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Relación entre Hipotiroidismo, Nutrición y Desarrollo Fetal en Mujeres Gestantes

Relationship among Hypothyroidism, Nutrition and Fetal Development in Pregnant Women

Relação entre Hipotiroidismo, Nutrição e Desenvolvimento Fetal em Grávidas

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Resumen

Introducción: El hipotiroidismo durante el embarazo puede afectar negativamente el desarrollo fetal y la salud materna, y su manejo nutricional es esencial para prevenir complicaciones.

Objetivo: Evidenciar la relación entre el hipotiroidismo, la dieta y el estado nutricional en mujeres gestantes y adolescentes.

Metodología: Se realizó una revisión bibliográfica no sistemática basada en artículos científicos extraídos de bases de datos reconocidas como PubMed, SciELO, Redalyc, Elsevier, entre otras. Se emplearon descriptores DeCS/MeSH y operadores booleanos para optimizar la búsqueda. Se establecieron criterios de inclusión por idioma (español e inglés) y relevancia temática.

Resultados: Se identificó que el hipotiroidismo en el embarazo puede desencadenar efectos adversos como aborto espontáneo, parto prematuro, bajo peso al nacer y alteraciones neurológicas fetales. Se destaca la importancia de la detección precoz, suplementación con yodo y el ajuste de levotiroxina. Los nutrientes como yodo, selenio, hierro y vitamina D juegan un rol clave en la función tiroidea, y su deficiencia agrava los riesgos.

Discusión: Las estrategias alimentarias adecuadas y la educación a la paciente mejoran la adherencia al tratamiento y reducen complicaciones. Un enfoque interdisciplinario es esencial para optimizar la función tiroidea y el estado nutricional.

Conclusiones: El monitoreo constante de la función tiroidea, acompañado de una intervención nutricional adecuada, permite mejorar la salud materno-fetal en mujeres gestantes con hipotiroidismo.

Palabras Clave: hipotiroidismo; embarazo; estado nutricional; levotiroxina sódica; adolescencia; composición corporal.

Abstract

Introduction: Hypothyroidism during pregnancy can negatively impact fetal development and maternal health, and its nutritional management is essential to prevent complications.

Objective: To highlight the relationship between hypothyroidism, diet, and nutritional status in pregnant and adolescent women.

Methodology: A non-systematic literature review was conducted using scientific articles retrieved from recognized databases such as PubMed, SciELO, Redalyc, Elsevier, among others. DeCS/MeSH descriptors and Boolean operators were used

to optimize the search. Inclusion criteria were established based on language (Spanish and English) and thematic relevance.

Results: It was identified that hypothyroidism during pregnancy may trigger adverse effects such as miscarriage, preterm birth, low birth weight, and fetal neurological alterations. The importance of early detection, iodine supplementation, and levothyroxine adjustment is emphasized. Nutrients such as iodine, selenium, iron, and vitamin D play a key role in thyroid function, and their deficiency increases the associated risks.

Discussion: Adequate dietary strategies and patient education improve treatment adherence and reduce complications. An interdisciplinary approach is essential to optimize thyroid function and nutritional status.

Conclusions: Continuous monitoring of thyroid function, accompanied by appropriate nutritional intervention, improves maternal-fetal health outcomes in pregnant women with hypothyroidism.

Keywords: hypothyroidism; pregnancy; nutritional status; sodium levothyroxine; adolescence; body composition.

Resumo

Introdução: O hipotiroidismo gestacional pode afetar negativamente o desenvolvimento fetal e a saúde materna, sendo a gestão nutricional essencial para a prevenção de complicações.

Objectivo: Demonstrar a relação entre o hipotiroidismo, a dieta e o estado nutricional em grávidas e adolescentes.

Metodologia: Foi realizada uma revisão bibliográfica não sistemática com base em artigos científicos extraídos de bases de dados reconhecidas, como a PubMed, SciELO, Redalyc, Elsevier, entre outras. Utilizaram-se descritores DeCS/MeSH e operadores booleanos para otimizar a pesquisa. Os critérios de inclusão foram estabelecidos por língua (espanhol e inglês) e relevância temática.

