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Original Article

Evaluating the Burden of Autoimmune Thyroid Disorders: Findings from Tertiary Care Facilities of Bangladesh

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Abstract

Introduction: Autoimmune thyroid disorders (ATDs) like Graves' disease and Hashimoto's thyroiditis affect 2%-5% globally, yet localized data in Bangladesh are scarce. This study investigates genetic, environmental, and gender factors influencing ATD prevalence. Understanding these risks is crucial for effective management and public health strategies.

Methods: This observational cross-sectional study in two major Bangladesh healthcare facilities aimed to assess the burden of autoimmune thyroid disorders. With a sample size of 73 participants, strict inclusion criteria targeted individuals likely to have ATDs—18 and above, showing suspected thyroid disorder based on Thyroid-Stimulating Hormone (TSH) values or already on thyroid medication. The study gathered comprehensive clinical data through medical record reviews, focusing on prevalence, demographics, and the correlation between TSH levels and ATDs. This design offered a snapshot of ATD prevalence and management in these Bangladeshi healthcare settings.

Result: The study involved 73 participants, primarily aged between 31 and 50, with a female predominance (83.56%). The average age was 41.77 years. BMI ranged from 18.55 to 44.55, with 47.95% overweight and 27.40% at a healthy weight. The most prevalent thyroid conditions were subclinical hyperthyroidism (38.36%) and hyperthyroidism (35.62%), with an average TSH level of 12.25 micro IU/I. 30.14% tested positive for thyroid antibodies, indicative of autoimmune thyroid disorders, while 32.88% had diabetes, the most common comorbidity. Hypertension (21.92%) and dyslipidemia (9.59%) followed. Menstrual irregularities were reported by 26.03% of participants, with menopause in 28.77%. The study explored associations between thyroid status and comorbidities but found no statistically significant correlations for diabetes, hypertension, dyslipidemia, NAFLD, impaired glucose tolerance, or CKD across different thyroid statuses.

Conclusion: The study highlights the high prevalence of autoimmune thyroid disorders (ATDs) in Bangladesh, particularly subclinical hyperthyroidism and hyperthyroidism, with a significant female predominance. It emphasizes the need for increased awareness and targeted screening, especially in middle-aged individuals. The study also highlights the complex interplay between ATDs and comorbid conditions.

Keywords: Thyroid Disorders, Autoimmune, Grave's Disease, Hyperthyroidism, Hypothyroidism.

Introduction

Autoimmune thyroid disorders (ATDs), primarily Graves' disease and Hashimoto's thyroiditis, are significant contributors to global thyroid pathology, affecting 2%-5% of the global population.[1] These disorders, characterized by an aberrant immune response against thyroid antigens, lead to a spectrum of clinical manifestations ranging from hyperthyroidism in Graves' disease to the hypothyroidism commonly seen in Hashimoto's thyroiditis. The global burden of ATDs is substantial, with varying prevalence and incidence rates across different regions, reflecting a complex interplay of genetic, environmental, and possibly regional factors.[2,3] Graves' disease, the most common

