

Prevalence of hypothyroidism in patients with gallstones: a hospital-based study

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Abstract- Gallstones are the most common biliary pathology. For decades, there has been a discussion, whether thyroid disorders could cause gallstone disease due to the low bile flow in hypothyroid subjects. The present study was conducted on 200 patients of gallstone diseases admitted in the Department of Surgery, Regional Institute of Medical Sciences Hospital, Imphal, after taking due permission from the Institutional Ethics Committee. Among the 43 hypothyroid patients with gallstones, 38 were found to be in subclinical state. Females showed predominance with 65.7%. Subclinical hypothyroid was more in the age group 46-55 years. Hypothyroidism in choledocholithiasis patients was more in subclinical state. When treating patients with gallstone disease, clinicians should be aware of the possible hypothyroid background and consider examining the thyroid function, atleast in elderly female patients.

Index Terms- gallstones, hypothyroidism, subclinical, Sphincter of Oddi.

I. INTRODUCTION

Among the most common gastrointestinal illnesses requiring hospitalization and frequently occur in young, otherwise healthy people, gallstone diseases have a prevalence of 11% to 36% in autopsy reports.¹ For decades, there has been a discussion whether thyroid disorders could cause gallstone disease. Particularly there are several explanations for a possible relation between hypothyroidism and gallstone disease.² The existence of gastrointestinal hypoactivity in hypothyroidism has been well known. Thyroxine has a direct effect on the control mechanisms of Sphincter of Oddi motility. Since the effect of thyroxine on the pre contracted SO is relaxing, the absence/insufficient concentration of thyroxine may result in increased tension of the SO in hypothyroidism.³ A 90% of hypothyroid patients have elevated cholesterol levels, triglyceride levels, or both. In hypothyroidism, decreased LDL receptor activity leads to impaired removal of cholesterol from the serum and reduced regulation of HMG-CoA reductase expression leads to decreased cholesterol synthesis. Even though THs reduce the synthesis of bile salts in human hepatocytes⁴, there is a decrease in biliary bile salt concentration in hypothyroidism.⁵ This altered cholesterol and bile salts ratio may cause bile to supersaturate in cholesterol leading to the formation of gallstones.

Of late an increased occurrence of hypothyroidism has been noted in patients with gallstone disease admitted in the Department of Surgery, RIMS. And in our present setup there have been no studies being done on the relationship between gallstone disease and thyroid disorders. Hence, this study is taken up to determine the prevalence of hypothyroidism in gallstone patients according to certain variables of interest, e.g. age, sex, in a Manipuri population.

II. MATERIALS AND METHODS

The study was conducted after taking due permission from the Institutional Ethics Committee. It was done in the Department of Surgery, Regional Institute of Medical Sciences, Imphal, Manipur. It was a cross-sectional study conducted on 200 patients admitted for gallstone diseases during the period of September 2014 to August 2016. Patients with any known thyroid disorders or unstable haemodynamic status, pregnant patients and those who were unwilling to participate were excluded from this study.

Detailed history and complete clinical examination of the patients were recorded. Routine investigations included complete haemogram, urine (routine and microscopy), KFT, LFT, HBsAg, HCV-Ab, R-Ab, blood sugar (random or fasting/PP), chest X-Ray, ECG, BT, CT. Patients diagnosed clinically for gallstones underwent transabdominal ultrasonography to evaluate most of the biliary system. Thyroid hormone levels TSH (0.465-4.68 mIU/L), T3 (1.49-2.60 nmol/L), T4 (71.2-141 nmol/L) were checked by Chemiluminescence method on Vitros ECIQ instrument, using morning fasting blood samples in the Biochemistry Department, RIMS, Imphal. Results were tabulated, analyzed and subjected to statistical analysis using SPSS 16.0 software for windows. Chi-square test was used to find the significance between the proportions. A p<0.05 was considered as statistically significant.

III. RESULTS

As shown in table 1, hypothyroidism was found in 43 (21.5%) patients while hyperthyroidism was found only in 9 (4.5%) patients.

Table 1: Distribution of gallstone patients by thyroid function test.

Thyroid function test	Frequency	Percentage(%)
Euthyroid	148	74
Hypothyroid	43	21.5
Hyperthyroid	9	4.5
Total	200	100

Maximum number of patients with hypothyroidism were in the age group of 46-55 years comprising of 17(39.5%). The minimum age was 21 years.

Among the 126 female patients, 29(23.1%) had hypothyroidism. Only 6(4.7%) had hyperthyroidism. While for male patients, 14(18.9%) had hypothyroidism and 3 (3.9%) had hyperthyroidism, as shown in table 2.

