ASSOCIATION OF LIPID PROFILE WITH BODY MASS INDEX IN GALL STONE DISEASE

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Article Info: Received 18 June 2019; Accepted 22 July. 2019

DOI: <https://doi.org/10.32553/ijmbs.v3i7.412>

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Conflict of interest: Nil

Abstract

Introduction: Gall stone disease is common in northern regions of India including Uttarakhand. It is traditionally seen in fat, fertile, female of forty. Apart from this, age, obesity, hyperlipidemia, smoking & diabetes are other risk factors. Gall stones show more association with elevated levels of triglyceride and low high density lipoprotein (HDL-C) where less association with total cholesterol and low density lipoprotein (LDL-C). Increased prevalence of gall stone reported in overweight. This present study conducted with an aim to find out the co-relation of lipid profile, BMI (body mass index) and gall stones in Uttarakhand population attending Shridev Suman Subharti Medical College Teaching Hospital, Dehradun.

Material & Methods: Total 120 patients (10 M, 110 F) were included in the study following confirmation of diagnosis of gall stones on ultrasound. Age, sex, dietary habits, occupation, medical history and drug history of each patient were recorded in predesigned, tested proforma. The BMI calculated as weight in Kg/height in meter square. BMI of 18 to 24.9 were regarded as normal, whereas, 25 to 29.9 as overweight, 30 to 39.9 as obese and above 40 as morbid obese. The serum cholesterol, LDL, HDL and Triglyceride were estimated on a fasting sample by keeping patient nil orally for 12hrs after their normal meal.

Results: Out of total 120 patients, 110(91.67%) were female & 10(8.33%) were male, with female to male ratio 9:1. The age-group of 21 to 40 years was the most common, with 64(53.33%) patients belonging to this group. Triglyceride was raised in 35(29.17%) patients, total cholesterol was raised in 7(5.83%) patients and LDL was raised in 5(4.17%) patients. The cholesterol was lowered in 13(10.83%) patients, HDL was lowered in 8(6.66%) patients and triglyceride was lowered in 3(2.5%) patients. Triglyceride & LDL were raised in 4(3.3%) patients, cholesterol and triglyceride were raised in 3(2.5%) patients and cholesterol and HDL were lowered in 4 (3.33%) patients. Patients with BMI of 18.0-24.9 were 72(60.00%), BMI of 25-29.9 were 36(30.00%) and BMI of 30-39.9 were 9(7.50%) respectively.

Conclusion: The present study on presence of Gall stones which are more commonly found in females aged 21 to 40 years. Raised levels of Triglyceride and lower levels of cholesterol are associated with gall stones. There is no association between Increased BMI & presence of gall stones. BMI is associated with higher level of Triglyceride.

Key Words: Gall stone, BMI, Triglyceride, Cholesterol, and HDL-C.

INTRODUCTION

Gall stones are common in clinical practice in Uttarakhand. It is traditionally seen in fat, fertile, female of forty. In western countries, additional risk factors include hyperlipidemia, smoking & diabetes mellitus. Cholesterol is one of the leading components of gall stones. The predominant types of gall stones found in Asia differ from the west (1), indicating the difference in etiology and risk factors for gall stones. The association of High Triglycerides and low HDL with gall stones is more consistent than total cholesterol and LDL. The major constituents of the gall stones are cholesterol and triglycerides.

Combination of various factors such as excess dietary cholesterol, obesity, diabetes and genetic factors are responsible for an abnormality in lipid metabolism (2-4). The physical-chemical basis of cholesterol gall stone formation is cholesterol supersaturation of bile. Prevalence of gall stones is high in overweight individuals. Even though obesity is a risk factor for formation of gall stones, the excess risk associated with higher level of obesity and recent weight gain are poorly quantified. The aim of the present hospital-based prospective study is to determine the association of lipid profile, BMI (Body Mass Index) and gall stones in Uttarakhand population in both

rural & urban areas attending Subharti Medical College Teaching Hospital, Dehradun.

MATERIAL AND METHODS

After confirmation of diagnosis of gall stones with ultrasound, total 120 patients were included in this study. It is a hospital based observational prospective study conducted in Shridev Suman Subharti Medical College attached with Dr. K.K. Bhatnagar Memorial Subharti Hospital, Dehradun, Uttarakhand, India since January 2017 to December 2017. Clearance from Institutional Ethics Committee is obtained before undertaking this study. Age, sex, dietary habits, occupation, medical history and drug history of each patient were recorded. BMI was calculated as weight in kg/height in meter square after recording height and weight of each patient. BMI of 18 to 24.9 were regarded as normal, 25 to 29.9 as overweight, 30 to 39.9 were as obese and above 40 as morbid obese. The blood cholesterol, Triglyceride, LDL and HDL were estimated by keeping patients nil orally for 12 hrs after their normal meal as they were taking daily. The lipid profile was estimated by standard procedures. Patients admitted as acute calculus cholecystitis were also included. Patients having cardiovascular medical illness & those on lipid lowering agents were not included in this study.

