



Prevalence of Sub-Clinical Hypothyroidism in Diagnosed Cases of Gallstone Disease

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Author's contribution

The sole author designed, analysed, interpreted and prepared the manuscript.

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ABSTRACT

Thyroid issues have long been debated as a possible cause of gall stone disease. The link between hypothyroidism and gallstone disease could be explained in a variety of ways. The main objective of this study is to determine the prevalence of hypothyroidism in gallstone patients and to rule out hypothyroidism as a probable cause of gallstone formation. A prospective study was conducted in surgical wards of Department of surgery sree balaji medical college from 2016 to 2017. All patients were evaluated using a comprehensive clinical history and examination, as well as suitable investigations such as abdominal USG, thyroid function tests, and lipid profiles. Out of 22 patients 19 patients (86.4%) had normal TSH, 2 patients (9.1%) had increased TSH, 1 patient (4.5%) had decreased TSH. Raised TSH was more in the AGE Group of 61- 75 years, which is comparable to other studies. Out of 22 patients, (100%) had normal T3 levels. 19 patients (86.4%) had normal T4 levels and Ultrasound examination of neck, 2 patients (9.1%) had decreased T4 level and 1 patient (4.5%) had increased T4 levels and 3 patients (13.6%) had abnormal Ultrasound Neck findings. Hence In this Study Cholelithiasis is most commonly seen in Females of age group of 41-60 years and prevalence of raised TSH level in cholelithiasis patient was 9% and most were found in the age group of 61-80 years.

Keywords: Cholelithiasis; hypothyroidism; gallstone disease.

1. INTRODUCTION

Gallstones are the most prevalent biliary pathology and are classified as cholesterol, pigment (black, brown), or mixed stones. Cholesterol or mixed stones are composed of 51–99% cholesterol, as well as calcium salts, bile acids, bile pigment, and phospholipids [1]. Gallstones can be solitary or numerous, large or small, and radio-opaque if they contain calcium salts. It is commonly known that hypothyroidism causes gastrointestinal hypo activity [2]. Thyroxine has a direct effect on the Sphincter of Oddi's motility control mechanisms. Because thyroxine has a calming effect on the pre-contracted SO, hypothyroidism may result in increased SO tension due to a lack of thyroxine or insufficient thyroxine levels [3,4]. There have been few previous investigations on the prevalence of thyroid problems in healthy people. According to a recent study from the United Kingdom, thyroid issues affect 3.6 % of healthy people. There has been debate for a decade about whether thyroid issues might cause gallstone disease [5-7]. There are various plausible explanations for a probable association between hypothyroidism and gallstone disease; these possibilities include the established link between thyroid failure and lipid metabolic abnormalities, which may lead to a change in bile composition.

Gallstones can be solitary or numerous, large or small, and radio-opaque if they contain calcium salts. Single stones are unusual, but they usually contain mostly cholesterol and form as a result of a disruption in the physico-chemical equilibrium that ordinarily keeps cholesterol in micellar form in the bile. Small amounts of cholesterol and traces of iron have been found. Gallstones disease has multiple causes, including gall bladder infection, decreased gall bladder motility following surgery for obesity and/or weight loss, ileal disease or resection, hemolytic disease, and familial inheritance. Low biliary flow has also been found in hypothyroid people in recent research [8]. As a result, numerous mechanisms for thyroid hormone action leading to gall stone formation have been hypothesised. This study was done to determine the prevalence of hypothyroidism in cholelithiasis patients in order to shed light on the relationship between hypothyroidism and cholelithiasis.

2. MATERIALS AND METHODS

This prospective study was conducted in surgical wards of Department of surgery sree balaji

medical college from 2016 to 2017. A total of 22 patients with Gallstone disease were selected randomly for the study.

2.1 Inclusion Criteria

- Patients from both sexes of various age groups of 26 yrs to 75 years of age.
- All patients admitted with Gallstone disease were taken into consideration.

