laboratories. Strengthening antimicrobial stewardship programs, promoting rational antibiotic prescribing practices, and discouraging empirical overuse of broad-spectrum agents are strongly recommended.

Conflict of Interest: None

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Research Article

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Histopathological Examination of Gallbladder in Cholecystectomy Specimens in Lumbini Medical College and Teaching Hospital

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Abstract

Introduction: More than 95% of biliary tract infection is caused by Gallstone. Cholecystectomy, the utmost major abdominal operation across the globe. Cholelithiasis establish a numerous histopathological variation in gallbladder mucosa, which is acute and chronic inflammation, cholesterolosis, hyperplasia, granulomatous inflammation, dysplasia, carcinoma in situ and carcinoma.

Objective: To assess the histopathological examination of gallbladder in cholecystectomy specimen in Lumbini Medical College and Teaching Hospital.

Methods: This was retrospective descriptive study of 200 cholecystectomy specimens received in the Department of Pathology, Lumbini Medical College and Teaching Hospital (LMC-TH) Nepal over a period of 2.5 years from November 2022 to May 2025. Clinical details and histopathological data were retrieved from the record file. A wide variety of histomorphological changes in the resected gall bladder were studied.

Results: Out of 200 cases, 134 (67%) were female and 66 (33%) male, with male to female ratio was 1:2. The age of the patients ranged from 8 years to 85 years, with a mean age of 46.75 ± 14.202 years. Histopathological examination showed that chronic cholecystitis was the most usual findings (50%) with a female predominance. The least common variant was adenocarcinoma not otherwise specified, low grade dysplasia and empyema of the gallbladder each in 1% of cases. Analysis of the relationship between serosal and sex of the respondents using the chi-square test yielded P-value of 0.024, indicating significant association. The significant association was also observed between age of the respondents with serosal surface, whereas age of respondents was not found to be significantly associated with serosal surface..

Conclusion: Routine histopathological examination of cholecystectomy specimens is crucial in identifying the non-neoplastic lesion, their complication and incidental gallbladder carcinoma.

Keywords: Cholecystectomy; cholelithiasis; chronic cholecystitis; histopathological; metaplasia.

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Introduction

More than 95% of biliary tract infection is caused by Gallstone. The stones in gallbladder give rise to morphological alteration.[1] Cholecystectomy, the utmost major abdominal operation across the globe.[2] Cholelithiasis is associated with a numerous histopathological variation in gallbladder mucosa, which includes acute inflammation, chronic inflammation, cholesterolosis, hyperplasia, granulomatous inflammation, dysplasia, carcinoma in situ and carcinoma. [3] Cholelithiasis has strong correlation for the progression of gallbladder carcinoma in up to 40-100% as well as significantly correlated factor independent of age or sex.[4]

Following cholecystectomy, gallbladder carcinoma is often diagnosed as an incidental histological findings.[5] Majority of gallstones are asymptomatic in more than 80%, however gallstones can also give rise to numerous complications associated with cholecystitis and can result in serious morbidity and mortality.[6] Cholecystectomy operated for the benign diseases established on clinical, ultrasonological and computerized tomographic scanning skips a remarkable number of early malignant lesions of gallbladder. To prevent such errors with adverse consequences, all cholecystectomy specimens should be routinely examined histologically.[7] This study aims to evaluate the histopathological lesion in gallbladder specimens encounter cholecystectomy due to cholelithiasis.

Methods

A retrospective descriptive study was conducted on 200 specimen cases from November 2022 to May 2025 in the Department of Pathology, Lumbini Medical College and Teaching Hospital (LMC-TH) Nepal following ethical approval from the Institutional Review Committee (Reference number: IRC- 09/2025).

This study included gallbladder specimens resected via open or laparoscopic cholecystectomy for cholelithiasis. All resected specimens were submitted to the Department of Pathology for detailed histopathological analysis. The sample size was calculated using the formula $n = Z^2xpxq/d^2$, taking $p = 0.75$ [Reference: Sharma S et al.[8], $Z = 1.96$ at 95% confidence interval, and $q = 0.25$]. Assuming a margin of error of 6% ($d = 0.06$), the calculated sample size was obtained as: $Z^2 = 3.8416$, $p \times q = 0.1875$, and $d^2 = 0.0036$. Substituting these values, $n= (3.8416 \times 0.1875) / 0.0036 = 200.0$ Patients of all age group and both gender were included. Specimens that were autolyzed or absence of gallstones, acalculous cholecystitis were excluded to ensure the reliability of the histopathological findings. Cases with incomplete, inadequate, or missing medical records were excluded from the study. The patient's clinical history was retrieved from histopathology requisition forms and the hospital medical records and histopathological findings were obtained from the Pathology Department. All cholecystectomy specimens were received in 10% formalin, subjected to detailed gross examination, processed, paraffin-embedded, and stained with Hematoxylin and Eosin staining. Sections were obtained from the fundus, body, and neck of the gallbladder. All slides were examined under a light microscope by the consultant pathologist.

Data were analyzed during SPSS version 25. Descriptive data were used to summarize the data. The Chi-square test was applied to assess associations between categorical variables with a P-value of <0.05 considered statistically significant.

Results

The study included 200 cholecystectomy specimens received in the Department of Pathology at Lumbini Medical college. Of these, 134 (67%) were female and male 66 (33%), with male to female ratio was 1:2. Also the patient's age ranged from 8 years to 85 years with mean age of 46.75±14.202 years and the preponderance of gall bladder lesions were notice in the age group 31 to 55 years. (Table 1)

Table 1: Distribution of demographic characteristics of study population.

General Characteristics	Frequency (n)	Percentage (%)
Age of Respondents		
5-30 Years	31	15.5
31-55 years	107	53.5
56-70 years	53	26.5
> 70 years	9	4.5
Mean age of respondents in years ± SD; 46.75± 14.20		
Sex of Respondents		
Female	134	67.0
Male	66	33.0

Among 200 cases, 93.50% of cases had normal serosal surface whereas 6.5% of cases were found to have congestion of serosal surface. (Figure 1)

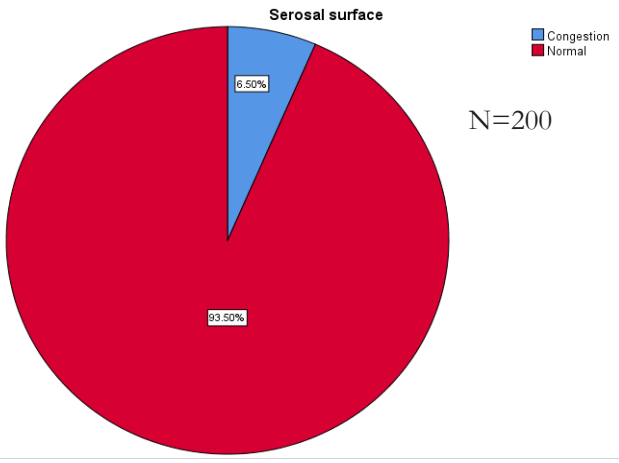

Figure 1: Serosal surface of the study population.

Regarding the wall thickness, 54.0% had thickened wall thickness were as remaining 46.0% of cases were found to have normal wall thickness. (Figure 2)

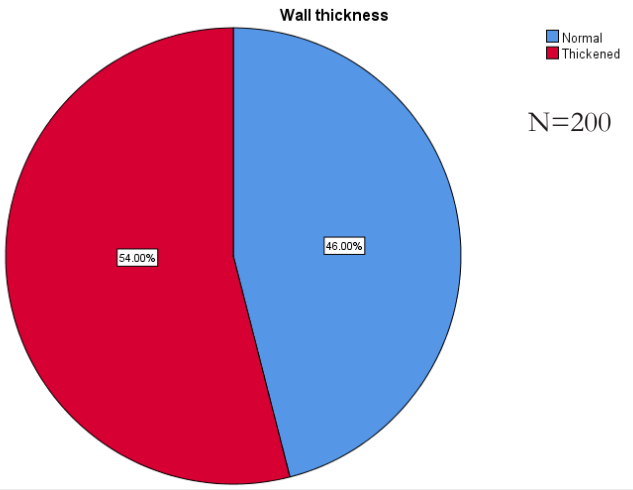

Figure 2: Wall thickness of the study population.

