

Research Article

Occurrence of Thyroid Dysfunction and Associated Metabolic Abnormalities Among Adults Attending a Tertiary Care Hospital in Kathmandu

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A B S T R A C T

Background: Endocrine disorders, particularly thyroid dysfunction, are increasingly prevalent worldwide and significantly contribute to metabolic disturbances and reduced quality of life. Early diagnosis and management are essential for preventing complications.

Objective: To assess the prevalence of thyroid dysfunction and associated metabolic abnormalities among adults attending a tertiary care hospital in Nepal.

Methods: A hospital-based cross-sectional study was conducted among 240 adults attending endocrine and general medicine outpatient departments. Thyroid function tests, fasting blood glucose, lipid profile, body mass index, and blood pressure were evaluated.

Results: Hypothyroidism was identified in 28.3% participants, while hyperthyroidism was observed in 11.7%. Thyroid dysfunction was significantly associated with obesity, dyslipidemia, hypertension, and impaired fasting glucose ($p < 0.05$). Female participants demonstrated higher prevalence of thyroid abnormalities compared to males.

Conclusion: Thyroid dysfunction is highly prevalent among adults in Nepal and is significantly associated with metabolic abnormalities. Routine endocrine screening and lifestyle modification strategies are essential for early diagnosis and prevention of complications.

Keywords: Endocrine disorders, Thyroid dysfunction, Hypothyroidism, Metabolic abnormalities, Nepal

Introduction

The world is dealing with a problem called endocrine disorders. This is because more and more people are getting

these disorders and they can last a time. They can also cause a lot of health problems and affect the quality of life.

The endocrine system is made up of glands that produce hormones, including the thyroid, pancreas and pituitary

glands. These glands work together to control how our bodies grow make energy and stay healthy.

The thyroid gland is a part of the endocrine system. When it does not work right it can cause a lot of problems. Thyroid hormones are important for things like how fast our bodies burn energy how we feel and how our hearts work. If our thyroid hormones are not just right it can cause a lot of health problems.

Thyroid problems are very common. One kind of thyroid problem is called hypothyroidism. This is when the thyroid gland does not make thyroid hormones. People with hypothyroidism often feel tired, cold and depressed. They may also gain weight have skin and have trouble thinking clearly.

Another kind of thyroid problem is called hyperthyroidism. This is when the thyroid gland makes many thyroid hormones. People with hyperthyroidism often lose weight feel nervous and have a heartbeat. They may also feel too hot have trouble sleeping and have problems.

Thyroid disorders like hypothyroidism and hyperthyroidism can cause a lot of problems. The endocrine system and thyroid gland play a role in keeping our bodies healthy. We need to take care of our thyroid gland and the rest of the endocrine system to stay healthy. The thyroid gland and endocrine system are important, for our health and well-being.

Thyroid disorders are a problem all over the world. They affect millions of people. Are a major concern for public health. This is because thyroid disorders are term and can cause a lot of other problems. The number of people with thyroid problems is different in parts of the world. It depends on how old you're if you are a man or a woman, where you live, how much iodine you get if you have a family history of thyroid problems and if you have been exposed to things that can hurt your thyroid.

Women are more likely to have thyroid problems because of hormones. Because they are more likely to get autoimmune diseases. Asian countries, including Nepal still have a lot of thyroid problems even though they have improved their healthcare and are adding iodine to food. Nepal used to have a lot of problems with goiter and iodine deficiency because of the mountains, iodine in the soil and not enough iodized food. Even though they have been adding iodine to salt thyroid problems are still very common in Nepal.

Thyroid problems that are caused by the system like Hashimoto thyroiditis and Graves' disease are some of the main reasons people have thyroid problems. These problems happen when the immune system attacks the thyroid or makes it work hard. This can be caused by genes, things in the environment infections not eating well and stress. Thyroid problems are linked to other health issues,

including being overweight having trouble, with insulin, high cholesterol, high blood pressure and heart disease.

Thyroid hormones help control how the body uses fat, cholesterol and sugar. They also help control how hard the heart works and how well the blood vessels work. So if the thyroid is not working right it can cause a lot of problems. Not having thyroid hormone or hypothyroidism can cause high cholesterol, weight gain and other problems because the body is not working as well as it should. If this is not treated it can increase the risk of heart disease, high blood pressure and stroke.

