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Research Article

PREVALENCE OF HYPOTHYROIDISM IN PATIENTS WITH GALL STONE DISEASE IN A RURAL TERTIARY CARE HOSPITAL

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ABSTRACT

Background: Gallstone disease is a prevalent condition, with increasing evidence suggesting a link to hypothyroidism. However, the exact relationship between thyroid abnormalities and gallstone disease is not wellestablished. This studyaims to assess the prevalence of hypothyroidism among gallstone patients and explore its potential role in disease progression.

Aims and Objectives: • To find the prevalence of hypothyroidism in patients with gallstone disease and association between hypothyroidism and gallstone disease.

Methods: A descriptive observational study was conducted at Government Thiruvarur Medical College, Tamil Nadu, from June 2024 to May 2025. Patients aged 18–75 with gallstone disease were included. Thyroid functionwasassessed through TFT, categorizing patients into euthyroid, subclinical hypothyroid, and hypothyroid groups. Data were analyzed using descriptive statistics.

Results: Hypothyroidism was present in 23.5% of gallstone patients, with subclinical hypothyroidism (16.5%) more common than overt hypothyroidism (7%). Fatigue (13%) and constipation (8.5%) were the most common hypothyroid symptoms. Among those with choledocholithiasis, 29.4% had subclinical hypothyroidism and in particular, women had higher thyroid dysfunction (94.1%).

Conclusion: Thyroid dysfunction,

particularly subclinical hypothyroidism, is common in gallstone patients. Routine thyroid screening is recommended, especially for middle-aged women with gallstones,to prevent disease progression and recurrence.

Keywords: Gall stone disease, Hypothyroidism, Subclinical Hypothyroidism, TFT

INTRODUCTION

Millions of individuals around the world are affected by gall stone disease (cholelithiasis)a frequent illness characterized by stones within the gallbladder. It is a leading cause of morbidity, manifesting with complications such as pancreatitis, biliary colic and cholecystitis. Many factors such as genetics, diet, metabolic abnormalities, and endocrine disturbances, all play their part in the disease. [1]

Gallstone development is, to a great extent, metabolic in origin, with lipid metabolism abnormalities playing an important role. Most common type of gallstones are cholesterol gallstones, which arise when disruption of bile composition leads to super saturation of the bile by cholesterol. The cause of this disruption is numerous metabolic disorders, with hypothyroidism increasinglyrecognized as a potential risk factor. [2]

An inability to produce thyroid hormones is the defining characteristic of hypothyroidism, which affects a number of body systems. Regulation of metabolic functions, particularly lipid and bile acid metabolism, relies on these hormones. Reduced thyroid hormone levels result in less liver secretion of bile, cholesterol becoming less soluble in bile, and reduced gallbladder motility. Together, these changes provide conditions favorable to gallstone development. [3]

Many clinical studies attest to the association between gallstone disease and hypothyroidism. Gallstone development is more frequent in patients with hypothyroidism, especially untreated or undertreated patients. This can be attributed to the dual role of hypothyroidism on the motility of the gallbladder and bile composition. Crystallisation of cholesterol precedes the development of gallstonesand is promoted bydecreased bile flow and stasis of gallbladder bile. [4]

Hypothyroid patients are predisposed to gallstone disease because of hormonal and physiological alterations. For example, hypothyroidism prolongs intestinal transit time so that bile reabsorption increases, thus cholesterol saturation in bile increases. In addition, the metabolic depression that comes with hypothyroidism disables the clearance of cholesterol from the blood, adding to its sequestration in bile. [5]

Apart from metabolic consequences, hypothyroidism also modifies gallbladder physiology. Thyroid hormones modulate smooth muscle contractility, such as that of the gallbladder wall. In hypothyroidism, diminished contractility results in partial gallbladder emptying with bile stasis and enhanced predisposition to gallstone formation. These multifactorial pathways emphasize the need for lecturing thyroid dysfunction in gallstone sickness patients. [6]

