

## HYPOTHYROIDISM AND PREGNANCY: THE IMPORTANCE OF PRENATAL DIAGNOSIS, TREATMENT AND MONITORING

### HIPOTIREOIDISMO E GESTAÇÃO: IMPORTÂNCIA DO PRÉ-NATAL NO DIAGNÓSTICO, TRATAMENTO E ACOMPANHAMENTO

### HIPOTIROIDISMO Y EMBARAZO: LA IMPORTANCIA DEL DIAGNÓSTICO PRENATAL, TRATAMIENTO Y SEGUIMIENTO

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## ABSTRACT

The research aimed to investigate the epidemiological profile of hypothyroidism during pregnancy in the city of Palmas-TO. This is a descriptive and exploratory study of documentary type, with quantitative approach, carried out at the Public Maternity and at the Center for Sexual and Reproductive Health. The analysis comprised 15 medical records of women with hypothyroidism, four from the Maternity and eleven from the Center for Sexual and Reproductive Health (CSRH). The average maternal age was 30.2 years and average gestational age was 16.3 years; the personal history of this disease was present in 14 individuals; history of abortions was present in 5; hormone replacement occurred in 4 pregnant women. Regarding the repeated hormonal assessments during pregnancy, there was one case according to the medical records. We conclude that monitoring occurred in a timely manner with pertinent interventions; however, it is necessary to improve the quality of the medical records, since missing information hindered the understanding of the prognosis of women under high-risk prenatal.

**Keywords:** Hypothyroidism; Thyroid Hormones; High-risk Pregnancy.

## RESUMO

A pesquisa teve por objetivo investigar o perfil epidemiológico do hipotireoidismo na gestação na cidade de Palmas-TO. Trata-se de um estudo descritivo e exploratório do tipo documental, com abordagem quantitativa, realizado na Maternidade Pública e no Centro de Saúde Sexual e Reprodutiva. Analisaram-se 15 prontuários de mulheres portadoras de hipotireoidismo, sendo quatro na Maternidade e 11 no Centro de Saúde Sexual e Reprodutivo (CSSR). A idade materna média foi de 30,2 anos; a idade gestacional média, de 16,3 anos; o histórico pessoal da doença contempla 14 indivíduos; a história de abortos contempla cinco; a reposição hormonal ocorreu em quatro gestantes. Em relação aos exames repetidos durante a gestação, obteve-se um registro nos prontuários. Concluiu-se que o acompanhamento se deu de forma pontual, com intervenções pertinentes, entretanto, é preciso melhorar a qualidade dos registros nos prontuários, uma vez que informações não preenchidas dificultaram o entendimento do prognóstico dessas mulheres no pré-natal de alto risco.

**Palavras-chave:** Hipotireoidismo; Hormônios Tireoidianos; Gestação de Alto Risco.

## RESUMEN

Este estudio tuvo como objetivo investigar el perfil epidemiológico del hipotiroidismo durante el embarazo en la ciudad de Palmas-TO. Se trata de un estudio exploratorio descriptivo tipo documental, con enfoque cuantitativo, conducido en la Maternidad Pública y en el Centro de Salud Sexual y Reprodutiva. Se analizaron los archivos médicos de 15 mujeres con hipotiroidismo, once de la Maternidad y cuatro del Centro de Salud Sexual y Reprodutiva (CSSR). La edad materna promedio era 30,2 años; la edad promedio de las embarazadas era 16,3 años; la historia personal de la enfermedad considera a 14 mujeres; la historia de abortos incluye a 5; el reemplazo hormonal se produjo en 4 mujeres embarazadas. En cuanto a los exámenes repetidos durante el embarazo se obtuvo 1 registro en los archivos. Se puede concluir que el seguimiento de las embarazadas ocurrió puntualmente con las intervenciones adecuadas; sin embargo, es necesario mejorar la calidad de los registros en los archivos ya que informaciones sin llenar perjudican la comprensión del pronóstico de las mujeres en el prenatal de alto riesgo.

