

Association of Dieting, Physical Activity and Lipid Profile with Cholelithiasis in Young Women

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ABSTRACT

Introduction: Cholelithiasis is becoming very prevalent in the society. A dramatic change is seen in the presentation of the diseases due to change in dietary habits and physical inactivity due to use of social media. Young females (20- 40 years) are increasingly being affected by gallstones due to craving for fast food on one hand and strong desire to be smart on the other hand. **Objectives:** This study aimed at identification of modifiable risk factors like dieting/weight loss and physical activity in young females suffering from gallstone disease and to define the role of serum HDL and LDL in the causation of cholelithiasis. **Study Design:** Cross-sectional Study. **Settings:** Surgical unit I of Allied Hospital, Faisalabad Medical University (FMU), Faisalabad. **Duration:** 20-6-2017 to 20-10-2017. **Methodology:** A total of 80 participants were included in the study; 50 patients of gallstones and 30 controls having same age (20-40 years). A literature-based questionnaire regarding nature of dieting and physical activity was used to collect the data. Serum HDL was assayed by kit method using automated analyzer and serum LDL was calculated using Friedl Wald' Equation. Abdominal ultrasonography for both patients and controls were performed. Statistical analysis was done on the obtained data using SPSS version 17. **Results:** A p value less than 0.05 was considered as significant. Out of 80 participants, 6(12%) patients and 4(13.3%) controls gave history of dieting. While the remaining 44(88%) patients and 26(86.7%) controls had no previous history of dieting. Only 7(14%) patients and 3(10%) controls had history of physical activity whereas 43(86%) patients and 27(90%) controls gave history of sedentary lifestyle. Raised LDL was found in 27(54%) patients and 8(26.7%) controls. Normal level was seen in 23(46%) patients and 22(73.3%) controls. Decreased HDL was observed in 45(90%) patients and 25(83.3%) controls. Normal HDL was found in 5(10%) patients and 5(16.7%) controls. **Conclusion:** No association was found with dieting and physical inactivity. There is strong correlation of the disease with raised LDL. Also, no correlation was found with decreased HDL.

Keywords: Cholelithiasis, Dieting, Physical activity, Dyslipidemia.

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INTRODUCTION

Cholelithiasis is a disease which is becoming quite prevalent in the world. It is very costly to treat.¹ This disease is traditionally known to be the disease of fatty, fertile, fair, females of forty (years). Recent years have seen a dramatic change in the population afflicted by this disease along with its presentation. Now cholelithiasis is not only the disease of a specific group but it is seen in both male and female population of fair and dark races. The incidence of cholesterol gallstones has been found to be increasing in China due to changing lifestyles in the past few decades.² Younger women are increasingly being affected due to change in dietary habits and sedentary lifestyle.³

The occurrence of GD (Gallstone disease) changes widely region wise. The prevalence of gallstone disease in Western countries ranges from 7.9 percent in men to 16.6 percent in women. It ranges from almost 3 percent to 15 percent in Asians, is non-existent (less than 5 percent) in Africans, and approximately 4.21percent to 11percent in China.⁴ In Pakistan, especially Southern Sindh, the overall incidence for cholelithiasis is 9.03 percent, with 3.3 times more propensity for females to develop gallstones in comparison to males.⁵ The different types of stones are cholesterol, black pigment, brown

pigment and carbonate stones.⁶ Several genetic and environmental factors are involved in the causation of the disease. The stasis of bile and mucus hyper secretion are the recognized factors in causation of cholesterol stones.^{7,8}

The female sex, daily physical activity, advancing age and marital status are important factors in disease progression.⁹ A well-established risk factor for gallstone formation is abdominal obesity.¹⁰ Comparison of various patients of gallstones with healthy persons without disease shows that some factors cannot be modified such as ethnicity, genetics, female gender and advancing age whereas some are modifiable e.g., physical activity, diet, obesity and rapid weight loss.¹¹ People or patients who went through bariatric surgery or have low caloric diets associated with rapid loss of weight are found to have gallstones.^{12,15} Inactive life style, abdominal adiposity and elevated intake of saturated fats increase the risk of formation of gallstone while physical activity inhibits the disease. Increased exercise (up to 30 minutes five times per week) is important to prevent symptomatic disease development in males.^{13,14} A strong association of the disease was found with female gender, family history, illiteracy, low socioeconomic status, advanced age, underlying disease, multipara women, women taking oral contraceptive pills,

smoking, high body mass index (BMI), rapid weight loss, dyslipidemia, dietary factors, intake of low fiber, diabetes, hypertension, soft drink & tea consumption, and less physical activity.^{9,15-19,24} Healthier choices of lifestyle (e.g. sleep patterns, diet and exercise) among females with higher intake of vegetable protein are also protective from gallstones.^{17,18}

