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Prevalence of Thyroid Dysfunction Among Young Women in an Indian Population: A prospective study.

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ABSTRACT

BACKGROUND: It is estimated that approximately 200 million people worldwide were diagnosed with thyroid disease. Thyroid dysfunction is a significant public health concern, particularly among young women in developing countries. Therefore, understanding the current prevalence of thyroid disease is of significant importance.

OBJECTIVE: To assess the prevalence and types of thyroid dysfunction in young women population.

MATERIAL & METHODS: This study was Prospective Cross Sectional study carried out in the Department of Biochemistry with collaboration to the Department of Medicine conducted at a tertiary care hospital for a period of six months. The TSH(thyroid stimulating hormone) was used as the screening test to diagnose thyroid dysfunction. The abnormal TSH values were classified as

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mild TSH elevation (TSH 4.5–10 mIU/ml), significant TSH elevation (TSH > 10 mIU/ml), and low TSH (TSH < 0.4 mIU/ml).

RESULTS: In the present study a total of 1058 participants were screened of whom 138 subjects (13.04%) had abnormal TSH. The overall prevalence of elevated TSH was 1.13% out of which 11.24% had mild TSH elevation. A low TSH was seen in 0.67% of the study population.

CONCLUSION: This study highlights a concerning prevalence of thyroid dysfunction in young women, with subclinical hypothyroidism being the most common.

KEYWORDS: Thyroid stimulating hormone, thyroid dysfunction, hyperthyroidism, prevalence.

INTRODUCTION

Thyroid disease is an umbrella term encompassing various conditions that affect the function, size, or structure of the thyroid, mainly including hyperthyroidism, hypothyroidism, thyroid nodules, autoimmune thyroid disease, and thyroid cancer [1]. Thyroid dysfunction encompasses a range of disorders affecting the thyroid gland, including hypothyroidism, hyperthyroidism, and thyroiditis. Thyroid dysfunctions are associated with change in reproductive function including delay in puberty, anovulation etc. There is a change in cycle duration and flow. Subclinical hypothyroidism is defined as a state in which T3, T4 are within the normal range but there is slight increase in TSH level [2-5]. According to the survey, the prevalence of overt hyperthyroidism in areas with sufficient iodine ranges from 0.2% to 1.3%, while the prevalence of hypothyroidism ranges from 1% to 2%. Moreover, the proportion of palpable thyroid nodules in the general population accounts for 4% to 7% [6].

It is more common in females , common presenting features are complaining of fatigue, weight gain, constipation, menstrual irregularities. Subclinical hypothyroidism is early stage of disease and it is found to be significantly prevalent according to some studies [7,8].

It is now wellknown that thyroid disorders are common in India. In the past focus have been on iodine deficiency disorders (IDDs). It has been more than three decades since universal salt iodization program was introduced in India [9-11]. Most common cause of hypothyroidism is iodine deficiency in developing countries and chronic autoimmune thyroiditis in developed countries. Other causes are radioactive iodine ablation of thyroid gland, antithyroid drugs etc [12-15].

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The prevalence of hypothyroidism and hyperthyroidism in a study was 7.3% and 0.3%. The most recent nationwide study showed that hypothyroidism was common in India; in this population 88% was consuming iodized salt [16,17]. There is a growing body of literature highlighting the crucial role of thyroid hormones in the normal development and function of virtually every vertebrate. It has also established associations between thyroid disorders and various health conditions, including diabetes, cardiovascular disease, depression, oral disease, and cancer. Both hyperthyroidism and hypothyroidism have been linked to increased morbidity and mortality related to cardiovascular disease [18].

This study focuses on young women attending the tertiary care hospital. Several studies have highlighted the importance of diagnosing and treating hypothyroidism in pregnancy [19] .

Hypothyroidism in young women is also linked to menstrual irregularities, polycystic ovaries, and infertility [20]. This study mainly emphasize on finding the prevalence of thyroid disfunction among young females attending the tertiary care hospital.

MATERIAL AND METHODS

Study Design and Population : This Prospective cross-sectional study was conducted over a period of 6 months i.e, January 2024 to June 2024 at ASMC, Auraiya, Uttar Pradesh . A total of 1058 women aged 18-25 years were recruited through systematic random sampling.

Inclusion criteria: Women aged 18-25 years, residing in North India and providing informed consent were included in the study.

