

THE NEED AND RATIONALE OF THYROID FUNCTION TESTS IN A TERTIARY CARE LABORATORY

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ABSTRACT

Objective: To find out the outcome of thyroid function tests in a tertiary care laboratory and to assess the rationality of thyroid function tests advice.

Methodology: It was a descriptive study which was carried out in a tertiary care laboratory of Rawalpindi. Patient's demographic data and clinical details were recorded. Blood samples were obtained and analysis was done. Results were analyzed on SPSS version 17.

Results: One hundred twenty seven samples of both sexes with age range 15-80 years were selected for study and non probability random sampling was done. There were 94 (74%) females and 33 (26%) males. Age range of the patients was 38.8 ± 14.4 years. Majority of the patients were found to be euthyroid 76.38%. On basis of history, the most common symptom for which thyroid testing was advised was lethargy.

Conclusion: For non-specific symptoms, full thyroid profile should not be advised, rather Thyroid Stimulating Hormone (TSH) should be used as a first line screening test. Full thyroid profile is an expensive test and has financial implications on both patients as well as the laboratory, so rational use of thyroid function tests is recommended.

Keyword: Thyroid function test, Thyroid Stimulating Hormone (TSH), Rationale testing.

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INTRODUCTION

Thyroid gland is a very important endocrine gland which exerts its effects on a large number of organs of the body such as liver, brain, kidney, heart besides influencing the basal metabolic rate and other metabolic activities. Test used for diagnosing any thyroid abnormality are Thyroid stimulating hormone (TSH), free thyroxine (fT4) and free triiodothyronine (fT3), also known as the thyroid function tests. Other tests which

can be used to find out specific causes are Thyroglobulin (Tg), Thyroxine binding globulin (TBG), thyroid auto antibodies, thyroid ultrasound, thyroid scan and fine needle aspiration cytology (FNAC).

The principal test in investigating any type of thyroid dysfunction is TSH¹. Then depending upon the value of TSH, it is decided whether additional testing is required or not. Thyroid abnormality should only be suspected when symptoms are compatible with possible thyroid disease as well as goiter or thyroid nodule, atrial fibrillation (AF), osteoporosis, sub fertility and dyslipidemia². TFTs should not be primarily advised for non-specific symptoms such as weakness, lethargy, etc.

Although the signs and symptoms of thyroid disease are very non-specific but still TSH should be used as a first line test for diagnosing any abnormality in the thyroid as serum TSH has a sensitivity of 89-95% and specificity of 90-96% for overt thyroid dysfunction². Some conditions in which TSH alone is unhelpful are common conditions like recent treatment of thyrotoxicosis, Pituitary disease, Non-thyroidal illness and rare conditions like TSH-secreting pituitary tumour and thyroid hormone resistance³. In these conditions other tests can be used to aid in diagnosis.

Current practice in that the clinicians liberally advise full thyroid function tests for vague symptoms and even for monitoring therapy. Detailed history and

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examination are often overlooked because of which additional tests have to be performed. Requests forms are frequently not accompanied by any clinical notes. It is also noted that the entitled patients in the government run hospitals are liberally advised for the full profile whether indicated or not which causes a financial constraint on the government and institutions. It is seen that at times full profile is advised even on the insistence of patients. Ignorance of patients about the usefulness of full profile also results in a large number of unwanted tests. The disadvantage of these practices is that it incurs a financial burden on the patient while the laboratories become overburdened with work.

The aims and objectives of this study were to find out the outcome of thyroid function tests in a tertiary care laboratory in both the sexes and in age groups (15-80 years) and to assess the rationality of thyroid function tests advice.

METHODOLOGY

The study was performed in a tertiary care laboratory in Rawalpindi from May to September 2010. It was a descriptive study which was carried on both sexes and all the age groups. Sample size was 127 patients and the sampling technique used was simple non probability convenient random sampling. Adults and elderly patients of both sexes were included in the study and intensive care patients and those with systemic diseases affecting the thyroid function were excluded from the study. Patients were usually referred from the adjoining hospitals of Rawalpindi. A detailed history about the presenting features, their duration and past history was taken from the patient. Detailed examination

was also done in each case. Thyroid function tests (TFTs) were done using chemiluminiscence immunoassay method.