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cause of thyrotoxicosis, accounts for 70-80% of hyperthyroidism cases.[4] It presents with symptoms like sweating, weight loss, and palpitations, often leading to significant morbidity. On the other hand, Hashimoto's thyroiditis, characterized by thyroid autoantibodies, manifests a spectrum ranging from euthyroidism to overt hypothyroidism. The prevalence of Hashimoto's thyroiditis in patients with thyroid disorders in a tertiary care setting was reported as high as 48.33%, indicating its significant clinical impact.[5] Understanding the risk factors for ATDs is crucial in comprehending their epidemiology and guiding preventive strategies. Several factors contribute to the development of ATDs, including genetic predisposition, environmental triggers, and lifestyle influences. Genetic factors play a pivotal role, with family history of thyroid disorders significantly increasing the risk.[6] Environmental factors, such as iodine intake, smoking, and exposure to certain chemicals, have been implicated in the pathogenesis of ATDs.[7] Additionally, gender is a notable risk factor, with women being more susceptible than men, likely due to hormonal influences.[8] Age also plays a role, with ATDs commonly presenting in mid-life, although they can occur at any age.[9] Furthermore, other autoimmune conditions, such as type 1 diabetes and celiac disease, are frequently associated with an increased risk of developing ATDs, suggesting a shared autoimmune pathway. These risk factors highlight the multifactorial nature of ATDs and underscore the importance of a comprehensive approach to their study and management. While global data on ATDs are extensive, specific insights from South Asia, particularly Bangladesh, are less prevalent. Studies in neighboring countries like India have shown a high prevalence of thyroid disorders, including ATDs, in tertiary care settings, suggesting a similar trend might be present in Bangladesh.[3,10] However, localized data from Bangladesh remain sparse. A study focusing on thyroid disorder prevalence during pregnancy in Bangladesh reported a significant burden, with a prevalence of 34.98%, highlighting the need for early detection and management.[11] This gap in localized data is a significant barrier to formulating effective health policies and patient management strategies in the region. The current study aims to bridge this gap by evaluating the burden of ATDs in a tertiary care facility in Bangladesh. Understanding the prevalence, clinical presentation, and management challenges of ATDs in this setting is crucial for developing targeted healthcare interventions. Moreover, this study's findings could inform broader public health strategies and healthcare system improvements in Bangladesh, particularly in the context of non-communicable diseases. The relevance of this study extends beyond local healthcare settings. ATDs have been linked to other systemic health issues, including an increased risk of Alzheimer's disease in older populations.[12] Additionally, the complexity of ATDs is highlighted in rare cases where patients exhibit transitions between Hashimoto's thyroiditis and Graves' disease, presenting unique diagnostic and therapeutic challenges.[13,14] These findings underscore the need for comprehensive understanding and management approaches for ATDs. In conclusion, this study aims to provide a detailed analysis of the burden of autoimmune thyroid disorders in a tertiary care setting in Bangladesh. By doing so, it seeks to contribute valuable insights to the existing body of knowledge on ATDs, particularly in a region where such data are limited. The findings are expected to aid in the development of more effective management strategies for ATDs, ultimately improving patient outcomes and informing public health policies in Bangladesh and similar settings.

Materials and Methods

This cross-sectional observational study was conducted to evaluate the burden of autoimmune thyroid disorders (ATDs) at two prominent healthcare facilities in Bangladesh: The Holy Family Red Crescent Medical College Medicine Outpatient Department (OPD) and BIRDEM General Hospital. Initially, the sample size was calculated to be 246 participants. However, due to time constraints, the study was conducted with a final sample size of 73 participants. Participants were included in the study based on the following criteria: (1) Patients aged 18 and above who attended the hospital during the study period; (2) Patients with suspected thyroid disorder based on Thyroid-Stimulating Hormone (TSH) values; and (3) Patients currently on thyroid medication. These criteria were chosen to ensure a focus on individuals who were most likely to present with ATDs, thereby enhancing the study's relevance to the target population. Data collection involved reviewing medical records for relevant clinical information, including TSH levels, patient demographics, and current thyroid medication. The study also included a review of patient histories to

identify any previous diagnosis of ATDs. This approach allowed for the collection of comprehensive data on the prevalence and characteristics of ATDs among the patients attending these healthcare facilities. The data analysis focused on the prevalence of ATDs, demographic distribution, and the correlation between TSH levels and the presence of ATDs. Statistical analyses were performed using appropriate software, with results presented in terms of frequencies, percentages, and other relevant statistical measures. The study's observational and cross-sectional nature provided a snapshot of the burden of ATDs in these healthcare settings, contributing valuable insights into the prevalence and management of these disorders in Bangladesh.

Results

Table-I:Baseline characteristics distribution of the participants (N=73)

Age Distribution	n	%
≤30	17	23.29%
31-40	19	26.03%
41-50	22	30.14%
51-60	10	13.70%
61-70	4	5.48%
71-80	0	0.00%
>80	1	1.37%
Mean ± SD age	41.77 ± 12.98	
Age range	21-82	
Gender		
Male	12	16.44%
Female	61	83.56%
BMI		
Healthy Weight	20	27.40%
Overweight	35	47.95%
Obese	16	21.92%
Morbidly Obese	2	2.74%
Mean ± SD BMI	27.74 ± 4.98	
BMI Range	18.55-44.55	

