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Prevalence of Hypothyroidism and Hyperthyroidism Among Women of Reproductive Age in Wadi-Etba - South of Libya

*Annour M Alalem1 and Ali MB Nouh2

Department of Public Health, Faculty of Medical Technology - Fezzan University[1]

Medical Bioscience Department, University of the Western Cape, South Africa[2]

A B S T R A C T

in women of reproductive age, thyroid disorders can be caused by a complex interaction between thyroid hormones and the hypothalamic-pituitary gland. This causes abnormal thyroid function, including hyperthyroidism and hypothyroidism, which can delay puberty, increase early pregnancy loss, and cause recurrent abortions. **Objective:** To determine the prevalence of thyroid disorders in women of reproductive age in Wadi Etba - South of Libya and evaluate the thyroid disease in both non-pregnant and pregnant women. **Design and data collection:** The study was conducted on 233 women aged 15-49 in reproductive ages, who were tested for thyroid function at Al-Abedin Medical Laboratory Wadi Elba. Data collected over the past five years include T3, T4 and TSH hormones. **Results:** The prevalence of thyroid dysfunction is 45% among 233 women 37 hypothyroid (16%) and 68 hyperthyroid (29%). The thyroid function abnormality is found in 53 non-pregnant women, with 19 hypothyroid (8%) and 34 hyperthyroid (15%). A total of 52 abnormal thyroid functions were also found in pregnant women (18) hypothyroid (7.7%) and 34 hyperthyroid (15%). Our study found a statistically significant difference ($P < 0.05$) between the normal/abnormal thyroid function groups. **Conclusion**: A high prevalence of thyroid dysfunction was found in Wadi Etba - South of Libya, affecting one in five women of reproductive age. The rates of hyperthyroidism among women are also higher than those of hypothyroidism. As a result, early detection and treatment of thyroid disorders can ensure normal reproductive function and prevent complications for both fetus and mother.

Keywords: Hypothyroidism, Hyperthyroidism, Reproductive age, Thyroid hormones and Wadi Etba.

*Corresponding author:
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دراسة مدى إنتشار قصور وفرط نشاط الغدة الدرقية بين النساء في سن الإنجاب بوادي عتبة جنوب ليبيا

*النور محمد احمد العالم[1] و علي محمد نوح[2]
[1]قسم الصحة العامة – كلية التقنية الطبية مرزق – جامعة فزان
[2]قسم العلوم البيولوجية – جامعة غرب كيب تاون – جنوب افريقيا

الملخص

المقدمة: النساء في سن الإنجاب ، يمكن أن تحدث عندها اضطرابات الغدة الدرقية، بسبب تفاعل معقد بين هرمونات الغدة الدرقية والغدة النخامية, مما يؤدي إلى خلل في وظيفة الغدة الدرقية ، بما في ذلك قصور وفرط نشاط الغدة الدرقية ، مما قد يؤخر البلوغ ويزيد من فقدان الحمل المبكر, ويسبب الإجهاض المتكرر. **الهدف:** تحديد مدى انتشار اضطرابات الغدة الدرقية لدى النساء في سن الإنجاب بوادي عتبة - جنوب ليبيا وتقييم مرض الغدة الدرقية لدى النساء الحوامل. المواد والطرق: أجريت هذه الدراسة على 233 امرأة تتراوح أعمارهن بين 15 و 49 عامًا في سن الإنجاب ، وتم اختبار وظائف الغدة الدرقية في مختبر العابدين للتحاليل الطبية بوادي عتبة, على الهرمونات(T3 و T4 و TSH) على مدى الخمس السنوات الماضية. **النتائج:** بلغ معدل انتشار إضطرابات الغدة الدرقية 45٪ من بين 233 امرأة (37 حالة قصور الغدة الدرقية (16٪), و 68 حالة فرط نشاط الغدة الدرقية (29٪)). كما اتضح من خلال الدراسة اضطرابات في وظائف الغدة الدرقية في 53 امرأة غير حامل (19 حالة قصور الغدة الدرقية (8٪), و 34 حالة فرط نشاط الغدة الدرقية (15٪)). ووجدت 52 حالة غير طبيعية للغدة الدرقية عند النساء الحوامل (18 حالة قصور الغدة الدرقية (7.7٪) و 34 حالة فرط نشاط الغدة الدرقية (15٪)). وأظهرت الدراسة فروق ذات دلالة إحصائية ($P < 0.05$) بين مجموعات وظائف الغدة الدرقية الطبيعية وغير الطبيعية. **الخلاصة:** أوضحت الدراسة ان هناك انتشار كبير فى أضطراب هرمونات الغدة الدرقية في وادي عتبة - جنوب ليبيا ، حيث تصيب واحدة من كل خمس نساء في سن الإنجاب ، كما أن النساء المصابات بفرط نشاط الغدة الدرقية أعلى من اللواتي يعانين من قصور الغدة الدرقية. ووفقا لنتائج الدراسة يتطلب الكشف المبكر وعلاج اضطرابات هرمونات الغدة الدرقية مما يضمن الإنجاب الطبيعي ويمنع المضاعفات لكل من الأم والجنين.

