

A Cross - Sectional Study on Association Between Hypothyroidism and Cholelithiasis at a Rural Tertiary Care Centre

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Abstract: Background: Gallstones are the most common biliary pathology, can be divided into three main types cholesterol, pigment (black, brown) or mixed stones. In India 10% are cholesterol stones, 5% are pigment stones, and 75 - 80% are mixed stones. About 80% of gallstones are asymptomatic and are detected incidentally. Thyroid disorder is a prevalent condition among adult population; however, it is frequently over looked. 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; these explanations include the known link between thyroid failure and disturbances of lipid metabolism that may lead to changes in composition of bile. Aim and objective: To estimate TSH levels in patients who are diagnosed with cholelithiasis. To investigate the correlation between Cholelithiasis and thyroid dysfunction. Material and Method: A cross - sectional observational study conducted at Akash hospital, Devanahalli, Bengaluru rural. Consisting of 128 patients over the age of 18 diagnosed with cholelithiasis by ultrasonography. These patients were subjected to fasting serum TSH levels evaluation and were categorised into 2 cohorts based on the fasting serum TSH levels into normal thyroid function (0.35 - 3.5) and thyroid dysfunction (<0.3 to >3.5). The findings were statistically analysed using SPSS and findings are graphed. Results: Among the 128 subjects, 83 (64.8%) were female, while 45 (35.2%) were male. Within this pool, 73 patients (57%) were identified as hypothyroid and none were hyperthyroid, with peak age of 45, 85 (66.4%) were asymptomatic and the most common symptoms begin weight gain (26.6%) and weakness (23.4%). Of the 128 cholelithiasis patients 43% (55) were -asymptomatic and the most common symptom was dyspepsia 57% (73). Conclusion: The analysis highlighted a significant association between thyroid dysfunction and cholelithiasis, with a majority of patients exhibiting altered TSH levels. The prevalence of hypothyroidism was notably higher in this study compared to previous research, emphasizing the importance of considering thyroid function in the management of cholelithiasis. Investigating TSH values not only give reason for high incidence of gallstone disease and also help in overall management of patient as most patients will be subjected to surgical line of management, where in ensuring euthyroid status of the patient becomes mandatory. Moving forward, it is crucial to include thyroid function screening in the healthcare regimen of individuals diagnosed with gallstones, particularly those over 40 years old. By addressing thyroid dysfunction as a potential risk factor in patients with cholelithiasis

Keywords: Gallstones, Thyroid Dysfunction, Cholelithiasis, Hypothyroidism, TSH Levels

1. Introduction

The prevalence of cholelithiasis in Delhi reaches 21.5 per 100, 000 among females¹, predominantly affecting young to middle - aged individuals who are otherwise healthy, with autopsy reports indicating a prevalence of 11 - 36%. Moreover, while hypothyroidism affects approximately 10.95% of the Indian population², the study aims to explore the correlation between hypothyroidism and cholelithiasis, as well as the complications arising from laparoscopic cholecystectomy.

2. Material and Methods

A cross sectional study conducted at Akash hospital, Devanahalli. It included 128 patients between the ages of 18 and 80 years.

Participants less than 18 years old.

Individuals unwilling to engage in the study.

Subjects currently or formerly administered Thyroxine therapy.

Subjects currently or formerly administered antithyroid therapy.

Individuals receiving Anti - lipidemic pharmacotherapy.

Patients with established hepatic disorders.

Individuals who have undergone cholecystectomy or total thyroidectomy.

Were excluded from the study.

Aims and objectives of the study

To evaluate association between hypothyroidism and Cholelithiasis.

3. Observations and Results

A cross - sectional study was conducted to investigate the association between cholelithiasis and hypothyroidism. A total of 128 patients who met the inclusion criteria were examined. These individuals were selected from the surgical department of Akash Institute of Medical College, covering the period from September 2022 to December 2023. Each patient underwent a clinical evaluation, and only necessary

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investigations were carried out prior to surgery, which included thyroid function tests. The findings are presented below.

We included 128 patients diagnosed with cholelithiasis; 64.8% were females and 35.2% were males. In this study, females are more compare to males.

Of the 128 patients, majority of patients were classified as hypothyroid 73 (57%), 55 (43%) patients were classified as normal (euthyroid) thyroid status.

Most of patients had Dyspepsia as a complaint 73 (57%), while 55 (43%) patients had cholelithiasis as an incidental finding on sonography, 42 (32.8%) had right upper quadrant pain, 13 (10.2%) patients and 6 (4.7%) had vomiting and fever respectively. No patients had jaundice at the time of presentation.

