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Correlation Between Gall Stone Disease and Hypothyroidism

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KEYWORDS
correlation, gall stone disease, hypothyroidism.

Abstract

Background: Gallstones, a common issue affecting the digestive system, can lead to hospitalization. They often occur in young, healthy individuals, with a prevalence rate of 11-36% according to autopsy reports. Some individuals may not experience symptoms, but the disease can still have a significant impact on healthcare costs and lead to life-threatening complications. The prevalence of gallstones varies, influenced by age, gender, and ethnicity, and can differ between countries and regions.

Materials & Methods: This is hospital based cross sectional observational study which was conducted in the Department of general surgery of Private medical college with study period of 6 months. The total sample size of the study was 100 patients. The collected data was entered in Microsoft Excel. Coding of the variables was done. Analysis was done using SPSS software (Version 27, IBM). Results: Of the 100 patients, (71%) were females and (29%) were females. Diagnosis 68% cholelithiasis, 13% had chronic calculous cholecystitis,16% of patients had acute calculous cholecystitis, and Only 2% of cases involved gallbladder polyps. Gallstones are 60% single, while 40% had multiple gallstones. Prevalence of hypothyroid was 14% .Conclusion This study aimed to explore hypothyroidism prevalence in cholelithiasis patients, highlighting their demographic and clinical characteristics. As anticipated, the majority were female, consistent with higher incidences of both conditions in women. Most patients were aged between forty and fifty. Hypothyroidism was diagnosed in 14% of cases, correlating with the presence of multiple stones at surgery. The study suggests that prolonged elevated TSH levels contribute to stone formation over time, particularly in older patients. These findings support existing literature and advocate for larger studies to validate them. Regular TSH monitoring for early hypothyroidism detection could potentially mitigate cholelithiasis burden through timely intervention.

INTRODUCTION

Gallstones are a prevalent issue that can affect the digestive system and may warrant hospitalization[1]. They frequently occur in young, healthy individuals, with a prevalence rate of 11-36% according to autopsy reports[2]. While some individuals may not experience any symptoms, the disease still has a significant impact on healthcare costs and can lead to life-threatening complications[3]. The prevalence of gallstones varies not only between countries but also among ethnic groups and is influenced by age and gender[4]. For instance, a survey in northern India found a prevalence rate of 6.12%, while another study revealed that gallbladder stones were seven times more common in north Indians than in south Indians[5].

Gallstone formation is largely attributed to several factors, including bile stasis, bactibilia, chemical imbalances, pH imbalances, alterations in bile composition, and the development of sludge[6]. Among the most common endocrine disorders worldwide are thyroid diseases, and this is also true for India[7]. There has been ongoing debate about whether thyroid disorders, particularly hypothyroidism, can lead to gallstone disease[8]. To date, several explanations have been proposed to explain the potential link between hypothyroidism and gallstone disease[9]. In our study, we sought to determine if there is a connection between gallstone disease and both previously diagnosed and undiagnosed hypothyroidism in patients who received treatment at our hospital.

The objective of this research was to investigate the relationship between gallstone disease and hypothyroidism, as well as to determine the prevalence of hypothyroidism among patients with gallstones.

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MATERIALS & METHODS

This is hospital based cross sectional observational study which was conducted in the Department of general surgery of Private medical college with study period of 1 year. The total sample size of the study was 100 patients.

Inclusion criteria – 1) The study included patients aged ≥18 years of both genders, 2) Patients with cholelithiasis. Exclusion criteria – 1Pregnancy • Previous history of thyroid surgery • Known cases of haematological disorders • Patient on drugs causing hypothyroidism: Amiodarone, Lithium, antidepressants, Phenytoin, Interferon, Imatinib • Patient on drugs causing gallstones: Estrogen, Fenofibrate, Gemfibrozil.. The study was approved by Institutional Ethics Committee of the private medical college. A written informed consent was obtained from all the patients. All the patients were worked up and assessed according to the following protocol. • Detailed history. • Complete clinical examination • Complete blood count • Kidney function tests • Liver function tests • Thyroid function tests (FT3, FT4, TSH) • Serum cholesterol • Serum amylase (if needed) • Coagulation profile • Routine urine examination • Transabdominal ultrasonography • Chest radiograph. • Electrocardiography (ECG).

The collected data was entered in Microsoft Excel. Coding of the variables was done. Analysis was done using SPSS software (Version 27, IBM). Descriptive statistics was used. Association between categorical tests. The outcomes of the treatment groups were compared using a test to reach the hypothesis, a P value less than 0.5 was considered significant.