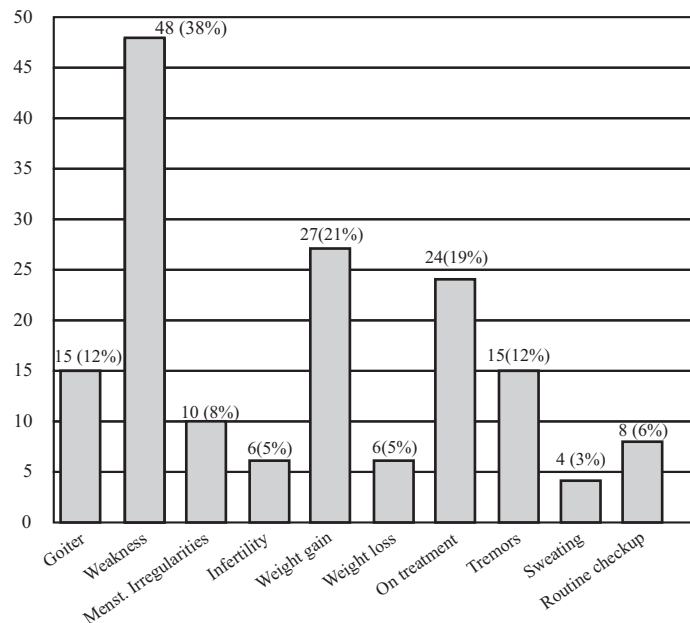
Data was recorded using specially designed proformas and results were analyzed using SPSS version 17.

On the basis of the results of TFT's, patients were classified as euthyroid, primary hyperthyroid, subclinical hyperthyroid, primary hypothyroid and subclinical hypothyroid. Euthyroid means that there are normal values of TSH, T4 and T3. In primary hyperthyroidism, TSH will be low while T4 levels will be increased and reverse is true for primary hypothyroidism. Subclinical hyperthyroidism means a patient with low TSH levels and normal values of T4 and T3⁴. In a patient with subclinical hypothyroidism there will be high TSH and normal values of T4 and T3⁴.

RESULTS

A total of 127 patients were included in our study of which 94 (74%) were females while only 33 (26%) were males. Female : male ratio was 2.82 : 1. Mean age of the patients was 38.8 ± 14.4 years. From the history taken from the patients it was seen that the clinical features for which TFTs were advised were mostly non-specific and in 38% of the subjects the main clinical feature was weakness/lethargy. In 21% of the patients it was for weight gain while in 19% for treatment monitoring (Figure 1). Most of the patients (76.38%) turned out to be euthyroid, while 23.62% had some thyroid disease of which the most common was primary hypothyroid (7.87%), followed by subclinical hyperthyroid (5.51%), subclinical hypothyroid (4.72%) and primary hyperthyroid (3.15%) as shown in Figure 2.

Figure 1: Frequency Distribution of Clinical Findings



The patients presenting with weakness and fatigability were (51.2%) , while for tremors (63.5%), for menstrual irregularities (72%), for treatment monitoring (80%), goiter (82%), where as (100%) of the results for routine checkup, infertility, weight gain and sweating turned out

to be euthyroid (Table 1). In all full profile was advised in 85.6% of the patients, while fT4 and TSH were advised in 7.1% and only TSH in 7.1% of the patients. There existed a significant negative correlation between TSH and fT4 (p<0.05).

