

The prevalence of hypothyroidism in diagnosed cases of cholelithiasis

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Abstract

Introduction: The aim of this study was to evaluate the prevalence of hypothyroidism in diagnosed cases of cholelithiasis using the patient's ultrasonography data and to find the prevalence of obesity in gallstone disease.

Materials and Methods: This study was conducted in Govt. medical college, Thrissur. Two hundred and sixty five study subjects were selected from the patients who were attending wards and outpatient department (OPD) of General Surgery with diagnosed cases of cholelithiasis by ultrasound of abdomen. All the participants were subjected to clinical examination and lab investigations. Serum thyroid-stimulating hormone (TSH) was used to assess thyroid function and thereby hypothyroidism. Body Mass Index (BMI) was used to assess obesity.

Results: High prevalence of hypothyroidism (23%) was observed in gallstone disease. In this study only 6% gallstone disease subjects were obese. We also found that 73% of the study subjects with hypothyroidism were obese.

Conclusion: Hypothyroidism may be suggested as a risk factor for developing gallstone disease. Gallstone patients should be checked for serum TSH because of high incidence of hypothyroidism.

Keywords: Cholelithiasis, Dyslipidaemia, Gallstone Disease, Hypothyroidism, Thyroxine.

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Introduction

Gall stone is the most common biliary pathology both in India and western countries. Autopsy report has shown a prevalence of gallstones from 11 to 36%. In India high prevalence is reported in northern population.¹ The prevalence of gallstones is related to many factors, including age, gender, and ethnic background. Patients with a common bile duct stone and gallbladder stone have, respectively; 7-fold and 3-fold increase in the frequency of hypothyroidism.² This may be related to the triad: hypercholesterolemia, hypotonia of the gallbladder and reduced Bilirubin excretion. There are several explanations for a possible relation between hypothyroidism and gallstone disease. These explanations include the known link between thyroid failure and disturbances of lipid metabolism³ that may consecutively lead to a change of the composition of the bile. Recent studies⁴ also demonstrated low bile flow in hypothyroid subjects. Furthermore, the sphincter of Oddi expresses thyroid hormone receptors and thyroxine has a direct pro-relaxing effect on the sphincter.⁵ Both low bile flow and sphincter of Oddi dysfunction are regarded as important functional mechanisms that may promote gallstone formation.⁶

In an animal model of rabbits in which a fatty diet induced gallstone formation, administering thyroxine was associated with a low gallstone weight, but did not dissolve the gallstones.⁷ Experiments in rats confirmed a thyroxine effect on bile composition,⁸ decreased hepatocytic bile salt excretion in hypothyroid state and relaxation of the sphincter of Oddi. Hence dyslipidaemia is suggested to have strong association with gallstones.

Many studies were conducted to investigate the association between thyroid function and gallstone disease in human beings.^{2,3} No systematic studies were carried out to evaluate the prevalence of hypothyroidism in diagnosed cases of cholelithiasis. Therefore, the aim of this study was to evaluate the prevalence of hypothyroidism in diagnosed cases of cholelithiasis using patient's ultrasonography data attending surgery outpatient department (OPD) /causality of Govt. Medical College, Thrissur.

Materials and Methods

This study was conducted in Govt. medical college, Thrissur, Kerala over a period of one year. Two hundred and sixty five study subjects were selected from the patients who were attending wards and OPD of General Surgery with diagnosed cases of cholelithiasis by

ultrasound scan of abdomen [sample size is calculated using the formula $N = (Z\alpha)^2 p q/d^2$ where N = Sample size, p = prevalence according to study⁹ $q = 100 - p$

$Z\alpha$ = Z score of α error (i.e. 1.96 with an α error of 5%), D = clinically allowable error of 20% & power of 80% at a significance level of 0.05 $D = (p \times 20)/100$]. Institutional scientific committee and ethical committee approval were obtained prior to the study. Written informed consent was obtained from all the participants and they were subjected to clinical examination and lab investigations. Serum TSH was used to assess thyroid function and thereby hypothyroidism. Serum TSH reference range of 0.350-4.940 uIU/ml was taken as normal.¹⁰ BMI used to assess obesity. Obesity BMI (Quetelet index) >30 was taken as obese.

