

Study of Nutritional Status, Lipid Profile and Effect of Multiparity in the Development of Cholelithiasis (Gall Stones) in Female

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Abstract

About three hundred million people inhabiting our planet are suffering from cholelithiasis. These disorders are among the most common diseases of adult life. Women develop biliary calculi about four times more frequently than men. The pathogenesis of gallstones is not completely understood and undoubtedly, several mechanisms are involved. A huge prospective study in American nurses showed a close association between weight gain since maturity and risk of gall stones (Mac Lure, 1989). In this study the line relating Body Mass Index (kg/m²) to the risk of gall stones did not flatten out at the left hand end, which implies that thinness protects against the disease. Among the various factors incriminated in the formation of gall stones are - Disturbance of the physiochemical equilibrium of bile constituents. Derangement of the cholesterol metabolism Stasis of the bile Persistent infection of other biliary tract Consumption of cholesterol rich diet or diet rich in fat Gall stone can only nucleate and grow when bile is supersaturated in regard to the precipitating material i.e. high concentration of cholesterol and decrease of bile salts. The comparative study was done so as to know the changing spectrum of gall stone disease and potentiality of old established risk factors in the present context. The analysis found that the incidence was more in females, the ratio being 1:4, and was seen between 40-49 years of age in both males and females. There are several ways in which diet and eating habits could promote gall stones. Women with gallstones had significantly higher intakes of total fats, mono saturated and saturated fatty acids and cholesterol and lower intakes of fibre, folate, magnesium and vitamin 'C' than control women. For vitamins and minerals studied, patients showed greater percentage of intakes below. Change in biliary lipid composition also explains the occurrence of acute cholecystitis in the presence of gallstones. The study on this gives the results for making the awareness about the subject.

Keywords: Cholelithiasis, Multiparity, Lipid Profile, Dietary Habits.

Introduction

Human beings in various parts of the world have suffered from biliary tract diseases such as cholelithiasis, acute or chronic cholecystitis (calculous or acalculous), cholesterosis, choledochal cyst acute suppurative cholangitis and carcinoma of the gall bladder and bile ducts etc. Among all of these causes cholecystitis and cholelithiasis dominate the spectrum of gall bladder disease. Cholelithiasis is the commonest biliary pathology. At least three hundred million people inhabiting our planet are suffering from cholelithiasis.

The incidence being 10% of the population (Davidson, 1991) Except for congenital anomalies, the vast majority of diseases of the extra hepatic biliary system are associated with gallstone. These disorders are among the most common diseases of adult life. Gallstones occur in approximately 10% of the adult population in the United States, and in about 20% of people over the age of 40 The incidence of cholelithiasis increases progressively with age so that approximately one-third of life have calculi. Women develop biliary calculi about four times more frequently than men The pathogenesis of gallstones is not completely understood and undoubtedly, several mechanisms are involved. The three major organic constituents of bile are the salts of bile acids, bilirubin and

cholesterol Bilirubin is poorly soluble in water, cholesterol is insoluble, yet these substances are normally maintained in a supersaturated aqueous solution, because water makes up 97% of bile. The mechanism whereby depends on the emulsifying action of the bile acids and fatty acids which form micelles with bilirubin and cholesterol Any chronic disturbance which produces increased concentration of the relatively insoluble components of bile cause them to precipitate and might lead to stone formation (Christophers, 1986) Several conditions are associated with an increased incidence of gallstones including hemolytic disorders, obesity, diabetes mellitus, familial hypercholesterolemia, cardiovascular disease, multiple pregnancies and use of oral contraceptives and drugs that lower blood cholesterol levels (Capron and colleagues, 1981) A fat fertile female of forty is the classical sufferer from gall stones (Horm, 1956) But as Rains and Mann (1988) mention gallstones occur in both sexes, quite common at much earlier age and are common in old age Heredity appears to have a major influence in the development of gall stones. Gall stones or biliary calculi are by far the commonest biliary disease and the only one in which there is evidence for a role of diet For example excess use of polyunsaturated fats can increase the incidence (Garrow 1992) Gall stones are common in all industrialized countries are affected twice as often as men and the prevalence rises with age to a peak of 30-60% in elderly women (Dichl, 1991) Among middle aged people about one in 150 develop gall stones each year (Jensen, 1991) Obesity has long been recognized as a risk factor for gall stones and it is the best documented one. A huge prospective study in American nurses showed a close association between weight gain since maturity and risk of gall stones (Mac Lure, 1989). In this study the line relating Body Mass Index (kg/m²) to the risk of gall stones did not flatten out at the left hand end, which implies that thinness protects against the disease. Teenage girls rarely develop gallstones but those who do are nearly always obese (Lee 1987) A change in biliary lipid composition also explain the occurrence of acute cholecystitis in the presence of gall stones. In patients with gall stones, gall bladder bile contains more deoxycholate (which is one of the most cytotoxic bile-salts) and less lecithin relative to normal gall-bladder bile and the concentration of lecithin in the gall bladder bile of patients with acute cholecystitis is markedly decreased (Quarterly Jr. of Medicine, 1986). It is sure that climate and soil condition, influence to a great extent, the dietary habits of the people. These nutritional idiosyncrasies vary in different population. These idiosyncrasies are mainly due to preformed impression that certain foods are useful or harmful, to be avoided or to be taken liberally in disease state or in special conditions for example during pregnancy and lactation etc. These different dietary habits are the main causes for variations in lithogenicity of bile in different geographical areas. That is why cholesterol rich diet or diet rich in fat has been thought to predispose gall stones (Abraham, 1991) among the various factors incriminated in the formation of gall stones are -

