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Research Article

## Prevalence of Thyroid Disorders and Reference Range of Thyroid Hormones among Pregnant Women in Bosaso City, Somalia

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### Abstract

**Background:** Thyroid dysfunctions are among the most prevalent of medical conditions, and considered the most prevalent disorders in women during pregnancy, and can adversely affect obstetric outcomes. The aim of this study was to determine the prevalence of thyroid disorders among pregnant women in Bosaso city, Somalia, and to initiate normal levels of thyroid related hormones

**Materials and methods:** This study was cross-sectional hospital-based study conducted at University of Health Science Hospital (Prof Abdirisak Hospital), Bosaso city, Somalia during the period of August 2023 to December 2023. a total of 250 pregnant women were included in the study. A total of five ml of whole blood was collected from each participant into sterile plain containers for thyroid hormones estimation. Estimation of thyroid hormones was done by using CLIA technique (Maglumi 800). The data was gathered using per-designed structural questionnaire and the SPSS 26.0 statistical software (SPSS Inc., USA) was used for statistical analysis.

**Results:** The overall prevalence of thyroid disorders were 33 (13.2%), 8% of them were hyperthyroidism and the rest 5.2% were hypothyroidism. The reference range for TSH, T3 and T4 were (0.07 mIU/L-4.14 mIU/L), (0.19 nmol/L-4.98 nmol/L), and (0.21 nmol/L-3.69 nmol/L) respectively.

**Conclusion:** This study concluded that there is a slightly higher frequency of thyroid dysfunction disorders among pregnant women.

**Keywords:** Thyroid function test, Thyroid dysfunction, T3, T4, TSH, Pregnant women

## INTRODUCTION

Thyroid hormones are produced by the thyroid gland and play a crucial role in regulating metabolism, growth, and development in the body. The two main hormones produced by the thyroid gland are thyroxine (T4) and triiodothyronine (T3). These hormones help control the rate at which the body uses energy, regulate body temperature, and affect other vital functions. Imbalances in thyroid hormone levels can lead to various health issues, such as hypothyroidism or hyperthyroidism <sup>1</sup>.

Hypothyroidism and hyperthyroidism are most prevalent in women ages 15-35 years old, hypothyroidism can lead in pregnant women to complications such as preeclampsia, premature birth, and low birth weight. It is important for pregnant women with hypothyroidism to receive appropriate thyroid hormone replacement therapy and regular monitoring <sup>2</sup>.

Thirty percent of the world's populations live in areas of iodine deficiency. Thyroid dysfunction is ten times more common in women than men, especially it has been found more prevalence in pregnant women <sup>3,4</sup>.

Identifying the prevalence of thyroid disorders in pregnant women can aid in the development of appropriate screening and diagnostic guidelines. Early detection and management of thyroid disorders during pregnancy can help mitigate potential adverse effects on maternal and fetal health. Moreover, studying the prevalence of thyroid disorders in pregnant women can contribute to our understanding of the broader public health impact of these conditions. This information can inform healthcare policies, resource allocation, and the development of targeted interventions to support the health and well-being of pregnant women and their babies in Somalia, and because of less data available about prevalence thyroid disorders in Somalia, this study is aimed to determine the prevalence of thyroid disorders among pregnant women in Somalia.

## MATERIALS AND METHODS

This study was cross-sectional hospital-based study conducted at University of Health Science Hospital (Prof Abdirisak Hospital), Bosaso, Somalia during the period of August 2023 to December 2023. Pregnant women who came at University of Health Science Somalia Hospital (Prof Abdirisak Hospital), during the aforementioned period were included. In addition to that, any pregnant woman who refused to give consent was

excluded. 250 subjects were included. A total of five ml of whole blood was collected from each participant into sterile plain container for thyroid hormones estimation. Estimation of thyroid hormones was done by using CLIA technique (Maglumi 800). The data was gathered using pre-designed structural questionnaire and the SPSS 26.0 statistical software (SPSS Inc., USA) was used for statistical analysis. Finally, the study was licensed by the ethical committee of University of Health Science Somalia Hospital, and gynecological data were independent variables. Confidence intervals of 95% were calculated and  $P < 0.05$  was considered significant. In case of discrepancy between the results of the univariate and the results of multivariate analyses, the later was taken as final.

## RESULTS

A Total of 250 samples were collected from pregnant women, their age ranged from 15–40 years with a mean age of 27.5 years old. In the laboratory diagnosis, the prevalence of thyroid dysfunctions among pregnant females evaluated for thyroid dysfunction was 13.2 % (33/250) and maximum respondents were Euthyroid 217 (86.8%) followed by 20 (8%) of respondents, were hyperthyroid and 13 (5.2%) respondents had hypothyroid.

As one of our objectives was to try to estimate the mean average of thyroid hormone levels among healthy pregnant females who have normal thyroid function (according to the international values), we found the average ranges of TSH was (0.07-4.14 mIU/L), T3 (0.19-4.98 nmol /L) and T4 (0.21- 3.69 pg ml).

Also, there was slight fluctuation of the mean values of thyroid hormones according to trimester in Euthyroid pregnant women as follow: T4 increased slightly in the second trimester and in the third trimester while T3 dropped slightly in the second trimester and in the third trimester, again TSH slightly dropped by in the second and third trimesters respectively.

On further analysis and with regard to the age (OR= 1.3; CI=1.1-1.3; P value= 0.042) family history of autoimmune diseases (AID) (OR=13.1; CI=, 2.1-59.4; P value =0.042) and rural residence (OR=12.7; CI=2.9-43; P value=0.001), they showed significant correlation with thyroid dysfunctions among our respondents. These findings were shown in tables 1,2,3,4.

