



PREVALENCE OF THYROID PATHOLOGIES IN PAKISTAN

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ABSTRACT

Objectives: The objective of this research was to elucidate some of the major relation of thyroid dysfunctions, keeping in view the various selected demographic details of included patients. **Methods:** This study was approved by the ethical committee of Services hospital, Lahore and was conducted in Services hospital, Lashore. The blood samples were collected, followed by their analysis for triiodothyronine (T3), tetraiodothyronine (T4) and thyroid stimulating hormone (TSH). **Results:** The results obtained regarding the demographical aspects of the patients revealed that female gender has categorically significantly high percentage of occurrence of thyroid abnormality as compared to male gender (75.8% vs. 24.2%). Results regarding locality distribution of the patients depicted that majority of those belonged to the local population of Lahore and Faisalabad region. **Conclusion:** In Pakistan especially Punjab, thyroid diseases are more common in females as compared to males. The most probable causes could be lactation and pregnancy.

KEYWORDS: Triiodothyronine, elucidate.

INTRODUCTION

Endocrine diseases are common, particularly those of the thyroid gland. Some endocrine glands respond directly to metabolic glands; while most are controlled by hormones released from the pituitary gland.^[1] Endocrine diseases are increasing globally but are growing more rapidly in Asia.^[2] In Nepal, about 0.2% of deaths are because of endocrine disorders, the major cause of which is iodine deficiency.^[3] The pathophysiology of many thyroid diseases relates to TSH, T₃ and T₄. The most important chemical marker of thyroid function is TSH. Hyperthyroidism is the result of low TSH profile, whereas high value leads to hypothyroidism.^[4]

Thyrotoxicosis is the hyper-metabolic condition confirmed by estimation of free T4 (fT4), free T3 (fT3).^[5] Thyrotoxicosis or hyperthyroidism is an excess of thyroid hormone caused by an over active thyroid tissue or is the consequence of additional synthesis and liberation of thyroid hormone. The incidence of hyperthyroidism is lower i.e., 2% as compared with hypothyroidism in general population of Pakistan.^[6] In 90% cases, thyrotoxicosis or hyperthyroidism is caused by Graves's disease, toxic multinodular goiter and toxic adenoma. In some cases, sub-acute thyroditis is also responsible for hyperthyroidism.^[7] After Graves's disease, the major cause of thyrotoxicosis is toxic multinodular goiter, which has mostly been diagnosed in

mature and aged patients. About 5% of patients with thyrotoxicosis have toxic thyroid adenoma caused by excessive release of thyroid hormones.^[8] Hypothyroidism is a common metabolic disorder in the general population. It is characterized by diminished metabolism, retarded growth and development, impaired mental activity and swelling of certain parts of the skin. It is a disease caused by lack of iodine in drinking water.^[9] Hypothyroidism is a clinical condition due to deficiency of thyroid hormone and increased level of TSH.^[10] Hypofunction of the thyroid gland is also accompanied by changes throughout the organism. Hypothyroidism was found in more than 2% of 2800 patients.^[11] In case of sufficient iodine intake; autoimmune thyroid disease Hashimoto's thyroditis appears to be the most common cause. In this situation, there is replacement of normal thyroid tissue with lymphocytic and rubbery tissue.^[12] The presence of excess iodine in patient's body is also a cause of hypothyroidism including patients with a history of radioactive therapy, autoimmune thyroditis and subtotal thyroidectomy. Other causes of hypothyroidism include certain medications like interferon alpha, amiodarone, thalidomide lithium and sta-vudine.^[13]

METHODS

Blood samples and data were collected from patients attending Services hospital Lahore, Pakistan.

