

Original Research Article


The prevalence of undiagnosed thyroid dysfunction and diagnosed diseases of gallstones

Manimegalai¹, T. Avvai^{2*}

¹Associate Professor, Department of General Surgery, Govt. Stanley Medical College, Tamil Nadu, India

²Associate Professor, Department of General Surgery, Govt. Omandurar Medical College and Hospital, Tamil Nadu, India

*Corresponding author email: avvailamparuthi@gmail.com

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Abstract

Background: Cholelithiasis is a disease prevalent worldwide because of an imbalance of bile salt and cholesterol concentrations that leads to precipitation inside the gallbladder. Gall stones are the most common biliary pathology both in India and western countries. Recent studies concentrate on gall stones and thyroid hormones – T3 and T4 have an effect on both bile content and bile flow. Patients with hypothyroidism have a serum level of cholesterol approximately 50% higher level than in euthyroid patients and 90% of all hypothyroid patients have elevated cholesterol level. Likewise, low levels of t4 have an effect in relaxing the sphincter of odds, leading to biliary stasis and stone formation.

The aim of the study: To check thyroid status in patients who are diagnosed with gallstone disease, thereby dividing into euthyroid, hypothyroid, hyperthyroid and subclinically hypothyroid, correlating the prevalence of subclinical hypothyroidism in patients with cholelithiasis.

Materials and methods: This study was conducted in the Department of General Surgery, Government Stanley Medical College, Chennai in 2018. Patients were divided according to history, clinical examination, and USG neck and lab estimation of T3, T4, and TSH. **Subclinical hypothyroidism:** The symptom-free patient with TSH concentration above the upper limit of normal range and T3/T4 or both decrease below normal limit. **Clinical hypothyroidism:** In which there were symptoms of hypothyroidism with TSH level above the upper limit and T3/T4 or both decreases below normal limit. **Euthyroid group:** Where clinical and lab tests were within normal range.

Results: The predominant age group was 51-60 years constituting 36.67% of patients. Youngest patient age was 21 years and the oldest was 80 years of age. Of the 60 patients, the majority of patients were euthyroid status 52 (86.67%). 6 (10%) patients were subclinical hypothyroidism, 2 (3.33%) were clinical hypothyroidism. Of the 60 patients, 52 were diagnosed with gallstone only and 8 were diagnosed with gallstone and CBD stones. In this study, hyperlipidemia was present in 7 of the hypothyroidism.

Conclusion: There is a relationship between thyroid dysfunction particularly hypothyroidism and gallstone diseases. Hypothyroidism is seen more in GB stones patients compare with CBD stone patients. Subclinical hypothyroidism is more common than clinical hypothyroidism. Hypothyroidism has a higher prevalence in females than males. High cholesterol levels are seen in gallstone disease with thyroid dysfunction.

Key words

Hypothroidism, Cholelithiasis, TSH, T3, T4.

Introduction

Cholelithiasis is a disease prevalent worldwide because of an imbalance of bile salt and cholesterol concentrations that leads to precipitation inside the gallbladder. Gall stones are the most common biliary pathology both in India and western countries. In western countries, 10-12% of adults develop gallstones [1]. A gallstones survey suggested that gallbladder stones occurred 7 times more commonly in north Indians than in south Indians. The prevalence of common bile duct stones in patients with gallstones varies from 8 to 16%. Cholesterol stones-Pure cholesterol stones are not very common [2]. It accounts for less than 10% of all stones. It usually presents as a single large stone with a smooth surface. Most of the other cholesterol stones contain a variable amount of bile pigments and calcium. They are always more than 70% cholesterol by weight [3]. These stones are usually multiple in number with variable sizes and may be hard and faceted or irregular, mulberry shape and soft. Color ranges from whitish yellow and green to black. Most cholesterol stones are radiolucent. Among that radiopaque are less than 10%. Supersaturation of bile with cholesterol is the common primary event in the formation of cholesterol stone [4]. Similar in both kind of stones, pure or of mix nature. Supersaturation almost always is due to cholesterol hypersecretion but not caused by reduced secretion of phospholipids or bile salts

[5]. Pigment stones contain less than 20% cholesterol and are dark because of the presence of calcium bilirubinate. Black pigment stones are characterized as small, brittle, black and sometimes speckled. They are formed by supersaturation of calcium bilirubinate, carbonate and phosphate [6]. They are formed most often secondary to a hemolytic disorder such as hereditary spherocytosis and sickle cell anemia. Like cholesterol stones, they are almost always found in the gall bladder. Bile stasis, bactibilia, chemical imbalances, pH imbalances, change of bile composition and formation of sludge are among the principle factors thought to lead to the formation of gallstones [7]. In hypothyroidism serum cholesterol values rises which in turn leads to supersaturation of bile with cholesterol, leading to gallbladder hypomotility, decreased contractibility and impaired filling, giving rise to the prolonged residence and flow capacity of bile in the gallbladder [8]. These events may contribute to the retention of cholesterol crystals, thereby allowing sufficient time for nucleation and continual growth into mature gall stones. Patients with hypothyroidism have a serum level of cholesterol approximately 50% higher level than in euthyroid patients and 90% of all hypothyroid patients have elevated cholesterol level. Likewise, low levels of t4 have an effect in relaxing the sphincter of Oddi, leading to biliary stasis and stone formation. Only in 50% of cases, ultrasonography actually visualizes bile duct

stones. About 75% of cases of bile duct with a diameter greater than 6mm is seen in ultrasonography [9]. Endoscopic retrograde cholangiopancreatography (ERCP) is the standard method for the diagnosis and therapy of bile duct stones having sensitivity and specificity rates of approximately 95% [10].

