Perinatología y Reproducción Humana

Permanyer

REVIEW ARTICLE

Hypothyroidism and quality of life in women of reproductive age: an analysis of its consequences

Liliana Baez-Corona

Department of Medical Sciences, Universidad Popular Autónoma del Estado de Puebla. Puebla, Pue, Mexico

Abstract

Hypothyroidism is a chronic endocrine disease that affects multiple body systems, with a significant impact on the quality of life of women of reproductive age. This condition alters metabolism and cardiovascular function and affects emotional well-being and reproductive health. Various studies have shown that hypothyroidism can cause menstrual irregularities, infertility, and an increased risk of complications during pregnancy, such as miscarriage, premature birth, and pre-eclampsia. In addition, the disease is associated with symptoms such as fatigue, weight gain, depression, and cognitive impairment, which interfere with patients' daily lives. Early diagnosis and timely treatment with hormone replacement therapy, mainly levothyroxine, can significantly improve the quality of life of women with hypothyroidism. However, the response to treatment varies between individuals, requiring ongoing monitoring and a personalized approach. It is also essential to complement medical management with psychological support and lifestyle strategies to minimize the adverse effects of the disease. This review emphasizes the need for greater awareness of the impact of hypothyroidism on women's reproductive and general health. Early identification of symptoms and appropriate medical intervention can prevent complications, preserve fertility, and improve the well-being of patients, ensuring a better quality of life in the long term.

Keywords: *Hypothyroidism. Quality of life. Reproductive health. Infertility. Pregnancy. Thyroid hormones.*

Hipotiroidismo y calidad de vida en mujeres en edad reproductiva: un análisis de sus consecuencias

Resumen

El hipotiroidismo es una enfermedad endocrina crónica que afecta múltiples sistemas del organismo, con un impacto significativo en la calidad de vida de las mujeres en edad reproductiva. Esta condición no solo altera el metabolismo y la función cardiovascular, sino que también afecta el bienestar emocional y la salud reproductiva. Diversos estudios han demostrado que el hipotiroidismo puede provocar irregularidades menstruales, infertilidad y un mayor riesgo de complicaciones durante el embarazo, como aborto espontáneo, parto prematuro y preeclampsia. Además, la enfermedad se asocia con síntomas como fatiga, aumento de peso, depresión y deterioro cognitivo, lo que interfiere con la vida cotidiana de las pacientes. El diagnóstico temprano y el tratamiento oportuno con terapia de reemplazo hormonal, principalmente con levotiroxina, pueden mejorar significativamente la calidad de vida de las mujeres con hipotiroidismo. No obstante, la respuesta al tratamiento varía entre pacientes, lo que requiere un monitoreo continuo y un enfoque personalizado. Asimismo, es fundamental complementar el manejo médico con apoyo psicológico y estrategias de estilo de vida para minimizar los efectos adversos de la

Correspondence:
Liliana Baez-Corona
E-mail: lilianacorona525@gmail.com

Date of reception: 21-05-2025
Date of acceptance: 14-07-2025
DOI: 10.24875/PER.25000005

Available online: 26-11-2025
Perinatol Reprod Hum. 2025;39(1):30-38
www.perinatologia.mx

enfermedad. Esta revisión enfatiza la necesidad de una mayor concienciación sobre el impacto del hipotiroidismo en la salud reproductiva y general de la mujer. La identificación temprana de síntomas y la intervención médica adecuada pueden prevenir complicaciones, preservar la fertilidad y mejorar el bienestar de las pacientes, garantizando una mejor calidad de vida a largo plazo.

Palabras clave: *Hipotiroidismo. Calidad de vida. Salud reproductiva. Infertilidad. Embarazo. Hormonas tiroideas.*

Introduction

Hypothyroidism is an endocrine disorder characterized by a reduction in the production of thyroid hormones, which affects multiple systems of the human body and significantly impacts the quality of life[1,2]. This condition can be classified as primary, when the dysfunction originates in the thyroid gland, or secondary, when the problem lies in an alteration of the hypothalamus-pituitary axis. Worldwide, the prevalence of hypothyroidism varies between 1 and 10% of the general population, with a higher incidence in women[3].

Among the most frequent causes of hypothyroidism are Hashimoto's thyroiditis, an autoimmune disorder that causes the progressive destruction of the thyroid gland, and iodine deficiency, especially in regions with low consumption of this micronutrient[4]. It can also be triggered by genetic factors, thyroid ablation, or specific medical treatments such as radiotherapy and the use of drugs that affect thyroid function[5]. Regardless of the cause, thyroid hormone deficiency generates symptoms such as chronic fatigue, weight gain, cold intolerance, mood disorders, concentration disorders, and metabolic dysfunction[6,7].