**Table 1: Distribution of the participants according to age groups**

Age group	Frequency	Percent
<b>15-19 years</b>	23	9.2
<b>20-24 years</b>	135	54.0
<b>25-29 years</b>	21	8.4
<b>30-34 years</b>	40	16.0
<b>&gt;=35 years</b>	31	12.4
<b>Total</b>	250	100

**Table 2: Distribution of the study subjects on the basis of Thyroid function status**

Thyroid function status	Frequency	Percent
<b>Eu-thyroid</b>	217	86.8
<b>Hyperthyroid</b>	20	8
<b>Hypothyroid</b>	13	5.2
<b>Total</b>	250	100

**Table 3: Thyroid hormone levels among pregnant females with normal thyroid function**

		Test	Mean $\pm$ SD	Minimum	Maximum
<b>Level of thyroid hormones in all Euthyroid females</b>		<b>TSH</b>	$1.56 \pm 0.77$	0.07	4.14
		<b>T3</b>	$3.21 \pm 0.54$	0.19	4.98
		<b>T4</b>	$0.78 \pm 0.71$	0.21	3.69
<b>Level of thyroid hormones in Euthyroid females per trimester</b>	<b>1<sup>st</sup></b>	<b>TSH</b>	$1.69 \pm 0.71$	0.33	4.34
		<b>T3</b>	$4.65 \pm 1.12$	0.44	5.21
		<b>T4</b>	$0.91 \pm 0.78$	0.51	4.67
	<b>2<sup>nd</sup></b>	<b>TSH</b>	$1.49 \pm 1.3$	0.11	4.67
		<b>T3</b>	$3.12 \pm 1.2$	0.49	5.1
		<b>T4</b>	$1.13 \pm 0.61$	0.15	4.32
	<b>3<sup>rd</sup></b>	<b>TSH</b>	$1.38 \pm 1.14$	0.08	8.21
		<b>T3</b>	$3.10 \pm 0.93$	0.76	5.51
		<b>T4</b>	$1.21 \pm 0.61$	0.28	4.68

**Table 4: Risk factors for thyroid dysfunction among pregnant women, using univariate and multivariate analyses**

Variable	Univariate analyses			Multivariate analyses		
	OR	95% CI	P-Value	OR	95% CI	P-Value
<b>Age ≥ 35</b>	1.0	0.9-1.2	0.039	1.3	1.1-1.3	0.042
<b>Rural residence</b>	6.8	2.6-19	0.002	12.7	2.9-43	0.001
<b>Family history of AID</b>	7.3	2.1-34	0.008	13.1	2.1-59.4	0.042

## DISCUSSION

Thyroid diseases are amongst the most prevalent of medical conditions, and many studies shown high prevalence in women during pregnancy, and can adversely affect obstetric outcomes. The present study was cross-sectional hospital-based study conducted at University of Health Science Hospital (Prof Abdirisak Hospital), Bosaso, Somalia for the determination of prevalence of Thyroid dysfunction and the mean values and range of thyroid hormones in pregnant women.

The results of this study revealed that the age of the study population ranged between 15-40 years with a mean age of 27.5 years old. There was significant correlation between the age and frequency of thyroid dysfunction with P-value of 0.042. this finding agrees with a study done by Amel K. Saeed, et al, who reported that the age had a significant correlation with the prevalence of thyroid dysfunction <sup>5</sup>.

Regarding to the prevalence of hypothyroidism, this study describes (5.2%) which is slightly higher than what was observed in Gaza, America and European population (2.2%) <sup>6</sup>.

Also, the prevalence of hyperthyroidism in our study was very high (8%) as compared with other studies (Gaza 1.0 %) and (1.3%) in Tunisia <sup>7</sup>.

In this study, we found that T3 was dropped slightly in the second trimester and in the third trimester, which is similar with results with a study done by Pasupathi P, et al in china where they found the highest level of FT3 was during the first trimester <sup>8</sup>.

Where T4 was increased slightly in the second trimester and in the third trimester, in contrast with a study done by Kurioka and his colleagues, who reported significantly reduced levels of free T4 during pregnancy <sup>9</sup>.

Our study has shown slightly increase in TSH level in first trimester when compared with second and third trimester ( $1.69 \pm 0.71$ ,  $1.49 \pm 1.3$  and  $1.38 \pm 1.14$  respectively), these levels are still within the recommended levels of the American Thyroid Association Task force on Thyroid Disease during Pregnancy 2011 <sup>10</sup>. During pregnancy, the thyroid hormone levels can undergo significant changes <sup>11</sup>.

Although there is still no strong evidence concerning the effect of the thyroid disease on pregnancy, there are clear data confirmed that with thyroid dysfunction there is increased risk of miscarriage, premature delivery, preeclampsia, low birth weight <sup>12-13</sup>.

## CONCLUSIONS

This study concluded That there is a slightly higher frequency of thyroid dysfunction disorders among pregnant women. There is slight fluctuation of thyroid hormones during pregnancy in euthyroid women and thyroid dysfunction is affected by age and history of auto-immune disorder. We recommend investigation for thyroid function test during pregnancy.

## Limitations

Limitation of this study is partly due to the small size sample and being confined to only one hospital which underestimate the actual burden of the problem.

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## Author's contribution:

### Ali Bile Farah Hassan

- Conceived and designed the analyses
- Collected the data
- Contributed data/analysis tools
- Performed the analysis
- Wrote the paper
- Submitted the paper for publication

### Mohamed Hassan Osman Ebar

- Conceived and designed the analyses
- Collected the data
- Contributed data/analysis tools

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## Conflicts of interest

There are no conflicts of interest

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