RESULTS

1: Age and sex wise distribution of patients

Age(years)	N=Number (%)	Female	Male
18 -20	07(05.84%)	07	00
21-40	64(53.33%)	59	05
41-60	39(32.50%)	35	04
61-80	10(08.33%)	09	01

Table no 1 shows age sex wise distribution of study subjects. It contains 110 females and 10 males. Lowest age of the patients was 18 years and upper age limit is 80 years.

Table 2: Levels of Body mass Index in study patients.

BMI(Kg/Height m ²)	N=Number (%)
<18	03(2.50%)
18-24.9	72(60.00%)
25-31.9	36(30.00%)
32-38.9	09(07.50%)

Table 3: Increased level of Lipid profile & BMI

Lipid profiles	BMI (Kg/Height m ²)	Increased(↑) N=Number (%)
Cholesterol	21- 33	7(5.83%)
Triglyceride	21-34	35(29.17%)
HDL	33	2(1.67%)
LDL	21-34	5(4.17%)
Triglyceride and LDL	21-35	4(3.33%)
Cholesterol and LDL	32	2(1.67%)
Cholesterol and Triglyceride	25-30	3(2.50%)
Cholesterol, Triglyceride and LDL	21-30	2(1.67%)

Table 4: Decreased level Lipid profile & BMI

Lipid profiles	BMI (Kg/Height m ²)	Decreased (↓) N=Number (%)
Cholesterol	20-34	13(10.83%)
Triglyceride	23-30	3(2.50%)
HDL	21-26	8(6.66%)
LDL	22	1(0.83%)
Triglyceride and HDL	23	1(0.83%)
Cholesterol and HDL	19-32	4(3.33%)

Out of total 120 patients, 110(91.67%) were female & 10(8.33%) male. The age-group of 21 to 40 years was the most common, with 64(53.33%) patients belonging to this group. [Table-1]

The patients with BMI of 18-24.9 were 72(60.00 %), BMI of 25-29.9 were 36 (30.00%) and BMI of 30 and above were 9(7.50%) [Table-2]. The Triglyceride levels were raised in 35(29.17%) patients and had BMI from 21 to 34. Cholesterol was raised in 7(5.83%) patients with BMI from 21-33. LDL was raised in 5(4.17%) patients with BMI from 21-34. Both Triglyceride and LDL were raised in 4(3.33%) patients and had BMI from 22-34. Both Cholesterol and Triglyceride were raised in 3(2.50%) patients and had BMI from 25-30. HDL, Cholesterol & LDL and Cholesterol, Triglyceride & LDL were raised in 2(1.67%) patients each with BMI from 33, 32 & 21-30 respectively [Table3]. Cholesterol was reduced in 13(10.83%) patients and had BMI of 20-34. HDL was reduced in 8(6.66%) patients and had BMI of 21-26.

Both Cholesterol and HDL were reduced in 4(3.33%) patients and had BMI of 19-32. Triglyceride were reduced in 3(2.50%) patients and had BMI from 23-30. LDL and triglyceride & HDL were reduced in 1(0.83%) patient each with BMI of 22 & 23 respectively [Table 4].

DISCUSSION

Gall stone is a major health problem in Uttarakhand seen in a wide range of age group from 20 to 80 years but more common in age group of 21 to 40 years which is similar to the study reported by G.M.Brownrigg (2) which correlates with the present study. However, it is not comparable to other study done by Sukij Panpimanmas and Charuwan Manmee in a Thai Population (3) where patients between the age group of 40 to 60 years were more commonly affected. This study showed female to male ratio is 9:1 but other showed 4:13 (1). One Study conducted by Pradhan SB (4) in Nepal revealed that patients belonging to the age group of 30 to 39 years were more affected and male to female ratio was 3:1. Easy availability of ultrasound facilities and frequent use of ultrasound as a diagnostic tool for evaluation of patients with any abdominal problems may attribute to these findings. The percentage of pigment stones were increased with age (5). Concentrating function of the gall bladder reduces with the advancing age. This explains the occurrence of gall stones more often in elderly people (5).

