

Prevalence of Hypothyroidism and Hyperthyroidism in Women of Reproductive Ages in Kabul

Hossain Rezayee¹, Adamkhan Alipour¹, Hadi Ali Zada², Dawood Hossaini^{3*}

1. Department of Chemistry and Biochemistry, Khatam Al-Nabieen University, Kabul, Afghanistan.

2. Department of Biochemistry, Maihan Asri medical laboratory, Kabul, Afghanistan.

3. Department of Biology and Microbiology, Khatam Al-Nabieen University, Kabul, Afghanistan.

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*Corresponding Author:

Dawood Hossaini

Address: Department of Biology and Microbiology, Khatam Al-Nabieen University, Kabul, Afghanistan.

E-mail address:

dawoodhossaini75@gmail.com

ABSTRACT

Introduction: The association of sex steroids with cancer cell proliferation has been reported in recent studies; however, the findings are still controversial. The present study aimed to determine the cytotoxic effects of progesterone and testosterone on colon cancer (SW480) cells and to evaluate the expression levels of Bcl-2 and Bax genes in SW480 cells.

Materials and Methods: The SW480 cell line was divided into a control group (untreated) and groups treated with 125, 250, 500, and 1000 µg/mL of testosterone and progesterone. Cell viability was quantified by the MTT assay. qRT-PCR was performed to evaluate gene expression levels. Flow cytometry was used to assess the apoptosis in cancer cells. Data were analyzed using the student's t-test and ANOVA.

Results: The expression level of the Bax gene significantly decreased in SW480 cells exposed to a cytotoxic dose of progesterone. Moreover, the expression level of the Bax gene significantly increased in the SW480 cells exposed to a cytotoxic dose of testosterone.

Conclusion: The results of the present study showed that testosterone might affect the apoptosis of colon cancer cells at low concentrations. Studies have shown that progesterone can induce tumor cell death in cancer cells. Accordingly, the clinical use of testosterone and progesterone therapy for cancer treatment is highly controversial.

Keywords: Hypothyroidism, Hyperthyroidism, Women of Reproductive Age, Kabul.

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1. Introduction

Hypothyroidism and hyperthyroidism represent contrasting states impacting the thyroid gland. Responsible for controlling metabolism, body temperature, and organ operation, the thyroid gland secretes hormones crucial for bodily functions. Although both conditions stem from irregular thyroid hormone levels, they manifest unique traits and signs. Hypothyroidism emerges as a persistent ailment linked to a scarcity of the vital thyroid hormones thyroxine (T4) and triiodothyronine (T3) (1). Neglecting or inadequately addressing hypothyroidism can lead to a range of repercussions, such as infertility, cardiovascular issues, and symptoms affecting the nervous system and musculoskeletal system (2-4).

The primary cause of thyroid disorders, like hypothyroidism on a global scale (5), is often rooted in environmental iodine insufficiency. Conversely, in regions where iodine levels meet requirements, autoimmune thyroiditis (Hashimoto's disease) stands out as the main culprit behind primary hypothyroidism (5, 6). Failure to address hypothyroidism may lead to the development of conditions such as hypertension, dyslipidemia, infertility, cognitive dysfunction, and neuromuscular deficits. Hypothyroidism arises due to the malfunction of the thyroid gland or

inadequate stimulation by the hypothalamus or pituitary gland. The failure of the thyroid gland can be attributed to autoimmune destruction (Hashimoto's disease), congenital anomalies, infiltrative disorders, or iodine deficiency. Autoimmune thyroid disease stands out as the most prevalent cause of hypothyroidism. The primary origins of hypothyroidism typically manifest alongside other symptoms of hypothalamic or pituitary dysfunction (7). Thyroid dysfunction impacts a considerable proportion of the population (8).

The escalation of hypothyroidism is on the rise globally. The American Thyroid Association disclosed that a total of 20 million individuals in the United States are afflicted with various types of thyroid disorders, with over 12% of the American population projected to experience a thyroid ailment at some point in their lives (8). Hypothyroidism stands out as the most prevalent thyroid ailment in India, impacting one out of every ten adults. The incidence stands at 11%, in contrast to 2% in the United Kingdom and 4.6% in the United States (9). Hyperthyroidism (Graves' disease) is distinguished by heightened levels of the thyroid hormones thyroxin (T4) and triiodothyronine (T3) in the bloodstream. The release of T3 and T4 from thyroid gland follicles is typically

regulated by thyroid stimulating hormone (TSH), a protein secreted by the anterior pituitary. The production of TSH from the anterior pituitary is governed by thyrotropin-releasing hormone (TRH), a tripeptide crafted in the hypothalamus. Therefore, hypothalamic TRH triggers the secretion of pituitary TSH, which subsequently prompts the release of T3 and T4 from the thyroid gland. Elevated levels of thyroid hormones in the bloodstream lead to the suppression of TSH secretion through a negative feedback mechanism (10).

