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Corresponding Author: Bushra Rehman (Assistant Professor, Institute of Biotechnology and Microbiology, Bacha Khan University, Charsadda, KP, Pakistan. Email: (dr.bushrabkuc.edu.pk)

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Circulating Thyroid Hormone Levels among Patients with Cardiovascular, Gastrointestinal, and Hypertensive Disorders in the Population of Peshawar, Khyber Pakhtunkhwa: An Analytical Comparison

Bushra Rehman [a] Hira Ikram [b] Rabiya Nasir [c]

Aiman Umar [d] Seema Nawaz [e]

Abstract: *This research set out to determine the levels of TSH, T4, and T3 in various age groups, genders, and conditions such as heart disease, gastroenteritis, and hypertension. Chemiluminiscence immunoassay (CLIA) was used to measure the serum levels of TSH, T4, and T3 in stomach, heart, and hypertension patients of various age groups and genders. Gender differences were seen in thyroid hormone levels. Based on our findings, women have a wider TSH range than men. Women's mean T3 values are nearly identical to those of men, whereas women's T4 values are higher than men's. Hormone levels vary significantly across people with heart disease, hypertension, and gastrointestinal disorders. While the values of T3 and T4 are normal, the mean TSH value in several patients was somewhat higher than the normal range. Hormone levels are influenced by age in a similar manner.*

Key Words: Thyroxin, Tri iodothyronine, Thyroid Stimulating Hormone, Chemiluminiscence Immunoassay

Introduction

The thyroid gland is an endocrine gland with a high vascularization level that often exhibits a wide range of morphological abnormalities. Although the thyroid gland weighs about 25 grammes, its size varies significantly depending on the person's sex, age, race, physical condition, and location. It is significantly heavier in women, and it is even

[a] Assistant Professor, Institute of Biotechnology and Microbiology, Bacha Khan University, Charsadda, KP, Pakistan.
[b] Lecturer, Centre of Biotechnology and Microbiology, University of Peshawar, KP, Pakistan..
[c] Assistant Professor, Center of Excellence in Marine Biology, Karachi, Sindh, Pakistan.
[d] Assistant Professor, Department of food and Nutrition, Shaheed Benazir Bhutto Women University, Peshawar, KP, Pakistan.
[e] Assistant Professor, Institute of Biotechnology and Microbiology, Bacha Khan University, Charsadda, KP, Pakistan.

heavier during menstruation and pregnancy [Standring 2018].

The situation that occurs due to unnecessary production of thyroid hormone by the thyroid gland is called Hyperthyroidism [Rajkonwar 2016].

Goitre is a thyroid gland pathology that primarily affects pregnant women and children. It arises from a prolonged deficiency of iodine storage in the human body. It is brought on by a diet low in iodine, which poses a serious risk to public health [Endalamaw 2019].

The risk of hypertension may increase due to hypothyroidism and hyperthyroidism [Berta 2019]. High TSH levels along with low thyroid hormone levels are indicative of hypothyroidism. In individuals who are not pregnant, the prevalence of overt hypothyroidism is 0.2-2.0%.Six about 25% of individuals with overt hypothyroidism experience reversible hypertension, primarily diastolic. Blood pressure and TSH levels have undoubtedly been linked, even within the guideline range [Cappola 2019].

Important circulatory system regulating functions are carried out by thyroid hormones. Variations in thyroid hormone levels are linked to notable differences in cardiovascular function. Many heart failure patients have thyroid abnormalities in one way or another, including low T3 syndrome, hyperthyroidism, and hypothyroidism [Vale 2019]. Numerous factors influence the likelihood of thyroid diseases, such as age, sex, origin, and geography. Thyroid problems are more common in iodine-deficient nations. Almost one-third of people on the planet reside in iodine-deficient areas. In regions with a significant iodine deficiency, goitre can occur up to 80% of the time [Chaurasia 2011].
The aim of this study was to find out the level of TSH, T4 and T3 in different age groups, and in different disorders like heart diseases, gastro and hypertension and also to find out the effect of age and gender on the level of hormones.

The data and medical history of many suspected patients will be gathered with the aid of this study. This information can be utilised in future research to determine any potential connections between thyroid dysfunction and other illnesses, which will aid medical professionals in making a diagnosis of the condition. In the future, a particular approach can be developed to manage and eradicate the illness.