Disturbance of the physiochemical equilibrium of bile constituents. Derangement of the cholesterol metabolism Stasis of the bile Persistent infection of other biliary tract Consumption of cholesterol rich diet or diet rich in fat Gall stone can only nucleate and grow when bile is supersaturated in regard to the precipitating material i.e. high concentration of cholesterol and decrease of bile salts. Bile acids and phospholipids have been claimed to be some of the responsible factors the exact etiopathogenesis of cholelithiasis is not fully known but age along with diet, sex, obesity, hormones use of drugs (e.g. oral contraceptive drugs), pregnancy, smoking, alcohol etc. are factors thought to be associated with cholelithiasis.

A study done by Tyagi (1999) to evaluate the risk factors responsible for gall stone disease. The comparative study was done so as to know the changing spectrum of gall stone disease and potentiality of old established risk factors in the present context. He found that the incidence was more in females, the ratio being 1:4, and was seen between 40-49 years of age in both males and females. The incidence of gall stone was higher in patients with lower HDL level and low serum VLDL and triglycerides in female patients. Serum cholesterol and serum LDL were not found to be responsible for cholelithiasis. Multiparity was found to be an etiological factor for cholelithiasis. Although studies have been conducted world wide on the various risk factors associated with cholelithiasis. Hence an attempt was made to assess the nutritional status, dietary habits and lipid profile of female patients suffering from cholelithiasis the objectives of the study were: To assess the nutritional status of female patients suffering from cholelithiasis to study the lipid profile of the patients. To study the dietary intake and dietary habits of female patients suffering from cholelithiasis.

Objective of the Study

1. To assess the nutritional status of females suffering from cholelithiasis.
2. To study the role of multiparity in the development of gall stones.
3. To find the relation of gall stones and lipid profile of the patient.

Review of Related Literature

Gallstones or biliary calculi are by far the commonest biliary disease and the only one in which there is evidence for a role of diet (Garrow, 1997) While conventional wisdom typifies the patient with gall-bladder disease as "fat, fertile, female, and forty", few epidemiological studies have characterized the risk factors of this disorder. Literature on past studies reviewed on this topic is herewith presented under four major categories:

1. Prevalence of gall stones
2. Risk factors for gall stones
3. Diet, eating habits and gall stones
4. Gall stones and lipid profile

Prevalence of gall stones

The prevalence of gall bladder diseases is relatively less in our country and other Asian countries in comparison to western countries In India

cholecystectomies are next only to appendectomies in frequency amongst abdominal operations. The incidence and types of stones vary in different geographical regions, different races and ethnic population, being much frequent white rare and Western American Indians and is rare in African countries Ortega et al. (1998).

