



Surgery

ASSOCIATION BETWEEN HYPOTHYROIDISM AND GALL STONE DISEASE

Dr. Josna K Jose*

Junior Resident, Department Of General Surgery, Govt. Medical College, Kottayam, Kerala, India *Corresponding Author

Dr. S. Kailasanadhan

Additional Professor, Department Of General Surgery, Govt. Medical College, Kottayam, Kerala, India

ABSTRACT **Objective:** 1.To find the association between hypothyroidism and gallstone disease. **Method:** This is a crosssectional study conducted in the Department of General Surgery, Government Medical College, Kottayam. This study includes a total of 157 patients with cholelithiasis/choledocholithiasis diagnosed through radiological studies & they will be analysed by overnight fasting blood samples for TFT. All patients will be assessed according to TSH, FT3, FT4 levels. **Results:** In this study, age of these patients selected from 20 – 70 years, there were 31.2% male patients and 68.8% female patients. Females were the predominant group. On evaluation with imaging, 79 patients (50.3%) had multiple GB calculi, and 67 patients (42.7%) had single GB calculus, and 11 patients (7%) had multiple GB calculi + CBD calculi. 157 patients were tested for thyroid function, of which 34 patients (21.7%) had hypothyroidism and the remaining i.e. 123 patients were euthyroid. Of these 34 patients, females were 30 in number & most of them were more than 40 years of age. 26 patients (16.6%) had subclinical hypothyroidism, and 8 patients (5.1%) had clinical hypothyroidism **Conclusion:** In my research , I found an association between hypothyroidism and number of gallstones with a significant p-value. Hypothyroidism must be considered as a specific risk factor like sex, obesity, age in cholelithiasis patients. Therefore , clinicians need to understand thyroid status and control thyroid function in patients with cholelithiasis/choledocholithiasis

KEYWORDS : TSH , GB calculi, hypothyroidism, euthyroid

INTRODUCTION

Gall stone diseases are one of most common diseases affecting gastro intestinal tract. The pathogenesis of gallstones is a complex process and involves many factors altering cholesterol mechanism. It varies according to age, gender, geography, diet , sedentary life style and obesity level . Most gallstones are asymptomatic, but the disease can cause high medical costs and is rarely life threatening. Gall stones are of three types – cholesterol, pigment or mixed. They can be single or multiple, small or large, radiopaque or radiolucent. Overall, thyroid disease is one of the most common endocrine diseases. The hypothyroidism can be either a subclinical type or hypothyroidism (overt) where the level of thyroxine is actually below normal.

There are many explanations for the relationship between hypothyroidism (thyroid failure), and lipid metabolism and gall stone formation.

These descriptions include

- A known link between thyroid dysfunction and disturbances in lipid metabolism that may consequently lead to a change of composition of bile² (Experimental in rabbit).
- Duodenum Low bile flow in case of hypothyroidism³.
- Expression of thyroid hormone receptors of Sphincter of Oddi and thyroxine have a direct pro-relaxing effect on the sphincter of Oddi⁴ (Experimental in pig).
- Thyroxine therapy is thought to dissolve gallstones and CBD stones in some cases⁵. (Case report)
- There is dysmotility of digestive tract in hypothyroidism⁶.
- In several studies, hypothyroidism has been associated with decreased bilirubin excretion due to decreased activity of UDP glucuronyl transferase⁷.

Therefore, this study aims to estimate the prevalence of previously undiagnosed hypothyroidism in patients with gallstones. If a significant relationship is found, we can change the course of treatment, which will facilitate future diagnostic and therapeutic workup of cholelithiasis patients.

METHODOLOGY

Type of Study

Cross sectional Study

Period of Study: 12 Months

Ethical Permission Number :6/2022

Study Setting

All patients above 18 years suffering from cholelithiasis/ choledocholithiasis who are attending surgical outpatient clinic or casualty & are admitted in Dept of general surgery, are going to take into the study

based on the inclusion and exclusion criteria.

Sample Size

Sample size is calculated using the formula $N = (Z\alpha)^2 p q / d^2$

Where

N = Sample size

p = prevalence according to study¹

$q = 100 - p$

$Z\alpha$ = Z score of α error (i.e. 1.96 with an α error of 5%),

d = clinically allowable error of 20% & power of 80% at a significance level of 0.05

$d = (p \times 20) / 100$.

