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**Research article**

# Epidemiology of Gall Stone Diseases among Patients attending Surgical Department of a Tertiary Care Hospital in Nepal

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**ABSTRACT**

**Background and Objectives:** Gallstone disease (GSD) is a chronic disease that consumes a lot of economic and medical resources. It not only affects patients' life quality, but also is associated with the potential risks of the development of consequences of gallstone diseases. Therefore, the study is aimed to investigate the epidemiology and risk factors of gall stone diseases among patients attending tertiary care centre in Nepal.

**Material and Methods:** A cross sectional study was conducted among patients attending surgical department of Janaki Medical College Teaching Hospital (JMCTH) over a period of one year from January 2019 to December 2019. Chi-square test was applied to show the association between the two groups. P-value < 0.05 was considered statistically significant.

**Results:** In a total of 148 patients, 69.59% had mixed gallstone, 17.57% had cholesterol stone and 12.84% had pigment gallstone. Types of gallstone was found significant for age group (p=0.006), gender (p=0.027) and presence of diabetes (p=0.003) but insignificant with presence of hypertension (p=0.992).

**Conclusion:** Age of the patients, gender and presence of diabetes were found significant for the all types of gall stone. Further large scale research need to be conducted.

**Key words:** Co-morbidities, Epidemiology, Gall stone index, GSD

## INTRODUCTION

Gallstone disease (GSD) is a chronic disease that consumes a lot of economic and medical resources [1]. It not only affects patients' life quality, but also is associated with the potential risks of the development of cholecystitis, pancreatitis, biliary tract obstruction and gall bladder cancer [2, 3]. Gallstone disease is common in world population with the incidence ranging from 10% to 20% [4]. The compositions of gallstones are different between Asia and Western countries. In Asian countries, pigment and mixed gallstone predominate, whereas cholesterol gallstones are more common in Western countries [5]. In UK, cholesterol or cholesterol predominate (mixed) stones account for 80% of gallstones and black pigment stones are uncommon and accounts for less than 5% whereas cholesterol stone account for only 27%,

mixed stone with pigment core comprises 19%, mixed stone with pigment exterior 10%, black pigment stones 12% and brown pigment stone 32% among US population [6].

In Nepal, the overall prevalence of gallstone disease is around 2.44% - 6.45% [7]. Most common type of stone was mixed type comprising 78.75%, followed by cholesterol stone 12.5%, brown pigment stone 7.5% and black pigment stone 1.25% [8]. The incidence is four times higher in women than in men with high prevalence among younger age group [9].

Several studies reported that sex, age, body mass index, usage of oral contraceptives, alcohol consumption, diabetes mellitus, and race have been closely associated with gallstone diseases [10-12]. However, in Nepal, limited studies have focused on types of gallstone diseases [8]. Therefore, this study aims to investigate the types of gallstone associated with socio-demographic and co-morbidities characteristics of patients attending surgical department at Janaki Medical College, Janakpur, Nepal.

## MATERIAL AND METHODS

A cross sectional study was carried out in the department of Surgery, Janaki Medical College Teaching Hospital from January 2019 to December 2019. All the patients attended surgical OPD during study period were included in the study. The presence of gall stone disease was confirmed on the basis of history, clinical examinations and ultra sonography.

Parameters included in the study were demographic data, clinical information, and co morbidities. Participant's age were divided into five groups; less than 15 years, 15-29 years, 30-44 years, 45-59 years, and 60 years and above. Gender was recorded as male and female. Co-morbidities were recorded as presence or absence of diabetes mellitus and hypertension. Ethical clearance was obtained. Written informed consent was taken. Categorical variables were presented as absolute numbers and percentages. Chi-square test was applied to show the association between types of gallstone and demographic as well as co morbidities. All the statistical analysis was performed using statistical software SPSS version 23.0. A p-value < 0.05 was considered statistically significant.

## RESULT

During the study period, a total of 148 patients were consented for the study who diagnosed with gallstone diseases (GSD). Of the 148 patients, the majority had mixed gallstone [103 ;(69.59%)]. Few patients [26; (17.57%)] and [19;(12.84%)] were with cholesterol and pigment gallstone respectively (figure-1).

