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Analysis of Common Risk Factors for Gallbladder Disease, in AL-Kut City

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ABSTRACT— It has been demonstrated that the most common risk factors for gallstones formations are fatty diet, carbohydrate diet, age, female gender, obesity and rapid weight change. However, information regarding prevalence and significant risk factors of the mentioned disease still restricted in AL-Kut city. Determine main risk factors in patients with gallstones among AL-Kut city population, Wasit, Iraq. Sample population of present study consists of two groups; control (n=100), and individuals diagnosed with gallstones (n=100). Notably, people in both groups were selected from Al-Karama teaching hospital in AL-Kut city following consent signing up in order to participate in this study via filling the questionnaire. Data was analyzed by using SPSS version 26. Each group had a total of 100 individuals. Percentages of females were 46% and 71% in control and case groups respectively. We also found that 47% and 49% of females in both groups (control and case respectively) have had previous pregnancy. Moreover, percentage of smoker individuals was 35% in control, while it was only 12 in case groups. In our study population, both groups had similar BMIs, with 59 % of the control group and 62 % of the cases group having a BMI of greater than 24 kg/m2. In the category "rapid weight change," there was a significant difference between the two groups: 23 percent of the controls had a weight change, either gain or loss, whereas 51% of the cases had a rapid weight change. The control group consumed fat (3%) and carbohydrate (12%) less than the cases group when it came to the type of diet they chose to eat (31%, 26% percent respectively). The control group consumed a mixed diet (68%) more than the cases group (27%). After using multivariate regression analysis, age between 20-45 years (OR - 2.726, p value- 0.001), female gender (OR - 2.874, p value - 0.000) and rapid weight change (OR - 3.484, p value - 0.000), previous pregnancy (OR -1.909, p value -0.021), fatty diet (OR-14.527, p value 0.000), carbohydrate diet (OR-2.577, p value 0.011) were found to be independent risk factors for development of gallstones. The main risk factors for gallstones are female gender, previous pregnancy, age ranging from 20-45 years, rapid weight change and diet rich in fat and carbohydrate.

KEYWORDS: Gallstones, risk factors, fatty diet and obesity.

1. INTRODUCTION

Gallstones are the most frequent biliary system illness that does not result in death. It has been shown that it causes pain in the right upper quadrant, as well as nausea, vomiting, postprandial fullness, and discomfort in the right upper quadrant. Moreover, it, can have a significant impact on one's quality of life. Gallstones affect ten percent to fifteen percent of individuals in affluent nations [1]. Each year, 20-25 million new gallstone patients are identified in the United States, with medical expenses for gallstone disease prevention and treatment totaling about $62 billion [2]. Gallstone disease is frequently seen as a serious health problem in today's culture [3]. Furthermore, it has been known to humans for a long time, as they were discovered in the gallbladders of Egyptian mummies going back to 1000 BC [4]. Despite regional differences in gallstone

frequency, this illness is a global medical concern [5- 11]. It becomes more frequent; they affect people of all ages, but their prevalence rises with age [12]. With roughly a fifth of women over 60 developing them [13]. At the majority of the time, the gallstones do not produce symptoms, with just 10% and 20% becoming symptomatic after 5 and 20 years of diagnosis [14], [15] As a result, the average chance of getting symptoms is minimal, hovering at 2.02 percent per year [15]. It has been revealed that gallstones are split into two categories: cholesterol and pigment stones. In Europeans and Americans, cholesterol stones account for 80 to 90 percent of gallstones, and cholesterol crystals precipitating from oversaturated bile indicate a high amount of cholesterol production by the liver [16]. Pigment stones, which form calcium bilirubinate and polymerized bilirubin are usually related to hemolysis, bacterial infection, or liver disease, and they can be divided into high-residue, low-residue, and mixed pigment stones [17- 19]. Despite the fact that some individuals have no symptoms, many others have acute cholecystitis or have gallstones stuck in the bile duct. More work might be done to avoid gallstone disease and its consequences if the variables linked with gallstone disease could be identified [20], [21]. Transcutaneous sonography should be used to demonstrate the presence or absence of cholelithiasis. Sonography is the technique of choice for gallbladder stones, with a sensitivity of >95 percent and a specificity of nearly 100 percent [22]. Elderly individuals should have laparoscopic cholecystectomy rather than open cholecystectomy to reduce the risk of morbidity and mortality associated with cholecystectomy [23]. Elective surgery is favored over emergency surgery because the perioperative risk is reduced [24]. In the same line of thought, there are numerous studies regarding gallstones risk factors around the world, but in Iraq we don't have many studies to cover this important subject in our society so we decide to perform this study to identify the main risk factors for gallstones in AL-Kut city, Wasit, Iraq.