Although certain cases of hyperthyroidism stem from pituitary tumors producing excessive TSH, resulting in the hyperactivity of the thyroid gland and increased thyroid hormone secretion, the majority of hyperthyroidism cases arise from either activating thyroid antibodies or nodules within the thyroid gland. The frequency of Graves' disease is approximately 8-fold greater in females than males, particularly prevalent among individuals in their third or fourth decade of existence. It is an uncommon occurrence among individuals above the age of 50. Graves' disease seems to have a hereditary component (10). There have been few studies conducted to identify the prevalence of hypothyroidism and hyperthyroidism in Kabul. The current investigation focuses on

evaluating the occurrence of thyroid dysfunctions, specifically hypothyroidism and hyperthyroidism, among women within the reproductive age bracket residing in Kabul during the year 2023.

2. Materials and Methods

This investigation utilized a cross-sectional methodology. It facilitates the acquisition of information from a statistically significant sample of the specified population at a particular juncture. The implementation of a cross-sectional strategy is suitable for evaluating prevalence percentages and investigating the relationships between various factors.

2-1. Study Population

The study enrolled women of reproductive age, specifically those between 15 and 49 years old, residing in Kabul. These individuals were referred to the Mihan Asiri laboratory to evaluate and determine hormone concentrations.

2-2. Laboratory evaluation

A thorough clinical evaluation was carried out by healthcare professionals who met the necessary qualifications for the individuals involved in the research study. This encompassed a detailed review of medical records, a physical examination, and an evaluation of symptoms related to the thyroid. Blood samples will be collected from the participants for laboratory

analysis. TSH levels were measured to assess thyroid function. TSH was categorized as higher TSH levels > 4.2 mIU/L, lower TSH levels < 0.4 mIU/L, and normal TSH levels 0.4 to 4.2 mIU/L (11).

2-4. Data Analysis

Descriptive and inferential statistics were employed to conduct data analysis. The statistical analysis was carried out using Statistical Package for Social Science (SPSS) version 21. Categorical variables underwent the computation of proportions and frequencies. Continuous variables were subject to the computation of means and standard deviations. In cases of a non-normal distribution, the median was computed for the variable.

3. Results

Table 1 provides the characteristics of the study participants. In aggregate, a cohort of 384 participants was involved in the investigation from January to September 2023. However, 43 individuals were excluded from the analysis based on predefined exclusion criteria, resulting in a final sample size of 346 individuals to conduct the conclusive analysis. Among the study participants, 21.6% fell within the age range of 16 to 20 years old. Additionally, 33.8% of the participants were situated within the 21- to 29-year-old age bracket, while 31.3% were in the 30- to

39-year-old age range. Moreover, a proportion of 13.3% of the participants were found to be between the ages of 40 and 49. Moving on to the subsequent variable, this study examines the educational attainment of the participants. It was observed that 30% of the participants had no formal education, while 9.2% possessed minimal Quranic literacy. Furthermore, 28.6% of the participants had completed primary education, whereas 23.5% had attained secondary education. The remaining 8.7% of the participants exhibited a higher level of education. Furthermore, an investigation was conducted into the employment status of the participants. The findings indicate that 32.3% of the participants were not engaged in any form of employment, while the remaining majority, accounting for 67.7%, were gainfully employed. The final psychodemographic variable under scrutiny is the monthly income of the participants. Analysis of the data reveals that a significant majority, comprising 71.4% of the participants, reported a low monthly income. Additionally, 23.9% of the participants had an average income, while the remaining 4.7% reported a good monthly income.

Table 1. Presents a comprehensive overview of the demographic characteristics of the study participants

Variable	N (346)	Percentage (%)
Age		
16-20	75	21.6
21-29	117	33.8
30-39	108	31.3
40-49	46	13.3
Education		
Illiterate	104	30.0
Quranic illiteracy	32	9.2
Primary	99	28.6
Secondary	81	23.5
High school	30	8.7
Job status		
Unemployed	112	32.3
Employed	234	67.7
Income		
Low	247	71.4
Medium	83	23.9
High	16	4.7

Table 2. Prevalence of Hypothyroidism and Hyperthyroidism in women of reproductive age population in Kabul

Variable	Percentage (%)
Hypothyroidism	n= 37 (10.7)
Normal TSH level	n= (85.8)
Hyperthyroidism	n=12 (3.5)

The prevalence of hypothyroidism and hyperthyroidism in women of reproductive age in Kabul has been shown in Table 2. The observed data depicted a distribution of thyroid conditions among the participants in this study. Specifically, it was discerned

that 10.7% of the participants were afflicted with hypothyroidism, while the majority, constituting 85.8%, exhibited normal concentrations of TSH. The remaining 3.5% of the participants were identified as having hyperthyroidism. The association between TSH level and demographic variables is shown in Table 3.

