

A Cross Sectional Study to Evaluate the Association between Hypothyroidism and Cholelithiasis

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Abstract

Introduction: About 10 to 15% of adults suffer from cholelithiasis, a common illness of the gall bladder. Asymptomatic cholelithiasis patients make up more than 80% of the population. Gall stone production is thought to be a result of hypothyroidism, an endocrine condition, hyperlipidemia, and motility issues affecting the bile duct and sphincter of Oddi. Our study's goal is to find out how common hypothyroidism is among cholelithiasis patients admitted to tertiary care facilities.

Method: This descriptive cross-sectional study was carried out from May 2018 to April 2019 at the Department of Surgery, Pacific Institute of Medical Sciences, Udaipur, Rajasthan. The sample size was 50, and the sampling method was consecutive non-probability sampling. The study comprised all patients with cholelithiasis diagnosed by ultrasonography, ranging in age from 20 to 70. Each piece of information, including age, gender, height, weight, BMI, and hypothyroidism, was entered into a pre-made proforma and was analysed. For numerical variables, mean and standard deviation were computed, and for qualitative variables, frequencies and percentages. A t-test was done and p-value of 0.05 was considered significant.

Result: Age, height, weight, and BMI had mean values of 41.66 13, 165.15 11, 35, 68.17 11, 95, and 25.69 7.19, respectively. 47.1% of the 174 individuals with cholelithiasis belonged to the 41–50 age group. 14.4% of the patients had hypothyroidism, mostly in women. Twenty (20.6%) of the 97 female patients and five (6.5%) of the 77 male patients both had hypothyroidism. Both males and females had statistically significant hypothyroidism.

Conclusion: This study looked into the connection between cholelithiasis and hypothyroidism. It was determined that female, obese, and elderly patients had a higher incidence of hypothyroidism. In contrast to all other variables, the gender distribution of the hypothyroidism in cholelithiasis patients was statistically significant.

Keywords: Hypothyroidism, Euthyroidism, Thyroidism, Cholelithiasis, Gall stone

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Introduction

About 10 to 15% of persons have the common gallbladder pathology cholelithiasis. More than 80% of cholelithiasis patients have no symptoms. Cholelithiasis prevalence varies with age, gender, ethnicity, and other comorbidities. Compared to men, women are more likely than men to have gall bladder stones. Because of its effects on cholesterol, it is thought that oestrogen plays a significant role in the production of gallstones. Children are less likely to get gallstones, which are thought to be an aging-related condition. Affected children with hemolytic anaemia are more vulnerable [(1-6)].

Compared to the populations of Asia and Africa, cholelithiasis is more common in Europe and the United States. Other comorbidities like metabolic syndrome, pregnancy, hemolytic anaemia, and Crohn's disease, among others, are linked to the development of gallstones.

Depending on their composition and underlying reasons, gallstones can be of various sorts. Cholesterol gallstones, which account for 90% of gall bladder stone development, are the most prevalent type of gallstone. Gallstones with a black colour account for 2% of all gallstones and are linked to hemolytic anaemias, Crohn's disease, and cystic fibrosis. Bile stasis and infections are linked to brown pigment gallstones [7-10].

The pathophysiology of gall stone production is a multifactorial, complex process. Gallstone development is thought to be influenced by hyperlipidemia, biliary stasis and altered flow, and problems with the sphincter of Oddi. One of the endocrine illnesses, hypothyroidism is more prevalent in women and affects 3.7% of the world's population. It is thought that gallstone development is a result of hypothyroidism.

The causes of the hypothyroidism and cholelithiasis are many. Hyperlipidemia, as well as abnormalities of bile duct and sphincter

of Oddi motility, are potential causes of gall bladder stones in hypothyroid patients. Numerous studies with prevalence rates ranging from 13% to 24% explained hypothyroidism in individuals with cholelithiasis [11,15].

Recent study's objective was to identify the prevalence of hypothyroidism among cholelithiasis patients admitted to tertiary care facilities. We determined the prevalence of hypothyroidism in relation to gender, age, and BMI.

Material and methods

This descriptive cross-sectional study was carried out from at the Department of Surgery, PIMS, Udaipur, Rajasthan, India. The study included 50 patients with cholelithiasis diagnosed by ultrasonography who were between the ages of 20 and 70. Patients with a history of thyroid surgery, pregnancy, haematological disorders, particularly hemolytic anaemia, and use of medications that cause hypothyroidism, such as amiodarone, lithium, antidepressants, phenytoin, or medications that cause gallstone formation, such as estradiol, fenofibrate, or gemfibrozil, were excluded. To control the confounders and eliminate bias in the study's findings, exclusion criteria were closely adhered to.

All patients admitted to the surgical ward for cholecystectomy had 5 ml of blood drawn and forwarded to the hospital laboratory for the diagnosis of hypothyroidism after receiving approval from the hospital ethical committee and receiving informed consent from study participants.

When TSH levels were 5.5 IU/mL or more and T3 and T4 levels were normal or low, a patient was classified as hypothyroid. A pre-designed proforma was used to capture all the information, including age, gender, height, weight, BMI, and hypothyroidism. Graph pad 7 online version was used to analyse data. For

numerical variables, mean and standard deviation were computed, and for qualitative variables, frequencies and percentages. The t-test was used to analyse categorical variables, and a p value of 0.05 was considered significant.