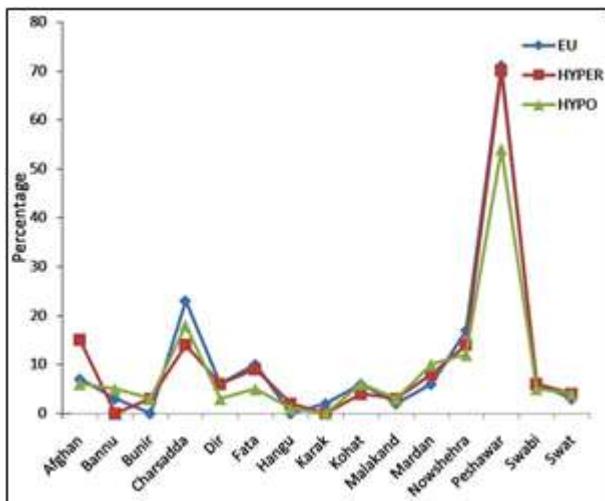


Fig. 1: Comparison of Locality with clinical diagnosis (Female Population).

Patients belonging to different areas of Khyber Pakhtunkhwa were included in this study. The study subjects were divided into three groups: euthyroid, hypothyroid and hyperthyroid. Euthyroids serve as the control group; the number of cases included in this group is 214, whereas 195 and 191 patients are grouped as hyperthyroids and hypothyroids, respectively. Patients suffering from chronic diseases like hypertension,

diabetes mellitus and cardiac disorders were excluded. Patients having thyroid surgery were also excluded. Patients who were taking thyroxin were also excluded. The selected cases were analyzed for serum levels of TSH, T_4 , T_3 at IRNUM, Lahore, Pakistan, by using Gamma counter. TSH in the sample is estimated by using radioimmunoassay (RIA).^[14] The principle involved in the determination of fT_4 and fT_3 is based on the use of labeled antibody.^[15,16]

RESULTS

Results in Fig.1 and 2 illustrate the area-wise distribution of both male and female patients and their clinical diagnosis. On the basis of thyroid function tests, a statistically significant variation in the mean levels of T_3 was observed for hypothyroid (3.31 ± 0.128 pmol/L) and hyperthyroid (6.98 ± 0.367 pmol/L) when compared to the mean levels in controls i.e. euthyroid (3.92 ± 0.143 pmol/L). Similarly, significant differences were observed in the mean levels of T_4 for hypothyroid (10.71 ± 0.637 pmol/L) and hyperthyroid (34.75 ± 1.640 pmol/L) when compared to the mean levels in controls i.e. euthyroid (17.10 ± 0.332 pmol/L). The study also showed significant changes in TSH i.e. in hypothyroid (31.47 ± 1.628 uIU/mL) and in

Table-I: Comparison of descriptive of thyroid function tests with clinical diagnosis.

<i>Laboratory Results N=600</i>		<i>EU (N=214)</i>				<i>Hyper (N=195)</i>				<i>Hypo (N=191)</i>			
		<i>Min</i>	<i>Max</i>	<i>Mean</i>	<i>SD</i>	<i>Min</i>	<i>Max</i>	<i>Mean</i>	<i>SD</i>	<i>Min</i>	<i>Max</i>	<i>Mean</i>	<i>SD</i>
Thyroid	T3 (pmol/L)	0.10	7.10	3.92	1.62	1.20	32.60	6.98	4.17	0.80	7.00	3.31	1.43
Function	T4 (pmol/L)	2.90	24.00	17.10	3.70	5.90	77.00	34.75	18.63	0.00	54.00	10.71	7.14
Tests	TSH (uIU/ml)	0.20	10.40	1.77	1.44	0.00	0.13	0.25	0.36	0.06	51.00	31.47	18.27

