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Relationship of Hypothyroidism and Coronary Artery Disease

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Abstract: Background*: Coronary artery disease, one of the most important cause of mortality, is due to reduced coronary blood flow which is in turn the consequence of atherosclerotic plaques in the coronary vessels. The Thyroid hormones T3(Triiodothyronine) & T4(Thyroxine) has effect on lipid metabolism. The Thyroid hormones increases the degradation of cholesterol carrying lipoproteins. Therefore, any derangement in the Thyroid hormones may cause an abnormality in the lipid metabolism which may increase the risk of developing coronary artery disease. The aim of this study was to see the correlation between hypothyroidism and coronary artery disease*
Materials and Methods*: This is a cross sectional study, conducted in the Department of Biochemistry in collaboration with the Department of Cardiology, RIMS. The study population consisted of 80 patients above 18 years suffering from coronary artery disease.*
Results*: Among the 57 male patients 14 patients were euthyroid, 35 patients were hypothyroid & 8 patients were hyperthyroid and among the 23 female patients 8 patients were euthyroid, 11 patients were hypothyroid & 4 patients were hyperthyroid. Most of the patients of coronary artery disease had raised serum TSH levels.*
Conclusion: *The study concluded that hypothyroidism increases the risk of developing coronary artery disease therefore individuals with raised serum TSH and decreased T3 & T4 should be screened properly for any cardiac abnormality*
Key Word*: Triiodothyronine(T3), Thyroxine(T4), Atherosclerotic plaques, Lipoproteins, Cholesterol*

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I. Introduction

Coronary artery disease is caused due to decreased blood flow to the coronary arteries and it may be caused due to multiple factors. Hyperthyroidism is present at 1.3% of the population (clinically overt in 0.5% and subclinically overt at 0.7%) while hypothyroidism is present at 4.6% (with clinical significance at 0.3% and subclinical significance at 4.3%)[1]. Thyroids disorders are associated with systolic and diastolic heart dysfunction, hypertension, rhythm disorders, etc. Clinically significant hyperthyroidism and hypothyroidism may have an impact on patients with ischemic heart disease.[2] The association between overt hypothyroidism and coronary heart disease has been repeatedly observed.[3] The most frequent cause of hypothyroidism is the autoimmune thyroid disease (AITD) manifested by elevated thyroid antibodies, namely thyroid peroxidase antibodies.[4] This study was taken up to see the correlation between hypothyroidism and coronary artery disease.

II. Material And Methods

The study was a cross sectional study conducted in the Department of Biochemistry in collaboration with the Department of Cardiology, Regional Institute of Medical Sciences & Hospital, Imphal, Manipur for a period of 24 months from September 2016 to August 2018.
Study Design: A cross sectional study.
Study Location: This was a tertiary care teaching hospital based study done in Department of Biochemistry in collaboration with Department of Cardiology, RIMS, Imphal.
Study Duration: September 2016 to August 2018.
Sample size: 80 patients.
Subjects & selection method: The study population consisted of 80 patients above 18 years suffering from coronary artery disease and the patients were chosen from those admitted in the cardiology ward of RIMS, Imphal.
Inclusion criteria: 80 patients who were admitted within 12 hours after onset of symptoms in ICCU or Medicine Ward of RIMS Hospital having typical ischaemic symptoms with test reports positive for CK-MB & Trop-I and who were not undergoing treatment for any thyroid disorder were taken as the study population.

Exclusion criteria: Patients with hypothalamic disorders, pregnancy, administration of specific thyroid drugs prior to the inclusion in the study were excluded from the study.

Procedure methodology

5 ml of venous blood was collected, each in the fasting state by venipuncture from antecubital vein. The blood collected in the plain vial was centrifuged for 10 minutes within 30 minutes of collection and the serum was stored immediately at < -20 °C. Other investigation parameters were collected from the documentation of routine investigations done in the hospital. Serum TSH level was done by Enzyme linked immunoassay using Human ELISA kit. Approval of Research Ethics Board, RIMS, Imphal was taken. Informed consent was taken from the participants before the study and confidentiality were maintained.

Statistical analysis

The results available were analysed using SPSS version 20.