The prevalence of cholelithiasis is affected by many factors including race, ethnicity, gender, medical problems and fertility. In the US. 10-20% of adults or about 20 million people have gallstones. Every year 1-3% of people develop gall stones and about 1-3% of people become symptomatic per year (Santen, 1998) internationally: In an Italian study, 20% of women has gall stones % of men have stones. In a Danish study, the prevalence of gall and 14 stones at age 30 was 1.8% for men and 4.8 for women, at 60 years of age 12.9% of men has stones (Sauerbruch, 1991) Gallstones are common in all industrialized countries. Women are affected twice as often as men and the prevalence rises with age to a peak of 3-60% in elderly women (Diehl, 1991) As far as one can tell, gallstones are rare in rural areas of the third world. They have become much commoner in Europe in the last 100 years (Acalovschi et al., 1987) Biliary stone disease is a common problem. Gallstones are present in approximately 15 to 20% of adults. These are rare in children, begin to emerge in adolescence, increase in incidence between age 35 and 55 years; and continue to show gradual increase up to 65 years (Rajasthan Medical Journal, 1991). Genetic susceptibility and unfavourable environment combine in the North American Indians to give them the highest prevalence of 17) gallstones in the world-70% of young Pima women have gallstones by the age of 30 (Sampliner et al, 1970) Bhansali (1976) and Daniel et al. (1978) reported the female to male ratio as 1.5:1 and 3:1 respectively with maximum number of cases between 4th to 6th decades. While others noted the ratio to be 2:1 with maximum number of patients in 4th and 5th decades. In another 7th decades. The prevalence of gallstones is high in the Puna Indians (upto 75% in the elderly) The prevalence of gallstones is low in African Americans, however, African- Americans with sickle cell disease have gallstones early in life (David et al., 1998)

Risk Factors for Gallstones

A fat fertile female of forty is the classical sufferer from gall stones (Horn 1956). But as Rains and Mann (1988) mention gall stones occur in both sexes, uncommon at earlier age and are quite common in old age Vander er al. (1965) have suggested that there is a genetic factor in the development of cholelithiasis since they found that the disease occurred more often among the brothers and sisters than among husbands and wives of patients with gall stone Almost all studies of the association of body mass index with the risk of gall bladder disease have found that risk increases with obesity 18)

Ghosh et al. (1973) noticed that obesity was present in 10.60% patients among 300 of their cases of chronic cholecystitis To investigate the co-existence of gall bladder disease and morbid obesity

(Calhoun et ali., 1987) conducted a study on 92 morbidly obese patients who underwent routine cholecystectomy at the time of their bariatric procedures. The preoperative ultrasonographic findings were positive in only 20 patients of the 92 patients who underwent

Cholecystectomy, 87 (95%) have pathologic evidence of gall bladder disease. This included cholecystitis, cholesterosis, cholelithiasis, or some combination of the three Obesity has long been recognized as a risk factor for gall stones and it is the best documented one. A huge prospective study in American nurses showed a close association between weight gain since maturity and the risk of gallstones (Maclure et al, 1989). In this study the line relating body mass index (kg/m²) to the risk of gallstones did not flatten out the left-hand end, which implies that thinness protects against the disease.

Richard er al. (1973) did a study on Mexican population and they found 51.9% of their patients to be markedly over weight and about 90% were above their ideal body weight. The majority of patients were females (87.4%) out of which 55% were multiparous previous studies of the association between oral contraceptives and gall bladder diseases have yielded conflicting results. But Storm et al. (1986) concluded that oral contraceptives are risk factors for gall bladder disease, although the risk is of sufficient magnitude to be of potential clinical importance only in young women Diche and Soma et al. (1993) proposed other etiological factors also like obesity, oestrogen replacement therapy apart from the oral contraceptive pills for cholelithiasis.

Several other risk factors have been identified including cirrhosis of liver, peptic ulcer etc. Bouchier et al; (1969) found an increased frequency of gall stones (29 4%) in cirrhotic liver disease Peter et al (1982) studied that women who smoked at entry into the study had a 50% higher crude incidence than non-smokers Andrew er al, (1987) observed that most common associated diseases with cholelithiasis as, heart disease, diabetes mellitus, hypertension, cigarette smoking and alcohol consumption was seen in 52% of their cases.

