A REVIEW ON COMPREHENSIVE CONSEQUENCES OF GALL STONES AS CONCOMITANT DISEASE IN HYPOTHYROIDISM (CCCCH)

ABSTRACT

This review investigates the potential correlation between hypothyroidism and gallstone disease, with a particular focus on subclinical hypothyroidism. The study explores the physiological factors that may contribute to gallstone formation in hypothyroid patients, including changes in bile flow and sphincter of Oddi dysfunction. The review also highlights the role of thyroid hormones in lipid metabolism and their potential impact on the composition of bile. The findings suggest a significant association between gallstone disorders and thyroid malfunction, particularly subclinical hypothyroidism. The review concludes that early identification and treatment of subclinical hypothyroidism could significantly reduce biliary stone disease inpatients. regular monitoring of thyroid levels in hypothyroid individuals is recommended to prevent complications due to abnormal thyroid hormone levels.

KEYWORDS:

Hypothyroidism, Gallstone Disease, Subclinical Hypothyroidism, Thyroid Hormone Level, Biliary Stone Disease

INTRODUCTION

"Thyroid hormones have profound variation during the life span and are associated with severe adverse health impacts"[1,2]. The most prevalent biliary disease is gallstones, which affect 10-15% of adults in the United States (20

million people). Cholecystectomy was performed on 3% of these adults, and 85% of them remain asymptomatic. Females are affected more frequently than men by a ratio of 3:1. [3,4].Several variables, such as age, gender, and ethnic origin, are connected to the occurrence of gallstones (33%) in the population. Gallstones can form as a result of specific medical conditions. Gallstones are more likely to form in people who are overweight, pregnant, have certain dietary restrictions, have Crohn's disease, have had stomach surgery, had their terminal ileum removed, have genetic spherocytosis, have sickle cell disease, or have thalassemia[5]. There has been debate about whether thyroid conditions may lead to gallstone disease for many years. There are several theories, in particular, suggesting a potential connection between gallstone disease and hypothyroidism. These factors include the established connection between thyroid dysfunction and lipid metabolic issues, which may afterwards result in a change in the bile's composition.[6]. Subsequent investigations [7] also showed that hypothyroid patients had decreased biliary flow. Thyroid hormone receptors are expressed in the sphincter of Oddi, and thyroxine directly relaxes the sphincter. [8]. Gallstone development is thought to be influenced by fundamental physiological factors such as poor bile flow and sphincter of Oddi dysfunction [9]. The delayed biliary tract emptying caused by the reduced pro-relaxing effect of T4 on the sphincter of Oddi (SO) in hypothyroidism suggested by experimental studies, along with a potential cholesterol load in the bile and a decreased hepatocytic excretion rate, may provide an important explanation for the rising prevalence of common bile duct (CBD) stones [10]. This review depicts the correlation between hypothyroid and gallstone

METHOD

The purpose of this review was to determine whether thyroid function and gallstone disease are related in any way. Choledocholithiasis instances with

documentation served as the subject of this investigation. The information was gathered using the terms cholelithiasis, thyroid profile and hypothyroidism connection, common bile duct stone, risk factors, and sphincter of Oddi dysfunction to search via multiple databases like google scholar, PubMed, andMedline. All of the publications we found were cross-sectional, case-control, and prospective studies. [15]

Individuals were classified as normal if their serum TSH levels were between 0.5 and 4.7mIU/L. Subclinical hypothyroidism is defined as a serum TSH level of 4.7–10mIU/L with normal T3, and T4 levels. TSH concentrations of more than 10mIU/L are regarded as clinical hypothyroidism. [18]

RESULTS and DISCUSSION

Severalrecent research have found a link between CBD stones and hypothyroidism, or subclinical hypothyroidism. It is possible that changes in the function of the SO, rather than changes in the metabolism of cholesterol or bile excretion rate, are what isresponsible for the association between CBD stones and hypothyroidism, as evidenced by the higher prevalence of hypothyroidism in patients with CBD stones compared to patients with gallbladder stones. It is yet unknown if hypothyroid people who have had their gallbladder removed are more likely to get CBD stones than euthyroid people in the same circumstances.

“In many respects, the absence of thyroxine in hypothyroidism probably leads to a decrease in bile flow. The lack of the pro-relaxant action of thyroxine on the SO appears to be a major element contributing to the lower bile flow in hypothyroidism, in addition to the increased cholesterol burden in bile and the decreased bile secretion rate”. [17]

- Research by Sun et al. in China, Figueredo et al. in California, and Sharma et al. in India all showed that cholelithiasis affects females more

frequently than men, which is consistent with the majority of patients in our study being female. [21]

- 53.7% of the hypothyroid participants in this research had subclinical hypothyroidism. This is consistent with the Laukkarinen et al. research, which found that individuals with cholelithiasis had a considerably high frequency of subclinical hypothyroidism. [16,17]
- When compared to the general population, individuals with undiagnosed or subclinical hypothyroidism were 12 times more likely to develop choledocholithiasis, according to case-control research by BJ et al. to determine the relationship between hypothyroidism and gallstone disease. [20]

