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Original Research Article

Prevalence of Undiagnosed Hypothyroidism in Gall Bladder Stones Patients

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Abstract

Background and Aim: The hypersaturation of cholesterol in bile during the nucleation process, a crucial stage in the formation of bile stones, has been the subject of numerous studies conducted in the west to uncover risk factors for biliary lithiasis. The prevalence of gall stones is higher in people with hypothyroidism condition, according to several reasons for a potential relationship between hypothyroidism and lipid metabolism and gall stone development. The current study aims to determine hypothyroidism as a likely cause of biliary stones in Tertiary care teaching institute of India by examining the prevalence of undiagnosed hypothyroidism in patients with cholelithiasis.

Material and Methods: In a Tertiary Care Teaching Institute in India, a prospective, hospital-based cross-sectional study was conducted on patients hospitalised for the treatment of gall stone disease in the general surgery department over the course of a year. After initial screening, patients who met the selection criteria provided a thorough history, paying particular attention to symptomatology and risk factors as per the proforma. All patients who qualified had their thyroid function tested. Three groups of patients—euthyroid, subclinical hypothyroid, and clinical hypothyroidism—were created. used statistical analysis. The prevalence of hypothyroidism and subclinical hypothyroidism in all patients included was obtained after determining the percentage of gall stones in different age groups and genders of the study population.

Results: Four of the 160 patients were under the age of 20, 48 were between the ages of 21 and 40, 40 were between the ages of 41 and 60, and 56 were between the ages of 61 and 80. Of of 160 patients, 112 had normal thyroid function, 40 had subclinical hypothyroidism, and 8 had hypothyroidism as their official diagnosis. The research population, which had an unknown thyroid function, displayed indications of hypothyroidism.

Conclusion: The study showed a considerable frequency of hypothyroidism in cases of cholelithiasis of 29%. 6 percent had clinical hypothyroidism, while 23 percent had subclinical hypothyroidism. According to this study, ladies over 40 years old have a higher prevalence. The study group had hypothyroid symptoms while having unknown thyroid status, which strongly suggests thyroid profile testing prior to surgery.

Keywords: Cholelithiasis, Euthyroid, Hypothyroidism, Gall Stone.

Introduction

The most frequent biliary pathology is gallstones, which can be classified as cholesterol, pigment (black or brown), or mixed stones. Gall bladder stones are becoming more common in India as a result of changing dietary patterns, cutting-edge research, and growing costs. Stone development is influenced by biliary stasis brought on by aberrant gall bladder motility, supersaturation, nucleation, and cholesterol content.[1] Stones containing 51-99% cholesterol as well as calcium salts, bile acids, bile pigment, and phospholipids are known as cholesterol or mixed stones.[2,3] Gallstones can be single or numerous, big or small, and radio-opaque if they contain calcium salts. Slight amounts of cholesterol and traces of iron have been found in single stones, which are unusual but often contain mostly cholesterol and form when the physico-chemical equilibrium, which normally keeps cholesterol in micellar form in the bile, is disturbed [4,5].

The hypersaturation of cholesterol in bile during the nucleation process, a crucial stage in the formation of bile stones, has been the subject of numerous studies conducted in the west to uncover risk factors for biliary lithiasis.[6] Although it is a common ailment among adults, thyroid disorders are typically ignored. There have only been a few prior investigations on the frequency of thyroid problems in healthy persons.

Subclinical or overt hypothyroidism, where the level of thyroxine is actually below normal, are two different types of hypothyroidism. When blood thyroid hormone levels are within normal lab range but serum thyroid stimulating hormone (TSH) levels are slightly elevated, subclinical hypothyroidism (mild thyroid failure) is found. It has been reported to have some extra thyroidal effects, though.[7-9]

The current study seeks to evaluate hypothyroidism as a likely cause of biliary stones in Tertiary care teaching institute of India by examining the prevalence of undiagnosed hypothyroidism in patients with cholelithiasis.

Material and Methods

In a Tertiary Care Teaching Institute in India, a prospective, hospital-based cross-sectional study was conducted on patients hospitalised for the treatment of gall stone disease in the general surgery department over the course of a year.

The source of the data: Gall stone disease patients getting admitted to the surgery wards.

Included were all cholelithiasis patients. Patients with a history of thyroid surgery or hypothyroidism, hemolytic diseases, concurrent co-morbid conditions, particularly diabetes mellitus type II, renal stones, pancreatic duct stones, women who were pregnant or taking oral contraceptives, patients with cholangitis, and people who were taking phenytoin, carbamazepine, metoclopramide, amiodarone, or lithium were excluded from the study. The universal sampling technique was used for the sampling process. The investigation contained 160 samples in total.

