

## Prevalence of Hypothyroidism in Cholelithiasis Patients in Bikaner, Rajasthan (India)

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### ABSTRACT

**Background:** For decades, there has been discussion whether thyroid disorders could cause gallstone disease. Gallstone formation is a complex process involving various mechanisms affecting the flow of bile and bile content. Hypothyroid patients are found to have biliary stasis because of slowed emptying of bile from the biliary tract into the duodenum. This is attributed to the decreased pro-relaxing action of thyroxine on sphincter of Oddi in hypothyroid individuals. The hallmark laboratory investigation to detect hypothyroidism and also a sensitive indicator for diagnosing early thyroid dysfunction is serum TSH level. Serum TSH level is the most accurate indicator of thyroid function. This study attempts to know the prevalence of hypothyroidism in cholelithiasis.

**Material and Methods:** A cross-sectional study was done between May 2015 to October 2015. 50 patients diagnosed as cholelithiasis in Department of General Surgery, at P.B.M. Hospital, were included in the study. Full history, clinical examination, ultrasound abdomen and laboratory blood test for free T3, free T4 and TSH were done for every patient. Data was analysed statistically using SPSS version 19.0.

**Results:** Out of 50 patients of cholelithiasis, 29 (58%) were females and 21 (42%) were males. Thyroid disorder in form of hypothyroidism was found in 19 (38%) patients. In that, 11

(22%) patients presented with subclinical hypothyroidism and 8 (16%) patients with clinical hypothyroidism.

**Conclusion:** There is an increase in prevalence of hypothyroidism in cholelithiasis in this study. The prevalence was more among >40 years age group. This increase in prevalence could have an effect on the diagnostic and therapeutic workup of cholelithiasis patients.

**Keywords:** Cholelithiasis, Hypothyroidism, Thyroid Hormone Assay.

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### INTRODUCTION

Among biliary pathology, gallbladder stones are the most common. Gallbladder stone prevalence varies among different parts of the world. About 10% in western countries and around 4% in India.<sup>1</sup> Biliary stasis is an important factor in gallstone formation. Altered lipid metabolism, sphincter of Oddi dysfunction and altered flow of bile has been noted in thyroid failure patients.<sup>2,3</sup> Hypothyroidism causes increased serum cholesterol levels and supersaturation of bile with cholesterol causing decreased motility, contractility and filling of gallbladder causing prolonged residence of bile. This leads to gallstone formation. Delayed hilum duodenum transit time impairs the clearance of precipitates from gallbladder and biliary tract.<sup>4</sup> This study is performed to understand and reemphasise the relationship between hypothyroidism and gallstone disease.<sup>5</sup>

### Definition

Subclinical hypothyroidism symptom free patient with TSH level above upper limit of normal and T3, T4 within normal limit.<sup>6</sup> Clinical

hypothyroidism in which there are symptoms of hypothyroidism with TSH level above the upper limit and T3, T4 or both decrease below normal limit. Euthyroid group where clinical and lab tests are within normal range.<sup>7</sup>

### OBJECTIVE

To know the prevalence of hypothyroidism in patients with cholelithiasis.

### MATERIALS AND METHODS

The present study has been conducted by utilising cases admitted and managed in the Department of Surgery at P.B.M. Hospital attached to S.P. Medical College & Hospital, Bikaner over a period of six months from May 2015 to October 2015. A cross-sectional study of 50 cases of cholelithiasis in specified period done. These cases were selected on the basis of the nonprobability (purposive) sampling method and studied in detail clinically. Full history,

clinical examination and symptoms of hypothyroidism (loss of appetite, gaining weight, tiredness, constipation, cold intolerance, menstrual disturbances etc.) with investigations of USG abdomen and thyroid function test were done.

#### Inclusion Criteria

Patients with cholelithiasis.

#### Exclusion Criteria

- Previous history of hypothyroidism on treatment.

Patients are divided according to history, clinical examination and lab estimation of T3, T4 and TSH as subclinical hypothyroidism, clinical hypothyroidism and euthyroid group as mentioned earlier. Data was analysed statistically using SPSS version 19.0.