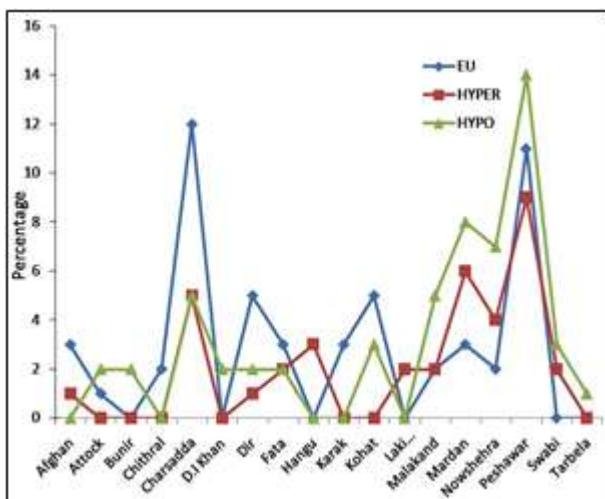


Fig. 2: Comparison of Locality with clinical diagnosis (Male Population). hyperthyroid (0.25 ± 0.003 uIU/mL) compared to the mean in controls i.e. euthyroid (1.77 ± 0.130 uIU/mL).

Statistical Analysis: Primary data ingress was processed on MS Database version 2007, which was cleaned in MS

Excel with sophisticated formulas for corrections. Data were checked in EPI-info Version 16.0 for scientific verifications. The data were finally imported in SPSS version 20.0 for analysis. The student's "t" test, is being used to find out the significance between two values, in various diseased groups. Frequencies, p-value, and other descriptive analysis was done to calculate the mean and standard deviation of different parameters. The latest versions of the said programs were used for graphical and tabular analysis. The valid frequencies were premeditated for desired results. To compare the significance of the difference between the two means, their values are given as (Mean \pm SD/SEM).

The results in Fig.1 show greater number of hyperthyroid and hypothyroid females from Lahore city, followed by patients from Faisalabad and those who migrated from Afghanistan.. However, there is a marked difference in the number of female subjects having thyroid dysfunction in Lahore as compared to rest of the localities. Just like the female population, increased numbers of thyroid disease cases in males were present in Lahore region, with relatively greater number of

hypothyroids (Fig.2). There were almost equal number of male patients suffering from hyperthyroidism and hypothyroidism belonging to Faisalabad. The number of patients with thyroid dysfunction in rest of the areas in KPK as well as Afghanistan occurs in a similar pattern.

DISCUSSION

The pair sample "t" test showed that the mean difference of hyperthyroid patients with T_3 is nonsignificant when compared with the control group. The difference was statistically significant for TSH and T_4 in the same group. These findings are in accordance with the study of Tayal D et al.^[17]

Table-II: Association between descriptive of thyroid function tests with EU & Hyper.

Laboratory Results N=600		EU (N=214)			Hyper (N=195)			Association
		<i>Min</i>	<i>Max</i>	<i>Mean SD</i>	<i>Min</i>	<i>Max</i>	<i>Mean SD</i>	<i>P-Value</i>
Thyroid	T_3 (pmol/L)	0.10	7.10	3.92 1.62	1.20	32.60	6.98 4.17	0.999
Function	T_4 (pmol/L)	2.90	24.00	17.10 3.70	5.90	77.00	34.75 18.63	0.000
Tests	TSH (uIU/ml)	0.20	10.40	1.77 1.44	0.00	0.13	0.25 0.36	0.264

Table-III: Association between descriptive of thyroid function tests with EU & Hypo.

Laboratory Results N=600		EU (N=214)			Hyper (N=191)			Association
		<i>Min</i>	<i>Max</i>	<i>Mean SD</i>	<i>Min</i>	<i>Max</i>	<i>Mean SD</i>	<i>P-Value</i>
Thyroid	T_3 (pmol/L)	0.10	7.10	3.92 1.62	0.80	7.00	3.31 1.43	0.921
Function	T_4 (pmol/L)	2.90	24.00	17.10 3.70	0.00	54.00	7.14 10.71	1.000
Tests	TSH (uIU/ml)	0.20	10.40	1.77 1.44	0.06	51.00	18.27 31.47	0.666