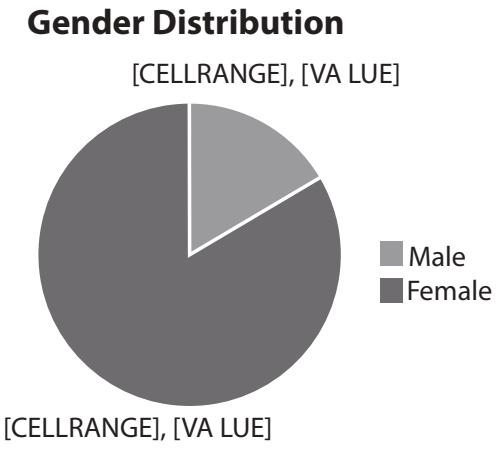

Figure-I:Gender Distribution of the participants

Gender distribution showed a significant female predominance in the study cohort. Out of the 73 participants, 61 were female (83.56%), while only 12 were male (16.44%). This gender disparity is consistent with the higher prevalence of thyroid disorders in females observed in other studies.

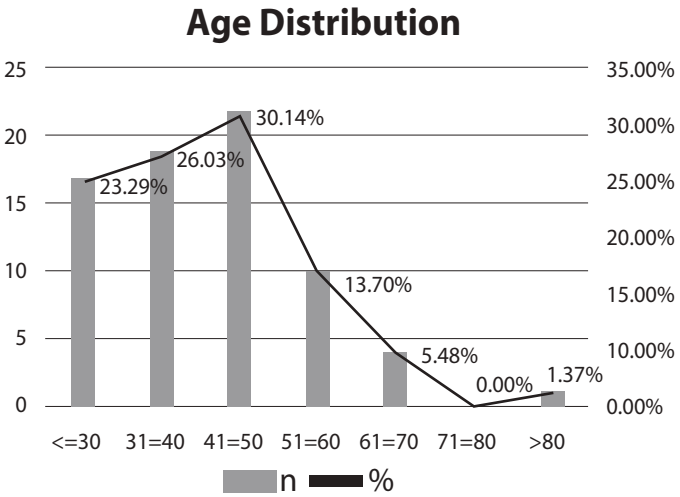

Figure-II: Age distribution of the participants (N=73)

The age distribution of the participants varied, with the majority falling within the 31-50 age range. Specifically, 17 participants (23.29%) were aged 30 years or below, 19 participants (26.03%) were between 31 and 40 years, and the largest age group was those between 41 and 50 years, comprising 22 participants (30.14%). The study included fewer participants in the older age groups, with 10 participants (13.70%) aged between 51 and 60 years, 4 participants (5.48%) between 61 and 70 years, and only 1 participant (1.37%) over the age of 80. The mean age of the participants was 41.77 years, with a standard deviation of 12.98 years, and the age range spanned from 21 to 82 years.

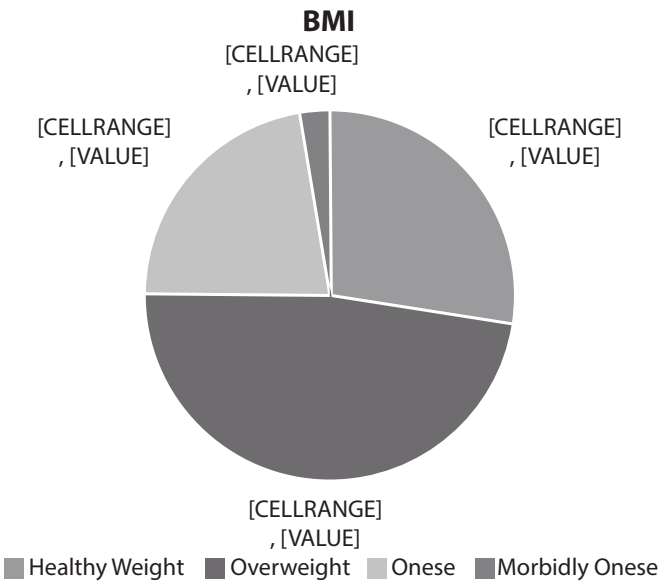

Figure-III: BMI Distribution of the participants (N=73)

Regarding Body Mass Index (BMI), the participants' BMI ranged from 18.55 to 44.55, with a mean BMI of 27.74 and a standard deviation of 4.98. The distribution of BMI categories indicated that the largest group was overweight, with 35 participants (47.95%), followed by 20 participants (27.40%) with a healthy weight. There were also 16 obese participants (21.92%) and 2 participants (2.74%) who were classified as morbidly obese.