الكلمات المفتاحية: سن الإنجاب ، فرط نشاط الغدة الدرقية ، قصور الغدة الدرقية ، هرمونات الغدة الدرقية, وادي عتبة.

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INTRODUCTION

Thyroid disorder can affect women of reproductive age negatively by causing fatigue, obesity, lethargy, behavioral changes, and infertility conditions [1]. Due to the complicated interaction between thyroid hormones and the hypothalamus-pituitary system, thyroid disease is a common problem in reproduction health [2]. Resulting in abnormalities in thyroid function, including hyperthyroid and hypothyroid that can delayed puberty, recurrent abortions and increased early pregnancy loss [3, 4]. Hypothyroidism and hyperthyroidism are often the results of thyroid disorders (primary thyroid disease), but hypothalamus or pituitary disorders can occur rarely [5].

Thyroid hormones affects nearly every stage of reproduction cycle and act on practically every cell within the body [6,7]. The presence of altered levels of thyroid hormone is associated with impaired folliculogenesis, a lower quality embryo, and a lower rate of fertilization[8]. For fertility, pregnancy, and to maintain a healthy pregnancy, thyroid function must be tested. It is important to test for thyroid hormones such as triiodothyronine (T3), thyroxine (T4), and thyroid stimulating hormone (TSH) [9, 10]. A typical thyroid hormone can affect virtually every tissue in the body, such as its development, differentiation, metabolic balance, and physiological function [11]. According to studies, 2–4% of women of reproductive age have hypothyroidism[10, 12]. Hypothyroidism affects fertility in non-pregnant women through an ovulatory cycles, hyperprolactinemia, luteal phase defects, and hormonal imbalances [13]. Hypothyroidism in pregnancy can lead to high blood pressure, gestational hypertension, cretinism, fetal death, and spontaneous abortions [14].

The incidence of hyperthyroidism during pregnancy is uncommon, and higher among populations with a low level of iodine [15, 16]. The causes of hyperthyroidism include hyperplasia, overstimulation of the thyroid epithelium, and medications[17]. In pregnant women, hyperthyroidism leads to heart failure, preeclampsia, preterm delivery, and still births [14]. The prevalence of hyperthyroidism in pregnancy is between 0.1% and 1%[18], whereas the women aged 60 years or over a frequency ranging between 0.5 and 2% [19, 20]. While hyperthyroidism is rare during pregnancy, it should still be considered because negative effects can adversely affect mother and fetus [16].

As thyroid dysfunction presents clinically in a variety of ways and is non-specific, most thyroid disorders are diagnosed biochemically [21]. Thyroid disorders are more common in women during their reproductive years, as well, no data is available on thyroid dysfunction among women in our area. Thus, we proposed to examine the prevalence of thyroid dysfunction in pregnant and non-pregnant women of reproductive age.

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METHODS

STUDY DESIGN

The study was conducted in Wadi-Etba, South Libya, to investigate the prevalence and evaluate of the thyroid function. At the Al-Abedin Medical laboratory Wadi Etba, thyroid function tests have been collected over the last five years. This study involved women in reproductive age who had thyroid tests.