Resultados: O hipotiroidismo gestacional foi identificado como um potencial desencadeador de efeitos adversos, como aborto, parto prematuro, baixo peso à nascença e anomalias neurológicas fetais. Salienta-se a importância da deteção precoce, da suplementação de iodo e do ajuste da levotiroxina. Nutrientes como o iodo, o selénio, o ferro e a vitamina D desempenham um papel fundamental na função tiroideia, e a sua deficiência agrava os riscos. Discussão: Estratégias

dietéticas adequadas e educação do doente melhoram a adesão ao tratamento e reduzem as complicações. Uma abordagem interdisciplinar é essencial para otimizar a função tiroideia e o estado nutricional.

Conclusões: A monitorização constante da função tiroideia, acompanhada de intervenção nutricional adequada, melhora a saúde materna e fetal em grávidas com hipotiroidismo.

Palavras-chave: Hipotiroidismo; gravidez; estado nutricional; levotiroxina sódica; adolescência; composição corporal.

INTRODUCTION

Hypothyroidism is a common endocrine dysfunction in women, with an overall incidence ranging from 0.4% to 0.5%, reaching up to 2-8% in its subclinical forms. This condition impacts nutritional and metabolic balance due to thyroid hormone deficiency. (1,2) In pregnant women, hypothyroidism affects growth, sexual maturation and fluid distribution, with a prevalence of 2%. It can cause infertility and complications in physiological adaptations during pregnancy. (1,3)

Treatment of hypothyroidism in these women requires a comprehensive nutritional intervention, including an adequate intake of iodine, zinc, selenium, and vitamin D, key nutrients for thyroid function. The intake of these micronutrients, through a balanced diet and, if necessary, through supplementation, is essential to ensure maternal well- being and healthy fetal development. (3) Foods rich in iodine (dairy products, fish), selenium (nuts, seafood), iron (meats, vegetables), and vitamin D (fatty fish, sun exposure) are fundamental in this management. Interdisciplinary coordination and medical follow-up are crucial to optimize both thyroid function and nutritional status

during pregnancy. (4) The objective of this study is to explore how the treatment of hypothyroidism affects the nutritional status of pregnant women.

Methodology

Eligibility Criteria: A non-systematic literature review with a narrative approach was conducted. The objective was to interpret and synthesize existing information on hypothyroidism, nutrition, and pregnancy. Source selection was based on thematic relevance, accessibility of full content, and publication in Spanish or English. Duplicate articles, those with poor methodological rigor, or those unrelated to the studies objectives were excluded.

Information sources:

Renowned scientific databases such as PubMed, SciELO, Redalyc, Elsevier, Medline, DOAJ, and Google Scholar were used. Relevant documents available in academic repositories of universities and health organizations were also included.

Search strategy: The bibliographic search was conducted using DeCS and MeSH descriptors, such as "Hypothyroidism," "Levothyroxine sodium," "Nutritional status," "Body composition," "Pregnancy," and "Adolescence." These terms were combined with Boolean operators (AND, OR) to optimize the retrieval of relevant results. Priority was given to studies published between 2019 and 2024.

Data Extraction Process:

The selected sources were evaluated and organized according to their study type, main findings, relevance to the objectives, and thematic focus. The extracted information was grouped into thematic categories (diagnosis, treatment, effects on pregnancy, nutrition, etc.), allowing for a structured narrative synthesis of the contents.

Ethical Considerations:

As this was a literature review, no direct participation of human subjects was involved; therefore, ethics committee approval was not required. The principles of academic integrity were respected, and each source used was properly cited.

Limitations: This non-systematic review may be subject to selection bias due to the subjective criteria applied in the selection of sources. Furthermore, the heterogeneity

of the included studies, in terms of design, geographic context, and time period, limits the generalizability of the results.

Table 1 summarizes the criteria applied during the literature search, including terms used, integrating MeSH and DeCS descriptors, and Boolean operators to refine the results**.**

Table 1: Summary of Criteria applied during the search.