Table-II: Distribution of TSH determined thyroid disorder among the participants (N=73)

Thyroid Type	n	%
Subclinical hypothyroidism (0.001 - 0.449)	8	10.96%
Normal (0.450 - 4.499)	11	15.07%
Subclinical hyperthyroidism (4.500 - 9.999)	28	38.36%
Hyperthyroidism (10.000 - 75.000)	26	35.62%
Mean ± SD TSH value	12.25±16.7	(micro IU/I)
Range	0.001-75.00	

The distribution of thyroid disorders varied, with a notable prevalence of subclinical hyperthyroidism and hyperthyroidism. Subclinical hypothyroidism, characterized by TSH levels ranging from 0.001 to 0.449 micro IU/I, was observed in 8 participants, accounting for 10.96% of the study population. Normal TSH levels, defined as 0.450 to 4.499 micro IU/I, were found in 11 participants, representing 15.07% of the cohort. The most prevalent condition was subclinical hyperthyroidism, with TSH levels between 4.500 and 9.999 micro IU/I, observed in 28 participants, constituting 38.36% of the study group. This was closely followed by hyperthyroidism, defined by TSH levels ranging from 10.000 to 75.000 micro IU/I, which was present in 26 participants, making up 35.62% of the participants. The mean TSH value across the study population was 12.25 micro IU/I, with a standard deviation of 16.7 micro IU/I. The range of TSH levels observed in the study was quite broad, extending from as low as 0.001 micro IU/I to as high as 75.00 micro IU/I.

Table-III:Distribution of participants by autoimmune test result (N=73)

Presence of Antibody	n	%
Positive Antibody	22	30.14%
Negative Antibody	6	8.22%
Not Done	44	60.27%
TSH-R + (Graves' Disease)	1	1.37%

A total of 22 participants, accounting for 30.14% of the study population, tested positive for thyroid antibodies, indicating the presence of autoimmune thyroid disorders. Conversely, only 6 participants, representing 8.22% of the cohort, tested negative for thyroid antibodies. A significant portion of the study, comprising 44 participants or 60.27% of the total, did not undergo antibody testing. The decision to not conduct antibody tests for these individuals was based on the absence of clinical features suggestive of autoimmune disease. This approach reflects a targeted testing strategy, prioritizing antibody testing for patients with clinical indications of autoimmune thyroid disorders. Additionally, one participant, accounting for 1.37% of the study group, tested positive for Thyroid-Stimulating Hormone Receptor Antibodies (TSH-R), a marker indicative of Graves' Disease.

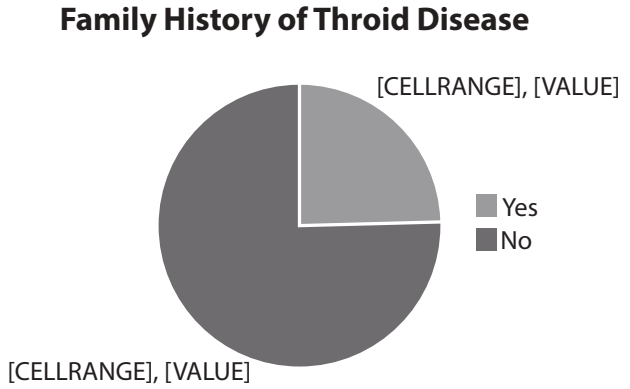

Figure-IV:Distribution of participants by family history of thyroid disorder (N=73)

Table-IV:Distribution of participants by presence of comorbidities among participants (N=73)

Comorbidities	n	%
Diabetes	24	32.88%
Hypertension	16	21.92%
Dyslipidemia	7	9.59%
Non-alcoholic Fatty Liver Disease	1	1.37%
Impaired Glucose Tolerance	3	4.11%
Chronic Kidney Disease	1	1.37%

Diabetes emerged as the most common comorbidity, present in 24 participants, which constitutes 32.88% of the study population. This high prevalence highlights the potential interplay between thyroid function and glucose metabolism, a connection that has been noted in previous research. Hypertension was the second most prevalent comorbidity, observed in 16 participants, accounting for 21.92% of the cohort. This finding aligns with existing literature that suggests a correlation between thyroid dysfunction and blood pressure regulation. Dyslipidemia was identified in 7 participants, making up 9.59% of the study group. This condition, characterized by abnormal lipid levels, is often associated with thyroid disorders, particularly hypothyroidism, which can alter lipid metabolism. Other comorbidities were less prevalent but still noteworthy. Non-alcoholic Fatty Liver Disease (NAFLD) and Chronic Kidney Disease (CKD) were each found in 1 participant, representing 1.37% of the participants. Additionally, Impaired Glucose Tolerance was observed in 3 participants, accounting for 4.11% of the study population.