Regarding mucosal patterns more than two third (68.50%) of cases had normal mucosa, followed by strawberry (18.0%), atrophied (8.5%) and least nodular and Polyp (1%). (Figure 3)

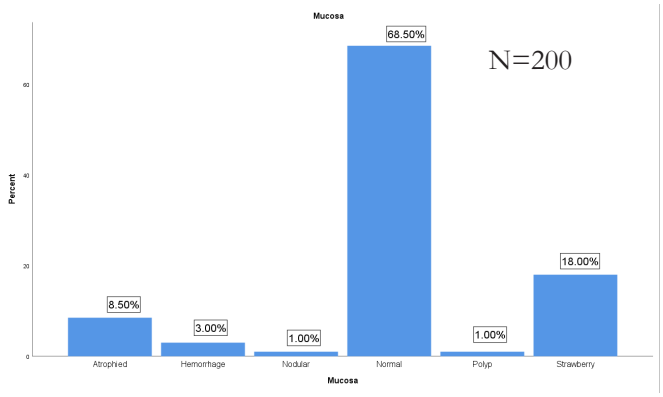

Figure 3: Mucosal pattern of the study population.

Histopathological examination showed chronic cholecystitis was the most usual histological findings (50%) with a female predominance. The second most common findings were chronic cholecystitis with cholesterolosis (18%) followed by chronic cholecystitis with pyloric metaplasia (13%). Other least histological variant findings were acute on chronic cholecystitis in 5%, Adenomatous hyperplasia and spongioid hyperplasia both found in 3%, chronic cholecystitis with intestinal metaplasia in 2.5%, follicular cholecystitis in 2%, Xanthogranulomatous cholecystitis were found in 1.5%. Very least variant was Adenocarcinoma NOS, low grade dysplasia and empyema of gallbladder in 1%. (Table 2)

Table 2: Distribution of Histopathological diagnosis in the study population.

Histopathological Diagnosis	Frequency (n=200)	Percentage (%)
Chronic cholecystitis	100	50.0
Chronic cholecystitis with cholesterolosis	36	18
Chronic cholecystitis with pyloric metaplasia	26	13
Acute on chronic cholecystitis	10	5
Adenomatous hyperplasia	6	3.0
Chronic cholecystitis with spongioid hyperplasia	6	3.0
Chronic cholecystitis with intestinal metaplasia	5	2.5
Follicular cholecystitis	4	2.0
Xanthogranulomatous cholecystitis	3	1.5
Acute cholecystitis	1	0.5
Adenocarcinoma NOS	1	0.5
Low-grade dysplasia	1	0.5
Empyema of gallbladder	1	0.5

The association between serosal surface and demographic characteristics (sex and age of the respondents) were analysed using chi-square test. A statistically significant association was observed between sex of the respondents and serosal surface, whereas age of respondents was not found to be significantly associated with serosal surface. (Table 3)

Table 3: Association of serosal surface with demographic characteristics

Characteristics	Serosal Surface (%)		p-value
	Congestion (n=13)	Normal (n=187)	
Sex of Respondents			
Female	5 (3.7)	129(96.3)	0.024*
Male	8 (12.1)	58(87.9)	
Age of Respondents			
5-30 Years	1 (3.2)	30(96.8)	<0.588
31-55 years	7 (6.5)	100 (93.5)	
56-70 years	5 (9.4)	48 (90.6)	
Greater than 70 years	0 (0)	9 (100.0)	

The association between mucosa with demographic variables. Both the variables were not found to be significantly associated with mucosa (Table 4)

Table 4: Association of Mucosa with demographic variables

Characteristics	Mucosa (%)						p value
	Atrophied (n=17)	Hemorrhage (n=6)	Nodular (n=2)	Normal (n=137)	Polyp (n=2)	Strawberry (n=36)	
Sex of Respondents							
Female	11 (8.2)	3 (2.2)	0(0)	94 (70.1)	2 (1.5)	24 (17.9)	0.303
Male	6 (9.1)	3 (4.5)	2 (3.0)	43 (65.2)	0 (0)	12 (18.2)	
Age of Respondents							
5-30 Years	1 (3.2)	0 (0)	1 (3.2)	26 (83.9)	0 (0)	3 (9.7)	0. 178
31-55 years	11 (10.3)	4 (3.7)	0 (0)	63 (58.9)	2 (1.9)	27 (25.2)	
56-70 years	5 (9.4)	2 (3.8)	1 (1.9)	39 (73.6)	0 (0)	6 (11.3)	
> 70 years	0 (0)	0 (0)	0 (0)	9 (100)	0 (0)	4 (44.4)	

The association between wall thickness with demographic variables. Both the variables that is Sex of respondents and age of respondents were not found to be significantly associated with wall thickness. (Table 5)

Table 5: Association of wall thickness with demographic variables

Characteristics	Wall thickness (%)		p value
	Normal (n=92)	Thickened (n=108)	
Sex of Respondents			
Female	66 (49.3)	68(50.7)	0.188
Male	26 (39.4)	40 (60.6)	
Age of Respondents			
5-30 Years	15 (48.4)	16(51.6)	0.926
31-55 years	48 (44.9)	59 (55.1)	
56-70 years	24 (45.3)	29 (54.7)	
Greater than 70 years	5 (55.6)	4 (44.4)	

Discussion

Cholecystectomy is the most frequently performed surgical procedure and is indicated in the management for the majority of gallbladder pathologies, including cholelithiasis, cholecystitis, gallbladder polyps, and carcinoma. Among the aforementioned pathologies, cholelithiasis accounts the utmost common biliary tract pathology worldwide with a prevalence rate at 10%-15%.[9] In the present study of 200 cholecystectomy specimens received, gallbladder lesions were predominantly observed in females as compared to males accounting 134 (67%) female cases and 66 (33%) male cases with male to female ratio (M: F) ratio of 1:2. which is similar to the study conducted by Bhatta et.al.[10] Stinton LM et.al.[11] The gall stone disease is more frequent in female gender particularly over the fertile period. Women are at high risk nearly twice as men to develop stones. Subsequent menopause, the accelerating rate will be in men. The female sex hormones, parity, estrogen replacement therapy, and oral contraceptive use might be the underlying mechanism for the established risk factors for cholesterol gallstone formation.[12]

In this study the patients age ranged from 8 years to 85 years with mean age of 46.75±14.202 years and the preponderance of gall bladder lesions were notice in the age group 31 to 55 years. This result was similar to the study done by Joshi HN et al.[13] who described that most of the gall bladder lesions were seen in 3rd to 4th decade of life. However many other studies found that 40 to 50 years was the crucial age group for cholecystectomy.[14,15] Dissimilarly Veerabhadrappa PS and Uysal et al.[12,16] reported maximum cholecystectomy cases in the age group more than 50 years. In the current study, entire cholecystectomy specimens encounter chronic inflammation, with chronic cholecystitis being the most common, concerning 100 (50%) patients. Various further studies also revealed chronic cholecystitis as the most common lesion in gall bladder specimens.[17,18]

The present study found chronic cholecystitis with cholesterolosis in 36(18%) cases. Similarly, Mondal B et al.[19], Kafle et al.[4] and Bhatt et al.[10] also observed cholesterolosis in 2.9%, 22% and 9.75% of cholecystectomy specimens, respectively. In our study, chronic cholecystitis with pyloric gland metaplasia was the third common finding accounting for 27 (13.5%) cases. of total cholecystectomy cases. The prevalence of pyloric gland metaplasia varied considerably across studies. Mondal B et al.[19] observed pyloric gland metaplasia in 73.7% of cases, indicating a markedly higher prevalence while Thakar BD et al.[20] reported 64 cases (8%), a proportion that aligns closely with the results of our study. Also it was assumed that persistent irritation by gallstones and chronic inflammation followed to metaplastic changes of gallbladder mucosa which may sometimes and ultimately lead to the development of carcinoma.[21]

Acute on chronic cholecystitis was found in 10 (5%) cases, histologically characterized by congestion, edema, hemorrhage, acute inflammatory infiltrate and fibroblastic proliferation. Raza et al.[22] reported 26.25% cases in their study, Kumbhakar D.[18] and Pathak et al.[23] had also observed in 1.25% and 3% respectively, whereas Acute cholecystitis was found in least number 1 (0.5%) in our study. In this present study out of 200 cases, we found equal number and percentage of chronic cholecystitis with spongioid hyperplasia and adenomatous hyperplasia. Cholelithiasis can induce the epithelium to undergo hyperplastic changes. These are in primary papillary, spongioid or adenomyomatous hyperplasia are the precursor lesions of carcinoma of the gallbladder.[24] The follicular cholecystitis in the present study was observed in 4 (2%) cases which was similar to the observation made by Dattal et al.[25] (0.6%). We found three cases (1.5%) of Xanthogranulomatous cholecystitis, which reveals marked wall thickening and simulate

with carcinoma macroscopically. There microscopic diagnosis is hence necessary. Similar study was observed in Uysal et al. 16 Bhatta et al.[10] in 0.1% and 1.39% respectively. We also found 0.5% case of Empyema and chronic cholecystitis with low grade dysplasia. Empyema of gallbladder is an rare condition designate by purulent infection of the gallbladder developed on blockage of the cystic duct. The lumen is commonly distended with pus.[25] In our study among the non-neoplastic specimens, low grade dysplasia which can be considered as pre-malignant lesions but not true neoplastic lesions. These cases were included in the non-neoplastic group rather than neoplastic group in our study. This gives a variety of inflammatory and pre-malignant histopathological changes of the study cases.

