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BRIEF ORIGINAL

Frequency of dyslipidemia and type 2 diabetes mellitus among women with subclinical hypothyroidism in Oruro, Bolivia

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Keywords:
dyslipidemias; diabetes mellitus, type 2; hypothyroidism; hypertriglyceridemia; hypercholesterolemia (source: MeSH-NLM).

ABSTRACT

Objective. To describe the frequency of dyslipidemia and type 2 diabetes mellitus among women with subclinical hypothyroidism treated at the Candelaria Comprehensive Specialty Health Care Polyclinic in Oruro, Bolivia. **Methods.** A descriptive cross-sectional study was conducted in 318 women aged 25 to 75 years with a diagnosis of subclinical hypothyroidism, selected through nonprobability sampling. Data were obtained from medical and laboratory records. The lipid profile was determined using enzymatic-colorimetric methods, and the thyroid profile was assessed using chemiluminescent immunoassay. **Results.** The highest proportion of women with subclinical hypothyroidism was observed in the 46- to 55-year age group (32.1%). In the 56- to 65-year age group, 37.0% had mixed dyslipidemia. Likewise, 29.6% of the participants had type 2 diabetes mellitus, with the highest proportion observed in the 66- to 75-year age group (13.6%). **Conclusions.** The highest proportion of women with subclinical hypothyroidism was found in the 46- to 55-year age group. Mixed dyslipidemia was the most frequent type of dyslipidemia, and nearly one third of the participants had type 2 diabetes mellitus. These findings underscore the importance of comprehensive metabolic assessment and timely follow-up of women with subclinical hypothyroidism.

Frecuencia de dislipidemias y diabetes *mellitus* tipo 2 en mujeres con hipotiroidismo subclínico de Oruro, Bolivia

Palabras clave:
dislipidemias; diabetes mellitus tipo 2; hipotiroidismo; hipertrigliceridemia; hipercolesterolemia (fuente: DeCs-BIREME).

RESUMEN

Objetivo. Describir la frecuencia de las dislipidemias y la diabetes *mellitus* tipo 2 en mujeres con hipotiroidismo subclínico atendidas en el Policlínico de Atención Integral de Salud de Especialidades Candelaria, en Oruro, Bolivia. **Métodos.** Se realizó un estudio transversal y descriptivo en 318 mujeres de 25 a 75 años, con diagnóstico de hipotiroidismo subclínico, seleccionadas mediante muestreo no probabilístico. Los datos fueron obtenidos de historias clínicas y registros de laboratorio. El perfil lipídico fue determinado mediante métodos enzimático-colorimétricos y el perfil tiroideo mediante inmunoensayo por quimioluminiscencia. **Resultados.** La mayor proporción de mujeres con hipotiroidismo subclínico correspondió al grupo de 46 a 55 años (32,1 %). En el grupo de 56 a 65 años, el 37,0 % presentó dislipidemia mixta. Así mismo, el 29,6 % de las participantes presentó diabetes *mellitus* tipo 2, cuya mayor frecuencia fue observada en el grupo de 66 a 75 años (13,6 %). **Conclusiones.** La mayor proporción de mujeres con hipotiroidismo subclínico estuvo concentrada en el grupo de 46 a 55 años. La dislipidemia mixta fue el tipo de dislipidemia más frecuente, y cerca de un tercio de las participantes presentó diabetes mellitus tipo 2. Estos hallazgos resaltan la importancia de una evaluación metabólica integral y del seguimiento oportuno de las mujeres con hipotiroidismo subclínico.

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INTRODUCTION

Dyslipidemia is a disorder of lipid metabolism characterized by abnormal concentrations of lipids and lipoproteins in the blood and includes hypercholesterolemia, hypertriglyceridemia, decreased levels of high-density lipoproteins (HDL), and elevated levels of low-density lipoproteins (LDL) [1,2]. It is one of the main modifiable risk factors for the development of cardiovascular diseases and is common among individuals with type 2 diabetes mellitus and thyroid function disorders [3-6].

Thyroid diseases represent one of the most frequent reasons for consultation in endocrinology. According to the Bolivian Society of Endocrinology [7], these diseases primarily affect middle-aged women and are characterized by alterations in thyroid hormone production, which may manifest as hypothyroidism or hyperthyroidism.