Thyroid dysfunction was diagnosed by the chemical analysis of thyroid function tests. The prevalence of diagnosis was 214 cases of Euthyroidism (35.7%), 195 Hyperthyroidism (32.5%) and 191 hypothyroidism (31.8%), respectively out of a total 600 cases. As regards the nature of abnormality of thyroid disorder, it has been observed that patients of Euthyroidism-i.e., 214 were more than 191 and 195 for hyperthyroidism and hypothyroidism respectively. The prevalence of hypothyroidism is slightly higher than that of hyperthyroidism, as indicated in a study by Baral. The association of TFTs with hypothyroidism is statistically significant ($p=0.005$) for T_3 . The difference is highly significant for TSH and T_4 as ($p=0.000$). Hypothyroidism is an observable fact. In the initial stage there is a minor decrease in T_4 which leads to an elevated value of TSH whereas T_3 are in the reference range. Due to the deficiency of thyroid hormone, a biochemical abnormality is present but is asymptomatic. Although in some severe cases the danger exists resulting in a life-threatening illness.^[18]

The locality wise distribution and the frequencies of euthyroidism, hyperthyroidism and hypothyroidism of the selected cases was also noted: Patients from 20 different districts of KPK were included in the study. The majority of the patients were from the Lahore and its nearby districts. A total of 229 (38.16%) subjects included 13.17% hyperthyroids and 11.3% hypothyroids. On the other hand 77 (12.83%) individuals were belonging to district Faisalabad KPK, out of these 19(3.17%) turned out to be hyperthyroids and 23 (3.83%) as hypothyroids. A total of 56 (9.3%) patients belonged to district Narowal, out of these 18 (3%) were diagnosed as hyperthyroids and 19(3.17%) as

hypothyroids. Similarly, a total of 41 (6.83%) patients were from the district Sheikhpura, out of these 12 (2.33%) and 18 (3%) were hyperthyroids and hypothyroids, respectively. Patients from the nearby districts of Punjab were also included in the study. The prevalence of thyroid dysfunction is greater in Lahore and in the three main districts i-e Faisalabad, Narowal and Sheikhpura.

According to the above results the incidence of hyperthyroidism in Lahore is evident, whereas in the remaining three districts there is greater incidence of hypothyroidism. The reason is being greater population in Lahore and availability of medical and laboratory facilities. Importantly, the data showed that significant percentage of patients were from Afghanistan. The higher occurrence of these disorders among foreign refugees may be because they are adversely affected by chronic exposure to the toxic radiations due to devastating war conditions, chemical weapons and bomb blasts from foreign invaders for the last three decades. It is also evident from the literature that 18% of the survivors of the atomic bomb explosion in Japan (Hiroshima Nagasaki) developed thyroid cancers especially those who are exposed to the carcinogenic effect of radiation during childhood.^[19]

Beside these, the occurrences of thyroid dysfunctions in different regions were less than 5%. However, Hypothyroidism is more prevalent in Fata region. Cardiovascular diseases must be monitored especially angina, Ischemic heart disease as coronary atherosclerosis is common in hypothyroidism. Hypothyroidism can increase blood cholesterol levels and that contributes to heart disease; however, if the

hypothyroidism is being treated with a thyroid hormone, then the cholesterol returns to normal.^[20] To prevent cardiovascular disease myxedema coma, hypothyroidism must be treated with thyroxin immediately and thyroid function should be monitored frequently with treatment. This study shows the frequency of the patients having problems of thyroid disorders in comparison with their locality. Results regarding locality distribution of the patients depicted that majority of these belong to local population of Lahore and Faisalabad region.

CONCLUSION

In Pakistan especially KPK, thyroid diseases are more common in females as compared to males. The most probable cause could be lactation and pregnancy. In lactation and pregnancy BMR is raised because the body requirement increases than the normal, leading to stimulation of thyroid gland to produce more hormones. Early diagnosis and treatment should be done as early as possible. Another important conclusion is the commonness of thyroid disorders in Afghan refugees which is due to exposure to chemical weapons and radiations due to bomb blasts in Afghanistan and the nearby regions of KPK. As Lahore is geographically close to Afghanistan so the people in KP are more prone to be affected by the radiations due to bomb blast. So nationally and internationally peace and harmony should be ensured, especially in KPK and Afghanistan.

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