Out of 200 cases in our study, Adenocarcinoma of gallbladder was found in 1 (0.5%). Similar finding were observed by Bharti et al.[20] and Mohamed et al.[26] in 0.25% and, 0.1% respectively. The signs and symptoms of carcinoma are non-specific, simulating chronic cholecystitis and reveal only after the tumor has invoke significant harm.[27] Gallbladder carcinoma is a rare but fatal disease represented by poor prognosis carcinoma constitutes 2- 4 % of all malignant lesions and is the commonest malignancy of the biliary tract.[23] The study's limitations include relatively small sample size and retrospective design and patient population from a single region at Lumbini Medical College and Teaching Hospital, (LMC-TH) which may affect the relevance of the findings to other populations. And also results may vary in regions with a higher prevalence of gallbladder carcinoma emphasizing the need for broader, multicenter research across diverse populations.

Conclusion

Routine histopathological examination of cholecystectomy specimen is crucial in identifying the non-neoplastic lesion, their complication and incidental gallbladder carcinoma. Although the most common histopathological finding is chronic cholecystitis, however histopathological findings of gallbladder following cholecystectomy is immensely variable. Also they state indicating that the metaplasia-dysplasia-carcinoma sequence, a well-established progression in carcinoma. The results strongly recommended that all specimens should undergo routine histopathological assessment to promptly identify any associated pathological abnormalities.

Conflict of Interest: None

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Research Article

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Morphometric Study of Nose of Three Ethnic Groups of Rural Population of Jumla, Nepal

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Abstract

Introduction: The nose is one of the most important structures in the face, with both bones and cartilage, and performs a major function in smell and has profound aesthetic value as well.

Objective: This study is aimed to assess the morphometric measurement of the nose in the residents of Jumla.

Method: This was a descriptive cross-sectional study carried out among the residents of Jumla district aged 20-60 years with various ethnicities. A data gathering form with information including age, ethnicity, gender, and other useful personal bio-data was filled out for each subject. Nasal widths and lengths were measured with the aid of a manual spreading vernier caliper.

Results: There were 386 participants from different ethnic groups, of which 192 were male and 194 were female. The mean nasal length of the male and the femalewere42.96 ± 3.84 and 41.84 ± 3.51, and breadth were 34.02 ± 2.73 and 33.64 ± 2.58, respectively. Similarly, mean nasal index in males and females was 79.52 ± 6.20 and 80.78 ± 7.27.The mean nasal index of the Brahmin, Chhetri, and Dalit were 79.32±6.70, 79.23±6.83, and 81.85±7.07respectively.

Conclusion: There was sexual dimorphism observed. The ethnic group Dalit had higher values. All the ethnic groups, including males and females, have had a similar type of nose, i.e. Mesorrine in the present study.

Keywords: Anthropometric; ethnicity; nasal index;nasal types.

Introduction

Nose is one of the most important structures in the face that has both bone and cartilages and performs major function in smell and has got profound aesthetic value as well.[1] There are various methods to study the nose such as morphometric analysis, cephalometry, 3D scans and digitizers.[2] Nasal anthropometry is the measurement of the size, shape and proportion of human nose.[3] In human, the part of the nose that projects forward from the face is the external nose and it is variable in shape.[4]

Nasal index is a useful tool in anthropometry to differentiate sexual,

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ethnic and racial variables and is an important tool used in forensic science.[5] M. Broca in 1878 discovered that the nasal index is one of the best for the purpose of distinguishing the various races of mankind and human nose appears in different sizes and shapes due to ethnic differences, which is dependent upon the environmental climatic condition.[7] Narrow noses are naturally present in dry and cold climates while broad noses thrive in moist and warm regions as results of natural selection in human evolution.[8] Thus, nasal index corresponds with nasal size, oxygen utilization, average temperature and humidity in different regions.[9]

However, there are limited researches available especially in the mountainous regions of Karnali province, Nepal. So, this study is aimed to assess the morphometric measurement of the nose in the residents of Jumla and compare the variations of nose among different ethnic groups predominant in the Jumla district (Brahmin, Chhetri and Dalit).

Methods

An analytical cross-sectional study was carried out from Magh 2081 to Ashwin 2082 among the residents of Jumla district age group ranging from 20-60 years with various ethnicity. The ethical clearance was obtained from the Institutional Review Committee, of Karnali Academy of Health Sciences (KAHS), Jumla, Nepal.

A data gathering form with information including age, ethnicity, gender and other useful personal bio-data was filled for each subject after taking the verbal and written consent. Nasal widths and lengths were measured with the aid of manual spreading vernier caliper [MODEL: AC120-012-14 WEIGHT: 0.86kg PACK DIM: 43.20mm x 13.20mm x 3.20mm UPC: 6009515863913] by a single observer to avoid errors using the standard method described by Anas and saleh. The individual participant was seated in a relaxed position with his or her head positioned anatomically (face anteriorly) and measurements taken. Nasal width was measured and recorded as a straight distance from right ala to left ala and nasal height measured as the distance from the nasion to the sub-nasale. Vernier caliper was used to measure the dimensions of nose. It is a valid tool to measure length. The anthropological nasal index is calculated by using the formula mentioned below, given by Topinard. [6]

Nasal Index = Width of nose (cm)/Length of nose (cm) x 100

In order to calculate the proportion of people with various types of nose, sample size was calculated taking 50% prevalence of a certain type of nose (to get the highest calculated sample size in the absence of relevant prior data, to our knowledge)

$N = z^2PQ/d^2 = 1.962 * 0.5 * 0.5 / 0.052 = 386$

The participants were enrolled using the convenient sampling technique. The participants aged 20- 60 years and belonging to the ethnic groups Brahmin, Chhetri and Dalit of Jumla and who provided the consent were enrolled. Individuals below 20 years and above 60 years, having nasal deformities including deformities, nasal polyps, septal deviation and previous nasal surgeries were excluded from the study. Moreover, the individuals having chronic nasal conditions such as sinusitis and upper respiratory tract infections that may alter nasal shape were excluded from the study. The data collected was recorded in a proforma and entered into Microsoft Excel spreadsheet version 13. Further analysis was carried out with Statistical Package for Social Sciences (SPSS) version 25. Descriptive statistics was reported as frequency and percentage. Association between categorical variables was analyzed using chi-squared test, continuous variables with independent sample t test and ANOVA. The p value of <0.05 was considered as statistically significant.