Materials and Methods

Eighty patients, 24 of whom were male and 56 of whom were female, were chosen from various age categories. Of these eighty patients, twenty had high blood pressure, eighty had heart disease, and forty-two had digestive issues. Patients on medications and those with a history of infectious diseases were eliminated. Patients with confirmed diseases provided a blood sample of 4 millilitres. To separate the sera from the blood, the blood samples were centrifuged. Utilising a micropipette, serum from the blood was collected into an eppendorf tube, which was then refrigerated at -20 C. The serum was then tested using the chemiluminescence immunoassay technique for TSH, T4, and T3.

Statistical Analysis

The data obtained from chemiluminiscence immunoassay were further analyzed using SPSS Version 20.0.

Results

In the current experiment, serum concentrations of TSH, T4, and T3 were evaluated in 122 suspected patients of different ages and genders. The current results showed the influence of diseases, age, and gender. Table 1 lists the specifics of the patients who have been accepted.

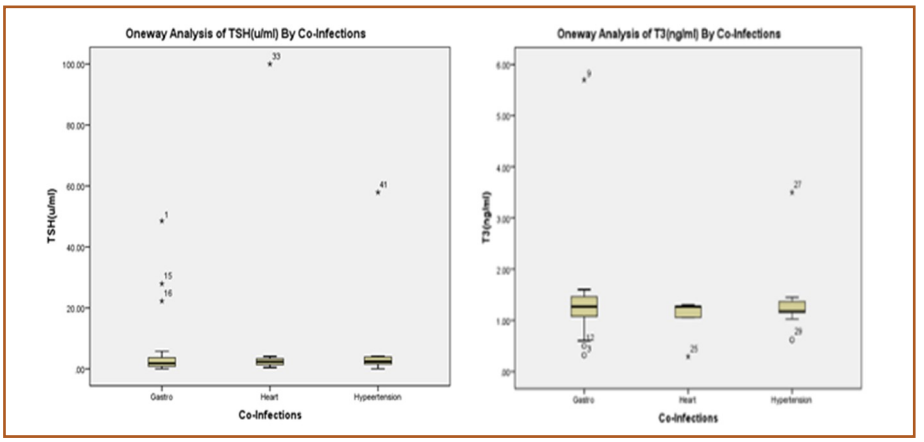
Table 1

Table shows Detail of the Enrolled Patients.

Gender				
	Frequency	Percent	Valid Percent	Cumulative Percent
Female	84	68.9	68.9	68.9
Male	38	31.1	31.1	100.0
Total	122	100.0	100.0	

Figure 1

Statistical Analysis between TSH, T3 and T4 and Different Disorders.



The mean TSH level among gastro patients was 6.09μIU/ml, with a range of 0.03–48.5μIU/ml. TSH in heart patients ranged from 0.42 to 100 μIU/ml, with a mean of 11.90 μIU/ml. TSH in patients with hypertension ranged from 0.01 to 57.9 μIU/ml, with a mean value of 8.46 μIU/ml. (Figure: 1)

T3 in gastrointestinal patients had a mean of 1.38 ng/ml and a range of 0.32-5.7 ng/ml. T3 had a mean value of 1.07 ng/ml and a range of 0.29-1.3 ng/ml in heart patients. T3 had a mean value of 1.04 ng/ml in hypertension patients, with a range of 0.62–3.5 ng/ml. (Figure 1)

In Gastro patients, Mean value for T4 has a range of 2.86–39 ug/dl and was 10.00 ug/dl. T4 had a mean value of 8.33 ug/dl in heart patients, ranging from 2.74 to 11.6 ug/dl. Patients with hypertension had a mean T4 value of 9.85 ug/dl, within a range of 3.9–21.1 ug/dl.(Figure 1)

Table 2

TSH and Thyroid Hormones Level in Females of Different age Groups.

Age in Groups (years)	TSH (μIU/ml)	T4 (ug/dl)	T3 (ng/ml)
11_20	18.06	7.3	0.99
21_30	1.38	13.84	2.02
31_40	5.63	11.21	1.45
41_50	17.16	7.31	0.99

Age in Groups (years)	TSH (µIU/ml)	T4 (ug/dl)	T3 (ng/ml)
>50	16.37	8.10	1.12

Table 3

TSH and Thyroid Hormones Level in Males of Different age Groups.