DATA COLLECTION

The results of thyroid function tests on women aged 15-49 were collected between January 2017 and December 2021. A total of 233 participants were divided into two groups (non-pregnant and pregnant). The collected data included T3, T4 and TSH hormones, as well as demographic and pregnancy information.

STATISTICAL ANALYSIS

Calculations were used to analyze quantitative data (e.g. means, standard deviations, percentages). In statistics, a t-test was used to measure differences between two groups' means, were carried out using SPSS, version 20.0. P-value of <0.05 was considered statistically significant.

RESULTS

The total of 233 women lived in Wadi Etba who were of reproductive ages (15–49 years, two groups of non-pregnant and pregnant women were divaded. The first analysis to evaluate thyroid function by comparing abnormal and normal levels of T3,T4 and TSH parameters among non-pregnant and pregnant women.

The prevalence of thyroid dysfunction is 45% among 233 women 37 hypothyroid (16%) and 68 hyperthyroid (29%). The thyroid function abnormality is found in 53 non-pregnant women, with 19 hypothyroids (8%) and 34 hyperthyroids (15%). A total of 52 abnormal thyroid functions were also found in pregnant women (18 hypothyroid (7.7%) and 34 hyperthyroid (15%), as showed in Table 1.

Table (1). The prevalence of thyroid dysfunction in women of reproductive age with a pregnant stste (in %).

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Thyroid Dysfunction					
Women state	Normal	Abnormal n(%)			Total
		Hypothyroidism	Hyperthyroidism		
Non-pregnant	60	19(8%)	34(15%)	53	113
Pregnant	68	18(7.7%)	34(15%)	52	120
	128	37(16%)	68(29%)	105(45%)	233

In Tables 2 and 3, we analyzed the difference between the normal and abnormal mean T3, T4 and TSH hormone levels of the all group women of reproductive ages, non-pregnant women and pregnant women. Hypothyroidism group thyroid dysfunction (normal, abnormal) were T3 (2.2± 0.6, 0.8 ±0.02 nmol/L). The mean value of T3 (normal, abnormal) among hypothyroidism non-pregnant women (2.2±0.5, 0.9±0.05 nmol/L), respectively, while pregnant women were T3 (2.1±0.4, 0.8±0.1 nmol/L), respectively.

In the hyperthyroidism group, normal and abnormal mean value of T4 hormone (115.1±24, 194.1±37 nmol/L), respectively. The mean value of T4 (normal, abnormal) among hyperthyroidism non-pregnant women (111.6±26, 195.1±35 nmol/L), respectively, while pregnant women were T4 (115.4±21, 193.1±39 nmol/L), respectively.

Mean TSH value (normal, abnormal) among hypothyroidism group women (1.31±0.7, 23.8±8.1 µIU/L), respectively. The mean value of TSH (normal , abnormal) among hypothyroidism non-pregnant women (1.3±0.8, 0.16±0.08 µIU/L), respectively, while pregnant women were TSH (1.7±0.7, 31.6±2.3 µIU/L), respectively. TSH mean value (normal, abnormal) among hyperthyroidism group women (1.6±1, 0.23±0.2µIU/L), respectively. The hyperthyroidism non-pregnant women (2.1±0.7, 18. 1±8 µIU/L), respectively, while pregnant women were TSH (1.3±0.9, 0.2±0.1µIU/L), respectively. There was a statistically significant difference between the normal/abnormal thyroid function groups, $P < 0.05$.

Table (2). Show the differences between normal and abnormal mean values of the T3 and T4 hormones in women of all groups, non-pregnant and pregnant.