2. Methods

A case -control study was conducted among patients with gallstones visited AL-karama Teaching Hospital in AL-Kut city, the center of Wasit province. Data were collected during period from March 2021 to August 2021.

Sample size: according to [25], the required sample size is based on the number of predictors as presented in equation.

$N \geq 104 + m$

m = number of independent variables which is 6 in this study.

In this study the number of sample is N = 200, more than the 110 Required [25].

Cases and control selection, current study covered all participants who had been diagnosed with gallstones. There were 100 patients in this cases group who were chosen as study subjects. In a 1:1 ratio, the controls were included. In terms of age and sex, the subjects in the control group were identical to the patients. Controls were recruited from among the relatives and companions of the patients (who did not have gallstones) who were at the hospital at the same time as the cases were being collected.

Inclusion criteria, as a cases group, patients with gallstones over the age of 18 who were in good enough physical and mental condition to provide valid answers to the questionnaire were included in the study.

-As a control group, healthy relatives over the age of 18 were included.

Exclusion criteria, Refusal to participate in the study.

Patients with critical illness.

Data collection, data of present study was gathered using a questionnaire created by the authors. The

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questionnaire includes demographic information (such as age, gender, weight, and height) as well as, risk factors for gallstones (e.g. family history, weight change, smoking and others). Other chronic diseases such as hypertension and diabetes mellitus were also discovered. Body mass index (BMI) was computed for both groups based on their weight and height, which then classified as underweight, normal, overweight, or obese according to the CDC definition. The presence and absence of gallstones were compared in both groups.

3. Results

Each group had a total of 100 people. 61 percent of the controls are between the ages of 20 and 45, while 81 percent of the cases are between the ages of 20 and 45. In the control group, 46% of women were female, compared to 71% in the cases group. In the control group, 47% of females already had a previous pregnancy, but in the cases group, 49% of females do have a previous pregnancy. In terms of smoking, 35% of the control group smoked, compared to only 12% of the cases group. In our study population, both groups had similar BMIs, with 59 percent of the control group and 62 percent of the cases group having a BMI of greater than 24 kg/m2. In the category "rapid weight change," there was a significant difference between the two groups: 23 percent of the controls had a weight change, either gain or loss, whereas 51% of the cases had a weight change. The control group consumed fat (3%) and carbohydrate (12%) less than the cases group when it came to the type of diet they chose to eat (31 percent , 26 percent respectively).The control group consumed a mixed diet (68%) more than the cases group (27%).Other recognized gallstone risk factors include familial history of gallstones, hypertension, diabetes mellitus, liver disease, hemolytic disease, and hyperlipidemia, although data was insufficient or the difference between the two groups was too small for these risk factors. Risk factor details of the two groups are given in table 1.

Table (1), Frequency and p value of common risk factors

		Control group n=100 (%)	**Cases group n=100 (%)**	**P value**
Age	20-45	61 (61%)	81 (81%)	0.002
	45-70	39 (39%)	19 (19%)	
Gender	female	46 (46%)	71 (71%)	0.000
	male	54 (54%)	29 (29%)	
Smoking	yes	35 (35%)	12 (12%)	0.000
	no	65 (65%)	88 (88%)	
Rapid weight change	yes	23 (23%)	51 (51%)	0.000
	no	77 (77%)	49 (49%)	
Family history of gallstones	yes	78 (78%)	62 (62%)	0.014
	no	22 (22%)	38 (38%)	
Previous pregnancy (for female)	yes	22 (22% form control group ,47% from female)	35 (35% from cases group ,49%from female)	0.042
	no	78 (78%)	65 (65%)	
Type of diet	High fat diet	3 (3%)	31 (31%)	0.000

commonly consumed	High carbohydrates diet	12 (12%)	26 (26%)	
	High fiber diet	17 (17%)	16 (16%)	
	Mix diet	68 (68%)	27 (27%)	
BMI	More than 24	59 (59%)	62 (62%)	1.000
	Less than 24	41 (41%)	38 (38%)	

BMI = body mass index. P value calculated using chi-square test.