Age in Groups(years)	TSH (µIU/ml)	T4 (ug/dl)	T3 (ng/ml)
11_20	0.57	9.82	1.30
21_30	1.38	8.57	1.14
31_40	3.10	8.51	1.18
41_50	1.65	9.65	1.28
>50	1.13	8.41	1.17

Thyroid hormones level in female of different age groups is shown in table-1. Results shows that level of TSH was highest in the first age group and lowest in the second and third age group and then again increases in fourth and fifth group. Similarly the level of T4 was lowest in first age group and slightly increases in second and third group and then again decreases in fourth and fifth group. TABLE-1 shows that the level of T3 was lowest in the first age group and fourth group and highest in the second group and remains nearly stable in other groups.

Thyroid hormones and TSH level in males of different age groups are shown in table-2 Current result shows that the TSH level was lower in the first age group and highest in the third group and remain almost stable in the other groups. Similarly the T4 value was high in the first and the third age group while remain almost stable in other groups. TABLE-2 also shows that the value of T3 observed were higher in the first and third age group and remains nearly stable in the other groups.

Discussion

The variations in the mean values of the concerned hormones with gender suggest that the mean of TSH for female is slightly higher in the female then in male within normal limit. In case of female the Mean for T3 is almost same in both genders. Result shows that in case of female the Mean value of T4 is slightly higher in female then in male.

Given the gender-related differences in the mean values of the relevant hormones, it is possible that the mean TSH in females is marginally higher than in males within a normal range. When it comes to women, the Mean for T3 is about the same for both sexes. The results indicate that the mean value of T4 is somewhat greater in females than in males. Based on earlier research by Chaurasia et al. (2011) [10]. Ahmed et al. 2009, [11], this finding was made. The study found that while the mean value of T3 remained about the same in both genders, the mean of TSH was somewhat higher in females than in males. This investigation supported several of Lacej et al.'s earlier works. According to a 2015, [12] study, women have greater T4 levels than men.

The mean value of TSH was slightly higher than the normal level, indicating subclinical hypothyroidism, while the mean of T3 and T4 is normal for all diseases in the patients with thyroid hormone levels, which include heart, hypertensive, and gastrointestinal disorders. Our research led us to the conclusion that subclinical hypothyroidism or aberrant thyroid hormones are linked to cardiac, hypertension, and gastrointestinal problems. Our findings are consistent with previous research by Tieche et al., 1981 [13], and Dean et al., 1985 [14], which also found a link between subclinical hypothyroidism and coronary heart disease in senior female patients. According to studies by Short, K. et al. (2015) [15] and Manappallil R. G. et al. (2016) [16], hypertensive individuals have a higher prevalence

of high TSH levels, and adequate thyroid hormone replacement therapy has been shown to be effective in lowering blood pressure in these patients.

Based on our findings, the level of T4 in females was lowest in the first age group, slightly increased in the second and third age groups (21–30 and 31–40), and then decreased again in the fourth and fifth age groups (41–50 and 51–60).(Table:1) Additionally, in men, the T4 value remained nearly constant in other age groups but was elevated in the first and third age groups. (Table: -2) However, the serum T4 level in both males and females was high in the first group and stayed nearly steady in the other groups according to earlier findings by Chaurasia P, et al. 2011 10. However, T4 levels increased in other age groups as they increased, but they decreased in the first age group according to Lacej et al.'s 201512 findings.

The results of a recent study indicate that, for females, the values of T3 were higher in the first (11–20) and fourth (41–50) groups and remained relatively stable in the other groups, while for males, the values were lowest in the first (11–20) and fourth (41–50) groups and highest in the second (21–30) group.

According to our observations, the serum T3 level in females was found to be lowest in the first age group in Chaurasia P, et al. (2011) [10] findings; however, there are also contradictory results showing that the T3 level in females is nearly stable in the second, third, and fourth groups, while in males, the T3 level was found to be lowest in the first age group, highest in the second group, and stable in the third and fourth groups.

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