

# Original Article: Determination of Risk Factors for Cholelithiasis in Patients with Morbid Obesity

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## ABSTRACT

**Introduction:** The importance of examining the factors associated with cholelithiasis is to prevent the formation of gallstones in people as much as possible so that they do not need reoperation for cholecystectomy or, if necessary, remove the gallbladder during obesity surgery and impose the reoperation risk on the patient. Therefore, the present study investigates the risk factors, precursors of gallstones, and the need for prophylactic cholecystectomy during bariatric surgery.

**Materials and Methods:** In this cross-sectional descriptive study, 150 patients who were candidates for cholecystectomy with a body mass index greater than 35 were evaluated. Cholelithiasis was evaluated based on the severity of obesity in patients.

**Results:** Out of 23 people who had a history of gallstones and gallbladder surgery due to stones in the past, 19 (82.6%) had a history of weight loss and 4 (17.4%) had no history of weight loss. There was no significant relationship between the history of weight loss and gallstones in candidates for obesity surgery. In addition, no significant relationship was observed between the rate of weight loss in the past and the number of attempts to lose weight and gallstones in candidates for obesity surgery.

**Conclusion:** In general, in the present study, the only factor associated with cholelithiasis in the subjects was *H. pylori*. In fact, people with obesity who are infected with the bacterium *H. pylori* are positive, they are more prone to cholelithiasis than others.

## Introduction

Due to the obesity prevalence, one third of population suffers from this problem, its growth of 0.4% per year, its adverse effect on physical and

mental health as well as the costs imposed on society, the need for obesity treatment (defined by  $BMI \geq 30 \text{ kg/m}^2$ ), especially morbid obesity (defined by  $BMI \geq 35 \text{ kg/m}^2$ ) is quite obvious. Obesity has various complications. Among other things, obesity increases the risk of cholelithiasis

and progression by the mechanism of cholesterol concentration and increased bile stasis [1,2].

Nowadays, along with diet and physical activity, and also emphasis on lifestyle modification as the first line in solving the problem of obesity and medical treatments along with it to control weight, metabolic syndrome, and insulin resistance as problems accompanying the problem of obesity, surgical methods (Bariatric Surgery) is used to treat morbid obesity. One of the bariatric indications for surgery is morbid obesity and surgery is effective in improving the disabilities and complications of obesity [3,4].

As mentioned earlier, morbid obesity is a known risk factor for gallstones, so that the incidence of cholelithiasis in patients with morbid obesity is 3 to 5 times higher than other people [5]. On the other hand, rapid weight loss after bariatric surgery, which is considered as a treatment for morbid obesity, can cause gallstones after surgery. Due to the fact that one of the indications for open cholecystectomy is asymptomatic gallstones in unrelated abdominal surgery candidates, some authors believe that cholecystectomy should be performed prophylactically at the same time as bariatric surgery [6].

Although surgery is a quick and effective way to improve the condition of patients with cholelithiasis, the risk of anesthesia and complications during and after surgery is an integral part of this treatment. The importance of examining the factors associated with cholelithiasis is to prevent the formation of gallstones in people as much as possible so that they do not need reoperation for cholecystectomy or, if necessary, remove the gallbladder during obesity surgery and impose the reoperation risk on the patient. Be prevented in the future. Therefore, the present study investigates the risk factors and precursors of gallstones and the need for prophylactic cholecystectomy during bariatric surgery.

### Materials and Methods

In this cross-sectional study, the information of all patients with morbid obesity who were admitted to the thoracic surgery ward of Imam

Reza Hospital from the beginning of 2015 to the end of 2017 and underwent surgery were examined. The number of these patients was 150 and their information was extracted from their files.

Patients were divided into two groups based on cholelithiasis disease (based on diagnostic ultrasound performed before surgery) with and without gallstones. The variables extracted from the files included age, sex, marital status, menopausal status, duration, obesity time (35BMI>), history of successful weight loss without surgery (less than 5 kg - between 5 kg to 10 kg - more than 10 kg), frequency of weight loss in the past, eating habits (small eater [1] - bulk eater [2] - sweet eating [3] - licorice fluid), hypothyroidism, history of past obesity surgery, number of deliveries, distance from last delivery, fatty liver disease and its degree (grade I, II, and III), OCP use, history of weight loss medication, blood lipid-lowering drug, family history of gallstones, body mass index, systolic and diastolic blood pressure, fasting blood sugar and insulin and vitamin D and zinc levels, TG, HDL, LDL, VLDL, ALT, AST, ALP, and status HBs Ag and anti-HCV Ab and H. pylori infection (using diagnostic respiratory test) were compared between both groups. Finally, information of all patients was entered into SPSS software and data analysis was performed.

The characteristics of subjects were presented by descriptive statistical methods including central indices, dispersion, and frequency distribution. Independent t-test was used to compare quantitative variables in both groups (patients with morbid obesity with gallstones and no stones) with normal distribution of data and Mann-Whitney test without normal distribution. Chi-square test and Fisher test were used to compare qualitative variables in both groups. Finally, variables that were statistically different between both groups were included in the logistic regression model. In all calculations, the value of ( $p < 0.05$ ) has a significant level.

This study was carried out with the approval of Ethics Committee of Tabriz University of Medical Sciences and obtaining informed consent from all participants.