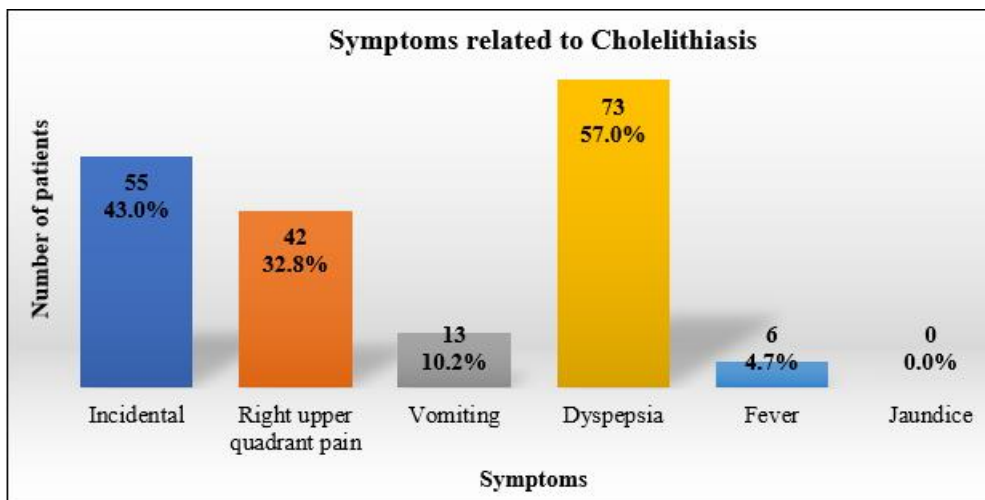


Figure 1

Among the 128 patients studied, 85 individuals (64.4%) exhibited no symptoms associated with either hyperthyroidism or hypothyroidism. In contrast, 34 patients (26.6%) reported a perceived increase in weight over the past year, while 30 patients (23.4%) experienced feelings of

weakness. Additionally, 12 patients noted alterations in their sleep patterns or duration, and 8 patients (6.3%) reported changes in skin texture. Notably, none of the patients presented with complaints related to weight loss, heat intolerance, diarrhea, or palpitations.

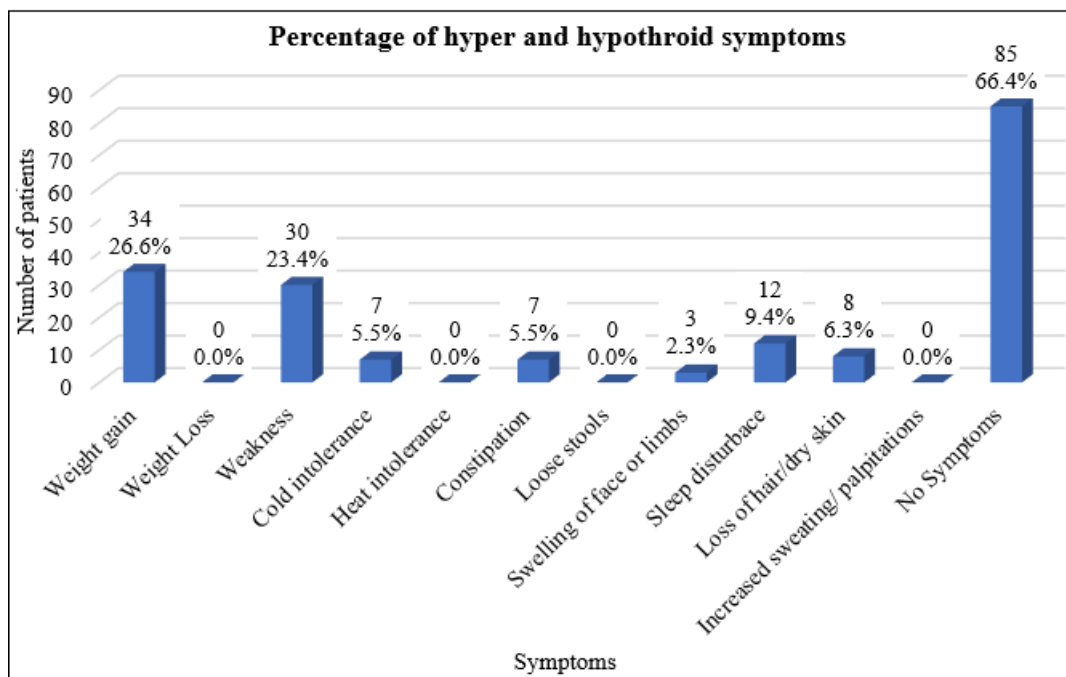


Figure 2

TSH Level status:

For the study base line TSH levels were taken in range of 0.39 - 3.55 as reference base line, 73 (57.03%) had altered TSH levels and 55 (42.97%) had normal TSH levels.

Table 1: TSH levels

Symptom	Number	Percentage
Altered TSH level	73	57.03%
Normal	55	42.97%

Table 2: Chi - square tests

Statistical test	Value	df	P - value
Pearson Chi - Square	37.737	1	.000
Continuity Correction	35.337	1	.000
Likelihood Ratio	50.911	1	.000
Linear - by - Linear Association	37.442	1	.000
N of Valid Cases	128		

All these tests consistently show p - values of .000, providing strong evidence that there is a significant association between the categorical variables cholelithiasis and hypothyroidism (0.3 - 3.5 vs <0.3 to >3.5).