After comparing both groups for risk factors for gallstones, difference between two groups were calculated using chi square test (table 1). Following initial comparison, age between 20-45 years, Female gender, previous pregnancy, rapid weight change, diet rich in fat and carbohydrate showed significant values. So, these variables were included in multivariate regression analysis. Odd ratio (OR), confidence interval (CI) and p values obtained after multivariate analysis are shown in table 2.

Table (2), Multivariate regression analysis showing risk factors for gallstones

	Beta	SE	Odds ratio (95%Cl)	P value	VIF
Age	0.193	0.072	2.726 (1.436-5.175)	0.001	1.200
Gender	0.096	0.074	2.874 (1.603-5.154)	0.000	1.492
Carbohydrate diet	0.246	0.079	2.577 (1.216-5.458)	0.011	1.066
Rapid weight change	0.151	0.066	3.484 (1.896-6.405)	0.000	1.137
Fatty diet	0.353	0.086	14.527 (4.269-49.432)	0.000	1.174
Previous pregnancy	0.166	0.084	1.909 (1.020-3.573)	0.021	1.612

Cl=confidence interval, SE= standard error, VIF= variance inflation factor

After using multivariate regression analysis, age between 20-45 years (OR - 2.726, p value- 0.001), female gender (OR - 2.874, p value - 0.000) and rapid weight change (OR - 3.484, p value - 0.000), previous pregnancy (OR -1.909, p value -0.021), fatty diet (OR-14.527, p value 0.000), carbohydrate diet (OR-2.577, p value 0.011) were found to be independent risk factors for development of gallstones. Variance inflation factor technique was used to determine if there is multicollinearity, in our study the VIF is less than 3 so there is no multicollinearity [25].

4. Statistical analysis

SPSS version 26 was used for data analysis. Age of the participants was divided into two groups, and frequency tables were utilized to compare risk factors for gallstones and other desired characteristics. Chi

square test was used to compare the features of two groups. Multivariate regression analysis was utilized to compute the odds ratio (OR), confidence interval (CI), and p values for factors that were statistically significant. Statistical significance was defined as a 95% confidence interval and a p value of less than 0.05.

5. Discussion

Previous study has demonstrated that gallstones disease is the most common biliary disease that affect the population and cause many symptoms such as nausea, vomiting, abdominal pain and others, gallstones disease can have a significant impact on one's quality of life [1]. Thus, identifying the most common risk factors for and trying to reduce them might to some extent mitigate the burden of this disease.

Female gender was found to be a significant risk factor for gallstones, such outcomes were confirmed by other studies [26- 28]. Similar findings were reported in previous research, when the condition was found to be more common in women. This could be related to the estrogen hormone increasing the saturation of cholesterol in the bile, which increases the production of gallstones [29- 31]. In the present study, we found that age between 20-45 years shows significant association with gallstones in contrast to other studies which show that gallstones is more common in older population [26- 28]. Moreover, our observations show that previous pregnancy or parity is a significant risk factor for gallstones, which is in agreement with other investigations [32], [33]. On the other hand, previous work declines such relationship between parity and gallstones [34].

Furthermore, rapid weight change shows strong association with gallstones in our research which is consistent with other studies that confirmed this association too, the reason behind increase gallstones rate in people with weight loss is mostly due to supersaturation of bile with cholesterol, because of an increased synthesis by the liver and secretion into bile, Gallstones are more likely to form if you lose more than 1.5 kg every week [35].

Our study also found a strong association between diet habit and gallstones especially diet rich in fat which show very high association, there are many studies revealed to this relationship between fatty diet and gallstones [36]. Dietary cholesterol increases the biliary cholesterol saturation and increase gallstones formation [37], [38].

Limitations

There was number of limitation, data was collected from a single hospital in AL-Kut city. In addition, coronavirus pandemic accompanied with time restrict have profoundly impacted sample size.

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6. Conclusion and Recommendations

Our study demonstrates that female gender, age between 20-45 years, parity, rapid weight changes a type of diet especially fatty diet are strong risk factors for gallstones formation.

According to the result of present study we recommend doctors to explain this information to patients (regarding weight loss and the type of diet they consumed) and to tell them about the risk of rapid weight change when the patients want to lose some weight. further studies are recommended to determine the type of stones in the gallbladder specific for each risk factor. we also recommend doctors to do gallstones checkup for all patients with gallstones risk factors to detect asymptomatic patients with gallstones.

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