Research has found gallstone disease to be more prevalent in patients with thyroid disorders, particularly in women, who are otherwise predisposed due to hormone-related factors such as estrogen. This

highlights the significance ofthyroid function testing in gallstone disease patients, particularly those who are in high-risk groups. [7]

Despite such correlations, thyroid abnormalities are often overlooked when managing gallstone disease. While cholecystectomy represents the common surgical intervention for symptomatic gallstones, correction of underlying metabolic conditions such as hypothyroidism might be necessary for the prevention of recurrence and improvement of long-term outcomes. [8]

In the management of gallstone disease, prevention by addressing metabolic risk factors, including hypothyroidism, is being increasingly accepted. Decreasing bile cholesterol super saturation, enhancing gallbladder motility, and reducing recurrence risk for gall stones could all be possible with the correction
of thyroid dysfunction. The higher goals of prevention andindividualized medicine are consistent with this approach. [9, 10]

The purpose of this study is to assess the prevalence of hypothyroidism among patients with gallstone disease and define a possible causal link between the two diseases. In doing so, thisresearch aims to highlight the criticalityofearlydiagnosis and treatment ofhypothyroidism inpreventing gallstone disease and its recurrence, thereby favorable to more effective management strategies for concerned patients.

AIMS AND OBJECTIVES

- Toestimate the prevalence of hypothyroidism in patients diagnosed with gall stone disease.
- To examine the relationship between hypothyroidism and gallstone disease,

METHODOLOGY

This research was conducted in the Department of General Surgery, in patients diagnosed with Gall stones at Government Thiruvarur Medical College, Tamil Nadu, India. This research was carried out over the course of one year - June 2024 to May 2025.According to an estimated 13.8% incidence of hypothyroidism in patients with gallstone disease, the sample size for the study was calculated to 200 participants. All the patients who were presenting to the Department of General Surgery with a diagnosis of gallstone disease, established by ultrasonography, were screened for eligibility in accordance with the inclusion and exclusion criteria. Informed consent was taken and clinical history and symptoms of gallstone disease and hypothyroidism were documented on a structured proforma. Routine investigations such as thyroid function tests were carried out and patients were classified according to thyroid status and clinical presentation. The collection of data was standardized for consistency and reliability.

Patient data were constructed based on a predetermined proforma that captured demographic details, clinical results, and diagnostic results. The proforma was constructed with certain predetermined sections for thyroid function tests, symptoms of gallstones, and patient characteristics. The data collected was evaluated using descriptive statistical methods, such as frequencies and percentages. For ease of visualization, tables and pie charts were generated using statistical analysis software. For comparison of thyroid function categories and their relationship with gallstone disease, subgroup analyses were performed using statistical tests in SPSS.

Permission was obtained from the institutional ethics committee prior to the commencement of the study. Informed consent was given by all participants following a proper explanation of the study's purpose, procedures, and potential risks. Patient confidentiality was guaranteed throughout the study/

RESULTS

Age Structure of Study Participants

Age profile of gallstone disease patients in this research indicated that the majority were above the age of 60 years, which comprised 26% of the sample. The age groups 31–40, 41–50, and 51-60 years each sponsored approximately equal proportions (approximately 18–19.5%), which reflects that middle-aged individuals and old persons constitute the majority population affected. Of the 200 gallstone disease patients, 52.5% werefemale and 47.5% were male.

Table 1.Age-wise distribution of study participants with gall stone disease (N=200)

Age Group(Years)	Frequency	Percentage (%)
<20	3	1.5
21–30	32	16.0
31–40	39	19.5
41–50	37	18.5
51–60	37	18.5
>60	52	26.0
Total	**200**	**100.0**

Clinical Presentation of Gall stone Disease

The most presenting symptom among patients with gallstones was in accessibile abdominal pain, which was complained of by 41% of the study subjects. This was followed by abdominal pain and vomiting (15%) as well as by nausea alone (13%).