**Palabras clave:** Hipotiroidismo; Hormonas Tiroideas; Gestación de Alto Riesgo.

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## INTRODUCTION

Hypothyroidism is characteristic by low production of hormones of the thyroid gland, leading to low blood levels of Triiodothyronine (T<sub>3</sub>) and Thyroxine (T<sub>4</sub>).<sup>1</sup> Changes in the production of thyroid hormones affect practically all functions of the organic system, with regulatory effects on cellular metabolic activity. When the T<sub>3</sub> and T<sub>4</sub> levels are diminished, all processes of the body are slowed down.<sup>2</sup>

The thyroid gland increases in size during pregnancy due to tissue hyperplasia and increased vascularity. This happens because of three factors: high estrogen rates, thyroid stimulators produced by the placenta and decreased iodine by the maternal thyroid.<sup>3</sup> However, low levels of the hormones T<sub>3</sub> and T<sub>4</sub> may cause obstetric complications such as maternal hypertension, preeclampsia, placental abruption, spontaneous abortion, anemia, postpartum hemorrhage, ventricular cardiac dysfunction, fetal death or stillbirth, low birth weight, and abnormal brain development.<sup>4</sup>

Women who have hypothyroidism and who wish to become pregnant should be encouraged to undergo the diagnostic test and, once the disease is confirmed, to have good control of T<sub>3</sub> and T<sub>4</sub> levels before conception. The diagnosis is confirmed based on dosages of TSH (Thyroid Stimulating Hormone) and T<sub>3</sub> and T<sub>4</sub> levels. When the pregnancy is confirmed, these hormones should be monitored from the first trimester of pregnancy onwards, every six or eight weeks. The treatment consists in replacement of thyroid hormones, with adjustments when necessary.<sup>5</sup>

In the state of Tocantins, in the period between January 2008 and June 2014, 8,055.73 cases of thyroid disorders related to iodine deficiency in women were reported. Of these, the municipalities with highest incidence were: Araguaína, with 3,152.14 reported cases, followed by Palmas with 2,308.13 and Gurupi with 1,371.89 notifications.<sup>6</sup>

It is, therefore, questionable how pregnant women with hypothyroidism have been screened at the Municipal Specialized Center and at the Public Maternity in the city of Palmas.<sup>6</sup>

During pregnancy, all women should do, at least every trimester of pregnancy, thyroid specific tests. However, many of women have hypothyroidism even before becoming pregnant but they are unaware of it. Other untreated women develop the disorder during pregnancy, which can pose serious risks to both the mother and the fetus. Although common, thyroid disorders are often overlooked. Therefore, health professionals should be attentive to the screening of prenatal exams, in order to trace, identify, diagnose and treat these pregnant women as early as possible.

The following are recommendations of the prenatal program: to carry out the first consultation as early as possible; attend at least six prenatal visits, one in the first trimester, two in the second trimester and three in the third trimester of preg-

nancy, preferably; and attend one consultation in the puerperium up to 42 days after birth, which is a good time to detect probable risks and prevent them.<sup>7</sup>

Endocrine changes in gestation most often do not present symptoms, and when they are discovered, they prevent to keep the conception and the evolution of pregnancy, leading to maternal-fetal complications. Due to the high incidence of cases of hypothyroidism in Brazil, especially in the North and Northeast regions where people are considered to be under risk for iodine deficiency, and due to the lack of scientific production on the theme in the State, the objective of this study was to investigate the epidemiological profile of hypothyroidism during gestation in a Public Maternity and in a Specialized Center in the city of Palmas.