According to the crosssectional study done in Bikaner¹ in 2017 examined 50 cases of cholelithiasis, 19 out of 50 that is 38% had hypothyroidism.

$Z = 1.96$ at 95% CI

$P = .38$

$N = (1.96 * 1.96 * 0.38 * 0.62) / .076 * .076 = 156.69$

Hence minimum sample size required for the study is 157.

Hypothesis Statement

Hypothyroidism is associated with increase in gall stone formation

MATERIALS AND METHODS

After getting approval for thesis from institutional review board, written informed consent would be taken from all patients undergoing study. This study includes patients with cholelithiasis diagnosed through radiological studies, who were admitted in the Department of General surgery in our hospital. After excluding patients with history of medical /surgical thyroid intervention, the patients will be investigated by analysing over night fasting blood samples for TFT. According to the hospital standard values, patients with TSH >5.20 as hypothyroid, all patients will be assessed according to TSH, FT3, FT4 levels.

Collected data will be recorded on a case record form and analysed. During every phase of the study the personal details of the patients participating in the study shall be kept confidential and the patient has every right to withdraw at any phase of the study without affecting his/her future treatment

Study Tool

Study tool includes pro forma questionnaire form, ultrasound study of abdomen and consent form.

Inclusion Criteria

1. Patients in age group of 20 to 70 years
2. Patients with gall stones confirmed by USG/ CT Scan /ERCP/

MRCP

3. Incidentally detected gall stones

Exclusion Criteria

1. Patients previous history of thyroid disorder / underwent thyroidectomy
2. Any patients with drug history of thyroid medications, or previous radioiodine exposure
3. Pregnancy
4. Oral contraceptive pills
5. Those prescribed medications known to affect the TFT such as phenytoin, carbamazepine, metoclopramide, amiodarone and lithium

Data Management And Statistical Analysis

Data will be entered in MS excel and will analyse with SPSS software version 18.

RESULTS

Table : 1 Association Between Thyroid Status And Number Of Stones

Thyroid status	Number of stones			Chi square	Degrees of freedom	P value
	Single Calculi	Multiple Calculi	Multiple Calculi + CBD stone			
Euthyroid	59(48)	59(48)	5(4.1)	11.794	4	0.019
Subclinical hypothyroid	6(23.1)	15(57.7)	5(19.2)			
Clinical hypothyroid	2(25)	5(62.5)	1(12.5)			

Chi square test was used to find the association between number of stones and thyroid status. And it was found that there was a significant association between those two variables since p value =0.019 which is less than 0.05.

Table :2 Association Between Thyroid Status And Age

Age	Thyroid status			Chi square	Degrees of freedom	P value
	Euthyroid	Subclinical hypothyroid	Clinical hypothyroid			
≤40 years	53(88.3)	6(10)	1(1.7)	6.002	2	0.049
>40 years	70(72.2)	20(20.6)	7(7.2)			

Chi square test was used to find the association between thyroid status and age. And it was found that there was a significant association between those two variables since p value =0.049 which is less than 0.05.

Table : 3 Association Between Thyroid Status And Gender

Gender	Thyroid status			Chi square	Degrees of freedom	P value
	Euthyroid	Subclinical hypothyroid	Clinical hypothyroid			
Female	78(72.2)	23(21.3)	7(6.5)	7.646	2	0.022
Male	45(91.8)	3(6.1)	1(2)			

Chi square test was used to find the association between thyroid status and gender. And it was found that there was a significant association between those two variables since p value =0.022 which is less than 0.05.

DISCUSSION

Thyroid hormones affect lipid metabolism, rise in serum cholesterol in hypothyroidism causes supersaturation of bile leading to depressed gall bladder contractility, hence risk of gall stone formation.

This cross-sectional study was conducted in 157 selected patients with gall stones or CBD stones or both in Department of General surgery, Government medical college, Kottayam. This aim of this study was to determine the relationship between hypothyroidism and patients with extrahepatic biliary stones, to determine its significance as a cause and to include thyroid function tests as part of the routine investigations of patients with biliary stones.

