ISSN: 0975-3583, 0976-2833 VOL8, ISSUE 2, 2017

Original Article

To find out the prevalence of subclinical hypothyroidism in general population

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Abstract

Background & Methods: The aim of the study is to find out the prevalence of subclinical hypothyroidism in general population. The analyser was programmed to take 10uL each of distilled water, standard and sample were taken in three separate cuvettes as blank, standard and sample respectively. One mL of working reagent was added to each cuvette.

Results: Serum hsCRP, homocysteine, lipids and lipoproteins were the coronary risk factors measured in all the subjects. Coronary risk factors in euthyroid (EuT) group and subclinical hypothyroidism (SCH) group in urban population were compared. SerumhsCRP was found to be significantly higher in SCH groupas compared to EuT group ($p<0.05$). The difference in serum homocysteine was not statistically significant ($p>0.05$)

Conclusion: The prevalence of subclinical hypothyroidism (SCH) was 9.75%. The prevalence was 9.61% in male subjects and 9.94% in female subjects. Prevalence of elevated serum hsCRP was high in SCH. Serum homocysteine was normal in all the study subjects. The difference was not statistically significant associated. Subclinical hypothyroidism is be defined as elevated serum TSH concentration with normal Free Thyroxine (FT4) and Free Triiodothyronine (FT3) concentration, associated with few or no signs and symptoms of hypothyroidism.

Keywords: prevalence, subclinical & hypothyroidism.

Study Design: Cross sectional study.

Introduction

An endocrine gland in the neck, consisting of two lobes connected by an isthmus. It is found at the front of the neck, below the Adam's apple. The thyroid gland secretes thyroid hormones, which primarily influence the metabolic rate and protein synthesis. The hormones also have many other effects including those on development[1]. The thyroid hormones triiodothyronine (T3) and thyroxine (T4) are created from iodine and tyrosine. The thyroid also produces the hormone calcitonin, which plays a role in calcium homeostasis.

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Thyroid hormone act on nearly every cell in the body and increase the basal metabolic rate, affect protein synthesis, help regulate long bone growth (synergy with growth hormone) and neural maturation, and increase the body's sensitivity to catecholamines (such as adrenaline) by permissiveness[2]. The thyroid hormones are essential to proper development and differentiation of all cells of the human body.

These hormones also regulate protein, fat, and carbohydrate metabolism, affecting how human cells use energetic compounds. They also stimulate vitamin metabolism. Numerous physiological and pathological stimuli influence thyroid hormone synthesis. About 90-95% T4 metabolically active hormone and 5-10 % T3 is secreted by the thyroid gland. Most of the T4 is converted to T3 in the tissues so both are functionally important[3]. Thyroxine and triiodothyronine are qualitatively similar but differ in speediness and strength of action. Triiodothyronine is farmore potent than thyroxine but triiodothyronine is present in the blood in much smaller quantities and persists for a much shorter time than thyroxine[4].

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Material and Methods

This cross sectional study was conducted on 200 subjects for 01 Year at Index Medical College Hospital & Research Centre, Indore, M.P. Five ml venous blood samples after 12 hours fasting were collected in plain vial from antecubital vein under aseptic conditions. The blood was centrifuged at 4000 rpm for 5 minutes and the serum removed and stored at – 200C.The serum was subjected to estimation of the following parameters on fully automatic analyser using standard kits and methods.

Glucose oxidase (GOD) acts on glucose to produce gluconic acid and hydrogen peroxide. Breakdown of hydrogen peroxide by peroxidase (POD) is coupled with oxidation of phenol. The oxidized phenol complexes with 4-amino antipyrine to give a pink colored complex, the absorbance of which is directly proportional to the concentration of glucose in the plasma. The colored complex is measured at 530 nm.

Inclusion Criteria:

1. Adult subjects from urban and rural population.

2. Subjects were enrolled after taking written consent from them on the prescribed format.

Exclusion Criteria:

1. Pregnant women.

2. Person who refused to fill consent form.

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3. Those were not willing to participate in the study.

Result

Table No. 1: Age and Sex Distribution

Age	Male		Female	
	No.	%	No.	%
≤30	17	8.5	22	11
31-40	24	12	27	13.5
41-50	33	16.5	16	08
51-60	19	9.5	13	6.5
61-70	16	08	08	04
>70	04	02	01	0.5
	113	56.5	87	43.5

The age and sex distribution of urban subjects (N=200) was studied. Age groups were made with class interval of ten years i.e. below 30, 31-40, 41-50, 51-60, 61-70, and above 70 years. Maximum number of male subjects fell in the age group of 41-50 years (16.5%). The highest number of females were in the age group of 31-40 years (12%). When subjects of both the sexes were combined, the highest number was found in the age group of 41-50 years (24.5%) followed by the age group of 31-40 years (25.5%)

Table No. 2: Proportion of euthyroid hypothyroidism, hyperthyroidism and subclinical hypothyroidism

	Male		Female		P Value
	No.	%	No.	%	
Euthyroidism	103	51.5	69	34.5	0.712
Hypothyroidism	01	0.5	06	03	
Hyperthyroidism	01	0.5	01	0.5	
SCH	12	06	07	3.5	
	117	58.5	83	41.5	

Out of the remainder, 103 male subjects (51.5% of the total) had serum TSH within the normal range. The proportion of urban female subjects having serum TSH within the normal range was 34.5%. Serum TSH was above normal in 6% of the male subjects and 3.5% of the female subjects. The proportion of subjects having high TSH was more in females than in males but the difference was not significant.