## MATERIAL AND METHOD

This is a descriptive and exploratory research of the documentary type with quantitative approach carried out at the Center for Sexual and Reproductive Health (CSRH), a reference for high-risk pregnancies in the city of Palmas, and in the state maternity center that assists high-risk cases. The sample consisted of 15 medical records of pregnant women diagnosed with hypothyroidism assisted between January and July 2015 by the municipal and state network. The criterion of choice was the registration in the municipal and state health units of patients with a history of abortion. The instrument of data collection was guided by a closed questionnaire adapted for this research based on the guidelines of the *American Thyroid Association* and the *Endocrine Society*. Data analysis was based on quantitative approach, presented in tables. The research considered the ethical aspects of Research Involving Human Beings recommended by Resolution nº 466/2012 of the National Health Council (NHC). The study was conducted after approval by the Research Ethics Committee (REC) under protocol number 1,131,049/2015 and CAAE number 41188814.0.0000.5516.

## RESULTS

We analyzed a total of 15 medical records of women with hypothyroidism in the Public Maternity and in the Center for Sexual and Reproductive Health. All the medical records investigated confirmed that the pregnant women had hypothyroidism and that they were referred from basic health units to the municipal and state high-risk reference units. Personal history of thyroid disorders was not reported in only one medical record, but this was confirmed by laboratory tests.

The mean maternal age was 30.2 years (15) and the mean gestational age was 16.3 (15). The personal history of the disease comprised 14 individuals (93%), while the history of abortions

was verified in five (33%). Hormone replacement occurred in four (27%) cases. In relation to the repeated examinations during pregnancy, 11 records (73%) were verified in the medical records.

Table 1 - Distribution of variables according to gestational age, personal history, abortion, hormone replacement and repeated assessments – Palmas, 2015

	Condition	PM* n (%)	CSRH** n (%)
Gestational Age	From 01 to 10 weeks	–	2 (13)
	From 11 to 20 weeks	4 (27)	4 (27)
	From 21 to 30 weeks	–	2 (13)
	More than 31 weeks	–	2 (13)
	Not informed	–	1 (7)
Personal History	Yes	4 (27)	10 (66)
	No	–	–
	Not informed	–	1 (7)
Cases of Abortion	Yes	–	5 (34)
	No	2 (13)	4 (27)
	Not informed	2 (13)	2 (13)
Hormonal Replacement	Yes	1 (7)	3 (20)
	No	1 (7)	–
	Not informed	2 (13)	8 (53)
Repeated Assessments	Yes	4 (27)	7 (46)
	No	–	–
	Not informed	–	4 (27)

Source: medical records of the Public Maternity and the Center for Sexual and Reproductive Health of the municipality of Palmas, 2015.

\* PM: Public Maternity; \*\* CSRH: Center for Sexual and Reproductive Health.

## DISCUSSION

The present study aimed to evaluate the diagnosis, treatment and follow-up of pregnant women with hypothyroidism. Based on the analyzed parameters, it was evident that some pregnant women with hypothyroidism presented typical signs of thyroid disorders during the gestational period and that repeated hormonal assessments and increased hormonal replacement took place during pregnancy, according to recommendations of some literatures. However, only four of the 15 medical records analyzed reported thyroid hormone replacement and increase (Puran T<sub>4</sub> during the gestational period. This confirms the difficulty for researchers to analyze the medical charts and obtain satisfactory results of high-risk prenatal care offered by the investigated units.

Pregnancy is an important event and thyroid dysfunction is a common disorder during the reproductive period.<sup>8</sup> Thyroid hormones play a key role during this phase, when excessive stimulation of thyroid function happens due to the action of pregnancy hormones.<sup>4</sup>

During gestation, the thyroid goes through physiological changes such as enlargement and vascularization. These changes are stimulated by the hCG, a pregnancy hormone that stimulates the thyroid from the first trimester onwards, decreasing the concentration of TSH.<sup>9</sup> These metabolic changes that occur during pregnancy are reversible at the postpartum.<sup>10</sup>

Thyroid hormones are essential for the development of the fetus in the first trimester of gestation, being the main source of hormonal supply during this period. They are responsible for normal myelination, regulation of the migration of cells in the cortex, cerebellum and hippocampus, and differentiation of neurons.<sup>11</sup> Studies have shown that during 18 to 20 weeks of gestation, the fetus' thyroid is not functional.<sup>10</sup> Consequently, the fetus depends exclusively on the maternal thyroid hormones that cross the placenta for its neurological development.<sup>12</sup>