The proforma was first used to screen the patients. All patients who met the requirements for selection received written informed permission and were educated about the study's objectives and potential outcomes. A thorough history was taken, paying particular attention to the symptomatology and risk factors included on the proforma. A clinical examination was conducted, and results were recorded using the prescribed format. All patients who qualified had their thyroid function tested.

If the absence of hypothalamic/pituitary pathology is confirmed, serum TSH level is typically the first laboratory test used to screen for thyroid dysfunction. S.TSH levels that are elevated or decreased indicate that the thyroid is dysfunctional, but the cause cannot be determined. Hyperthyroidism is diagnosed

with reduced TSH and high serum levels of free T4 (FT4) and/or free T3 (FT3). Patients were divided according to history, clinical examination and laboratory test (free T3, free T4 and TSH) into three groups according to hospital values, serum TSH: 0.27-4.2 microIU/ml, F.T4: 0.93-1.7 mg/dl, free T3: 2-4.4 mg/dl.

Group 1: euthyroid group; clinical and laboratory tests were normal.

Group 2: subclinical hypothyroidism; asymptomatic and with TSH concentration above the upper limit of normal range and FT4 and/or FT3 within normal limits.

Group 3: clinical hypothyroidism; symptomatic and with TSH level above the upper limit and FT4 and/or FT3 decrease below the normal limit.

Statistical Analysis

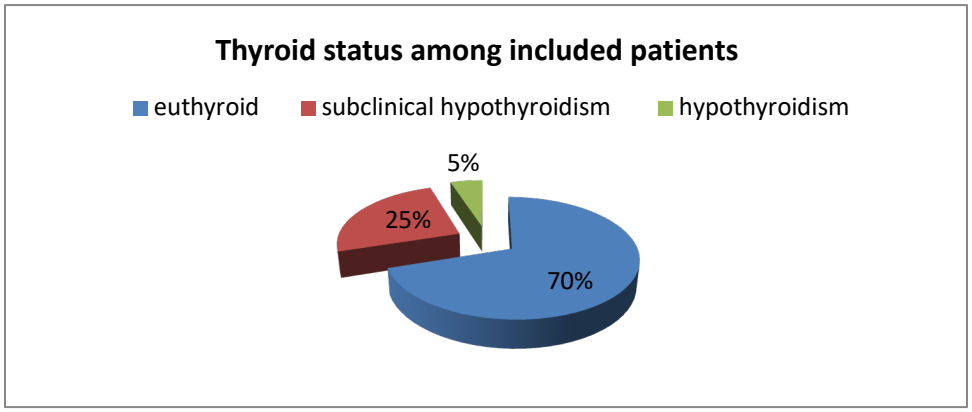
Microsoft Excel 2007 was used to compile and enter the collected data, which was then exported to the data editor page of SPSS version 15 for analysis (SPSS Inc., Chicago, Illinois, USA). The level of significance and confidence level for each test were set at 5% and 95%, respectively.

Results

Data on a total of 160 randomly selected patients who met the selection criteria was collected. There were 60% women and 40% men. Four of the 160 patients were under the age of 20, 48 were between the ages of 21 and 40, 40 were between the ages of 41 and 60, and 56 were between the ages of 61 and 80. Twelve of the patients were above 80 years old. Of of 160 patients, 112 had normal thyroid function, 40 had subclinical hypothyroidism, and 8 had hypothyroidism as their official diagnosis.

58 of the 112 patients with euthyroidism were female and 54 were male. There were 31 females and 9 males with subclinical hypothyroidism. Only 1 male out of 8 clinical hypothyroidism instances and 7 females.

There were only 2 female patients under the age of 21 among the 112 euthyroid patients. There were 27 women and 8 men in the age range of 21 to 40. Male and female patients were, however, 19 and 20, respectively, in the 41–60 age range. In the age group of 61 to 80 years, there were 23 more male patients than female patients (only 6). In the above 80-year-old age category, there were 4 female patients and 3 male patients. Only 2 of the 40 patients with subclinical hypothyroidism were female and under 20 years old. Similar to this, there were just 9 female patients in the 21–40 year age range. 78% of the 17 patients in the 41–60 age range were female, and 22% were male. Six of the 10 patients between the ages of 61 and 80 were female, and four were male. In the 80+ year age group, there were only 2 female patients. 50% of the 8 hypothyroidism cases were female and in the age range of 41 to 60. Two patients, one each male and female, ranged in age from 61 to 80. Only one female patient above the age of 80 was discovered.



