

# Etiologies and posttreatment conditions of thyrotoxic patients in Sylhet division, Bangladesh: A clinical series

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## ABSTRACT

**Objective:** The endeavor of the study was to analyze the posttreatment (postradioactive iodine therapy [RAI]) conditions of thyrotoxic patients in a tertiary level hospital. **Materials and Methods:** A retrospective study of 186 patients was conducted from 2012 to 2014 in Institute of Nuclear Medicine and Allied Sciences (INMAS), Sylhet MAG Osmani Medical College Campus. Patients' information regarding the etiologies and their disease status after getting RAI therapy was recorded. **Results:** In this study, 29.57% patients were male and 70.43% were female where the mean ages were 44.57 and 43.46 accordingly. The most vulnerable group was in between 41 and 50 years of age, which is 25.81%. The patients were categorized according to the etiologies as Graves' disease (GD), multinodular goiter (MNG), and single toxic nodule (STN). In primary stage, 60.22% patients had GD, 26.88% had MNG, and 12.90% had STN. After 6 months of RAI therapy, the disease status of 51.61% patients became euthyroid, 19.35% became hypothyroid, and 29.03% remained thyrotoxic. Thus, a second dose of RAI therapy was given to those patients for next 6 months. After 12 months from the beginning of the therapy of each patient, the total recovery was found to be 72.04%. However, though all the GD patients improved to either euthyroid or hypothyroid state after 6 months, on a 12-month observation, 17.86% of them regained the thyrotoxicosis due to discontinuation of the treatment. **Conclusion:** The findings show an overall significant recovery of thyrotoxic patients taking RAI therapy in INMAS and important points to improve the rate.

**Key words:** Etiology, Graves' disease, multinodular goiter, radioactive iodine therapy, thyrotoxicosis

## INTRODUCTION

Thyroid disorders are categorized as one of the most ubiquitous endocrine disorders. According to the recent World Health Organization estimates, thyroid disorders are affecting about 750 million people worldwide, being conceivably more endemic than diabetes mellitus.<sup>[1]</sup> It is presumed that >50% of the affected people are unaware of their condition.<sup>[2,3]</sup> Based on the altered thyroid hormone levels such as thyroid stimulating hormone (TSH),

thyroxin (T<sub>4</sub>), and triiodothyronine (T<sub>3</sub>), thyroid disorders are divided into two categories, namely hypothyroidism, which is elevated TSH and/or lowered T<sub>4</sub> or T<sub>3</sub> level, and hyperthyroidism, which is lowered TSH and/or elevated T<sub>4</sub> or T<sub>3</sub> level.<sup>[2]</sup> It is noted that thyroid hormone is very imperative to sustaining body's

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crucial tasks. Any kind of inequity can lead to critical health quandary.<sup>[4]</sup>

Thyrotoxicosis, the other name of hyperthyroidism, is the clinical syndrome of hypermetabolism associated with raised serum total and free T3 and/or T4 concentrations.<sup>[5]</sup> Several physiological functions are altered in patients due to thyrotoxicosis, which in turn promotes the development of various complications such as palpitations, hypertension, myxedema, anxiousness, depression, increased appetite, and osteoporosis.<sup>[6]</sup> Etiologies regarding thyrotoxicosis include Graves' disease (GD), followed by toxic multinodular goiter (MNG), single toxic nodule (STN), and barely toxic adenoma and thyroiditis.<sup>[7,8]</sup> Patients with thyrotoxicosis are treated based on their severity of toxic levels. The pattern and duration of the treatment depend also on the disease condition. Definitive form of treatment comprises surgical excision of the nodule and treatment with radioactive iodine therapy (RAI). On the contrary, the treatment with antithyroid drugs and  $\beta$ -adrenergic receptor antagonist is less frequent as a long-term therapy is required, and a relapsing may occur almost in all instances after discontinuation of the medication.<sup>[9]</sup>

In this country, there is a lack of clinical research in the field of thyrotoxicosis, especially concerning the efficacy of the treatment. Sylhet division is the largest diversified demographic holder in Bangladesh. A significant number of thyroid disordered patients from different areas of the division are referred to come to the Institution of Nuclear Medicine and Allied Sciences (INMAS), Sylhet MAG Osmani Medical College (SOMC) campus, located in the town, to get their treatment. Thus, the study was designed with the aim to investigate the posttreatment status of thyrotoxic patients in the Northeastern part of Bangladesh by sorting them in different etiological factors.