RESULT

The age range of the 100 patients varied from a minimum of 19 years to a maximum of 77 years. The mean age was 43.5 years, with a standard deviation of 14.1 years. The percentage of patients aged under 20 years was 1%, while those aged between 21 and 30 years constituted 19%. Patients aged between 41 and 50 years made up 16% of the total, followed by those aged between 61 and 70 years (8%), 51 and 60 years (17%), and 31 and 40 years (31%). There were 6 patients who was > 70 years old. Among the study patients 71% were females and 29% were males. **(Chart-1, table 1).**

Chart 1: Gender distribution among the study participants

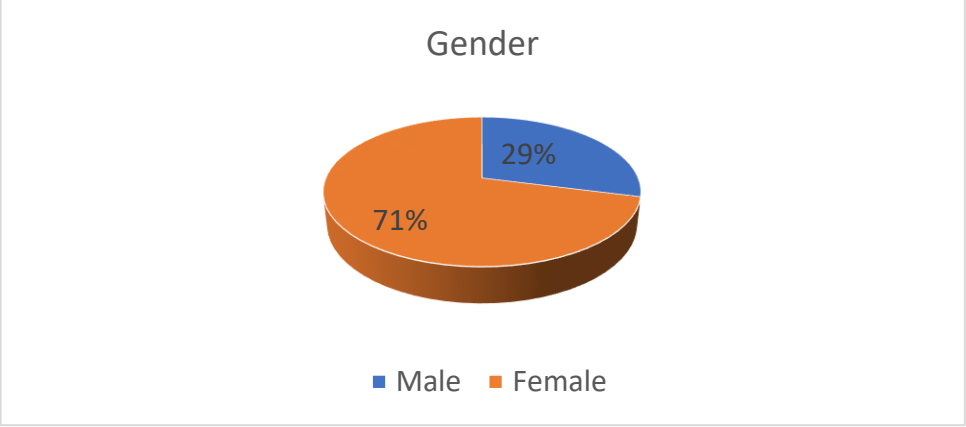

Table 1: Details of age distribution

Age	Frequency	Percentage (%)
< 20 years	1	1%
21-30 years	19	19%
31-40 years	31	31%
41-50 years	16	16%
51-60 years	17	17%
61-70 years	10	10%
>70 years	6	6%

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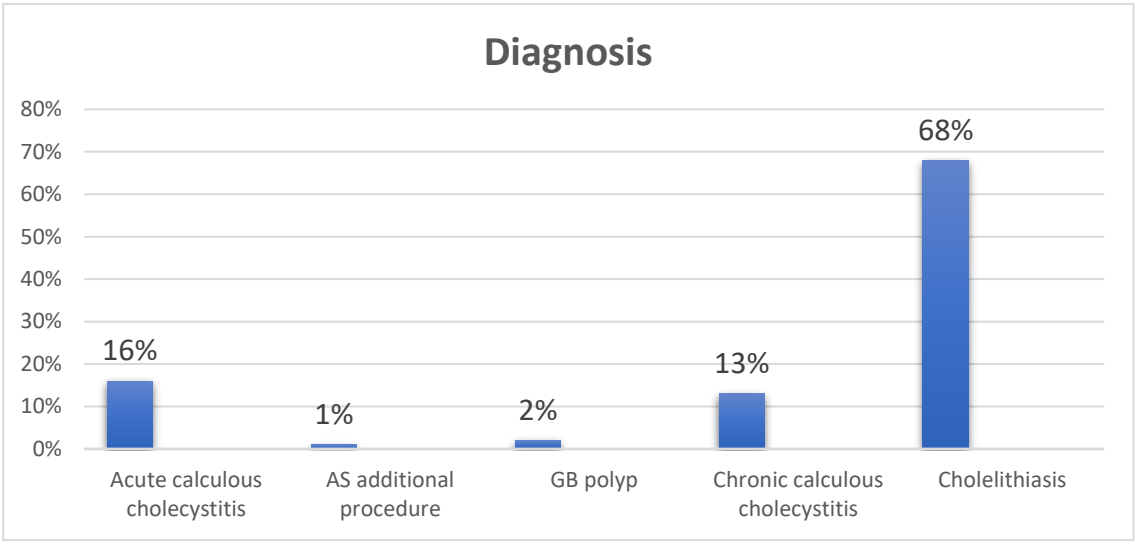
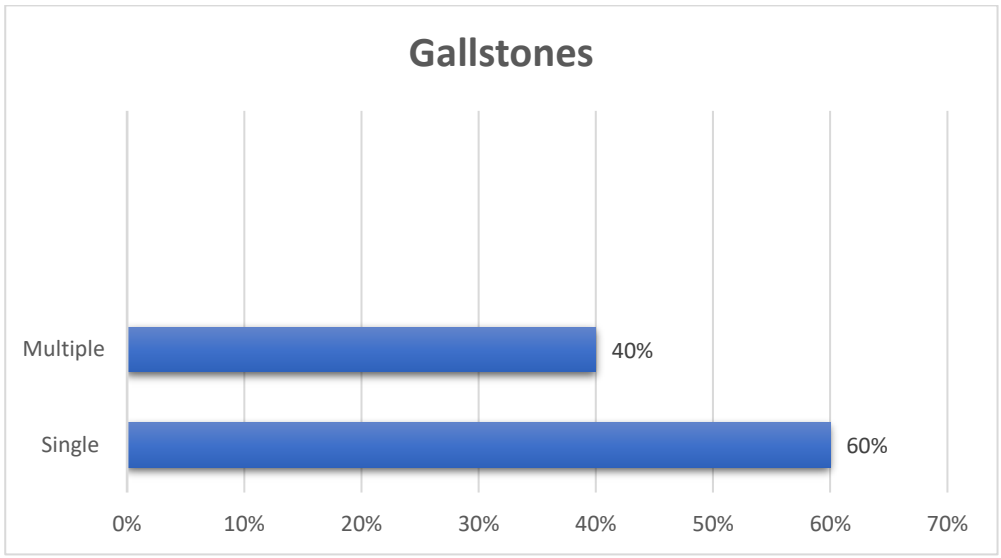
Chart 2: Details on Diagnosis of the study patients