Table-V:Distribution of menstrual records among the participants (N=73)

Menstrual Records	n	%
Regular	25	34.25%
Irregular	19	26.03%
Menopause	21	28.77%
Menorrhea	2	2.74%
Polymenorrhea	1	1.37%
Post-menopause	1	1.37%
Dysmenorrhea	1	1.37%
Pregnant	2	2.74%

Of the participants, 25 (34.25%) reported having regular menstrual cycles, indicating a normal menstrual pattern despite the presence of thyroid disorders. Irregular menstrual cycles were reported by 19 participants, accounting for 26.03% of the study population. This finding is significant as it highlights the impact of thyroid dysfunction on menstrual regularity, a correlation well-documented in medical literature. Menopause was reported by 21 participants, representing 28.77% of the cohort. This demographic is noteworthy as menopause itself can influence thyroid function, and vice versa, thyroid disorders can affect the onset and symptoms of menopause. Other menstrual conditions were less common but provided insight into the diverse effects of thyroid disorders on menstrual health. Menorrhea and polymenorrhea were reported by 2 (2.74%) and 1 (1.37%) participants, respectively. Post-menopause and dysmenorrhea were each reported by 1 participant (1.37%). Additionally, 2 participants (2.74%) were pregnant at the time of the study.

Table-VI:Association between comorbidities and thyroid status (N=73)

Variables	Subclinical hypothyroidism (n=8)		Normal (n=11)		Subclinical hyperthyroidism (n=28)		Hyperthyroidism (n=26)		p-value
	n	%	n	%	n	%	n	%	
Diabetes	3	37.50%	5	45.45%	12	42.86%	4	15.38%	0.125
Hypertension	1	12.50%	4	36.36%	8	28.57%	3	11.54%	0.249
Dyslipidemia	2	25.00%	0	0.00%	1	3.57%	4	15.38%	0.137
Nonalcoholic fatty liver disease	0	0.00%	0	0.00%	1	3.57%	0	0.00%	0.653
Impaired Glucose Tolerant	0	0.00%	0	0.00%	2	7.14%	1	3.85%	0.689
Chronic Kidney Disease	0	0.00%	1	9.09%	0	0.00%	0	0.00%	0.126

The study investigated the relationship between various comorbidities and different thyroid statuses in a cohort of 73 participants. The thyroid statuses were categorized as subclinical hypothyroidism (n=8), normal thyroid function (n=11), subclinical hyperthyroidism (n=28), and hyperthyroidism (n=26). In the context of diabetes, its prevalence among participants with subclinical hypothyroidism was 37.50%, while it was slightly higher in those with normal thyroid function at 45.45%. The prevalence of diabetes in participants with subclinical hyperthyroidism was 42.86%, and it was notably lower in those with hyperthyroidism at 15.38%. However, the p-value of 0.125 suggests that this association was not statistically significant. Hypertension showed a varied distribution across thyroid statuses. It was present in 12.50% of participants with subclinical hypothyroidism, 36.36% with normal thyroid function, 28.57% with subclinical hyperthyroidism, and 11.54% with hyperthyroidism. The p-value of 0.249 indicates no significant statistical association between hypertension and thyroid status. Dyslipidemia was observed in 25.00% of participants with subclinical hypothyroidism, none with normal thyroid function, 3.57% with subclinical hyperthyroidism, and 15.38% with hyperthyroidism. The p-value of 0.137 suggests no significant correlation between dyslipidemia and thyroid status. Nonalcoholic fatty liver disease, impaired glucose tolerance, and chronic kidney disease showed low prevalence across all thyroid statuses, with no significant associations observed (p-values of 0.653, 0.689, and 0.126, respectively).