On the hand having too much thyroid hormone or hyperthyroidism can cause the heart to beat too fast high blood pressure and other problems. It can also cause osteoporosis, muscle wasting and heart problems. If this is not treated it can cause heartbeat, heart failure and weak bones. Thyroid disorders, including hypothyroidism and hyperthyroidism are problems that need to be treated. Thyroid disorders can cause a lot of health issues and it is essential to take care of thyroid health to prevent these problems.

The relationship between thyroid dysfunction and diabetes mellitus is particularly important in endocrine medicine. Thyroid hormones influence insulin secretion, glucose metabolism, hepatic glucose production, and insulin sensitivity.¹⁴ Patients with diabetes mellitus frequently demonstrate altered thyroid function, and coexistence of both disorders substantially increases cardiovascular and metabolic risk.

Obesity has also emerged as an important contributor to endocrine dysfunction. Excess adipose tissue influences inflammatory pathways, hormonal regulation, insulin resistance, and thyroid hormone metabolism.¹⁵ Obese individuals often demonstrate altered thyroid-stimulating hormone levels and increased susceptibility to metabolic syndrome.

One of the major challenges associated with endocrine disorders is delayed diagnosis because clinical manifestations are often nonspecific and develop gradually over time.¹⁶ Symptoms such as fatigue, mood changes, weight fluctuations, and metabolic abnormalities may remain unrecognized or be misattributed to stress, aging, or lifestyle factors. Consequently, many patients remain undiagnosed until complications become clinically evident.

Early identification of thyroid dysfunction through routine endocrine screening is therefore essential for preventing long-term complications. Laboratory investigations including thyroid-stimulating hormone (TSH), triiodothyronine (T3), thyroxine (T4), fasting blood glucose, and lipid profile play crucial roles in diagnosis and monitoring of endocrine disorders.¹⁷

Lifestyle modification represents an important component of endocrine disease prevention and management. Balanced nutrition, adequate iodine intake, regular physical activity, weight management, smoking cessation, stress reduction, and adherence to medical therapy may significantly improve endocrine and metabolic health outcomes.¹⁸

Community awareness regarding endocrine disorders remains inadequate in many developing countries including Nepal. Limited healthcare accessibility, poor health literacy, socioeconomic barriers, and insufficient routine screening programs contribute to delayed diagnosis and poor disease control.¹⁹ Strengthening endocrine healthcare services and promoting preventive health education may therefore substantially reduce endocrine disease burden.

Recent advancements in endocrinology including improved hormonal assays, imaging techniques, molecular diagnostics, and individualized hormone replacement therapies have significantly improved diagnosis and management of thyroid disorders.²⁰ However, accessibility and affordability of advanced endocrine care remain limited in several low-resource settings.

Considering the increasing burden of thyroid dysfunction and associated metabolic complications among South Asian populations, evaluation of endocrine abnormalities among adults attending tertiary healthcare facilities is critically important for developing preventive healthcare strategies and improving patient outcomes.

The present study was therefore conducted to assess the prevalence of thyroid dysfunction and associated metabolic abnormalities among adults attending a tertiary care hospital in Nepal.

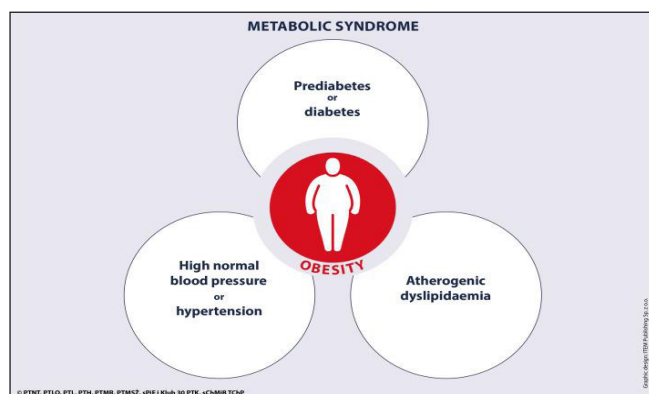


Figure 1. Metabolic Syndrome

Materials and Methods

Study Design

The present study was designed as a hospital-based cross-sectional observational study aimed at assessing the prevalence of thyroid dysfunction and associated

metabolic abnormalities among adults attending a tertiary care healthcare institution in Nepal. A cross-sectional study design was selected because it allows simultaneous assessment of endocrine abnormalities and associated metabolic risk factors within a defined study population over a specific time period.

Study Setting

The study was conducted in the Departments of Internal Medicine and Endocrinology at Tribhuvan University Teaching Hospital, a major tertiary care referral center in Kathmandu, Nepal. The hospital caters to both urban and rural populations from different regions of Nepal and provides specialized endocrine and metabolic healthcare services.