2.2 Exclusion Criteria

Patients with a history of thyroid capacity irregularities that have recently been analysed or treated, history of thyroidectomy, continuous pregnancy, genuine basic illnesses, patients on oral contraceptives, sepsis or cholangitis, and those prescribed medications that are known to affect the thyroid capacity test, such as phenytoin, carbamazepine, metoclopramide, amiodarone, and lithium. Each selected patients under went detailed history and complete physical examination. History regarding age, sex, socioeconomic status, rural or and urban were taken.

Apart from above mentioned general history

- Pain abdomen.
- Nausea
- Vomiting.
- Fever
- Loss of appetite.

A general physical examination of all patients was done along with detailed abdominal examination. All routine laboratory investigations including: Random blood sugar, hemoglobin, total leukocyte count, urea, creatinine.

- Thyroid function test: T3, T4, TSH
- Ultrasonography Abdomen.
- Ultrasonography Neck.

Data was entered and analysed using statistical package solution software (SPSS Version 15). Percentages were calculated and the results obtained were presented in the form of tables and graphs. Data was analysed using descriptive statistical method.

2.3 Statistical Analysis

Fisher exact test and chi square test for all prevalence variables comparing age, sex, kind of

stones with TSH, USG results, etc. are performed using Statistical Analysis System (SAS) windows software 2014.

3. RESULTS

In this study 22 patients with cholelithiasis were enrolled.

3.1 Sex Distribution in the Study

Out of these 22 patients, 15 patients were Females and 07 patients were Males (Table 1).

3.2 Age Distribution in the Study

In this study 22 patients with cholelithiasis were enrolled. Out of 22 patients, 5(22.7%) patients were of age group 20 to 40 years, 13(59.1) patients were of age group 41 to 60 years, 04(18.2%) patients were of age group 61 to 80 years (Table 2).

3.3 Clinical Symptoms

In this study of 22 patients, all 22 patients (100%) presented with abdominal pain. 11 patients (50%) presented with associated vomiting, 6 patients (27.3 %) presented with nausea, 2 patients (9.1%) presented with jaundice, 3 patients (13.6%) presented with loss of appetite, 06 patients (27.3%) presented with fever (Table 3).

To conclude all 22 patients (100%) had pain abdomen. 11 patients (55%) had Pain in Abdomen and vomiting. 3 patients (13.6%) had pain abdomen, Vomiting and Nausea. 1 patient (4.5%) had pain Abdomen, vomiting nausea and jaundice. 1 patient (4.5%) had pain abdomen, vomiting, nausea and loss of appetite. 3 patients (13.6%) had pain abdomen, vomiting and Fever (Table 4).

3.4 Thyroid Status and Stone Size

In the current study, all stones in hypothyroidism patients were > 1cm, with 89 % of stones being > 1cm. The fisher exact test result is 0.0005 and is statistically significant at p<0.05 (Table 5). The pigment type stones accounted for 37.08% of the total, whereas cholesterol stones accounted for

20.6%. The majority of stones in hypothyroid instances 39.02% were of the cholesterol type, while the majority of stones in euthyroid cases were of the pigment type. The value of the Chi square test is 10.530, with a p value is 0.00230. At a P value of ≤0.05, it is significant.

3.5 Thyroid Profile TSH Levels

There were 22 patients in this study, and all were tested for TSH level out of which 19 patients (86.4%) had normal TSH, 2 patients (9.1%) had increased TSH, 1patient (4.5%) had decreased TSH (Table 6).

3.6 T4 Levels Distribution

In this study out of 22 patients, 19 patients (86.4%) had normal T4 levels, 2 patients (9.1 %) had decreased T4 level, and 1 patient (4.5%) had increased T4 levels (Table 7).

3.7 USG Neck Findings

In this study of total 22 patients, 19 patients (86.4%) had normal Ultrasound examination of neck and 3 patients (13.6%) had abnormal Ultrasound Neck findings (Table 8).

4. DISCUSSION

Gall stone etiologies have been studied more thoroughly in the last two decades. Gall stones and delayed biliary tract emptying in hypothyroidism have been linked, in addition to traditional risk variables such as age, gender, weight, and heredity. The incidence of thyroid dysfunction in patients with gallstone disease was investigated in this study. Thyroid dysfunction is marked by elevated TSH levels in the blood. Increased serum TSH levels, T4 levels, and a lack of clinical symptoms describe the subclinical form of hypothyroidism. Cholelithiasis is most usually seen in females between the ages of 41 and 60, and the incidence of elevated TSH levels in cholelithiasis patients was 9%, with the majority being between the ages of 61 and 80 [9,10].

