Original Research Article

Prevalence of hypothyroidism in patients with biliary stones: a prospective study

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ABSTRACT

Background: Biliary stones (gall bladder stones and common bile duct stones) are hardened concretions that develop due to supersaturation of bile. The known risk factors for development of biliary stones include genetics, body weight, high fat diet, diabetes, women taking estrogen containing pills and decreased motility of gall bladder. Of late there has been discussion whether hypothyroidism could lead to formation of biliary stones. Aim of our study is to analyze the prevalence of hypothyroidism in patients of biliary stones and subsequently finding a correlation between hypothyroidism and formation of biliary stones.

Methods: The present study was conducted on 100 patients of biliary stones admitted in inpatient department of Surgery at SGRDIMSAR, Amritsar. Their fasting thyroid and lipid profiles were tested to study the prevalence of hypothyroidism in these patients of biliary stones.

Results: Percentage of males with gall stones who were diagnosed as hypothyroid, euthyroid and hyperthyroid is 24%, 64% and 12% respectively. Whereas males with common bile duct (CBD) stones who were hypothyroid, euthyroid and hyperthyroid were 18%, 62.5% and 18.75% respectively. Percentage of females with gall stones diagnosed hypothyroid, euthyroid and hyperthyroid was 24.4%, 65.85% and 1% respectively. Percentage of females with common bile duct stones who were hypothyroid, euthyroid and hyperthyroid were 27.7%, 61.1% and 1.1% respectively.

Conclusions: We therefore conclude that the role of hypothyroidism with respect to biliary stone formation in human beings is currently not well investigated and further research is needed.

Keywords: Gall Stones, Hypothyroidism, Bile, Thyroid

INTRODUCTION

For decades, there has been a discussion, whether thyroid disorders could cause biliary stone (gall stones and bile duct stones) disease or not. The explanations include the known link between thyroid failure and disturbances of lipid metabolism that may consequently lead to a change of the composition of the bile.¹ The use of thyroxine was even suspected to dissolve gallstones.² Studies have demonstrated low bile flow in hypothyroid subjects

consequently leading to formation of biliary stones. To prove such a relationship, many experiments have been performed from time to time.⁴

Studies that investigated the association between thyroid function and gallstone disease in human beings, was conducted in a series of patients with potential for selection bias that may have produced false positive results. Furthermore, the statistical analyses were only controlled for age, but not for further confounders in

these studies. Moreover, there are currently no investigations that also include ultrasound to evaluate asymptomatic gallstones in this context.

Therefore, the aim of our study is to analyze the prevalence of hypothyroidism in patients of biliary stones and try to establish hypothyroidism as a likely etiology for biliary stones by eliminating various confounding factors and including only those patients who are radiographically proved to have biliary stones.

METHODS

The present study was conducted in the Department of general surgery at Sri Guru Ram Das Institute of Medical Sciences and Research, Vallah, Sri Amritsar

The study included 100 cases of biliary stones of age more than 18 years, admitted in inpatient department at SGRDIMSAR, Amritsar from period of December 2014 to April 2016.

All patients who were already diagnosed with hypothyroidism and/or were undergoing treatment, history of hemolytic diseases, patients with concomitant comorbidities especially diabetes mellitus type II, with renal stones, stones in pancreatic duct and women taking oral contraceptive pills were excluded.

These 100 patients who were diagnosed radiographically as having biliary stones were tested for basic hematological parameters along with their fasting lipid profile and thyroid function tests (TSH, T3 and T4). The results were analyzed mathematically and statistically.

To know the statistical significance of our data, chi-square test was performed independently for male patients and female patients with gall stones and bile duct

stones who were hypothyroid, hyperthyroid and euthyroid.

RESULTS

Sex distribution

Out of 100 patients of biliary stones, 41 patients (41 %) were males and 59 patients (59%) were females.

Biliary stone parameter

Out of the 41 male patients, 25 (61%) had pure gall stones and 16 (39%) had pure bile duct stones or gall stones and bile duct stones.

Whereas out of 59 females, 41 (69.5%) had pure gall stones whereas 18 females (30.5%) had common bile duct stones or gall stones and common bile duct stones.

