Original Research Article

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Epidemiological, demographic and risk factor profile in patients harbouring various types of gallbladder calculi: a cross sectional study from a south Indian tertiary care hospital

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ABSTRACT

Background: Gallstone disease is one of the most common digestive system diseases next to GERD and accepted treatment involves laparoscopic or open cholecystectomy making it one of the costly diseases. with increasing westernisation of Indian lifestyle and food and also recent studies pointing out its association with cardiovascular disease and cancer mortality its need of the time to undertake an extensive study on epidemiology, demography and risk factors of gallstone disease. The aim was to study the epidemiological, demographic and risk factor profile in patients harbouring various types of gallbladder calculi.

Methods: A cross sectional prospective study was conducted. 100 cholelithiasis patients were undergoing operative procedure at our department.

Results: Showed that females had higher incidence of gallstone disease with a ratio of 2:1, mixed gallstone was the predominant type (53%), mean BMI of the study population was 28.03 with SD of 3.61.

Conclusions: Women are twice as likely as men to form gallstones. Most common gallstone type found is mixed type and least is cholesterol type. Age group most commonly affected is between 31-50 years. There is a statistically significant association between high BMI and occurrence of gallstone. There is a statistically significant association between diabetes and occurrence of gallstone.

Keywords: Cholesterol, Gallstones, Obesity

INTRODUCTION

Gallstones are calculi that most frequently form and reside in the gallbladder but in many cases become apparent because of their inherent risk to cause pain or complications. In principle, two major gallstone subtypes occur in the gallbladder, cholesterol gallstones and bilirubin or 'pigment' gallstones.¹ In western populations, the majority of gallbladder stones are cholesterol gallstones.^{1,2} The prevalence of gallstone disease varies in different parts of India. This study was conducted to understand the epidemiology, demography and various risk factors involved in the formation of gall stones in

patients of north Kerala. In this study categorized the different types of biliary tree calculi in north Kerala seeking professional health care in our hospital, correlating it with various risk factors.

METHODS

It was a cross sectional study done between the period of January 2015 to July 2016 in Department of General Surgery, Government Medical College, Kozhikode, Kerala, India. Subjects included were the patients hailing from north Kerala admitted in the department wards. Inclusion criteria consisted of all stable patients without

any complications like emphysematous gallbladder, gall bladder perforation diagnosed as cholelithiasis in CECT/USG abdomen >13 years willing to participate in the study were included. Exclusion criteria was patients who were not willing for study, seriously ill patients and patients with deranged renal functions (serum creatinine >1.5) were excluded. College ethical committee approval was sought for the study. Data was analyzed using the SPSS-statistical software. Appropriate statistical test was applied for analysis and interpretation.

Diagnosed case of cholelithiasis meeting the inclusion criteria was taken up for the study and assessment was made regarding the identification (age, sex, ip number), epidemiological and demographic profile, socioeconomic status, relevant past history(number of pregnancies, smoking, alcoholism) and risk factors(BMI was calculated according to Indian guidelines are chosen for BMI: normal 19 to 24, overweight 25 to 29, obese \geq 30) was noted using a standard performa, post cholecystectomy gallbladder was opened up and gallstones were divided into 3groups depending on their colour.

- Pale yellow and whitish stones as cholesterol calculi
- Black and blackish brown as pigment calculi
- Brownish yellow or greenish with laminated features as mixed calculi.