Table2.Distribution of symptoms among patients with gall stone disease

Symptoms	Frequency	Percentage (%)
Abdominal pain	82	41.0
Abdominal pain, vomiting	30	15.0
Nausea	26	13.0
Abdominal pain, nausea	14	7.0
Vomiting	21	10.5

Nausea, vomiting, abdominal pain	1	0.5
Nausea, vomiting	1	0.5
Nil (Asymptomatic)	25	12.5
Total	200	100.0

Clinical Symptoms Related to Hypothyroidism

63% of patients in this cohort had no symptoms at all suggestive of hypothyroidism, indicative of the subclinicality of thyroid disease in most individuals. In symptomatic patients, the most frequent complaints were fatigue (13%) and constipation (8.5%), followed by an increase in weight (7%). Few patients had combinations of symptoms like fatigue with menstrual irregularities or changes in weight.

Table 3. Distribution of hypothyroid-related symptoms among study participants (N=200)

Hypothyroid Symptoms	Frequency	Percentage (%)
Nil	126	63
Fatigue	26	13.0
Constipation	17	8.5
Weight gain	14	7.0
Fatigue, Constipation	5	2.5
Lethargy	2	1.0
Lethargy, Constipation	3	1.5
Fatigue,Weightgain	3	1.5
Fatigue, Menstrual abnormalities, Constipation	1	0.5
Lethargy, Weight gain	1	0.5
Lethargy, Weight gain, Loss of appetite	1	0.5
Weight gain, Constipation	1	0.5
Total	**200**	**100.0**

Gall stone disease-related ultrasonographic findings

In ultrasonography findings, 8.5% of patients had both cholelithiasis and

choledocholithiasis, while 91.5% of patients had isolated cholelithiasis. Gallstones in the common bile duct (choledocholithiasis) indicate a more complex course of the disease and call for additional treatment such as endoscopic retrograde cholangiopancreatography (ERCP).

Table 4: Ultrasonographic findings of gallstones in study participants (N=200)

USGFinding	Frequency	Percentage (%)
Cholelithiasis	183	91.5
Cholelithiasis with Choledocholithiasis	17	8.5
Total	**200**	**100.0**

Thyroid Function Status

Thyroid dysfunction was identified in 23.5% of patients with gallstones in the present study, 16.5% with subclinical hypothyroidism and 7% with overt hypothyroidism.

Table 5: Thyroid function status distribution in galls tone disease patients(N=200)

Parameter	Frequency	Percentage (%)
Hypothyroid / Sub clinical	47	23.5
Normal	153	72.5
Total	**200**	**100.0**

Thyroid Function Status Distribution by Age Group

Euthyroid status was the most frequent status among the 200 participants of the study across all ages, with the greatest frequency in the age group above 60 (28.8%).Subclinical hypothyroidism was more frequent in the agesbetween21–30 and 41–50, representing 27.3%and 24.2%ofcases, respectively. The age group 41 to 50 years had the greatest frequency of overt hypothyroidism(35.7%).

Table6. Thyroid function status distribution by age in gall stone disease patients (N=200)

Age Group (Years)	Euthyroid (n)	Hypothyroidism (n)	Subclinical Hypothyroidism (n)	Total (n)
<20	1(0.7%)	1(7.1%)	1(3.0%)	3

21–30	21(13.7%)	2(14.3%)	9(27.3%)	32
31–40	32(20.9%)	3(21.4%)	4(12.1%)	39
41–50	24(15.7%)	5(35.7%)	8(24.2%)	37
51–60	31(20.3%)	2(14.3%)	4(12.1%)	37
>60	44(28.8%)	1(7.1%)	7(21.2%)	52
Total	**153(100%)**	**14(100%)**	**33(100%)**	**200**

Thyroid Hormone Level Comparison by Gall stone Disease Type

Thyroid profiles were significantly different in patients with choledocholithiasis and cholelithiasis compared to those with cholelithiasis alone. The mean serum TSH was greater in the choledocholithiasis group (9.34 mIU/L vs. 6.95 mIU/L, p = 0.034), indicating more pronounced hypothyroid tendencies. In addition, the choledocholithiasis group presented with lower mean values of Free T3 and Free T4 (T3: 3.56 vs. 4.00 pmol/L, p = 0.001; T4: 13.42 vs. 22.09 pmol/L, p = 0.026). Such statistically significant findings imply a strong implication between thyroid dysfunction and types of gallstone disease.

