

Obesity and the Risk of Gallstones: A Cross Sectional Study

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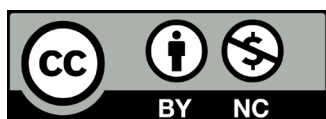
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ABSTRACT

Background: Cholelithiasis, one of the most common gallbladder disorders affecting millions globally, is increasing largely due to the increasing prevalence of obesity. This study explores the pattern of BMI groups among cholelithiasis cases in a tertiary care centre in Nepal.

Methods: This cross-sectional study was done in the Department of General Surgery of Nepal Armed Police Force Hospital, Kathmandu. A total of 395 patients were included in the study. Data of adult patients with cholelithiasis visiting Surgery OPD from January 2023 to December 2024 were taken. Height and weight of the subjects were recorded, along with age and other parameters. Body mass index (BMI) was calculated and categorized according to the World Health Organization.

Results: The mean age of the total participants was 41.35 ± 16 years. Only 22.78 % of patients had a BMI of more than 30. Most of the patients were in the overweight category (having a BMI of 25-29.9). The number of patients either overweight or obese (BMI ≥ 25) was 243 (61.51 %) as compared to 152 (38.49%) who were either underweight or normal (BMI < 25).

Conclusions: Cholelithiasis was found to be common among population with either "overweight or obese", as compared to the 'normal or underweight individuals'.

Keywords: Body Mass Index; Cholelithiasis; Obesity.

INTRODUCTION

Cholelithiasis is the most common gallbladder disorder globally due to the increasing prevalence of obesity.¹ A comprehensive review has linked obesity and cholelithiasis, highlighting the mechanisms involved.² With increasing overweight or elderly subjects, the prevalence of gallstones may further increase.^{3,4} A study in a Japanese cohort provided an overview of the epidemiology of gallbladder diseases, including the association of obesity and BMI with gallstone prevalence.⁵ Obesity increases biliary cholesterol saturation, impairs gallbladder motility, and alters lipid metabolism, leading to stone formation.^{3,6} Approximately 10–15% of Western adults are affected by gallstones.^{7,8} Risk factors include age, sex, genetic predisposition, rapid weight loss, and obesity. Obesity, measured using Body Mass Index (BMI), is a critical determinant, particularly for cholesterol stones.^{9,10} There are limited studies on cholelithiasis and BMI

patterns in the Nepalese population. This study explores the pattern of BMI groups among cholelithiasis cases in a tertiary care centre in Nepal.

METHODS

A cross-sectional, retrospective hospital-based study was conducted to study the presentation of cholelithiasis and its distribution among different BMI groups. The study population consisted of all patients with ultrasound evidence of cholelithiasis visiting the Surgery OPD of Nepal APF hospital within the last two years. Data of adult patients visiting the Surgery OPD over the period from January 2023 to December 2024 was taken. Study variables like height, weight, age, sex, were included, and clinical parameters: BMI, and Ultrasonographic findings were recorded in a proforma. The ethical clearance was

obtained from the Institutional Review Committee of Nepal APF Hospital (IRC: Ref no: NAPFH-025/2024). A consecutive sampling technique was used. BMI was categorized based on WHO criteria: Underweight: <18.5 kg/m², Normal Weight: 18.5–24.9 kg/m², Overweight: 25–29.9 kg/m², and Obese: ≥30 kg/m². Patients aged 18–70 years were included, while patients with a previous history of gallbladder surgery, liver disease, or malignancy were excluded.

RESULTS

Data from 395 patients with radiological evidence of gallstones who presented to the Surgery department from January 2023 to December 2024 were included in the study. The mean age of the patients was 41.35 ± 16 years, ranging from 18 to 82 years. Most of the patients, 113 (28.61 %), fell under the age group 30-40 years.

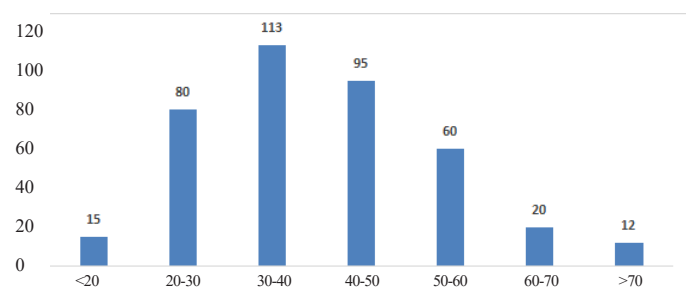


Figure 1: Age-wise Distribution of Patients with Cholelithiasis

Only 60 (15.19 %) patients were asymptomatic, where cholelithiasis was detected on radiological investigations. Among the 335 (84.81 %) symptomatic individuals, the most common presenting symptom was abdominal pain in 290 (73.42 %).