## Results

In this study, 150 patients with a mean age of about 37.5 and 10.79 years old were studied. 119 patients (79.3%) were female and 31 (20.7%) were male. Out of 150 samples, 127 (84.7%) had no history of gallstones; 10 cases (6.7%) had undergone gallbladder surgery in the past and 13 cases (8.7%) had gallstones during obesity surgery. Among 127 cases without the history of gallstones, 27 were male (21.3%) and 100 were female (78.7%), and also out of a total of 23 patients were with a history of gallstones and gallbladder surgery due to stones, 4 were male (17.4%) and 19 were female (82.6%). No significant relationship was observed between gender and the presence of gallstones in candidates for obesity surgery.

Among the patients included in the study, 133 cases (88.7%) had a history of past weight loss and 17 cases (11.3%) did not report the previous weight loss. Among 127 cases without the history of gallstones, 114 (89.8%) had a history of weight loss in the past and 13 (10.2%) had no history of weight loss and had gallbladder surgery due to stones in the past, 19 patients (82.6%) had a history of weight loss and 4 patients (17.4%) had no history of weight loss. There was no significant relationship between the history of weight loss and gallstones in candidates for obesity surgery. Likewise, no significant relationship was observed between the rate of weight loss in the past and the number of attempts to lose weight and gallstones in candidates for obesity surgery.

Among 127 cases without the history of gallstones, 12 (9.4%) had a history of obesity surgery and 115 (90.6%) had not undergone obesity surgery in the past, and also out of a total of 23 patients with a history of gallstones Bile and gallbladder surgery due to stones in the past, 3 patients (13%) had a history of obesity surgery and 20 patients (87%) had no history of obesity surgery. There was no significant relationship between past obesity surgery and gallstones in candidates for obesity surgery.

Among 127 patients who did not have a history of gallstones, 91 (71.7%) were large eaters, 87 (68.5%) were small eaters, 82 (64.6%) were

sweet eaters, and 60 (47.2%) were sweet-eating liquids, and also out of 23 people who had a history of gallstones and gallbladder surgery due to stones in the past, 17 (73.9%) were bulky, 14 (60.9%) or 15 people (65.2%) were sweet eaters, and 10 people (43.5%) were sweet drinkers. There was no significant relationship between bulky diet, small meal, sweet food, and sweet liquid with gallstones in candidates for obesity surgery.

Among 127 patients who had no history of gallstones, 59 (46.5%) were positive for *H. pylori* and out of 23 patients with a history of gallstones and gallbladder surgery due to stones in the past, 17 (73.9%) were positive for *H. pylori*. There was a significant relationship between the presence of *H. pylori* bacteria and gallstones in candidates for obesity surgery ( $p < 0.05$ ). In the present study, between marital status, body mass index, duration of obesity, menopause, systolic and diastolic blood pressure, hypothyroidism, fatty liver and its grade, fasting blood sugar level, insulin level, vitamin D and zinc levels, fat profile, levels of liver enzymes, family history of cholelithiasis, OCP use, history of lipid-lowering and weight-loss drugs, as well as being positive for HBs antigen, HCV antibody, and the presence of gallstones in candidates for obesity surgery no significant relevance was observed.

## Discussion

In various studies, infection has been proposed as one of the mechanisms, factors cholelithiasis, and other diseases of the gallbladder and bile ducts. *Escherichia coli* is one of the pathogens most associated with gallstones. Studies have also shown the role of helicobacter pylori (found in gallbladder tissue) in the development of cholesterol gallstones and other gallstones. In the present study, patients with gallstones were significantly more likely than other patients with helicobacter pylori infection [3]. However, in this study, the presence of helicobacter pylori was investigated in the stomach [7].

In several studies performed on cholelithiasis 8 and 10 years after obesity surgery, it was concluded that female sex and rapidly induced weight loss with surgery were major risk factors

for cholelithiasis after surgery [8]. In other studies, however, weight loss due to a very low-calorie diet encounters a person at risk for gallstones. Despite this evidence, in this study, no significant relationship was found between gender, weight loss, and diet with gallstones [9].

According to studies, an increase in BMI is a causative factor for symptomatic gallstones, which is more likely in females. The gallstones incidence is further associated with age, obesity, abdominal obesity, and hyperinsulinemia in postmenopausal women, and insulin resistance may be associated with gallstones formation in postmenopausal women with abdominal obesity [6,10].

Because in the present study, there was a closer relationship between weight loss and its extent, degree of fatty liver, hypothyroidism, OCP intake, insulin, and LDL levels than other variables, the number of samples may not have been sufficient to examine the relationship between these variables. Therefore, it is recommended to perform similar tests with more samples to determine possible relationship between the above variables and cholelithiasis. Among the variables age, sex, marital status, duration of obesity, fatty liver status, history of past obesity surgery, family history gallstones, weight loss drugs, systolic and diastolic blood pressure, BMI, FBS, vitamin D and zinc levels, TG, VLDL, HDL, cholesterol, ALT, AST, and cholelithiasis in the present study, there is no close relationship and accordingly there is a correlation between similar studies. Thus, more studies can be done in this regard. There is no correlation between variables such as menopausal status, taking lipid-lowering drugs, hepatitis B and C, and cholelithiasis in our study, although in similar studies, items of communication have been identified [11,12].

### Conclusion

In general, in the present study, the only factor associated with gallstone formation in the subjects was *H. pylori*. In fact, people with obesity who are infected with the bacterium *H. pylori* are positive, they are more prone to gallstones than others. However, due to the fact that the present study is cross-sectional and

cannot confirm the causal relationship, based on the results of the present study, helicobacter pylori infection cannot be used as evidence for cholecystectomy during bariatric surgery. However, as one of the treatable risk factors for gallstone formation, drug therapy can be performed for people with pre-obesity surgery to reduce the possibility of gallstone formation in these people.

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