In women of reproductive age, the impact of hypothyroidism is especially relevant since thyroid hormones regulate key processes in reproductive health, such as ovulation, the menstrual cycle, and corpus luteum function. Alterations in these mechanisms can lead to infertility, miscarriages, and complications during pregnancy[8-10]. In addition, thyroid dysfunction can affect mental health, increasing the risk of depression and anxiety, which contributes to a worse perception of quality of life[6].

Since hypothyroidism has a multisystemic impact, timely diagnosis and treatment are essential to avoid long-term complications. Although levothyroxine therapy is the standard treatment, not all patients achieve optimal well-being recovery, suggesting a more comprehensive approach to managing this condition[7,11].

Therefore, this article aims to review the current scientific literature on the effects of hypothyroidism on health-related quality of life in women of reproductive age. It will explore aspects such as metabolic, reproductive, and psychological alterations associated with this condition, as well as the impact of treatment on patients' quality of life.

Methods

Search strategy

This manuscript was prepared in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines, as it presents a narrative review of the scientific literature concerning the impact of hypothyroidism on the quality of life of women of reproductive age. Although it is not a systematic review, efforts were made to adhere to the principles of transparency, comprehensiveness, and methodological rigor in the search, selection, and analysis of the included studies.

A non-systematic literature review was conducted to analyze the available scientific evidence on the impact of hypothyroidism on health-related quality of life in women of reproductive age.

To do so, searches were conducted in the PubMed, Web of Science, and Google Scholar databases, using key terms in English and Spanish, such as:

- "Hypothyroidism AND quality of life AND reproductive women"
- "Hipothyroidismo AND ciclo menstrual AND fertility"
- "Hypothyroidism AND depression AND infertility"

Original studies, systematic reviews, and meta-analyses published between 2013 and 2024 that analyzed the relationship between hypothyroidism and quality of life in women of reproductive age were included. Animal studies, articles without full access, and publications that did not specifically address the relationship between hypothyroidism and reproductive health were excluded.

Titles and abstracts were independently reviewed. Each study provided information on the effects of hypothyroidism on the quality of life of women of reproductive age. Relevant information was organized in a results table, and the findings were subsequently analyzed narratively by the established methodological recommendations for literature reviews.

Selection of studies

Based on the established search terms, 31 publications were identified. During the screening process, 23 publications were excluded because they were duplicates in another language or unrelated to the objective of this work. Finally, the review was carried out with eight leading publications (Fig. 1), and to complement the analysis, another 37 relevant articles were included in the discussion of the topic.

Results

From the literature review, multiple studies were identified that evaluate the impact of hypothyroidism on the quality of life of women of reproductive age. The findings suggest that this condition negatively affects various dimensions of well-being, including physical, emotional, and reproductive status. Among the most reported effects are chronic fatigue, mood alterations (depression and anxiety), metabolic dysfunction, and menstrual disorders, which can significantly compromise the quality of life and reproductive health of patients.

In addition, an association has been found between hypothyroidism and decreased fertility, as well as an increased risk of complications during pregnancy, which underlines the importance of timely diagnosis and treatment (Fig. 2). Regarding treatment, although levothyroxine is the standard therapy, some studies have reported that patients may continue to experience symptoms even with normalized hormone levels, suggesting the need for more individualized therapeutic approaches.

Hypothyroidism overview

Hypothyroidism is a chronic disease characterized by the inability of the thyroid gland to produce sufficient amounts of thyroid hormones, which are essential for regulating body metabolism[1]. These hormones play a key role in various physiological processes, such as energy production and utilization, body temperature regulation, heart rate, and weight control, among other metabolic functions[3]. Worldwide, the prevalence of hypothyroidism varies depending on the population studied, with estimated rates between 1 and 10%[3]. In countries with adequate iodine intake, the most common cause is Hashimoto's thyroiditis, an autoimmune disease that causes progressive destruction of the thyroid gland[4]. In contrast, endemic goiter remains a significant cause of the disorder in iodine-deficient regions. Furthermore, genome-wide association studies have identified the influence of autoimmune-related genes in the development of hypothyroidism, suggesting a genetic component in its predisposition[12].

Hypothyroidism is classified into two primary forms: subclinical and clinical. Subclinical hypothyroidism is characterized by elevated levels of thyroid-stimulating hormone (TSH) with normal concentrations of thyroxine (T4) and triiodothyronine (T3)[5]. It is more common in women and older adults, with an estimated prevalence between 3 and 15%, depending on factors such as age, sex, and geographic region. Population studies have shown that postmenopausal women and people over 60 years of age are at increased risk of developing this condition[3].

In subclinical hypothyroidism, the thyroid does not produce enough thyroxine (T4), causing a compensatory elevation of TSH levels. This increase occurs as a mechanism of the body to stimulate the thyroid gland and thus increase the production of thyroid hormones[3]. However, T4 and triiodothyronine (T3) concentrations remain within normal ranges, which explains the absence of apparent clinical symptoms in many patients. Despite this, subclinical hypothyroidism has been associated with an increased risk of complications such as cardiovascular disease and metabolic disorders[5].