The study was carried out over a period of 12 months from February 2025 to January 2026.

Study Population

The study population consisted of adult patients attending outpatient departments for routine medical evaluation, endocrine consultation, metabolic assessment, or general health checkups during the study period.

Sample Size

A total of 240 participants were included in the study using convenient sampling technique. The sample size was determined based on previous prevalence studies related to thyroid dysfunction and endocrine disorders among South Asian populations.

Inclusion Criteria

Participants fulfilling the following criteria were included in the study:

- Adults aged 18 years and above
- Patients attending endocrine or general medicine outpatient departments
- Individuals willing to participate voluntarily
- Participants capable of providing informed consent

Exclusion Criteria

Participants were excluded under the following conditions:

- Pregnant women
- Critically ill patients requiring emergency care
- Individuals with previously diagnosed severe endocrine malignancies
- Patients receiving corticosteroid therapy or medications significantly affecting thyroid function
- Individuals unwilling to participate in the study

Sampling Technique

A non-probability convenient sampling method was utilized for participant recruitment. Eligible participants attending

outpatient clinics during the study period were screened according to inclusion and exclusion criteria.

Ethical Consideration

Ethical approval for the study was obtained from the Institutional Ethical Review Committee of Tribhuvan University Teaching Hospital prior to commencement of the research. Written informed consent was obtained from all study participants after explaining the objectives, procedures, benefits, and confidentiality aspects of the study.

Participant confidentiality and anonymity were maintained throughout the study. Data collected from participants were used strictly for academic and research purposes.

Data Collection Procedure

After obtaining informed consent, participants underwent detailed clinical evaluation and laboratory investigation. A predesigned structured questionnaire was used to collect sociodemographic and clinical information.

Sociodemographic Variables

The following demographic variables were recorded:

- Age
- Gender
- Residential status (urban/rural)
- Educational status
- Occupation
- Socioeconomic status
- Family history of thyroid disease
- Lifestyle practices

Clinical Assessment

A detailed clinical history was obtained from all participants regarding symptoms suggestive of thyroid dysfunction such as:

- Fatigue
- Weight gain or weight loss
- Heat or cold intolerance
- Palpitations
- Tremors
- Constipation
- Menstrual irregularities
- Neck swelling
- Appetite changes
- Sleep disturbances

General physical examination and systemic examination were subsequently performed by trained physicians.

Anthropometric Measurements

Anthropometric parameters were measured using standardized procedures.

Body Weight

Body weight was measured using calibrated digital weighing scales with participants wearing light clothing and no footwear. Weight was recorded to the nearest 0.1 kilogram.

Height

Height was measured using a stadiometer while participants stood erect without footwear. Height was recorded to the nearest 0.1 centimeter.

Body Mass Index

Body mass index (BMI) was calculated using the formula:

$$BMI = \frac{Weight (kg)}{Height (m)^2}$$

Participants were categorized according to World Health Organization BMI classification criteria.

Blood Pressure Measurement

Blood pressure was measured using a standardized sphygmomanometer after participants rested for at least 10 minutes in sitting position. Two readings were recorded at five-minute intervals and the average value was considered for analysis.

Hypertension was defined according to Joint National Committee criteria as systolic blood pressure ≥ 140 mmHg and/or diastolic blood pressure ≥ 90 mmHg or current use of antihypertensive medication.

Laboratory Investigations

Venous blood samples were collected under aseptic precautions following overnight fasting of 8–10 hours. The following laboratory investigations were performed:

Thyroid Function Tests

Serum levels of:

- Thyroid-stimulating hormone (TSH)
- Triiodothyronine (T3)
- Thyroxine (T4)

were measured using chemiluminescent immunoassay techniques.

Participants were categorized as:

- Euthyroid
- Hypothyroid
- Hyperthyroid

based on laboratory reference ranges.

Fasting Blood Glucose

Fasting plasma glucose levels were measured using enzymatic glucose oxidase method.

Lipid Profile

Serum lipid profile included:

- Total cholesterol
- Triglycerides
- High-density lipoprotein cholesterol (HDL)
- Low-density lipoprotein cholesterol (LDL)

Dyslipidemia was defined according to National Cholesterol Education Program guidelines.

Operational Definitions

Hyperthyroidism

Participants with suppressed TSH levels and elevated T3/T4 levels were classified as hyperthyroid.

Obesity

- Obesity was defined as BMI ≥ 30 kg/m².
- Impaired Fasting Glucose
- Fasting blood glucose levels between 100–125 mg/dL were considered impaired fasting glucose.

