

**Research Article****AGE SPECIFIC PREVALENCE OF THYROID DYSFUNCTION IN WOMEN FROM NORTHERN PART OF BANGLADESH: A CROSS-SECTIONAL STUDY****Dipayon Krisna Ghose¹, Rabeya Khatun², Md. Shariful Islam Chowdhury² and Laia Ahmed Lisa^{1*}**¹ *Department of Biochemistry and Molecular Biology, Jagannath University, Dhaka-1100, Bangladesh*² *Institute of Nuclear Medicine and Allied Sciences, Rajshahi, Bangladesh**Received: 12 February 2025,**Accepted: 15 May 2025***ABSTRACT**

Thyroid dysfunction, especially among women, poses a significant global health issue. The people living in the northern part of Bangladesh are particularly vulnerable to thyroid dysfunction, yet it has not received much attention. The objective of this research was to investigate the occurrence of thyroidism across different life stages, which include childhood, puberty, youth, mid-age, and post-menopause. Using the ¹²⁵I- RIA method, the study analyzed the serum TSH, fT₃, and fT₄ levels of 295 subjects at the Institute of Nuclear Medicine and Allied Sciences (INMAS), Rajshahi. The results showed that the overall percentage of affected women was 12.9%. The prevalence of dysfunction was minimal in childhood (10.0%) and puberty (4.3%), peaked in mid-life (29.8%), and then declined in post-menopause (10.2%). The study identified hypothyroidism as the most common form of dysfunction among the positive cases. Notably, mid-age individuals experienced the highest incidence of total hypothyroidism, whereas total hyperthyroidism was most prevalent in the youth stage. This research offers a comprehensive insight into the thyroid status of women in North-Bengal, which can be used to address relevant health concerns.

Keywords: *hypothyroidism, hyperthyroidism, life stages, women in Northern part of Bangladesh***Introduction**

Thyroid dysfunction, one of the most common endocrine disorders, affects approximately 200 million people all over the world with diagnosed thyroid disease (Zhang *et al.*, 2023). Thyroid hormone plays an array of metabolic function in the maintenance of and development of normal physiological processes throughout the life span. The notable role of thyroid hormones in children's growth as well as brain and cognitive development in infants. In adult, thyroid hormones are involved maintaining normal blood flow, cardiac output, heart rate and physical

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strength as well as in thermogenesis (Brent, 2012).

Common thyroid dysfunction is represented by two medical conditions; one is hypothyroidism that indicates the insufficiency of thyroid hormone, while too much hormone leads to another condition known as hyperthyroidism. Moreover their subclinical forms are also used to interpret thyroid disorders. Elevated and lowered TSH levels found with normal thyroid hormone level are regarded as subclinical hypothyroidism and subclinical hyperthyroidism respectively.

Scientific studies have shown increasing trend of the prevalence of thyroid disease as age increased. Though both hyper and hypo type disorder is observed in both sexes, females are more affected than males (Vander pump, 2019). Subclinical disturbance is reported as more frequent than overt, being subclinical disorder is ~6-20% in individuals age >60 years compared to ~1-10% in those age <60 years (Canaris *et al.*, 2000). Some studies report functional change in the thyroid gland as a key factor for this higher rate, while others cite thyroid autoimmunity (Veltri *et al.*, 2017). Bangladesh, located in the Ganges delta between Himalayas and the Bay of Bengal, is at risk of thyroid disorder, particularly in the northern part, due to repeated loss of iodine from its land mass and lower availability of dietary iodine. Although the actual burden of thyroid disorders in Bangladesh is largely unknown, in general, 20% of its population is reported to be affected (Ansari, 2015). Even though the risk and prevalence of thyroid disorders are high, we have very limited information in this regard. Only few studies have been performed for searching correlation between thyroid disorder and other diseases. Age specific prevalence of thyroid disorder in women has so far received little attention in Bangladesh. Therefore, we designed a study to explore the age specific occurrence of thyroid dysfunction in the female population of northern area of Bangladesh.

Methods and materials

The study was conducted at the Institute of Nuclear Medicine and Allied Sciences (INMAS) in Rajshahi. In this cross-sectional study, females, majorly from Rajshahi, Natore, Naogaon and Chapainawabganj districts, visiting the outpatient department of the INMAS for thyroid check-up, were recruited randomly between the days of September 2024 to December 2024. Written informed consent or assent (for children under 18 years) was obtained from all participants prior to the commencement of the study. The study was ethically approved by the Ethical Review Committee, Jagannath University, Dhaka, Bangladesh.