Clinical hypothyroidism, on the other hand, is characterized by a significant reduction in the production of thyroid hormones T4 and T3 due to a dysfunction of the thyroid gland. This alteration leads to decreased basal metabolism, impacting various physiological functions. Among the main risk factors for its development are advanced age, female sex, family history of thyroid diseases, and previous exposure to radiation or treatments that affect thyroid function. In addition, people with autoimmune disorders, such as type 1 diabetes or rheumatoid arthritis, are more predisposed to suffer from this disease[13].

Impact of hypothyroidism on female reproductive health

Hypothyroidism can occur in both women and men; however, it is less common in the latter group, who tend to develop symptoms such as fatigue, weight gain, hair loss, decreased libido, and fertility problems. On the other hand, women are more susceptible to hypothyroidism, which significantly impacts their quality of life, affecting their physical, emotional, and

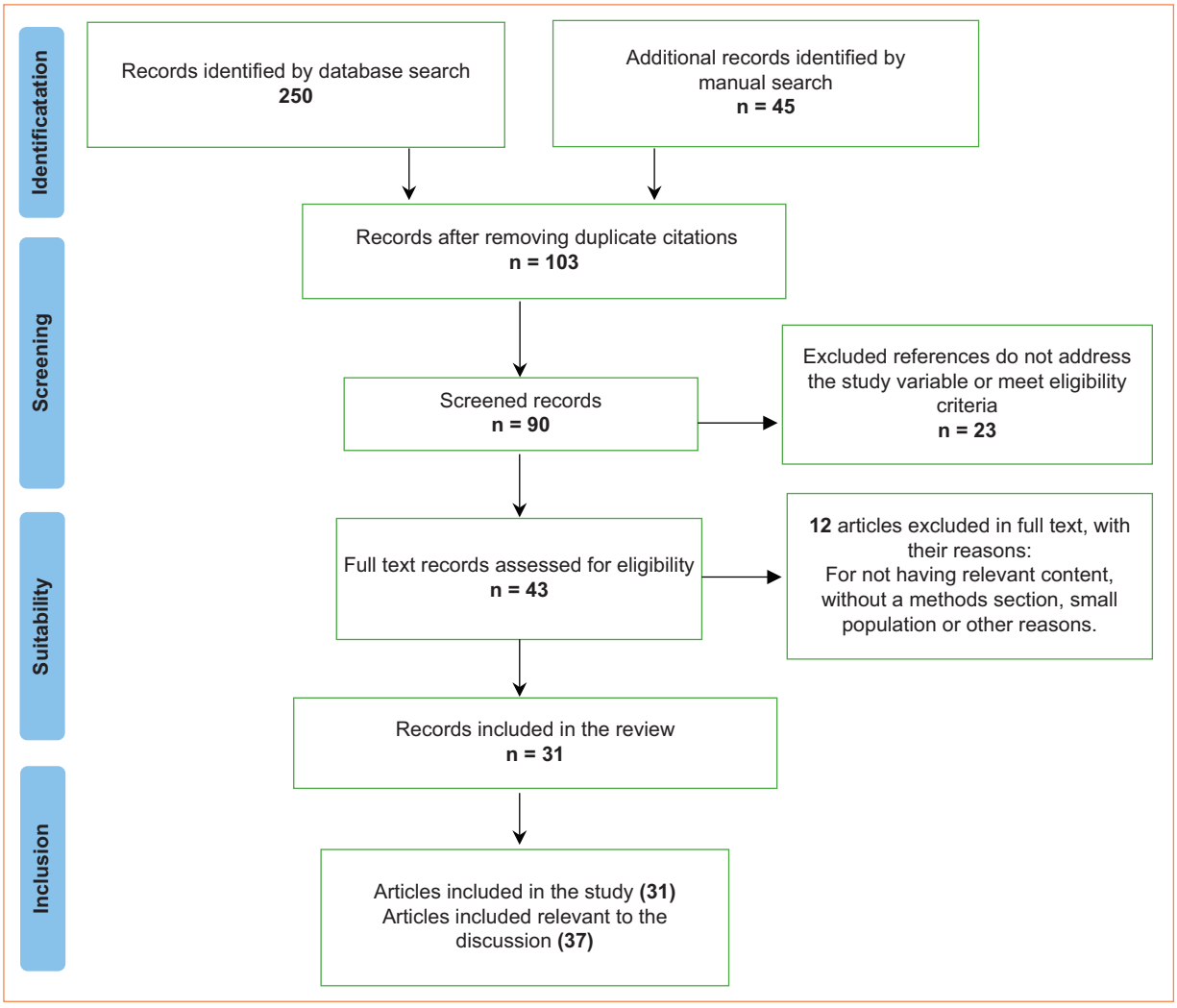

Figure 1. Cochrane flowchart of the search for included studies for this review.

reproductive well-being. Among the most common symptoms in women are fatigue, weight gain, cold intolerance, xerosis, menstrual irregularities, and mood disorders[7,14]. Early diagnosis is crucial in both groups to avoid serious complications. In addition, treatment usually consists of supplementation with synthetic thyroid hormone, allowing for better control of symptoms and preventing long-term adverse effects[7].