Table7.Serum thyroid hormone levels in patients with cholelithiasis versus cholelithiasis with choledocholithiasis

Thyroid Marker	Cholelithiasis (Mean ± SD)	Cholelithiasis with Choledocholithiasis (Mean ±SD)	*p*- value
TSH (0.39–6.16mIU/L)	6.95±6.66	9.34±7.88	0.034*
Free T3 (2.6–6.2 pmol/L)	4.00± 1.00	3.56± 0.93	0.001*
Free T4 (9–21 pmol/L)	22.09± 113.47	13.42± 2.83	0.026*

*P Value <0.05 using Student T test

Association between Thyroid Function and Type of Gall stone Disease

Among patients with isolated cholelithiasis, 78.1% were euthyroid, 6.6% were hypothyroid and 15.4% were subclinical hypothyroid. Comparing this result with choledocholithiasis, subclinical hypothyroidism was more common with 29.4%, with 58.8% being euthyroid and 11.8% having overt hypothyroidism. While the trend indicates increased prevalence of thyroid dysfunction, particularly

Subclinical hypothyroidism, in patients with more complicated gall stone disease, the suggestion fell short of statistical significance (p = 0.198).

Table 8. Distribution of thyroid function status by ultrasonographic gall stone findings (N= 200)

Thyroid Status	Cholelithiasis (n, %)	Choledocholithiasis (n, %)	Total (n)	*p*-value
Euthyroid	143(78.1%)	10(58.8%)	153	**0.198**
Hypothyroidism	12 (6.6%)	2(11.8%)	14	
Subclinical Hypothyroidism	28(15.4%)	5(29.4%)	33	
Total	**183(100%)**	**17(100%)**	**200**	

P Value >0.05 using Chi square test

DISCUSSION

1. Demographic Profile of Gall stone Disease Patients

Gallstone disease was highest in patients over 60 years of age (26%), followed by those between 31 and 60 years, together contributing to more than half the sample. This pattern is consistent with prior studies suggesting age-related trends in gallstone occurrence, Rana et al. (2020) found the most frequent age group for gallstone patients to be 41–50 years of age, supporting the theorythat middle-aged and elderly individuals are overrepresented bythis ailment [11].

Gender distribution in the present study also followed traditional lines, with females making up 52.5% of cases. This female predominance of gallstone disease is also commonly cited and has been explained on the basis of hormonal effects, especially the impact of estrogen on bile cholesterol saturation. A number of studies corroborate this finding. Stephen et al. (2016) identified that in subclinical hypothyroid gall stone patients, 83.3%werefemale [12]. Likewise, Ahmed et al.(2020) stated that 78.57% of women with hypothyroidism were reported [13], The interaction between the female gender, increasing age, and hypothyroidism is of clinical relevance when evaluating gallstone disease.

This age and sex demographic profiling highlights the clinical importance of age and sex as factors to consider when evaluating risk and designing interventions for gall stone disease. Because of the reported overlap among female sex, hypothyroidism and gallstone disease, universal screening for thyroid dysfunction in women with gallstones, particularly those older than age 30, could provide important advantages for early diagnosis and prevention. Pokhrel et al. (2023) whole heartedly endorse this policy, reporting a 25.58% prevalence of hypothyroidism among their hospital population, and of these, 72.08% in women [14].

2. Symptomatology and Clinical Presentation

Abdominal pain was the most commonly reported symptom in the present study among patients with gallstone disease, either in isolation (41%) or with accompanying vomiting or nausea. This is consistent with the classical presentation of biliary colic. 12.5% of the patients were notably asymptomatic, highlighting incidental discovery during investigation for unrelated gastrointestinalsymptoms or

as part of routine imaging. These observations mirror the range ofgallstone disease, extending fromsilent stones to acute symptomatic disease necessitating treatment.