**Table 1: Age Distribution**

Age	Number of Patients	Percentage
≤20	2	4.0
21-30	9	18.0
31-40	9	18.0
≥41	30	60.0
<b>Total</b>	<b>50</b>	<b>100.0</b>

**Table 2: Sex Distribution**

Age	Number of Patients	Percentage
Female	29	58.0
Male	21	42.0
<b>Total</b>	<b>50</b>	<b>100.0</b>

**Table 3: Prevalence of Hypothyroidism**

Diagnosis	Number of Patients	Percentage
Euthyroid	31	62.0
Hypothyroid	19	38.0

**Table 4: Prevalence of Subclinical and Clinical Hypothyroidism**

Diagnosis	Number of Patients	Percentage
Euthyroid	31	62.0
Subclinical hypothyroid	11	22.0
Clinical hypothyroid	8	16.0
<b>Total</b>	<b>50</b>	<b>100.0</b>

## OBSERVATIONS AND RESULTS

### Age Distribution

Total of 50 cases of cholelithiasis studied. Among the study group, 60% were in the age group of >41 yrs. 18% each in age groups 21-30 yrs. and 31-40 yrs. and 4% below 20 yrs.

### Sex Distribution

Among the study group, 58.0% are females and 42.0% are males.

### Prevalence of Hypothyroidism

Among the study group, 38%, i.e. 19 patients had hypothyroidism and 62%, i.e. 31 patients were in euthyroid state.

### Prevalence of Subclinical and Clinical Hypothyroidism-

Among the study group, 22%, i.e. 11 patients had subclinical hypothyroidism, 16%, i.e. eight patients had clinical hypothyroidism and 62%, i.e. 31 patients were in euthyroid state.

### Distribution According to Age and Thyroid Function

Below 20 yrs. of age, all patients 100%, i.e. two patients were in euthyroid state. Between the age group of 21-30 yrs. 11.1%, i.e. one patient had thyroid dysfunction, 88.9%, i.e. eight patients were in euthyroid state. Between the age group of 31-40 yrs. 44.4%, i.e. four patients had thyroid dysfunction, 55.6%, i.e. five patients were in euthyroid state. Above 41 yrs. 46.6%, i.e. 14

patients had thyroid dysfunction, 53.3%, i.e. 16 patients were in euthyroid state. Among 50 patients, 38%, i.e. 19 patients had thyroid dysfunction and 62%, i.e. 31 patients were in euthyroid state.

### Distribution According to Age and Subclinical, Clinical Hypothyroidism-

Among the patients less than 20 yrs. of age, subclinical hypothyroidism and clinical hypothyroidism was not found. All patients 100%, i.e. two patients were in euthyroid state. Between the age group of 21-30 yrs. 11.1%, i.e. one patient had subclinical hypothyroidism. Clinical hypothyroidism was not found. 88.9%, i.e. eight patients were in euthyroid state. Between the age group of 31-40 yrs. 11.1%, i.e. one patient had subclinical hypothyroidism, 33.3%, i.e. three patients had clinical hypothyroidism, 55.6%, i.e. five patients were in euthyroid state. Above 41 yrs. 30%, i.e. nine patients had subclinical hypothyroidism, 16.7%, i.e. five patients had clinical hypothyroidism, 53.3%, i.e. 16 patients were in euthyroid state. Among 50 patients, 22%, i.e. 11 patients had subclinical hypothyroidism, 16%, i.e. eight patients had clinical hypothyroidism, 62%, i.e. 31 patients were in euthyroid state.

**Distribution According to Sex and Thyroid Function**

Among males, 23.8%, i.e. five patients are hypothyroid and 76.2%, i.e. 16 patients are euthyroid. Among females, 48.3%, i.e. 14 patients are hypothyroid and 51.7%, i.e. 15 patients are euthyroid. Among 19 hypothyroid patients, five are males and 14 are females.

**Distribution According to Sex and Subclinical, Clinical Hypothyroidism**

Among 50 patients, 29 patients were males and 21 patients were females. Among 29 male patients, 14.3%, i.e. 3 patients had subclinical hypothyroidism, 9.5%, i.e. 2 patients had clinical

hypothyroidism and 76.2%, i.e. 16 patients were in euthyroid state. Among 21 female patients, 27.6%, i.e. eight patients had subclinical hypothyroidism, 2.7%, i.e. six patients had clinical hypothyroidism and 51.7%, i.e. 15 patients were in euthyroid state. Among 50 patients 22.0%, i.e. 11 patients had subclinical hypothyroidism, 16.0%, i.e. eight patients had clinical hypothyroidism and 62.0%, i.e. 31 patients were in euthyroid state. Among 11 subclinical hypothyroid patients, three are males and eight are females. Among eight hypothyroid patients, two are males and six are females.