The mean and standard deviation of age, height, weight and BMI were calculated. The mean age of the patients was 43.66 ± 12.41 , Average Height was 162.12 ± 10.23 , Mean weight was 67.06 ± 10.34 Kg and their BMI was 24.98 ± 7.15 .

Results

Table 1: Mean and SD values of Demographic parameters.

Variables	Mean	SD
Age (years)	43.66	12.41
Height (cm)	162.12	10.23
Weight (Kg)	67.06	10.34
BMI (kg/cm ²)	24.98	7.15

Table2: Frequency and percentage of hypothyroid patients

	Frequency (N=50)	Percentage
Euthyroid	41	82
Hypothyroid	9	18

Frequency and percentage of hypothyroid patients. Out of 50 patients having cholelithiasis, 41(82%) were euthyroid and 9(18%) were hypothyroid as shown in table 2.

Table 3: Prevalence of hypothyroidism in different age & sex groups

	Euthyroid (N=41)		Hypothyroid (N=9)	
	Male No (%)	Female No (%)	Male No (%)	Female No (%)
Age (<20 years)	2 (4)	4 (9)	0 (-)	1 (11)
Age (21-40 years)	3 (7)	7 (17)	1 (11)	2 (22)
Age (>40 years)	5 (13)	20 (49)	1 (11)	4 (45)
Total	10 (24%)	31 (75%)	2 (22)	7 (78)

Prevalence of hypothyroidism in different age groups. The prevalence of hypothyroidism in age group above 40 years old patients with cholelithiasis were 11% males and 45 % females, while the age group 21-40 years were 33 % hypothyroidism. 11 % patients were male hypothyroid and 22% females hypothyroid. In age group more 41years 13 % males and 49 % females were euthyroid whereas 11 % males and 45% females were hypothyroid. Total 24% were Euthyroid male patients and 76 % female euthyroid patients and hypothyroid with cholelithiasis were 22% males and 78 % females were hypothyroid in the group as shown in table 3.

Table 4: Prevalence of hypothyroidism among different BMI group.

BMI (kg/m ²)	Euthyroid (N=41) No (%)	Hypothyroid (N=9) No (%)
BMI (< 18kg/m ²)	8 (19)	1 (11)
BMI (18-24 kg/m ²)	19 (46)	4 (45)
BMI (25-30 kg/m ²)	2 (4)	3 (33)
BMI (>30kg/m ²)	12 (29)	1 (11)
Total	41 (100)	9 (100)

Prevalence of euthyroid according to BMI were divided into 4 groups with BMI less than 18 kg/m², second with BMI 18-24 kg/m², third

with 25-30 kg/m² and last group with BMI more than 30 kg/m². The percentage were

highest in BMI 18-24 kg/m² was 46 % Euthyroid and 45% hypothyroid. (Table 4)

Discussion

Gender, age, obesity, and co-morbidities are risk factors for gallstone formation. One of the risk factors for the development of gallstones is hypothyroidism. A study by Watali YZ *et al.*, found that patients with cholelithiasis had a higher frequency of hypothyroidism than patients without cholelithiasis. Even though it was not statistically significant, patients with gallstones had a higher rate of hypothyroidism. In individuals with cholelithiasis, hypothyroidism was 14.4% common, according to our study. Recent study's hypothyroidism prevalence matched that of a study by Kotwani *et al.*, which found that the prevalence of hypothyroidism in those with cholelithiasis was 14.4% [16-18].

According to other studies, prevalence ranges from 8% to 24%. In this study, 12 patients (24%) were men and 38 patients (76%) were women. 7 out of the 38 female patients (18 % of the female patients) had hypothyroidism. 29 % of the 12% male patients with hypothyroidism, or cases, were men. A study by Bensal *et al.* found that 35% of the population was male and 65% were female. Compared to male patients with cholelithiasis, female patients had a higher rate of hypothyroidism [19,20].

The age of the patients has a significant impact on the occurrence of hypothyroidism in cholelithiasis patients. It is thought that older people are more likely to have hypothyroidism with cholelithiasis. In the study it was found that patients older than 40 years were more likely to have hypothyroidism. According to Honore LH *et al.*, female patients older than 40 years old had a higher prevalence of hypothyroidism in cholelithiasis patients. Obesity and hyperlipidemia are regarded as risk factors for the development of cholesterol gallstones [21].

According to many research, patients with high BMI are more likely to develop gallstones. Gallstones of the cholesterol kind are more likely to form because hyperlipidemia brought on by hypothyroidism increases that risk. In our study, patients with a BMI more than 30 kg/m² had a higher prevalence of hypothyroidism [22,23].

Conclusion

This investigation was done to find out how hypothyroidism and cholelithiasis are related. It was determined that female, obese, and elderly patients had a higher incidence of hypothyroidism. In contrast to all other variables, the gender distribution of the hypothyroidism in cholelithiasis patients was statistically significant.

It is advised that individuals with cholelithiasis who are female, fat, or elderly also have their thyroid function checked. This study has some limitations, including not assessing the types of gallstones and the link between hyperthyroidism and cholelithiasis.

Ethical approval: The study was approved by the Institutional Ethics Committee

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