The sample size was 295 for this investigation. Five milliliters blood from each participant were taken by peripheral venipuncture and allowed to clot. Then serum samples were obtained by centrifugation at 10000 rpm for 15 minutes and preserved at -20°C till to test. All serum samples were tested by ¹²⁵I- RIA system for estimating TSH, free T₃ and free T₄ hormones (Veltri *et al.*, 2017). To get comprehensive illustration of thyroid dysfunction, affected participants were categorized into four types named as hypothyroidism, subclinical hypothyroidism, hyperthyroidism and subclinical hyperthyroidism based on their serum level of fT₃, fT₄ and TSH. After getting raw data, these were arranged in five groups named as childhood, puberty, youth, mid-age and post-menopause to find out the age specific prevalence of thyroid dysfunction and

then statistical analysis was performed using Microsoft Excel. Continuous data were presented as mean \pm SE and categorical data were presented as frequencies and percentages.

Results and Discussion

Age specific distribution of participants and participants with thyroid dysfunction (TD) is presented in Table-1. Participants were graded into five groups based on their life stages.

Table-1: Group introduction (TD = Thyroid Dysfunction)

Groups	Age (Years)	Total (n)	TD (n)
Childhood	< 11	20	2
Puberty	11-17	23	1
Youth	18-30	97	16
Midage	31-45	106	14
Post-menopause	> 45	49	5

Overall, 12.9% of women (n=295) were reported to have thyroid dysfunction, while this percentage was 13.5% and 10.6% in case of married (n=229) and unmarried (n=66) individuals respectively (Figure-1).

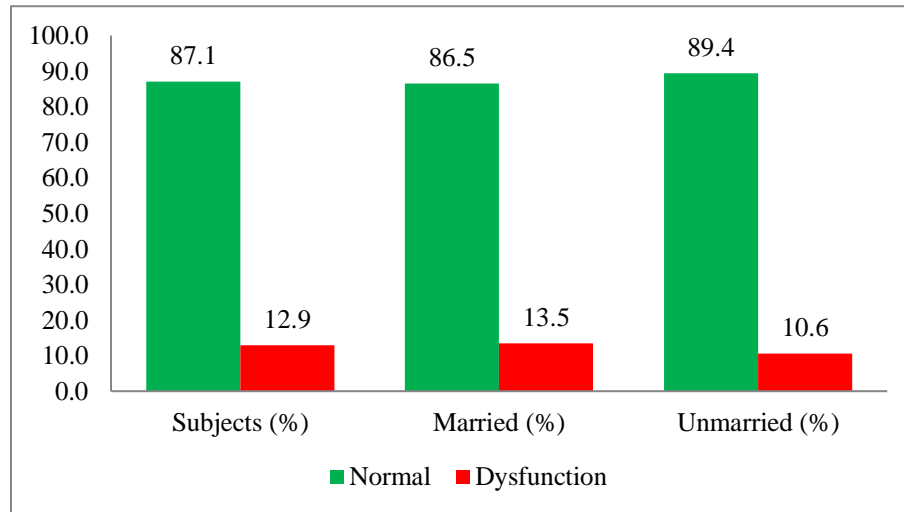


Figure-1: Prevalence of thyroid dysfunction

Clinical hypothyroidism was prevalent in 6.1% women, subclinical in 1.7%, while clinical and subclinical hyperthyroidism in 4.1% and 1.0% respectively. The prevalence of clinical hypo and hyper thyroidism was higher than their subclinical counterparts and the most observed dysfunction was hypothyroidism (Figure 2).

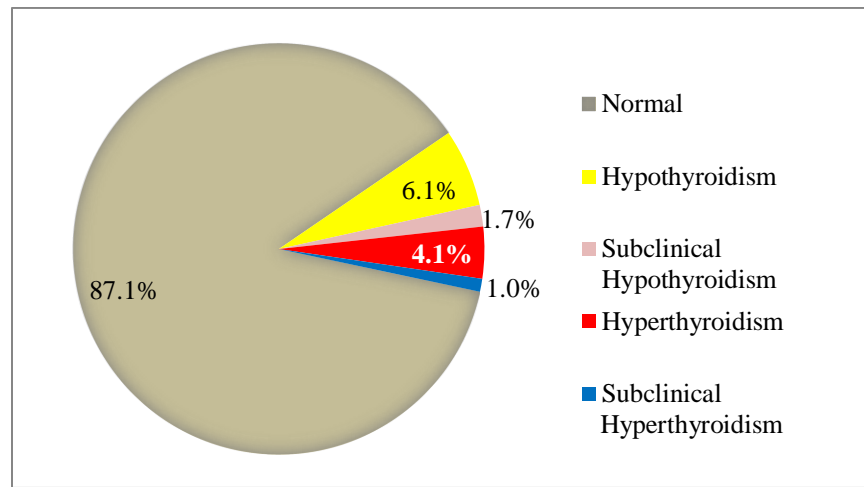


Figure-2: Complete thyroid status

In Figure-3, women's life stage-based distribution of thyroid dysfunction was exhibited through a bar-diagram. Both subclinical hypothyroidism and subclinical hyperthyroidism were absent among females in childhood, puberty and post-menopause stage. Additionally, no case of hyperthyroidism was found in the childhood and puberty stage.