The modifiable dietary factors of gallstone disease like obesity, overweight, insulin resistance, dyslipidemia, and changed cholesterol homeostasis have been associated with increased gallstone occurrence as pointed in previous studies. The effect of some confusing factors like physical activity could not be ruled out.²⁰ An overnight or prolonged fasting, weight loss due to dieting and intake of low fiber diet have independent role in the causation of gallstones.²¹

Obesity is a very strong risk factor in the pathogenesis of gallstones especially in females. In the initial months of weight loss, starting with low caloric diet, this risk is increased. Obese females having high body mass index and the one who tend to lose weight very rapidly are at greatest risk for developing gallstones. To prevent formation of gallstones during dieting ursodeoxycholic acid can be used.²²

Young women are becoming self-conscious regarding their body image. There is a misconception in the society generated by social media that looking thin makes a person happy, beautiful and energetic. Truly speaking in real life, successful and happy people are seen in all shapes and sizes. Regarding dieting, what important is to select a healthy and good food choices like fibers, fruits & vegetables and reduce eating junk food or skipping meals or omitting a variety of healthy food. Health is more important than looks. Dieting should always be planned and started after consulting doctors or dieticians.²³

Quick weight loss (greater than three pounds per week) is associated with increased chance of gall stone formation. Breakdown of triacylglycerol into glycerol & fatty acids occurs. Glycerol is utilized in glycolysis. Fatty acid breakdown leads to formation of acetyl co A and then cholesterol. This may be precipitated in bile forming stones. Experts therefore recommend slow weight loss of half to two pounds per week to avoid gallstone formation. To achieve a healthy lifestyle and to prevent gallstone formation, 60 to 90 minutes per day regular physical or aerobic activity is required.²⁴

Dieting and physical inactivity have resulted in a large number of young female population affected by gallstones. Result is increase in prevalence of cholelithiasis and ultimately operative surgery (cholecystectomy). In our society, the operative surgery is still a stigma regarding the marriages of young girls. Post-operative complications, subsequent risk of depressive disorders especially in females and mortality rate after surgery are still very high.^{3,25,26} High TG and low HDL levels are strongly associated with cholelithiasis whereas total cholesterol and LDL have less association.^{24,27,28} Another study shows positive association of high cholesterol, high LDL and low HDL with cholesterol gallstones.²⁹

METHODOLOGY

Study Design: This was a Cross Sectional Study.

Settings: Surgical Unit I of Allied Hospital, Faisalabad Medical University, Faisalabad-Pakistan.

Duration: June to November 2017.

Methods: Total number of participants was 80. Young females of 20-45 years were selected having same socioeconomic status. 50 patients of cholelithiasis were taken. Diagnosis was confirmed by ultrasound abdomen. 30 females having no stones were selected after ultrasound to rule out presence of silent gallstones. The study was started after permission of ethical review board of the institution (UMDC Faisalabad). Participants were made sure regarding confidentiality of their personal information. Informed consent was then taken. Data was collected by a senior trained post graduate resident using a questionnaire. The questionnaire was designed from literature review. Question regarding dieting (skipping meals or following any weight loss regime or taking only fiber diet in the form of fruits and vegetables) and physical activity (routine household activity, regular walk or any aerobic activity) were inquired. Serum HDL was assayed by enzymatic colorimetric method with end point selective accelerator detergent.³³ An automated analyzer of company named Elitech Merck was used. Serum cholesterol (Thomas, L. 2012) & triglyceride (Schettler, G. and Nussel, E. 1975) were assayed by liquicolor kit of Human Company using automated analyzer. Serum LDL-cholesterol was estimated by Fried Wald's Equation from the quantitative measurements of plasma triglycerides (TG) and total and HDL-cholesterol.

$[LDL\text{-cholesterol}] = [Total\ cholesterol] - [HDL\text{-cholesterol}] - [Triglycerides]/5$ where all values were in mg/dL.

Data was then analyzed using chi square test and SPSS version 17 was used for statistical analysis. Results were considered significant or non-significant on the basis of p value (A p value less than 0.05 was considered as significant).

RESULTS

A total of eighty females having 20-45 years of age were included in this study of four months period.

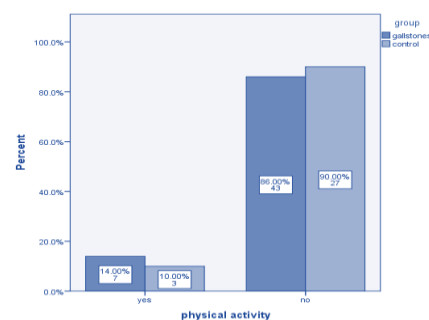


Figure 1: Analysis of physical activity with gallstones using chi square test

Results are; Chi-square value = 0.274, p-value = 0.6

Biochemical parameter of this study was estimation of lipid profile values including serum cholesterol, serum triglycerides, HDL cholesterol and LDL cholesterol.