Exclusion criteria: Known thyroid disease, pregnancy, or use of thyroid-altering medications were excluded from the study.

Data Collection: Thyroid stimulating hormone assay was performed in all blood samples for screening of thyroid function. TSH assay was performed using electrochemiluminescence immunoassay on the Elecys 2010 Analyzer (Roche Diagnostics) It is a sandwich assay and the method has been standardized against the 2nd IRP WHO Reference Standard 80/558. The functional sensitivity of the TSH kit was 0.014 mIU/ml. The laboratory’s reference value for TSH was 0.4–4.5 mIU/ml. [20] Participants with abnormal TSH were followed-up for further testing.

Abnormal TSH values were grouped into three categories:

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• Mild TSH elevation: TSH of 4.5–10 mIU/ml

• Significant TSH elevation: TSH >10 mIU/ml • Suppressed TSH: TSH <0.4 mIU/ml.

Statistical Analysis Data were analyzed using SPSS version 26. Prevalence rates were calculated, and associations with risk factors were assessed using chi-square tests and logistic regression. A p-value <0.05 was considered statistically significant.

RESULTS

A total of 1058 subjects were screened with TSH(thyroid stimulating hormone), and the results were analysed. Among the 1058 participants, abnormal TSH was observed in 138 females and the overall prevalence of abnormal TSH was 13.04%. (Figure 1)

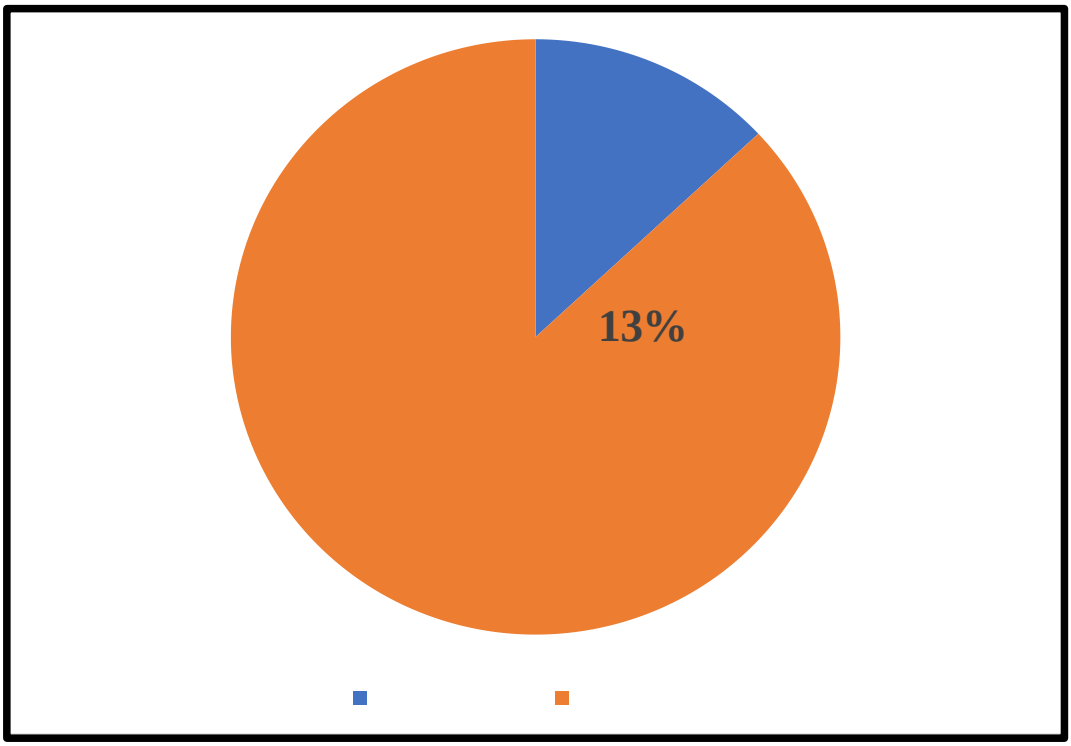

Figure 1: Prevalence of abnormal TSH.