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Thyroid Dysfunction	Variables	Number	Mean ±SD	P. value
Hypothyroidism	T3 (nmol/L) Normal	30	2.2±0.6	0.00
	T3(nmol/L) Abnormal	30	0.8±0.02	
	T3 (nmol/L) Normal (Non-pregnant)	13	2.2±0.5	
	T3 (nmol) Abnormal (Non-pregnant)	13	0.9±0.05	
	T3 (nmol/L) Normal (Pregnant)	15	2.1±0.4	
	T3 (nmol/L) Abnormal (Pregnant)	15	0.8±0.1	
Hyperthyroidism	T4 (nmol/L) Normal	59	115.1±24	
	T4 (nmol/L) Abnormal	59	194.1±37	
	T4 (nmol/L) Normal (Non-pregnant)	28	111.6±26	
	T4 (nmol/L) Abnormal (Non-pregnant)	28	195.1±35	
	T4 (nmol/L) Normal (Pregnant)	31	115.4±21	
	T4 (nmol/L) Abnormal (Pregnant)	31	193.1±39	

Table (3). Show the differences between normal and abnormal mean values of the TSH hormones in women of all group, non-pregnant and pregnant.

Thyroid Dysfunction	Variables	Number	Mean ±SD	P. value
Hypothyroidism	TSH (µIU/L) Normal	11	1.31±0.7	0.00
	TSH (µIU/L) Abnormal	11	23.8±8.1	
	TSH (µIU/L) Normal (Non-pregnant)	12	1.3±0.8	
	TSH (µIU/L) Abnormal (Non-pregnant)	12	0.16±0.08	
	TSH (µIU/L) Normal (Pregnant)	2	1.7±0.7	
	TSH (µIU/L) Abnormal (Pregnant)	2	31.6±2.3	
Hyperthyroidism	TSH (µIU/L) Normal	23	1.6±1	
	TSH (µIU/L) Abnormal	23	0.23±0.2	
	TSH (µIU/L) Normal (Non-pregnant)	6	2.1±0.7	
	TSH (µIU/L) Abnormal (Non-pregnant)	6	18.1±8	
	TSH (µIU/L) Normal (Pregnant)	8	1.3±0.9	
	TSH (µIU/L) Abnormal (Pregnant)	8	0.2±0.1	

DISCUSSION

In this study, thyroid disorders are highly prevalent in women of reproductive age. A majority of the women in the study had hyperthyroidism 37 hypothyroid (16%) and 68 hyperthyroid (29%). This current prevalence is dramatically higher than the

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previously reported, 8.8% hypothyroidism and 3.4% hyperthyroidism among women in reproductive age [22]. There are differences in diagnostic outsets and their sensitivity, population selection, and iodine intake that make it difficult to compare thyroid dysfunction prevalence and incidence between countries [21].

In this study, hyperthyroidism was observed in 34% of non-pregnant women and 34% of pregnant women to be more prevalent than hypothyroidism (19% and 18%), respectively. In other hand, a study demonstrated that the hypothyroidism (32%) and hyperthyroidism (9%) in non pregnant women in the Western province of Saudi Arabia [23]. A study showed in hypothyroidism (7%) and hyperthyroidism (4%) during pregnancy [24]. Another studies, hyperthyroidism in pregnant, its prevalence ranging between 0.1- 1% [18, 25]. It might be explained by the fact that hyperthyroidism in the reproductive age group is linked with oligomenorrhea [22].

Autoantibodies cause patients with classical hyperthyroidism which affects the TSH receptors that stimulate thyroid follicular cell receptors to increase produce thyroid hormones [26]. As a result of autoantibodies attacking TSH receptors that cause autoimmune thyroid stimulation, may promate thyrotoxicosis [16]. It appears that there is high hyperthyroidism in this study, and it is important to screen for both thyroid dysfunction as well as thyroid antibodies in women of reproductive age. There was a significant increase in TSH levels in hypothyroidism and a decrease in levels in hyperthyroidism, indicating overt-hypo/hyperthyroidism. Furthermore, in non-pregnant and pregnant women suffering from thyroid disorders, there were significant differences between normal and abnormal levels of T3, T4, and TSH hormones.

CONCLUSION

There was a high prevalence of thyroid dysfunction among women with hyperthyroidism which put them at more risk of infertility and developing fetal problems than that of hypothyroidism. Early detection and treatment of thyroid disorder is essential for regular reproductive function and for preventing fetal and maternal complications. To determine thyroid dysfunction, additional studies are needed, including screening for autoimmunity at every pregnancy term.

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