Discussion

The findings of this study on the prevalence and characteristics of thyroid disorders in a Bangladesh tertiary care setting provide valuable insights into the epidemiology of these conditions. The most notable finding is the high prevalence of subclinical hyperthyroidism (38.36%) and hyperthyroidism (35.62%), which is consistent with global trends indicating an increasing prevalence of thyroid disorders.[15] The predominance of these conditions in the study population underscores the need for heightened awareness and screening for thyroid dysfunctions. Gender distribution showed a significant female predominance (83.56%), aligning with the well-established understanding that thyroid disorders are more common in females.[9] This gender disparity may be attributed to hormonal, genetic, and immunological factors that predispose women to thyroid abnormalities. The age distribution, with most participants in the 31-50 age range, suggests that middle-aged individuals are at a higher risk, necessitating targeted screening and intervention strategies in this demographic. The BMI distribution revealed that the largest group of participants was overweight (47.95%), followed by those with a healthy weight (27.40%). This finding is particularly relevant given the complex relationship between thyroid function and body weight. While obesity can influence thyroid hormone levels, thyroid dysfunction can also lead to weight changes.[16] The high prevalence of overweight participants in this study highlights the bidirectional relationship between BMI and thyroid function. Menstrual health was notably affected, with only 34.25% of participants reporting regular menstrual cycles. The impact of thyroid disorders on menstrual health is well-documented, with thyroid hormones interacting with reproductive hormones and influencing menstrual regularity.[17] The proportion of participants in menopause (28.77%) further emphasizes the need to consider thyroid function in the management of menopausal symptoms. A family history of thyroid disorders was reported by 24.66% of participants, indicating the significant role of geneticfactors in the development of these conditions.[18] This finding suggests that family history should be a key consideration in the assessment and management of thyroid disorders. Regarding comorbidities, diabetes was the most common, present in 32.88% of participants, followed by hypertension (21.92%) and dyslipidemia (9.59%). The coexistence of these conditions with thyroid disorders is well-established, with thyroid dysfunction exacerbating metabolic and cardiovascular conditions.[19] The lack of statistically significant associations between thyroid status and comorbidities in this study, however, suggests that the relationship may be influenced by other factors, including lifestyle and genetic predisposition. The autoimmune test results showed that 30.14% of participants tested positive for thyroid antibodies, while a significant portion (60.27%) did not undergo testing due to the absence of clinical features suggestive of autoimmune disease. This approach reflects a targeted testing strategy, which is crucial in resource-limited settings. Finally, the mean TSH value of

12.25 micro IU/l and the broad range of TSH levels (0.001 to 75.00 micro IU/l) observed in this study highlight the diverse thyroid function status among the participants. This variability underscores the complexity of thyroid disorders and the need for individualized diagnostic and therapeutic approaches. In conclusion, this study provides important insights into the prevalence and characteristics of thyroid disorders in a Bangladesh tertiary care setting. The findings emphasize the need for increased awareness, targeted screening, and a comprehensive approach to managing thyroid disorders, considering their impact on overall health and comorbid conditions.

Limitations

The study was conducted with a small sample size. So, the results may not represent the whole community.

Conclusion

This study highlights the significant prevalence of autoimmune thyroid disorders (ATDs), notably subclinical hyperthyroidism and hyperthyroidism, in a tertiary care setting in Bangladesh. The findings demonstrate a pronounced female predominance, which aligns with global trends. These results underscore the necessity for increased awareness and targeted screening, especially in middle-aged individuals. The study also emphasizes the complex interplay between ATDs and comorbid conditions like diabetes, hypertension, and dyslipidemia, although no significant statistical associations were found. The high prevalence of ATDs in this setting necessitates a comprehensive approach to their management, considering the individualized nature of thyroid disorders and their impact on overall health. This research contributes valuable insights into the epidemiology of ATDs in Bangladesh, informing public health strategies and healthcare system improvements in managing non-communicable diseases.

Recommandation

Considering the observed high prevalence and demographic patterns of autoimmune thyroid disorders (ATDs) in Bangladesh, we recommend enhanced public health initiatives for early detection and education. Targeted screening programs, particularly for middle-aged women, should be prioritized. Furthermore, healthcare providers should receive updated training on the management of ATDs, emphasizing the integration of care for comorbid conditions such as diabetes and hypertension. Research efforts should focus on understanding the etiological factors contributing to ATDs in the Bangladeshi population to inform tailored treatment and prevention strategies.

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