Original Article

Hypothyroidism among rural population: A hospital based study

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Abstract

Introduction: Thyroid dysfunctions are the most common endocrinopathies across the world. Thyroid hormones perform a wide range of functions including regulation of lipids, carbohydrates, and proteins metabolism. **Aims and Objectives:** To StudyT3, T4 and TSH in Hypothyroidism at Tertiary health care center. **Material and Methods: This** was a cross-sectional study conducted among suspected patients of thyroid diseases. Serum samples of 284 clinically suspected patients were collected who were referred to clinical biochemistry laboratory of a tertiary care hospital from rural area. The personal data was collected in a predesigned proforma which included name, age, sex, provisional diagnosis and tests required.T3, T4 and TSH was estimated by Microplate ELISA method. **Results:** Overall majority of the patients were females i.e. 82.05%. The majority of the female patients were from the age group of 26 to 50 yrs. i.e. 43.59 %.It was observed that in female T4 level was found to be comparatively lower in age group of >50 yrs. While T3 level was also comparatively lower in age group <25 and serum cholesterol level was found to be relatively higher in age group 26 to 50. However, in male hypothyroid patients T4, T3 level were found to be comparatively lower in age group 26 to 50 and serum cholesterol level was found relatively higher in age group >50. **Conclusion:** Females found to be more vulnerable for hypothyroidism showing higher percentage as compared to males. The hormonal levels are also low as compare to males.

Key words: Hypothyroidism, T4, T3, TSH.

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INTRODUCTION

Thyroid dysfunctions are the most common endocrinopathies across the world.[1]Thyroid hormones perform a wide range of functions including regulation of lipids, carbohydrates, and proteins metabolism.[2] Their dysfunction manifests in a wide spectrum of clinical diseases and biochemical abnormalities from clinically intangible diseases to myxedemacoma.[3]Biochemical decrease in T3 (tri-iodothyronine) andT4 (tetra iodothyronine) concentrations leads to hyper secretion of thyroid stimulating hormone (TSH) from the pituitary causing an increase in the serum TSH levels. This is a key laboratory finding, particularly in the early detection of thyroid abnormalities.[4]The aberration of thyroid functions like hypothyroidism leads to remarkable disturbances in various metabolic activities and physio/chemical constituents of body fluids affecting the various organs and systems leading to various disorders. The most common cause of thyroid dysfunction is a primary failure of thyroid gland. Pituitary dysfunction, hypothalamic dysfunction, or generalized tissue resistance to the circulatory thyroid hormones is also found in such cases.[5]In India, having a population of 1.2 billion, an estimated 108 million people suffer from endocrine and metabolic disorders, of these 42 million people suffer from thyroid disorders. Iodine is essential inherent component thyroid hormones, i.e. T3 and T4. The World Health Organization (WHO) recommends for adequate

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daily iodine intake of 150 µm for men, non-pregnant, and non-lactating women; 250 µm for pregnant and lactating women; daily intake of iodine of 90 µm for preschool children (0–59 months) and 120 µm for school going children (6–12 years).[6]

Diseases of thyroid are very common estimating about 1 percent of women with hypothyroidism as compared to men where its magnitude is less. Physiological situations like pregnancy and ageing also affect thyroid functions. The newborn may also be affected by hypothyroidism which leads to irreversible mental and physical retardation if not identified early and treated properly. Many may go undiagnosed and misdiagnosed. Considering all this the present hospital based study was conducted to know the proportion of hypothyroidism and the hormonal levels in suspected patients of thyroid disease.

MATERIAL AND METHODS

The present cross-sectional study was conducted at a tertiary care hospital from rural area The personal data was collected in a predesigned proforma which included name, age, sex, provisional diagnosis and tests required. It included 284 patients of clinical suspected thyroid disease. The patients were explained about the purpose of study and were enrolled for the study. For T3 and T4 blood sample was collected by venipuncture in 5 ml Silicone evacuated tubes or EDTA or heparin. The usual precautions for venipuncture were observed. Serum was used for estimation of T3 and T4 by separating red blood cells with centrifugation. T3 and T4 were estimated by microplate ELISA method. Most of the samples were assayed within time.

Whenever it was not possible to assay the sample within time; it was stored at 2 to 8 degree C but not more than 48 hours. The cross reactivity of T3 and T4 antibody of selected substances was evaluated by adding the interfering substance to a serum matrix at various concentrations. The cross reactivity was calculated by deriving a ration between doses of interfering substance to dose of T3 and T4 needed to displace the same amount of tracer.

For estimation of TSH blood serum was used. For accurate comparison a fasting morning serum sample was obtained from the patients. The blood for serum was collected in a plain red top venipuncture tube without additives or gel barrier. Blood was allowed to clot and serum was separated by centrifuging the sample. Repetitive freezing and thawing was avoided.

RESULTS

Table 1: Age and sexwise distribution of suspected patients of thyroid disease

Sr. No.	Age Group in year	Sex		Total
		Male	Female	
1.	Below 25	15	67	82
2.	26 to 50	63	107	170
3.	Above 50	11	21	32
Total		**89**	**195**	**284**

Out of total 284 suspected patients majority i.e. 195 (68.66%) were females and most of the patients i.e. 170 (59.86%) belonged to age group 26 to 50 years.