Data base	Search combination used	Years consulted	Language	Relevant results
PubMed	"hypothyroidism and pregnancy and nutritional status"	2019 - 2024	English	18
SciELO	"hypothyroidism and pregnancy and nutritional status"	2020 - 2024	Spanish	10
Redalyc	"hypothyroidism and adolescence and feeding"	2020 - 2024	Spanish	8
Elsevier	"hypothyroidism or levothyroxine and body composition"	2019 - 2024	English/Spanish	6
Medline	"thyroid disease and pregnancy and clinical treatment"	2020 - 2024	English	3
DOAJ	"subclinic hypothyroidism and thyroid function"	2019 - 2024	Spanish	4
Google Scholar	"hypothroidism y nutrition in preganat women and adolescence"	2019 - 2024	Spanish/English	9

Figure 1 presents a flowchart adapted from the PRISMA model that describes the selection process of articles included in this bibliographic review.

Figure 1 Flowchart of the article selection process

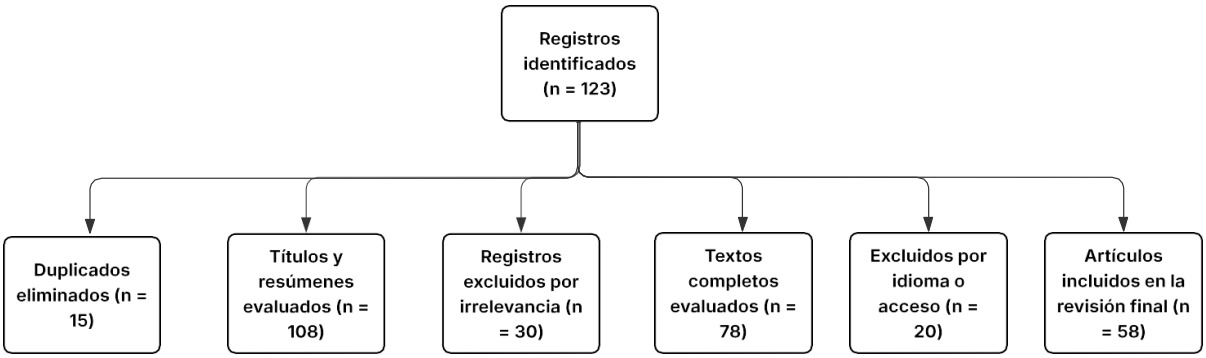

Table 2. Principal research included in the review

Author)s)	Year	Kind of study	Main contribution to the review
Pande & Anjankar	2023	Narrative revision	Effects of maternal hypothyroidism on fetal neurological and physical development.
Solha et al.	2022	Clínica revision	Diagnostic and therapeutic recommendations for hypothyroidism in pregnancy.
Jiménez, Conde & Torres	2020	Observational study	Relationship between hypothyroidism and fertility problems in women of reproductive age.
Janota et al.	2022	Transversal study	Influence of eating habits on the quality of life of women with hypothyroidism.
Alkhatib, Shi & Ganji	2024	Epidemiological study (NHANES)	Association between dietary patterns and prevalence of hypothyroidism in adults.
Van der Gaag et al.	2020	Randomized controlled trial (RCT)	Positive impact of a dietary intervention on symptoms of subclinical hypothyroidism.
Taylor et al.	2019	Clinical Revision	Importance of nutritional education in pregnant women with hypothyroidism.
Waksmańska et al.	2020	Cohort study	Nutritional risks in pregnant women with hypertension and hypothyroidism.
Larsen, Singh & Brito	2022	Integrative review	Effects of micronutrients (iodine, selenium, zinc) and gluten/dairy-free diets.
Tene et al.	2024	Transversal Study	Physiological and metabolic

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Table 2 summarizes the main studies selected during the review. Research with different methodological designs is highlighted, allowing for a comprehensive approach to hypothyroidism in pregnant women from a clinical, nutritional, and public health perspective.

