THE PREVALENCE OF HYPERTHYROIDISM AT UNIVERSITY OF MAIDUGURI TEACHING HOSPITAL (UMTH), MAIDUGURI.

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ABSTRACT

Background: Hyperthyroidism and hypothyroidism are the two common thyroid disorders but there is paucity of information on the prevalence of hyperthyroidism in Nigeria in general and in Northeast of Nigeria in particular.

Objective: To determine the prevalence of hyperthyroidism at University of Maiduguri Teaching Hospital. Method: A retrospective study done over a period of one year that reviews the results of serum TSH, T_3 and T_4 from 203 patients.

Results: Eighty-nine (43.8%) and 79 (38.9%) patients had elevated serum levels of T_3 and T_4 respectively (i.e. were hyperthyroid), 114 (56.2%) and 112 (55.2%) patients had normal serum levels of T_3 and T_4 respectively (i.e. were euthyroid) while 12 (5.9%) patients had low serum levels of T_4only (i.e. were hypothyroid). The female to male ratio of hyperthyroidism was 4 and 1[T_3 — female 68 (35.4%), male — 17(89%); T_4 — female 59 (30.7%), male 15(7.8%)]. Age —group from 25—34 years was the most frequent. (51 patients) and with the highest prevalence of hyperthyroidism [T_4 - 19(14.2%); T_4 18(13.4%)].The study further revealed a decline in the prevalence of hyperthyroidism as age increased. The finding of high prevalence of low TSH (20.8%) against high prevalence of elevated T_3 and T_4 [89(44.1% and 79(38.9%) respectively] in this study could suggest that the hyperthyroidism in the studied patients could have been largely caused by Graves' disease.

Conclusion: This study revealed that thyroid disorders are not uncommon in our environment and the finding of high prevalence of low TSH above high TSH, suggested that the hyperthyroidism discovered in our study may have been largely caused by Grave's disease.

We recommend that more laboratory diagnostic centre should be established in our environment where thyroid disorders can be diagnosed.

Keywords: Hyperthyroidism, TSH, T_3 and T_4.

INTRODUCTION

Hyperthyroidism and hypothyroidism are the two common thyroid disorders. The term hyperthyroidism (Thyrotoxicosis) is the syndrome that develops after body tissues are exposed to increased concentration of the thyroid hormones — triiodothyronine (T_3) or thyroxine (T_4) or both. Hypothyroidism is defined as a deficiency in thyroid hormone secretion and action. The presentation of hyperthyroidism varies with age, the classical symptoms and signs being seen in young and middle aged patients but less so in the elderly. [1, 2, 3]

Thyrotoxicosis is found in various age groups and in different clinical situations. For instance, a hospital based study by Moayeri and Flaghshenas reported the prevalence of 3.9% of hyperthyroidism in 384 cases of children that were diagnosed as goitre.[4] Lowest occurrence before the age of 3 and peak occurrence in puberty have been reported.[5] Muller et al, reported occurrence of hyperthyroidism in the elderly.[6] Hyperthyroidism is present in approximately 0.5% of the population. An additional 0.8% of the population has mildly suppressed or undetectable serum TSH level but the circulating thyroid hormone levels are within the normal range. Additionally, the rate of development of the various causes of hyperthyroidism varies according to geographic location and is believed to be related to the iodine intake of the population.[7,8]

Laboratory testing of thyroid hormones is used to diagnose and document the presence of thyroid disease, a condition that often presents with vague and subtle symptoms. Accurate measurement of thyroid hormone concentrations is crucial to the proper diagnosis of thyroid gland dysfunction.[1]

In view of paucity of information on the prevalence of hyperthyroidism in Nigeria in general and in North-East of Nigeria in particular, the study was intended to determine in retrospective the prevalence of hyperthyroidism at University of Maiduguri Teaching Hospital, Maiduguri, Nigeria. This hospital, being a referral centre, serves principally, the people in the North-East zone of Nigeria.

METHOD

The study was conducted following clearance from Research and Ethical Committee of University of Maiduguri Teaching Hospital, Maiduguri. A 5ml venous blood was collected in plain bottle from each patient who was being investigated for thyroid disorder. After clotting and retracting, applicator stick was used to dislodge the whole blood from the inner wall of the bottle and spun at 5000rpm for 10mm. Serum was extracted from each bottle and kept frozen at -20°C each in 2m1 well stopper bottle until the time of analysis. On the day of analysis, the frozen serum was allowed to thaw at room temperature and gently rocked before sampling.