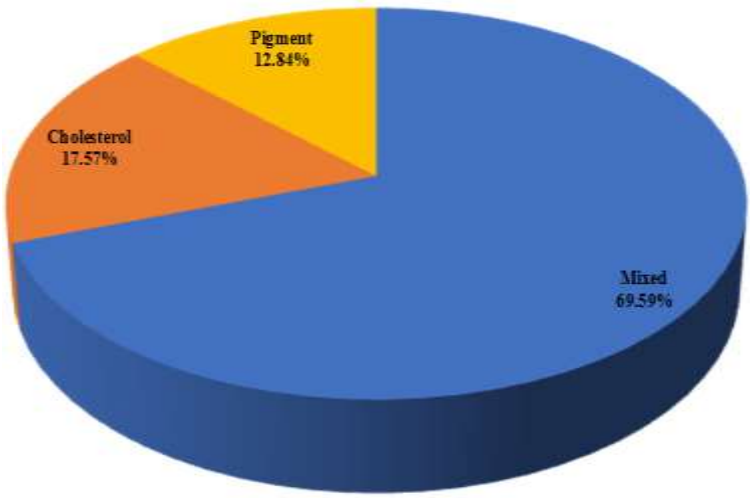


Figure-1:Types of Cholesterol

**Table 1 Age sex distribution of the patients with gallstone diseases**

| Age group (years) | Male | | Female | | All | |
|---|---|---|---|---|---|---|
| | N | % | N | % | N | % |
| <15 | 3 | 7.6 | 4 | 3.7 | 7 | 4.7 |
| 15-29 | 13 | 34.4 | 41 | 37.3 | 54 | 36.5 |
| 30-44 | 12 | 31.6 | 39 | 35.3 | 51 | 34.5 |
| 45-59 | 5 | 13.2 | 19 | 17.3 | 24 | 16.2 |
| ≥60 | 5 | 13.2 | 7 | 6.4 | 12 | 8.1 |
| Total | 38 | 100.0 | 110 | 100.0 | 148 | 100.0 |

**Table 2: Types of Gallstone by Socio-demographic characteristics of the patient**

| Characteristics | Total N=148, (%) | Types of Gall Stone | | | p-value |
|---|---|---|---|---|---|
| | | Mixed | Cholesterol | Pigment | |
| | | n=103, (%) | n=26, (%) | n=19, (%) | |
| **Age group** | | | | | |
| <15 | 7(4.7) | 4(3.9) | 2(7.7) | 1(5.3) | 0.006 |
| 15-29 | 51(34.5) | 39(37.9) | 8(30.8) | 4(21.1) | |
| 30-44 | 54(36.5) | 45(43.7) | 5(19.2) | 4(21.1) | |
| 45-59 | 24(16.2) | 9(8.7) | 8(30.8) | 7(36.8) | |
| ≥ 60 | 12(8.1) | 6(5.8) | 3(11.5) | 3(15.8) | |
| **Gender** | | | | | |
| Male | 38(25.6) | 33(32.0) | 3(11.5) | 2(10.5) | 0.027 |
| Female | 110(74.4) | 70(68.0) | 23( 88.5) | 17(89.5) | |

**Table 3: Types of Gallstone by Co-morbidities among the patients**

| Characteristics | Total N=148, (%) | Types of Gall Stone | | | p-value |
|---|---|---|---|---|---|
| | | Mixed | Cholesterol | Pigment | |
| | | n=103, (%) | n=26, (%) | n=19, (%) | |
| **Diabetes mellitus** | | | | | |
| Presence | 51(34.4) | 27(26.2) | 12(46.2) | 12(63.2) | 0.003 |
| Absence | 97(65.6) | 76(73.8) | 14(53.8) | 7(36.8) | |
| **Hypertension** | | | | | |
| Presence | 47(31.8) | 33(32.0) | 8(30.8) | 6(31.6) | 0.992 |
| Absence | 101(68.2) | 70(68.0) | 18(69.2) | 13(68.4) | |

Table 1 shows the age sex distribution of patients with gallstone. Majority (71.0%) of the patients were in the age group 15 to 44, less than one fifth (16.2%) were in the age group 45 to 59, and remaining were either child (4.7%) aged under fifteen years or elderly (8.1%) aged sixty years and above. Of these 38 (25.6%) were male, and the remaining 110 (74.4 %) patients were female. The male female ratio was 1:2.9.