Results

Several studies have documented that hypothyroidism, both subclinical and manifest, is associated with a significantly increased risk of obstetric complications. Pande and Anjankar point out that untreated maternal hypothyroidism can critically affect fetal neurological development, increasing the risk of delayed central nervous system maturation, impaired neuronal migration, and myelination defects (5). Similarly, Solha et al. and Singh and Sandhu report that pregnant women with hypothyroidism have a higher incidence of spontaneous abortion, premature delivery, low birth weight, and preeclampsia (6,7).En cuanto al abordaje terapéutico, Solha et al. observaron que la administración temprana de levotiroxina, especialmente cuando se ajusta la dosis desde el primer trimestre, reduce de manera significativa el riesgo de complicaciones tanto maternas como perinatales (6). Table 3 of the present study also summarizes the effects of untreated hypothyroidism during each stage of pregnancy, highlighting the high frequency of neurological disorders, intrauterine growth retardation, and congenital malformations. Furthermore, the importance of frequent monitoring of TSH and free T4 levels throughout pregnancy has been highlighted to prevent adverse outcomes, as recommended by Solha et al. and Colorado and Proaño (6,8). These findings underscore the need to implement early screening strategies in pregnant women to identify thyroid dysfunction, both subclinical and overt, before the first trimester of pregnancy.

Hypothyroidism, particularly in its subclinical form, has been associated with alterations in lipid metabolism and cardiovascular function. Wilson et al. identified that patients with subclinical hypothyroidism have an adverse lipid profile, characterized by

elevated levels of LDL cholesterol and triglycerides, as well as decreased HDL cholesterol, which increases the risk of atherosclerosis (1). Likewise, an increase in markers of systemic inflammation has been observed, a phenomenon that contributes to the early development of cardiovascular disease.

This finding was supported by the study by Calcaterra et al., who documented that adolescent with eating disorders had thyroid dysfunctions associated with significant metabolic alterations (9). In the Latin American context, Tene et al. conducted a cross- sectional study in an Ecuadorian population, identifying statistically significant differences ($p<0.05$) in lipid profiles, insulin levels and postprandial glucose between subjects with clinical hypothyroidism and those with normal thyroid function (10).

Additionally, in Venezuela, Angulo et al. (11) reported that obese schoolchildren with subclinical hypothyroidism showed a higher degree of insulin resistance and lipid abnormalities, reinforcing the association between thyroid dysfunction and metabolic dysregulation from an early age. These findings suggest that hypothyroidism not only affects the thyroid hormonal axis but also has significant systemic implications, especially on overall metabolic health. Therefore, its timely diagnosis and treatment are essential to prevent the long-term development of chronic non-communicable diseases. In Ecuador, studies indicate substantial physiological alterations in patients with clinical hypothyroidism, while in Venezuela, its link with metabolic disorders in the obese pediatric population has been highlighted. Tene et al. also emphasize the fundamental role of nutrition in the diagnosis and management of hypothyroidism, which not only seeks to regulate endocrine function but also improve the nutritional status of affected individuals (10). Additionally, in Venezuela, Angulo et al. (11) reported that obese schoolchildren with subclinical hypothyroidism showed a higher degree of insulin resistance and lipid abnormalities, reinforcing the association between thyroid dysfunction and metabolic dysregulation from an early age.

These findings suggest that hypothyroidism not only affects the thyroid hormonal axis but also has significant systemic implications, especially on overall metabolic health. Therefore, its timely diagnosis and treatment are essential to prevent the long-term development of chronic non-communicable diseases. In Ecuador, studies indicate substantial physiological alterations in patients with clinical hypothyroidism, while in Venezuela, its link with metabolic disorders in the obese pediatric population has been highlighted.Tene et al. also emphasized the fundamental role of nutrition in the

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In studies with pregnant women, Waksmańska et al. found that those diagnosed with hypothyroidism tended to consume higher amounts of fats and carbohydrates, which could

exacerbate the metabolic complications associated with this condition (14). Van der Gaag et al. showed that a dietary intervention focused on increasing the intake of lean meats, green vegetables, and dairy products was able to reduce the feeling of fatigue in adolescents with subclinical hypothyroidism, suggesting that a balanced diet may modulate clinical symptoms (15).

Likewise, Taylor et al. and Janota et al. have highlighted the importance of nutritional education in women with hypothyroidism, showing that those patients who adopt healthy eating patterns have better body weight control and a higher quality of life (16,17). These results indicate that women with thyroid dysfunction should receive personalized nutritional guidance, focusing on diets rich in fruits, vegetables, legumes and fish. Similarly, it is recommended to promote regular physical activity and adequate sleep hygiene to promote overall well-being (2).