Symptoms related to gallstones as well as those related to hypothyroid were assessed. A large percentage of patients (63%) had no symptoms consistent with hypothyroidism, suggesting the prevalence ofsubclinicaldisease. Among those with complaints, fatigue (13%), constipation (8.5%), and weight gain (7%) were the most frequent.

Stephen et al. (2016) also found 13% of gallstone patients to have a subclinical hypothyroidism prevalence, presenting many without obvious symptoms [12]. The similarity between our discussion of overlapping symptoms of hypothyroidism and gallstones—lethargy, dyspepsia, and abdominalpain—may pose challenges in clinical diagnosis if not actively screened. Rahman et al. (2021) further portrayed the overlap, presenting that 28.7% of gallstone patients presented with subclinical hypothyroidism, furthering emphasizing the silent presentation of thyroid dysfunction among this patient group [15].

3. **Thyroid Dysfunction Prevalence and Patterns**

Thyroid dysfunction was identified in 23.5% of patients with gallstones in the present study, 16.5% with subclinical hypothyroidism and 7% with overt hypothyroidism. The higher prevalence of subclinical hypothyroidism agrees with previous reports, suggesting a high but hidden prevalence of thyroid disease among gallstone patients. The need for active thyroid screening is underscored by such findings, particularly in groups at risk for the two diseases.

The results of Rahman et al. (2021), who found 31.9% thyroid dysfunction among gallstone patients where 28.7% were subclinical cases and only 3.2% were clinical hypothyroidism, are in line with the high prevalence of subclinical hypothyroidism[15]. Similarly, Dangi et al. (2023) revealed that 41.9% Of patients with gall stones were found to have hypothyroidism, most of whom were subclinical and newly diagnosed [16]. These uniform trends among studies confirm that thyroid dysfunction is not merely prevalent but often remains undiagnosed among patients with gallstone disease.

The findings of the present study also indicate the gender predisposition of thyroid dysfunction in gallstone patients. A greater percentage of the females were hypothyroid, consistent with findings from Ahmed et al. (2020), where 78.57% of female hypothyroid patients with gallstones [13]. Manimegalai et al. (2019) also found that 78.57% of their female hypothyroid gallstone group, showing a strong gender correlation [17].

4. **Association Between Gall stone Severity and Thyroid Dysfunction**

Through a comparison of thyroid profiles in patients with simple cholelithiasis and those with complicated presentations, including cholelithiasis with choledocholithiasis, the present study explored the relationship between thyroid function and the severity of gallstone disease. More patients with choledocholithiasis had thyroid dysfunction; particularly subclinical hypothyroidism, while most gallstone patients were euthyroid. Specifically, subclinical hypothyroidism was found in 29.4% of cases of choledocholithiasis and 15.4% of cases of cholelithiasis. Even though this difference was not statistically significant ($p = 0.198$); the trend in the results indicates that thyroid dysfunction could be involved in the course and complications of gallstone disease.

This trend is corroborated by the evidence of Issa et al. (2018), which documented a high incidence of hypothyroidism (13.8%) in patients with gallstones and identified its correlation with abnormal lipid metabolism appreciated to be an etiological factor for gallstones and potentially progression of disease [18].

Similarly, Dangi et al., observed a 41.9% incidence of hypothyroidism in gallstone patients and once again underscored that thyroid dysfunction is not coincidental but may contribute to the severity of the disease [16].

In addition, the occurrence of overt hypothyroidism in 11.8% of choledocholithiasis patients versus 6.6% of those with uncomplicated cholelithiasis supports the hypothesis that thyroid disease could be a reason for a more complicated disease phenotype. This result is consistent with Sinha et al., who reported that hypothyroidism occurred with greater frequency in gallstone patients with metabolic disorders like dyslipidemia and multiple stones - characteristics more frequently associated with complicated gallstone disease [19].