Table 1. Sex distribution

Sex	Number of patients		Percentage (%)
	Euthyroid	Hypothyroid	
Male	5	2	31.82
Female	10	5	68.18
Total	15	7	22

Table 2. Age distribution

Age	Number of patients	Percentage (%)
25 -40 years	05	22.7
41 -60 years	13	59.1
61 -75 years	04	18.2
Total	22	100

Hypothyroidism patients are more likely to have elevated serum cholesterol levels. Thyroid hormones have a multifaceted effect on cholesterol metabolism. Thyroid hormones affect cholesterol production, absorption, and use. Although the case group's mean cholesterol

levels were not comparable to the control group's [10],

Table 3. Clinical symptoms

Clinical symptoms	Number of patients	Percentage (%)
Abdominal pain	22	100
Vomiting	11	50
Nausea	06	27.3
Jaundice	02	9.1
Loss of Appetite	03	13.6
Fever	06	27.3

Table 4. Showing symptom complex of cholelithiasis

Symptom complex	Number of patients	Percentage
Pain abdomen., Vomiting, Nausea, and Fever	1	4.5%
Pain abdomen and Vomiting.	4	18.1%
Pain abdomen and Loss of Appetite.	1	4.5%
Pain abdomen, vomiting, Nausea and Jaundice.	1	4.5%
Pain abdomen	5	22.7%
Pain abdomen, Vomiting and Fever	3	13.6%
Abdomen pain and fever	1	4.5%
Abdomen pain and Nausea	2	9.1%
Abdomen pain, vomiting, Loss of Appetite.	1	4.5%
Pain abdomen, vomiting,		
Nausea and Loss of Appetite.	1	4.5%
Abdomen pain and Nausea and Fever.	1	4.5%
Pain abdomen and Jaundice.	1	4.5%
Total	22	100

Table 5. Thyroid status and the size of the stone

Size of stone on USG (mm)	Thyroid status	Percentage (%)
<10 mm	4	10.5
>10 mm	17	89.5
Total	22	100

Table 6. TSH distribution

Thyroid profile	Number of patients	Percentage (%)
Normal TSH	19	86.4
Increased TSH	02	09.1
Decreased TSH	01	04.5
Total	22	100

Table 7. T4 Distribution

	Number of patients	Percentage (%)
T4 levels	Number of patients	Percentage
Normal T4	19	86.4
Increased T4	01	04.5
Decreased T4	02	09.1
Total	22	100

Table 8. USG neck findings

Findings	Number of	Findings
Normal study	19	86.4
Abnormal study	03	13.6
Total	22	100

Johanna L, Gediminas K [11] found that 11.4 % of gallstone patients had subclinical hypothyroidism, with none of the patients having clinical hypothyroidism. In the study conducted by Yousif et al age distribution of patient is presented with cholelithiasis were 26.7% in the age group of 25 to 40 years, 61.3% in the age group of 41-60 years, and 12% in the age group of 61 to 75 years [12]. In the study conducted by Hassan et al, there were 21.3% in the age group of 25 to 40 years, 74.3% in the age group of 41-60 years and 04.4% in the age group of 61 to 75 years [13]. In the present study there were 22.7% in the age group of 25-40 years. 51.9% in the age group of 41 to 60 years and 18.2% in the age group of 61 to 75 years.

4.1 Comparison Study of Thyroid Profile

In this study 22 patients with cholelithiasis were enrolled, out of these patients 9.1 % has Gall stone with low T4, 4.5% had Gallstones with Low TSH and 9.1% had Gallstones with high TSH. From The above table and graph Gallstone with low T3 and T4 in study conducted by Hassan et al was 8.9%, but in this study it was 0%. In Study conducted by Hassan et al Gallstone with low T4 was 1.3%, and in this study it is 9.1%. In the study conducted by Hassan et al Gallstones with low T3 was 0.5%, but in this study it is 0%. In the study conducted by Hassan et al Gallstones with high TSH was 1.1% [12] and in this study was 9.1 %. In this study Gallstones with low TSH was 4.5%.

