



## ROLE OF BMI, PHYSICAL ACTIVITY AND DIET IN CHOLELITHIASIS – CLINICAL STUDY.

**Dr. Nadeem Rashid\***

Senior Resident, Department of Surgery, GMC Anantnag. \*Corresponding Author

**Dr. Manzoor Parrey**

Senior Resident, Department of Surgery, GMC Anantnag.

### ABSTRACT

The purpose of this study was to find the association between body mass index, physical activity and diet with respect to the risk of cholelithiasis. We performed a case control study which included 200 subjects both men and women. These were enrolled for the purpose of this study during the routine health check up in GMCH, Anantnag. These were divided into two groups. Group 1 consisted of 100 diagnosed cases of gall stones and Group 2 consisted of 100 age and sex matched healthy controls. For each subject an abdominal ultrasound screening was performed in order to detect cholelithiasis. In addition to this anthropometric measurements like height and weight were taken and body mass index was calculated by standard methods. The study included adult subjects with age between 20 and 70 years. The results show an increased prevalence of obesity in the group of patients with gall stone disease. Comparing the results on feminine and masculine groups we observed that obesity was present more in females than males though many male subjects also had obesity and features of metabolic syndrome. The results lead to the conclusion that obesity is a major risk factor for gall stone disease in both sexes, especially the females. Obesity is a risk factor which can be controlled by diet and lifestyle changes. In order to prevent the appearance of gallbladder gallstones it is very important to control obesity by an active way of life and a balanced nutrition and to keep a check on the blood lipid levels.

**KEYWORDS :** Obesity, cholelithiasis, anthropometric measurements.

### INTRODUCTION

Biliary lithiasis has become an important socio-economical issue because of its continuous increasing prevalence.<sup>1</sup> The connection between obesity and biliary lithiasis is highly questionable. Various studies suggest increased frequency of biliary stones in obese persons.<sup>(11-41)</sup> There are complex biochemical mechanisms that lead to an increased synthesis of cholesterol.<sup>(5)</sup> Bile is the only exit source for cholesterol in our body and its stasis leads to a high saturation of cholesterol in bile.<sup>(6-8)</sup> The activity of HMG CoA-reductase increases in hyperinsulinemia as well as increased food intake.<sup>(9,10)</sup> Metabolic syndrome is defined as a cluster of multiple cardiovascular factors including central obesity, elevated plasma glucose, high blood pressure, lower HDL and higher triglyceride levels. Many studies have showed that metabolic syndrome is associated with various diseases like diabetes mellitus, cardiovascular diseases, hypertension and also gall stone diseases.<sup>11</sup> In this study we tried to find the connection between obesity, metabolic syndrome and cholelithiasis by evaluating the patients through clinical history, demographic data, nutritional history and also by abdominal ultrasound screening upon a significant number of cases and controls.

### MATERIALS AND METHODS:

We performed a case control study which included 200 subjects both men and women. These were enrolled for the purpose of this study during the routine health check up in GMCH, Anantnag. These were divided into two groups. Group 1 consisted of 100 diagnosed cases of gall stone disease and Group 2 consisted of 100 healthy controls age and sex and socioeconomic status matched. For each subject an abdominal ultrasound screening was performed in order to detect presence of cholelithiasis.

#### Questionnaire Form:

Each subject was asked to complete a standard questionnaire about the demographic parameters, weight, height, waist circumference, age, gender, nutritional history etc. In addition to this anthropometric measurements like height and weight were taken and body mass index was calculated by standard methods. We determined the prevalence of obesity in the group with cholelithiasis. The study included adult subjects with age between 20 and 70 years. The subjects were considered as obese if BMI was > 30 (BMI = Weight (kg)/height (metres)<sup>2</sup>).<sup>(6,10)</sup>

History about dietary intake, sugar and carbohydrate, oil consumption, green tea usage in both males and females was taken. Oral contraceptive use in female was also asked through questionnaire form. Blood pressure was recorded in all subjects and noted.

### RESULTS:

**Table 1: Demographic, Diagnostic And Clinical Parameters Of The Study Participants.**

Variables	Cases N=100 (Mean ± SD)	Controls N=100 (Mean ± SD)	p value
Age (years)	44.73 ± 10.93	39.13 ± 5.26	0
Weight (kgs)	75.1 ± 1.5	70.1 ± 0	<0.0001
Height (cm)	166.8 ± 0	166.7 ± 9	<0.231
BMI (Kg/m <sup>2</sup> )	27.4 ± 3.0	24.2 ± 3.5	<0.0001
Fasting blood sugar (mmol/l)	6.4 ± 1.4	5.9 ± 1.01	<0.0001
Blood pressure Systolic	124.7 ± 14.0	118 ± 14.5	<0.0001
Blood pressure Diastolic:	76 ± 9.8	72 ± 10.4	<0.0001
Lipid profile (TGS)	201.1 ± 184	182.7 ± 184.8	0.0069
Lipid profile (HDL)	43.4 ± 10.2	47 ± 10.58	0.0004
Lipid profile (Total cholesterol)	210 ± 36.8	176 ± 45.2	<0.001
Waist hip ratio:	0.85 ± 10.07	0.83 ± 0.06	0.512

The results show an increased prevalence of cholelithiasis in the group of patients with obesity. Comparing the results on feminine and masculine groups we observed that obesity was present more in females than males though many male subjects also had obesity and features of metabolic syndrome. The results lead to the conclusion that obesity is a major risk factor for gall stone disease in both sexes. There was more number of overweight and obesity cases in the study group in comparison to the control group for both male and female groups. Thus, it may be inferred from above results that people with more weight are more prone to the risk of cholelithiasis. There were significantly higher levels of triglycerides and total cholesterol in Group 1 as compared to Group 2. BMI was also high in Group 1. HDL cholesterol levels were significantly lower in Group 1. Blood pressure and fasting sugar levels were also higher in patients of cholelithiasis when compared to the control group. These results are suggestive of higher risk of gall stone disease

patients to development of features of metabolic syndrome.

After analyzing the nutritive value of the food intake of the study participants it was found that patients consumed significantly more carbohydrate, fat, sugar, sodium as compared to the control subjects. However, the gallstone patients consumed significantly less dietary fibre, potassium and vitamin C as compared to controls.

## DISCUSSION

Obesity is a risk factor which can be controlled. In order to prevent the appearance of gallbladder gallstones it is very important to control obesity by an active way of life and a balanced diet and healthy lifestyle. According to numerous studies Met S has a close association with development of cholelithiasis. Obesity is one of the major risk factors for development of Met S and eventually cholelithiasis. A lot of studies place obesity as one of the top risk factors for biliary lithiasis.<sup>[12-20]</sup> There is over production of cholesterol and also super saturation of cholesterol in bile which makes suitable conditions that lead to the development of biliary stones.<sup>[6, 7]</sup> The results obtained in our study confirm data from literature which consider obesity an important risk factor for biliary lithiasis and eventual development of metabolic syndrome.

## CONCLUSION

Gall stone disease appears to be strongly associated with obesity as well as with other features of metabolic syndrome. Obesity is a major lithogen factor for both males and females. Prevention is possible by maintaining a healthy weight and taking healthy diet.

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