

Relationship of BMI and age with gallstone disease

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ABSTRACT

Objective: To find out the relationship of BMI and age in patients with gallstone disease.

Methodology: This is a cross-sectional study done from March 2019 to February 2020 at the Department of General Surgery PIMS, Islamabad. All patients admitted with a diagnosis of Cholelithiasis were included and patients with previous abdominal surgery were excluded from the study. Patients' data was collected about their age, sex, dietary habits, occupation and medical history. Their weight in kilograms and heights in centimeters were measured and BMI was calculated in kg/cm². All data was collected, recorded and analyzed using SPSS 22.

Results: A total of 158 patients were included in the study with mean age was 46.2±6.7 years (18 - 83 years). Majority (63%) of the patients were between 41 and 60 age group. There were 120 females and 38 males with ratio of 3:1. The mean BMI of the study population was 25.8 ± 7.61 (Range 19.37 - 33.12). Most of the patients were healthy (n=86, 54.4%) having their BMIs between 18 and 24.9 whereas 72 (46.6%) patients were overweight and obese.

Conclusion: Increased frequency of cholelithiasis is found with increasing age even with normal BMI.

Keywords: Age, BMI, Cholelithiasis

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Introduction

Cholelithiasis is one of the most common diseases and one of the main causes of abdominal morbidity worldwide. There is a marked variation in the overall prevalence of Cholelithiasis between different populations as suggested through various epidemiological studies.¹⁻³ Cholelithiasis is closely linked to other risk factors. In this context gender, ethnicity, age, obesity, dyslipidemia, contraceptive use, diabetes mellitus (DM), and alcohol consumption are usually reported, particularly prevalent among western populations.⁴ Nevertheless, changes in lifestyle and tendencies towards high-energy diets in recent decades have affected the

prevalence of gallstones. It would not be entirely wrong to say that diet not only is the risk factor for gallstone disease but a protective factor as well.

Cholesterol has been found to be amongst the leading components of Cholelithiasis. In an experimental study conducted on gallstone patients, vitamin C supplementation (2 g per day for two weeks) had induced changes in bile composition and prolongation of nucleation time, thereby signifying that vitamin C supplementation may also influence the conditions for cholesterol crystal formation in humans.⁵ A small case-control study had observed an affiliation between lower dietary intake of ascorbic acid and gallbladder disease in

women, but not in men. Therefore, the relationship between ascorbic acid status and Cholelithiasis is prevalent mostly among women and may be the result of biological interaction between ascorbic acid status and sex hormones.⁶ These findings may however be a reflection of the fact which suggests the lower prevalence of gallbladder disease among men.

The incidence of gallstones rises with age and about 20% of adults over age 40 and 30% of adults over age 70 have gallstones.⁷ There is an increased risk of Cholelithiasis among people, especially women, who are overweight. In the West, 80-90% of gallstones are cholesterol stones, while the majority of gallstones found in Asian populations are pigment stones, primarily derived from bilirubinate salts or polymers.⁸ Cholelithiasis is also growing and becoming a major health problem in Pakistan, with some estimates showing a prevalence of 10-15%.⁹

Body mass index (BMI; in Kg / m²) is a general obesity measurement metric that is commonly analyzed in the studies related to obesity and gall stones.¹⁰ The Higher Body Mass Index (HMI) is considered as an independent risk factor for the development of gallstones.¹¹ Previous studies have also shown that obesity is closely linked to cholelithiasis, although proof is not clear.¹² The traditional and most common risk factors for Cholelithiasis include female, forty, fat and fertile. However, obesity, cigarette smoking, diabetes are also some risk factors of Cholelithiasis particularly prevalent among western populations. WHO report indicated that obesity is a well-established risk factor of gallbladder disease.¹³ As the data is scarce in our local population, this study is designed to find out the relationship of gallstones with age and BMI in local setup.

Methodology

A cross sectional study was conducted at the Department of General Surgery, Pakistan Institute of Medical Sciences (PIMS) Islamabad from March 2019 and February 2020. All admitted patients with a diagnosis of Cholelithiasis without comorbid were included. Patients with previous abdominal surgery were excluded. Patients under 20 years of age were also inquired and investigated for any haemolytic disease. Patients' data was collected about their age, sex, dietary habits, occupation and medical history. Their weight in kilograms and heights in centimeters were measured and BMI was calculated in kg/cm². The BMIs were categorized such that between 18 and 24.9, it was considered normal, from 25 to 29.9 were

taken as overweight, between 30 to 39.9 were categorized as obese and more than 40 were considered as morbid obese. Data was analyzed using SPSS version 22.