Statistical Analysis

Collected data were entered into Microsoft Excel and analyzed using Statistical Package for Social Sciences (SPSS) version 25.0.

Descriptive statistics including mean, standard deviation, frequency, and percentage were calculated. Chi-square test was applied to determine association between thyroid dysfunction and metabolic abnormalities. Logistic regression analysis was additionally performed to identify independent risk factors associated with endocrine dysfunction.

A p-value less than 0.05 was considered statistically significant.

Quality Control Measures

All instruments used during anthropometric and laboratory assessment were calibrated regularly. Laboratory investigations were performed by trained technicians following standardized protocols. Data accuracy and completeness were verified before statistical analysis.

Results

Table 1. Sociodemographic Characteristics

Variable	Frequency (n=240)	Percentage
Age 18–35 years	92	38.3%
Age 36–50 years	84	35.0%
Age >50 years	64	26.7%
Male	98	40.8%
Female	142	59.2%
Urban residents	148	61.7%
Obesity	74	30.8%

Table 2. Prevalence of Thyroid Dysfunction

Thyroid Status	Frequency	Percentage
Euthyroid	144	60.0%
Hypothyroidism	68	28.3%
Hyperthyroidism	28	11.7%

Table 3. Associated Metabolic Abnormalities

Metabolic Abnormality	Frequency	Percentage
Dyslipidemia	96	40.0%
Hypertension	72	30.0%
Obesity	74	30.8%
Impaired Fasting Glucose	58	24.2%

Discussion

Expanded Discussion

The present study assessed the prevalence of thyroid dysfunction and associated metabolic abnormalities among adults attending a tertiary care hospital in Nepal. The findings demonstrated substantial prevalence of endocrine abnormalities, particularly hypothyroidism, along with significant association between thyroid dysfunction and metabolic disorders such as obesity, dyslipidemia, hypertension, and impaired fasting glucose. These observations highlight the growing burden of endocrine disorders in South Asian populations and emphasize the importance of early diagnosis and preventive endocrine healthcare strategies.

Hypothyroidism emerged as the most common thyroid disorder identified in the present study. Similar findings have been reported in several epidemiological studies conducted in India, Nepal, and other South Asian countries where hypothyroidism constituted a major endocrine health concern.^{13,14} Multiple factors including iodine imbalance, autoimmune thyroiditis, nutritional deficiency, genetic susceptibility, and environmental influences contribute to increased prevalence of thyroid dysfunction in this region.⁶

The higher prevalence of thyroid dysfunction among female participants observed in the present study is consistent with previous literature.^{7,15} Women are biologically more susceptible to autoimmune endocrine disorders because of hormonal influences, immune modulation by estrogen, reproductive endocrine fluctuations, and genetic predisposition. Thyroid dysfunction among women may significantly affect menstrual function, fertility, pregnancy outcomes, emotional well-being, and overall metabolic health.

The study additionally demonstrated strong association between thyroid dysfunction and obesity. Thyroid

hormones play an essential role in regulating basal metabolic rate, thermogenesis, appetite, lipid metabolism, and energy expenditure.¹¹ Reduced thyroid hormone levels in hypothyroidism result in decreased metabolic activity, accumulation of adipose tissue, reduced caloric utilization, and gradual weight gain. Obesity may further exacerbate endocrine dysfunction through inflammatory cytokine release, insulin resistance, and hormonal imbalance.

Dyslipidemia was highly prevalent among participants with thyroid dysfunction. Similar findings have been reported in previous endocrine studies where hypothyroidism contributed significantly to elevated serum cholesterol, increased low-density lipoprotein cholesterol, and hypertriglyceridemia.^{12,16} Thyroid hormones influence hepatic lipid synthesis, cholesterol clearance, and lipoprotein metabolism. Consequently, untreated hypothyroidism significantly increases risk of atherosclerosis, coronary artery disease, and cerebrovascular complications.

The relationship between thyroid dysfunction and cardiovascular risk observed in the present study is clinically important. Hypothyroidism contributes to endothelial dysfunction, increased peripheral vascular resistance, diastolic hypertension, impaired cardiac contractility, and altered lipid metabolism.¹⁷ Hyperthyroidism, conversely, increases sympathetic nervous system activity, resulting in tachycardia, palpitations, atrial fibrillation, and increased cardiac workload. Persistent endocrine imbalance may therefore substantially increase cardiovascular morbidity and mortality.