In women of reproductive age, thyroid hormone deficiency can significantly affect health-related quality of life, as it has been described as being associated with irregularities in the menstrual cycle, making conception difficult[10]. Likewise, untreated hypothyroidism can increase the risk of complications during pregnancy, highlighting the importance of timely diagnosis and treatment to preserve a woman's reproductive and general health[8,15]. Some of the effects of hypothyroidism on the quality of life of women of reproductive age are described below.

Impact of hypothyroidism on the quality of life of women of reproductive age

Depression

Thyroid hormones regulate various bodily functions, including mood[16]. When hormone levels are low, the body experiences a general slowdown of its processes, which can affect mental health. One of the lesser-known but highly relevant aspects of hypothyroidism is its relationship with depression[17]. Thyroid hormone

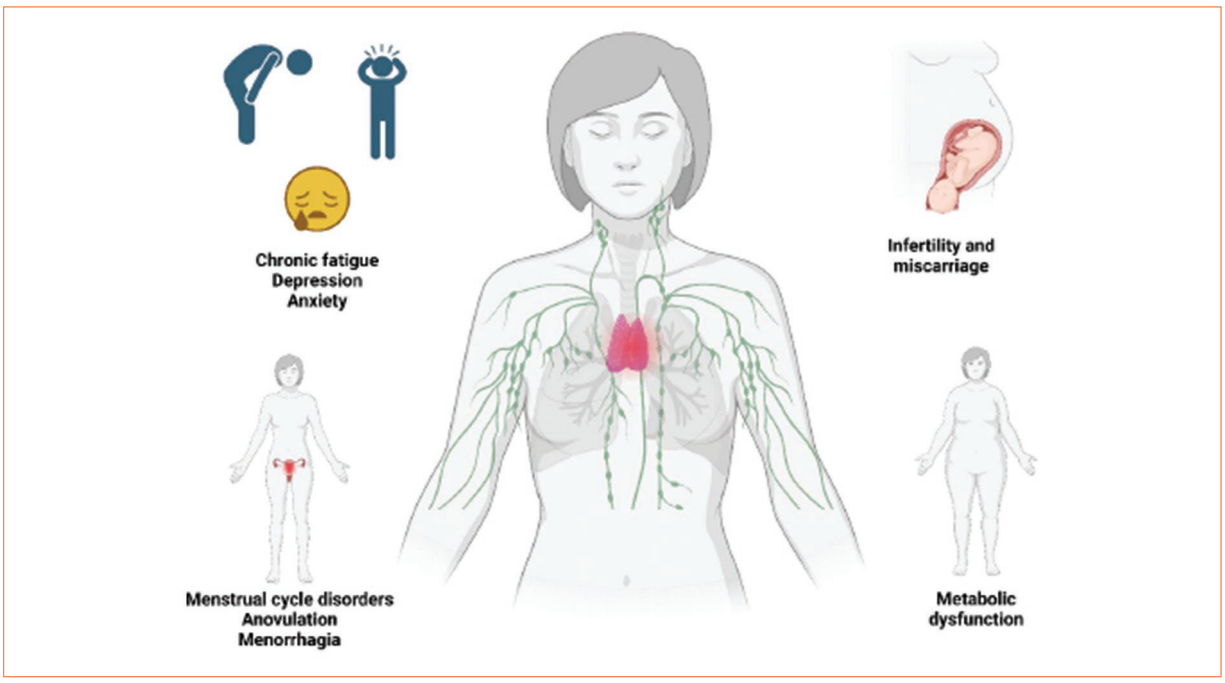

Figure 2. Effect of hypothyroidism on quality of life in women of reproductive age.