Table 2: Distribution of patients according to their hypothyroid status

Sr. No.	Sex	Hypothyroidism		Total
		Yes	No	
1.	Male	07 (7.87)	82 (92.13)	89 (100)
2.	Female	32 (16.41)	163 (83.59)	195 (100)
Total		**39 (13.73)**	**245 (86.27)**	**284 (100)**

Figures in the parentheses show percentages.

$\chi^2 = 3.77$, $p > 0.05$, not significant.

Out of 284 patients; 39 (13.73%) were suffering from hypothyroidism while remaining 245 were not. But of these 245 patients 23 (9.39%) were having hyperthyroidism. The proportion of hypothyroidism was higher in females (16.41%) as compared to males (7.87%) though chi square was not significant ($p > 0.05$).

Table 3: T4, T3 and TSH levels in µg/dl in female patients of hypothyroidism

Sr. No.	Age Groups in years	Thyroid function tests		
		T4 (M±SD)	T3 (M±SD)	TSH (M±SD)
1.	Below 25	1.87±0.45	67.73±11.19	15.46±4.13
2.	26 to 50	1.77±0.29	70.63±14.71	14.18±5.10
3.	Above 50	1.40±0.32	78.40±12.12	18.03±1.79

Table 4: T4, T3and TSH levels in µg/dlin male patients of Hypothyroidism

Age Group in year	Thyroid function tests		
	T4 (M±SD)	T3 (M±SD)	TSH (M±SD)
Below 25	2.89±0.49	62.54±10.47	13.46±4.57
26 to 50	1.57±0.42	59.12±12.75	13.46±4.57
Above 50	1.65±0.32	71.01±13.18	16.06±2.62

Table no 3 and4 shows the values of T4, T3, and TSH in females and males respectively suffering from hypothyroidism. In females the T3 and TSH levels were slightly higher among the age group more than 50 as compared to those below 25 while T3 levels were higher in age group below 25 years. In males, the T3 and T4

levels were higher amongst aged less than 25 while TSH was higher in age group more than 50 years.

Table 5: Comparison of T4, T3and TSH levels in µg/dl in patients of Hypothyroidism

Thyroid function tests	Male	Females	't' value	'p' value	Significance
T4(M±SD)	1.65± 0.33	2.12± 0.42	2.77	0.008	Significant
T3(M±SD)	65.19± 11.23	71.39± 12.34	1.22	0.23	Not Significant
TSH(M±SD)	14.57± 3.24	15.23± 3.61	0.45	0.66	Not Significant

The mean T4 levels in males and females showed significant difference ($t = 2.77$, $p<0.05$) with mean of 1.65 and 2.12 respectively. The T3 levels in females was higher i.e. 71.39 than the males (65.19) though there was no statistical significant difference. The TSH levels in females was slightly higher in females than males but no significant difference ($P>0.05$).

DISCUSSION

The present cross sectional study was conducted the in a tertiary care hospital. There is limited data available on the prevalence of hypothyroidism and hyperthyroidism in our country. Most of the studies have concentrated on the effectiveness of the iodization program and have looked at the prevalence of residual thyroid disease in school children and adolescents.[9–13]. Juvenile Hypothyroidism Congenital hypothyroidism will be present right from the birth and the child will be affected physically mentally and functionally. Thyroid hormones are required for brain development during first two years. If the disease is not detected immediately after birth and treated, the child will be permanently handicapped physically and mentally. Hence screening the newborns for thyroid function test is being carried out in developed countries. The incidence was coated as 1 in 3800.[8] But a very few studies have been conducted to compare the T3, T4, TSH levels in males and females.

In present study patients of Hypothyroidism is observed in 39 patients forming 13.73% of patients referred. Ambika Gopalkrishnann *et al*[14] found prevalence of hypothyroid patient as 7.97% which is less than the present study. The higher prevalence of hypothyroidism in present study was high because this study was conducted among clinically suspected patients. While the study by Ambika Gopalkrishnan *et al* [14] was a community based epidemiological study.

Out of these 39 patients, most of them were females i.e. 82.01%. Similar observations were made by Rama Jailkhani e al (81.2%)[15], poonam Arora e t al (82.25%)[16], Arindam Bose *et al* (78.44%)[17]. All these studies were hospital based and conducted in clinically suspected patients. These observations indicates more prevalence of hypothyroidism in women.But percentage cannot be taken into considerations as it was a selective based on clinically suspected patients.A recent study has been carried out among adult people in India. In this population-based study carried out in Cochin on 971 adult subjects, the prevalence of hypothyroidism was more.[18]In a study conducted in south India by Agarwal *et al*. shows higher prevalence of hypothyroidism in women population in their studies.[19]

It was also observed that in female T4 level was found to be comparatively lower in age group of>50 yrs. While T3 level was also comparatively lower in age group <25. However, in male hypothyroid patients T4, T3 levels were found to be comparatively lower in age group 26 to 50. These study findings were comparable with Pallavi Chaurasia *et al*[20], Firdushi Begum[21].

CONCLUSION

Overall majority of the patients were females. The biochemical profile of males and females with reference to T4, T3 and TSH is different. Females being the risk group should be screened frequently especially in those reproductive age group as the hypothyroid state of the mother may adversely affect her child.

LIMITATIONS OF THE STUDY

As this was a hospital based study, it may not reflect the true prevalence in the community.

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