Results

There were 386 participants from residents of Jumla district belonging to the different ethnic groups in which 192were male and 194 were female. The mean nasal length of the male and the female were found to be 42.96 ± 3.84 and 41.84 ± 3.51 respectively. Similarly, the mean nasal breadth of the male and the female were found to be 34.02 ± 2.73 and 33.64 ± 2.58 respectively. (Figure 1). Among 386 participants among which 134 were Chhetri, 120 were Brahmin and 132 were Dalit. (Figure 2)

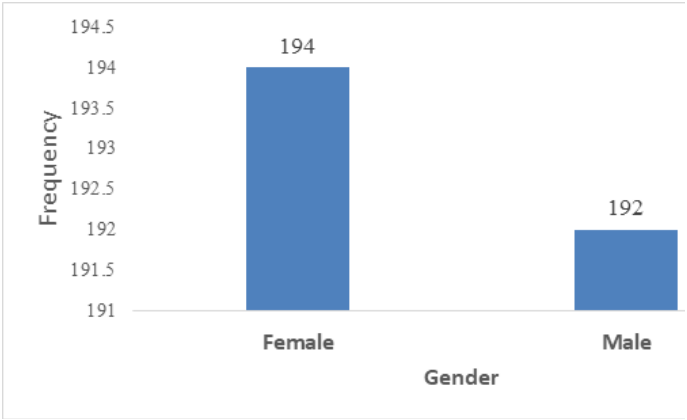

Figure 1: Distribution of participants based on gender

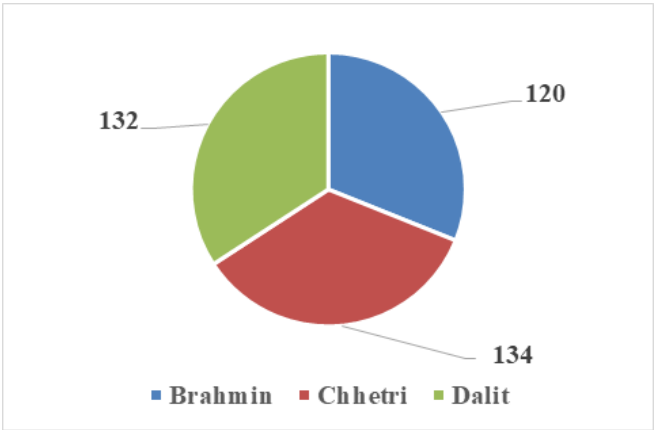

Figure 2: Distribution of participants based on ethnic groups

The classification of nasal index based on types of nose is shown. It categorizes noses into five different types namely hyperleptorrhine, leptorrhine, mesorrhine, platyrrhine and hyperplatyrrhine. (Table 1)

Table 1: Nasal classification based on the nasal index

Categories	Size of nose	Nasal Index	
		On living head	On skull
Hyperleptorrhine	Long narrow nose	40-54.9	-
Leptorrhine	Moderately narrow nose	Less than 70	Less than 47
Mesorrhine	Moderately or medium size	70-84.9	47-50.9
Platyrrhine	Moderately wise nose	85-99.9	51-57.9
Hyperplatyrrhine	Very wide nose	100 or more	58 or more

Table 2: Gender wise comparison of the variables.

Characteristics	Sex	n	Mean ± Std. Deviation	p value
Age	Female	194	36.81 ±11.334	0.93
	Male	192	36.90 ± 11.023	
Nasal length (mm)	Female	194	41.84 ± 3.51	<0.01
	Male	192	42.96 ± 3.84	
Nasal breadth (mm)	Female	194	33.64 ± 2.58	0.17
	Male	192	34.02 ± 2.73	
Nasal index	Female	194	80.78 ± 7.27	0.07
	Male	192	79.52 ± 6.20	

Table 3: Ethnicity wise comparison of variables.

Characteristics		n	Mean± Std. Deviation	p value
Nasal Index	Brahmin	120	79.32 ±6.70	0.02*
	Chhetri	134	79.23±6.83	
	Dalit	132	81.85±7.07	
Nasal breadth (mm)	Brahmin	120	34.71±2.59	<0.01*
	Chhetri	134	33.86±2.40	
	Dalit	132	33.01±2.73	
Nasal length (mm)	Brahmin	120	43.95±3.76	<0.01*
	Chhetri	134	42.91±3.30	
	Dalit	132	40.47±3.23	
Age (years)	Brahmin	120	36.84±10.87	0.11
	Chhetri	134	38.28±11.73	
	Dalit	132	35.42±10.72	

Dalit group has a higher nasal index and Brahmin and Chhetri have comparable nasal indices. (Figure 4

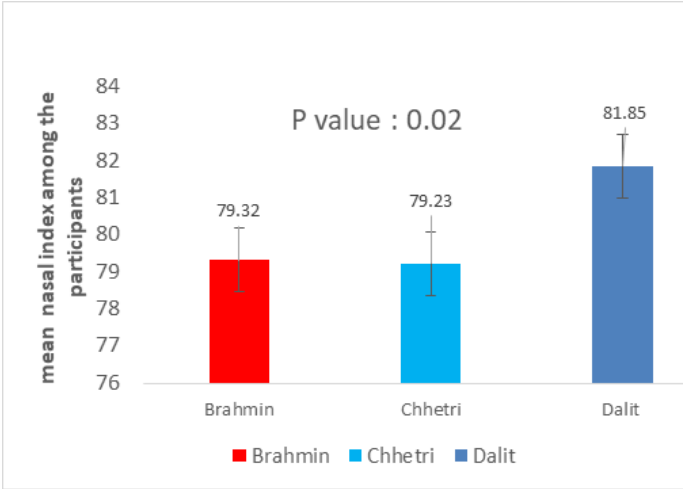

Figure 4: Comparison of nasal indices among different ethnic groups

Discussion

This study provides valuable baseline data on nasal morphology among different ethnic groups of the mountainous region of Jumla, Nepal. It includes both male and female participants from diverse ethnic backgrounds and this study offers insights into gender and ethnicity based variations in nasal index classification. In our study, the nasal index of the Brahmin, Chhetri and Dalit were 79.32±6.70, 79.23±6.83 and 81.85±7.07 respectively. This shows the nose of the mountainous population of Jumlais mesorrhine type. A similar study conducted on Tharu and Mongoloid population aged between 25-45 years Eastern Nepal, that included two different ethnical groups; concluded that the nasal index of the Mongoloid male and female were 74.6 and 75.[9] Respectively with Mesorrhine (medium nose) type whereas the nasal index of Tharu male and female were 83.8 and 82.4 respectively also fall under the mesorrhine (medium nose) type.[10]

Female have higher nasal index values than the male in this study. This shows the sexual dimophism.These findings are also similar to the study done in Nepal by SahSKet.al. in which mesorrhine emerged as the most common nasal type in both genders and among Branmin/Chhetri students had mehorrhine followed by leptorrhine and hyperleptorrhine.11 The study of Franciscus and Long found the nasal height and width are higher in South Nigerian males than females.[12] In the present study, these parameters were not found to be statistically significant difference between males and females (Tables 1). In a study conducted in Itsekiri and Urhobo people, the results showed the Urhobos had a mean nasal index of 89.63 and the Itsekiri's had a mean nasal index of 90.74 ($p<0.05$), and the two ethnic group fall under platyrrhine(short and broad nose).[13]

In our study, the gender difference was minimal, suggesting that while nasal morphology may show slight gender specific variations, and it is predominantly influenced by ethnicity and environmental factors. Socioeconomic and nutritional factors also contribute to variations in nasal morphology.[14] In some cultures, narrow and straight noses are considered more appealing, influencing subtle shifts in nasal morphology through intergenerational preferences.[15]

Variations in nasal shape and size are not merely aesthetic but serve specific physiological purposes, ensuring optimal respiratory function in diverse climates.[16] Limitations of the study include, this could not cover more number of ethnic groups and age groups.

Conclusion

Males exhibited greater nasal length and breadth than females. However, the nasal index was higher in the Dalit community compared to Chhetri and Brahmin groups. Ultimately, while nose type varies by gender, the nasal index contributes little to sexual dimorphism. This study may play a vital role in providing a baseline information for reconstructive nasal surgery, rhinoplasty and, nose prosthesis while treating various population group of Nepal. The present study recommends conducting large multicenter studies involving wider geographical area and ethnic groups to establish comprehensive anthropometric reference data for Nepalese population.

Conflict of Interest: None

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Case Report

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Nepal Journal of Health Sciences

Management of Post- Partum Pulmonary Edema in an Intensive Care Unit of a Peripheral District Hospital: A Case Report

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Abstract

Pulmonary edema is an infrequent yet severe complication that may arise in the postpartum period following normal vaginal delivery. Prompt recognition and treatment are essential to prevent further deterioration. Here, we present a case involving a 23 year old primigravida, presented with shortness of breath and orthopnea on the fifth day after childbirth. Following diagnosis of postpartum pulmonary edema, the patient received subsequent management in the Intensive Care Unit. The patient's condition improved and patient was discharge. This case underscores the significance of coordinated care across various medical specialties and timely intervention in managing such conditions.

Keywords: Anesthesiologist; intensive care unit; post-partum vaginal delivery; pulmonary edema.

