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Original Research Article

FREQUENCY OF DYSLIPIDEMIA IN PATIENTS WITH THYROID DYSFUNCTION PRESENTING AT SAIDU GROUP OF TEACHING HOSPITAL

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ABSTRACT

Background: *Thyroid dysfunction is known to affect lipid metabolism, increasing the risk of cardiovascular diseases. Dyslipidemia is frequently observed in both hypothyroid and hyperthyroid patients, but its prevalence and associated risk factors vary across populations. Understanding this association can help optimize management strategies for patients with thyroid disorders.* ***Objective:*** *To determine the frequency of dyslipidemia in patients with thyroid dysfunction and to explore its association with demographic and clinical factors.* ***Study Design:*** *Cross-sectional study.* ***Setting:*** *Department of General Medicine, Saidu Group of Teaching Hospital, Swat.* ***Duration of Study:*** *Six months (21-03-2024 to 21-09-2024).* ***Methods:*** *130 patients aged 20–70 with thyroid dysfunction were included using consecutive non-probability sampling. Thyroid dysfunction was defined as hyperthyroidism (serum TSH <0.4 mU/L) or hypothyroidism (serum TSH >4.5 mU/L). Patients with pre-existing cardiovascular or renal diseases, as well as pregnant or lactating women, were excluded. Lipid profiles were assessed, and the frequency of dyslipidemia was determined. Data were analyzed using SPSS version 25, and associations between dyslipidemia and demographic/clinical factors were evaluated using the Chi-square test. A p-value ≤0.05 was considered statistically significant.* ***Results:*** *The prevalence of dyslipidemia among patients with thyroid dysfunction was 38.5%. Dyslipidemia was significantly associated with comorbidities such as hypertension (66% in dyslipidemic vs. 26.2% in non-dyslipidemic patients, p<0.05) and diabetes (66% vs. 27.5%, p<0.05). The highest prevalence of dyslipidemia was observed in older adults (51–70 years, 62%). A slight female predominance (55.4%) was noted, aligning with the higher prevalence of thyroid disorders in women.* ***Conclusion:*** *Dyslipidemia is common in patients with thyroid dysfunction, particularly among older individuals and those with hypertension or diabetes. These findings highlight the need for routine lipid screening and early intervention in patients with thyroid disorders to mitigate cardiovascular risks.*

Keywords: Dyslipidemia, Thyroid Dysfunction, Hypothyroidism, Hyperthyroidism, Cardiovascular Risk, Lipid Profile

INTRODUCTION

The thyroid synthesises two primary hormones, thyroxine (T4) as well as triiodothyronine (T3), which influence various physiological processes in the body, involving the regulation of body temperature, digestion, and essential functions including respiration and heart rate (1). Symptoms arising from inadequate hormone production can significantly impact the body and may vary greatly in severity, contingent upon the underlying cause of dysfunction. Hypothyroidism, typically resulting from an underactive thyroid. Hyperthyroidism, typically resulting from an overactive thyroid (2). Hypothyroidism, a thyroid disorder associated with severe iodine deficiency, is on the rise globally, influencing 5% of the population worldwide.[2] Hyperthyroidism is a common thyroid dysfunction, with a global prevalence that ranges from 0.2% to 13% (3).

Lipids, which include cholesterol and triglycerides, are absorbed in the intestines and transported all through the body by lipoproteins for purposes such as generating energy, steroid synthesis, or bile acid formation. Cholesterol, low-density lipoprotein cholesterol, triglycerides, and high-density lipoprotein contribute significantly to these pathways. An imbalance in any of these factors, whether due to organic or nonorganic causes, can result in dyslipidaemia (4). Dyslipidaemia is defined by an imbalance in circulating lipids, which includes total cholesterol, triglycerides, low-density lipoprotein, and high-density lipoprotein (HDL) (5). This pathological condition represents a significant risk of heart disease and may arise from dietary and genetic influences, along with lifestyle choices including smoking, along with physical inactivity (7). In the study, the prevalence of thyroid disorders is 11.9% (7). A study showed the thyroid dysfunction indicated the prevalence of diagnosed as well as undiagnosed hypothyroidism is 3.82%, while that of hyperthyroidism is 0.75% (8). A study found the frequency of dyslipidemia was 41.5% among thyroid dysfunction (9).