Serum TSH, T_3 and T_4 were estimated using ELISA method. Kits from Fortress Diagnostics Limited, United Kingdom were used for the measurement. Kits for TSH, T_3 and T_4 had sensitivities of 0.05μiμ/ml, O.O4ng/ml and 0.4μg/dl respectively. TSH, T_3 and T_4 kits had intra and inter assay coefficient of variations of (5.7% and 6.8%), (3.9% and 4.5%); and (4.4% and 4.2%) respectively. The three kits were assayed against the WHO RI' (58/40). Randox control sera (level 2) after reconstituting quantitatively, was used to control the assays.
The results of 203 patients whose serum TSH, T and T were quantitatively determined were collated and analysed using SPSS version 15. The period of the study was one year starting from3rd September, 2009 to 20th September, 2010. The analysed results were presented in tabular form.

RESULTS

Table 1 shows the means serum TSH, T_3 and T_4 concentrations of 1.59tiu/ml, 2.S6ng/ml and 11.70ig/dl respectively. Table 2 shows a significantly increased serum TSH, T_3 and T_4 concentrations against expected values (TSH< 0.05, T_3<005 and T4 <0.05 respectively); and the control performance. Table 3 shows age-group prevalence of hyperthyroidism. The ages from 25-34 years had the highest frequency (51 patients) and prevalence (T_3-14.2 % and T4 - 13.4%).

Table 4 shows sex distribution of hyperthyroid in the studied patients with female having higher prevalence. The ratio of female to male

of hyperthyroidism in the general studied patients (T_3 — 44.1% and T_4- 38.9%).

Table 6 shows sex distribution of serum TSH concentrations in the studied patients. 40(20.8%) of the studied patients had serum TSH concentrations < 0.4μiu/ml, 146(76.0%) had theirs within reference range while 6 3.1%) had their serum TSH concentrations> 6.O.tiu/ml.

DISCUSSION

In this study, the serum TSH, T_3 and T_4 levels of the studied patients were interpreted in relation to the established values obtained from the Caucasians. The study revealed statistically significant increase in the serum levels of TSH, T_3 and T_4 (P_{TSH}< 0.05, P_{T3}<0.05 and P_{T4}<0.05). This was a proof of incidence of hyperthyroidism in the studied patients. Hyperthyroidism has been documented to be commonly caused by, in order of decreasing frequency, Grave's disease(70-80%), thyroiditis, toxic nodular goitre, toxic thyroid adenoma and exogenous hyperthyroidism (iatrogenic, factitious, iodine induced). The rare causes include excess thyroid stimulating hormone (troptoblastic tumours, pituitary tumours) and ectopic

Table 1: Characteristic Features of the Parameters

Parameter	Valid N	Missing N	Range	Mini	Maxi	Mean	SD
Age (Years)	136	68	70	15	85	38	13
Age - group	134	68	7	1	8	3	0.1
TSH μiu/ml	203	-	39.8	0.2	40.0	1.59	4.33
T3(ng/ml)	203	-	7.20	0.30	7.50	2.56	2.25

Legend: N — Number of patients. Mini — Minimum values. Maxi — Maximum values. SD — Standard Deviation.

Table 2: Serum T_3 and T_4 Levels (±SD) and Control Performance.

Parameter	No of Patients	Meant± SD	Expected Range	P - Value*	C"-sera Meant± SD	C"-sera Actual Values	C"-sera CV%	C"-sera Std Error
TSH (μiu/ml)	203	1.6±4.33	0.40- 6.00	<0.05	3.1±0.27	3.0	9	0.05
T3(ng/ml)	203	2.56±2.25	0.52-1.85	<0.05	1.70±0.30	1.5	18	0.11
T4 (μg/ml)	203	11.70±6.99	4.40-11.60	<0.05	8.20±0.96	8.5	12	0.34

*Values are compared with expected values for significance.
C"- Control.
CV% - Percentage coefficient of variation.