In relation to these findings, the study by Alkhatib et al. also evaluated the relationship between different dietary patterns and the prevalence of hypothyroidism, using data collected during three cycles of the National Health and Nutrition Examination Surveys (NHANES) (13). The authors identified three dietary patterns using factor analysis: 1) Fats, Processed Grains, Sugars, and Meats (FPSM); 2) Oils, Nuts, Potatoes, and Lean Meats (ONPL); and 3) Fruits, Whole Grains, Vegetables, and Dairy (FWVD). The analysis showed that the FPSM and ONPL patterns were inversely associated with hypothyroidism, indicating that moderate consumption of fats, oils, and lean meats may be associated with a lower risk of developing this condition. In contrast, the FWVD pattern did not show a significant association with hypothyroidism (13). Based on these results, the authors recommended adopting a balanced dietary pattern that limits the consumption of processed foods, refined sugars and saturated fats, favoring instead the inclusion of fruits, vegetables, whole grains and essential nutrients such as iodine, selenium and zinc (4)

Foods such as dairy products, fish, nuts, seafood, meats, green leafy vegetables, and fatty fish are essential for maintaining healthy thyroid function (4). Among these

essential nutrients, iodine—found mainly in iodized salt and dairy products—plays a crucial role in the synthesis of thyroid hormones. Selenium, found in nuts and seafood, promotes the conversion of thyroxine (T4) to triiodothyronine (T3), its active form, and also protects the gland from oxidative processes. Iron, abundant in meats and vegetables, is essential for hormone production, while vitamin D—available in fatty fish and through sun exposure—contributes to immune strengthening and the reduction of inflammatory processes, both of which are important for thyroid health (4). Along these lines, Waksmańska et al. pointed out that pregnant women with

hypothyroidism often have unfavorable dietary patterns, characterized by a higher consumption of fats, cholesterol, and carbohydrates. This type of diet can negatively impact the course of the pregnancy, favoring excessive weight gain and the appearance of complications associated with the disease (14).

On the other hand, Larsen, Singh and Brito analyzed the dietary and alternative strategies used in the management of thyroid disorders, highlighting the fundamental role of micronutrients such as iodine, selenium and zinc (12). In their review, they note that iodine deficiency is a recognized cause of hypothyroidism and goiter, but they also emphasize that its excess can induce thyroid dysfunctions such as hyperthyroidism or autoimmune hypothyroidism. Selenium and zinc, although relevant, have shown limited benefits in some studies, and their effects are not necessarily extrapolated to the entire population (15). Regarding other supplements such as vitamin B12, the available evidence does not support its systematic use in the treatment of these pathologies. Likewise, in patients with gluten or lactose intolerance—such as in cases of celiac disease or lactose intolerance—the elimination of these foods may improve the absorption of levothyroxine. However, no conclusive benefits have been observed in eliminating cruciferous vegetables or soy products for thyroid health in people without these conditions (18)

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Summary results

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In summary, the evidence collected indicates that hypothyroidism during pregnancy significantly increases the risk of obstetric complications such as miscarriage, premature delivery, and low birth weight, highlighting the need for timely screening and treatment.

Likewise, it was identified that subclinical and overt hypothyroidism negatively impacts the metabolic and cardiovascular profile, increasing insulin resistance, dyslipidemia, and the risk of early cardiovascular disease.

Finally, the literature highlights that adequate nutrition, based on the consumption of essential micronutrients such as iodine, selenium, iron, and vitamin D, along with structured dietary interventions and nutritional education, contribute to improving disease control and patients' quality of life.

Conclusion

This review confirms that hypothyroidism during pregnancy increases the risk of serious obstetric complications such as spontaneous abortion, premature delivery, and low birth weight, underscoring the need for early diagnosis and appropriate management from the earliest stages of pregnancy. Furthermore, it was shown that this thyroid dysfunction negatively impacts lipid metabolism and cardiovascular health, promoting the development of insulin resistance and lipid profile alterations, with long- term implications for maternal health. It was also identified that adequate nutrition,

based on the intake of essential micronutrients such as iodine, selenium, iron, and vitamin D, along with educational interventions, can optimize the clinical outcome of patients. Consequently, an interdisciplinary approach integrating pharmacological treatment, individualized nutritional support, and continuous monitoring of thyroid function is recommended, with the goal of improving maternal and fetal outcomes and promoting a better quality of life in pregnant women with hypothyroidism

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