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Table No. 3: Comparison of smoking habit in Euthyroid (EuT) and Subclinical hypothyroidism (SCH) groups

Thyroid Status	Smoker		Non Smoker	
	No.	%	No.	%
Euthyroidism	18	09	182	91
SCH	42	21	158	79

Table No. 4: Comparison of serum hsCRP and homocysteine in Euthyroid (EuT) and Subclinical hypothyroidism (SCH) (N=190)

Coronary risk factors	Thyroid Status	No.	Mean	SD	P Value
hsCRP	EuT	170	0.6	0.19	0.046
	SCH	20	1.6	0.59	
Homocysteine	EuT	170	7.5	0.53	0.271
	SCH	20	7.4	1.37	

Serum hsCRP, homocysteine, lipids and lipoproteins were the coronary risk factors measured in all the subjects. Coronary risk factors in euthyroid (EuT) group and subclinical hypothyroidism (SCH) group in urban population were compared. SerumhsCRP was found to be significantly higher in SCH groupas compared to EuT group ($p<0.05$). The difference in serum homocysteine was not statistically significant ($p>0.05$)

Discussion

Disorders of thyroid hormone secretion are considered to be the commonest endocrine disorders worldwide out of which hypothyroidism is supposed to be a common health problem. The prevalence of hypothyroidism in the developed countries is reported to be 4-5%. In India, a recent study has reported a prevalence of hypothyroidism to be 3.9%. Thus, hypothyroidism has become a serious public health problem worldwide including in India[8].

Thyroid hormones control a wide range of biological activities including the basal metabolic rate, growth, body temperature, the menstrual cycle, the functioning of the lungs, heart, muscles and other vital organs. Hypothyroidism is believed to lead to dyslipidemia, which results in high risk of cardiovascular diseases, hypertension and clinical coronary artery disease[9]. T4 (Thyroxine) and T3 (Triiodothyronine) are the hormones secreted by the thyroid gland, and their secretion is regulated by TSH (thyroid stimulating hormone) which is secreted by the pituitary gland of the brain. TSH stimulates the thyroid gland to synthesize and release the thyroid hormones. Disorders of thyroid hormone secretion may be due to a primary disease of the thyroid gland or may be secondary to abnormal TSH secretion from the pituitary gland[10].

While prevalence of subclinical hypothyroidism has been investigated in some countries and varied results have been obtained, the prevalence of subclinical hypothyroidism in general population of India is largely unexplored[11]. After a thorough literature search, it was found that very little is known about the prevalence of subclinical hypothyroidism in the general adult population of India. Whatever results are available are about some specialized populations.

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Therefore, this study was planned to find out the prevalence of subclinical hypothyroidism in the general population of North India. It was also decided to compare the prevalence in urban and rural populations by taking an equal number of subjects from both the subsets. The prevalence in men and women was also compared[12].

Conclusion

The prevalence of subclinical hypothyroidism (SCH) was 9.75%. The prevalence was 9.61% in male subjects and 9.94% in female subjects. Prevalence of elevated serum hsCRP was high in SCH. Serum homocysteine was normal in all the study subjects. The difference was not statistically significant associated. Subclinical hypothyroidism is be defined as elevated serum TSH concentration with normal Free Thyroxine (FT4) and Free Triiodothyronine (FT3) concentration, associated with few or no signs and symptoms of hypothyroidism.

References

1. Rizos CV, Elisaf MS, Lieberopoulos EN. Effect of thyroid dysfunction on the lipid profile. The Open Cardiovascular Medicine Journal 2011; 5:76-84.

2. Biondi B, Klein I. Hypothyroidism as a risk factor for cardiovascular disease. Endocrine. 2004; 24 (1):1-13.

3. Jung CH, Sung KC, Shin HS, Rhee EJ, Lee WY, Kim BS, et al. Thyroid dysfunction and their relation to cardiovascular risk factors such as lipid profile, hsCRP, and waist hip ratio in Korea. Korean J Intern Med. 2003; 18(3):146-53.

4. Biondi B. Cardiovascular mortality in subclinical hypothyroidism. Eur J Endocrinol. 2010; 162(3):587-89.

5. Ladenson PW, Singer PA, Ain KB, Bagchi N, Bigos ST, Levy EG,et al. American thyroid association guideline for detection of thyroid dysfunction. Arch Intern Med. 2000; 160(11):1573-75.

6. Unnikrishnan AG, Menon UV. Thyroid disorders in india. An epidemiological perspective. Indian Journal of Endocrinology and Metabolism. 2011; 15(2):S78–S81.

7. Samuels MH. Subclinical thyroid disease in the elderly. Thyroid.*1998;* 8(9):803–13.

8. Choi JW, Choi HS. The regulatory effects of thyroid hormone on the activity of 3-hydroxy-3-methylglutaryl coenzyme A reductase. Endocr Res. 2000 ;26(1):1-21

9. Shin DJ, Osborne TF. Thyroid hormone regulation and cholesterol metabolism are connected through Sterol Regulatory Element-Binding Protein-2 (SREBP-2).J Biol Chem. 2003 5;278(36):34114-8.

10. Owens DK, Whitlock EP, Henderson J, Pignone MP, Krist AH, Bibbins- Domingo K et al. Screening for subclinical thyroid dysfunction in nonpregnant adults. Ann Intern Med. 2016; 4;165(7):501-508

11. Khandelwal D, Tandon N.Overt and subclinical hypothyroidism: who to treat and how. 2012 Jan 1;72(1):17-33.

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12. Dongbin Ahn, Jin Ho Sohn, Jae Han Jeon. Hypothyroidism Following Hemithyroidectomy: Incidence, Risk Factors, and Clinical Characteristics,The Journal of Clinical Endocrinology & Metabolism. Volume 101, Issue 4, 2016; 101(4);1429–1436.