In hypertriglyceridemia, there is decrease sensitivity to Cholecystokinin (CCK) leading to impairment in gall bladder motility which may add to the risk of cholelithiasis. Obesity, hyperlipidemia, hepatitis B and C infections, cirrhosis and menopause are the risk factors for gall stone formation in female (1). Present study highlighted 35(29.17%) patients had increased triglyceride and 7(5.83%) had increased cholesterol which is comparable to other studies (6,7) indicating mean serum triglyceride and cholesterol were higher in cholelithiasis patients. The explanation for this association is possible role of serum lipids and lipoproteins in initial precipitation, aggregation of cholesterol crystals and development of cholesterol gall stones. Although the association between serum lipids and gall stones has remained controversial, decreased cholesterol, HDL and increased triglyceride might be risk for gall stones (8).

Increased levels of both triglyceride and cholesterol were not associated with the formation of gall stones. This may be because of plasma lipoprotein

profile markedly differing from patients of gall stone disease than normal subject. Present study showed Triglyceride and cholesterol were increased in both male and female. Study by Sarya (9) A. showed triglyceride and cholesterol were increased in both male and female but Triglyceride was increased in only female (8). This may be due to obese women are more likely to develop cholelithiasis than obese men (10). High values of triglyceride and cholesterol were found in patients older than 36 years but no difference in male and female which is comparable with the study (11). In present study, Hypertriglyceridemia was the commonest abnormality seen in 35(29.17%) patients followed by decrease in cholesterol seen in 13(10.83%) patients which is not similar to other study (12) where hypertriglyceridemia was followed by HDL level. Hypertriglyceridemia and Decreased HDL lead to risk of gall stones (13,14) which is similar to present study. A study reported by Torben Jorgensen et al (15) showed decrease in HDL were associated with gall stones. Another study by Nishikawa H. et al (16) showed elevated LDL was not associated with gall stones. However, present study showed raised LDL levels in 5(4.17%) patients.

In a study conducted by Goro Kajyama et al apart from lower blood HDL, no other lipid profiles manifested any difference in gall stones(7). According to the study conducted by 1 A. Abubakar et al (17), BMI is not related to gallstones and BMI of 25 or higher had relative risk for gall stones formation. As per the study conducted by Torben Jorgensen et al(15), the most substantial association between gall stones and BMI was found among women with BMI greater than 30. In present study 72(60.00 %) patients had normal BMI and 36(30.00 %) patients were overweight. Normal BMI and gall stones suggest serum lipids are more linked to formation of gall stones than obesity (13). In my earlier study on LFT in patients with symptomatic gall stone disease showing there was no change in routine LFT parameters and shows it is not effective predictive marker for gall stone disease (18).

Our study is not comparable to the study by Meir J Stampfer et al (19) where BMI>45 had 7 folds higher risk compared to BMI<24 and increased prevalence of gallstones with age, high BMI and BMI>30(15). This may be related the change in plasma lipids associated with lack of physical activities, smoking, high fat intake. According to the study conducted by Shiffman ML et al (20), gall stones prevalence and body weight

does not show significant relationship. According to the study conducted by Wg Cdr DS Chadha et al(21), BMI is associated with increased cholesterol in older men. The highest risk of gall stones were found with low HDL and high triglyceride (15).

As per the study done by Angelico M et al (22), an inverse association between gall stones and plasma cholesterol is found. In present study, cholesterol levels were decreased in 13(10.83%) patients & HDL levels were decreased in 8(6.66%) patients. Most studies reported a positive relation between triglyceride and gall stones (23) but others found no correlation. In a study conducted by Angelico M et al (22), gall stones frequency is higher in women, increase with age and BMI for both genders. There is no association found between lipid profiles with BMI (19) which is similar to present study where 72(60.00%) patients had normal BMI. In study conducted by Shama L et al(24), positive association of BMI with Triglyceride, negative association with HDL and no association with LDL was reported.

CONCLUSION

Gall stone disease is common in Uttarakhand. It is more commonly documented in female. Age group of 21 to 40 years is the most commonly affected group. Raised levels of Triglyceride and lowered levels of cholesterol are associated with gall stones. There is no association between Increased BMI & gall stones. BMI is associated with raised Triglyceride levels.

ACKNOWLEDGEMENT

Authors are thankful to Senior Medical Superintendent Dr. K. K. B. Hospital, Sridev Suman Subharti Medical College, Dehradun for permission to publish the findings. Both Authors are equally contributed for planning and execution of present study.

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