Results

Two hundred and sixty five subjects were selected for this study. Age of the study subjects ranged from 36–65 and their age distribution is given in Table 1. Middle aged population is the group mostly affected with gallstones.

Table 1: Age wise distribution of the study subjects

Age group	Frequency	Percent
<35	5	1.88
36-45	96	36.22
46-55	97	36.6
56-65	67	25.28
Total	265	100.0

Gender distribution is given in Table 2.

Table 2: Gender distribution

Sex	Frequency	Percent
Female	168	63.40
Male	97	36.60
Total	265	100.0

Table 6: Prevalence of obesity in gallstone disease subjects with and without hypothyroidism

		Frequency	
Obese Subjects	30(6%)	Hypothyroidism Present	22(73%)
		Hypothyroidism Absent	8(27%)
Non obese Subjects	235(94%)	Hypothyroidism Present	39(17%)
		Hypothyroidism Absent	196(83%)

Discussion

In this study we observed a high prevalence of hypothyroidism in gallstone disease. Many studies have investigated possible associations between serum TSH levels and gallstone disease.

Female preponderance was noted in study population.

Prevalence of hypothyroidism in gallstone disease is given in Table 3.

Table 3: Prevalence of hypothyroidism in gallstone disease

	Gall Stone Disease Present
Hypothyroidism Present	61(23%)
Hypothyroidism Absent	204(77%)

Gender prevalence of hypothyroidism in gallstone disease is given in Table 4 and 5.

Table 4: Gender prevalence of hypothyroidism in gallstone disease – in male

	Gall Stone Disease Present
Male Hypothyroidism Present	32(33%)
Male Hypothyroidism Absent	65(67%)

Table 5: Gender prevalence of hypothyroidism in gallstone disease – in female

	Gall Stone Disease Present
Female Hypothyroidism Present	29(17%)
Female Hypothyroidism Absent	139(82%)

Prevalence of Obesity in gallstone disease is given in table 6.

In a study conducted by Honore,¹¹ series of 668 female patients who had undergone cholecystectomy for gallstone disease, the proportion of treated hypothyroidism was 2.4% compared to 0.8% in the 782 controls.

Other studies found a proportion of

previously diagnosed hypothyroidism of 8% and 6% in patients having common bile duct and gallbladder stones respectively, compared to a proportion of only 1% in the controls.¹⁰ The usage of thyroxine was even suspected to dissolve gallstones.¹² In an animal model of rabbits in whom a fatty diet induced gallstone formation, administering thyroxine was associated with a low gallstone weight, but did not dissolve the gallstones.⁸ In a study conducted in North India by Watali et al¹³ they observed that 14% of patients were hypothyroid in case group and 8% of the patients in control group. On comparing the two groups, there was no statistically significant difference in the prevalence of hypothyroidism (p value 0.175) between the two groups. However in the present study we observed that 23% of gallstone disease patients have hypothyroidism.

Previous studies that investigated the association between thyroid function and gallstone disease in human beings, were conducted in a series of patients with potential for selection bias that may have produced false positive results.^{2,10} Furthermore, the statistical analyses were only controlled for age, but not for further confounders in both studies.^{10,11} In a large case control study, no independent relation between thyroid disorders and gallstone formation was found.² Unfortunately, the exposure was only defined as previous history of thyroid disease, and assessments of the current thyroid function status were not included.

According to Singh et al an advanced age, high BMI and serum lipids were identified as major independent risk factors for cholelithiasis¹⁴. However in our study only 6% gallstone disease subjects were obese. According to Sanyal and Raychaudhuri obesity and hypothyroidism are two common clinical conditions that have been linked together closely.¹⁵ Our study is also in agreement with that as we found that 73% of the study subjects with hypothyroidism were obese.

Conclusion

High incidence of hypothyroidism was observed in patients with gallstone disease. Hypothyroidism may be suggested as a risk factor for developing gallstone disease. In this study male hypothyroids were of larger in number when compared with females in gallstone disease. Only 6% of gallstone subjects were noted obese. Gallstone patients should be checked for serum TSH because of high incidence of hypothyroidism.

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