The earlier the identification of thyroid disorders, the faster is the follow-up and treatment, thus preventing maternal and fetal complications such as abortion, pre-eclampsia, prematurity, among others.<sup>13</sup>

Maternal age has been considered a risk factor for gestation, either when this is precocious or advanced, being related to possible complications for both maternal and fetal health. In this sense, special attention is essential during prenatal care; in the case of young women, many of them delay to start prenatal care, which may lead to hypertensive disorders, low birth weight, prematurity and complications during childbirth.<sup>14</sup> Gestations in older ages have the highest incidence of hypertensive disorders and gestational diabetes. In addition, existing latent problems may be triggered due to the progressive decline of the woman's hormonal functions.<sup>15</sup>

Abortion is one of the most common complications during pregnancy when thyroid dysfunctions are not investigated. In case of evidence of disorders, it is necessary to carry out screening, especially in women with a history of spontaneous abortions, so that they may receive adequate hormonal supplementation.<sup>16</sup>

Because thyroid dysfunction is common during pregnancy and usually asymptomatic, its effects may have adverse maternal and fetal consequences; these can be avoided with early detection during pregnancy. This screening will benefit pregnant women and their fetuses because of the possibility of applying preventive measures.<sup>17</sup>

Research studies<sup>12</sup> have shown that women with untreated hypothyroidism during pregnancy have children with marked intellectual disability compared to pregnant women who carefully undergo hormone replacement, experiencing a calm pregnancy and giving birth to healthy children. According to Sahay and Nagesh<sup>10</sup>, researches have shown that children born to mothers with hypothyroidism are at high risk of IQ deficit. Children born to untreated mothers had IQ values below to the average of those born to mothers who received adequate

supplementation. It is worth noting that women who use supplementation below the ideal amount run also this risk.<sup>10</sup>

Pregnancy is a unique moment. The diagnosis of thyroid dysfunction represents a risk factor to mothers and fetuses. It is, thus, fundamental to screen women who intend to become pregnant and those who are already pregnant. There are controversies, though, regarding the active search of these patients.<sup>18</sup>

There are several organizations that guide the screening of thyroid function during pregnancy. The most recent ones have suggested specifically approaching women who present factors that favor thyroid dysfunction. However, there is a lack of consensus about performing the screening despite the evidence that lack of timely detection and treatment may compromise the neuropsychological development of the child.<sup>19</sup> According to Cignini *et al.*<sup>9</sup>, thyroid function must be investigated in cases of autoimmune diseases, personal history or family history.

There is a consensus that this initiative should be incorporated into care because it favors the universal screening that could help in the diagnosis and appropriate management of thyroid dysfunctions during pregnancy, and consequently minimize maternal and fetal complications.<sup>20</sup>

Levothyroxine has been the main choice to treat hypothyroidism during pregnancy. Physiological changes make it necessary to increase the daily dose of thyroid hormone, which varies, on average, from 30 to 50% more than the usual dose.<sup>10</sup> TSH levels should be kept within normal ranges in the third trimester. Women should be free of thyroxine, within the normal range, and should be monitored every four to six weeks so that dose adjustments may be made as needed.<sup>21</sup>

After four weeks from delivery, women should decrease the hormone dosage, which was increased during gestation, returning to the dose they used to take during the pre-gestational period. Women who started taking hormone doses during pregnancy will need half the dose they took before giving birth. Pregnant women with subclinical hypothyroidism may stop taking the medication after childbirth and should be evaluated after six weeks to decide whether or not to continue the hormonal treatment.<sup>22</sup> Thyroid function tests should be carried out for at least six months after delivery so as to determine whether the hypothyroidism was gestational or permanent.<sup>10</sup>

## CONCLUSION

The research demonstrated the existence of clinical interventions for diagnosis of hypothyroidism during pregnancy. However, improvements and adjustments are necessary in the prenatal care provided in the units studied, so that essential clinical or care information recorded by health and administrative professionals may not be missing, in order to help in the

understanding of the outcomes and contribute in the promotion of the women's health.