Hypertension identified among participants with thyroid dysfunction further emphasizes the complex interaction between endocrine and cardiovascular systems. Thyroid hormones regulate vascular tone, cardiac output, sodium balance, and renal hemodynamics.¹⁸ Abnormal thyroid function may therefore contribute directly to elevated blood pressure and increased cardiovascular risk.

The present study additionally demonstrated association between thyroid dysfunction and impaired fasting glucose. Thyroid hormones influence glucose metabolism, hepatic gluconeogenesis, insulin secretion, and insulin sensitivity.¹⁴ Hypothyroidism commonly contributes to insulin resistance and metabolic syndrome, while hyperthyroidism may worsen glucose intolerance through increased hepatic glucose production and altered insulin metabolism.

The coexistence of thyroid dysfunction with obesity, hypertension, dyslipidemia, and impaired fasting glucose suggests strong association between endocrine abnormalities and metabolic syndrome. Metabolic syndrome represents a cluster of cardiovascular risk factors including central obesity, insulin resistance, hypertension, and dyslipidemia, all of which significantly increase risk

of diabetes mellitus and cardiovascular disease.¹⁹ Early identification and management of endocrine dysfunction may therefore play an important role in reducing long-term metabolic complications.

One of the important observations of the present study was the presence of nonspecific symptoms among many participants with thyroid dysfunction. Clinical manifestations such as fatigue, lethargy, mood changes, weight fluctuations, and reduced physical activity are often gradual and nonspecific, leading to delayed diagnosis.²⁰ Consequently, many individuals remain undiagnosed until metabolic or cardiovascular complications become clinically evident.

The findings of the present study emphasize the importance of routine endocrine screening among high-risk populations, particularly women, obese individuals, elderly populations, and patients with metabolic abnormalities. Thyroid function testing is relatively inexpensive, minimally invasive, and highly valuable for early diagnosis and management of endocrine disorders.

Lifestyle factors also play a significant role in endocrine health. Sedentary lifestyle, unhealthy dietary habits, obesity, smoking, alcohol consumption, chronic stress, and inadequate physical activity contribute substantially to metabolic and hormonal imbalance.²¹ Community awareness programs promoting balanced nutrition, physical activity, weight management, stress reduction, and healthy lifestyle practices may therefore help reduce endocrine disease burden.

Iodine nutrition remains critically important in prevention of thyroid disorders. Although Nepal has implemented universal salt iodization programs, regional variations in iodine intake and nutritional status continue to affect thyroid health.⁹ Both iodine deficiency and iodine excess may contribute to thyroid dysfunction. Continuous monitoring of iodine nutrition and public health education regarding balanced iodine intake are therefore necessary.

The study additionally highlights the growing importance of preventive endocrinology and multidisciplinary healthcare approaches. Effective management of thyroid disorders requires collaboration among endocrinologists, physicians, nutritionists, laboratory specialists, and public health professionals. Integrated management focusing on hormonal regulation, metabolic control, cardiovascular risk reduction, and lifestyle modification may significantly improve patient outcomes.

Recent advances in endocrinology including sensitive hormonal assays, ultrasonography, autoantibody testing, and individualized hormone replacement therapy have substantially improved diagnosis and treatment of thyroid disorders.²² Early therapeutic intervention with

levothyroxine replacement or antithyroid medication may significantly improve metabolic health and prevent long-term complications.

Despite important findings, the present study has certain limitations. Being a hospital-based cross-sectional study, causal relationships between thyroid dysfunction and metabolic abnormalities could not be definitively established. The sample size was relatively limited and may not fully represent the general Nepalese population. Larger multicentric longitudinal studies are therefore recommended for better understanding of endocrine disease patterns and associated risk factors in Nepal.

Overall, the findings of the present study emphasize the growing burden of thyroid dysfunction and associated metabolic abnormalities among adults in Nepal and highlight the urgent need for early endocrine screening, preventive healthcare strategies, lifestyle modification, and community awareness programs aimed at improving endocrine and metabolic health outcomes.

Conclusion

Endocrine disorders, particularly thyroid dysfunction, continue to represent a major and growing public health concern worldwide because of their increasing prevalence, chronic progression, and association with multiple metabolic and cardiovascular complications. The present study demonstrated a substantial prevalence of thyroid dysfunction among adults attending a tertiary care hospital in Nepal, with hypothyroidism emerging as the most common endocrine abnormality identified among study participants.

