

# The Prevalence and Association between Subclinical Hypothyroidism and Gall Stone Disease: Study in Shaheed Suhrawardy Medical College Hospital

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### Abstract:

**Background:** Gall stones are the most common biliary pathology. Subclinical hypothyroidism is not an uncommon problem in the population with thyroid disease, several explanations for a possible relation between hypothyroidism and lipid metabolism with gall stone formation proved that prevalence of gall stones is increased in patients with hypothyroidism.

**Objective:** To find the prevalence and correlation between the subclinical hypothyroidism and gall stone disease.

**Methods:** This is a cross-sectional study was done in the Unit-II of department of Surgery of Shaheed Suhrawardy Medical Hospital between July 2018 to June 2019, where 80 patients presented with gall stones. All the patients were assessed and prepared for cholecystectomy by detailed history, clinical examination, thyroid function test, abdominal ultrasound and others investigation needed for general anaesthesia.

**Results:** Among 80 patients, 78.57% were in 40–59 year age group, 56 (70%) of them were female and 24 (30%) were male. Of the total number of patients, 14 of them (17.5%) had subclinical hypothyroidism and 66 (82.5%) were euthyroid. Most of patients in the subclinical hypothyroid group were showing female gender predominance with 78.57%. While the prevalence among males were found 21.43%. Dyslipidemia was present among 81.25% patients ( $p=0.03$ ) having subclinical hypothyroidism and gall stones. Besides single stone was common (57.14%) among this hypothyroid group and all stones of this group were  $>1$  cm.

**Conclusion:** There is a gender specific relationship between subclinical hypothyroidism and gall stone disease. As this study showing statistically significant in the prevalence of the subclinical hypothyroidism among females in age group  $\geq 40$  years, dyslipidemia and single gall stone. This subset of patients should be assessed for thyroid dysfunction.

### Key Words:

Gall Stone diseases, Hypothyroidism, Dyslipidemia

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### Introduction:

Gall stones are one of the most common biliary pathology encountered by the surgeons. The prevalence of gall stones differs not only between countries but also between ethnic groups. Age and gender also influence the prevalence of gallstone disease. Females are more affected than males.<sup>1</sup> The reported prevalence of gallstones in Bangladesh is 6.12%.<sup>2</sup> A gallstone survey suggested that gallbladder stones occurred 7 times more commonly in South-Asian people than others.<sup>3</sup> Thyroid diseases are arguably among the commonest endocrine disorders worldwide. Subclinical hypothyroidism is a predominant disorder among adult population; however, it is often overlooked.<sup>4</sup> Subclinical hypothyroidism is identified when serum

thyroid hormones are within normal lab level, but serum thyroid stimulating hormone (TSH) level is slightly raised.<sup>4</sup> The pathogenesis of gallstones is complex process involving several factors affecting bile content and bile flow. A crucial factor in the forming of bile duct stones is biliary stasis, which may be caused by sphincter of Oddi stenosis, dyskinesia, or bile duct strictures.<sup>5</sup> Since Sandblom first proved the hormonal action of CCK (cholecystokinin) on the sphincter of Oddi, several other hormones have been shown to affect sphincter of Oddi activity.<sup>5</sup> Sphincter of Oddi plays an important role in guiding the bile flow into the gall bladder or the duodenum and inhibiting reflux of duodenal contents into the biliary tree. There are numerous studies for a possible relation between subclinical hypothyroidism and disturbance of lipid metabolism that may consequently lead to a change of composition of bile and gall stone formation.<sup>6</sup> Expression of thyroid hormone receptors of Sphincter of Oddi and thyroxine has a direct relaxing effect on the sphincter of Oddi which may be suppressed in subclinical hypothyroidism.<sup>7</sup> There is also dysmotility of digestive tract in hypothyroidism leading to low bile flow rate in duodenum.<sup>7</sup> In various studies hypothyroidism has been linked with reduced bilirubin excretion due to decreased activity of UDP glucuronyl transferase.<sup>8</sup> The aim of this study was to find the prevalence and correlation between the subclinical hypothyroidism and gall stone disease.