Among the 68% of study patients diagnosed with cholelithiasis, gallstones were present in their gallbladder. Of these patients, 13% had chronic calculous cholecystitis, a long-term inflammation of the gallbladder caused by gallstones. Furthermore, 16% of patients had acute calculous cholecystitis, a sudden and severe inflammation caused by gallstones. Only 2% of cases involved gallbladder polyps, which are growths on the gallbladder wall. Lastly, 1% of patients required an additional surgical procedure related to their condition.

Chart 3: Details on gallstones



Among the study patients, 60% of the patients had a single Gallstones, while 40% had multiple gallstones.

Table 2: details on the Size of gallstones

Size of gallstones	Frequency	Percentage (%)
< 10 mm	80	80%
> 11 mm	20	20%

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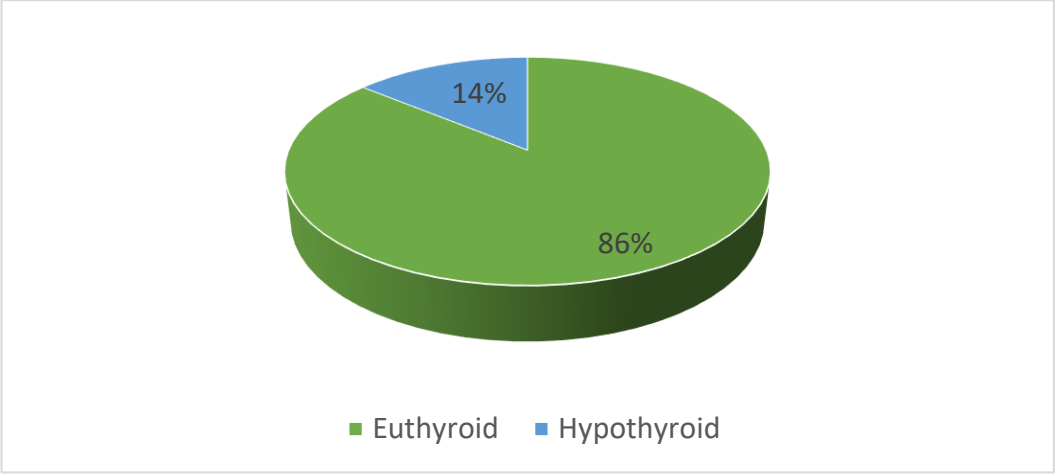
The distribution of gallstone sizes among patients shows that the majority, 80%, have gallstones measuring < 10 mm. Larger gallstones, greater than 10 mm, are present in 20% of the cases.

Table 3: Mean ± SD of thyroid profile

Thyroid profile	Mean	Standard deviation
T3	3.138600	0.869199
T4	1.264500	0.372063
TSH	4.492460	11.853027

The thyroid profile data includes the mean values and standard deviations for three key thyroid hormones: T3, T4, and TSH. The mean level of T3 is 3.138600 with a standard deviation of 0.869199, indicating some variability around this average value. T4 has a mean level of 1.264500 and a standard deviation of 0.372063, suggesting relatively low variability. TSH shows a mean level of 4.492460, but with a high standard deviation of 11.853027, indicating significant variability in TSH levels among the population studied

Chart 4: Prevalence of hypothyroidism



The study patient shows that 86% of the patients have euthyroid function, in contrast, 14% of the patients are hypothyroid.