Thyroid hormones play a fundamental role in the regulation of energy and lipid metabolism. They participate in lipid mobilization and degradation, stimulate lipolysis in adipose tissue, and promote β-oxidation of fatty acids in the liver and muscle [8,9]. Consequently, reduced thyroid hormone activity alters lipid metabolism, favoring increased serum cholesterol and triglyceride concentrations [10].

Subclinical hypothyroidism is defined by elevated thyroid-stimulating hormone (TSH) concentrations with free thyroxine (FT4) levels within the reference range [11-13]. It generally presents with few clinical manifestations or nonspecific symptoms; therefore, diagnosis is often delayed and the condition may be confused with physiological processes such as aging or menopause.

Worldwide, the prevalence of subclinical hypothyroidism among women is estimated at approximately 7.5%. In Latin America, prevalence ranges from 0.9% to 5.9%, depending on age, sex, and the characteristics of the population studied [14,15]. This condition is more frequent among women and older adults, with an incidence ranging from 2.5% to 7.5% and reaching up to 20% in certain population groups [16,17].

Several studies have demonstrated an association between subclinical hypothyroidism and lipid profile abnormalities. In Colombia, Landázuri [18] reported a prevalence of hypercholesterolemia of 43.6% among individuals with subclinical hypothyroidism. In Ecuador, Andrade Mejía and Moncayo Macías [11] found that 80% of patients had some type of dyslipidemia, with mixed hyperlipidemia predominating among women aged 40 to 55 years with subclinical hypothyroidism.

In Peru, several studies have reported that subclinical hypothyroidism, defined by TSH concentrations between 4.5 and 10 mIU/L, is associated with an increased risk of cardiovascular and ischemic events [12,18,19]. Similarly, Herrera [19] reported that individuals with subclinical hypothyroidism are older than euthyroid individuals and that approximately 72% are women.

Early detection of lipid profile and thyroid function abnormalities is essential for the timely identification of individuals at higher cardiometabolic risk and for establishing interventions aimed at reducing associated morbidity and mortality [20]. In Bolivia, studies have described the classification of dyslipidemias and some of their associated factors [21]. However, few studies have evaluated the frequency of dyslipidemia and type 2 diabetes mellitus among women with subclinical hypothyroidism. In this context, this study aimed to describe the frequency of dyslipidemia and type 2 diabetes mellitus among women with subclinical hypothyroidism treated at the Policlínico de Atención Integral de Salud de Especialidades (PAISE) Candelaria in Oruro, Bolivia.

METHODS

Study design and area

This was a quantitative, cross-sectional, descriptive study. Data were collected at the PAISE Candelaria of the Caja Nacional de Salud, Oruro Regional Office, Bolivia.

Population and sample

The population consisted of 362 women aged 25 to 75 years diagnosed with subclinical hypothyroidism and treated by the endocrinology service from January to December 2024. The inclusion criteria comprised all female patients without chronic diseases that could alter lipid metabolism. Women diagnosed with overt hypothyroidism or with previous treatment for hypothyroidism, those receiving lipid-lowering medications, and pregnant or breastfeeding women were excluded. After applying the sample selection criteria, a final sample of 318 patients was obtained.

Variables and data collection instruments

Data were collected from laboratory records and medical records. The results obtained were tabulated according to the study variables. Subclinical hypothyroidism was defined as elevated thyroid-stimulating hormone levels (TSH >4.5-10 mIU/L) with normal free thyroxine levels (FT4: 0.90-1.75 ng/dL). Measurements were performed using a competitive chemiluminescent immunoassay (CLIA) with the Maglumi 800 analyzer. The measurements included TSH and FT4 determinations, the results of which were interpreted according to the reference values established by the manufacturer.

Dyslipidemia was defined as an alteration in serum lipid levels, including total cholesterol and triglycerides. Measurements were performed using blood chemistry tests based on standardized enzymatic-colorimetric methods. Samples were processed using the Mindray BS-240 Pro automated blood chemistry analyzer. Results were expressed in mg/dL and interpreted according to the reference values established by the manufacturer of the Mindray reagents. Similarly, serum glucose was determined using the same analytical method and equipment, thereby ensuring standardization of the procedure.