Table 2: Distribution of different thyroid status by sex.

Sex	Thyroid status		
	Hypothyroid	Hyperthyroid	Euthyroid
Female	29 (23.1%)	6 (4.7%)	91 (72.2%)
Male	14 (18.9%)	3 (3.9%)	57 (77.2%)
Total	43	9	148

Majority of the hypothyroid patients were diagnosed to have subclinical hypothyroidism with 38 patients out of total 43 cases. Out of 38 subclinical hypothyroid, 25(65.7%) were present in females and 13(34.3%) were present in males, as shown in table 3.

According to age distribution, 46-55 years group had maximum number of subclinical hypothyroid with 36.8%, as shown in table 4.

Among the seven choledocholithiasis patients with hypothyroidism, five were subclinical with 71.4% of the cases.

Table 3: Distribution of hypothyroidism in gallstone patients by sex.

Sex	Subclinical	Clinical
Female	25(65.7%)	4(80%)
Male	13(34.3%)	1(20%)
Total	38	5

Table 4: Distribution of hypothyroidism in gallstone patients by age.

Age (years)	Subclinical	Clinical
<25	3(0.08%)	0
26-35	4(10.4%)	0
36-45	11(28.9%)	1(20%)
46-55	14(36.8%)	3(60%)
56-65	2(0.05%)	1(20%)

>65	3(0.08%)	0
Total	38	5

IV. DISCUSSION

Gallstone disease is a worldwide disease and it remains to be one of the most common health problems leading to surgical intervention.⁶ During the last two decades, the etiologies of gallstones have been evaluated more seriously. In addition to classic risk factors such as age, gender, obesity and genetics, the associations between gallstones and delayed emptying of the biliary tract in hypothyroidism have been shown. This is related to the lack of the pro-relaxing effect of the thyroid hormone on Sphincter of Oddi contractility.⁷

Defect in motor activity of the gallbladder are thought to play a role in cholesterol nucleation and gallstone formation. Gallbladder filling is facilitated by tonic contraction of Sphincter of Oddi, which create a pressure gradient between the biliary ducts and the gallbladder. In response to a meal, the gallbladder empties by a coordinated motor response of gallbladder contraction with sphincter of Oddi relaxation. Hormonal and neural pathways are involved in the coordination of the gallbladder with the sphincter of Oddi.¹

In a study by Singh RR et al⁸, percentage of females with gallstones diagnosed hypothyroid, euthyroid and hyperthyroid was 24.4%, 65.85% and 1% respectively. Similarly, in the present study, percentage of females diagnosed as hypothyroid, euthyroid and hyperthyroid were 23.1%, 72.2% and 4.7% respectively.

In the study by Ahmad MM et al², there was a female gender predisposition with 87% of patients being females in the choledocholithiasis with hypothyroidism group. Further, on evaluation it was found that around 17% of females with choledocholithiasis had subclinical hypothyroidism. There was a prevalence of 16% of hypothyroidism in choledocholithiasis group as compared to 8% in the cholelithiasis. But in the present study, prevalence of hypothyroidism in patients with choledocholithiasis was 31.8%.

A study by Laukkarinen J et al⁹ has shown subclinical hypothyroidism to be common problem among patients with CBD stones. They concluded that hypothyroidism played a role in the formation of CBD stones secondary to its effects on SO relaxation; which in turn might be influence on emptying of the biliary system. This statement is well supported in the present study where 71.4% of the choledocholithiasis patients with hypothyroidism were subclinical.

Wang Y et al¹⁰ noted that the majority of the patients who were diagnosed as having choledocholithiasis with hypothyroidism were having subclinical hypothyroidism with 75% of the patients and only 25% having clinical hypothyroidism. The prevalence of subclinical hypothyroidism in women older than 60 years of age was 11.4% in CBD-stone patients compared with 1.8% in control patients.

Serum TSH is a hallmark of thyroid dysfunction. The subclinical form of hypothyroidism is characterized by increased serum TSH levels along with normal T4 levels and a lack of clinical symptoms. The mean TSH levels among the case group were higher than the control group. Although subclinical

hypothyroidism was more common in patients with CBD stones, the difference was not significant. There were more females with subclinical hypothyroidism in both groups in the study by Ajdarkosh H et al¹¹. The present study also showed higher percentage of 65.7% in females with subclinical hypothyroidism.

V. CONCLUSION

While treating patients with gallstone disease, clinicians should be aware of the possible hypothyroid background and consider examining the thyroid function, atleast in elderly female patients in which the prevalence of subclinical hypothyroidism is the highest.

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