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Original Research Article

Accuracy of Wayne's criteria in diagnosing hyperthyroidism: a prospective study in south Kerala, India

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ABSTRACT

Background: Thyroid is an important endocrine gland regulating the metabolism of body from utero to maturation. Thyroid related diseases are most common among all endocrine diseases. Hyperthyroidism causes major metabolic derangement and hence the need for a screening test to diagnose the disease holds greater public health importance in a populated country like India. The study aims at finding the sensitivity of Wayne's Criteria in correlation with Biochemical analysis in screening Hyperthyroidism.
Methods: A prospective study done to screen patients with symptoms suggestive of hyperthyroidism coming to surgery department of Dr. S. M. C. S. I. medical college over a period of one year from September 2016 to September 2017 with the aid of Wayne's Diagnostic criteria and biochemical analysis.
Results: Of the total 53 cases studied, 23 cases were biochemically hyperthyroid. of the 23 cases Wayne's criteria identified 20 cases as hyperthyroid, 2 cases were Disambigous and 1 was diagnosed as Euthyroid. Of the 30 biochemically Euthyroid patients Wayne's criteria picked up 27 true Euthyroid patients, 2 patients as Disambigous and 1 patient was falsely diagnosed as Hyperthyroid. Sensitivity of the criteria was found to be 86.9%, specificity as 96%, positive predictive value was 95.2% and Negative predictive value was 90%.
Conclusions: Wayne's criteria holds a good deal of diagnostic accuracy. With high sensitivity specificity Wayne's criteria can be applied as a screening test to diagnose a hyperthyroidism for early diagnosis and referral at the primary health care level in a populated country.

Keywords: Diagnostic accuracy, Hyperthyroidism, Wayne's criteria

INTRODUCTION

Thyroid gland is very important for metabolism of the body, its function is very important from in utero to maturation. . Fluctuation in levels of thyroid hormone from normal have far reaching effects on body's homeostatic mechanism. Thyrotoxicosis is a relatively common disorder. It occurs in all parts of the world, affecting 2% of women and 0.2% of males.[1]

The first groups of symptoms occur because of hyperfunctioning of the thyroid gland and increased catecholamine sensitivity. The second group related to the enlargement of the thyroid, i.e., goitre and its accompanying signs such as thyroid bruit. The third constellation of symptoms and signs is the eye signs, which are a long list of eponymous conditions, dreaded by medical students. In addition, there are miscellaneous clinical features, affecting the skin, muscles and other systems.[2]

The burden of thyroid related disease in the general population is vast. Thyroid related diseases are the most common among all endocrine diseases in India.

In many studies conducted abroad, half the people in a population has microscopic nodules, less than 15% have thyroid swellings, less than 3.5% are subclinically having occult papillary carcinoma, 10% have aberrant TSH levels and 5% have clinically significant hypothyroidism or hyperthyroidism.

Inspite of the successful coverage of National iodine deficiency diseases control programme (NIDDCP) in India, iodine deficiency is still prevalent in many parts throughout India.

The spectrum of thyroid diseases is very wide and hypothyroid state is out of scope of Wayne's index. So, focusing on current problem in India, gives a clear need of Targeted Screening for thyroid diseases in high risk population of all age groups is essential. So far biochemical analysis is confirmative of thyroid state quantitatively. Other investigative modalities like FNAC, Scintiliography, Radio-lodine uptake study, Ultra Sound Scan, Auto-Antibody study are available for confirmation of diagnosis at higher centres. Since, Indian setup of medical services offers certain investigative modalities at certain level of health system it is not possible for primary level of health setup to facilitate diagnosis. Conclusively, Wayne's Index will be useful to apparently quantify clinically the thyroid state of patient and referring the selective to higher centres.

This study aims to find the sensitivity of Wayne's index in correlation with biochemical analysis in our clinical setup and thereby promoting the hypothesis that Wayne's index quantification at primary level for screening and referral.

In 1960, Sir Edward Wayne described a scale named Wayne's index to improve the accuracy of diagnosis of hyperthyroidism and also to limit the need for other diagnostic

This index of signs and symptoms is a clinical scoring tool to evaluate the presence and degree of hyperthyroidism**.** It is also useful in resource challenged regions or when thyroid function tests results are at variance with clinical suspicion. With a score ranging from +45 to -25, a score less than 11 defines "euthyroidism" while scoring above 19 suggests "toxic hyperthyroidism". Although this system of scoring has very little relevance today, it is a useful guide to the relative importance of clinical features in the diagnosis of hyperthyroidism.[3]

Aim of the present study was to quantitatively analyze the accuracy of Wayne's clinical criteria in correlation of biochemical investigation.

METHODS

A prospective study done to screen patients with symptoms suggestive of hyperthyroidism coming to surgery department of Dr. S. M. C. S. I. medical college over a period of one year from September 2016 to September 2017 with the aid of Wayne's Diagnostic criteria and biochemical analysis.

Inclusion criteria

Inclusion criteria include patient with Age >12years, Previously diagnosed to be a case of thyroid, Patient with thyroid swelling and symptoms suggestive of hyperthyroidism or neck swelling admitted in Dr SMCSI medical college over duration of one year is being considered for the study. Sample size was 53.

Exclusion criteria

Include patients with Age <12 years, known medical co-morbidities and pregnancy.

Outcome measures

Wayne's diagnostic criteria as an aid to diagnose hyperthyroidism.