Materials and methods

This study was conducted in the Department of General Surgery, Government Stanley Medical College, Chennai in 2018. Patients were divided according to history, clinical examination, and USG neck and lab estimation of T3, T4, and TSH.

Subclinical hypothyroidism: the symptom-free patient with TSH concentration above the upper limit of normal range and T3/T4 or both decrease below normal limit.

Clinical hypothyroidism: in which there were symptoms of hypothyroidism with TSH level above the upper limit and T3/T4 or both decreases below normal limit.

Euthyroid group: where clinical and lab tests were within normal range.

Inclusion criteria: Patients with cholelithiasis (the presence of gallstones on ultrasound).

Exclusion criteria: Excluded were patients with a history of previously diagnosed or treated thyroid function abnormalities, history of thyroidectomy, pregnancy, serious underlying diseases, sepsis or cholangitis and those prescribed medications known to affect the thyroid function test such as phenytoin, carbamazepine, metoclopramide, amiodarone, and lithium and statins.

Results

We included 60 patients diagnosed with Gallstone disease; 61.67% were females and 38.33% were males. In this study, a female was more comparable to male, may be due to earlier symptomatology of gallstone disease as well as a higher incidence of thyroid disease in women.

Of the 52 patients with euthyroid status, 21 of them belonged to the age group of 51-60 years. Subclinical hypothyroidism patients were almost distributed equally among the age group mentioned (Table – 1).

Table – 1: Thyroid status.

	No. of Patients	%
Subclinical Hypothyroidism	6	10%
Euthyroid Status	52	86.67%
Clinical Hypothyroidism	2	3.33%

Table – 2: Thyroid status in gall bladder stone.

	Euthyroid	Subclinical Hypothyroidism	Clinical hypothyroidism
Gallstones	45	5	2
Gallstones with CBD stone	7	1	0

Table – 3: Lipid profile in gallstones.

	TC >250 mg/dL	TGL >150 mg/dL
Gallstones	15	12
Gallstones with CBD stones	3	1

Of the 60 patients, 52 were diagnosed with gallstone only and 8 were diagnosed with gallstone and CBD stones (**Table – 2**).

In this study, total cholesterol levels were increased in 18 patients and increased total triglycerides seen in 13 patients. In this study, hyperlipidemia is seen in 7 of the hypothyroidism patients (**Table – 3**).

Discussion

Earlier, an association between gallstone and diagnosed hypothyroidism and delayed emptying of the biliary tract is shown. This relation was showed with a help of experimental and clinical hypothyroidism, explained at least partly by the lack of pro relaxing effect of T4 on the sphincter of Oddi contractility [11]. In recent years, experiments have demonstrated that low bile flow and sphincter of Oddi dysfunction are important functional mechanisms that may promote biliary stone formation. In this study, 61.67% were female compared with 38.33% of males. This is because of the early symptomatology of gallstones in females and a higher incidence of thyroid disease in women [12]. In a study conducted by Saravanakumar, et al. in 2012 at Faisalabad, out of 200 patients that were included in the study, 166(83%) were females and 34(17%) were male. These results are very similar to our study. It has been documented in many studies that being female is the single most important, non-modifiable cause of gallstones [13]. In this study, the population with gallstones was more in the age group of 51-60 compared to other age groups. It is expected that risk factors of gallstones or thyroid dysfunction increase with increase in age [14]. The study was conducted with data available of 4202 patients and found advancing age, increased BMI and low HDL levels as independent risk factors for the development of cholelithiasis. A similar study done by Mirella Fraquelli, et al. in October 2001 analyzed 330 patients. They observed that gallstones were significantly associated with age ($p < 0.001$) being 13%, 36% and 51% in patients aged 44 years and

younger, 45 to 59 years and 60 years and older, respectively [15]. In this study, subclinical hypothyroidism was seen in 5 of the patients with gallstones alone compare with one patient having gallstones and CBD stones. Serum TSH is a hallmark of thyroid dysfunction. The subclinical hypothyroidism is characterized by increased levels of serum TSH with normal T4 levels and lack of symptoms [16]. A study by Laukkarinen has shown hypothyroidism to be a common problem among patients with gallstone diseases. He concluded that hypothyroidism played a role in the formation of gallstones secondary to its effects of SO relaxation. These effects, in turn, might influence on emptying of the biliary system [17]. Patients with hypothyroidism are more prone to have an abnormality in lipid profile. In this study, 5 of the patients with subclinical hypothyroidism are having elevated levels of total cholesterol and total triglyceride [18]. The mechanism leading to this is multifactorial. Thyroid hormones influence the synthesis, absorption, and usage of cholesterol in human body. So, it can be concluded that the serum TSH level is an independent factor that could be considered a risk factor for the formation of gallstones [19, 20].

Conclusion

There is a relationship between thyroid dysfunction particularly hypothyroidism and gallstone diseases. Hypothyroidism is seen more in GB stones patients compare with CBD stone patients. Subclinical hypothyroidism is more common than clinical hypothyroidism. Hypothyroidism has a higher prevalence in females than males. High cholesterol levels are seen in gallstone disease with thyroid dysfunction. So, we recommend that the surgeon should be aware of thyroid background in patients with the biliary stone disease, TSH should be measured as most are subclinically hypothyroid along with lipid profile.

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