Medico Research Chronicles

ISSN No. 2394-3971

Original Research Article

TO STUDY THE CORRELATION OF FOOD HABITS AND ANTHROPOMETRIC MEASURES OF PATIENTS SUFFERING FROM CHOLELITHIASIS

Pallavi Dhawan[1], Prithpal S Matreja[2*], A S Grover[3], P M L Khanna[4]

[1]*MBBS Student, Gian Sagar Medical College and Hospital, Village Ram Nagar, Patiala, Punjab.*

[2]*Associate Professor, Department of Pharmacology, Gian Sagar Medical College and Hospital, Village Ram Nagar, Patiala, Punjab.*

[3]*Prof. & Principal, Department of Surgery, Gian Sagar Medical College and Hospital, Village Ram Nagar, Patiala, Punjab.*

[4]*Prof. & Head, Department of Pharmacology, Gian Sagar Medical College and Hospital, Village Ram Nagar, District Patiala, Punjab, India-140601*

Submitted on: February 2015
Accepted on: February 2015
For Correspondence
Email ID:
drpsmatreja@yahoo.co.in

Abstract

Background: Studies have shown that age, female gender, pregnancy, obesity, sedentary lifestyle; diet rich in animal fats and refined sugars; and poor in vegetable fats and fiber were significant risk factors for gall stone formation. The data on risk factors associated with gall stones is insufficient in India; hence this study was designed to determine food habits and anthropometric measures of patients suffering from cholelithiasis.

Material and Methods: This prospective study was conducted on 50 patients after they signed in written informed consent. These patients were divided into two groups, Group A –included patients suffering from cholelithiasis and Group B included controls. The following parameters were assessed age, sex, weight, waist circumference, hip circumference, height, BMI, WHR, number of children/abortion, use of OCP, and family history of cholelithiasis were evaluated in both the groups.

Results: A total of 53 patients were recruited in the study and divided into 2 groups. The mean age of patients in Group A was significantly ($p<0.05$) higher than Group B. Patients in Group A had significantly higher waist circumference (WC) and Hip circumference (HC) as compared to Group B. Estimates of correlation demonstrated that waist circumference had significant correlation with weight, hip circumference, body mass index, waist hip ration; hip circumference had significant correlation with weight, waist circumference, and BMI; BMI had significant correlation with weight, waist circumference, hip circumference; WHR had significant correlation with waist circumference in both groups.

Conclusion: To conclude patients suffering from gall stones had higher waist circumference, hip circumference and age than in controls and there was significant correlation of WHR, BMI, HC and WC.

Key words: gall stones, waist circumference, hip circumference, body mass index, waist hip ratio

Introduction:

Cholelithiasis is the pathologic state of stone s or calculi within gallbladder lumen.

Gallstones are among the most common gastrointestinal illness requiring hospitalization and frequently occur in young, otherwise healthy people with a prevalence of 11 to 36% in autopsy reports. Risk factors for gallstones include obesity, rapid weight loss, childbearing, multiparity, female sex, first degree relatives, ileal disease, increasing age, drugs: ceftrioxone, postmenopausal estrogens, and total parentral nutrition. Only first degree relatives of patients with gallstones and obesity (body mass index >30kg/m^2) have been identified as strong risk factors for development of symptomatic gallstone disease. Approximately 75-80% of gallstones are of cholesterol type and 10-20% bilirubinate of either black or brown pigment. In Asia, pigmented stones predominate, although recent studies have shown an increase in cholesterol stones and the prevalence in India is 4%. Gallstones represent an inability to maintain certain biliary solutes, primarily cholesterol and calcium in a solubilised state. Most cholesterol stones contain calcium salts in there center. The pathogenesis of cholesterol gallstones involves three stages: cholesterol super saturation of bile, crystal nucleation and stone growth (1). Whether cholesterol remains in solution depends on the concentration of phospholipids and bile acids in bile and the type of phospholipid and bile acid. Micelles formed by the phospholipid hold cholesterol in thermodynamic state. When bile is supersaturated with cholesterol or bile acid concentrations are low, unstable unilamellar phospholipid vesicles form, from which cholesterol crystals may nucleate and stones may form. Patients with gallstones have increased fasting and postprandial gallbladder volumes (2). Pigment stones contain less than 20% cholesterol and are dark due to the presence of calcium bilirubinate. Black pigment stones are usually associated with hemolytic conditions like hereditary spherocytosis, and sickle cell disease or cirrhosis. These stones are usually not associated with infected bile and are found exclusively in the gallbladder. They are common in Asian countries like Japan as compared to Western countries. Brown pigment stones often contain more cholesterol and calcium palmitate and occur as duct stones in Western patients. They are associated with disorders of biliary motility and bacterial infection. E. coli secrete beta glucuronidase that causes enzymatic hydrolysis of soluble conjugated bilirubin glucuronide to produce insoluble bilirubin, which then precipitates with calcium (1). A study done to evaluate the association between diet, physical activity and gall stones concluded that sedentary lifestyle and a diet rich in animal fats and refined sugars are significant risk factors for gall stone formation (3). Another study done to study diet as a risk factor for cholesterol gall stone disease concluded that energy intake related to obesity and energy storage represents an important risk factor for the formation of gall stones (4). A study done to determine the role of iron deficiency in the formation of gall stones concluded that low serum iron levels lead to bile super saturation with respect to cholesterol, which leads to gallstone formation (5). Similar studies done to assess obesity, dyslipidemia and cholesterol gallstone disease in an Antarctic expedition and Romania concluded that the most important risk factors for gallstones are age, female gender, pregnancy and obesity (6, 7). Recently in 2011 a study was done in India to check the antecedent risk factors in the causation of gallstone disease concluded that abdominal adiposity, inadequate physical activity and high intake of saturated fats represent high risk lifestyles (8).