Table 1. Summary of the works that discuss the effect of hypothyroidism and quality of life in women

Study	Effects	Main findings	References
Caneo et al. 2020	Mood disorders	Female patients of working age with depression and panic attacks suffer from hypothyroidism.	19
Bode et al. 2021	Depression	There is a slightly more significant association between hypothyroidism and depression in females than in males.	16
Nuguru et al. 2022	Treatment-resistant depression	Patients with hypothyroidism experience depression as a comorbidity, and most cases were reported as treatment-resistant depression. Levothyroxine therapy as an adjunctive therapy to antidepressants in the treatment of depression improves symptoms of depression rapidly compared to antidepressants alone.	18
Naz et al. 2020	Changes in the menstrual cycle	Oligomenorrhea (cycles longer than 35 days) is the most common menstrual disorder among endocrine disorders (thyrotoxicosis, hypothyroidism, polycystic ovary syndrome, Cushing's syndrome, and diabetes).	20
Jacobson et al. 2018	Changes in menstrual cycle function	Circulating concentrations of thyroid hormones are associated with subtle differences in menstrual cycle function outcomes.	26
Thakur et al. 2020	Abnormal uterine bleeding	In patients with hypothyroidism, the most common complaint of abnormal uterine bleeding was menorrhagia, followed by oligomenorrhea, menometrorrhagia (heavy menstrual bleeding), and polymenorrhea (increased menses).	31
Jimenez-Ibañez et al. 2020	Infertility	Severe hypothyroidism leads to ovulatory dysfunction due to numerous interactions of thyroid hormones with the female reproductive system.	27
Koyyada and Orsu, 2020	Infertility and abortion	Thyroid hormones and follicle-stimulating hormone promote granulosa cell differentiation, followed by normal follicle development, which is necessary for ovulation and corpus luteum formation. In addition, untreated hypothyroidism during pregnancy can lead to infertility/subfertility, stillbirths, premature births, and miscarriages.	34

deficiency influences the chemical balance of the brain, favoring the appearance of depressive symptoms. Various epidemiological studies have shown that people with hypothyroidism have a higher prevalence of depressive symptoms compared to the general population[18]. In addition, it has been observed that patients with hypothyroidism may experience persistent sadness, loss of interest in previously pleasurable activities, difficulties concentrating, and a constant feeling of emotional exhaustion. These symptoms can lead to hypothyroidism being confused with major depressive disorder, especially in those cases where the physical symptoms are less evident[16,18,19].

In women of reproductive age, a higher susceptibility to mood disorders has been identified due to hormonal fluctuations of the menstrual cycle and the influence of thyroid hormones on the levels and function of neurotransmitters such as serotonin[20-22]. Observational studies have shown a higher prevalence of depressive symptoms in women with untreated hypothyroidism compared to those without thyroid dysfunction[19]. Furthermore, the effects on quality of life are usually milder in women with subclinical hypothyroidism than in those with clinical hypothyroidism[5,23]. However, several studies have shown that even women with subclinical hypothyroidism can experience symptoms such as fatigue, decreased vitality, and depression[5,19], suggesting that minimal alterations in thyroid function can significantly impact the quality of life. In this sense, mental and cognitive impairment in women with hypothyroidism can cause significant changes in their personal and work life, interfering with their ability to perform daily activities[24,25].

The close relationship between hypothyroidism and depression can complicate both diagnosis and treatment since the symptoms of both conditions can overlap. For this reason, early evaluation of thyroid function in patients with depressive symptoms is essential to identify possible hormonal dysfunctions and improve therapeutic outcomes[13,15].

Menstrual cycle disorders

Hypothyroidism has been significantly linked to changes in the menstrual cycle, as thyroid hormones play a key role in its regulation and ovulation[26,27]. Women with untreated hypothyroidism may experience irregular cycles, such as oligomenorrhea (cycles longer than 35 days), which is the most common menstrual disorder among endocrine disorders, including thyrotoxicosis, hypothyroidism, polycystic ovary syndrome, Cushing's syndrome, and diabetes. Likewise, thyroid dysfunction can cause anovulation, which directly affects the ability to conceive[20].

Thyroid hormones also regulate the hypothalamus-pituitary-ovarian axis, which is responsible for the production of estrogen and progesterone. Together with follicle-stimulating hormone, these hormones promote normal follicular development, an essential process for ovulation. Previous studies have suggested that alterations in TSH hormone levels may be sufficient to cause ovulatory disorders[28].

Another common disorder in women with hypothyroidism is menorrhagia, characterized by heavier-than-normal periods[29]. This condition is caused by thyroid dysfunction, which can affect blood clotting and prolong and increase the volume of menstrual flow[30]. In addition, hypothyroidism has been associated with an increased risk of abnormal vaginal bleeding in adults[31]. A clinical study of a 13-year-old pediatric patient showed that menorrhagia was a key sign of hypothyroidism, which was also associated with short stature due to the influence of thyroid hormones on growth. Consequently, specialists emphasize the importance of regular thyroid examinations in women with menstrual disorders[32].

Infertility and miscarriage

Hypothyroidism has been associated with infertility in both men and women. In men, this condition can affect sperm production and quality, reducing fertility. In addition, low levels of thyroid hormones can interfere with libido and erectile function, representing another obstacle to conception[33]. The effects of hypothyroidism on the quality of life of women of reproductive age are summarized in table 1, which presents the main findings of the studies analyzed. In women, thyroid hormones play a fundamental role in regulating the menstrual cycle and ovulation, influencing the function of the corpus luteum, an essential structure for maintaining pregnancy in its early stages[28].