Lipid profile values were considered according to National Cholesterol Education Program (NCEP) values.

Desirable value of HDL cholesterol was 60mg/dL. Borderline was considered between 35-45mg/dL and a value less than 35mg/dL were taken as high risk.

Desirable value of LDL cholesterol was 60-130mg/dl. Borderline was considered between 130-159 mg/dL and a value 160-189mg/dL was taken as high risk.

Table 1: Analysis of dieting or weight loss with gallstones using chi square test

Dieting	Group		Total
	Gallstones	Control	
Yes	6 (12.0%)	4 (13.3%)	10 (12.5%)
No	44 (88.0%)	26 (86.7%)	70 (87.5%)
Total	50	30	80

Chi-square value = 0.03, p-value = 0.861

Table 2: Descriptive statistics of values of Lipid profile

Variables	n	Minimum Value	Maximum Value	$\bar{x} \pm SD$
LDL	80	18.0	168.0	94.580±27.1973
HDL	80	30	74	41.39±6.532

Table 3: Analysis of association of serum LDL with gallstones using chi square test

Raised LDL	Group		Total
	Gallstones	Control	
Yes	27 (54.0%)	8 (26.7%)	35 (43.8%)
No	23 (46.0%)	22 (73.3%)	45 (56.2%)
Total	50	30	80

Chi-square value = 5.692, p-value = 0.017

Increased LDL level includes borderline.

Table 4: Analysis of association of serum HDL with gallstones using chi square test

Decreased HDL	Group		Total
	Gallstones	Control	
Yes	45 (90.0%)	25 (83.3%)	70 (87.5%)
No	5 (10.0%)	5 (16.7%)	10 (12.5%)
Total	50	30	80

Chi-square value = 0.762, p-value = 0.383

Decreased HDL level includes borderline.

DISCUSSION

Data of table no. 1 shows that out of 80 participants, 6(12%) patients and 4(13.3%) controls gave history of dieting. While the remaining 44(88%) patients and 26(86.7%) controls had no previous history of dieting. Six patients gave history of dieting on irregular basis (skipping one meal daily and consumption of fruits and vegetables mostly). This study shows insignificant association of disease with previous dieting. This is contrary to previous studies by Sichieri 1991, Al- Jiffry et al, 2003, Laura et al, 2012, Naeem et al, 2012, Harish, 2014, Bilal et al, 2017 which suggests that history of recent dieting or rapid weight loss is strongly associated with gallstone formation. ^{21,12,11,15,16,9}

Only 7(14%) patients and 3(10%) controls as shown in fig. 1 gave history of regular physical exercise whereas 43(86%) patients and 27(90%) controls gave history of sedentary

lifestyle. This study shows that physical inactivity is not associated with gallstones as p value is not significant. The previous studies showed a strong association of the disease with physical inactivity (Banim et al, 2010,¹³ Sachedeva et al, 2011,¹⁴ Laura et al, 2012,¹¹ Hayat 2013,³ Harish, 2014,¹⁶ Ansari-Moghaddam et al, 2016,¹⁷ Lander et al, 2016,¹⁸ Bilal et al, 2017.⁹ One study by Ciaula et al, 2017 showed that effects of physical activity are confusing. But in high risk patients having hypercholesterolemia this should be particularly kept in mind.²⁰ In table no. 3 the data showed that raised LDL was found in 27(54%) patients and 8(26.7%) controls. Normal level was seen in 23(46%) patients and 22(73.3%) controls. Raised LDL is strongly associated with gallstone disease. This finding is supported by previous study by Atamanalp, 2013.²⁹

Table no. 4 shows that decreased HDL was observed in 45(90%) patients and 25(83.3%) controls. Normal HDL was found in 5(10%) patients and 5(16.7%) controls. Decreased HDL level is not associated with the disease. This is contrary to finding in previous studies (Ahlberg 1997, Shrestha et al 2012, Laura et al 2012, Atamanalp, 2013 and Harish 2014). ^{27, 28, 11, 29, 16}

CONCLUSION


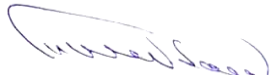



This study shows that there is no direct association of cholelithiasis with physical activity and dieting or weight loss. Decreased HDL has also no correlation with the disease but there is strong correlation of the disease with raised LDL. Young women can be educated on the basis of this study to improve their daily physical activity and increase consumption of fiber in the form of fruits and vegetables along with reduction in intake of cholesterol in the form of junk food like burgers, pizzas and fried food etc. In future, this study should be conducted in young girls of universities to find association of the disease with dieting, reduced physical activity and unhealthy lifestyle due to excessive use of social media. BMI measurement should be done to assess obesity. If these modifiable factors causing gallstones are taken into consideration, the chances of cholelithiasis in young girls can be reduced and thus operative surgery as well.

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