Introduction

Pulmonary edema is a potentially life-threatening condition characterized by accumulation of fluid in the lungs, leading to impaired gas exchange and respiratory distress.[1] This condition goes by various names such as postpartum heart failure, postpartum myocarditis, meadows' syndrome and postpartum cardiomyopathy.[2] It is an idiopathic cardiomyopathy occurring in the third trimester or up to 6 months post-partum and is seen most often in the first month postpartum.[3] Postpartum pulmonary edema has an overall incidence of only 0.08%.[4] It is rare in the postpartum period following normal vaginal delivery. However,

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when it does occur, it requires immediate management to prevent complications.

Case Report

A 23 year old, primigravida and with an uneventful antenatal period, presented at a peripheral hospital's emergency department on the fifth day after giving birth. She complained of worsening shortness of breath, coughing, abdominal pain, and difficulty breathing while lying flat. She had normal vaginal delivery with an episiotomy, resulting in a healthy baby girl weighing 3.5 kg, without any complications. The patient had no significant medical history or family history of chronic conditions such as hypertension, diabetes, or heart disease.

Upon examination, the patient had a Glasgow Coma Scale (GCS) score of 15 out of 15 and exhibited tachypnea (40 breaths per minute), tachycardia (119 beats per minute), and low blood oxygen levels (69%) while breathing on room air. Her blood pressure was 230/140 mmHg. Bilateral pitting edema was observed, alongside a normal body temperature. Lung auscultation revealed widespread crackling sounds on both sides.

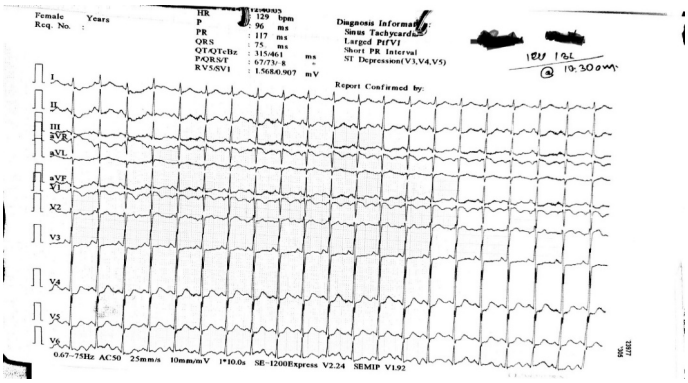

Figure 1: Sinus Tachycardia.

The patient was promptly transferred to the Intensive Care Unit (ICU), where oxygen supplementation was initiated at a rate of 10 liters per minute via a face mask. At this point, the patient's blood pressure was measured at 180/100 mmHg, pulse rate at 132 beats per minute, respiratory rate at 35 breaths per minute, oxygen saturation at 77%, temperature at 96.6 degrees Fahrenheit, and blood glucose level at 127 mg/dL.

Further investigations revealed arterial blood gas (ABG) findings consistent with respiratory alkalosis and hypoxemia. Electrocardiography (ECG) showed only sinus tachycardia (figure 1). A chest X-ray of fifth postpartum day demonstrated diffuse bilateral infiltrates suggestive of pulmonary edema (figure 2).

Bedside lung scanning revealed normal lung sliding with multiple B lines. Bedside echocardiography screening ruled out structural cardiac abnormalities or evidence of cardiogenic pulmonary edema. Additionally, bedside venous doppler of bilateral lower limbs was performed to exclude venous thromboembolism. Laboratory investigations (Table 1), including complete blood count, renal function tests, electrolytes, bleeding time, and clotting time, were within normal limits, except for a total white blood cell count of 16,900/cumm with 89% neutrophils. Slight elevations in serum glutamic pyruvic transaminase (SGPT) at 64 IU/L and serum glutamic oxaloacetic transaminase (SGOT) at 69 IU/L were noted, but they were deemed insignificant. Furthermore, the D-dimer test yielded negative results.

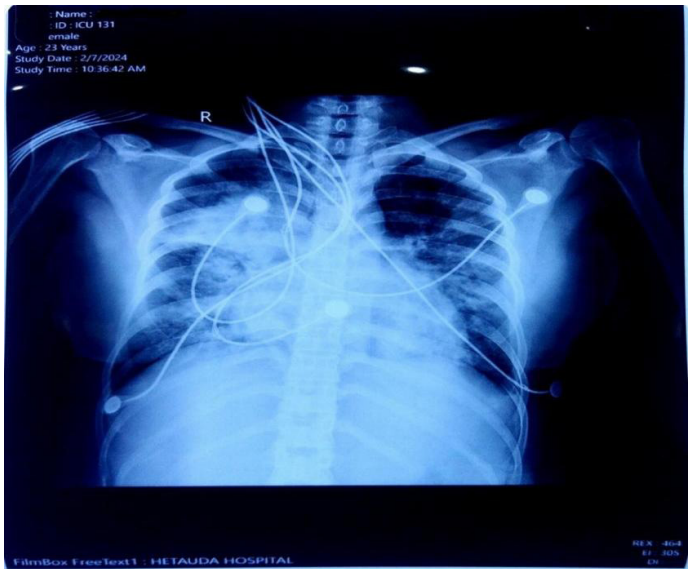

Figure 2: Bilateral Heterogeneous Opacity in both Middle and Lower Lobe.

Table 1: Investigations of the patient during the course of hospital stay.

Investigations	1st Day of admission	1st DOR	2nd DOR	3rd DOR
Hb (gm%)	12.9	10.4	11.2	11
Platelet count (/cumm)	3,53,000	3,31,000	3,01,000	3,00,000
Tlc (/cumm)	15,300	16,000	16,000	14,000
Neutrophil (%)	90	89	83	80
Lymphocyte (%)	8	8	15	10
Rbs (md/dl)	95	92	95	90
B. Urea (md/dl)	18	28	38	46
S. Creatinine (md/dl)	0.4	0.54	0.94	0.16
Sodium (mmol/l)	137	136	138	140
Potassium (md/dl)	3.8	3.9	4.19	5.0
ABG				
Ph	7.57	7.45		
po2	35	98		
pco2	20	32		
hco3	25.4	23		
Lactate	1.1	0.8		

***1st DOR (Day of Readmission) = 1st day of readmission i.e. 5 days after admission*2nd DOR= 2nd day of readmission**

*3rd DOR= 3rd **day of readmission**

Management

The patient was swiftly transferred to the Intensive Care Unit (ICU) under the supervision of an anesthesiologist for further management. She was given supplemental oxygen through a face mask at a high flow rate of 10 liters per minute to ensure her blood oxygen levels stayed above 92%. To alleviate pulmonary congestion and breathing difficulties, she received intravenous diuretics: a 40 mg dose of furosemide initially, followed by another 40 mg dose after 10 minutes, and then 20 mg twice daily. Additionally, she was administered GTN (glyceryl trinitrate) through an IV, starting with a 100 mcg bolus dose followed by a continuous infusion of 5 mcg per minute to manage her blood pressure, decrease heart load, and enhance oxygen levels.

Broad spectrum antibiotics (Piperacillin 4 gm + Tazobactam 0.5 gm) were also started, along with a prophylactic dose of Enoxaparin (40 units) injected subcutaneously. Hydrocortisone (100 mg three times daily) was administered intravenously, and nebulization with a mixture of salbutamol, ipratropium, and normal saline (in a ratio of 1:1:2) was done three times daily. Intravenous morphine (2 mg) injection was available for pain. lose monitoring of vital signs, fluid intake and output, and urinary output was initiated, and fluid intake was restricted to prevent further fluid overload. The patient's response to treatment was carefully tracked through repeated arterial blood gas analyses and chest X-rays. Over the following 48 hours, the patient's respiratory symptoms and oxygen levels gradually improved.

Outcome

The patient's clinical condition continued to improve with conservative management in the ICU. She was weaned off after 48 hours and transitioned of supplemental oxygen via face mask to nasal cannula. Diuretic therapy was gradually tapered, and the patient's fluid balance normalized. Patient was initiated on chest physiotherapy and incentive spirometry. Repeat chest X-ray showed resolution of pulmonary infiltrates (figure 3).

The patient was directly discharged from the ICU in the 8th postpartum day 2024-2-11 with stable vital signs and improved respiratory status (figure 4). She was counseled regarding the importance of follow-up visits and advised on measures to prevent recurrence. On further follow up after fifth day, her general examination, systemic examination and investigations were within normal range.