RESULTS

Of the total 100 subjects in the study population, males were 32 and females were 68 in the ratio of 1:2. (Table 1). The chi-square statistic is 0.9624. The p-value is >0.05. The result is not significant. Mean age of the study population is 44 year. SD of the study population is 13.33 range of 19-70 year (Table 2) age group more commonly affected was 31-50 years. Mean weight of the study population was 70.61 kg SD of 10.76. Mean height of the study population was 158.8 cm SD of 10.8 (Table 3). Mean BMI of the study population was 28.03 with SD of 3.61 and Range of 19.37 - 36.12. Out of the 100 stones collected, 57 were mixed calculi, 23 were pigment calculi and 20 were cholesterol calculi. Mean age of patients harbouring cholesterol gallstones was 49.2 with SD of 12.93, mixed stones 43.6 with SD 13.2 and pigment stones was 40.39 with SD of 13.61, 91% of the patients were of sedentary type of occupation and only 9% were of non-sedentary occupation (Table 5), indicating a high occurrence of gallstone in sedentary population but statistically the chi-square statistic is 4.95 and p value was >0.05 indicating insignificance of association. 21% were of normal BMI, with 46% and 33% were overweight and obese respectively. The chi-square statistic is 123.8593.

The p-value is < 0.00001. The result is significant at p < 0.01 (Table 4). Out of 68 females 6 were nullipara, 5 were primipara and 57 were multipara. 89% of the patients were non-diabetic with 11% being diabetic with

chi-square statistic is 29.726 (Table 6). The p-value is < 0.00001. The result is significant at p < .05. Out of 68 female patients 10 had a history of use of OCP while 58 did not report of such use in their reproductive period (Table 9).

Table 1: Distribution of the stones according to the sex of the population.

Sex stones	Males	Females
Cholesterol stone	08	12
Mixed stone	18	39
Pigment stone	06	17

Table 2: Distribution of various types of stones according to age group.

Stone type	11- 20	21- 30	31- 40	41- 50	51- 60	61- 70	71-80
Cholestrol stone	0	1	4	7	3	5	0
Mixed stone	0	15	11	12	11	8	0
Pigment stone	1	4	8	4	4	2	0

Table 3: Distribution of gallstones according to BMI (Indian guidelines are chosen for BMI: normal -19 to 24, overweight -25 to 29, obese \geq 30.)

BMI stone	Normal 19-24	Overweight 25-29	Obese ≥ 30
Cholesterol stones	0	0	20
Mixed stones	1	43	13
Pigment stones	20	3	0

Table 4: Distribution of the gallstones according to pregnancy status

Stones	Nulli	Primi	Multi	N/A
Cholesterol	1	0	11	8
Mixed	2	3	33	19
Pigment	3	2	13	5

The chi-square statistic is 5.3722. The p-value is .497037. The result is not significant at p < .05

Table 5: Relationship of gall bladder stones with occupation.

Stones	Non Sed	Sedentary
Cholesterol	3	17
Mixed	2	55
Pigment	4	19

The chi-square statistic is 4.9552. The p-value is .083946. The result is not significant at p < .05.

Table 6: Relationship of gall bladder stones with diabetic status.

Diabetic status		
	Absent	Present
Cholesterol	11	9
Mixed	55	2
Pigment	23	0

The chi-square statistic is 29.726. The p-value is < 0.00001. The result is significant at p < .05.

Table 7: Relationship between smoking status and gall stones.

Smoking status		
	Absent	Present
Cholesterol	17	3
Mixed	54	3
Pigment	21	2

Table 8: Relationship between alcohol consumption and gall stones.

Stones	Alcoholic	Non ALC
Cholesterol	2	18
Mixed	4	53
Pigment	2	21

The chi-square statistic is 0.2963. The p-value is .862303. The result is not significant at p < 0.05.

Table 9: Relationship between OCP use and type of stones.

Stones	OCP used	OCP not used
Cholesterol	1	11
Mixed	7	32
Pigment	2	15

The chi-square statistic is 0.8327. The p-value is .659445. The result is not significant at p < 0.05.