5. **Thyroid Hormone Profile and Biochemical Correlation**

The biochemical test of the current study presented a remarkable difference between the level of thyroid hormones in patients with simple cholelithiasis and patients with cholelithiasis complicated by choledocholithiasis. The average serum TSH was higher in the group of choledocholithiasis (9.34 ± 7.88 mIU/L) compared to the cholelithiasis group (6.95 ± 6.66 mIU/L), where there was a statistically significant difference ($p = 0.034$).

These findings strongly indicate that thyroid dysfunction is not accidental but possibly biochemically related to gallstone pathophysiology. Decreased levels of FT3 and FT4, even in subclinical hypothyroidism, inhibit gallbladder motility and change hepatic bile secretion, favoring bile stasis and cholesterol super saturation. Issaet al.(2018) highlighted this mechanism, observing an evident correlation between hypothyroidism, lipid disturbances, and gallstone occurrence in their series of 232 patients [18].

Finally, these results present a compelling argument for adding thyroid hormone evaluation, particularly TSH, FT3, and FT4 assays, to the routine diagnostic evaluation of patients with gallstones, particularly those with atypical symptoms or signs of complicated disease.

CONCLUSION

Gallstone disease is a common and clinicallyrelevant condition found in people of all ages, with a striking propensity for middle-aged and elderly individuals. Investigation of the frequency of hypothyroidism in gallstone disease patients and any potential associations between thyroid disease and severity of biliary disease were the aims of the present study.

The majority of the 200 study patients were more than 40 years old, and a significant proportion of them were greater than 60 years of age. There was a slight female predominance, which reflects known epidemiological patterns. If one examines the association between sex and complex gall stone presentation, this gender difference was further highlighted as the vast majority of choledocholithiasis patients were female. These results underscore the importance of considering demographic factors such as age and sexin performing risk evaluations and rendering clinical care.

Almost 25% of the subjects of the study were suffering from thyroid dysfunction, and the most common form was subclinical hypothyroidism. This highlights the significance of standard biochemical screening and emphasizes the often-neglected endocrine element of gallstone disease. As a result of subclinical hypothyroidism, which can alter the composition of bile as well as motility of the gallbladder, two physiological alterations which increase the potential for gallstone formation, it may be challenging to diagnose despite the fact that it does not present with any apparent symptoms.

A high correlation was noted by the study between thyroid dysfunction and more severe gallstone diseases. Individuals with uncomplicated cholelithiasis were compared to patients with

choledocholithiasis, who had significantly lower free T3 and T4 levels and elevated TSH levels. The biochemical distinctions observed signify a pathophysiological association that requires further investigation despite the failure to achieve statistical significance in categorical analysis between thyroid status and disease severity. This hormonal profile is consistent with the view that thyroid dysfunction contributes to the pathogenesis of stones, as well as to the progression and complications of the disease.

Female gender and choledocholithiasis showed a significant correlation, which is one of the most significant results of the study. Being female and having underlying or undiagnosed thyroid dysfunction can be a compounded risk factor, since the overwhelming majority of patients presenting with this complication were female. On the basis of these findings, universalthyroid screening could be crucial for early detection and preventive treatment of gallstone disease in female patients, especially those with complex or recurrent cases.

The implications are clear from a clinical perspective. All patients with gallstone disease, especially women and those over 40 years of age, should have thyroid function tests on a regular basis, including TSH, FT3, and FT4, as part of the routine diagnostic evaluation. Besides enhancing overall health outcomes, the detection and treatment of subclinical hypothyroidism in this group might reduce the likelihood of gallstone disease complications or recurrence. Furthermore, this type of screening may enhance postoperative management and surgical planning, particularly for patients undergoing cholecystectomy who may have unsuspected endocrine or metabolic comorbidity.

This research concludes that there is a high correlation between gallstone disease and thyroid dysfunction, in the form of subclinical hypothyroidism. It brings into focus the increased susceptibility of female patients and leaves open the possibility that biochemical thyroid derangement may influence the development and severity of gallstone disease. These findings confirm a more comprehensive, preventative, and individualized scheme of care by favoring the inclusion of thyroid screening in the standard assessment of patients with gallstone

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