5. CONCLUSION

Thyroid disorders, especially hypothyroidism, and gallstone disease have been linked. Hypothyroidism in the subclinical stage is more common than hypothyroidism in the acute stage. Females are more likely than men to suffer from hypothyroidism. Gallstone disease combined with thyroid dysfunction results in high cholesterol levels. In this study, the prevalence of hypothyroidism in cholelithiasis has increased. Hypothyroidism in the subclinical stage is more common than hypothyroidism in the clinical stage. Females are more likely than guys to have hypothyroidism. Patients with cholelithiasis who

are over 40 years old are more likely to have hypothyroidism. TSH should be checked because most people are subclinically hypothyroid, especially those over the age of 40. This rise in incidence may have an impact on cholelithiasis patients' diagnostic and treatment workup. Hypothyroidism, like age, sex, and weight, should be regarded a separate risk factor in cholelithiasis patients. As a result, we should be mindful of thyroid status in cholelithiasis patients and have them checked for thyroid function. Cholelithiasis is most commonly seen in Females of age group of 41-60 years and prevalence of raised TSH level in cholelithiasis patient was 9% and most were found in the age group of 61-80 years.

CONSENT & ETHICAL APPROVAL

As per international standard or university standard guideline Patient's consent and ethical approval has been collected and preserved by the authors.

COMPETING INTERESTS

Author has declared that no competing interests exist.

REFERENCES

1. American Diabetes Association. Diagnosis and classification of diabetes mellitus. *Diabetes Care*. 2010;33(Suppl 1):S62–9.
2. Laukkanen J, Kiudelis G, Lempinen M, Rätty S, Pelli H, Sand J. et al. Increased prevalence of subclinical hypothyroidism in common bile duct stone patients. *J Clin Endocrinol Metab*. 2007;92:4260–4.
3. Inkinen J, Sand J, Nordback I. Association between common bile duct stones and treated hypothyroidism. *Hepatogastroenterology*. 2000;47:919–921.
4. Honoré LH. A significant association between symptomatic cholesterol cholelithiasis and treated hypothyroidism in women. *J Med*. 1981;12:199–203.
5. Volzke H, Robinson Dm, John U. Association between thyroid function and gallstone disease. *World J Gastroenterol*. 2005;11:5530–4.
6. Owen PJ, Lazarus JH: Subclinical hypothyroidism: The case for treatment. *Trends Endocrinol Metab* 14:257, 2003. Schwartz Principles of General surgery.

7. Yokohata K, Tanaka M: Cyclic motility of the sphincter of Oddi. J Hepato-Biliary-Pancreatic Surg. 2000;7:178.
8. Johanna Laukkarinen, Gediminas Kiudelis, Marko Lempinen, Sari Raity, Hanna Pelli, Juhani Sand, Esko Kemppainen, Caj Haglund, and Isto Nordback Department of Gastroenterology and Alimentary Tract Surgery (J.L., S.R., H.P., J.S., I.N.), Tampere University Hospital.
9. Honore LH. A significant association between symptomatic cholesterol cholelithiasis and treated hypothyroidism in women. J. Med. 1981;12;199-203.
10. HenryVolzke, Daniel M Robinson, Ulrich John. Association between thyroid function and gall stone disease. World J Gastroenterol. 2005;11(35):5530-5534.
11. Johanna L, Gediminas K, Marko L, Sari Raty. Increased prevalence of subclinical hypothyroidism in gall bladder stone patient. J Clinical Endocrinol and Metabol. 2007; 92(11):4260-4264.
12. Yousif HH. Relationship between serum levels of TSH and Cholesterol with Types of Gallstones. The Iraqi Med Postgraduate J. 2011;10(1):1-4.
13. Hassan BA. Changing Pattern and Incidence of Gallstone Diseases in Al-Kadhymia Teaching Hospital. Al-Nahrain College of Medicine. 2003; ISSN 1681-6579 Iraq.

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