Both analytical methods correspond to standardized clinical laboratory techniques with adequate analytical validity and precision. These methodologies are supported by internal and external quality controls and by the evaluation program conducted by the national reference center, thereby ensuring the reliability, reproducibility, and accuracy of the results.

Data collection techniques and procedures

Data were collected through a documentary review of medical records from patients with a confirmed diagnosis of subclinical hypothyroidism, as well as laboratory reports corresponding to lipid and thyroid profiles. Data were recorded on a previously designed data collection form, ensuring information confidentiality through coding of the records.

Data analysis

A descriptive analysis of the variables was performed, calculating absolute and relative frequencies for quantitative variables. The results were presented in tables. The collected data were organized in a database using Microsoft Office Excel version 2017, and statistical analysis was performed using SPSS version 31.

Ethical considerations

The study was approved by the Quality Management Office and the Bioethics Committee of PAISE Candelaria under CITE: 001/2026. The study was conducted in coordination with the endocrinology and laboratory services after institutional authorization had been obtained to access the information. Data confidentiality was ensured by using the information exclusively for research purposes. Likewise, the formal procedures established to obtain authorization from the Directorate for access to information related to internal quality control and the laboratory's standard operating procedures (SOPs), required for the conduct of the research, were followed.

RESULTS

A higher frequency of women with subclinical hypothyroidism and dyslipidemia was found in the 46- to 55-year age group, with 102 cases (32.1%). In the same way, a decrease in the number of cases was observed at both age extremes, with the lowest frequency among women aged 25 to 35 years, with 11 cases (3.6%) (Table 1).

Table 2 shows the distribution of dyslipidemias among women with subclinical hypothyroidism. Among women aged 46-55 years, 24 (35.0%) had hypertriglyceridemia, followed by 22 women (32.5%) aged 56-65 years. Regarding hypercholesterolemia, 33 women (35.8%) were aged 46-55 years, followed by 21 women (22.6%) aged 66-75 years. Finally, among women diagnosed with mixed dyslipidemia, 58 (37.0%) were aged 56-65 years, suggesting that many women with subclinical hypothyroidism exhibit combined abnormalities in cholesterol and triglyceride

Table 1. Frequency of women with dyslipidemia and subclinical hypothyroidism according to age group in Oruro, Bolivia, 2024

Age range (years)	Women with dyslipidemia and subclinical hypothyroidism (n = 318), fi	
	fi	%
25-35	11	3.6
36-45	33	10.3
46-55	102	32.1
56-65	98	30.7
66-75	74	23.3

Table 2. Distribution of subclinical hypothyroidism and dyslipidemia according to age group among women in Oruro, Bolivia, 2024

Age range	Hypertriglyceridemia (n = 68)		Hypercholesterolemia (n = 93)		Mixed dyslipidemia (n = 157)	
	fi	%	fi	%	fi	%
25-35	1	1.3	5	5.7	5	3.5
36-45	2	3.9	16	16.9	14	8.9
46-55	24	35.0	33	35.8	45	28.7
56-65	22	32.5	18	18.9	58	37.0
66-75	19	27.3	21	22.6	35	21.9

levels, followed by 45 women (28.7%) aged 46-55 years. The highest proportion of dyslipidemia and subclinical hypothyroidism was observed among women aged 46 years or older.

A total of 94 women (29.6%) with subclinical hypothyroidism and dyslipidemia also had type 2 diabetes mellitus. Analysis by age group showed that the highest frequency corresponded to women aged 66 to 75 years, with 44 women (13.6%), followed by those aged 56 to 65 years, with 24 women (7.4%), both diagnosed with type 2 diabetes mellitus. These findings suggest that older women with subclinical hypothyroidism and dyslipidemia have a higher frequency of type 2 diabetes mellitus, reflecting a greater proportion of patients with elevated glucose levels. The results are presented in Table 3.

DISCUSSION

The findings of this study show that the highest proportion of women with subclinical hypothyroidism corresponded to the 46- to 55-year age group (32.1%; n = 102). These results are consistent with those reported by Mejía and Moncayo [11], who, in a study conducted in Ecuador, observed a high frequency of dyslipidemia associated with subclinical hypothyroidism among women aged 40 to 55 years. This similarity suggests that subclinical hypothyroidism and lipid profile abnormalities are more frequent among middle-aged women, a stage of life in which hormonal changes related to the menopausal transition may contribute to these metabolic alterations [15,20].