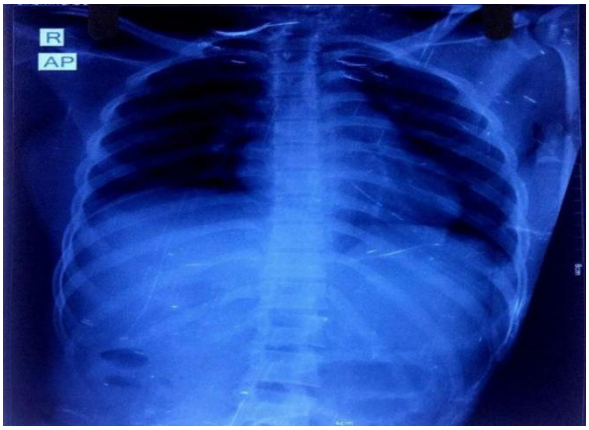

Figure 3: Normal chest x-ray of the patient at the time of discharge.

Figure 4: ICU monitor showing improve vitals of the patient at the time of discharge.

Discussion

Pulmonary edema following normal vaginal delivery is a rare but potentially serious complication that requires prompt recognition and management.[5] While the exact pathophysiology is not fully understood, it is believed to be multifactorial, involving fluid shifts, hemodynamic changes, and altered vascular permeability.[6] Postpartum pulmonary edema can be either cardiogenic (peripartum cardiomyopathy, pre-existing valvulopathies, myocardial ischemia, and pre-eclampsia causing heart failure) or noncardiogenic (iatrogenic fluid overload, excessive tocolytic use, thyroid disease, sepsis, and ARDS) in origin.[7] Studies have shown that there is an increased risk of pulmonary edema associated with cesarean and spontaneous preterm delivery. Our patient did not meet the criteria for any of the above causes. In study done by Kakogawa et al on Department of Obstetrics and Gynecology, St Marianna University School of Medicine, Kanagawa, Japan, patient was Managed with oxygen, diuretics, morphine and beta-blockers contrasting from our study where we used oxygen, diuretics, hydrocortisone and GTN infusion for management of the case.[8] A new position statement from a European Society of Cardiology working group on PPCM (Postpartum cardiomyopathy) has expanded the definition of the condition. It now describes PPCM as an idiopathic heart condition marked by heart failure caused by

decreased left ventricular function occurring towards the end of pregnancy or in the months post-delivery, with no other identifiable cause of heart failure.[9]

Kakogawa et al study reported that cause of heart failure in this patient was diastolic dysfunction during the third trimester of pregnancy however, in our study only echocardiography screening was done at the bedside.[8] As it is difficult to differentiate heart failure due to systolic dysfunction from that caused by diastolic dysfunction the finding of our echo screening was normal LVEF with no any cardiac abnormality due to lack of proper echocardiographic machine and probe as well as unavailability of cardiologist in our setting.

In Kakogawa et al study an elevated level of serum prolactin was found, as the 16-kDa cleavage product of prolactin as well as C1 inhibitor deficiency is a major contributor to PPCM.[8, 10] The deficiency of C1 inhibitor led to the onset of acute heart failure, marked by a combined dysfunction in both systolic and diastolic phases, attributed to the leakage of capillaries throughout the body.[11] However, we are unable to test serum prolactin and C1 inhibitor due to limited resources and unavailability of test in peripheral setting. A retrospective investigation studying BNP levels in pregnancy found that women who encountered adverse maternal cardiac events during this period had BNP levels exceeding 100 pg/mL.[12]

Although measuring serial BNP levels was helpful there are limited data available on the value of BNP levels when evaluating volume status during pregnancy, so in our study, we have not done serial BNP monitoring. In our case, multidisciplinary management involving anesthesiologists and obstetricians played a crucial role in the successful outcome. Prompt initiation of supportive measures, including supplemental oxygen, diuretic therapy, and GTN, helped alleviate symptoms and improve respiratory function. Close monitoring and serial assessments were essential in guiding therapeutic interventions and ensuring optimal patient care.

Summary

Pulmonary edema occurring after a regular vaginal delivery is uncommon yet can be a serious complication necessitating quick identification and comprehensive treatment. Anesthesiologists, given their proficiency in critical care and airway handling, hold a central position in managing such scenarios, especially in peripheral hospitals with constrained resources.

Conflict of Interest: None

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Case Report

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Nepal Journal of Health Sciences

Proximal Tibial Bone Metastases in Patient with Breast Carcinoma: A Rare Case Report

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Abstract

Bone metastases from any carcinoma below elbow and knee are rare, those to tibia are even rarer. We present a case of a 41 year female patient with a history of right breast carcinoma. Previously, the patient was misdiagnosed as right breast fibroadenoma. The patient was then advised to have an excisional biopsy and report revealed cribriform ductal carcinoma. 99mTc-MDP bone scan revealed that there is osteoblastic lesion in shaft of right proximal tibia suggestive of bone metastases that was confirmed with histopathology. Proximal tibial bone metastasis in breast carcinoma patient is relatively very uncommon, but challenging, site for bone metastasis.

Keywords: Acrometastases, bone metastases, breast carcinoma, bone scintigraphy, tibia.

Introduction

Tibial bone metastasis from breast cancer is considered a relatively rare presentation, as breast cancer metastases most commonly affect the axial skeleton (spine, ribs, pelvis, skull, and proximal long bones like the femur and humerus). However, there are few case reports and studies that include patients with tibial involvement.[1,2] One large study of 984 patients with bone metastases from breast cancer found that the tibia was involved in only 0.3% of cases.[3] ^{99m}Tc-MDP bone scan and histopathology may be performed to confirm the breast cancer origin, especially if it is the first or only site of metastasis.

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Case Report

We present a unique case of a 41 year female patient with a history of right breast carcinoma. Previously, the patient was misdiagnosed as right breast fibroadenoma with sebaceous cyst, a mass measuring 13.1x9.5x6.7 mm^3 in Ultrasonography (USG) report. The patient was then advised to have an excisional biopsy whole tumor mass and tumor was sent for histopathological examination to get confirmed diagnosis. The histopathology report revealed that there was cribriform ductal carcinoma in situ intermediate nuclear grade with positive margin. Before starting any treatment, the patient was advised to have all the required laboratory examinations, CECT chest-abdomen and ^{99m}Tc-MDP whole body bone scan. CECT revealed breast mass with hepatic solitary lesion.

Histopathology slides (Figure-1) were again reviewed and report revealed invasive carcinoma with immunohistochemistry (IHC) was Triple Negative Breast Carcinoma (TNBC). Whole body bone scan revealed that there was isolated osteoblastic lesion (measuring 2.7x1.7cm) in the shaft of the right proximal tibia suggestive of bone metastases (Figure-2). CT guided Fine Needle Aspiration Cytology (FNAC) performed from the focus present in the proximal 1/3 of the shaft of the right tibia revealed metastatic carcinoma.

Patient underwent for right breast modified radical mastectomy (MRM) followed with chemotherapy and local external field beam radiation therapy (30Gy/10#/ 2weeks). Later, she complained of severe pain below the left knee for which she also received local field radiation (20Gy/5#/1week). The symptoms decreased, allowing her to resume her daily routine. Tamoxifen was continued at 20mg/day. Patient was advised for 3-6 monthly follow up. The probable danger signs were explained and if any was advised for swift follow up.

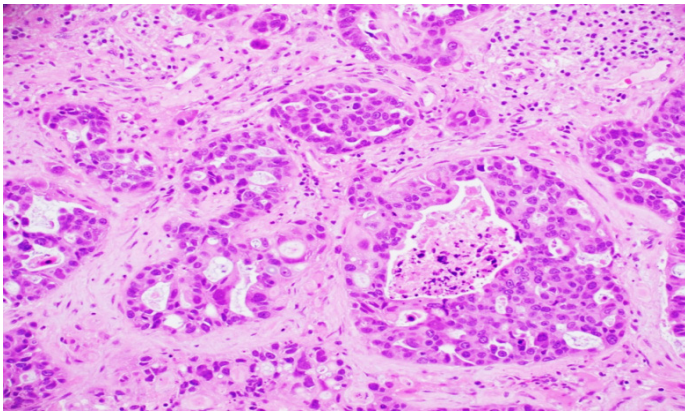

Figure 1: Histopathology image of Invasive carcinoma with Triple Negative Breast Cancer (TNBC) i. e. estrogen (ER), progesterone (PR), and HER2 protein all negative.

