



## Original Research Article

# PREVALENCE OF HYPOTHYROIDISM IN DIAGNOSED CASES OF GALLBLADDER STONES" IN A TERTIARY CARE CENTRE, SOUTH INDIA

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### ABSTRACT

**Background:** The most common pathology of the biliary system is the Gall bladder disease (GSD). There is a link between thyroid failure and disturbance of lipid metabolism that may consecutively lead to change in composition of bile. Thyroid gland does not produce enough hormones causing gallbladder to reduce its output. It slows down bile flow, stagnation leads to formation of gallstones. The aim of the study is to know the prevalence of hypothyroidism in diagnosed cases of gallbladder stones.

**Materials and Methods:** The study was conducted in the Department of Surgery, Government Medical College and Hospital, The Nilgiris. It is a cross sectional study conducted during the year November 2021-November 2022. Based on inclusion and exclusion criteria the study participants were recruited. The total sample size was 50. The data was collected using a predesigned and pretested questionnaire. Detailed history like name, age, sex, residence, symptoms hypothyroidism (loss of appetite, weight gain, tiredness, constipation, cold intolerance, menstrual disturbances, bradycardia, presence or absence of goiter etc) were noted. Clinical examination, USG neck and lab estimation of T3, T4, TSH were done. The collected data will be entered in the MS excel sheet Windows 10. The analysis was done using SPSS 23.

**Results:** Majority of the study participants were in 28-35 years of age and 36-45 years of age 17(34%). Female preponderance was observed 40(80%). Hypothyroidism was found in 13(26%) of the study participants. No statistically significant association found between hypothyroidism and age and sex.

**Conclusion:** The study concludes that Hypothyroidism was present in 13(26%) of the study participants with gall bladder disease. Hence the biochemical evaluation of T3, T4, TSH is important in detecting these patients. They should be treated medically and unnecessary surgery can be avoided. Few patients may require surgical treatment.

**Keywords:** Hypothyroidism, Euthyroid, gall bladder stones, lipid metabolism.

## INTRODUCTION

The most common pathology of the biliary system is the Gall bladder disease (GSD). Pigment stones (black and brown), mixed stones and cholesterol are the three types of stones. 85% of the Asian population has pigment stones. Among North Indians majority of the people has Cholesterol stones which found both in common bile duct and

gallbladder. In South Indian majority of the people have pigment gallstones which is also found both in common bile duct and gallbladder.<sup>[1,2]</sup>

Cholesterol is not a water soluble substance. The cholesterol solubility in the bile depends on many factors like bile acid present in the bile and phospholipid concentration. Cholesterol is maintained in a stable thermodynamic state by the phospholipid formed miscelles. When the

concentration of the phospholipid are low or when it is supersaturated with cholesterol results in formation of unstable unilamellar phospholipid vesicles which serve as nuclei for cholesterol crystals and lead to formation of stones.

A discussion was going on for decades whether the thyroid disorders could cause gallstone disease. Many explanations were given for this like. There is a link between thyroid failure and disturbance of lipid metabolism that may consecutively lead to change in composition of bile. The hypothyroidism can be overt (level of thyroxine is below normal) or subclinical type. When serum thyroid stimulating hormone (TSH) level is slightly raised it is known as subclinical hypothyroidism.<sup>[3]</sup> Sometimes extra thyroidal effect has also been reported.<sup>[4,5]</sup>

Hormonal action of Cholecystokinin on the sphincter of Oddi and several other hormones have been shown that will affect the sphincter of Oddi activity, bile streams via the cystic duct to fill and unfill the gall bladder. Mucosal absorption of electrolyte and water will concentrate the hepatic bile stored and the contraction of small muscle will discharge the contents into the upper small intestine are the known established physiologic mechanisms.<sup>[6]</sup>

Thyroid gland does not produce enough hormones causing gallbladder to reduce its output. It slows down bile flow, stagnation leads to formation of gallstones. The sphincter of oddi expresses thyroid hormone receptors and thyroxine has a direct prorelaxing effect on the sphincters.<sup>[7]</sup> Both low bile flow and sphincter of oddi dysfunction regarded as important reason that may promote gallstone formation.<sup>[8]</sup> In hypothyroidism sometimes there will be dysmotility of digestive tract.<sup>[9]</sup> Hypothyroidism also linked with decreased activity of UDP glucuronyl transferase which will reduce the bilirubin excretion.<sup>[10]</sup>

Hence if an increase prevalence of thyroid disorder will be found associated with cholelithiasis, it may have an effect on the diagnostic and therapeutic workup of the patients with gallstones. Hence this study intends to show prevalence of previously undiagnosed hypothyroidism in patients with gallstones.