DISCUSSION

This cross sectional study was conducted at Calicut medical college on 100 patients admitted for elective Cholecystectomy. We studied the epidemiology and demography, risk factors in patients harbouring different type of gallstones. Gallstones collected from patients were divided into 3 groups based on their colour: cholesterol calculi, mixed calculi and pigment calculi. Out of the 100 stones collected, 57 were mixed calculi, 23 were pigment calculi and 20 were cholesterol calculi indicating the incidence of gallstones in the studied population as follows: mixed calculi (57%) > pigment calculi (23%)> cholesterol calculi (20%). These observations are in confirmation from studies done by

Pundir CS, Tyagi SP et al, Bansal SK et al but different from studies conducted by Goswami M, Nakayama F.³⁻⁷ The differences may be attributed to different dietary conditions and habitats and different socio-economic status of the people in these areas.

Demography

Age

In our study mean age of the study population is 44 year. SD of the study population is 13.33 with range of 19-70 years. Mean age of patients harbouring cholestrol Gallstones was 49.2 with SD of 12.93, mixed stones 43.6 with SD 13.2 and pigment stones was 40.39 with SD of 13.61. Age group more commonly affected was 31-50. These observations are in conformity with the study from Pundir CS and also reports from Goswami M and Tyagi SP et al.^{3,4,6}

Sex

In our study males were 32 and females were 68 in the ratio of 1:2. The chi-square statistic is 0.9624. The p-value is >0.05. The result is not significant. Epidemiologic investigations have found and clinical studies have confirmed, that at all ages, women are twice as likely as men to form cholesterol gallstones. Females were predominant in all the three types of stones found with 12%, 39%, 17% harbouring cholesterol, mixed and pigment stones respectively while males were 8%, 18% and 6% for the same. Horn et al postulated 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.⁸

Occupation

In our study 91% of the patients were of sedentary type of occupation and only 9% were of non-sedentary occupation, indicating a high occurrence of Gallstone in sedentary population but statistically the chi-square statistic is 4.95 and p value was >0.05 indicating insignificance of association.

Risk factors

BMI

Distribution of gallstones according to BMI (Indian guidelines are chosen for BMI normal 19 to 24, overweight 25 to 29, obese \geq 30). In our study, mean weight of the study population was 70.61 kg SD of 10.76 mean height of the study population was 158.8 cm SD of 10.8.Mean BMI of the study population was 28.03 with SD of 3.61 and range of 19.37 - 36.921% were of normal BMI, with 46% and 33% were overweight and obese respectively. The chi-square statistic is 123.8593. The p-value is < 0.00001. The result is significant at p < 0.01,

hence there is a significant association of Gallstones and obesity from our study. One more interesting finding is 20 patients out of 13 with pigment Gallstones were of normal BMI. Similar results have been obtained from large prospective study of obese women demonstrating a strong linear association between BMI and the prevalence of cholelithiasis.⁹

Pregnancy

Out of 68 females 6 were nullipara, 5 were primipara and 57 were multipara but chi-square statistic is 5.3722. The p-value is 0.497037. The result is not significant at p < 0.05.

Diabetes

89% of the patients were non-diabetic with 11% being diabetic with chi-square statistic is 29.726. The p-value is < 0.00001. The result is significant at p < 0.05. So from our study there is an association between Gallstone formation and diabetes. This finding can be explained by increased risk of developing gallstones in diabetics because hypertriglyceridemia and obesity are associated with diabetes mellitus and because gallbladder motility is often impaired in patients with diabetes mellitus. 10

OCP use

Out of 68 female patients 10 had a history of use of OCP while 58 did not report of such use in their reproductive period. The chi-square statistic is 0.8327. The p-value is 0.659445. The result is not significant at p < 0.05.

CONCLUSION

Women are twice as likely as men to form gallstones. Most common gallstone type found is mixed type and least is cholesterol type. Age group most commonly affected is between 31-50 years. There is a statistically significant association between high BMI and occurrence of gallstone. There is a statistically significant association between diabetes and occurrence of gallstone. No association has been found with parity, use of OCP, occupation, smoking, alcoholism in patients with cholelithiasis.

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institutional ethics committee

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