Thyroid profile

Percentage of males with gall stones who were diagnosed as hypothyroid, euthyroid and hyperthyroid is 24%, 64% and 12% respectively.

Whereas males with common bile duct (CBD) stones who were hypothyroid, euthyroid and hyperthyroid were 18%, 62.5% and 18.75% respectively.

Percentage of females with gall stones diagnosed hypothyroid, euthyroid and hyperthyroid was 24.4%, 65.85% and 1% respectively. Percentage of females with common bile duct stones who were hypothyroid, euthyroid and hyperthyroid were 27.7%, 61.1% and 1.1% respectively.

The results were obtained as follow:

Table 1: Distribution of biliary stones amongst hypothyroid, hyperthyroid and euthyroid male patients.

	Total	Hypothyroid	Euthyroid	Hyperthyroid
GB stones	25	6 (24%)	16 (64%)	3 (12%)
CBD/ CBD and GB stones	16	3 (18.75%)	10 (62.5%)	3 (18.75%)
Total	41	9	26	6

Chi – square = 0.4299; degrees of freedom = 2; p>0.05 (Not significant)

Table 2: Distribution of biliary stones amongst hypothyroid, hyperthyroid and euthyroid female patients.

	Total	Hypothyroid	Euthyroid	Hyperthyroid
GB stones	41	10(24.4%)	27(65.85%)	4(1%)
CBD / CBD AND GB stones	18	5(27.78%)	11(61.1%)	2(1.19%)
Total	59	15	38	6

Chi – square = 0.122 Degrees of freedom = 2; p>0.05 (Not significant)

DISCUSSION

In recent years, experiments have demonstrated that low bile flow and sphincter of Oddi dysfunction are important functional mechanisms that may promote biliary stone formation.^{3,5} To our knowledge, there is only one large case control study that was appropriately adjusted for other risk factors of gallstone disease. In this study no independent relation between thyroid disorders and gallstone formation was found.⁶

The Study of Health in Pomerania (SHIP) is a cross-sectional examination in West Pomerania, the north-eastern part of Germany. The study region is a formerly iodine deficient area with a high prevalence of iodine deficiency-related disorders such as goiter, thyroid nodules and decreased serum TSH levels.^{7,8}

A stable and adequate iodine supply has been achieved in the study area for the past decade. A random sample from the population aged 20-79 years was drawn. The sample was selected using population registries.

After applying all relevant exclusions, the study population consisted of 3749 subjects who were available for the present analysis.

The prevalence proportions of cholelithiasis among males with low, normal and high serum TSH levels were 22.5%, 13.3% and 30.8%, respectively. Bivariate analyses revealed an increased proportion of cholelithiasis in male persons with high serum TSH levels. This association bordered statistical significance after adjustment for potential confounding variables. The full model in the male study population further revealed an independent association between high serum TSH levels and cholelithiasis. However, no independent association between bile duct stones and thyroid levels was found.

The prevalence proportions of cholelithiasis among females with low, normal and high serum TSH levels were 31.7%, 24.7% and 26.7%, respectively. The relation between low serum TSH levels and cholelithiasis that was found in bivariate analyses was not stable after appropriate adjustment for relevant confounders. Likewise, there was no independent association between high serum TSH levels and cholelithiasis and bile duct stones in women.

However, we have seen that, in our study consisting of 100 patients admitted in the inpatient department of SGRDIMSAR, Vallah, Amritsar; no independent association is observed between the thyroid status and biliary stone status (gall bladder stones and / or bile duct stones).

We know that, an advanced age, high BMI and serum lipids were identified as major independent risk factors for cholelithiasis. And we are aware of the fact that average life expectancy, BMI and serum lipid profile are generally lower in Indian population (life expectancy Germany 83.2 years vs 63.4 years India).

This explains the difference in results obtained in our study compared to the study of Pomeria.

One of the limitations of our study has been the small sample size.

We therefore conclude that the role of hypothyroidism with respect to biliary stone formation in human beings is currently not well investigated and further research is needed.

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Ethical approval: The study was approved by the institutional ethics committee

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