Women with uncontrolled hypothyroidism during pregnancy are at increased risk of complications, including miscarriage, premature birth, and pre-eclampsia[34]. Furthermore, untreated hypothyroidism has been shown to elevate prolactin levels, a hormone that, in excess, can inhibit ovulation and contribute to infertility[35]. A previous study identified a positive relationship between serum levels of TSH and prolactin in women with infertility. In that study, 60% of infertile

women had alterations in their menstrual cycle, and 41% showed hyperprolactinemia[36].

Infertile women with hypothyroidism also had significantly elevated prolactin levels compared to those without thyroid dysfunction, suggesting the need to include tests for hyperprolactinemia and thyroid abnormalities in the evaluation protocols of women with infertility or pregnant women[34,36].

Hypothyroidism not only affects the ability to conceive but also the ability to carry a pregnancy to term. Pregnant women with untreated hypothyroidism are at increased risk of miscarriage and premature birth. In addition, thyroid hormone deficiency during pregnancy has been found to interfere with the neurological and physical development of the fetus, which can lead to long-term consequences[34,37]. However, timely treatment of hypothyroidism can restore hormonal balance and improve the chances of conception in people with infertility associated with this condition[27,34]. Below is a table summarizing the effects of hypothyroidism in women of reproductive age.

Effects of hypothyroidism on physical, reproductive, and emotional health in women

Hypothyroidism causes a wide range of physical symptoms, including a general decrease in body energy, which causes constant fatigue and affects daily performance[5]. Many women with hypothyroidism experience a slower metabolism, which leads to weight gain without an apparent cause[10]. These changes can affect physical health, self-image, and emotional well-being.

In women of reproductive age, hypothyroidism can cause menstrual disorders, including irregular cycles, heavy periods (menorrhagia), and fertility problems, which directly impact reproductive capacity and can cause emotional distress[26]. Likewise, thyroid hormones are essential in regulating cholesterol and cardiovascular function. It has been reported that women with hypothyroidism have a higher risk of developing cardiovascular diseases, such as atherosclerosis, which further aggravates the complications associated with this condition[14,38,39].

In terms of reproductive health, uncontrolled hypothyroidism can negatively impact fertility. Women planning to conceive may face significant emotional and physical challenges due to this condition. Furthermore, those who achieve pregnancy without adequate control of hypothyroidism may face risks to both themselves and the fetus, including an increased risk of miscarriage, pre-eclampsia, low birth weight, and problems with fetal development. These factors highlight the importance of early diagnosis and appropriate treatment to minimize complications associated with hypothyroidism in women of reproductive age[27].

Studies have shown that women with hypothyroidism have a poorer perception of their overall well-being, which negatively impacts the physical, emotional, and social dimensions of their health[4,40]. Furthermore, the diagnosis and treatment adjustment process can be frustrating, as symptoms do not disappear immediately and require continuous monitoring of hormonal levels to ensure an adequate therapeutic response[2,15].

The standard treatment for hypothyroidism consists of thyroid hormone replacement therapy, mainly levothyroxine[7]. However, the response to this treatment can vary between patients, and some women take time to find the correct dose that allows them to feel better (Duntas and Jonklaas, 2019). Although most symptoms tend to improve with treatment, some women continue to experience problems related to hypothyroidism, suggesting the need for a more personalized approach and long-term follow-up[41].

These findings highlight the importance of comprehensive care, which includes medication, psychological support, and lifestyle advice, to optimize patients' quality of life and general well-being.

Conclusion

Hypothyroidism has a significant impact on the quality of life of women of reproductive age, affecting their physical, emotional, and reproductive well-being. Chronic fatigue, mood disorders, and metabolic disturbances can limit their ability to lead a whole life, while menstrual irregularities and infertility add an emotional burden. In addition, untreated hypothyroidism during pregnancy can lead to serious complications, such as spontaneous abortion, premature birth, and problems in fetal development, reinforcing the need for timely detection and treatment.

Early intervention, appropriate management, and a comprehensive approach can significantly improve the quality of life of these patients. Levothyroxine replacement therapy is the standard treatment, but the response varies between individuals, so constant monitoring and personalized dose adjustment are essential. Likewise, psychological support and lifestyle advice can play a key role in the overall well-being of women with hypothyroidism.

The findings of this review emphasize the importance of awareness about this disease and the need for timely medical evaluation in women of reproductive age with symptoms of hypothyroidism. Detecting and treating the disease early can not only prevent complications such as infertility or miscarriage but also preserve health and improve the quality of life of patients.

Acknowledgments

The author would like to thank the *Facultad de Ciencias Médicas* at Universidad Popular Autónoma del Estado de Puebla (UPAEP) for their academic support and institutional encouragement throughout the development of this work.