#### Materials and Methods:

This cross sectional study was conducted in the Unit-II of department of Surgery of Shaheed Suhrawardy Medical Hospital between July 2018 to June 2019. A total number of 80 patients were selected for this study by purposive sampling method who was diagnosed to have gall stone disease by abdominal ultrasound presented in this unit. The followings were the exclusion criteria:

- 1) Patients with previous history of thyroid disorder.
- 2) Patients with past surgical history of any thyroid interventions.
- 3) Any patient with drug history of thyroid medications, or previous radioiodine exposure.
- 4) Any patient with suspected common bile duct stone according to abdominal ultrasound.

All the patients were worked up and assessed according to following principles:

- 1) Detailed history taking including history of thyroid disorders.
- 2) Complete clinical examination.
- 3) Complete blood count.
- 4) Thyroid function test (TSH, T3, and T4).
- 5) Abdominal ultrasound.
- 6) Liver function test
- 7) Fasting Lipid profile and others investigation needed for general anaesthesia.

Patients with serum level of TSH of 0.5–4.7 mIU/L with normal T3, T4 levels were considered euthyroid, serum level of TSH of 4.7–10 mIU/L with normal T3, T4 levels is considered as a subclinical hypothyroidism.

The numerical data were tested for normality and those found to be normally distributed, paired t test, were used and those not normally distributed, Wilcoxon signed rank test were used. The categorical data were expressed in percentage and proportions and compared using chi-square test. All statistical tables and analysis were performed using SPSS (SPSS Version 22.0.1, December 2017). Institutional Ethical Committee approval was taken before commencing the study. A P value less than 0.05 was considered statistically significant.

#### Results:

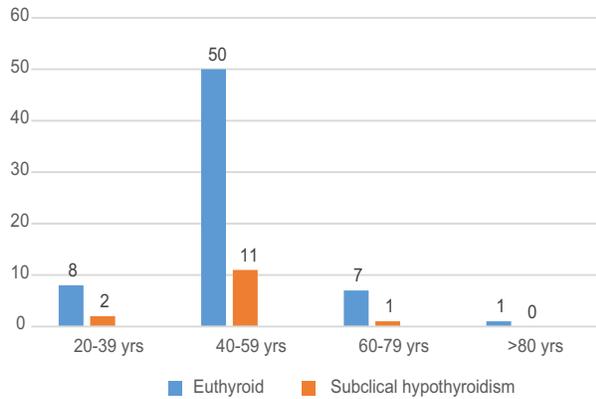
The Present study was carried out in the Unit-II of department of Surgery of Shaheed Suhrawardy Medical Hospital from July 2018 to June 2019. Total 80 cases of cholelithiasis were enrolled in this study.

Seventy six percent patients presented between the age group of 40-59 years (61 pts.); Out of them 56 (70%) patients were female and 24 (30%) were male. Fourteen (17.5%) patients presented with single stone while 66 patients (82.5%) with multiple stones and most of the stones were >1cm (78.75%). All the patients presented with normal liver function tests with no other pathology in the biliary tree. A total number of 65 (81.25%) patients presented with dyslipidemia (Table 1).

**Table-I**

*Characteristics of the patients having gall stone disease*

Characteristics	Value (n=80)	Percentage
Age:		
20-39 Years	10	12.5%
40- 59 Years	61	76.25%
60-79 Years	8	10%
>80 Years	1	1.25%
Sex:		
Female	56	70%
Male	24	30%
Dyslipidemia:		
Subclinical hypothyroidism:	14	17.5%
Number of stones:		
Single:	14	17.5%
Multiple:	66	82.5%
Stone size:		
<1cm	17	21.25%
> 1cm	63	78.75%