Figure 2: Frequency of thyroid disorders

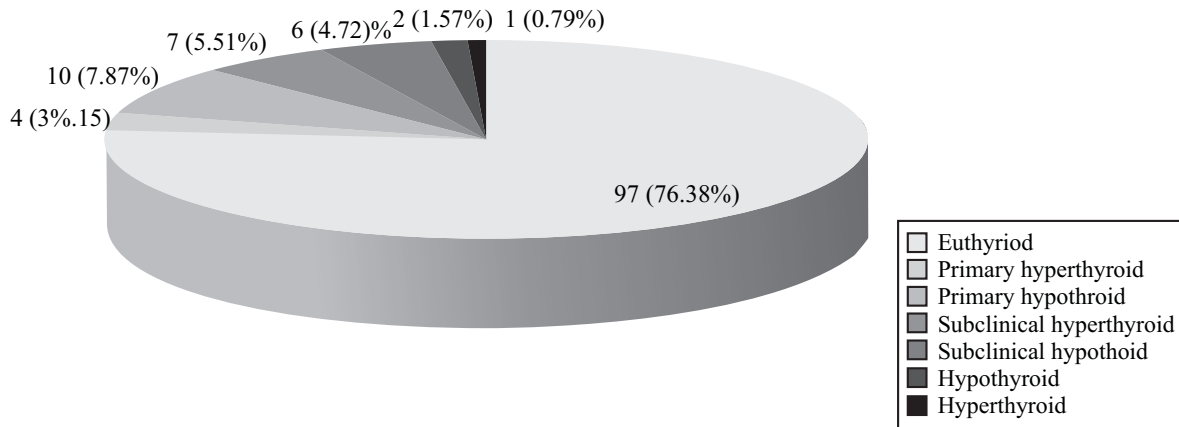


Table 1: Outcome of Thyroid Function Tests According to the Presenting Complaints

Presenting Complaints	Full Profile %	T4 and TSH %	TSH Alone %	Outcome %
Weakness and easy fatigability (48)	85% (41)	5% (2)	10% (5)	51.2% (25) Euthyroid 8.8 % (4) Subclinical hyperthyroidism 17.3% (8) Primary hypothyroidism 8.2% (4) Subclinical hypothyroid 4.5% (7) Primary hyperthyroid
Treatment monitoring (24)	90% (22)	5% (1)	5% (1)	80% (19) Euthyroid 20% (5) Primary hypothyroid
Tremors (15)	80% (12)	-	18.2% (3)	63.5% (9) Euthyroid 12.17% (2) Primary hyperthyroid 12.17% (2) Subclinical hyperthyroid 12.17% (2) Subclinical hypothyroid
Routine check up (8)	66% (5)	20% (2)	14% (1)	100% Euthyroid
Goiter (15)	83% (12)	17% (3)	-	82% (12) Euthyroid 18% (3) Subclinical hypo
Menstrual irregularities (10)	30% (3)	30% (3)	40% (4)	70% (7) Euthyroid 10% (1) Hypothyroid 20% (2) Primary hyper

DISCUSSION

Thyroid function tests are very often prescribed in clinical practice and make a major bulk of endocrine investigations done in an endocrine pathology laboratory. Systematic prescription of these tests can result in decreasing the work load of laboratories and improve the cost effectiveness. Although diagnosing thyroid function can be a very challenging job but amalgamation of clinical acumen and systematic use of TFTs can make it easier. Thyroid dysfunction should only be suspected when the signs and symptoms are compatible with the disease. Routine screening for thyroid dysfunction in asymptomatic patients is usually not recommended⁵. As thyroid dysfunction is associated with adverse health effects⁶, so it must be diagnosed and treated at the earliest. TSH is a very sensitive indicator of the gland function and should be used alone as an initial screening test⁷. A TSH value within the reference interval excludes majority of cases of primary overt thyroid diseases⁸. As can be seen in our study that 76.38% of the patients turned out to be euthyroid, so a systematic approach in which TSH is used as first line investigation should be used. A normal TSH mostly means that the fT4 would also be normal⁹. In such a patient no further testing will be required until clinically indicated⁹. In case of abnormal values of TSH, we can combine fT4 with TSH to determine the cause of thyroid dysfunction. A small number of patients may still be missed when TSH is used as the first line test and they would include patients on treatment for known thyroid dysfunction, sick euthyroid syndrome or those on drugs which are known to interfere with thyroid hormone level¹⁰. These patients will have deranged fT4 despite normal TSH. But looking at the greater picture, such cases are very rare and clinical acumen should be used in diagnosing such cases and by following TSH as the first line of investigation protocol we can save the money spent on the full profile and decrease the workload of the laboratory. If we look at the financial aspect, for full profile running cost of the reagents alone is Rs. 300 – 700 and the patients are charged Rs. 1500 – 3000 depending on the laboratory. For a developing country like Pakistan, it can affect our economy a lot as the health budget is already very less, so we need a systematic approach so as to save money which can be used for other health related activities.

CONCLUSION

From this study we conclude that thyroid profile is an expensive investigation and as most of the patients

CONTRIBUTORS

WA conceived the idea and did over all supervision. MS reviewed the literature, helped in the write up. WF helped in the write up of the manuscript. SA looked after the clinical aspect. KAK took care of the clinical correlation.

turned out to be euthyroid so both clinical assessment and rationale use of biochemical profile are important in diagnosing thyroid dysfunction. TSH should be used as the first line test for any suspected thyroid dysfunction and further tests should be based on the results of TSH.

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None Declared