**Table 5: Distribution According to Age and Thyroid Function**

Age	Euthyroid	Hypothyroid
≤20	2 (100%)	0 (0)
21-30	8 (88.9%)	1 (11.1%)
31-40	5 (55.6%)	4 (44.4%)
≥41	16 (53.3%)	14 (46.7%)
<b>Total</b>	<b>31 (62%)</b>	<b>19 (38%)</b>

**Table 6: Distribution According to Age and Subclinical, Clinical Hypothyroidism**

Age	Euthyroid	Subclinical Hypothyroid	Clinical Hypothyroid
≤20	2 (100%)	0 (0)	0 (0)
21-30	8 (88.9%)	1 (11.1%)	0 (0)
31-40	5 (55.6%)	1 (11.1%)	3 (33.3%)
≥41	16 (53.3%)	9 (30%)	5 (16.7%)
<b>Total</b>	<b>31 (62%)</b>	<b>11 (22%)</b>	<b>8 (16%)</b>

**Table 7: Distribution According to Sex and Thyroid Function**

Age	Euthyroid	Hypothyroid
Male	16 (76.2%)	5 (23.8%)
Female	15 (51.7%)	14 (48.3%)
<b>Total</b>	<b>31 (62.0%)</b>	<b>19 (38.0%)</b>

**Table 8: Distribution According to Sex and Subclinical, Clinical Hypothyroidism**

Age	Euthyroid	Subclinical Hypothyroid	Clinical Hypothyroid
Male	16 (76.2%)	3 (14.3%)	2 (9.5%)
Female	15 (51.7%)	8 (27.6%)	6 (20.7%)
<b>Total</b>	<b>31 (62.0%)</b>	<b>11 (22.0%)</b>	<b>8 (16.0%)</b>

**Table 9: Symptoms and Signs of the Patients in The Study**

Symptoms and Signs	Yes	No
Abdominal pain	17 (34%)	33 (66%)
Vomiting	9 (18%)	41 (82%)
Fatigue	8 (16%)	42 (84%)
Weight gain	7 (14%)	43 (86%)
Constipation	6 (12%)	44 (88%)
Hoarseness	1 (2%)	49 (98%)
Menstrual disturbance	3 (6%)	47 (94%)
Obesity	5 (10%)	45 (90%)
Dry skin texture	1 (2%)	49 (98%)
Hair loss	3 (6%)	47 (94%)
Right hypochondrial tenderness	5 (10%)	45 (90%)

**Symptoms and Signs of the Patients in the Study**

Abdominal pain was the most common symptom presenting in 34%, i.e. 17 patients. Among the specific symptoms of hypothyroidism, easy fatigability was the most common symptom presenting in 16%, i.e. eight patients.

**Symptoms and Signs Based on Thyroid Status of the Patients**

Among eight patients of clinical hypothyroidism, seven patients presented with symptoms of weight gain.

**USG Findings among the Study Group**

Among the study group, 58.0%, i.e. 29 patients had multiple calculi alone and 34.0%, i.e. 17 patients had single calculi. Patients with multiple calculi were more common.

**Association of USG Findings with Thyroid Status**

Among 19 patients of hypothyroidism, 11 patients had multiple calculi alone and one patient had multiple calculi with distended gallbladder.