Table 4: Associations with hypothyroidism

Variables		Euthyroid	Hypothyroid	P value
Gender	Female	65	10	**0.000***
	Male	25	4	
Diagnosis	Acute calculous cholecystitis	15	1	**0.001***
	AS additional procedure	1	0	
	GB polyp	1	1	
	Chronic calculous cholecystitis	10	2	
	Cholelithiasis	58	10	
Gall Stone	Single	58	2	**0.000***

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	Multiple	28	12	
Gall stone Size	< 10 mm	70	10	**0.000***
	>10 mm	15	5	

This table summarizes the distribution of variables among patients categorized by euthyroid and hypothyroid conditions. The data shows significant differences in several factors between these groups. Firstly, gender distribution differs significantly (p=0.000), with a majority of females in both euthyroid (65 out of 90) and hypothyroid (10 out of 14) categories. Diagnosis types also vary significantly (p=0.001), with acute calculous cholecystitis being more prevalent in the euthyroid group (15 out of 90) compared to hypothyroid (1 out of 14). In terms of gallstone characteristics, both the presence of gallstones (p=0.000) and their size (p=0.000) show significant differences. Euthyroid patients predominantly have single gallstones (58 out of 90) and smaller stones (<10 mm in size, 70 out of 80 with size data), whereas hypothyroid patients exhibit a higher proportion of multiple stones (12 out of 40) and larger stones (>10 mm, 5 out of 20 with size data). These findings underscore the association between thyroid function and the clinical characteristics of gallstone disease, warranting further investigation into potential mechanisms and clinical implications.

DISCUSSION:

This study was conducted at a hospital and involved 100 patients who were admitted for cholelithiasis and underwent cholecystectomy. All of the patients had cholelithiasis as indicated by their abdominal ultrasonography study. The relationship between thyroid disorders and gallstone disease has been a topic of discussion for many years, and several studies have suggested a possible connection between hypothyroidism and gallstone disease. These studies have shown that thyroid failure can lead to disturbances in lipid metabolism, which may subsequently affect the composition of the bile[10,11].

The distribution of patients by sex in our study showed a predominance of females, with 71% of the participants being female and 29% being male. This finding is consistent with other studies, which have reported a higher prevalence of cholelithiasis in females. The male-to-female ratio in our study was 1:5.25. Other studies have also reported similar findings. For example, Bansal et al[5] found 65% females and 35% males in their study of 104 patients, while Bhattacharya et al[6] reported that 71.4% of their participants were female and 28.6% were male. Similarly, the Sharma et al[7] study had a female to male ratio of 70:30.

Regarding the prevalence of hypothyroidism, 14 out of 100 patients in our study had increased TSH levels in their thyroid profile, indicating hypothyroidism. This gives a prevalence rate of 14%. Other studies have also reported varying prevalence rates of hypothyroidism. For instance, Ahmad MM[8] found a prevalence of 8% in their study, while Kotwal et al[9] reported a prevalence of 14.4% in their study conducted in Sikkim.

This can be attributed to a higher number of patients having undiagnosed or subclinical hypothyroidism. With the availability of radiological investigations, an increasing number of patients are being diagnosed with cholelithiasis through ultrasonography. Various studies have reported topographical and demographic differences.

According to the study, a total of 10 patients were diagnosed with hypothyroidism out of 14 individuals. Of these, 71.4% were female, while only 28.5% were male. In comparison, Stephan's et al[10] study found that 83.3% of females had hypothyroidism, while only 16.7% of males did. In our study, 21.15% of females and 12.5% of males had hypothyroidism. Previous research conducted by Stephan outside of India reported a prevalence of 4.8% in males and 20% in females. In the study by Ibrahim et al[11], 13.20% of males had hypothyroidism, while 95.47% of females did. However, the Fisher test value of 0.6606 was insignificant at $p < 0.05$, indicating that there was no relationship between gender and the presence of gallstones. This could be due to the higher prevalence of hypothyroidism in females.

Patients with hypothyroidism were discovered to have a higher prevalence of cholesterol stones, and this was found to be statistically significant. This conclusion was supported by the research of Ibrahim et al[11], Taher et al[12] and Yousif et al[13].

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Conclusion:

The objective of this study was to investigate the prevalence of hypothyroidism in patients with cholelithiasis in order to shed light on the relationship between the two conditions. In our study, as expected, the majority of patients were female, as both hypothyroidism and cholelithiasis are more common in women. Additionally, most of our patients were in the forty to fifty age range. Fourteen percent of patients were diagnosed with hypothyroidism, and these patients were found to have multiple stones upon surgery. The prevalence of hypothyroidism in older patients can be explained by the increased time needed for stone formation due to the effect of increased TSH. This study aligns with previous findings discussed in the discussion section and further contributes to our understanding of the relationship between hypothyroidism and cholelithiasis. To strengthen our findings, it is recommended that future studies be conducted on larger populations to compare these results and potentially recommend screening for early diagnosis of hypothyroidism at the subclinical level by regularly monitoring TSH. This could ultimately help prevent the burden of cholelithiasis in this particular subgroup through early treatment.

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Conflicts of interest: Nil

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