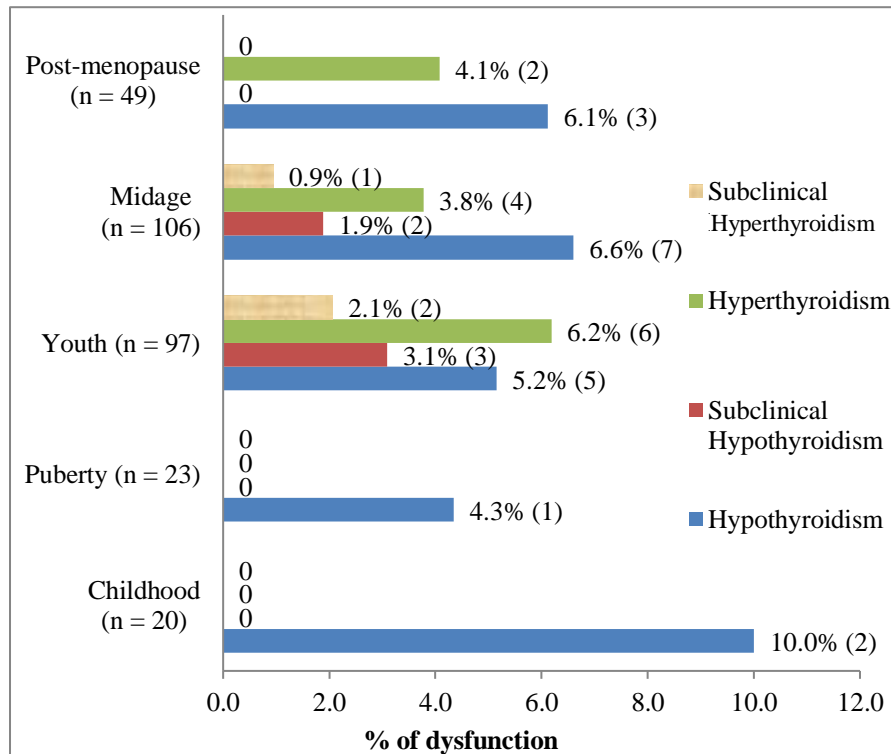


Figure-3: Life stage based distribution of thyroid dysfunction

Among the 20 subjects in the childhood group and 23 in the puberty group, 10.0% and 4.3% respectively were affected only by hypothyroidism. In the post-menopause group, hypothyroidism was noticed in a higher proportion (6.1%) of women than hyperthyroidism (4.1%). On the other hand, all four types of thyroid disorders were manifested by more than two third of the total subjects (203 individuals) who belonged to the youth and mid-age groups (age between 18 to 45 years). Hypothyroidism (6.6%) was dominating thyroid abnormality in the middle aged participants, whereas the youth group was suffered by hyperthyroidism at highest percentage (6.2%).

Regarding the 38 positive cases, 23 total hypothyroidism (60.5%) and 15 total hyperthyroidism (39.5%) cases were traced out from the present hormonal study, which were distributed across different age groups. It indicates that hypo condition was more common than hyper condition for female thyroid-health. Individually, the highest occurrence (39.1%) of total hypothyroidism was observed in middle-aged women (31-45 years) while the majority (53.3%) of total hyperthyroidism occurred in youth (18-30 years) group (Figure-4).

