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A Study of Correlation between Cholelithiasis and Hypothyroidism (Subclinical or Clinical) in a Rural Set Up

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Abstract:

BACKGROUND: It is found in various studies worldwide that there is a correlation between the two diseases namely Cholelithiasis and hypothyroidism. It is proposed that due to lack of thyroxine hormone there is decreased inhibitory effect (relaxation effect) on the sphincter of Oddi causing stasis of bile and in turn development of Cholelithiasis. Therefore in a case Cholelithiasisanalysing the thyroid hormone levels as well as in a case of hypothyroidism analysing the patient for any evidence of Cholelithiasis is going to be helpful in avoiding the potential complications.

PRIMARYOBJECTIVE : To establish if there is any correlation between Cholelithiasis and hypothyroidism (clinical and subclinical)

SECONDARYOBJECTIVES:

1) To evaluate correlation of cholelithiasis and hypothyroidism in different age groups and in relation to gender.

2) To evaluate this correlation with reference to sites of biliary stone(Gall bladder, CBD, pancreatic duct)

3)To evaluate the frequency of subclinical hypothyroidism in cholelithiasis.

4) To evaluate the relation of BMI, Obesity with Hypothyroidism and Cholelithiasis.

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METHODS: All the patients above the age of 12 years will be considered for the study after being eligible for all the criterion. Patients with evidence of Cholelithiasis will be screened for subclinical or clinical hypothyroidism by TFT. On the other hand, the patients presenting with hypothyroidism will be screened for any evidence of Cholelithiasis by abdominal ultrasound.

RESULT: We expect that we will be able to establish a correlation between hypothyroidism and Cholelithiasis hence establishing hypothyroidism as one of the etiological factors for Cholelithiasis.

CONCLUSION: Expecting to establish a correlation between the Cholelithiasis and hypothyroidism.

KEYWORDS: Cholelithiasis, Hypothyroidism, Abdominal ultrasound, Thyroxine, Gall stones.

INTRODUCTION

Correlation between gallstones and hypothyroidism is seen in various studies. The derangements in the metabolic mechanism of the excretion rate of the bile or the cholesterol and derangements in the contraction and relaxation of SO (sphincter of Oddi) denote the interdependence of hypothyroidism with the functioning of the gallbladder, which suggest considerably increased prevalence of hypothyroidism in the cases of Cholelithiasis. It is not satisfactorily studied whether if compared with individuals with normal thyroid functions, individuals with the hypothyroidism and who have undergone the procedure of cholecystectomy show a greater risk of developing of the gall stones.(1) The decreased thyroxine level in hypothyroidism cases leads to considerably decreased flow of the bile in various different mechanisms. In presence of the rise in the load of cholesterol in the bile and the fall in the rate of secretion of the bile, absence of the action which is pro-relaxant of thyroxine hormone on SO (sphincter of Oddi) carries out a vital role.(2)

The presence of gall stones has been seen as approx. 5%-26% in various nations of the world.The pathogenesis of cholelithiasis is not unique, but appears to be multifactorial. (Pdf 1)

Cholelithiasis is prevalent all over the world due to of disturbance in maintaining the balance of bile salt and cholesterol concentrations leading to accumulation of precipitates inside the gallbladder.(3) Stones are generally many in number with different sizes, they may be faceted or hard in consistency or irregular, soft and mulberry shaped.(4) In hypothyroidism and serum cholesterol levels rise which leads to bile supersaturation with cholesterol, leading to hypomotility of gall bladder, reduced contractibility and abnormal filling, leading to the increased time of residence and capacity of flow of bile into the gallbladder.(5) This factor can give rise to the condition where there is retention of crystals of cholesterol hence allowing sufficient time for nucleation and development into the gall stones. Patients who are suffering from hypothyroidism have a serum cholesterol values about 50% higher than in the euthyroid individuals and 90% of all the patients with Hypothyroidism have a rise in the levels of cholesterol. Fall in the levels of t4 have an

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action of relaxing the sphincter of Oddi, giving rise to stasis of the bile and process of stone formation .(6)