4. Discussion

Gallstone formation represents a complex phenomenon characterized by a multitude of mechanisms that affect the dynamics of bile and its biochemical composition. A range of factors is implicated, including a decline in hepatic cholesterol metabolism, a reduction in bile secretion from the liver, a decreased flow of bile into the duodenum, and impaired relaxation of the sphincter of Oddi, all of which synergistically contribute to gallstone formation in individuals suffering from hypothyroidism. Patients with hypothyroidism frequently demonstrate biliary stasis due to the sluggish clearance of bile from the biliary system into the duodenum, a condition attributed to the reduced pro - relaxing influences of thyroxine on the sphincter of Oddi in these patients.

The investigation conducted at Akash Institute of Medical Sciences located in Devanahalli, Bangalore, involved a sample of 128 patients diagnosed with cholelithiasis under the aegis of the Department of General Surgery. Within this cohort, 83 (64.8%) were female, with a median age of 45 years and a mode of 60 years, while 45 (35.2%) were male, with a median age of 50 years and a mode of 52 years. Among the 128 patients, 73 individuals (57%) were recognized as having thyroid dysfunction, of which 25 (34.2%) were males with a median age of 50 years and a modal age of 45 years, while 48 (65.8%) were females with a median age group of 44 years and a mode of 45 years. All 73 patients exhibited TSH levels exceeding 3.55 (indicative of hypothyroidism).

Inkinen et al.³ undertook a study that elucidates a noteworthy and statistically significant relationship between the occurrence of common bile duct stones and hypothyroidism, contrasting this with the correlation between gallbladder stones and hypothyroidism. This suggests that the alteration in cholesterol metabolism cannot be viewed as the singular or primary mechanism driving the formation and evolution of gallstones, a conclusion that highlights the intricate nature of these interconnected medical conditions.

In an extensive study performed by Hassan H. Zaini and Kussay M. Zwain, the findings indicated that the prevalence of hypothyroidism within the cohort examined by Hassan was observed at a significant rate of 10.6%, with the demographic peak age group notably delineated as being between 51 to 60 years old⁴, which curiously corresponds with the peak age range identified in our own research, namely 45 to 60 years.

Avvai et al., through a cross - sectional analysis, reached a conclusive determination that the incidence of hypothyroidism was significantly higher among patients diagnosed with gallbladder stones⁵.

Arun et al.⁶ undertook a study examining the incidence of hypothyroidism among individuals diagnosed with cholelithiasis at Trissur Medical College in Kerala, revealing a higher occurrence of male hypothyroid patients in comparison to their female counterparts within the scope of gallstone pathology. This observation prompted the conclusion that individuals afflicted with gallstones should be subjected to serum TSH testing, given the significantly elevated rate of hypothyroidism identified within this particular patient cohort. Conversely, in our investigation, the proportion of males and females diagnosed with thyroid dysfunction was nearly equivalent, recorded at 55% and 57%, respectively.

The collective findings from these varied studies align with the outcomes of our own research, which clarifies a distinct association between the occurrence of cholelithiasis and thyroid gland dysfunction, particularly concerning hypothyroidism. This connection underscores the importance of recognizing these relationships in clinical practice.

Our analysis attributes the elevated prevalence of symptomatic cholelithiasis and altered TSH levels observed in our study to the revised upper limit of normal TSH levels. This modification may be a result of the specific context of our research, conducted in a rural tertiary care facility that receives referrals from primary health centers in nearby rural locales, thus resulting in a greater influx of patients presenting with symptomatic cholelithiasis and hypothyroidism.

This increase in prevalence could potentially influence the diagnostic and treatment protocols for patients with cholelithiasis. Consequently, it is essential to evaluate the thyroid function in cholelithiasis patients and incorporate thyroid function screenings into their medical care. Monitoring TSH levels is vital, as it may reveal instances of subclinical hypothyroidism or overt hypothyroidism, especially in patients aged over 40 years. Therefore, it is critical to recognize hypothyroidism as an independent risk factor in individuals with cholelithiasis.

5. Conclusion

In conclusion, the findings from the cross - sectional study conducted at the Akash Institute of Medical Sciences shed light on the association between cholelithiasis and hypothyroidism. The results revealed intriguing insights into the demographic profiles, thyroid status, symptoms related to cholelithiasis, hyper or hypothyroid symptoms, comorbid

conditions, number of calculi, and TSH level status among the 128 patients studied.

The results fall inline with the other studies conducted in different parts of the world and India, which show significant correlation between thyroid dysfunction and cholelithiasis.

Our analysis highlighted a significant and evident association between hypothyroidism and cholelithiasis, with a majority of patients exhibiting elevated TSH levels. The prevalence of hypothyroidism is notably higher in this study compared to previous research, emphasizing the importance of considering thyroid function in the management of cholelithiasis.

Advancing our understanding, it is imperative to integrate thyroid function screening into the comprehensive healthcare protocols for individuals who have been diagnosed with gallstones, with a particular emphasis on those individuals who are aged 40 years and older. Furthermore, we arrive at an understanding that there is a pressing necessity for the conduction of more extensive multi - centric studies that are designed to accurately represent the diverse local populations to reinforce the evidence supporting the association between cholelithiasis and thyroid dysfunction.

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