Dyslipidaemia, characterised by abnormal lipid levels in the bloodstream, is frequently and thoroughly linked to thyroid dysfunction. The association between thyroid dysfunction and dyslipidaemia is intricate and multifaceted. Thyroid hormones significantly influence lipid metabolism, and variations in their levels or function can result in notable changes in lipid profiles. No studies have been conducted on this subject within our local population. This study aims to assess the frequency of dyslipidaemia among patients with thyroid dysfunction at Saidu Group of Teaching Hospital. This study's results will enhance understanding of the connection, which is essential for healthcare providers to effectively manage dyslipidaemia in patients with thyroid dysfunction and reduce associated cardiovascular risks through medication, lifestyle changes, and careful monitoring of thyroid function.

METHODOLOGY

The methodology for this study was designed as a cross-sectional investigation conducted in the Department of General Medicine at Saidu Group of Teaching Hospitals, Swat from 21-03-2024 to 21-09-2024 after getting approval from the hospital's ethical board. A total

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sample size of 130 participants was calculated using the WHO sample size calculator, based on a reported frequency of dyslipidemia of 41.5% among thyroid dysfunction patients (9), with a 95% confidence level and an 8.5% margin of error. Non-probability consecutive sampling was employed to select participants who met the inclusion criteria.

Participants included both male and female patients aged between 20 and 70 years who had been diagnosed with thyroid dysfunction, defined as either hyperthyroidism (serum TSH levels < 0.4 mU/L) or hypothyroidism (serum TSH levels > 4.5 mU/L). Patients with pre-existing heart or renal diseases, as well as lactating or pregnant women, were excluded to avoid confounding factors.

Data collection commenced after obtaining ethical approval from the hospital's ethical committee board and the research department of the College of Physicians and Surgeons, Pakistan (CPSP), Karachi. After explaining the study's purpose, risks, and benefits, written informed consent was obtained from all participants, ensuring their voluntary participation. Demographic information, including age, gender, address, education status, occupation status, financial status, and living area, was recorded. Comorbid conditions such as diabetes and hypertension were also documented.

To assess dyslipidemia, blood samples were collected from participants after a 12-hour overnight fast. Serum cholesterol, triglycerides, LDL, and HDL levels were measured and analyzed in the hospital laboratory. A consultant with at least five years of post-fellowship experience supervised the process to ensure accuracy and reliability. A structured proforma was used to record all patient information systematically.

Data analysis was performed using IBM SPSS version 25. Numerical data, such as age, weight, height, BMI, cholesterol levels, triglyceride levels, LDL levels, and HDL levels, were summarized using mean ± standard deviation or median (interquartile range) after assessing normality with the Shapiro-Wilk test. Categorical data, including gender, dyslipidemia status, diabetes, hypertension, education status, occupation status, financial status, and area of living, were presented as frequencies and percentages. Effect modifiers such as age, gender, BMI, diabetes, hypertension, education status, occupation status, financial status, and living area were controlled through stratification. Post-stratification analysis was conducted using the chi-square test or Fisher's exact test, with a significance level set at 5%. The results were presented in tabular form to facilitate interpretation and comparison.

RESULTS

The mean age was 49.14 ± 14.31 years, with the majority falling within the 51- to 70-year age group (50.8%), followed by the 36- to 50-year group (29.2%) and the 20- to 35-year group (20.0%). In terms of gender distribution, females constituted a slightly higher proportion (55.4%) compared to males (44.6%). Mean BMI and laboratory parameters are presented in Table 1.