Hypothyroidism can be subclinical or clinical where level of thyroxine is below the normal level.(7) Patients with thyroid stimulating hormone (TSH) concentrations between 0.35 and 4 IU/ml are considered to be euthyroid candidates, TSH values more than 4 are labelled to be individuals who are hypothyroid individuals and TSH values less than 0.35 are known to be having hyperthyroidism.(8) The relaxation as well as contraction of sphincter of oddi play a vital role in development of the disease, which is affected by the action of numerous hormones present in the body. Increase in the motility of the gall bladder occurs due to deficiency of the food material (the 'inter-digestive' period), and after the intake of food (the 'digestive' period), the last being further divided in four phases in accordance to the site at which the stimulus is originated: Cephalic, Gastric, Intestinal and Ileocolonic.(9) Here, sphincter of Oddi carries out a vital function of guiding of the flow of the bile in the gall bladder or the part of duodenum and inhibiting the reflux of contents of duodenum into the biliary-tree.(10)

RATIONALE: Hypothyroidism is a commonly encountered entity in our population. As the thyroid hormone acts on the nuclear receptor present in almost every cell of the body, it shows considerably wide range of actions in the human body. Deranged thyroid hormones therefore affect the human body in wide range of functions but on the other hand a case of Hypothyroidism can be very efficaciously managed by simply providing external source of hormones. Oral tablets of thyroxine content are widely used for management which have shown very promising results. Patients taking Thyroxine supplementation have shown to lead a considerably healthy life up to 90-95 years of age. Unfortunately, Thyroxine hormone replacement therapy is not enough to maintain the normal function of sphincter of oddi giving rise to a condition where there is increased risk of gallstone formation on the other hand patients with undiagnosed hypothyroidism condition actually show very good response to the changes managed in the levels of serum cholesterol with early treatment with replacement of the thyroxine hormone.(11) It has been proposed that the patients who are having greater chances of developing gall stones due to simultaneous presence of Hypothyroidism may get benefit because of the early management. That is why, it is a good practice to investigate the thyroid function in cases where we are treating patients who are having gallstones.(12)

OBJECTIVES:

PRIMARY OBJECTIVE : To establish if there is any correlation between Cholelithiasis and hypothyroidism (subclinical and clinical)

SECONDARY OBJECTIVES:

1) To evaluate correlation of cholelithiasis and hypothyroidism in different age groups and in relation to gender.

2) To evaluate this correlation with reference to sites of biliary stone(Gall bladder, CBD, pancreatic duct)

3)To evaluate the frequency of subclinical hypothyroidism in cholelithiasis.

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4) To evaluate the relation of BMI, Obesity with Hypothyroidism and Cholelithiasis.

METHODS:

1)Complete history of the patient

2) Clinical examination of the patient

3) Investigations :

1 CBC

2 LFT

3 T3 T4 TSH (THYROID FUNCTION TEST).

4 Abdominal USG.

STUDY DESIGN – Prospective study.

STUDY PLACE – Acharya Vinoba Bhave Rural Hospital (AVBRH), Sawangi, Wardha, Maharashtra. JNMC, DMIMS (DU)

STUDY DURATION – 2 1/2 YEARS PROSPECTIVE STUDY

SAMPLE SIZE– 83 CASES

STUDY POPULATION- EVERY PATIENT ABOVE 12 YEARS OF AGE WITH EITHER CHOLELITHIASIS OR HYPOTHYROIDISM.

INCLUSION CRITERIA –

All patients with cholelithiasis admitted and presented to OPD in the department of surgery and all patients of hypothyroidism in department medicine.

EXCLUSION CRITERIA –

1. Children of age less than 12 years.
2. Any previous surgical intervention in thyroid region
3. History of radiation.
4. H/O taking contraceptive medications

This interventional study will be conducted after the approval of the Ethics committee, Department of Medical Education, Jawaharlal Nehru Medical college, Deemed University, Sawangi(Meghe), and written consent will be obtained from the patient.Patient with symptoms suggestive of cholelithiasis and hypothyroidism will be thoroughly evaluated by complete general physical examination, systemic examination and T3, T4, TSH and USG abdomen & pelvis and CBC, LFT.Clinical symptoms were assessed as per the presence of duration, frequency, severity and type of symptoms.