**Table 10: Symptoms and Signs Based on Thyroid Status of the Patients**

Clinical Findings		Euthyroid	Hypothyroid
Fatigue	Yes	0 (0)	8 (42%)
	No	31 (100%)	11 (57.9%)
Weight gain	Yes	0 (0)	7 (36.8%)
	No	31 (100%)	12 (63.2%)
Constipation	Yes	0 (0)	6 (31.6%)
	No	31 (100%)	13 (68.4%)
Menstrual disturbance	Yes	0 (0)	3 (6.0%)
	No	31 (100%)	16 (84.2%)
Anaemia	Yes	3 (9.7%)	2 (10.5%)
	No	28 (90.3%)	17 (89.5%)
Obesity	Yes	0 (0)	5 (26.3%)
	No	31 (100%)	14 (73.7%)
Skin texture	Normal	31 (100%)	18 (94.7%)
	Dry	0 (0)	1 (5.3%)
Hair pattern	Normal	31 (100%)	16 (84.2%)
	Hair loss	0 (0)	3 (15.8%)

**Table 11: USG Findings Among the Study Group**

USG Findings	Number of Patients	Percentage
MC	29	58.0
SC	17	34.0
MC+DGB	3	6.0
SC+GB POLYP	1	2.0
Total	50	100.0

**Table 12: Association of USG Findings with Thyroid Status**

Age	MC	SC	MC+DGB	SC+GB POLYP
Euthyroid	18 (58.1%)	10 (32.3%)	2 (6.5%)	1 (3.2%)
Hypothyroid	11 (57.9%)	7 (36.8%)	1 (5.3%)	0 (0)
Total	29 (58%)	17 (34.0%)	3 (6.0%)	1 (2.0%)

**DISCUSSION**

Gallstone formation is a complex process involving various mechanisms affecting the flow of bile and bile content. Many factors like decrease in liver cholesterol metabolism, reduced hepatic bile secretion, reduced flow of bile into duodenum and impaired sphincter of Oddi relaxation contribute to formation of gallstones in hypothyroidism.<sup>2,3</sup> Hypothyroid patients are found to have biliary stasis because of slowed emptying of bile from the biliary tract into the duodenum.<sup>2</sup> This is attributed to the decreased pro-relaxing action of thyroxine on sphincter of Oddi in hypothyroid individuals.<sup>8,9</sup> The hallmark laboratory investigation to detect

hypothyroidism and also a sensitive indicator for diagnosing early thyroid dysfunction is serum TSH level. Serum TSH level is the most accurate indicator of thyroid function.<sup>6,7</sup> This study done in Government Royapettah Hospital included 50 patients of cholelithiasis diagnosed in the Department of General Surgery. Out of 50 patients, 29 (52%) were females and 21 (48%) were males. Among the study group, 60% i.e., 30 patients were in the age group of >41 yrs. 18%, i.e. nine patients each in age groups 21-30 yrs. and 31-40 yrs. and 4% below 20 yrs. Out of 50 patients, 19 (38%) patients were found to be hypothyroid. In that, 11 (22%) patients had subclinical hypothyroidism and 8 (16%) patients with

clinical hypothyroidism. In a study done by Hassan H. Zaini and Kussay M. Zwain, the results were as follows. Prevalence of hypothyroidism in Hassan study was 10.6% and peak age group between 51-60 years.<sup>10</sup>

In our study, prevalence of hypothyroidism is 38% and peak age group more than 40 years. Among the symptoms of hypothyroidism, easy fatigability was present in 16%, i.e. 8 patients. In ultrasound findings of cholelithiasis, 58%, i.e. 29 patients had multiple calculi alone. This increase in prevalence could have effect on the diagnostic and therapeutic workup of cholelithiasis patients. So, we should be aware of thyroid status in patients of cholelithiasis and should be screened for thyroid function. TSH should be measured as most are subclinically hypothyroid with special consideration to patients of more than 40 yrs. of age. Hence, hypothyroidism should also be considered as a separate risk factor in cholelithiasis patients.

### CONCLUSION

- There is an increase in prevalence of hypothyroidism in cholelithiasis in this study.
- Subclinical hypothyroidism is more common than clinical hypothyroidism.
- Hypothyroidism has a higher prevalence in females than males.
- Patients more than 40 yrs. of age with cholelithiasis are more likely to have hypothyroidism.
- TSH should be measured as most are subclinically hypothyroid with special consideration to patients of more than 40 yrs. of age.
- This increase in prevalence could have effect on the diagnostic and therapeutic workup of cholelithiasis patients.

Hypothyroidism should be considered as a separate risk factor like age, sex, obesity in cholelithiasis patients. So, we should be aware of thyroid status in patients of cholelithiasis and should be screened for thyroid function.

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