Table 2 shows association between types of gallstone and socio-demographic characteristics of the patients. Proportion of all three types of gallstones was most common among the patients of age group 30-44 years (36.5%) followed by the age group 15-29 years (34.5%). Similarly, proportion of all three types of gallstone was higher among female; mixed (68.0%, cholesterol (88.5%) and pigment (89.5%) as compared to male counterpart. Types of gallstone was found

significant for age group (p=0.006) as well as gender (p=0.027).

Regarding co morbidities and types of gallstone, proportion of pigment stone were higher (63.2%) among diabetic patients whereas mixed (73.8%) and cholesterol stone (53.8%) were found higher among non-diabetic patients. In hypertensive patients, all three types of stones were lower; mixed (32.9%, cholesterol (30.8%) and pigment (31.6%) than non-hypertensive patients. The proportion of mixed, cholesterol and pigment stone was found similar among hypertensive as well as non-hypertensive patients. The association between presence of diabetes and types of gallstone was found significant (p=0.003) but the association between presence of hypertension and types of gallstone was found insignificant (p=0.992) shown in Table 3.

## DISCUSSION

Gallstone disease is also known as cholelithiasis. It is the most common digestive surgical disorder and account for an important part of health care expenditure. This study assessed epidemiology of gallstone and its relation with socio-demographic characteristics and co morbidities of patients. The study identified three types of gall stone; cholesterol calculi, mixed calculi and pigment calculi. Out of the 148 patients, 69.59% had mixed calculi, 17.57% had cholesterol calculi and 12.84% had pigment calculi indicating the proportion of mixed gallstones in the studied population was higher. It accords with past studies, which reported the proportion of gallstone as 78.75% of mixed type, 12.5% of cholesterol type, and 8.75% of pigment type in Nepal [8] and 57% of mixed type, 20.0% of cholesterol type, and 23.0% of pigment type in India [13] but differed from the studies conducted in India [14, 15].The difference may be due to different socio-economic conditions and dietary behaviour of people in these regions.

In this study, the most common involved age group for all three types of gall stone was found among 15-29 years (34.5%) as well as 30-44 years (36.5%) with a female predominance (M:F=1:3.1 ). The study is concurrent with the findings of a couple of study conducted in Nepal by Pradhan SB et al. that showed the common prevalence of gallstone among younger age 20-30 years with female predominance (M:F=1:4) [9] and by Shrestha et al. that showed most common prevalence among 30-39 years (32.5%) with a female predominance (M:F=1:3.2 ) [8]. The study indicated there were significant association age group (p=0.006) and gender (p=0.0014) with the types of gallstone. These observations are in line with the findings the studies conducted by Pundir CS, Goswami M and Tyagi SP et al. [14, 16, 17]. An epidemiological investigation confirmed that at all ages; women are twice as likely as men to form cholesterol gallstones. Horn et al. indicated that under the influence of female sex hormone, the muscle may relax, biliary passage dilates and duodenal content of pancreatic secretion regurgitates into gallbladder and promote conditions which favour the formation of gallstones [18].

This study found proportion of pigment stone were higher (63.2%) among diabetic patients whereas mixed (73.8%) and cholesterol stone (53.8%) were found higher among non-diabetic patients. However, the proportion of mixed, cholesterol and pigment stone was found similar among hypertensive as well as non-hypertensive patients. The association between presence of diabetes and types of gallstone was found significant (p=0.003). This finding can be explained by increased risk of developing gallstones in diabetics

because hyper triglyceridemia and obesity are associated with diabetes mellitus and because gallbladder motility is often impaired in patients with diabetes mellitus [19].

There are several limitations of this study. First, the study design was cross sectional conducted at a single centre. Further longitudinal study is at multiple centres needed to explain the risk factors for GSD. Second, participants who attended surgery ward were enrolled in the study. This may result in selection bias.

## CONCLUSION

Proportion of mixed stone was higher among the patients. Age of the patients, gender and presence of diabetes were found significant for types of gallstone. Further, a large scale study for gallstone diseases to be studied in multiple centers the community.

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