Graph 1: Thyroid status among included patients

Table 1: Gender distribution of thyroid status

Gender	Euthyroid	Hypothyroid	Subclinical hypothyroid
Female	58	31	7
Male	54	9	1

Discussion

Bile composition and flow are impacted by the multiple and complex pathogenesis of gallstones.[1,10] A previous study found a link between gallstones, confirmed hypothyroidism, and delayed biliary emptying in both experimental and clinical hypothyroidism. This association was at least partially explained by T4's lack of a pro-relaxing impact on the sphincter of oddi contractility.[10,11] Although it is a common condition among adults, subclinical hypothyroidism is frequently disregarded. According to a recent study by Ahmed MM *et al*.[12], patients with choledocholithiasis had a 16% incidence of hypothyroidism, compared to 8% of those with cholelithiasis who had subclinical hypothyroidism.

After obtaining informed consent, 100 randomly chosen patients who met the inclusion criteria were enrolled in the study. A thyroid profile was sent for everyone after evaluating symptoms and warning indicators. Out of 100 patients, 29 percent were found to have hypothyroidism, of which 6 were given the diagnosis and 23 were determined to have subclinical hypothyroidism. Over the years, difficult investigations have been conducted all over the world to determine the relationship between biliary stone formation and thyroid condition. By performing 99 mTc cholescintigraphy on untreated hypothyroid patients in Finland before and after levothyroxine administration and making them euthyroid, Laukkarinen *et al*. in 2003 carried out a case control study in two stages.[13-15]

Between 2014 and 2016, 500 cholelithiasis patients were the subject of a cross-sectional study by Singha *et al*. in NorthEast India. [16] In their study, 13.8% of the participants were hypothyroid women. With a sex distribution of 75.8% females and 24.1% men, the prevalence rate in the current study was higher than that in Singha *et al* study's emphasising the higher prevalence among females. In Delhi, 200 patients with upper stomach pain for more than a year in 2017 participated in a study by Watali *et al*., which found no correlation between hypothyroidism and gallstones.[17] This study's findings are consistent with those from Watali *et al*, who found that patients over 50 years old had a significant incidence of hypothyroidism. In Madhya Pradesh, 50 individuals with gallstones were the subject of a study conducted in 2015–2016 by Brijendra *et al*.

The gender distribution was higher than the gender distribution in the current study, which was 60% female and 40% male. It was 84% female and 16% male. In the entire research population, Brijendra *et al*. indicate a prevalence of hypothyroidism of 24%, with 91% of females being affected. However, Brijendra *et al* were unable to demonstrate any connection between gender-specific gallstones and hypothyroidism.[18]

Gallstones had a greater prevalence of 29% hypothyroidism, according to the current study. Manjusha *et al*. discovered no association between subclinical hypothyroidism and patient comorbidities such diabetes, hypertension, hypercholesterolemia, obesity, smoking, or alcohol use even though the current investigation excluded individuals with recognised comorbidities known to cause gallstones. When compared to patients with euthyroidism, hypothyroid patients had bigger gallstones, according to Manjusha *et al*. The two showed a moderately positive correlation, which strongly suggested a connection between hypothyroidism and gallstone size.

Gallstones are mostly caused by ageing, and the age of 40 seems to mark the transition between relatively low and high rates of cholecystectomies. The incidence is four times higher in people between the ages of 40 and 69 than it is in younger persons. According to a research by Laukkarinen *et al*., patients with gallstones—particularly women over 60—should be examined for thyroid function abnormalities, no matter how minor or preclinical they may be.

This correlated with our findings regarding age groups and their distribution because as people age, their body's water content decreases and can even reach 45% of their body weight. This is because as people age, their lean body mass decreases, which can result in more concentrated bodily fluids and excretions as well as more deposition of solid excretions, which can cause gallstone nucleation and formation.[19]

According to a study by Volzke H *et al* [20] on thyroid function and gallstones, women experience gallstones almost two times more frequently than men do, despite the fact that women are only marginally more likely to have their gallstones diagnosed by ultrasound. The two showed a moderately positive correlation, which strongly suggested a connection between hypothyroidism and gallstone size. In contrast to Manjusha *et al* study which found that only 75% of hypothyroid patients had many calculi, the current study found that 100% of patients with clinical hypothyroidism and 78% of those with subclinical hypothyroidism had several calculi in the gall bladder. Research shows that people who are hypothyroid are more likely to experience larger and more frequent gallbladder stones.

The current study lacks data on the association between serum TSH levels and the size and number of calculi, making it impossible to determine if elevated TSH levels can increase calculi size and quantity. In order to draw the conclusion that hypothyroidism is a specific risk factor for cholelithiasis and that all patients with gall stones should be screened for thyroid dysfunction, more research on the early diagnosis and treatment of hypothyroidism that results in prevention or reduction in the size of biliary calculi is required.

Conclusion

The study found a considerable frequency of hypothyroidism in cases of cholelithiasis of 29%. 6 percent had clinical hypothyroidism, while 23 percent had subclinical hypothyroidism. According to this study, ladies over 40 years old have a higher prevalence. The study group had hypothyroid symptoms while having unknown thyroid status, which strongly suggests thyroid profile testing prior to surgery.