The data on risk factors associated with gall stones is insufficient in India; hence this study was designed to determine food habits

and anthropometric measures of patients suffering from cholelithiasis.

Methodology:

Study Design: This prospective study was conducted in the Department of Surgery for 2 months from April to August 2013. 50 patients were enrolled in the study after they signed in written informed consent. These patients were divided into two groups, Group A – included patients suffering from cholelithiasis and Group B included controls.

Patients between the age group of 20-65 years, suffering from cholelithiasis, willing to give written informed consent and undergoing abdominal ultrasonography were included in the study. Patients with chronic liver disease, previous gastric or small bowel surgery, inflammatory bowel disease, uncontrolled diabetes mellitus, hypothyroidism or hyperthyroidism, pregnancy and lactation, other serious disease, including depressive disorders treated by medication were excluded from the study.

Outcome Measures: The following parameters were recorded in both groups: age; sex; weight; waist circumference; hip circumference; height; BMI; Waist Hip Ratio (WHR); number of children; number of abortions; use of oral contraceptive pills (OCP); and family history of cholelithiasis

Statistical Analysis

The data was tabulated as mean ± standard deviation (SD). Results were analyzed using non parametric tests (Chi-Square Test), parametric tests (two tailed student t-test) and correlation (Pearson correlation coefficients) analysis. A $p<0.05$ was considered statistically significant

Results:

A total of 53 patients were recruited in the study and divided into 2 groups. Participants in Group A were patients suffering from cholelithiasis whereas subjects in Group B were controls. Twenty seven patients were recruited in Group A and 26 patients in Group B. All the 53 patients recruited in the study gave written informed consent and completed the questionnaire. The baseline characteristics of patients in both the groups are shown in Table 1. The mean age of patients in Group A was significantly ($p<0.05$) higher 43.85±13.86 years versus 34.65±13.94 years in Group B. A total of 23 females were recruited in Group A as compared to 20 in Group B. Patients in Group A had significantly higher waist circumference (WC) (38.65±6.37 versus 34.23±8.04) and Hip circumference (HC) (42.59±5.86 versus 37.81±8.33) as compared to Group B. Group A had higher Body Mass Index (BMI), weight, and consumption of oil as compared to Group B, but it was not statistically significant. The waist hip ratio (WHR) was comparable in both groups.

Correlation:

Estimates of correlation for waist circumference and hip circumference with other variables along with their significant levels among patients in Group A and B are presented in Table 2. It has been observed that waist circumference has significant ($p<0.05$) correlation with weight, hip circumference, body mass index, waist hip ration in both groups. The hip circumference has significant ($p<0.05$) correlation with weight, waist circumference, and BMI in both groups; with height in Group A.

Estimates of correlation for BMI and WHR with other variables along with their significant levels among patients in Group A and B are presented in Table 3. It has been observed that BMI has significant ($p<0.05$) correlation with weight, waist circumference, hip circumference in both groups; with height in Group A. The WHR has significant ($p<0.05$) correlation with waist circumference in both groups; with weight in Group A; and height in Group B.

Discussion:

Cholelithiasis is the pathologic state of stones or calculi within gallbladder lumen with majority being of cholesterol type (75-80%) followed by bilirubinate type (10-

25%) with the prevalence in India is 4%. Gall stone development is associated with certain risk factors that include heredity, obesity, rapid weight loss, through diet (very low calorie diet, prolonged fasting and low fiber/high cholesterol/high starch) or surgery, age over 60years and with high estrogen levels (pregnancy, hormone replacement therapy, oral contraceptive pills (1, 2, 9, 10).