## MATERIALS AND METHODS

### Study design

A retrospective hospital-based study was performed in INMAS, SOMC campus in Sylhet city, Bangladesh. Thyrotoxic patients who were referred at this institute for receiving the RAI were enrolled in this study, and this was conducted during the time period of 2012–2014. All the patients got RAI therapy on the basis of a 6-month dose (first dose), and after 6 months, those who required continuing the therapy were given the second dose for next 6 months. Hence, all the patients' disease status, regardless of continuation or discontinuation of the therapy, was tested and recorded for at least 12 months on the basis of a 6-month interval.

### Collection of data

The conditions of the study patients after having treatment were obtained from the archive of INMAS. Etiological factors of the patients were noted along with the general ranges of doses of the RAI therapy given for the patients. A follow-up cure rate for 6 and 12 months was collected for the same patients. Information regarding the age and sex was also noted.

### Data analysis

The collected data were transferred into the Microsoft Excel Spreadsheet 2010 (Microsoft Corp., USA), and the statistical analysis and graphical presentations were performed. Representation of the data was performed as percentage, frequency, mean, and ratio.

## RESULTS AND DISCUSSION

In the present study, medical records of 186 thyrotoxic patients were reviewed. Among the study group, 29.57% patients were male and 70.43% patients were female with a ratio of 1:2.38, respectively. The mean ages of these patients according to male and female were 44.57 and 43.46. The patients were categorized according to the etiologies as GD, MNG, and STN and they were given treatment on different doses. A fixed dose regimen of RAI therapy was given as 8–10 mCi for GD, 12–15 mCi for MNG, and 10–12 mCi for STN. The prevalence of the etiologies [Figure 1] among the patients shows that the high proportions of patients (60.22%) were having GD, followed by MNG (26.88%) and STN (12.90%).

The whole study group was subdivided into the above-mentioned categories and analyzed for the percentage and mean ages of both male and female as well as the ratio [Figures 2 and 3]. The male: female ratio for GD, MNG, and STN is 1:2.29, 1:2.13, and 1:3.8, respectively, which indicates that women in Sylhet division are more prone to thyrotoxicosis. This is basically in agreement with all the

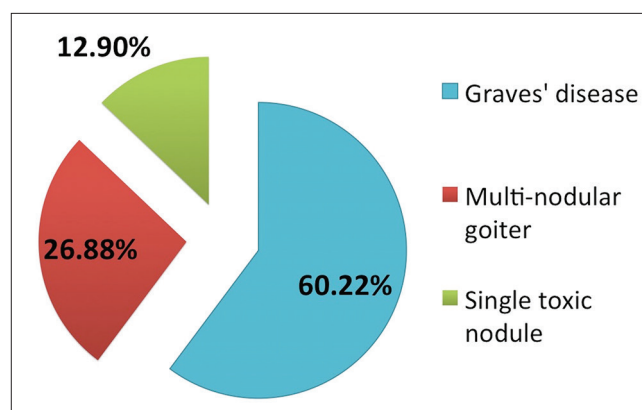


Figure 1: Prevalence of etiologies of thyrotoxic patients

previous studies; wherein every region of the world, it was found that women are mostly affected by thyroid disorders.

The highest percentage of the 186 patients was in between 41 and 50 years of age, which was 25.81%. Patient's age ranges were accordingly analyzed in distinctive manner for GD, MNG, and STN. Table 1 represents the distribution of etiology with various age groups. The highest number of total GD was observed in 41–50 years of age groups, wherein 61–80 years and 51–60 years of age groups were dominant in MNG and STN correspondingly.

The posttreatment status of these thyrotoxic patients was evaluated where the first dose's cure rate was 70.96% after 6 months of the treatment. The rate increased to 72.04% on 12-month observation. The cure status means the condition of acquiring euthyroidism after the treatment, which defines the normal range of thyroid hormones. In this study, thyrotoxic patients who acquired hypothyroidism after the treatment were also accounted as a cure success since the thyrotoxic condition had abolished. Figure 4 represents the overall posttreatment status after 6 and 12 months of RAI therapy, and Figure 5 does it by sorting according to the etiologies: GD, MNG, and STN.