Table 1: Distribution of BMI among Patients with cholelithiasis

BMI Category (Kg/m ²)	Frequency (%)	Total	Interpretation
Under weight (<18.5)	5 (1.27)	152 (38.49)	Either under weight or normal
Normal (18.5-24.9)	147 (37.22)		
Over weight (25-29.9)	153 (38.73)	243 (61.51)	Either Over weight or Obese
Obesity I (30-34.9)	63 (15.95)		
Obesity II (35-39.9)	27 (6.83)		
Total		395 (100)	

Ninety (22.78 %) patients had a BMI greater than 30 Kg/m². Out of the total 395 patients, 243 (61.51%) were either overweight or obese (BMI> 25 Kg/m²) while 147 patients (37.22 %) had normal BMI (18.5-24.9 Kg/m²) compared to 5 (1.27 %) cases with a BMI less than 18.5 Kg/m². Out of 395 patients, 319 (80.76 %) underwent surgical interventions. Among them, 310 (96.24 %) underwent laparoscopic cholecystectomy, and 9 (2.82 %) were converted to open cholecystectomy.

Table 2: Distribution of Body Mass Index among patients with cholelithiasis

Sex	BMI category	Frequency (n= 395)	Percentage
Male (n = 105)	Underweight	1	0.96
	Normal	48	45.71
	Overweight	38	36.19
	Obese	18	17.14
Total		105	100
Female (n =290)	Underweight	4	1.38
	Normal	99	34.14
	Overweight	115	39.66
	Obese	72	24.82
Total		290	100

Out of 395 patients, 290 (73.42 %) were females, while 105 (26.58 %) were males, with an M: F ratio of 1:2.76. Among all gallstone disease patients, overweight (39.66 % of females) and obese (24.82 %) patients among female patients were more common than overweight (36.19% of males) and obese (17.14 %) patients among males, respectively.

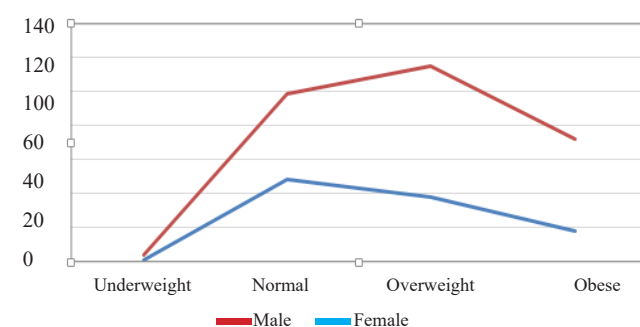


Figure 2 :Incidence of Gallstones among Male and Female of Various BMI Categories

DISCUSSION

Cholelithiasis, commonly known as gallstone disease, refers to the formation of stones within the gallbladder due to an imbalance in the composition of bile.⁵ It is a

prevalent condition worldwide, often asymptomatic, but can lead to complications such as cholecystitis, biliary colic, and pancreatitis if left untreated.⁶ Cholelithiasis is associated with several risk factors, including female sex, increasing age, obesity, rapid weight loss, pregnancy, and certain medications such as oral contraceptives and fibrates.^{5,6} Genetic predispositions, ethnicity, and metabolic conditions like diabetes mellitus also contribute significantly to the risk.⁹

In this study, 290 (73.42 %) patients were female. Male to Female (M: F) ratio was 1:2.76, which is comparable to the study done by Yadav UK et al.(77% female).¹¹ Similarly, a study by Paudel M et al. also revealed female predominance of 76 %. Higher incidence in females is due to the effect of estrogen hormone on cholesterol stone formation.¹² This study showed that cholelithiasis, although prevalent in all age groups, is more common in the 30-40 years age group, followed by the 40-50 years age group. In this study, the mean age of patient was 41.35 ± 16 years which is comparable to the findings of similar study by Yadav UK et al.¹¹, Paudel M et al¹² and Neupane et al.¹³ where the mean age was 43.85 ± 11.8 years, 44.96 ± 14 years and 42.8 ± 2.57 years respectively. Most of the patients were in the overweight category (having a BMI of 25-29.9 Kg/m²).

The number of patients either overweight or obese (BMI ≥ 25 Kg/m²) was 243 (61.51 %) as compared to 152 (38.49%) who were either underweight or normal (BMI < 25 Kg/m²). These findings are slightly different than the results observed by Yadav UK et al.¹¹, where 45.33% were either overweight or obese. These findings are comparable to results observed by Paudel M et al.¹² where more patients had a BMI more than 25 Kg/m² (187) as compared to a BMI less than 25 Kg/m² (150). In our study, only 90 (22.78 %) patients were obese (BMI ≥ 30 Kg/m²), similar to the results of Paudel M et al.¹² and Yadav UK et al¹¹ where the percentage of patients with obesity was 19.2 % and 11.2%, respectively. Among all gallstone disease patients, the number of overweight females (39.66 % among females) and obese females (24.82%) was greater when compared to overweight males (36.19%) and obese males (24.82 %), respectively. Studies have shown that obese women have a significantly higher risk of developing gallstones.^{14,15}

CONCLUSION

As obesity increases, the burden of cholelithiasis also increases leading to increase in incidence. Cholelithiasis was found to be common among population with either "overweight or obese", as compared to the "normal or underweight individuals".

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