### **Aims and Objectives**

To know the prevalence of hypothyroidism in diagnosed cases of gallbladder stones

## **MATERIALS AND METHODS**

### **Study Setting**

Department of General Surgery, Government Medical College and Hospital, The Nilgiris. The study was done after obtaining ethical committee approval in institution

### **Duration**

One year NOV 2021 TO NOV 2022

### **Study Design**

Cross sectional study

### **Sample Size**

As per inclusion and exclusion criteria the study participants were recruited. The final sample size was 60 patients, 30 patients in each category.

### **Inclusion Criteria**

Patients with cholelithiasis (prior history of cholecystectomy or the presence of gallstones in ultrasound)

### **Exclusion Criteria**

Patients with previous history of hypothyroidism on treatment.

### **Method Of Collection of Data**

#### **Data Collection Methods**

The data was collected using a predesigned and pretested questionnaire. Detailed history like name, age, sex, residence, symptoms hypothyroidism (loss of appetite, weight gain, tiredness, constipation, cold intolerance, menstrual disturbances, bradycardia, presence or absence of goiter etc) were noted. Clinical examination, USG neck and lab estimation of T3, T4, TSH were done.

Patients are divided according to history, clinical examination, USG neck and lab estimation of T3, T4, TSH.

1. Subclinical hypothyroidism : symptom free patients with TSH level above the upper limit of normal range and T3/T4 or both decrease below the normal limit.

2. Clinical hypothyroidism: symptoms of hypothyroidism with TSH level above the upper limit and T3 /T4 or both below the normal limit.

3. Euthyroid group: where clinical and lab tests are within normal limits.

(All these groups may present with or without goiter)

#### **Data Entry and Analysis**

The collected data will be entered in the MS excel sheet Windows 10. The analysis was done using SPSS 23. Descriptive statistics was expressed in terms of mean values and percentages. Chi square test was done for comparison two categorical variables. Continuous variables was expressed in mean and standard deviation. Continuous variables were analyzed using unpaired t test and Anova test. P value less than 0.05 is considered to be statistically significant.

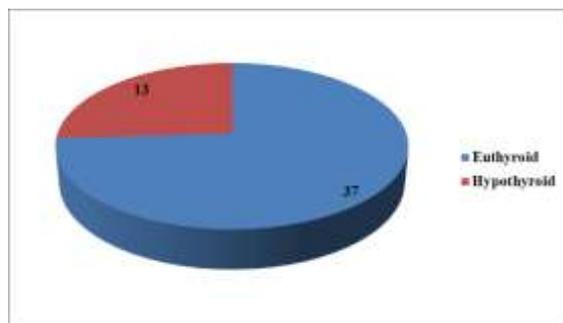
## **RESULTS**

The study was conducted in Department of general surgery, Government Medical college and Hospital, The Nilgiris for one year period. A total of 50 patients with features of gallstone diseases were enrolled in the study after obtaining proper informed consent.

**Table 1: Demographic details of the study participants**

Variables	Number(N)	Percentages (%)
Age category		
28-35 years	17	34
36-45 years	17	34
>45 years	16	32
Sex		
Male	10	20
Female	40	80

Majority of the study participants were in 28-35 years of age and 36-45 years of age 17(34%). Female preponderance was observed 40 (80%).

**Figure 1: Prevalence of Hypothyroidism****Table 2: Association of Thyroid with Age**

Hypothyroid	28-35 years	36-45 years	>45 years	Total	P value
Yes	3(23%)	6(46%)	4(31%)	13(100%)	.500
No	14(38%)	11(30%)	12(32%)	37(100%)	

Among the hypothyroid patients majority were in age category 36-45 years 6(46%) followed by >45 years 4(31%). There is no significant difference observed between age and hypothyroidism.

**Table 3: Association of Thyroid with Sex**

Hypothyroid	Female	Male	Total	P value
Yes	10(77%)	3(23%)	13(100%)	.747
No	30(81%)	7(19%)	37(100%)	

Among the hypothyroid patients 10(77%) were females and rest were males. There is no significant difference observed between age and hypothyroidism

**Table 4: Association of Common bile duct with Sex**

CBD stones	Female	Male	Total	P value
Yes	5(71%)	2(29%)	7(100%)	.541
No	35(81%)	8(19%)	43(100%)	

5(71%) of the Common bile duct stones was found in Females followed by 2(29%) males. The difference is not found to be statistically significant.