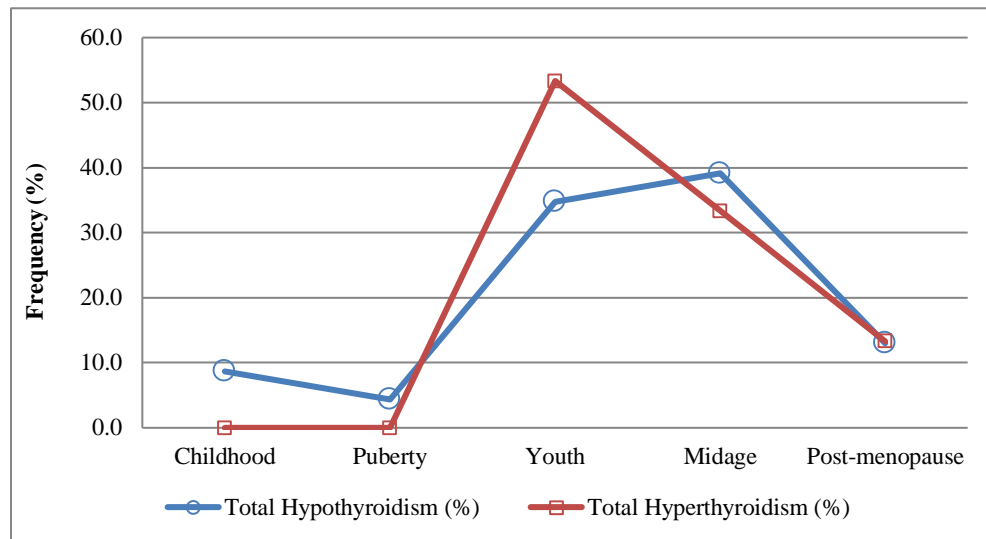


Figure-4: Hypo and hyper condition of thyroid dysfunction by stages of life

Levels of thyroid hormones are presented in Table-2. TSH was significantly higher in those with hypothyroidism, while fT_3 and fT_4 were higher in those hyperthyroidism, subclinical hyperthyroidism and subclinical hypothyroidism.

Table-2: Clinical results of hormonal assay

Thyroid Hormones	Hypothyroidism (Mean \pm SE)	Subclinical Hypothyroidism (Mean \pm SE)	Hyperthyroidism (Mean \pm SE)	Subclinical Hyperthyroidism (Mean \pm SE)	p
TSH (μ IU/mL)	36.24 \pm 5.30	21.05 \pm 6.06	0.13 \pm 0.02	0.21 \pm 0.01	0.0000
fT_3 (fmol/mL)	3.25 \pm 0.28	5.07 \pm 0.43	12.42 \pm 3.54	5.93 \pm 0.79	0.0129
fT_4 (fmol/mL)	6.60 \pm 0.41	11.61 \pm 0.66	28.96 \pm 0.63	13.33 \pm 0.83	0.0000

Northern area of Bangladesh is less developed than the rest of the country, a fact reflected in its healthcare infrastructure. Women's health complications and services have received insufficient attention in society. In many cases, women are unaware of their health status or well-being.

Untreated conditions become more critical, and many individuals carry thyroid abnormalities in various forms, with a significant proportion remains unnoticed (Moslem *et al.*, 2015). Thyroid dysfunction is one of the most important hormonal issues, and women are more susceptible than men (Vanderpump, 2019). According to some statistics, the prevalence of thyroid disorders is 2-5 times more frequent in women than in men (Gairola *et al.*, 2023; Nagarkar *et al.*, 2015; Unnikrishnan *et al.*, 2013). Bangladeshi researchers have also reported evidence of thyroid dysfunction in the country (Moslem *et al.*, 2015; Paul *et al.*, 2006). Our research found that 13% of women were affected by thyroid disease, with slightly higher severity among married women than unmarried. Most suspected cases were diagnosed in the age range of 18-45 years. Consequently, a higher percentage of thyroid complications was observed in this range than in the early life and postmenopausal stages. Similar findings were reported in a previous study in India (Gairola *et al.*, 2023). This correlation may be due to the association between thyroid and female hormones, as well as the influence of thyroid hormones on the ovaries and menstrual cycle. Thyroid hormones also play roles in various physiological stages of women, including puberty, menstruation, and menopause (Byna *et al.*, 2015). Therefore, our study's rationale for focusing on life stages was well justified.

This study indicates that hypothyroidism is the most prevalent form of thyroid dysfunction in northern Bangladeshi women. Hyperthyroidism did not emerge during the early life, such as childhood and adolescence. Reports from other countries, like India and France, show different results (Bhadada *et al.*, 2006; Simon *et al.*, 2018). Thyroid abnormalities are often correlated with factors such as geographical location, race, and nutritional status. Previous studies have reported iodine deficiency in one-fourth of school-children in Rajshahi (Zaman, 2009), which may account for our findings.

Although the study result was hospital-based, it provides us an opportunity to expand the investigation on larger scale, including broader communities. However, the current results adequately reflect thyroid dysfunction among women in mass population as they seek treatment at government health facilities. It is important to acknowledge that thyroid disorders among women remain significant issue in our society despite the presented statistics.

Conclusion

In conclusion, although Bangladesh is classified as a developing country, its healthcare system has not made significant strides toward advancement. Research and data collection regarding health issues remains inadequate, leading to a lack of understanding of several health concerns. Thyroid dysfunction is a pressing concern. Therefore, this study aimed to elucidate the prevalence of thyroid complications among the female population in North Bengal. These findings not only raise awareness among the general public about their health status but also provide valuable data to the government agencies to implement appropriate measures for managing thyroid disease and offering relevant healthcare services.

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