Results

A total of 158 patients were included in our study who were diagnosed with Cholelithiasis. There were 120 females and 38 males with a ratio of 3:1. The age range was from 18 to 83 years with a mean age of 46.2 ± 6.7 years. The majority of the patients were above 40 years. Cholelithiasis was particularly found to be prevalent among the patients of ages between 41 and 60 since 63% of the patients were between this age group. (Table I) The mean BMI of the study population was 25.8 with SD of 7.61 (Range 19.37 - 33.12). Most of the patients were healthy (n=86, 54.4%) having their BMIs between 18 and 24.9 whereas 57 patients were overweight (36.1%) had their BMIs ranging from 25 to 29.9. Only 15 patients were obese (9.4%) with BMIs above 30. (Table II)

Table I: Gender and Age of the patients. (n=158)

	No of patients	Percentage
Gender		
Male	38	24
Female	120	76
Age		
20 and below	04	2.5
21-30	12	7.6
31-40	24	15.1
41-50	61	38.6
51-60	38	24.0
61-70	15	9.5
70 and above	04	2.5

Table II: Association of age with BMI

Age	Healthy	Overweight	Obese	Total
Below 20 years	4	0	0	4
21 – 40 years	19	11	6	36
Above 40 years	63	46	9	118
Total	86	57	15	158

Discussion

In several cases, urinary tract infection (UTI) is the Cholelithiasis has become more common and is a growing healthcare problem in Pakistan. Its incidence is increasing with age and is found in all age groups. The

increasing prevalence of cholelithiasis is linked with the Western diet, obesity, and sedentary lifestyle. This study observed the relationship of cholelithiasis with age and BMI in our local population to find any association with these risk factors.

The incidence of cholelithiasis is high in females worldwide and is commonly attributed to sex hormones especially during the fertile years. Female gender is among the most significant risk factors. Gallstone rates between women are two to three times higher than among men. In this study female to male ratio is 3:1. Similar results were noted by Pimpale R et al with female to male ratio is 2.06:1,¹⁴ and by Karllati SS et al with female to male ratio of 3.47:1.¹⁵ The increased risk of gallstones in females is due to Estrogen that enhances biliary cholesterol production, allowing bile cholesterol to oversaturate.

The risk of cholelithiasis increases with age. The condition is extremely rare in children and gradually becomes more common over time, particularly after 40 years of age.¹⁶ In this study the mean age was 42.8 years \pm 2.57. This finding is consistent with the regional data. Parambil SM et al reported the mean age of 44 years in patients with gall stones.¹⁷ However, our mean age is less than the mean age of patients in Western countries possibly because of dietary habits of Asian people. Chang YR et al studied the changes in demographic features of gallstone disease, based on 30 years of surgically treated patients and found that mean age gradually increased while the male/female ration decreased.¹⁸ Matsui Y et al also observed that the average age of patients with gall stones has increased during the most recent years.¹⁹

This study reported increase in prevalence by overall 62.5% at the ages of 41 – 60 years. These facts contribute to the rate of development of gallstones by age. Similar results were reported by Bilal M et al and Khan I et al that 58% and 70% of patients with gall stones were above 40 years respectively.^{3,9} While Matui Y et al and Jing-Hong H et al observed elder age group (above 50 years) for gall stones.^{19,20}

Obesity is a well-established risk factor for cholelithiasis and this risk increases by every increase in BMI.²¹ There is evidence of the association of rising BMI with the development of gall stones.⁸ Studies have shown high incidence of cholelithiasis in obese patients, although the evidence is not consistent.¹⁰ There have ever been few attempts to see how the increase in BMI is related to cholelithiasis. Elevated body mass index as a causal risk

factor for symptomatic gallstone disease: a Mendelian randomization study.²² The mean BMI in our study is 25.8 \pm 7.61 which is comparable with other studies in this region conducted in India with a mean BMI of 23.3 \pm 4.84.²³ Females sex hormones are involved in the development of gall stones; that is why females with lower BMI as compare to males still have gall stones. Similar findings were observed in another study with a sample size of over 11000.²¹ In the present study, although the number of patients with BMI >25 were 45.5% as compared to 54.4% of patients with normal BMI (<25), this difference was not statistically significant. Another study stated that increased BMI was independently associated with a higher risk of gallstones.²⁴

Conclusion

The study concluded that the age factor is a predominant factor of Cholelithiasis. With age the risk of gall stones increases. Moreover, women seem to be more vulnerable to this disease as a high percentage of 76 suggests.

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