It is expected that this study helps health service managers and executors in order to enhance the care that this disease requires before and during pregnancy. Furthermore, we expect that appropriate diagnoses, treatments and follow-ups may be established for women who intend to become pregnant and those already pregnant during prenatal consultations, promoting an improvement in the quality of life of these women and their children during and after pregnancy.

## REFERENCES

1. Ministério da Saúde (BR). Agência Nacional de Saúde Suplementar. Hipotireoidismo: diagnóstico. Rio de Janeiro: ANS; 2009. [cited 2016 Jan 10]. Available from: <http://diretrizes.amb.org.br/ans/hipotireoidismo-diagnostico.pdf>
2. Hofstetter T, Matter LB. Incidência de hipotireoidismo auto-imune em pacientes atendidos na cidade de Três de Maio, RS. *Rev Bras Análises Clín.* 2005;37(3):163-8.
3. Sahay RK, Nagesh VS. Hypothyroidism in pregnancy. *Indian J Endocrinol Metab.* 2012[cited 2016 Jan 10];16(3):364-70. Available from: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3354841/>. DOI: 10.4103/2230-8210.95667
4. Nazarpour S, Tehrani FR, Simbar M, Azizi F. Thyroid dysfunction and pregnancy outcomes. *Iran J Reprod Med.* 2015[cited 2016 Mar 03];13(7):387-96. Available from: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4609317/pdf/ijrm-13-387.pdf>.
5. Medeiros MFS, Cerqueira TLO, Silva Júnio C, Amaral MTR, Vaidya B, Poppe KG, *et al.* An international survey of screening and management of hypothyroidism during pregnancy in Latin America. *Arq Bras Endocrinol Metab.* 2014[cited 2016 Feb 05];58(9):906-11. Available from: [http://www.scielo.br/scielo.php?script=sci\\_arttext&pid=S0004-27302014000900906&lng=en&nrm=iso&tlng=en](http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0004-27302014000900906&lng=en&nrm=iso&tlng=en). DOI: 10.1590/0004-2730000003382.
6. Ministério da Saúde (BR). Departamento de Informática do SUS: epidemiológicas e morbidade. Brasília: MS; 2014. [cited 2016 Mar 03]. Available from: <http://datasus.saude.gov.br>.
7. Ministério da Saúde (BR). Instituto Sírio-Libanês de Ensino e Pesquisa. Protocolos da atenção básica: saúde das mulheres. Brasília: MS; 2016. [cited 2016 Mar 05]. Available from: [http://189.28.128.100/dab/docs/portaldab/publicacoes/protocolo\\_saude\\_mulher.pdf](http://189.28.128.100/dab/docs/portaldab/publicacoes/protocolo_saude_mulher.pdf).
8. Han C, Li J, Wang W, Xie X, Zhou W, Li C, *et al.* High body mass index is an indicator of maternal hypothyroidism, hypothyroxinemia, and thyroid-peroxidase antibody positivity during early pregnancy. *Biomed Res Int.* 2015[cited 2016 Mar 01];351831:1-17. Available from: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4530209/>. doi: 10.1155/2015/351831.
9. Cignini P, Valentina E, Giorlandino C, Capriglione S, Spata A, Dugo N. Thyroid physiology and common diseases in pregnancy: review of literature. *J Prenat Med.* 2012[cited 2016 Jan 15];6(4):64-71. Available from: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3530964/>.
10. Sahay RK, Nagesh SRI. Hypothyroidism in pregnancy. *Indian J Endocrinol Metab.* 2012[cited 2016 Jan 10];16(3):364-70. Available from: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3354841/>. DOI: 10.4103/2230-8210.95667.
11. Andersen SL, Laurberg P, Wu CS, Olsen J. Maternal thyroid dysfunction and risk of seizure in the child: a danish nationwide cohort study. *J Pregnancy.* 2013[cited 2016 Feb 01];2013(636705):1-10. Available from: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3745964/>. DOI: 10.1155/2013/636705.
12. Chang DLF, Leung AM, Braverman LE, Pearce EN. Thyroid testing during pregnancy at an Academic Boston Area Medical Center. *J Clin Endocrinol Metab.* 2011[cited 2016 Jan 10];96(9):E1452-56. Available from: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3417162/>. DOI: 10.1210/jc.2011-0360.