The findings of this study revealed a noteworthy association (0.00) between the concentration of TSH hormone and age. Specifically, a total of 34 individuals, falling within the age range of 40 to 49 years, were identified as having hypothyroidism. It is noteworthy that the majority of participants (117 individuals) in this study who exhibited normal TSH concentrations were between the ages of 21 and 29.

Notably, hyperthyroidism was only observed in 12 individuals within the age group of 40 to 49 years. The concentration of TSH hormone demonstrated a significant correlation with the participant's level of education. Within the cohort of individuals diagnosed with hypothyroidism, 19 individuals were found to be illiterate, while 18 individuals possessed primary education. Interestingly, the majority of individuals with normal TSH hormone concentrations exhibited higher levels of education. Additionally, among the 12

individuals diagnosed with hyperthyroidism, the majority had attained secondary education.

4. Discussion

Thyroid dysfunction is a significant health concern, particularly among women of reproductive age, as it can have implications for fertility, pregnancy outcomes, and overall well-being. Understanding the prevalence of thyroid dysfunction in specific populations is crucial for healthcare strategy and action (12, 13). In the context of Kabul, Afghanistan, limited research has been conducted on the frequency of thyroid dysfunction among women of reproductive age. However, available studies provide valuable insights into the prevalence of thyroid disorders in the Afghan population.

The present study aimed to investigate the frequency of hypothyroidism and hyperthyroidism among women of reproductive age in Kabul, Afghanistan. The findings revealed that 14.1% of the participants exhibited thyroid dysfunction, with 10.7% diagnosed with hypothyroidism and 3.5% showing hyperthyroidism. These results highlight the significant burden of thyroid disorders in this population.

To contextualize these findings, it is important to consider previous studies conducted in Afghanistan. The prevalence of hypothyroidism and hyperthyroidism in

Afghanistan is not explicitly mentioned in the search results. However, the search did provide some relevant information about goiter and iodine deficiency in Afghanistan. According to a case-control study conducted in Afghanistan, goiter prevalence rates of more than 20% were observed among children and women. The study also highlighted the inadequate levels of urinary iodine in the population, with only 6.8% of all subjects having adequate levels. The presence of goiters was significantly associated with severe urinary iodine deficiency. However, the study also found that some children without palpable goiter showed abnormal TSH levels, indicating that the absence of goiter is not a sufficient indicator of adequate iodine status (14).

However, this study did not specifically provide data on the prevalence of hypothyroidism among women of reproductive age. The results of another study indicated that 14% of the participants had lower levels of thyroid-stimulating hormone (TSH), suggesting hyperthyroidism, while 12% demonstrated elevated TSH levels, indicating hypothyroidism (11).

These findings further emphasize the presence of thyroid dysfunction in the Afghan population. The prevalence of

thyroid dysfunction among women of reproductive age in Kabul, Afghanistan, is a matter of concern. Hypothyroidism and hyperthyroidism can have significant implications for reproductive health, including menstrual irregularities, infertility, and adverse pregnancy outcomes. It is crucial to address these issues through targeted healthcare interventions and strategies. Possible factors contributing to the high prevalence of thyroid dysfunction in this population include iodine deficiency, which has been identified as a significant concern in Afghanistan (14).

Iodine is an essential nutrient for thyroid hormone synthesis, and its deficiency can lead to thyroid disorders. Ensuring adequate iodine intake through the implementation of iodized salt programs and public health campaigns can be an effective strategy to reduce the burden of thyroid dysfunction (15). Furthermore, socio-economic factors, limited access to healthcare services, and cultural practices may also play a role in the prevalence of thyroid dysfunction among women in Kabul, Afghanistan. These factors can affect the timely diagnosis and management of thyroid disorders, leading to a higher burden of disease. It is important to note that the search results did not provide specific data on the prevalence of

hypothyroidism and hyperthyroidism in Afghanistan. Further research or studies may be needed to obtain more accurate information on the prevalence of these thyroid disorders in the country.

Conclusion

The available evidence suggests a significant prevalence of thyroid dysfunction among women of reproductive age in Kabul, Afghanistan. The findings of the present study, along with previous research, highlight the need for targeted interventions to address this health issue. Implementing measures to ensure adequate iodine intake, improving access to healthcare services, and raising awareness about thyroid disorders can contribute to better reproductive health outcomes for women in Kabul, Afghanistan.

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