The present study was undertaken to study the correlation of Body Mass Index, Waist Hip Ratio, age, gender and dietary habits with Cholelithiasis. The results showed that patients with cholelithiasis had higher weight, waist circumference, hip circumference and body mass index and were of higher age group. They had significantly higher age, hip circumference and waist circumference as compared to controls. The correlation revealed that both groups had significant correlation of body mass index with waist circumference, hip circumference and weight. A significant correlation also existed between waist hip ratio and waist circumference in both groups.

An association study done to determine if significant genetic component contributes to the pathogenesis of symptomatic gallstones, found a significant risk factors for symptomatic gallstone disease were female gender, obesity and age more than 50 years are quite similar to our results were we found a higher BMI, age and significantly higher weight in patients suffering from cholelithiasis (11).

Another study done to assess power of correlation between chosen risk factors of cholelithiasis Podlasie inhabitants demonstrated obesity as major risk factor in women and statistically significant in men. The other significant risk factors for women included: age, diabetes, use of contraceptive pills, while for men these were: age, serum triglycerol level, the result are quite similar to our study where there was a significantly higher weight in patients with cholelithiasis (12).

Another study done in Australian and immigrants from Southern Europe found that increased incidence of cholelithiasis in migrant group was more due to marked change in nutrient intake of southern European women on coming to Australia, are similar to our study where we found that patients with cholelithisais had a higher BMI and daily oil intake (13).

A study done in Southern India reported that higher BMI appear to be risk factors in the formation of gallstones in this population, where the reported predominant type of gallstones is pigment/mixed are contrary to our study where we found that although the BMI was higher in patients in cholielithiasis group but the BMI had significant correlation with other variables in both the groups (14).

There are certain limitation in our study firstly the sample size could have been larger but, the duration of study was only two months hence we tried to include patients who fulfilled the eligibility criteria. Secondly, a comparison with the intervention arm could be done, but any intervention could have prolonged the duration of study and we would not have been able to complete the study in the allotted 2 months.

To conclude it was observed in our study that waist Circumference, hip circumference and age were significantly higher in those suffering from gallstones than in controls. Group A had higher number of females, lesser height, more weight and higher BMI. Estimates of correlation showed that waist circumference had significant correlation with weight, hip circumference, body mass index, waist hip ratio; hip circumference had significant correlation with weight, waist circumference, and BMI; BMI had significant correlation with weight, waist circumference, and hip circumference; and WHR has significant correlation with waist circumference in both groups.

Source of Funding: This projects is a part of ICMR-STS (Indian Council of Medical Research – Short term Studentship Program) 2013. The project has been supported by ICMR-STS 2013 program.

References:

1. Chari RS, Shah SA. Biliary System. Sabiston's Textbook of Surgery: The Biological Basis of Modern Medical Practice. 18th ed. Editors Townsend CM, Beauchamp RD, Evers BM, Mattox KL. Publishers Elsevier, 2010; p 1547–88.
2. The Gallbladder and Bile Ducts. Bailey and Love's Short Practice of Surgery 24th ed. Editors Russell RCG, Williams NS, Bulstrode CJK. Publisher Hoddler Education, London, 2004; p 1094-113.
3. Misciagna G, Centonze S, Leoci C, Guerra V, Cisternino AM, Ceo R, et. al. Diet, physical activity and gall stones – A population based case control study in southern Italy. Am J Clin Nutr 1999; 69: 120-6.
4. Cuevas A, Miquel JF, Reyes MS, Zanlungo S, Nevri F. Diet as a Risk Factor for Cholesterol Gallstone Disease. J Am Coll Nutr 2004; 23: 187-96.
5. Mohan H, Punia RP S, Dhawan SB, Ahal S, Sekhon MS. Morphological Spectrum of Gallstone Disease in 1100 Cholecystectomies in North India. Indian J Surg 2005; 67: 140-2.
6. Prem Kumar M, Sable T. Obesity, Dyslipidemia and Cholesterol Gallstone Disease during One Year of Antarctic Residence. Rural and Remote Health 2012; 12: 2186. (Online) Available: http://www.rrh.org.au/articles/subviewaust.asp?ArticleID=2186
7. Constantinescu T, Huwood A, Jabouri A K, Bratucu E, Olteanu C, Toma M, et al. Gallstone disease in young population: Incidence, complications, therapeutic approach. Chirurgia, 107, 579-82.
8. Sachdeva S, Khan Z, Ansari MA, Khalique N, Anees A. Life Style and Gall stone Disease: Scope for Primary Prevention. Indian J Community Med 2011; 36: 263-7.
9. Cholelithiasis and Choledocholithiasis. Assessed on 15th September 2013. Available on Url. https://www.clinicalkey.com/topics/surgery/cholelithiasis-and-choledocholithiasis.html.
10. Heuman DM, Mihas AA, Allen J. Cholelithiasis [Internet] Updated: May 13, 2013 [cited 2013 September 26]. Available from: http://emedicine.medscape.com/article/175667-overview
11. Nakeeb A, Comuzzie AG, Martin L, Sonnenberg GE, Swartz-Basile D, Kissebah AH, et. al. Gallstones: Genetics Versus Environment. Ann Surg 2002; 235: 842–9.
12. Ostrowska L, Czapska D, Karczewski JK. Body weight gain as the major risk factor of cholelithiasis in women and an important risk factor in man. Annales Academiae Medicae Bialostocensis 2005; 50(Suppl 1): 54-6.
13. Wheeler M, Loftus L, Laby B. Cholelithiasis: A Clinical and Dietary Survey. Gut 1970; 11: 430-7.
14. Jayanthi V, Anand L, Ashok L, Srinivasan V. Dietary factors in pathogenesis of gallstone disease in southern India – A hospital-based case-control study. Indian J Gastroenterol 2005; 24: 97-9.