The findings revealed that 100% of the GD patients were improved from thyrotoxic state by the first dose after 6 months and so discontinued taking the therapy. However, after 12-month observation, it was found that 17.86% of the GD patients regained their thyrotoxic state. On the other hand, only 18% of the MNG patients recovered after 6 months, and it reached to the 60% recovery after 12-month therapy. The cure rate for STN was lower comparing with GD and MNG as only 50% of the patients got cured after 12-month therapy. It was also noted that the age group of 41–50 years of old was more tend to be recovered from thyrotoxic state within a 12-month follow-up period and which was also true for GD patients but not for TMN and STN patients. Therefore, from this finding, a conclusion can be made that GD patients in between 41 and 50 years of age responded better to RAI therapy in INMAS. It can also be said that all the thyrotoxic patients should be under proper management and care, even if they recovered from the disease state, to prevent the regaining of the disease.

Although hypothyroidism is also another thyroid disorder, in case of thyrotoxic patients, recovery rate is defined with the status of being either euthyroidism or hypothyroidism. Appropriate treatment and follow-up is required for patients who developed hypothyroidism to prevent the future complications. Moreover, in the present study, it was found

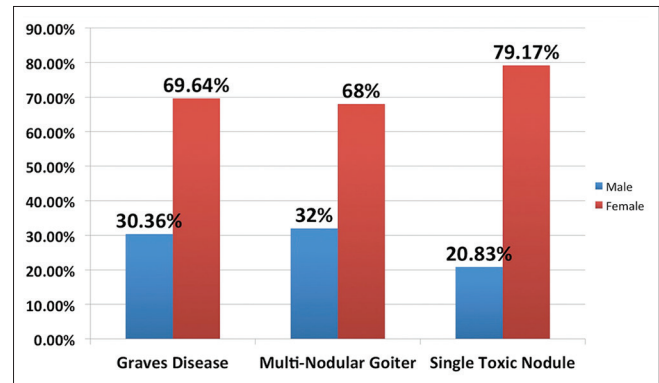


Figure 2: Gender-wise prevalence of etiologies of thyrotoxicosis

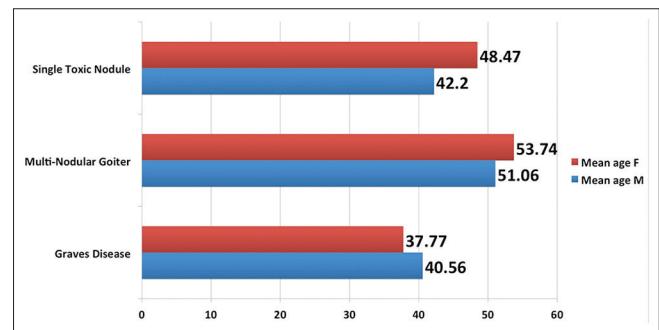


Figure 3: Mean ages of thyrotoxic patients

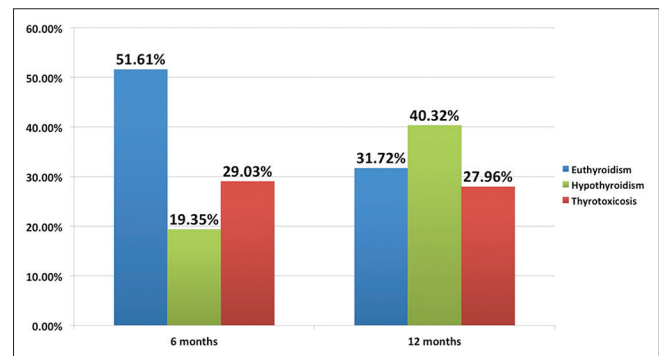
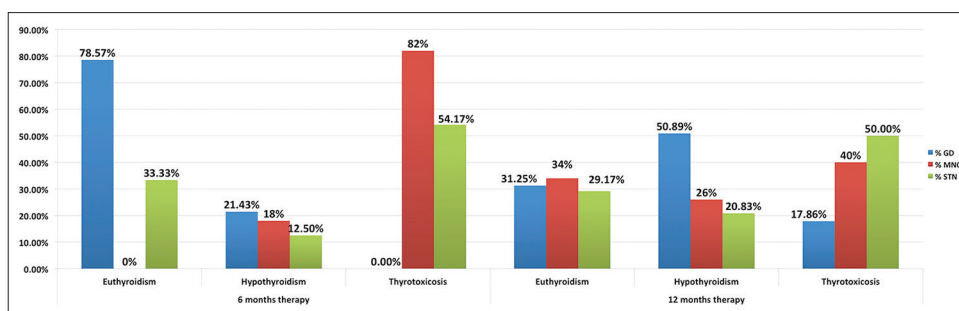