13. Rajput R, Goel V, Nanda S, Rajput M, Seth S. Prevalence of thyroid dysfunction among women during the first trimester of pregnancy at a tertiary care hospital in Haryana. *Indian J Endocrinol Metab.* 2015[cited 2016 Mar 05];19(3):416-9. Available from: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4366784/>. DOI: 10.4103/2230-8210.152791.
14. Santana FG, Santos FS, Feitosa MO, Farias FBB, Santos FCS, Neto MS, et al. Relação entre a idade materna e condições perinatais no município de Augustinópolis-TO. *Rev Pesq Saúde.* 2010[cited 2016 Jan 10];11(3):35-40. Available from: <http://www.periodicoseletronicos.ufma.br/index.php/revistahuufma/article/view/782/496>.
15. Gonçalves ZR, Monteiro DLM. Complicações maternas em gestantes com idade avançada. *Rev Femina.* 2012 [cited 2016 Jan 20];40(5):276-9. Available from: <http://files.bvs.br/upload/S/0100-7254/2012/v40n5/a3418.pdf>.
16. Lovegreen J, Schust DJ. Maternal hypothyroidism and pregnancy loss: awaiting firm recommendations on testing and treatment. *Gynecol Obstet (Sunnyvale).* 2013[cited 2016 Feb 10];3(1):1-3. Available from: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3825520/>. DOI: 10.4172/2161-0932.1000142.
17. Lazaro JH. Screening for thyroid dysfunction in pregnancy: is it worthwhile? *J Thyroid Res.* 2011[cited 2016 Jan 20];2011(397012):1-4. Available from: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3134289/>. DOI: 10.4061/2011/397012.
18. Tudosa R, Vartej P, Horhoianu I, Ghica C, Mateescu S, Dumitrache E. Maternal and fetal complications of the hypothyroidism-related pregnancy. *Maedica.* 2010[cited 2016 Apr 05];5(2):116-23. Available from: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3150006/>.
19. Vaidya B, Dydejczyk AH, Laurberg P, Negro R, Vermiglio F, Poppe K. Treatment and screening of hypothyroidism in pregnancy: results of a European survey. *European J Endocrinology.* 2012[cited 2016 Mar 05];166(1):49-54. Available from: <http://www.eje-online.org/content/166/1/49.long>. DOI: 10.1530/EJE-11-0729.
20. Sharmeen M, Shamsunnahar PA, Laita TR, Chowdhury SB. Overt and subclinical hypothyroidism among Bangladeshi pregnant women and its effect on fetomaternal outcome. *Bang Med Res Counc Bull.* 2014[cited 2016 Jan 12];40(2):52-7. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/26415340>.
21. Stagnaro-Green A, Abalovich M, Alexander E, Azizi F, Mestman J, Negro R, et al. Guidelines of the American Thyroid Association for the diagnosis and management of thyroid disease during pregnancy and postpartum. *Thyroid.* 2011[cited 2016 Jan 10];21(10):1081-125. Available from: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3472679/>. DOI: 10.1089/thy.2011.0087.
22. Ramprasad M, Bhattacharyya SS, Bhattacharyya A. Thyroid disorders in pregnancy. *Indian J Endocrinol Metab.* 2012[cited 2016 Apr 10];16(Suppl 2):S167-70. Available from: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3603018/>. DOI: 10.4103/2230-8210.104031.