Table 1. Characteristic in both groups

	Cholelithiasis (Group A) (n=27)	**Controls (Group B) (n=26)**	**p Value**
Age (years) (Mean±SD)	43.82±13.86	34.65±13.94	**0.02**$^{*\#}$
Sex(M:F)	4:23	6:20	0.68$^{\square}$
Height (Inches) (Mean±SD)	61.67±3.41	63.27±2.89	0.07$^{\#}$
Weight (Kg) (Mean±SD)	67.41± 17.59	65.17± 14.86	0.62$^{\#}$
Waist Circumference (Inches) (Mean±SD)	38.56±6.37	34.23±8.04	**0.03**$^{*\#}$
Hip Circumference (Inches) (Mean±SD)	42.59±5.86	37.81± 8.33	**0.02**$^{*\#}$
BMI (kg/m^2) (Mean±SD)	28.47±9.09	25.30±4.95	0.12$^{\#}$
WHR	0.8998±0.069	0.9042±0.089	0.84$^{\#}$
Oil Consumption (tablespoon)	2.54±2.86	2.02±0.57	0.37$^{\#}$
*p<0.05 and statistically significant			
$^{\#}$using student 't' test			
$^{\square}$using Chi Square Test			

Table 2. Correlation coefficients for waist circumference and hip circumference with other variables among patients in both groups.

Variables	Waist Circumference				Hip circumference			
	Group A (n=27)		Group B (n=26)		Group A (n=27)		Group B (n=26)	
	r	p	r	p	r	p	r	P
Height (Inches)	-0.28	0.15	0.11	0.58	-0.39	<0.05*	-0.13	0.54
Weight (kg)	0.80	<0.05*	0.50	<0.05*	0.50	<0.05*	0.42	<0.05*
Waist circumference (Inches)	1	-	1	-	0.89	<0.05*	0.92	<0.05*
Hip Circumference (Inches)	0.89	<0.05*	0.92	<0.05*	1	-	1	-
Body Mass Index (kg/m2)	0.77	<0.05*	0.53	<0.05*	0.80	<0.05*	0.55	<0.05*
Waist Hip Ratio	0.58	<0.05*	0.43	<0.05*	0.14	0.48	0.05	0.79
*p<0.05 and statistically significant								

Table 3. Correlation coefficients for body mass index and waist hip ratio with other variables among patients in both groups.

Variables	Body Mass Index				Waist Hip Ratio			
	Group A (n=27)		Group B (n=26)		Group A (n=27)		Group B (n=26)	
	r	p	r	p	r	p	r	P
Height (Inches)	-0.40	<0.05*	0.16	0.45	0.06	0.76	0.64	<0.05*
Weight (kg)	0.78	<0.05*	0.91	<0.05*	0.43	<0.05*	0.34	0.08
Waist circumference (Inches)	0.77	<0.05*	0.53	<0.05*	0.58	<0.05*	0.43	<0.05*
Hip Circumference (Inches)	.79	<0.05*	0.55	<0.05*	0.14	0.48	0.05	0.79
Body Mass Index (kg/m2)	1	-	1	-	0.26	0.18	0.87	0.67
Waist Hip Ratio	0.26	0.18	0.87	0.67	1	-	1	-
*p<0.05 and statistically significant								