Figure 4: Comprehensive posttreatment status of thyrotoxic patients after 6- and 12-month therapy

Etiology	Age group (years)					Total, n (%)
	13-25, n (%)	26-40, n (%)	41-50, n (%)	51-60, n (%)	61-80, n (%)	
Graves' disease	29 (25.89)	29 (25.89)	33 (29.46)	14 (12.5)	7 (6.25)	112 (60.22)
Multinodular goiter	1 (2)	8 (16)	11 (22)	16 (32)	14 (28)	50 (26.88)
Single toxic nodule	3 (12.50)	6 (25.00)	4 (16.67)	7 (29.17)	4 (16.67)	24 (12.90)
Total	33 (17.74)	43 (23.12)	48 (25.81)	37 (19.89)	25 (13.44)	186 (100)

n: Number of patients



**Figure 5:** Posttreatment status of thyrotoxic patients with Graves' disease, Multinodular goiter, and Single toxic nodule after 6- and 12-month therapy

that a total of 27.96% patients still remained thyrotoxic after 12 months despite second RAI therapy, and so they were suggested to take the third stage of the therapy for the next 6 months. Thus, this study indicates that to determine the recovery of thyrotoxic patients regardless of GD, TMN, and STN, a minimum course of 12 months and sometimes 18 months of follow-up should be supervised.

Thyroid disorders are the most common hormonal disorders throughout the world as well as in Bangladesh. Compared to the past histories, the state of thyroidology in the country has been improved to several aspects through the development of laboratory analysis, autoimmune markers, nuclear medicine (NM) facilities, and locally produced thyroid drugs. Despite the improvements, there are still reports encountered of undetected or unconfirmed thyroid problems, erroneous laboratory reports, late detection of thyroid malignancies, infertility due to thyroid disorders, pregnancy loss, and inappropriate treatment.<sup>[10]</sup> The reason behind these might be the lack of awareness, sufficient professional expertise, and availability to the appropriate treatment. If the above shortcomings had overcome, the RAI failure rate in this country would have been more lessened.

Previous studies showed that RAI therapy is an effective treatment for the management of thyrotoxicosis. Now, it is believed that NM plays the most telling role in diagnosing and managing of thyroid disorders.<sup>[10,11]</sup> However, in our country, there are only a few Government Medical College campuses have the availability to NM facility, which is very inadequate for this densely populated country where > 20% of the people are suffering from thyroid disorders.<sup>[10]</sup> Therefore, the establishment of few more NM facilities around the country along with the increasing workforce and raising awareness steps among the general populations is required to improve every pattern of thyroid disorder.

Basically, pattern of thyroid disorder varies in different parts of the world even in different regions of the same country. In Bangladesh, it was believed that thyroid disorders are

more common in the northern part such as Rangpur and Dinajpur district. However, a larger portion of the patients were found from the northeastern part of Bangladesh, which is essentially Sylhet division.<sup>[12]</sup> Thus, this study focused on the patients of Sylhet division of Bangladesh with thyrotoxicosis, and it was conducted to statistically evaluate the effectiveness of the RAI therapy given by INMAS.

There were few limitations in our study as the medical records were randomly collected from the archive of INMAS and as it was a hospital-based investigation; it may not represent the whole population. Along with that, although patients who were referred and easily recognizable as GD sufferer did not require to have TSH receptor antibodies and thyroid-stimulating immunoglobulin test done, the study could have been more reinforced if the tests were performed for all the patients.

## CONCLUSION

It was a retrospective hospital-based study, which represented a picture of etiologies of thyrotoxic patients in Sylhet division. Their treatment status after getting RAI therapy in INMAS, Sylhet was analyzed, which can be used as control data for further studies. Findings from the current study reveal that women and elderly people in Sylhet division are more prone to thyrotoxicosis. Most of the patients were suffering from GD and Graves' patients in between 41 and 50 years of age range were better responsive to RAI therapy. In conclusion, the treatment with RAI therapy given in INMAS, Sylhet for thyrotoxic patients was in a satisfactory level, as the cure rate of the patients was quite higher.

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Nil.

### Conflicts of interest

There are no conflicts of interest.

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