In this study, total of 157 patients of gall stone disease studied, 31.2% are males & 68.8% are females. Among them, 61.8% were in the group of >41 years, and remaining 38.2% were in the age group of ≤ 40 years. In this study, 42.7% had single GB calculus, 50.3% had multiple GB calculi and remaining 7% had multiple GB calculi with CBD calculi.

In this study group 21.7% were hypothyroid and 78.3% patients were euthyroid. In 21.7% of hypothyroid patients, 16.6% of patients have subclinical hypothyroidism and 5.1% have clinical hypothyroidism. Of the euthyroid patients, 48% had single GB calculus, 48% had multiple GB calculi & 4.1% had multiple GB + CBD calculi. Out of 26 subclinical hypothyroid patients 23.1% had single GB calculus, 57.7% had multiple GB calculi and 19.2% had multiple GB+ CBD calculi. Among clinical hypothyroid patients 25% had single GB calculus, 62.5% had multiple GB calculi and 12.5% had multiple GB+ CBD calculi. When the p-value were evaluated using chi square test, there was a significant correlation between gallstones & hypothyroidism. The incidence of multiple GB calculi is higher in hypothyroid than euthyroid.

In this study, 10% of patients aged ≤40 years had subclinical hypothyroidism & 1.7% had clinical hypothyroidism. Over the age of 40, 20.6% had subclinical hypothyroidism and 7.2% had clinical hypothyroidism. A significant association between hypothyroidism and increasing age was found when the p – value was analysed with the chi square test.

Of the 157 patients included in this study, 108 patients were females and 49 patients were males. Among females 21.3% had subclinical hypothyroidism and 6.5% had clinical hypothyroidism. Among male patients 6.1% had subclinical hypothyroidism & 2% had clinical hypothyroidism. This result was found to be significant when evaluating the p value, i.e., there is a significant association between hypothyroidism and female gender.

In this study, there is a significant association between hypothyroidism and age, hypothyroidism and female gender, and with multiple GB calculi & CBD stones.

CONCLUSION

In my study, I found a significant association between hypothyroidism and gall stone development with a significant p-value. There is an increase in prevalence of hypothyroidism in gall stone disease in this study. Subclinical hypothyroidism is more common than clinical hypothyroidism.

Women are more likely than men to have hypothyroidism. Therefore, it can be concluded from the results of this study that hypothyroidism is a risk factor for gall stones formation especially in middle aged women. Undiagnosed & untreated hypothyroidism in these patients can cause complications. Most importantly, when attending patients with cholelithiasis or choledocholithiasis, surgeons should be aware of the possible history of hypothyroidism and consider thyroid function tests, at least in female patients over 40 years of age, in which group the prevalence of clinical & subclinical hypothyroidism is the highest.

REFERENCES

1. Kedar Nath, Ashok Kumar, Jitendra Acharya. Prevalence of Hypothyroidism in Cholelithiasis Patients in Bikaner, Rajasthan (India). Int J Med Res Prof. 2017; 3(3):65-69.
2. R.F. Borgman, P.H. Haselden, Cholelithiasis in rabbits: effects of bile constituents and hormones on dissolution of gallstones Am. J. Vet. Res., 30 (1969), pp. 107-112
3. J. Laukkanen, J. Sand, R. Saaristo, et al. Bile Flow Reduced in Patients with Hypothyroidism Surgery, 133 (2003), pp. 288-293 PMID:12660641
4. J. Inkinen, J. Sand, P. Arvola, et al. Direct effect of thyroxine on pig sphincter of Oddi contractility Dig. Dis. Sci., 46 (2001), pp. 182-186 PMID:11270783
5. J.S. Vassilakis, N. Nicolopoulos, Dissolution of gallstones following thyroxine administration. A case report Hepatogastroenterology, 28 (1981), pp. 60-61
6. W. Steenbergen, J. Fevery, R. De Vos, et al. Thyroid hormones and the hepatic handling of bilirubin. I. Effects of hypothyroidism and hyperthyroidism on the hepatic transport of bilirubin mono- and diconjugates in the Wistar rat Hepatology, 9 (1989), pp. 314-322 PMID:2536351
7. D. Kim, J. Ryan Gastrointestinal manifestations of systemic diseases M. Feldman, L. Friedeman, M. Sleisenger (Eds.), Gastrointestinal and Liver Diseases: Pathophysiology/Diagnosis/Management (seventh ed.) (2002) Philadelphia: Saunders