The financial status of the participants varied, with the majority belonging to the middle-income group (51.5%), followed by the low-income group (33.8%) and the high-income group (14.6%). Education status was nearly balanced, with 52.3% of participants being educated and 47.7% uneducated. Employment status showed that 54.6% of participants were employed, while 45.4% were unemployed. Geographically, more participants resided in urban areas (56.9%) than rural areas (43.1%).

Regarding comorbidities, 41.5% of participants had hypertension, while 58.5% did not. Similarly, 42.3% of participants had diabetes, with 57.7% being non-diabetic. Dyslipidemia was identified in 38.5% of the participants, while 61.5% did not exhibit dyslipidemia.

A significant association was found between dyslipidemia and specific comorbidities. Among participants with dyslipidemia, 66.0% had hypertension ($p < 0.0001$). Similarly, 66.0% of participants with dyslipidemia had diabetes, ($p < 0.0001$). Age distribution also showed a notable association, with 62.0% of dyslipidemia cases occurring in the 51 to 70-year age group, compared to 43.8% in the same age group without dyslipidemia ($p = 0.04$). Other demographic variables such as gender, BMI, education status, occupation status, financial status, and living area did not exhibit a notable association with dyslipidemia.

Table 1: Descriptive statistics

Descriptive Statistics	Mean	Std. Deviation
Age (Years)	49.14	14.313
Cholesterol level (mg/dL)	196.78	22.260
LDL level (mg/dL)	107.33	28.388
HDL level (mg/dL)	44.52	10.375
Triglyceride level (mg/dL)	149.21	11.494
BMI (Kg/m2)	25.1676	1.33991

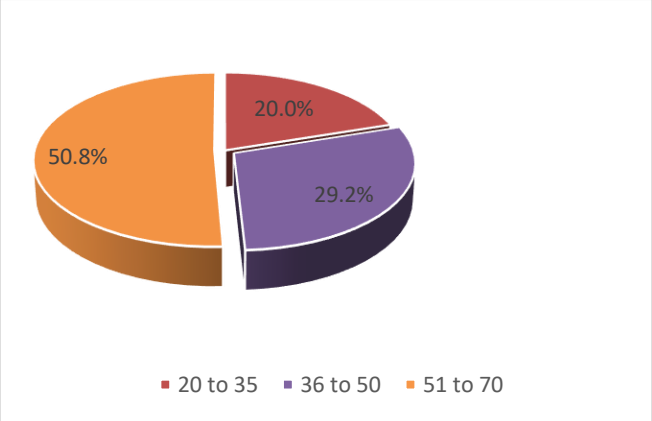

Figure 1: Age distribution (Years)

Table 2: Demographics of the patients

Demographics		N	%
Gender	Male	58	44.6%
	Female	72	55.4%
Financial status	Low	44	33.8%
	Middle	67	51.5%
	High	19	14.6%
Education status	Educated	68	52.3%
	Uneducated	62	47.7%
Occupation status	Employed	71	54.6%
	Unemployed	59	45.4%
Area of living	Rural	56	43.1%
	Urban	74	56.9%

Table 3: Comorbidities

Comorbidities		N	%
Hypertension	Yes	54	41.5%
	No	76	58.5%
Diabetes	Yes	55	42.3%
	No	75	57.7%

Table 4: Frequency of dyslipidemia

Dyslipidemia	Frequency	Percent
Yes	50	38.5
No	80	61.5
Total	130	100.0

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Table 5: Stratification of dyslipidemia with demographics and comorbidities

Demographics and comorbidities		Dyslipidemia				P value
		Yes		No		
		N	%	N	%	
Hypertension	Yes	33	66.0%	21	26.2%	0.0001
	No	17	34.0%	59	73.8%	
Diabetes	Yes	33	66.0%	22	27.5%	0.0001
	No	17	34.0%	58	72.5%	
Age distribution (Years)	20 to 35	5	10.0%	21	26.2%	0.04
	36 to 50	14	28.0%	24	30.0%	
	51 to 70	31	62.0%	35	43.8%	

DISCUSSION

Our study reported a mean age of 49 years, Banori et al. and Zeb et al., documented younger cohorts, averaging 40 years (10, 11), whereas Rizvi et al., reported a higher mean age of 51.8 years (9). The higher prevalence of dyslipidemia in older age groups (62% in participants aged 51–70 years in our study) resonates with Rizvi et al., who noted that dyslipidemia frequency increased with disease duration, suggesting age-related metabolic changes exacerbate lipid abnormalities (9). This trend is further supported by Rizos et al., who highlighted that thyroid hormone deficiencies in older adults amplify cardiovascular risks through mechanisms like reduced LDL receptor activity and altered lipoprotein lipase function (12).