Diet, eating habits and gall stones

There are several ways in which diet and eating habits could promote gall stones. Richard et al. (1973) observed that the incidence was 75.9% in Mexican population and this was done due to the diet having lithogenic properties of bile It has been reported that younger women with gall stones tend to have a longer overnight fast than controls matched for body mass index (Capron et al., 1981)

In another study conducted by Diehl et al. (1989) on Mexican Americans who have a high prevalence of gall bladder disease. They examined the contribution of ethnic preferences in food intake to the risk of gall bladder disease, they found that women with the highest intake of total fat and linoleic acid had reduced risk of gall bladder disease, although an opposite trend was observed in men. High levels of sucrose intake and low levels of cholesterol intake were associated with an increased risk for both sexes Ortega et al (1997) conducted a

study to know the differences in diet and food habits between patients with gall stones and controls. In their study two 24-hour dietary recalls, a "Food frequency intake" questionnaire and a questionnaire on physical activity patterns were obtained from 54 gall stone patients and 46 control subjects. Women with gallstones had significantly higher intakes of total fats, mono saturated and saturated fatty acids and cholesterol and lower intakes of fibre, folate, magnesium and vitamin 'C' than control women. For vitamins and minerals studied, patients showed greater percentage of intakes below the recommended [13]

Gall Stones and Lipid Profile

A change in biliary lipid composition also explains the occurrence of acute cholecystitis in the presence of gallstones. In patients with gallstones, gall bladder bile contains more deoxycholate (which is one of the most cytotoxic bile-salts) and less lecithin relative to normal - gall bladder bile and the concentration of lecithin in the gallbladder bile of patients with acute cholecystitis is markedly decreased (The Quarterly Journal of Medicine, 1986).

Subjects with severe hypercholesterolemia had a higher prevalence of clinical gall bladder disease than those with moderate hypercholesterolemia, who in turn had a higher rate than normals.

Material and Methods

The present study was aimed to study the nutritional status, dietary habits and lipid profile of female patients suffering from cholelithiasis belonging to Ajmer city Selection of samples:

Total thirty cases were selected from the Department of Surgery of JawaharLal Nehru Hospital, Ajmer only those patients were selected whose history and clinical presentation was suggestive of cholelithiasis, their diagnosis was confirmed by ultrasonography

Development of Tools and collection of data

All cases were investigated on a special comprehensive proforma printed for the purpose. A pilot study was done on 5 patients suffering from cholelithiasis. After the pilot study the proforma was suitably modified for the final use.

The proforma consisted of the following parts

Socio-Demographic Profile of the Patients

1. Type of family
2. Religion and caste
3. Age
4. Education
5. Occupation
6. Per capita income
7. No of Children

IL Information related to nutritional status

1. Anthropometric measurement
2. Dietary survey
3. Lipid profile

Results and Discussions

The present study was done to assess the Nutritional status, Dietary habits and The findings of the study are discussed under the following headings:
General information of the subjects

Socio Economic status of the subjects
Assessment of the subjects using anthropometry

Graph Showing Distribution of Subjects according to their Socio-Economic Status

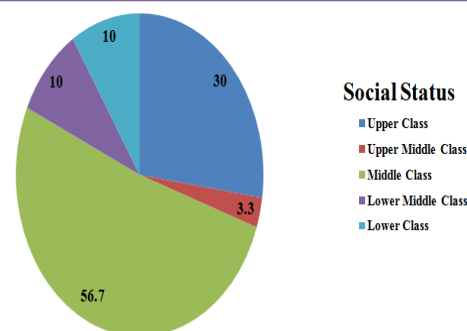


Figure 1

Specific Information of the subjects. Nutrient Intake, Dietary Habits of the subjects Lipid profile of the subjects A total of 30 samples were studied, the patients were selected from Jawaharlal Nehru Hospital Ajmer. Only those patients were studied whose history and clinical presentation was suggestive of cholelithiasis, and on the basis of ultrasonography

General Information of the Subjects

Out of the total subjects studied the majority of the subjects i.e., 30% belonged to the age group of 30-40 years.

Graph Showing Distribution of Subjects according to their Socio-Economic Status

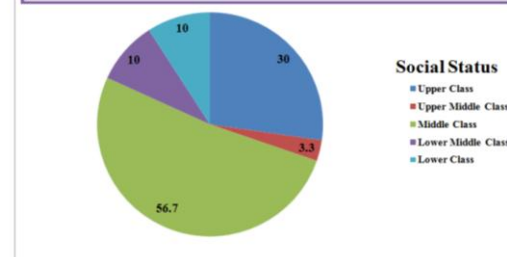


Figure 2

Summary and Conclusion

Cholelithiasis is a common disease in most countries and a frequent cause of abdominal surgery. Indeed many important risk factors for cholelithiasis, which include age, gender, race, ethnic group and family history cannot be modified. Other attributes associated with risk such as obesity, parity, use of oral contraceptives, intake of high fat and less physical activity can be the preventable causes, so that the prevalence of cholelithiasis can be reduced. In order to assess the nutritional status, dietary habits and lipid profile and female suffering from cholelithiasis, the total of thirty samples were selected from the J.L.N. Hospital, Ajmer.