Our work serves as a preliminary indicator of statistical prevalence and calls for further research into the biochemical, hormonal, pathological, and environmental elements that may contribute to the development of both cholelithiasis and thyroid disease as well as the relationship between them. By understanding the etiology and risk factors for the formation gall stones, incidental identification of subclinical hypothyroidism can be made, preventive and therapeutic measures can be taken.

References

1. Pierre F Saldinger. Natural history of gall stones and asymptomatic gallstones. In: Jarnagin WR, Belghiti J, Blumgart LH eds. Blumgart's surgery of the liver, biliary tract, and pancreas. 6th ed. Philadelphia: Elsevier Saunders; 2012:483-583.
2. I.J. Beckingham, B.J. Rowlands, Post cholecystectomy problems, in: H. Blumgart (Ed.), Surgery of Liver and Biliary Tract, third ed., WB Saunders, London, 2000;186.
3. A. Nakeeb, A.G. Comuzzie, L. Martin, et al., Gall stones: genetics versus environment, Ann. Surg. 2002; 235:842

4. Norman S. Wiliam, Bassi chemical analysis of gallstones 2004 clinical biochemistry, 2; 1178 – 1188.
5. N, aggiol , Ghiro S,meggiato T, Di Mariof, Del Favero G,Scalon P,Molinm, Damico D,Naccarato R, 1990. X- ray diffraction study of biliary calculi Gelin Med, 71: 331–335.
6. Kleinero, Ramesh J,Huleihel M,Cohen Z,Mordechai S, 2002. Acomartive study of gallstone from children and adult using FTIR spectroscopy and flurorescence microscopy. BMC Gastroenterol, 2:3-15.
7. V. Fatourechi, Subclinical hypothyroidism: an update for primary care physicians, Mayo Clin. Proc. 2009; 84 (1): 65–71.
8. C. Menendez, R. Baldelli, J.P. Camina, et al., TSH stimulates leptin secretion by a direct effect on adipocytes, J. Endocrinol. 2003; 176: 7–12.
9. E. Abe, R.C. Marians, W. Yu, et al., TSH is a negative regulator of skeletal remodeling, Cell. 2003; 115: 151–162.
10. Laukkarinen J, Sand J, Aittomaki S, Porsti I, Koobi P, Kalliovalkama J, et al. Mechanism of the prorelaxing effect of thyroxine on the sphincter of Oddi. Scand J Gastroenterol. 2002;37(6):667-73.
11. Inkinen G,S & J,Norback I, 2001. Association between common bile duct stones and treated hypothyroidism, Hepatogastroenterology;47:919-921.
12.] Mir Mujtaba Ahmad, Mir Irfan Nazirl, Haneef Mohamed Darl, et al., Evaluation of thyroid profile in biliary tract stones, International Surgery Journal. 2015;12(3): 344.
13. Laukkarinen J, Sand J, Saaristo R, Salmi J, Turjanmaa V, Vehkalahti P et al. Is bile flow reduced in patients with hypothyroidism? Surgery. 2003; 133(3): 288-93.
14. Laukkarinen J, Kiudelis G, Lempinen M, Räty S, Pelli H, Sand J et al. Increased prevalence of subclinical hypothyroidism in common bile duct stone patients. J Clin Endocrinol Metab. 2007;92(11):4260-4.
15. Laukkarinen J, Sand J, Autio V, Nordback I. Bile duct stone procedures are more frequent in patients with hypothyroidism. A large, registry-based, cohort study in Finland. Scand J Gastroenterol. 2010; 45(1): 70-4.
16. Singha D, Pawar NM, Prabhu BJ, Kumar N, Gopalarathnam S. Prevalence of previously undiagnosed hypothyroidism in patients with cholelithiasis in a tertiary care center, North-East India. Int Surg J. 2017; 4(3):932-5.
17. Watali YZ, Jain R, Bali RS, Mittal A. Is hypothyroidism a risk for gall stone disease? a study to assess the association. Int Surg J. 2017;4(8):2665-9.
18. Raghuwanshi BS, Jain S, Damor M, Patbamniya NK. Prevalence of subclinical hypothyroidism in cases of cholelithiasis. Int Surg J. 2017;5(1):34-8.
19. J. Laukkarinen, G. Kiudelis, M. Lempinen, et al., Increased prevalence of subclinical hypothyroidism, Metab. 2007; 92(11): 4260–4264.
20. Volzke Henry, Daniel M. Robinson, John Ulrich, et al., Association between thyroid function and gallstone disease, World J. Gastroenterol. 2005; 2(35).