Bonilla Salinas et al. [22] noted that the diagnosis of subclinical hypothyroidism is particularly important among older adults because of its high frequency and the presence of nonspecific clinical manifestations, which may hinder its identification. In this context, periodic clinical and biochemical follow-up represents an appropriate strategy for the timely detection of disease progression and the implementation of interventions when indicated [12-14].

In this study, mixed dyslipidemia was the most frequent lipid abnormality, observed in 37.0% of women aged 56 to 65 years with subclinical hypothyroidism. This finding is consistent with that described by Mejía and Moncayo [11], who reported a high frequency of mixed hyperlipidemia

Table 3. Frequency of type 2 diabetes mellitus and dyslipidemia among women with subclinical hypothyroidism in Oruro, Bolivia, 2024

Age range	Type 2 diabetes mellitus			
	Yes (n = 94)		No (n = 224)	
	fi	%	fi	%
25-35	4	1.4	17	5.2
36-45	7	2.2	25	7.8
46-55	15	4.8	49	15.4
56-65	24	7.4	78	24.7
66-75	44	13.6	55	17.5

among women aged 40 to 55 years with subclinical hypothyroidism. Taken together, these results support the frequent coexistence of lipid metabolism abnormalities among women with subclinical hypothyroidism.

Regarding type 2 diabetes mellitus, 29.6% of women with subclinical hypothyroidism presented this comorbidity. This frequency is higher than that reported by Núñez et al. [23], who found a frequency of impaired fasting glucose of 17.6% in a population of 202 patients. Nevertheless, comparisons between the two studies should be interpreted with caution because impaired fasting glucose and type 2 diabetes mellitus represent different clinical conditions, in addition to possible differences in the characteristics of the populations evaluated [18,19].

Furthermore, the highest frequency of women with subclinical hypothyroidism and type 2 diabetes mellitus was observed in the 66- to 75-year age group (13.6%), which is consistent with the higher prevalence of type 2 diabetes mellitus reported at older ages and highlights the importance of strengthening screening and metabolic follow-up in this population group [12,17].

Among the main limitations of the study was the use of secondary information obtained from medical records and laboratory records, which limited the availability of some relevant clinical variables. Consequently, it was not possible to include factors potentially associated with metabolic abnormalities, such as body mass index, menopausal status, use of oral contraceptives or hormone replacement therapy, or lifestyle-related variables, including physical activity, smoking, and dietary patterns. Furthermore, because of the cross-sectional design of the study, temporal or causal relationships between subclinical hypothyroidism, dyslipidemia, and type 2 diabetes mellitus cannot be established.

Future research should employ prospective designs and incorporate clinical, anthropometric, and lifestyle variables to better understand the interaction between subclinical hypothyroidism, dyslipidemia, and type 2 diabetes mellitus, as well as to generate evidence that may contribute to optimizing strategies for the prevention and management of these metabolic abnormalities.

Conclusions

The study characterized the distribution of dyslipidemias among women with subclinical hypothyroidism according to age group. The highest frequency of cases was observed among women aged 46 to 55 years, representing 32.1% of the study population, highlighting the importance of early detection of metabolic abnormalities in middle-aged women. Mixed dyslipidemia was the most frequent lipid abnormality, with a prevalence of 37.0%, predominantly among women aged 56 to 65 years with subclinical hypothyroidism. This finding demonstrates the high frequency of combined lipid profile abnormalities in this population.

Likewise, 29.6% of women with subclinical hypothyroidism had type 2 diabetes mellitus, highlighting the coexistence of both metabolic disorders. Within this group, the highest frequency was observed among women aged 66 to 75 years, who accounted for 13.6% of the total study population.

Taken together, these findings highlight the importance of comprehensive assessment of biochemical indicators among women with subclinical hypothyroidism and support the need to strengthen screening and clinical follow-up strategies. Timely identification of lipid profile abnormalities and type 2 diabetes mellitus could contribute to optimizing metabolic management and reducing the risk of cardiovascular complications.

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Authorship contribution

MRIF: conceptualization, methodology, investigation, resources, curation, writing, data management, visualization, administration, formal analysis, and writing – original draft.

B-EK: formal analysis, supervision, review, and editing.

SMPA: methodology, formal analysis, writing, visualization, review, editing, and supervision.

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