Table 3: Age-group prevalence of Hypothyroid, Euthyroid and Hyperthyroid in the Studied Patients

Age – group(years)	No of Patients	N(Hypothyroid)%	N(Euthyroid)%	N(Hyperthyroid)%
15 – 24 T_3(ng/ml)	15	0(0.0)	6(4.5)	9(6.7)
T_4(µg/dl)		1(0.7)	4(3.0)	10(7.5)
25 – 34 T_3(ng/ml)	51	0(0.0)	32(23.9)	19(14.2)
T_4(µg/dl)		3(2.2)	29(21.6)	18(13.4)
35 – 44 T_3(ng/ml)	30	0(0.0)	18(13.4)	12(9.0)
T_4(µg/dl)		0(0.0)	22(16.4)	8(6.0)
45 – 54 T_3(ng/ml)	23	0(0.0)	12(9.0)	11(8.0)
T_4(µg/dl)		0(0.0)	11(8.0)	12(9.0)
55 – 64 T_3(ng/ml)	9	0(0.0)	5(3.7)	4(3.0)
T_4(µg/dl)		2(1.5)	5(3.7)	2(1.5)
65 – 74 T_3(ng/ml)	4	0(0.0)	3(2.2)	1(0.7)
T_4(µg/dl)		1(0.7)	2(1.5)	1(0.7)
75 – 84 T_3(ng/ml)	1	0(0.0)	0(0.0)	1(0.7)
T_4(µg/dl)		0(0.0)	1(0.7)	0(0.0)
85 – 94 T_3(ng/ml)	1	0(0.0)	1(0.7)	0(0.0)
T_4(µg/dl)		0(0.0)	1(0.7)	0(0.0)
TOTAL	134			

Table 4: The Sex Distribution of Hyperthyroid and Ratio in the Studied patients.

Sex	No of Patients	N(Hyperthyroid)%	Ratio
T3 Male	29	17(8.9)	1
Female	163	68(35.4)	4
Total	192	85(44.3)	
T4 Male	29	15(7.8)	1
Female	163	59(30.7)	4
Total	192	74(38.5)	

Table 5: The Prevalence of Hyperthyroidism in the Studied Patients.

Parameter	No of Patients	N(Hypothyroid)%	N(Euthyroid)%	N(Hyperthyroid)%
T_3	203	0(0.0)	114(55.9)	89(44. 1)
T_4	203	12(5.9)	112(55.2)	79(38.9)

Table 6: Sex Distribution of Serum TSH Levels in the Studied Patients.

Sex	No of Patients	N(Low)%	N(Normal)%	N(High)%
Male	29	9(4.7)	19(9.9)	1(0.5)
Female	163	31(16.1)	127(66.1)	5(2.6)
Total	192	40(20.8)	146(76.0)	6(3.1)

thyroxine production. [2, 9, 10] The study also revealed that female had higher prevalence of hyperthyroidism than male in the ratio of 4 to 1. In North America, it was reported that "the prevalence of hyperthyroidism is fairly low in the general population (0.3% - 0.6%) and women are more prone to developing hyperthyroidism than men with the ratio of females to males with Graves disease being 5-1".[1] In a hospital based study in Iran, Moayeri et al reported female to male ratio of 2.75: 1.[4.]

The finding of high prevalence of T_3 above T_4 (T_3-44.1% and T_4-38.9%) in the study corroborates the reported fact that "serum T_3 concentration is often elevated to a greater degree than is T_4 in the early diagnosis of Graves disease and in some patients with solitary or multinodular toxic goitres (so called T3 thyrotoxicosis).[1,11]

The most frequent age-group in this study was from (25-34) years and had the highest prevalence of hyperthyroidism (T_3 - 14.2% and T_4– 13.4%). The study revealed that as the patients advanced in age, there was a decline in the prevalence of hyperthyroidism. This finding was in agreement with Ambali's report on thyrotoxicosis. The disease is rare in children but the frequency increases to a peak in the fourth decade thereafter declining".[2] Moayeri et al reported increased prevalence during the pubertal years. Fisher et al reported that Grave's disease is rare before the age of 3 and increases progressively with age thereafter.[4,5]

The finding of high prevalence of low TSH above high TSH (20,8% and 3.1% respectively) as against hyperthyroid prevalence of (T_3-44.1% and T_4-38.9%) suggested that the hyperthyroidism discovered in our study might have been largely caused by Grave's disease. The endocrinological features of Grave's disease include low to undetectable serum levels of TSH, elevated T_3 and T_4.

We want to recommend that more laboratory diagnostic centre should be established where thyroid disorders can be diagnosed.

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