Funding

This research has not received any specific grant from agencies in the public, commercial, or for-profit sectors.

Conflicts of interest

The author declares no conflicts of interest.

Ethical considerations

Protection of humans and animals. The author declares that no experiments were performed on humans or animals for this research.

Confidentiality, informed consent, and ethics approval. The study does not involve personal data of patients, nor does it require ethics approval. SAGER guidelines do not apply.

Declaration on the use of artificial intelligence. The author declares that she has not used any type of generative artificial intelligence in the writing of this manuscript.

References

1. Chaker L, Bianco AC, Jonklaas J, Peeters RP. Hypothyroidism. Lancet. 2017;390:1550-62.
2. Zamwar UM, Muneshwar KN. Epidemiology, types, causes, clinical presentation, diagnosis, and treatment of hypothyroidism. Cureus. 2023;15:e46241.
3. Taylor PN, Albrecht D, Scholz A, Gutierrez-Buey G, Lazarus JH, Dayan CM, et al. Global epidemiology of hyperthyroidism and hypothyroidism. Nat Rev Endocrinol. 2018;14:301-16.
4. Djurovic M, Pereira AM, Smit JW, Vasovic O, Damjanovic S, Jemuovic Z, et al. Cognitive functioning and quality of life in patients with Hashimoto thyroiditis on long-term levothyroxine replacement. Endocrine. 2018;62:136-43.
5. Hennessey JV, Espaillat R. Subclinical hypothyroidism: a historical view and shifting prevalence. Int J Clin Pract. 2015;69:771-82.
6. Fernández-Garza LE, Marfil A. Comorbidity between hypothyroidism and headache disorders in a Mexican population. Rev Neurol. 2022;75:13-6.
7. Romero-gómez B, Guerrero-alonso P, Carmona-torres JM, Pozuelo-carrascosa DP, Laredo-aguilera JA, Cobo-cuenca AI. Health-related quality of life in levothyroxine-treated hypothyroid women and women without hypothyroidism: a case-control study. J Clin Med. 2020;9:1-12.
8. Tariq A, Wert Y, Cheriyath P, Joshi R. Effects of long-term combination LT4 and LT3 therapy for improving hypothyroidism and overall quality of life. South Med J. 2018;111:363-9.
9. Sheikh Miri A, Iravani M, Boostani H, Latifi M. The effect of cognitive behavioral therapy on sexual function in reproductive aged women with hypothyroidism: a randomized controlled clinical trial. BMC Psychiatry. 2023;23:357.
10. Janota B, Szczepańska E, Noras K, Janczewska E. Lifestyle and quality of life of women with diagnosed hypothyroidism in the context of metabolic disorders. Metabolites. 2023;13:1033.
11. Wyne KL, Nair L, Schneiderman CP, Pinsky B, Antunez Flores O, Guo D, et al. Hypothyroidism prevalence in the United States: a retrospective study combining national health and nutrition examination survey and claims data, 2009-2019. J Endocr Soc. 2022;7:bvac172.
12. Porcu E, Medici M, Pistis G, Volpato CB, Wilson SG, Cappola AR, et al. A meta-analysis of thyroid-related traits reveals novel loci and gender-specific differences in the regulation of thyroid function. PLoS Genet. 2013;9:e1003266.
13. Wilson SA, Stem LA, Bruehlman RD. Hypothyroidism: diagnosis and treatment. Am Fam Physician. 2021;103:605-13.
14. Sara JD, Zhang M, Gharib H, Lerman LO, Lerman A. Hypothyroidism is associated with coronary endothelial dysfunction in women. J Am Heart Assoc. 2015;4:e002225.
15. Davis MG, Phillippi JC. Hypothyroidism: diagnosis and evidence-based treatment. J Midwifery Womens Health. 2022;67:394-7.
16. Bode H, Ivens B, Bschor T, Schwarzer G, Henssler J, Baethge C. Association of hypothyroidism and clinical depression: a systematic review and meta-analysis. JAMA Psychiatry. 2021;78:1375-83.
17. Radanovic-Grguric L, Filakovic P, Barkic´ J, Mandic N, Karner I, Smoje J. Depresion en pacientes con alteraciones del tiroides. Eur J Psychiat. 2003;17:123-34.
18. Nuguru SP, Rachakonda S, Sripathi S, Khan MI, Patel N, Meda RT. Hypothyroidism and depression: a narrative review. Cureus. 2022;14:e28201.
19. Caneo C, Aedo I, Riquelme MJ, Fardella C. Disfunción tiroidea y trastornos del ánimo: revisión del estado del arte. Rev Méd Clín Las Condes. 2020;31:122-9.
20. Naz MS, Dovom MR, Tehrani FR. The menstrual disturbances in endocrine disorders: a narrative review. Int J Endocrinol Metab. 2020;18:e106694.
21. Kundakovic M, Rocks D. Sex hormone fluctuation and increased female risk for depression and anxiety disorders: from clinical evidence to molecular mechanisms. Front Neuroendocrinol. 2022;66:101010.
22. Jin Z, Ling J, Yu J, He M, Ni P, Zhang F, et al. Serotonin 2A receptor function and depression-like behavior in rats model of hypothyroidism. Exp Brain Res. 2021;239:2435-44.
23. Concepción-Zavaleta MJ, Coronado-Arroyo JC, Quiroz-Aldave JE, Concepción-Urteaga LA, Paz-Ibarra J. Thyroid dysfunction and female infertility. A comprehensive review. Diabetes Metab Syndr. 2023;17:102876.
24. Figueroa-Varela MR, Aguirre-Ojeda DP, Hernández-Pacheco RR. Asociación del deterioro cognitivo, depresión, redes sociales de apoyo, miedo y ansiedad a la muerte en adultos mayores. Psicumex. 2021;11:2021.
25. Picó-Monllor JA, Picó-Monllor JA. La ocupación laboral como factor de protección en el deterioro cognitivo leve. Med Segur Trab (Madr). 2022;68:83-9.
26. Jacobson MH, Howards PP, Darrow LA, Meadows JW, Kesner JS, Spencer JB, et al. Thyroid hormones and menstrual cycle function in a longitudinal cohort of premenopausal women. Paediatr Perinat Epidemiol. 2018;32:225-34.
27. Jimenez-Ibañez LC, Conde-Gutierrez YS, Torres-Trejo JA. Hipotiroidismo asociado con infertilidad en mujeres en edad reproductiva. Ginecol Obstet Mex. 2020;88:321-9.
28. Kabodmehri R, Sharami SH, Sorouri ZZ, Gashti NG, Milani F, Chaypaz Z, et al. The relationship between thyroid function and ovarian reserve: a prospective cross-sectional study. Thyroid Res. 2021;14:22.
29. Weeks AD. Menorrhagia and hypothyroidism. Evidence supports association between hypothyroidism and menorrhagia. BMJ. 2000;320:649.
30. Elbers LP, Fliers E, Cannegieter SC. The influence of thyroid function on the coagulation system and its clinical consequences. J Thromb Haemost. 2018;16:634-45.
31. Thakur M, Maharjan M, Tuladhar H, Dwa Y, Bhandari S, Maskey S, et al. Thyroid dysfunction in patients with abnormal uterine bleeding in a tertiary care hospital: a descriptive cross-sectional study. JNMA J Nepal Med Assoc. 2020;58:333-7.
32. Barbero A, Pagano M, Tuli G, Buganza R, De Sanctis L, Bondone C. Menorrhagia as main presentation sign of severe hypothyroidism in a pediatric patient: a case report. Ital J Pediatr. 2022;48:171.
33. Nikoobakht MR, Aloosh M, Nikoobakht N, Mehrsay AR, Biniaz F, Karjalian MA. The role of hypothyroidism in male infertility and erectile dysfunction. Urol J. 2012;9:405-9.