**Fig-1:** Showing age distribution of the patients of cholelithiasis with subclinical hypothyroid

Majority (85.71%) of the patients having subclinical hypothyroidism presented with dyslipidemia which was statistically significant (p=0.031). Patients with subclinical hypothyroidism mostly presented with single stones (57.14%). In present study all stones in hypothyroidism patients were >1cm, which was statistically significant (p=0.023). (Table-II)

**Table-II**

<i>Characteristics of the patients having subclinical hypothyroidism with cholelithiasis.</i>		
Characteristics	Value (percentage) n=14	P value
<b>Age</b>		
20-39 Years	2(14.28%)	0.112
40- 59 Years	11(78.5%)	0.09
60-79 Year	1(7.22%)	0.124
>80 Years	0	0.0
<b>Sex</b>		
Female	11(78.5%)	0.08
Male	4(21.5%)	
Dyslipidemia	12(85.71%)	0.031
<b>Number of stones</b>		
Single:	8(57.14%)	0.167
Multiple:	6(42.86%)	
<b>Stone size</b>		
<1cm	0	0.023
> 1cm	14 (100%)	

**Discussion:**

It has been a matter of discussion for decades whether the thyroid disorders are responsible for the gall stone disease. Several studies have shown the possible relationship between hypothyroidism and gall stone disease.<sup>9,10</sup>

Fourteen patients showed subclinical hypothyroidisms characterized by increased TSH from normal value in their thyroid profile with prevalence rate of 17.5%. Eight percent prevalence was found in study conducted by Kotwal.<sup>11</sup> In other studies, 14.4 % patients were found to have cholelithiasis with subclinical hypothyroidism.<sup>12</sup>

Age is a main risk factor for gallstones, the age of 40 years appears to denote the cut-off between relatively low and high rates of cholecystectomies. Between the ages of 40 and 59 years, the incidence is 4 times higher than in younger subjects.<sup>13</sup> Our study showed similar findings. With increasing age there is decrease in water contents of body which may reach 45% of body weight, this is due to decrease in lean (muscle) mass of the body which may lead to more concentrated body fluids and excretions and more deposition of solid contents of the excretions which may lead to nucleation and formation of gall stones. In another study, there was higher prevalence of hypothyroidism and cholelithiasis in age group >40 year.<sup>14</sup> A study conducted by Khuroo and Pradhan SB observed similar findings.<sup>15</sup>

In the study Ahmad MM et al. shows majority of the patients in the hypothyroid group have subclinical hypothyroidism with females predominating and there was a female gender predisposition with 87%.<sup>16</sup> This matches with our study which shows 78.57% of female patients having cholelithiasis seem to be diagnosed as subclinical hypothyroidism as well. On the other hand a study conducted by Volzke H et al. between thyroid function and gall stones showed that women were affected nearly twice as often as men.<sup>17</sup>

Raised cholesterol level is strongly associated gall stone formation. Besides hypothyroidic patients frequently develops dyslipidemia due to abnormal lipid metabolism. In the present study about 85.71% patients with subclinical hypothyroidism presented with dyslipidemia with gall stone formation which coincided with previous studies.<sup>18</sup>

In this study, All Stones in subclinical hypothyroidic patients were >1cm and overall 78.75% stones were >1cm. Similarly, stone size of >1cm had strong correlation with subclinical hypothyroidism and single stone in gall bladder had a strong correlation with hypothyroidism as was in study by Bansal.<sup>19</sup>

Though no significant relationship is found in this study between subclinical hypothyroidism and gall stone

formation ( $p=0.084$ ) but our study represent a primary hint for statistical prevalence and need a high threshold of suspicion and further investigations and studies regarding biochemical, hormonal, pathological, environmental factors which may be responsible for the formation of both cholelithiasis and thyroid disease and the association between them.

### Conclusion:

There is a specific relationship between subclinical hypothyroidism and gall stone disease as this study sharing increased prevalence of the subclinical hypothyroidism among females, age group  $\geq 40$  years, dyslipidemia, and single gall stone. So these subset of patients should be assessed for thyroid dysfunction which may help to provide better management and outcome of the patients.

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