The findings of the study highlight the strong association between thyroid dysfunction and metabolic abnormalities including obesity, dyslipidemia, hypertension, and impaired fasting glucose. Thyroid hormones play a critical role in regulating metabolism, lipid homeostasis, glucose utilization, cardiovascular function, and energy balance. Disturbances in endocrine regulation therefore significantly affect multiple physiological systems and contribute to long-term morbidity and reduced quality of life.

Female participants demonstrated higher prevalence of thyroid dysfunction compared to males, emphasizing the important role of hormonal influences, autoimmune susceptibility, and reproductive endocrine interactions in thyroid disease pathogenesis. Women represent a particularly vulnerable population requiring regular endocrine evaluation and preventive healthcare interventions.

The study further demonstrated that many individuals with thyroid dysfunction presented with nonspecific clinical manifestations such as fatigue, weight changes,

reduced physical activity, mood disturbances, and metabolic abnormalities. Because these symptoms often develop gradually and remain unrecognized, delayed diagnosis is common. Consequently, many patients may develop cardiovascular and metabolic complications before receiving appropriate endocrine evaluation and treatment.

The association between hypothyroidism and dyslipidemia identified in the present study is clinically significant because elevated cholesterol levels and altered lipid metabolism substantially increase risk of atherosclerosis, coronary artery disease, cerebrovascular disease, and cardiovascular mortality. Similarly, hypertension and impaired glucose metabolism observed among participants with thyroid dysfunction further increase metabolic and cardiovascular risk burden.

The coexistence of obesity, insulin resistance, hypertension, dyslipidemia, and thyroid dysfunction observed in the study highlights the close relationship between endocrine disorders and metabolic syndrome. Metabolic syndrome is increasingly recognized as a major contributor to type 2 diabetes mellitus, cardiovascular disease, chronic kidney disease, and premature mortality. Early identification and management of endocrine dysfunction may therefore significantly reduce progression toward severe metabolic and cardiovascular complications.

Routine endocrine screening should be strongly considered among high-risk populations including women, obese individuals, elderly populations, patients with diabetes mellitus, and individuals with cardiovascular risk factors. Thyroid function tests including serum thyroid-stimulating hormone, triiodothyronine, and thyroxine provide valuable information for early diagnosis and management of thyroid abnormalities before development of irreversible complications.

Lifestyle modification remains a cornerstone in prevention and management of endocrine and metabolic disorders. Balanced nutrition, adequate iodine intake, regular physical activity, stress reduction, smoking cessation, weight management, and adherence to medical therapy may substantially improve endocrine function and metabolic health outcomes. Public health programs promoting healthy lifestyle practices are therefore essential for reducing endocrine disease burden.

The study also emphasizes the continuing importance of iodine nutrition in Nepal. Although universal salt iodization programs have significantly reduced iodine deficiency disorders, regional variations in dietary intake and nutritional status may still contribute to thyroid dysfunction prevalence. Public awareness regarding appropriate iodine consumption and nutritional balance remains essential for maintaining optimal thyroid health.

Strengthening endocrine healthcare infrastructure is critically important for improving early diagnosis and treatment of thyroid disorders in developing countries. Expansion of endocrine clinics, laboratory facilities, community screening programs, and specialized healthcare services may significantly improve accessibility to endocrine care, particularly in rural and underserved populations.

Healthcare professionals should additionally focus on patient education regarding symptoms, risk factors, complications, and treatment adherence associated with thyroid dysfunction. Increased public awareness may encourage earlier healthcare utilization and improve long-term disease control.

Recent advancements in endocrinology including sensitive hormonal assays, autoantibody testing, ultrasonography, molecular diagnostics, and individualized hormone replacement therapy have substantially improved management of thyroid disorders. Early therapeutic intervention may significantly reduce metabolic complications and improve patient quality of life.

Despite important findings, the present study has certain limitations. Being a hospital-based cross-sectional study, causal relationships between endocrine dysfunction and metabolic abnormalities could not be definitively established. The study population may not fully represent the general Nepalese population, and larger multicentric longitudinal studies are therefore recommended for more comprehensive evaluation of endocrine disease epidemiology in Nepal.

Overall, the present study emphasizes that thyroid dysfunction is highly prevalent among adults in Nepal and is closely associated with obesity, dyslipidemia, hypertension, and impaired glucose metabolism. Early endocrine screening, preventive healthcare strategies, nutritional regulation, lifestyle modification, and timely medical intervention are essential for reducing endocrine disease burden, preventing metabolic complications, improving cardiovascular health, and enhancing overall quality of life among affected individuals.

Conflict of Interest: None

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