III. Result

Table 1: Baseline characteristics of the cases

Parameters	**Total cases = 80**
Age (mean ± SD)	61.70 ± 11.07
Gender	
Male	57
Female	23
Religion	
Hindu	63
Muslim	9
Christian	8
Inhabitance	
Urban	46
Rural	34

Table 2-Gender wise Mean±SD values of coronary artery diseased patients

Sex	Mean	Std. Deviation
Male	6.7244	4.44791
Female	5.5087	4.78080
Total	6.3749	4.54924

Table 3- Thyroid status in patients with coronary artery disease

	Sex		Total
	Male	Female	
Euthyroid	14	08	22
Hypothyroid	35	11	46
Hyperthyroid	08	04	12
Total	57	23	80

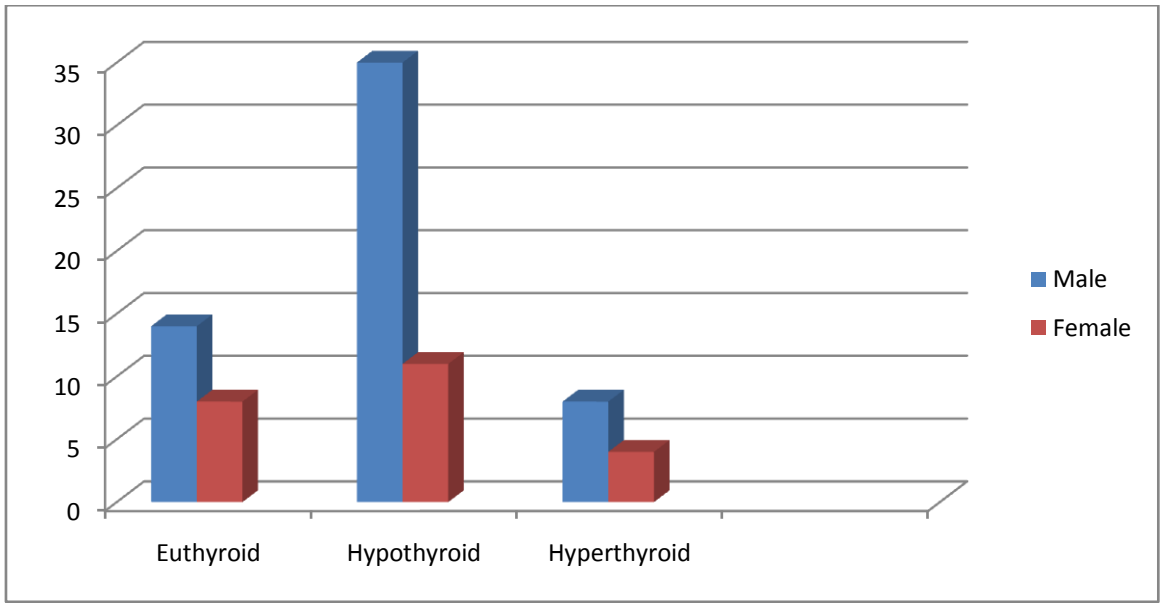

Figure: Bar diagram showing the thyroid status in the male and female patients of coronary artery disease

IV. Discussion

Thyroid hormones i.e thyroxine(T4) and triiodothyronine(T3) is secreted by the thyroid gland upon stimulation by the pituitary Thyroid stimulating hormone(TSH). The thyroid hormones are responsible for degradation of the cholesterol carrying lipoproteins and thereby has an effect on lipid metabolism. Hypothyroidism is caused by diseases that destroy the thyroid tissue leading to decreased thyroid hormone production due to which the negative feedback effect of thyroid hormones on the pituitary is withdrawn causing an increased production of TRH (Thyrotropin releasing hormone) and TSH. In mild or subclinical hypothyroidism, the level of T3 &T4 may be within the normal range with increased TSH level. In primary hypothyroidism, the T3 & T4 decreases with significantly increased TSH. In hypothyroidism due to decreased thyroid hormone levels, the cholesterol level in blood increases which makes the individual more prone to cardiovascular disease.

In the present study, out of the 80 coronary artery diseased patients 23 were females and 57 were males. Among the 57 male patients 14 patients were euthyroid, 35 patients were hypothyroid & 8 patients were hyperthyroid and among the 23 female patients 8 patients were euthyroid, 11 patients were hypothyroid & 4 patients were hyperthyroid. Table no 1 shows the mean ±SD value of serum TSH in the patients. In males it was 6.7244±4.44791 mIU/L and in females it was 5.5087±4.78080 mIU/L. In our study we found that the serum TSH level was significantly raised in critically ill patient. The result of our study was in accordance with a study done by Sarabjeet S et al[5] who in their study reported an association between subclinical hypothyroidism and CHD . In a study done by Sgarbi JA et al[6] a strong relationship was found between subclinical hyperthyroidism and all cause and mortality, while subclinical hypothyroidism was significantly associated with all cause mortality.

V. Conclusion

The result of our study showed that the level of serum TSH was raised in most of the patient of coronary artery disease which was due to the effect of thyroid hormones (T3 & T4) on lipid metabolism. Individuals in whom the serum TSH levels are raised should check their serum T3 & T4 and proper screening should also be done in such patients for cardiac diseases so that early intervention can be taken and mortality can be reduced. This study thus concludes that hypothyroidism increases the risk of cardiovascular diseases and an individual with raised Serum TSH should be further evaluated.

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