- Prospective cross-sectional research by Ghimire et al. "in West Nepal revealed that 43 out of 160 individuals with gallstone disease (26.7%) had hypothyroidism, with 21.1% of these patients having subclinical hypothyroidism and the other 5.6% having clinical hypothyroidism". [24]

- Inkinen et al. concluded that "there is a link between CBD stone sufferers and hypothyroidism that has been addressed in their study. According to the study's findings, primary hypothyroidism affected 8% of the study group compared to 1% of the control group, with a P value of less than 0.01". [10]

- A study done in Germany by Völzke et al. revealed a link between gallstone disease and thyroid function based on gender. Comparatively, to women, men were discovered to have an independent risk factor for developing cholelithiasis called thyroid dysfunction. However, in our study, the prevalence of hypothyroidism was higher in girls than in males,

perhaps as a result of the lesser size of sample size that we recruited than in the aforementioned German study. [23]

- According to research by Milionis et al., 70.9% of hypothyroid patients had a BMI of more than 25 kg/m2 and were obese [18]. This matches our study's findings that the majority of hypothyroid individuals (73.7%) were fat. [22]

Table 1. Data of the studies published reporting an association between hypothyroidism and gallstones**.**

SNO	AUTHORS	JOURNAL	STUDY TYPE	patient population	gender	age (years)	RESULTS	CONCLUSION
1	Inkinen et al	Hepatogastroenterol	Retrospective	168	65% F	> 60 years	In Group I the prevalence of previously diagnosed hypothyroidism was 7/86 (8%) compared with 1/86 (1%) in Group II (P = 0.01). Hypothyroidism was previously diagnosed only in the common bile duct stone patients (Group I) of over 60 years of age, where the prevalence was 7/66 (11%).	There is a significant association between common bile duct stones and previously diagnosed hypothyroidism. Their stronger association between the common bile duct stones and hypothyroidism compared to gallbladder stones and hypothyroidism suggests a mechanism other than merely the cholesterol metabolism-mediated mechanism. The 11% prevalence of previously diagnosed hypothyroidism in the common bile duct stone patients of over 60 years of age suggests all patients with common bile duct stones be screened for current thyroid dysfunction.
2	Dr.	Internati	A case	140	Both	>18	A case control study was	This study proves that

	Sharath et .al	onal Journal of Surgery Science	control study		(male and female)		done where 140 cases and 140 controls were sampled. A significant proportion of the cases were found to have hypothyroidism in comparison to controls with odds ratio of 12.21. Other variables included female sex, age greater than 60 years, non-vegetarian diet, increased LDL, VLDL and Triglyceride levels.	hypothyroidism is a significant independent risk factor for choledocholithiasis, and this can give validation to inculcate change in the approach and management of a case of choledocholithiasis
3	Dr pradeepg hirmire et al.	journal of dental and medical science	prospectiv e study	160	Both (male and female	range of 16 - 83 years	This study shows 75% female and 25% male, age wise minimum age was 16 and maximum age was 83. The mean age was 42.68 years. All160patients had gallstone in ultrasoundof the abdomen without complication. The prevalence of hypothyroidism in gallstone patient in our study was 26.7%	Higher association of hypothyroidism was seen (26.7%) in gallstone patients
4	Hui Sun, Hong Tang et al	world journal of gastroent erology	observatio nal study	3573	Both (male and female	range of 18 - 70 years	A total of 3573 people were included, 10.7% (384/3573) of whom had gallstone diseases. Multiple logistic regression analysis indicated that the incidence of gallstone disease in subjects aged 40-64 or ≥ 65 years was significantly different from that in those aged 18-39 years ($P < 0.05$); the incidence was higher in	We assume that age and sex are profoundly associated with the incidence of gallstone disease; the metabolic risk factors for gallstone disease were different between men and women

							women than in men (P < 0.05). In men, a high level of fasting plasma glucose was obvious in gallstone disease (P < 0.05), and in women, hypertriglyceridemia or obesity were significant in gallstone disease (P < 0.05).	
5	Anastasios Milionis et al	international scholarly research notes	correlation study	736	616 females and 118 males	range of 54 - 73 years	The correlation between BMI and the various thyroid hormones differed in both sexes. In women, there was a statistically significant association between BMI and TT3 and TT4, while in men BMI was positively associated with FT3 levels and negatively with TSH. BMI depends on fluctuations in body weight and height.	In conclusion, we have shown that variations of normal thyroid function are accompanied by differences in BMI perhaps due to the changes in the resting energy consumption. The high incidence of the pathological disorders in thyroid function combined with the strong influence of various environmental factors (diet, exercise, etc.) can increase weight with an unknown biological mechanism and lead to obesity. Further studies are required for a general assumption of the existence or nonexistence of a correlation between obesity and variations of normal thyroid function

CONCLUSION:

According to the findings of this study, gallstone disorders and thyroid malfunction, particularly subclinical hypothyroidism, are related. Biliary stone disease is linked to an increased frequency of subclinical hypothyroidism. Subclinical hypothyroidism can greatly reduce biliary stone disease patients if it is identified and treated promptly. To prevent complications brought on by an

abnormally high rise in thyroid hormone, we suggest that hypothyroid individuals should monitor their thyroid levels every three to six months**.**

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