**Table 5: T3, T4 and TSH**

Oneway		Descriptives							
	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum	
					Lower Bound	Upper Bound			
					FT3	28 to 35 yrs			17
	36 to 45 yrs	17	1.1094	.42681	.10352	.8900	1.3289	.59	1.90
	Above 45 yrs	16	1.0744	.38788	.09697	.8677	1.2811	.60	1.78
	Total	50	1.1602	.43949	.06215	1.0353	1.2851	.40	1.90
FT4	28 to 35 yrs	17	5.8659	2.03208	.49285	4.8211	6.9107	1.71	9.08

	36 to 45 yrs	17	5.8824	2.96628	.71943	4.3572	7.4075	2.20	11.54
	Above 45 yrs	16	5.7581	2.24436	.56109	4.5622	6.9541	2.13	10.10
	Total	50	5.8370	2.40135	.33960	5.1545	6.5195	1.71	11.54
TSH	28 to 35 yrs	17	3.8765	3.00955	.72992	2.3291	5.4238	.51	10.50
	36 to 45 yrs	17	4.9641	3.85512	.93501	2.9820	6.9462	1.03	13.60
	Above 45 yrs	16	5.8494	4.91388	1.22847	3.2310	8.4678	.78	16.20
	Total	50	4.8776	3.98256	.56322	3.7458	6.0094	.51	16.20

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
FT3	Between Groups	.456	2	.228	1.189	.313
	Within Groups	9.008	47	.192		
	Total	9.464	49			
FT4	Between Groups	.149	2	.074	.012	.988
	Within Groups	282.408	47	6.009		
	Total	282.556	49			
TSH	Between Groups	32.275	2	16.138	1.018	.369
	Within Groups	744.904	47	15.849		
	Total	777.179	49			

There is no statistically significant variation of T3, T4, TSH across age groups.

## DISCUSSION

The pathogenesis of biliary stone diseases is a complex process involving factors affecting bile content and bile flow. A crucial factor for the formation of CBD stone is biliary stasis<sup>[11]</sup>, which may be caused by sphincter of oddi (SO) stenosis<sup>[12]</sup>, SO dyskinesia & CBD stricture. A 90% of hypothyroid patients have elevated cholesterol levels, triglyceride levels, or both. In hypothyroidism, decreased LDL receptor activity leads to impaired removal of cholesterol from the serum and reduced regulation of HMG-CoA reductase expression leads to decreased cholesterol synthesis. Hypothyroidism may reduce hepatic bile secretion. Hepatocytic bile secretion may not be significantly reduced in humans in the early phase of hypothyroidism, but decreased bile secretion in prolonged hypothyroidism has been reported, whereas hyperthyroidism seems to have no effect. Thus decreased bile hepatic secretion may have at least some impact on the delayed bile flow in prolonged hypothyroidism. Hypothyroidism reduces bile flow into the duodenum.

Hypothyroidism is a common disorder in women, defined as in any state which results in deficiency of thyroid hormone, including hypothalamic or pituitary diseases, tissue resistance to thyroid hormone and disorders affecting thyroid gland. Thyroid deficiency is characterised by slowing of all metabolic processes. clinical symptoms and signs include weakness, lethargy and fatigue, memory impairment, dementia, cold intolerance, weight gain, constipation, loss of hair, hoarseness, menstrual irregularity, dry coarse and cold skin, periorbital edema, thick tongue, slow speech and decreased reflexes.

The laboratory hallmark of primary hypothyroidism and the most sensitive test for detecting early thyroid failure is serum TSH concentration. The serum FT4 is decreased in clinical hypothyroidism. In subclinical hypothyroidism an increased TSH level is accompanied by normal FT4 level and patient is asymptomatic.

Majority of the study participants were in 28-35 years of age and 36-45 years of age 17(34%). Among the hypothyroid patients 10(77%) were females and rest were males. There is no significant difference observed between age and hypothyroidism. In Bhavani et al<sup>[13]</sup> study the most common age group was 31-40 years of age (35.3%) followed by 41-50 years (27.45%). Female preponderance was observed 40(80%). Similar results was also found in Bhavani et al study where women constitute 59.8%. Hypothyroidism was found in 13(26%) of the study participants in our study. Rana ranjit singh in 2016<sup>[14]</sup> et al study the males patients with gall stone 24% were hypothyroid and 12% with hyperthyroid and females have 24.4% have hypothyroid and 1% with hyperthyroid. In Ahmed et al 15 study the hypothyroidism prevalence was found to be 8%. Of which 25% have clinical hypothyroidism and 75% have subclinical hypothyroidism. In his study in 12% of the cases (8%) and 15(10%) cases abnormal high levels of Serum TSH and cholesterol was reported. Among the hypothyroid patients majority were in age category 36-45 years 6(46%) followed by >45 years 4(31%). There is no significant difference observed between age and hypothyroidism.

### Limitations

- Small number of patients are included in the study
- Only diagnosed cases were included

- Those with risk factors are not included in the study
- Its is an analytical study and no randomisation was done

## CONCLUSION

Our study was done in patients who were diagnosed as having gallstone diseases and study concludes that there is an association between hypothyroidism and gallstone diseases. Hence the biochemical evaluation of T3, T4, TSH is important in detecting these patients. They should be treated medically and unnecessary surgery can be avoided. Few patients may require surgical treatment

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