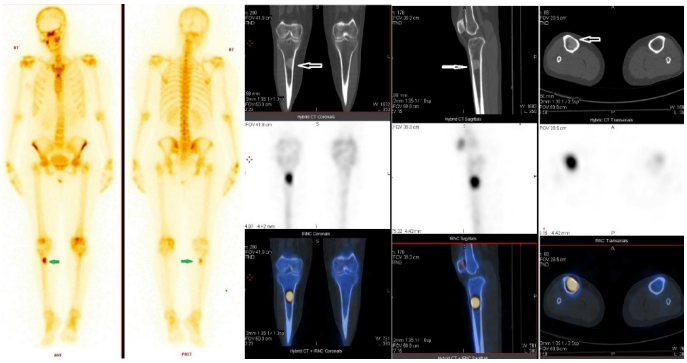

Figure 2: Tc-99m-MDP Whole Body Bone Scintigraphy and SPECT/CT shows there is increased radiotracer in the proximal shaft of right tibia likely metastases.

Discussion

Metastatic bone disease is the most common form of bone cancer found in oncology practice. Its incidence varies from 6% to 85% in several studies, and bone is the third most common site of metastases after lung and liver.[4] The primary cancers most commonly associated with bone metastases are Lung, Breast, Prostate, Thyroid and Kidney.[5] The spine appears to be the most affected bony site followed by the pelvis, ribs, skull and the upper arm bones. Breast cancer and lung cancer (which is 20% of cases) are the most common causes of distal or below elbow and below-knee metastases.[6]A literature review shows below-knee and below elbow metastases are found in only about 7% of cases. The tibia alone is affected in 4.4% while the foot and the ankle are involved in 1% each.[7] Our case also had metastasis to tibia. Most of these cases of acral metastases have been found to arise from bronchogenic carcinoma followed by renal cell carcinoma and breast cancer. The cause of the rarity of acral metastases is the relative lack of active hematopoetic bone marrow in these sites.[8] There have been reports of lung and breast cancers spreading to the thumb, or presenting just as an isolated metastases in the talus, or even to the phalanx.[9]

About 70% of cases with bony metastases are detected radiographically and 85% show lytic changes. Bone scans are not done routinely for early stage breast cancer and is recommended in stage II tumors>3 cm and high histologic grade, and in stage III and IV cancers.[10] On the other hand, stage II patients and stage I should only undergo for bone scans if the patients have bone pains. Hematogenous spread has been documented as the most common and important mechanism of bone involvement.[11] Metastases most often occur in red marrow, which are present in cancellous bone in vertebrae throughout adult life, hence the high frequency of spinal spread.

Metastases to peripheral skeleton distal to the elbows and knees are uncommon, hence a high index of suspicion needs to be maintained for diagnosis and effective management, especially in patients with prior cancers. Any suspected cases found through physical exams and imaging must be histopathological examination for definitive confirmation. While the general approach is palliative, surgical intervention might be an option for limited disease. In

such cases, CT or MRI is essential to map the local extent of the spread. Aggressive management may be beneficial for patients with contained disease who have a favorable prognosis. Radiotherapy is a key tool for managing pain, and the specific systemic therapy regimen is determined by the primary tumor's characteristics.

Summary

A case report of tibial bone metastasis in a breast cancer patient highlights an uncommon site of spread that typically requires aggressive local management (often surgery and/or radiation) in addition to ongoing systemic therapy and bone-modifying agents to manage symptoms, prevent SREs, and maintain the patient's quality of life and function.

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Case Report

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Nepal Journal of Health Sciences

Surgical and Orthodontic Management of Multiple Supernumerary and Impacted Teeth: A Case Report

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Abstract

Abnormal upper anterior teeth in a young patient are often a source of esthetic concern for both the child and their parent. The 12 year old male patient reported with an unesthetic smile with four supernumerary teeth and an impacted upper left maxillary central incisor. This case report describes combined surgical and orthodontic treatment for the removal of multiple supernumerary teeth, followed by orthodontic traction of the impacted incisor to guide it into its correct position, enhancing smile esthetics. The surgical orthodontic approach is the optimal strategy for treating impacted maxillary central incisors.

Keywords: Impacted incisors; smile; supernumerary teeth.

Introduction

Supernumerary teeth, which can either erupt properly or be impacted, can cause the development of an odontogenic cyst, displacement, crowding, diastemas, failure of eruption, resorption of nearby teeth, and esthetic problems.[1] An impacted/unerupted maxillary anterior tooth is regarded as unattractive, as it affects self-esteem and general social interaction.[2] This case report is unique as it describes combined surgical and orthodontic treatment for the removal of multiple supernumerary teeth, followed by orthodontic traction of the impacted permanent left maxillary central incisor. This type of case report is limited in the literature.

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Case Report

Chief complaint: A 12-year-old male patient complained of an unesthetic smile and an abnormal teeth in the upper front region of the jaw.

Clinical finding: The patient had two malformed (supernumerary) teeth clinically visible in the upper incisor region, creating interferences while bringing the teeth into occlusion. The profile was convex, and the patient had competent lips (Figure 1 a, b). Intra-orally, the number of teeth present was 26, along with two supernumerary teeth, with minimal crowding in the upper and lower arches. The unerupted teeth were 17, 18, 21, 28, 38, 48. The impacted 21 was palpable in the labial side. Upper dental midline was not possible to evaluate due to impacted 21; lower dental midline was shifted to the left by 2mm. There were occlusal interferences when the teeth were brought into occlusion. Molar relation was bilaterally super class I. Canine relation was class III bilaterally. Overjet was 2mm, and overbite was 1mm, 12.2% of the lower central incisor (Figure 1 b). When smiling, the lip line was average, non-consonant smile arc, smile style complex, upper lip curvature straight, presence of buccal corridors, asymmetrical, and abnormal shape of anterior tooth (Figure 1 a).

Radiographic finding: Orthopantomogram (OPG) showed impacted two supernumerary teeth and 21 (Figure 1 c, d, e). The patient was in stage 2 of Cervical Vertebrae Maturation (CVM) indicated in a lateral cephalogram. (Figure 1 c). CT scan showed that two supernumerary teeth were impacted, where one was in inverted position. No resorption of adjacent teeth was found in the CT scan (Figure 1e).

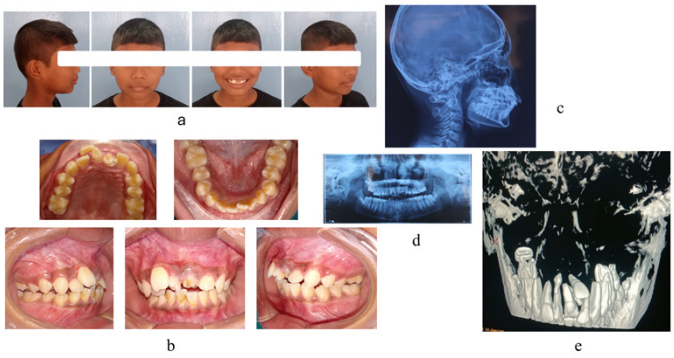

Figure 1: Pre-treatment records (a) Extra-oral photographs (b) Intra-oral photographs (c) Lateral cephalogram before the start of orthodontic treatment (d) OPG before the start of orthodontic treatment (e) CT scan of Face

Diagnosis: Considering cephalometric analysis, SNA was 80˚, SNB was 76˚, ANB was 4˚, and FMA was 27˚, suggestive of skeletal class I malocclusion with a vertical growth pattern. Upper incisor to NA was 36˚/7mm, suggestive of slightly proclined and forwardly placed upper incisors. The lower incisor to NB was 32˚/6mm, suggestive of slightly proclined and forwardly placed lower incisors. S line to upper lip was 3mm, and lower lip was 3mm, suggestive of slightly protrusive upper and lower lips (Table 1).

Table 1: Comparison of pre and post-treatment cephalometric values.

Parameters	Normal value	Pre-treatment	Post-treatment	Difference
SNA	82˚±2˚	80˚	79˚	-1˚
SNB	80˚±2˚	76˚	76˚	0˚
ANB	2˚±2˚	4˚	3˚	-1˚
FMA	25˚	27˚	26˚	-1˚
Upper incisor to NA	22˚/4mm	36˚/7mm	34˚/5mm	-2˚/-2mm
Lower incisor to NB	25˚/4mm	32˚/6mm	33˚/6.5mm	+1˚/+0.5mm
S line to Upper lip Lower lip	-4mm -2mm	3 mm 3mm	2mm 3.5mm	-1mm +0.5mm

Treatment planning: Corrective orthodontics was planned with the extraction of supernumerary teeth and orthodontic traction of 21 to bring it into the arch.