All cases were investigated on a special comprehensive proforma printed for the purpose. The proforma was used to collect the data on socio-demographic profile and dietary habits of the patients. Whereas the lipid profile test of the patients were performed by kit methods.

LIPID PROFILE OF THE PATIENT

S.No.	Component of Lipid Profile (mg/dl)	Mean (n=30)	S.D.
1.	Serum Cholesterol	187.18	±42.9
2.	Serum HDL-C	39.39	±8.9
3.	Serum VLDL-C	26.6	±10.5
4.	Serum LDL-C	128.21	±41.6
5.	Serum triglycerides	123.5	±51.3

Table 1

General information of the subjects : Out of the total subjects studied majority of the subjects i.e 30% belonged to the age group 30-40 years, which justifies the statement of "fat, fertile and forty" .

Results of the anthropometric measurements of the patients revealed that the mean weight of the patients was 7+12.5 kgs and the mean MUAC of the patients was 25.1:1.1 cm and the mean BMI was 21.6+3.6 (kg/m). No association between obesity and risk of gallstones was found in the present study. Specific information of the subjects: Information regarding the parity in females revealed that majority of the female patients were multiparous i.e. 63.3% and only 2 subjects were nullipara. The mean consumption of ghee during each pregnancy by the female patients was +5.5 kg. In the present study no association was found between the use of oral contraceptives and the risk of gall stones Association with other diseases:

PARITY WISE DISTRIBUTION OF THE SUBJECTS

S.No.	Parity	No. of Subjects	Percentage
1.	Nullipara	2	6.7
2.	1	1	3.3
3.	2	8	26.7
4.	>3	19	63.3
	TOTAL	30	100

Table 2

There is a significant positive correlation of gall stone disease with other diseases. In the present study association of gall stone disease with other diseases was also studied, and the results revealed that the most common diseases among patients were diabetes mellitus, hypertension, cardiovascular disease and G.I.T disorders. But 63.3% of the patients had no other disease except for gall stone disease.

LIPID PROFILE OF THE PATIENT

S.No.	Component of Lipid Profile (mg/dl)	Mean	S.D.
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Table 3

Nutrient intake, dietary habits of the subjects: In the present study out of the total subjects included in the study 50% were vegetarians and only 33.3% of the subjects were non-vegetarians. The type of oil used by the patients was also studied and the results revealed that 40% were using groundnut oil, 33.3% were using mustard oil, and others were using tili oil. Information regarding the mean nutrient intake of the subjects revealed that the energy intake of the subjects was low as compared with RDA, the total fat intake of the patients was high as compared to the RDA. The intake of other nutrients was normal when compared with the RDA. The average food intake of

the food stuffs by the patients was normal as compared to the RDA, but the intake of cereals and pulses was less as compared to recommended amounts. The total fat intake was more as compared to the recommended amounts.

DISTRIBUTION OF SUBJECTS ACCORDING TO THE TYPE OF OIL CONSUMED (n=30)

S.No.	Type of Oil	No. of Subjects	Percentage
1.	Groundnut Oil	12	40
2.	Mustard Oil	10	33.3
3.	Tili Oil	8	26.7
	TOTAL	30	100

Table 4

High intake of fat (saturated and unsaturated) has a significant role in cholelithiasis. Lipid profile of the subjects: In the present study no significant difference was found between the lipid profile of the subjects and the normal range of lipid profile. All the components of the lipid profile viz., serum cholesterol, serum HDL cholesterol, serum triglycerides, LDL cholesterol and VLDL cholesterol, only the patient showed a slight variation when compared with the normal range.

The triglyceride values of the values were To conclude, the study highlighted the various etiological factors responsible for gall stone discuses in females. The study intended to provide information re garding the lipid changes which occur due to gall stones disease. But, more information is needed for the prevention of development of gall stone disease in females, which needs further research on the same topic.

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