



ORIGINAL ARTICLE

Association of BMI with the Frequency of Cholelithiasis : A cross sectional study

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Abstract

Objectives: To find the correlation between Body mass index and age of patients with cholelithiasis.

Methodology: It is a cross sectional study conducted from 01-01-2024 to 30-12-2024 at the sector of general Surgery Bashir Hospital, Sialkot. All individuals that were diagnosed with cholelithiasis and have undergoneolecystectomy were included in the study and individuals with prior abdominal surgeries were not included in the study. The patients were interviewed regarding their age , gender, body mass in kilograms and vertical height in meters and the body mass index was calculated as mass in kilogram divided by the Square of height in meters.

Inference: The study involved 504 individuals according to the criterias mention before with an average BMI of 27.16 ± 4.47 and out of the 504 individuals 370 were women and the remaining 134 were men with a ratio of 4:1 . The average age of patients was found to be 44.2 ± 15.1

Conclusion: An increased occurrence of cholelithiasis is seen in females with advancing age.

Keywords: Age, BMI, Cholelithiasis

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Author contribution:

WR; conceptualization of project, data collection, writing manuscript, statistical analysis, drafting, revision and final approval.

SH; manuscript writing, data analysis, revision, Collecting data

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Introduction

Cholelithiasis is the formation of a single or multiple calculi in the gallbladder. Gall bladder stones are generally subclinical. One of the common symptoms of cholelith-

iasis is biliary colic or pain that appears in the right hypochondrium and radiates to the right shoulder and upper back. Gallstones could potentially worsen into inflammation of gallbladder or could potentially obstruct the

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common bile duct (choledocholithiasis), these could also cause infection as these stones provide a point attachment for the pathogens (cholangitis); and can also cause acute pancreatitis. Visualization of the gallstones with the help of ultrasound is an important diagnostic tool. If cholelithiasis causes any sort of symptoms or complications, then removal of gallbladder is deemed as a necessity¹.

Biliary sludge is often a predecessor to gallstones. It is composed of calcium salts of bilirubinate (a polymer of bilirubin), cholesterol microcrystals, and mucin. The final fate of sludge is to coalesce together into stones. The gallstones are of various types.

Cholesterol stones account for > 85% of gallstones in the Western world.

Brown pigment stones are soft and greasy, consisting of bilirubinate and fatty acids (Calcium palmitate or stearate). They could be associated with infections or any other inflammatory state, and with parasitic infections for example liver flukes in Asia².

The risk factors for gallstones include Females, individuals that are older than 40 years, gestation, high BMI, cholesterol rich diet, carbohydrates that are refined as in white bread, saturated fats (for example cheese, butter, and red meat), lifestyle with minimal physical activity, quick weight reduction, Underlying diseases for example, diabetes, metabolic syndrome, formation of fibrous nodules in liver or cirrhosis, IBD such as Crohn's disease associated with skip lesions and serpentine like ulcers, cystic fibrosis, sickle cell anemia, or a spinal cord injury, drugs that have estrogen as a constituent such as OCs and hormone replacement therapy, analogue of somatostatin known as octreotide, ceftriaxone, and thiazide diuretics hydrochlorothiazide also distributed³.

With increasing age the risk of developing all stones tends to increase and this could

be conferred from the fact that 20% of individuals that are above the age of 40 tend to have a gallstones and 30 % of individuals in age group of 70 and beyond tend to have calculi in the gallbladder⁴. Overweight Women tend to have a higher risk of cholelithiasis. There is also a regional variation in composition of gallstones as with the western community eighty-ninety percent of gallstones are composed of cholesterol in comparison to Asia where most of them are composed of bilirubinate salts or polymers⁵. The number of cases of cholelithiasis has been on a rise in Pakistan as seen in certain studies showing a prevalence of ten to fifteen percent.⁶ BMI is utilized as a measure of obesity and is routinely analyzed in studies involving a link between BMI and gallstones⁷. A high BMI is an exposure variable in the formation of gallstones. However calcium salts (e.g. Calcium oxalate and Calcium phosphate) stones are also seen like black pigment stones.⁸

Objectives: To find the correlation between Body mass index and age of patients with cholelithiasis.

Methodology:

A cross sectional study was conducted from 1-01-2024 up until 31-12-2024. The data was gathered at the department of surgery at Bashir Hospital, Sialkot via interviewing the patients regarding their age, height in meters and weight in kilograms and the BMI was calculated as kg/m² in about 124 patients and the data was analyzed by using SPSS2.

Inclusion criteria; All individuals who were diagnosed with cholelithiasis and have undergone cholecystectomy during duration of study.

Exclusion criteria; Patients who underwent other abdominal surgeries.

Independent variable;

- Age
- Gender
- Height

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• Weight
Dependable variable; Cholelithiasis

Above 40 yrs	10%	20%	26%
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Results:

Out of 504 diagnosed patients with cholelithiasis and undergone cholecystectomy 370 patients were female and 134 patients were male giving a ratio of 3:1. The age ranged 13-89 years with a mean age of 44.2 ± 15.2 . Cholelithiasis was highly frequent in age groups of 31-60 accounting for about 62% of patients. The average BMI of the patients was found to be 27.16 ± 4.47 and most of the patients were overweight (having a body mass index within the 25-29.9 range) accounting for 46% of the sample. Obesity (BMI between 30 and 39.9) was much more frequent in the older ages e.g. above 40 years (accounting for about 26% of sample).

Sex	Number of individuals	Proportion
Men	134	26.59
Women	370	73.41

Table 1: Sex and Age of patients (n=504)

Age	Proportion
20 and below	2.4
21-30	18.5
31-40	25
41-50	17.7
51-60	19.35
61-70	12
Above 70	4.83

Table 2: Age of patients (n=504)

Age	Health y	Over-weight	Obese
Below 21 yrs	3%	0%	0%
21-40 yrs	14%	26%	1%

Discussion

Cholelithiasis has been one of the diseases that has been on the rise and tends to affect all age groups which is evident from the study and this could be correlated with a sedentary lifestyle and a fatty diet.

According to many studies conducted worldwide it is quite affirmative the incidence of Cholelithiasis is higher in females as compared to males and is about 2-3 times greater⁹. In this study the ratio of female to male patients was 3:1 which is quite similar to the result obtained by Karllati SS et al with the woman to man ratio of 3:1 as seen in the literature⁹. This is theorized to be associated with female hormones such as estrogen and progesterone which tend to be associated with increased production of cholesterol and decreasing bile salts and also the stasis of gallbladder respectively as a result females with lower BMI tend to have more gallstones as compared to men¹⁰.

The study also tend to reveal that the individuals with BMI of the overweight (25-29.9) and obese (30-39.9) category tend to be mostly affected accounting for about 73% and of the sample which tends to signify that obesity is determined variable for the formation of gallstone and there is a subsequent increase in risk with a consequent rise in body mass index¹¹. It can be conferred from several studies that there is a strong association between gallstones formation and obese individuals, even though the results are not congruent¹². The average BMI of the patients was found to be 27.16 ± 4.47 which is quite consistent with a study involving controls(individual exposed to same risk factors but are not diseases) and cases(diseased individuals) that was conducted in SIH, Islamabad, from 2012 to



2017 with average body mass of index of diseased being 27.576 ± 5.753 kg/m² while that of control population was 25.638 ± 7.008 kg/m² ¹³.

Conclusion:

An increased frequency of cholelithiasis is seen with increasing age and in females with high BMI.

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