Gender distribution varied notably. Our study and those by Banori et al. and Zeb et al., reported female predominance (55–63%), consistent with the known higher prevalence of thyroid disorders in women (10, 11). In contrast, Rizvi et al. documented a male majority (57.4%), potentially reflecting regional differences in healthcare-seeking behavior or sample selection biases (12). Despite these discrepancies, all studies underscore the metabolic vulnerability of females, possibly linked to hormonal fluctuations affecting lipid metabolism.

Our study reported 38.5%, lower than the 70% observed by Banori et al. and Zeb et al. but closer to the 41.5% noted by Rizvi et al. (10-12). These variations may stem from differences in thyroid dysfunction severity—subclinical versus overt hypothyroidism—as Banori and Zeb focused exclusively on subclinical cases, which are often associated with pronounced lipid abnormalities due to subtle hormonal imbalances. Additionally, methodological disparities, such as lipid measurement protocols or diagnostic thresholds for dyslipidemia, could contribute to these differences. For instance, Rizos et al., emphasized that even mild thyroid dysfunction disrupts lipid homeostasis by impairing cholesterol synthesis and clearance. This mechanism might explain higher dyslipidemia rates in subclinical cases (12).

Comorbidities like hypertension and diabetes were strongly linked to dyslipidemia in our study, with 66% of dyslipidemia participants having hypertension. Similarly, diabetes prevalence was 66% in dyslipidemic. These associations align with Banori et al., who reported overlapping metabolic risks, and Rizos et al., who described thyroid dysfunction as a catalyst for insulin resistance and oxidative stress, exacerbating lipid abnormalities (10, 12). Rizvi et al. further noted that prolonged thyroid dysfunction amplifies cardiovascular risks, suggesting that dyslipidemia in these patients is not merely a secondary effect but a compounding factor in metabolic syndrome (9).

The pathophysiological links between thyroid hormones and lipid metabolism, as discussed by Rizos et al., provide a framework for these observations (12). Thyroid hormones regulate enzymes like HMG-CoA reductase and lipoprotein lipase, which govern cholesterol synthesis and triglyceride hydrolysis. In hypothyroidism, reduced hormone activity slows LDL clearance, elevates total cholesterol, and alters HDL composition. These mechanisms were evident in our study, where participants with dyslipidemia exhibited higher LDL (107 ±28 mg/dL) and triglycerides (149 ±11 mg/dL), consistent with the lipid profiles described across the literature.

CONCLUSION

In conclusion, this study found that the frequency of dyslipidemia in patients with thyroid dysfunction was 38.5%. A notable association was observed between dyslipidemia and comorbidities such as hypertension and diabetes.

DECLARATIONS

Data Availability statement
All data generated or analyzed during the study are included in the manuscript.
Ethics approval and consent to participate
Approved by the department Concerned.
Consent for publication
Approved
Funding
Not applicable

CONFLICT OF INTEREST

The authors declared absence of conflict of interest.

AUTHOR CONTRIBUTION

MUHAMMAD KASHIF HABIB (Resident Physician)
Conception of Study, Data Acquistion, Development of Research Methodology Design, Study Design, manuscript Review, and final approval of manuscript.
ABDUL AHAD (Professor)
Study Design, Critical Input.
HAFIZ MUHAMMAD MUDASIR (Resident Physician)
Manuscript revisions.
FARID ULLAH (PGR Physician)
Manuscript revisions
MAHA FATIMA (House officer)
Manuscript revisions

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