Statistical analysis

The statistical analysis is done by using method of central tendency (mean median, mode), Chi-square test and data packages.

Wayne's Index is explained in Table 1, Table 2 and Table 3.

RESULTS

In our study the Total Case Studied were 53. Out of 53 patients, biochemically hyperthyroid patients were 23. 30 patients were found to be biochemically Euthyroid.

Table 1: Wayne's index-symptoms.

Symptoms	Score
Dyspnoea on effort	+1
Palpitation	+2
Tiredness	+2
Preference for heat	-5
Preference to cold	+5
Excessive sweating	+3
Nervousness	+2
Apetite increased	+3
Apetite decreased	-3
Weight increased	-3
Weight decreased	+3

Among the true Hyperthyroid patients according to Wayne's index 20 patients were found to be hyperthyroid (true positive) with a Wayne's score of >19. Two patients who were Wayne Disambigous (False Negative) with a Wayne's score of 1-19. One the patient was diagnosed as

Euthyroid by Wayne's index. Among the 30 patients who were biochemically Euthyroid Wayne's index could accurately diagnose 27 patients (True negatives). 2 patients were found to be Wayne's Disambigous and one patient was diagnosed falsely as Hyperthyroid (Table 4).

Table 2: Wayne's index-signs.

Signs	Present	Absent
Palpable thyroid	+3	-3
Bruit over thyroid	+2	-2
Exopthalmos	+2	-
Lid retraction	+2	-
Lid lag	+1	-
Hyperk1nesis	+4	-2
Hands hot	+2	-2
Hands moist	+1	-1
Casual pulse rate		
>80/min	-	-3
>90/min	+3	-
Atrial fibrilati0n	+4	-

The Sensitivity of the Wayne's index in diagnosing Hyperthyroidism was found to be 86.9%, while the specificity was 96%. The positive predictive value of the test was found to be 95.2%, while the Negative predictive value was 90%. Sex wise ratio of hyperthyroidism was found to be 12:1 (according to Table 4).

Table 3: Wayne's index score.

Thyroid score	Score	Biochem	Corresponds
Euthyroid	<11	Euthyroid	Yes/no
Hyperthyroid	>19	Hyperthyroid	Yes/no

Table 4: Results.

	Disease positive	Disease negative
Wayne's index positive	20	1
Wayne's index negative	3	29
Total	23	30

Table 5: Sex ratio.

Gender	Hyperthyroid
male	2
Female	24

DISCUSSION

Wayne's Index is more than half a century old. Wayne's Index was earlier used to help to diagnose hyperthyroidism and limit the number of investigations required.[5] In present study hyperthyroidism was diagnosed in females more than males with a ratio of 12:1. This result was similar to many international studies.[6,7]

Among present study of 53 patients who presented with symptoms of thyroid dysfunction, we applied Wayne's diagnostic criteria to diagnose hyperthyroidism. All patients were biochemically ascertained of their thyroid status and Wayne's criteria were assessed for its accuracy by various parameters like specificity. Sensitivity, positive predictive value, negative predictive value, Sensitivity of 86.9%, specificity 96.6% and negative predictive value 90.2% positive predictive value of 95.2% proves that Wayne's index stands with near accurate diagnosis which can serve as a cost-effective screening test for diagnosis of hyperthyroidism. similar results were found by many researchers.[9-12] The first thyroid score (based on thyroid function tests) was established by Schultz and Ziene in 1956 to predict relapse of thyrotoxic patients after radioactive iodine.[4]

The first clinical thyroid score was the index of Crooks, Murray and Wayne, created by trial and error in 1959 which we now know as Wayne's Index.[5]

Whickham survey by Tunbridge WMG et at, states the prevalence of diffuse goitre decreases with age but greatest in pre-menopausal age group. As per our study results, the frequency is highest among premenopausal age group, which clearly correlates with our study. But the decreasing order of frequency of prevalence of diffuse goitre is not coinciding. The most possible explanation we can offer is selection bias. Because most of the patients we have selected from surgical wards and op, which automatically excludes pediatrics and adolescent age group.

According to National Health and Nutrition Examination Survey (NHANES III), Hollowell JG et at the ratio of hyperthyroid m mate: female is 1:10, and according to our study, we got study as male: female as 1:12.[8]

According to international journal of endocrinology, secondary hyperthyroidism does not present with sever eyes signs except for lid retraction and lid lag, which correlates with our study.

According to multiple international studies, occurrence of hyperthyroidism is highest among reproductive age group females, which is fairly depicted in our study.

In spite of all advanced diagnostic modalities, clinical examination should be the first and foremost thing to be stressed as indicated in Wayne's criteria, especially in a developing country where extremes of medical care exist.

The most common symptom being appetite increase and nervousness, followed by appetite increase and tiredness. The other symptoms which has not been included in Wayne's criteria are diarrhoea, menstrual irregularities, pruritus, infertility, etc. which is present in many patients.

CONCLUSION

Wayne's criteria hold a good deal of diagnostic accuracy. So, it is worth applying this criterion, to diagnose and for early referral, especially in women of reproductive age group detrimental effects of thyroid disorders on reproduction can be prevented. Due to high sensitivity, specificity, positive predictive value and negative predictive value, Wayne's criteria prove basic clinical methods still holds good despite advanced diagnostic modalities. Inter observer variation is an important limiting factor for Wayne's criteria, therefore, as score can vary with the observer. Certain signs and symptoms are not included in Wayne's criteria which are not uncommonly encountered in hyperthyroid patients.

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