34. Koyyada A, Orsu P. Role of hypothyroidism and associated pathways in pregnancy and infertility: clinical insights. Tzu Chi Med J. 2020;32:312-7.
35. Szukiewicz D. Current insights in prolactin signaling and ovulatory function. Int J Mol Sci. 2024;25:1976.
36. Binita G, Suprava P, Mainak C, Koner BC, Alpana S. Correlation of prolactin and thyroid hormone concentration with menstrual patterns in infertile women. J Reprod Infertil. 2009;10:207-12.
37. García De Guadiana Romualdo L, González Morales M, Martín-Ondarza González MC, Martín García E, Martínez Uriarte J, Blázquez Abellán A, et al. Valoración de la función tiroidea durante la gestación: intervalos de referencia de tirotropina y tiroxina no unida a proteína durante el primer trimestre. Endocrinol Nutr. 2010;57:290-5.
38. Papadopoulou AM, Bakogiannis N, Skrapari I, Moris D, Bakoyiannis C. Thyroid dysfunction and atherosclerosis: a systematic review. *In Vivo*. 2020;34:3127-36.
39. Yamakawa H, Kato TS, Noh JY, Yuasa S, Kawamura A, Fukuda K, et al. Thyroid hormone plays an important role in cardiac function: from bench to bedside. Front Physiol. 2021;12:606931.
40. Wekking EM, Appelhof BC, Fliers E, Schene AH, Huyser J, Tijssen JG, et al. Cognitive functioning and well-being in euthyroid patients on thyroxine replacement therapy for primary hypothyroidism. Eur J Endocrinol. 2005;153:747-53.
41. Duntas LH, Jonklaas J. Levothyroxine dose adjustment to optimise therapy throughout a patient's lifetime. Adv Ther. 2019;36 Suppl 2:30-46.