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Of 138 females with abnormal TSH, 119(86.2%) had TSH values between 4.5-10mIU/ml. the overall prevalence of mild TSH elevation among the 1058 females was 11.24%. totally, 12/138 females(8.69%) had TSH values >10 mIU/ml. the overall prevalence of TSH values > 10 was 1.13% in the study population. Among the 138 subjects with TSH abnormality, 7 had a TSH value <0.4 mIU/ml(5.07%). The overall prevalence of suppressed TSH was 0.67% in the study population.(Table 1)

Table 1: Number (%) of subjects with thyroidstimulating hormone abnormality

TSH Values	Numbers(n=138)	Prevalence
4.5–10 mIU/ml	119	86.2%
>10 mIU/ml	12	8.69%
<0.4 mIU/ml.	7	5.07%

DISCUSSION

The prevalence of thyroid disorders depends on various factors such as age, sex, geographical factors, and iodine intake. Thyroid disorders need to be addressed as a priority in two important age groups – neonates and pregnant women. In this study, we focus mainly on women in early reproductive age group. In the present study, we assessed the prevalence of thyroid dysfunction based on TSH in females attending the tertiary care hospital of north India.

The overall prevalence of thyroid dysfunction in the present study was observed to be 13.04%. Kochupillai *et al*. in 2000 estimated the prevalence of thyroid disorders in India to be around 42 million [21]. A crosssectional survey in central Kerala found the overall prevalence of thyroid function abnormalities in 19.6% of the population [22]. In a study on the prevalence of thyroid disorders in women of Pondicherry, 15.8% had thyroid dysfunction [23].

The majority (11.24%) had mild TSH elevation (4.5–10 mIU/ml). The majority of this group could have subclinical hypothyroidism. A small number in this group could also have overt hypothyroidism (with low free T4) and rarely may have central hypothyroidism.

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TSH value >10 mIU/ml was found in 1.13% of our subjects. The prevalence of hypothyroidism (clinical + subclinical) was 13.3% and 11.5% in the study from Kerala and Pondicherry, respectively [22,23]. In the most recent nationwide study in India, the prevalence of overt undiagnosed hypothyroidism was 3.5% and the prevalence of subclinical hypothyroidism was 8.5% [5]. In a study from Delhi in 2012 by Marwaha *et al*., subclinical hypothyroidism was present in 19.3% of subjects and 4.2% had overt hypothyroidism [24].

Low TSH (<0.4 mIU/ml) was seen in 0.67% of the study population. This group would include both subclinical and overt thyrotoxicosis. In the study from Cochin the combined prevalence of subclinical and clinical thyrotoxicosis was 2.9% [22]. In the epidemiological study in eight cities of India, the prevalence of clinical plus subclinical thyrotoxicosis was 1.9% [5].

WHO assessment of global iodine status classified India as having optimal iodine nutrition in 2004 [25]. The reasons for the high prevalence of thyroid disease in spite of the improvement in iodine status need to be looked at. It has been argued but not convincingly, that iodine supplementation may precipitate the emergence of thyroid autoimmunity [26].

In the epidemiological study of eight cities, 88% of the population was taking iodized salt [5]. In a countrywide screening of goitrous young girls by Marwaha *et al*., the prevalence of juvenile autoimmune thyroiditis was 7.5% [27] which was in accordance to the current study. In a study among school children in Delhi, 28.3% of the children with goiter had evidence of autoimmune thyroiditis [28].

The monitoring of iodine fortification programs is important in order to observe the benefits of iodine fortification in populations and to recognize unintended effects early. Ideally iodine deficiency disorder (IDD) prevention should result in a decrease of IDD without significant increase in the prevalence of hypothyroidism and autoimmune thyroid disorders [29,30] . An increase in the prevalence of hypothyroidism may already be induced by moderate increase in intake of iodine [31,32]. Thyroid dysfunction (TD) and type 2 diabetes mellitus (T2DM) frequently co-occur and have overlapping pathologies, and their risk increases with age. Thyroid dysfunction along with T2DM will worsen macro- and microvascular complications, morbidity, and mortality.

The findings align with global trends but emphasize unique regional risk factors such as dietary habits and familial predisposition. Early detection through targeted screening in high-risk groups

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could mitigate adverse health outcomes, including infertility, cardiovascular disorders, and metabolic syndrome.

CONCLUSION

Thyroid dysfunction is highly prevalent among young women in North India, necessitating public health initiatives for awareness, early diagnosis, and management. Further research should explore longitudinal outcomes and the impact of preventive strategies.

Declarations:

Conflicts of interest: There is not any conflict of interest associated with this study

Consent to participate: There is consent to participate.

Consent for publication: There is consent for the publication of this paper.

Authors contributions: Author equally contributed the work.

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