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Study Design:

It is a prospective study, done on the patients of Cholelithiasis. It will be conducted at Dept.ofsurgery, J.N.M.C and Acharya Vinoba Bhave Rural Hospital (AVBRH), Sawangi (Meghe), Wardha of DMIMS (DU).

Informed consent will be obtained from all the patients and prior approval from institutional ethical committee, DMIMS (DU)will be taken.

STATISTICAL ANALYSIS

- This interventional study will be conducted after the approval of the Ethics Committee Department of Medical Education, Jawaharlal Nehru Medical College, Deemed University, Sawangi(Meghe).
- The outcomes will be recorded and analysed at the end of study using statistical package for social sciences (SPSS).

METHODOLOGY:

All patients presenting to the dept. Of Surgery, Medicine AVBRH with the diagnosis of Cholelithiasis or hypothyroidism will be asked whether they agree to participate in our prospective study.Written informed consent will be obtained from the patient before enrolment.Thorough clinical examination will be done and the patients will be selected in accordance to the criteria of inclusion and exclusion.During duration of study period, patients who presented to AVBRH with Cholelithiasis or hypothyroidism will be included in this study. Data collection included history, age, sex, vital signs and laboratory data.Estimation of TFT, CBC, LFT and USG abdo pelvis will be done in all the patients included in the study.The serum and whole blood specimens will be collected in the standard lab conditions.

SCOPE :

The study will be useful for establishment of deranged thyroid function as an etiological or predisposing factor of Cholelithiasis. It will bring into attention the simultaneous presence of hypothyroidism and Cholelithiasis in the community and help in prevention of development of complications and the disease itself.

IMPLICATIONS

- Our recommendation is that every patient above 12 years with Cholelithiasis should be screened for TFT and it may be used as marker of thyroid gland status so that deranged thyroid status could be diagnosed at early stage and progression of hypothyroidism or complications of Cholelithiasis can be prevented. Further studies are to be done establish the role of oral thyroxin in high risk patients in the treatment and prevention of cholelithiasis.

- Every patient above 12 years of age having hypothyroidism should be screened for USG abdomen and it may be used as a marker of Cholelithiasis so that it could be diagnosed at an early stage and progression and complications of the disease can be avoided. Further studies should be done to establish the role of oral thyroxin in high risk patients in the

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treatment and prevention of cholelithiasis. Further studies should be done to establish the role of oral thyroxin in high risk patients in the treatment and prevention of cholelithiasis.

EXPECTED RESULT AND OUTCOME:

We expect that we will be able to establish a correlation between hypothyroidism and Cholelithiasis hence establishing hypothyroidism as one of the etiological factors for Cholelithiasis.

Variables: Normal T3- 100-200ng/dl

Normal T4- 5-12mcg/dl

Normal TSH- 0.5-4mU/L

Data sources/ measurement :

1. Serum T3, T4, TSH will be taken into consideration for evaluation of thyroid gland status

2. USG abdo-pelvis will be done for screening for Cholelithiasis.

Bias: To rule out the bias, USG abdo-pelvis will be done by a pre-decided team of doctors.

Quantitative variables: The T3, T4, TSH values will be compared with the pre-decided standards.

DISCUSSION:

BasimRassamGhadhban and FirasNajimAbid conducted a study on 103 patients with majority of them being in the 36-50 years age group and found that 8 of them were having subclinical hypothyroidism.

Brijendra Singh Raghuwanshi, Sandeep Jain, MahendraDamor, Naveen Kumar Patbamniya conducted a study on 50 patients of Cholelithiasis and 12 of them were found to have hypothyroidism.

Dr. AishwinSuvarnakumar also conducted a study in the same topic and the results were in accordance to other studies being 11% vs 14%.

Few of the related studies were reported(13-16). Jose et. al. reported on profile of thyroid dysfunctions among the female population in a rural community of Wardha district (17). Taksande reported about sensory nerve conduction study in patient of thyroid dysfunction(18).

LIMITATIONS:

- It will be a single centre study. This could have an impact on the reproducibility of the reported results.

- Not much material of literature is available on correlation between Cholelithiasis and hypothyroidism (subclinical and clinical) so further multicentric studies need to be done for validation of our hypothesis.

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