Treatment appliance: Initial bonding was done in upper arch with MBT (Meite Dental Orthodontic Manufacturing Company) 0.022" slot bracket.

Treatment sequence: 0.014" Nickel Titanium (NiTi) of Meite Dental Orthodontic Manufacturing Company, 0.016" NiTi, followed by 0.017" x 0.025" NiTi were used. The medical check-up of the patient was done before general anesthesia, which was normal. Surgery was done by an oral and maxillofacial surgeon under general anesthesia to remove both the erupted and impacted supernumerary teeth, and an attachment (lingual button) was placed wrt 21 by an orthodontist to apply force for orthodontic traction (Figure 2 a). After the removal of supernumerary teeth, occlusal interferences were eliminated. The closed eruption technique was followed in this case for the orthodontic traction. Traction force was applied with the help of an archwire 0.012" NiTi over the base archwire of 0.019" x 0.025" Stainless Steel (SS). 0.012" NiTi archwire was engaged after 21 was visible in the arch (Figure 2 b). The patient had a fall injury during the course of orthodontic treatment, resulting in the mesi-incisal fracture of 11 without pulp exposure. The composite restoration was done for the fracture portion of 11. Settling of posterior teeth was done on 0.018" SS wire through the posterior box elastics of size 3/16" and 4.5 oz force. OPG was done before the debonding of the appliance at 18 months, which showed paralleling of the roots (Figure 3 c). Lateral cephalogram was done before the debonding of the appliance (Figure 3 d). In both the upper and lower arches, a vacuum-formed retainer was placed. It was possible to attain class I molar relationships with normal overjet, and overbite at the end of treatment (Figure 3 a, b).

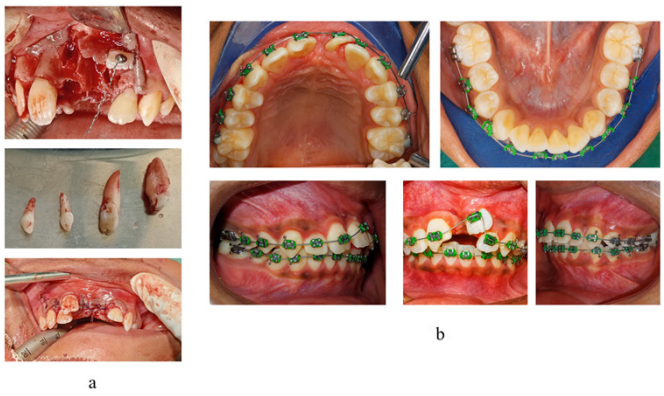

Figure 2: (a) Surgical exposure and attachment placed wrt 21, extracted supernumerary teeth, and photograph after flap closure (b) Photographs after 21 was erupted into the oral cavity

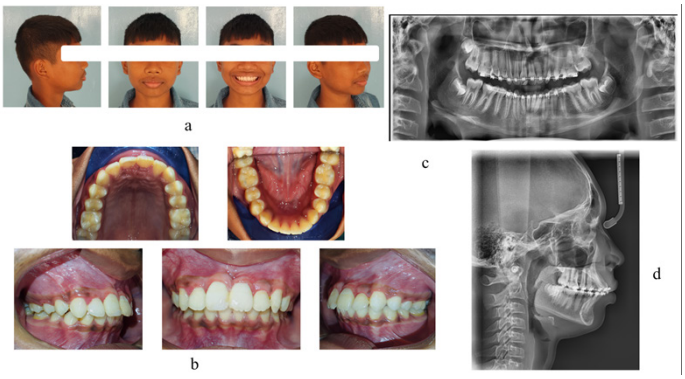

Figure 3: (a) Etra-oral photographs after debond of appliance (b) Intra-oral photographs after debond of appliance (c) OPG just before debond of appliance (d) Lateral cephalogram just before debond of appliance

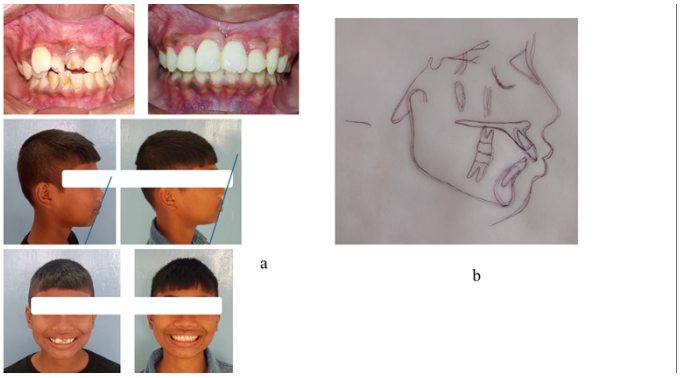

Figure 4: (a) Comparison of photographs before and after treatment and (b) Cranial base superimposition

Treatment outcome: The impacted tooth was erupted with the help of orthodontic treatment (Figure 3). The molar relation at the end of orthodontic treatment was bilaterally class I, with normal overjet and overbite, and upper dental midline coinciding with facial midline. The protrusiveness of upper lip was slightly improved while lower lip was slightly increased (Figure 4 and Table 1). The patient's smile improved from a non-consonant to a consonant smile (Figure 4). The final appearance of the tooth 21 was estheically pleasing with the gingival margin at the same level as 11. The superimposition (American Board of Orthodontics ABO method) of lateral cephalograms showed the improved inclination of upper incisors and slight protrusion of lower incisors (Figure 4 and Table 1).

Discussion

The abnormal upper anterior teeth in a young patient is often a cause for aesthetic concern, both for the child and their parents.[3] The maxillary incisors are the most prominent teeth in an individual's smile; they are also the teeth that are on maximum display during speech in most individuals, and the normal eruption, position, and morphology of these teeth are crucial to facial esthetics and phonetics.[3] The prevalence of supernumerary teeth is 1.87%.[4] Cases of a single supernumerary tooth can reach 92.5%. Multiple supernumerary teeth are rare, representing less than 1% of all cases.[5] Uneruption of maxillary anterior teeth can be due to tooth germ malformation, such as dilaceration, supernumerary tooth, odontoma, over-retained primary tooth, malpositioned tooth germ, odontogenic cyst, mucosal barrier, systemic disease, such as endocrine abnormalities, and bone disease.[2] This case had impacted maxillary central incisor. The cause of impaction was multiple supernumerary teeth in this case. 56-60% of supernumerary teeth cause maxillary incisors impaction due to direct obstruction of permanent incisors.[2] CT scan was done to accurately localize the the impacted teeth as it provides the highly detailed three dimensional information.[6] In our case two supernumerary teeth were erupted, two were impacted. Among the two impacted teeth, one was in inverted position. Lo YF, Liu JF found that the most prevalent etiology of uneruption of maxillary anterior tooth is root dilaceration which was not the case in this patient.[2] The study by Baldawa et al reported unerupted maxillary right central incisor due to a complex composite odontoma a rare occurrence in anterior maxilla.[7] In our case the uneruption was due to multiple supernumerary teeth.

The treatment options for the unerupted maxillary anterior teeth include surgery or transalveolar autotransplantation of the impacted teeth, extraction and prosthetic replacement with a bridge or implant, and orthodontic traction.[8] A longitudinal study of surgical repositioning revealed a high incidence of severe complications.[8] After evaluation of the position and direction of the impacted tooth, degree of root curvature, and availability of space for the impacted tooth, orthodontic traction was planned in this case. The impacted maxillary central incisor can be a challenging orthodontic problem which can further be made difficult if there are multiple supernumerary teeth present. The management of impacted incisor necessitates meticulous treatment planning and the collaboration of an oral surgeon and orthodontist. At the end of treatment, satisfactory functional and aesthetic results were obtained. The clinical crown length and gingival margin level of the impacted tooth 21 were similar to the contralateral tooth. The total treatment duration was 18 months.

Summary

This case report showed the combined surgical and orthodontic treatment for the removal of multiple supernumerary teeth, followed by the successful orthodontic traction of the impacted permanent left maxillary central incisor into the arch.

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