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Exploring the association: A Retrospective study on hypothyroidism and gallstone disease

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Abstract

Background: Gallbladder stones are a common biliary disorder with multiple contributing factors. Thyroid hormones influence gallbladder motility and lipid metabolism, and hypothyroidism has been proposed as a potential factor in gallstone formation due to its role in bile stasis and altered cholesterol metabolism.

Aims & Objectives: This study aimed to evaluate whether hypothyroidism is associated with the formation of a specific type of gallstone—cholesterol or pigment.

Methods: A retrospective analysis was conducted on 100 patients diagnosed with gallstone disease who underwent laparoscopic cholecystectomy. Patients were categorized into two groups based on thyroid function: Group A (n=50, Euthyroid) and Group B (n=50, Hypothyroid). Postoperative analysis was performed to determine gallstone composition, and statistical comparisons were made between the two groups.

Results: In Group A (Euthyroid patients), 27 had pigment stones and 23 had cholesterol stones, while in Group B (Hypothyroid patients), 20 had pigment stones and 30 had cholesterol stones. Statistical analysis using the chi-square test resulted in a χ^2 value of 1.38 and a p-value of 0.24, indicating no significant correlation between thyroid dysfunction and the type of gallstone formed ($p > 0.05$).

Conclusion: Although gallstones may be more prevalent in patients with hypothyroidism, the findings suggest that thyroid dysfunction does not influence the composition of gallstones. Therefore, hypothyroidism is not an independent risk factor for the formation of either cholesterol or pigment stones.

Keywords: Cholelithiasis, Hypothyroidism, Pigment Stones, Cholesterol Stones, Gallstones, Biliary Stones.

Introduction

Cholelithiasis is a common biliary disorder with a multifactorial etiology, including genetic, metabolic, and endocrine influences. Among various risk factors, hypothyroidism has been suggested as a potential contributor to gallstone formation due to its effects on bile composition, gallbladder motility, and lipid metabolism. Thyroid hormones play a crucial role in regulating hepatic cholesterol homeostasis and bile acid synthesis, and their deficiency may lead to bile stasis and cholesterol supersaturation, predisposing individuals to gallstone formation1. Reduced gallbladder motility in hypothyroid patients leads to impaired bile flow, creating a stasis that increases the risk of gallstone formation.2 Additionally, thyroid hormone deficiency disrupts lipid metabolism, elevating the cholesterol-to-bile acid ratio and promoting cholesterol crystallization, further contributing to gallstone development.3

Despite this growing body of evidence, the relationship between hypothyroidism and cholelithiasis remains inconclusive, with some studies reporting conflicting results. To address this gap, our retrospective study aims to evaluate the correlation between hypothyroidism and gallstone disease by categorizing patients based on their thyroid function status and analysing postoperative gallstone composition.4 By assessing these variables, this study seeks to contribute to a deeper understanding of the metabolic and endocrine factors influencing gallstone formation, potentially aiding in better risk stratification and management of at-risk patients.

Materials and Methods

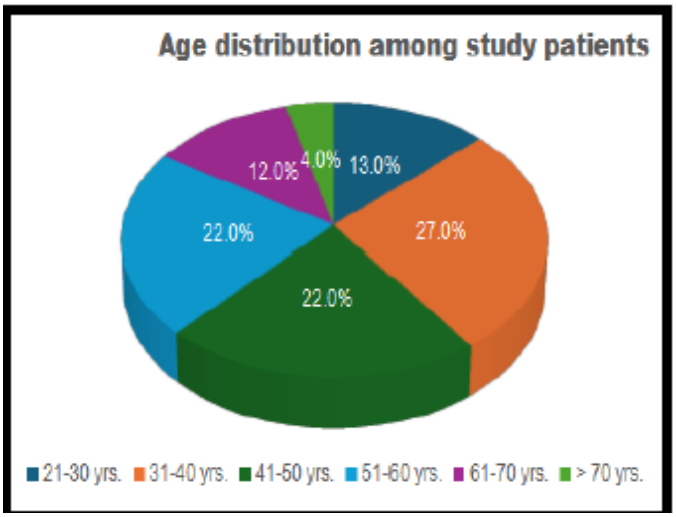
This retrospective, observational study was conducted at Kempegowda Institute of Medical Sciences and Research Centre, Bengaluru. The study analysed medical records of 100 patients who underwent laparoscopic cholecystectomy for biliary stone disease from February 2024 to February 2025, diagnosed through abdominal ultrasound.

Patients were categorized into two groups based on their preoperative thyroid function test results: Group A (Euthyroid, n=50) with TSH levels between 0.27 and 4.2 IU/mL, and Group B (Hypothyroid, n=50) with TSH >4.2 IU/mL, as per hospital reference values.

Patients with a history of haemolytic disorders, liver diseases, or prior thyroid surgery were excluded. Postoperative data on gallstone composition (cholesterol or pigment stones) were collected and analysed to assess the relationship between thyroid dysfunction and gallstone formation.

Results

The study included 100 patients with biliary stones, divided into two groups. The majority were in the 30–50 years age group, with a mean age of 45 years. Group A consisted of 50 euthyroid patients, while Group B included 50 hypothyroid patients. Among Group A patients, 27 had pigment stones and 23 had cholesterol stones, whereas in Group B, 20 patients had pigment stones and 30 had cholesterol stones in the gallbladder.



Graph 1

	Group A (Euthyroid)	Group B (hypothyroid)
Pigment stones	27	20
Cholesterol stones	23	30

Table 1

Discussion

Multiple studies have explored the association between thyroid function and gallstone formation.(4-7) However, the specific impact of hypothyroidism on the composition of gallstones remains unclear. This study aimed to assess whether hypothyroidism influences the formation of a particular type of gallstone—cholesterol or pigment. To our knowledge, previous research has not extensively examined gallstone composition in relation to thyroid dysfunction.

In our study, we included 100 patients with biliary stone disease, divided into euthyroid (Group A, n=50) and hypothyroid (Group B, n=50) groups. Data were compared and statistically analysed using the chi-square test, yielding a χ^2 value of 1.38 and a p-value of 0.24. The result was not statistically significant at $p < 0.05$.

Based on these findings, our study suggests that hypothyroidism does not specifically promote either cholesterol or pigment gallstones.

Conclusion

There was no significant association between hypothyroidism and the formation of cholesterol stones when compared to the euthyroid group. While hypothyroid patients may have a higher overall prevalence of biliary stones, thyroid dysfunction does not appear to influence the specific type of gallstone formed.

Ethical approval

Yes, Ethical Approval under supervision of institutional ethical committee, Kempegowda Institute of Medical Sciences and Research Centre, K.R Road, VV Puram, Bangalore, Karnataka Pin: 560004, India.

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