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Biochemistry

STUDY OF SUBCLINICAL HYPOTHYROIDISM IN NORTH COASTAL ANDHRA PRADESH

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ABSTRACT

Background: The Clinical thyroid function comprises a major part of spectrum of thyroid disorders and entails progression to overt hypothyroidism if untreated with adverse sequelae such as increased risk of IHD, neurocognitive impairment and lowered quality of life.

Aim: The present study aims to evaluate the prevalence of Subclinical Hypothyroidism in patient population of North Coastal Andhra Pradesh and analyze the effect of age and gender among the subjects.

Materials & Methods: Retrospective cross-sectional hospital study. Data for evaluation obtained from patient records of thyroid lab at Department of Nuclear Medicine, King George Hospital, a tertiary referral hospital of North Coastal, Andhra Pradesh, from January to December 2013.

Results: Total subjects were 738 comprising of 15.8% males and 84% females subjects with normal and hypothyroid were 56.6% and 43.36% respectively. Total of 194 cases (26.28%) had subclinical hypothyroidism including males 2.8% and females 23.44% among the 194 subjects prevalence was more in females 89.97% than males 10.82% . 20-59 yrs (79.36%) was the most affected age group.

Conclusion

The highest percentage of Subclinical Hypothyroidism was present in female age group of 20-65 yrs (89.47%). Routine screening of above suspect population may be beneficial along with application of serum thyroid stimulating hormone (S.TSH) age specific reference values especially to older age groups (80 years above) and avoid over replacement of thyroid hormones.

KEYWORDS : Subclinical Hypothyroidism, Serum Tsh, Prevalence

INTRODUCTION

Subclinical hypothyroidism (SCH) is described as an asymptomatic state in which reduction in thyroid activity has been compensated for by an increase in TSH output to maintain euthyroid state. Subclinical thyroid disease is primarily a laboratory diagnosis established by second and third generation sensitive serum thyrotropin assays[1]. SCH is defined as a serum concentration of TSH above the statistically defined upper limit of the reference range with serum T4 (Thyronine) and T3 tri iodothyronine within the range of normal[2].

The diagnosis therefore necessitates strict quality control by the laboratory with a standardized reference for TSH[3]. AACE, ATA and the endocrine society of USA have defined the normal range of S.TSH cone as 0.45-4.5 µIU/ml

The world wide prevalence of SCH ranges from 1 to 10%[4.] factors such as previous hyperthyroidism, T-1 DM, family history of thyroid disease, postpartum thyroiditis history of radiation treatment all raise the likelihood of SCH. The present study aims to evaluate the prevalence of SCH in hospital referral population of King George Hospital (KGH), Visakhapatnam, North coastal Andhra Pradesh.

MATERIALS & METHODS

The study data was obtained from patient records who attended the Department of Nuclear Medicine, KGH between January and December 2013 whose blood samples were processed at the thyroid laboratory.

Data of referral patients from the departments of Cardiology (IHD) Neurology (CVA) Endocrinology (DM) psychiatry ,pregnancy and postoperative thyroid cases with positive histopathology thyroid surgery were excluded to avoid sick euthyroid syndrome sub cohort of Patients on thyroxin therapy were included and analysed separately.

Serum samples were collected under strict precautions and were processed under standard laboratory conditions. Thyroid function tests comprising T3, T4, TSH levels were performed by Radioimmunoassay (RIA) provided by BRIT, Mumbai. As per manufactures reference ranges for **T3** -0.70 to 2.00 ng/ml, **T4**- 5.00 to 13.00 µg%, **TSH**-0.25 to 4.30µIU/ml were applied. S.TSH concentration of >4.50 to 10 µIU/ml with normal levels of serum thyroxin and triodothyronine were categorized as SCH.

Statistical analysis was by SSPS version 11.5 (Chicago 11) data was presented as mean, standard deviation and percentages. Microsoft excel program was employed to generate Bar Diagrams and tables.

RESULTS

The retrospective study comprised of 738 subjects with 125 males and 674 females. The mean (15.85%) males and (84.14%) females age group of the study was 37.26± 3 yrs with females below 40 yrs (32.6±17) and males (42±20)yrs. Euthyroid subjects were 56.6% n=418 and hypothyroidism with distinct elevation of S.TSH concentration above 10 µIU/ml was 43.36%. 194 individuals (Fig1)

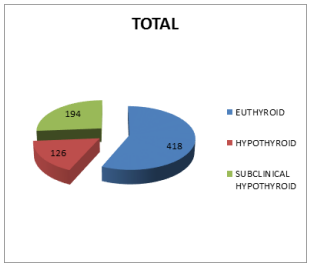

Figure-1 Thyroid Status In Study Population

were identified as subclinical hypothyroid with elevated S.TSH and S. Thyroxine (T4) & T3 within normal range with a prevalence of 23.44% in females and 2.6 % in males. 21 were males and 173 were females the distribution of cases and mean values of thyroid hormones are given in Fig 2, Table-1 & Table-2.

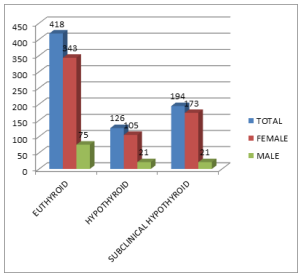

Figure-2 .gender Distribution In Subclinical Hypothyroidism

Table-1 Mean Values Of Thyroid Hormones In The Study Group

STATUS	T3 (ng/dl)	T4 (µg %)	TSH (µIU/ml)
EUTHYROID n =418	1.045±0.186	10.26±0.794	2.28±0.137
SUBCLINICAL HYPOTHYROID n =194	1.10±0.15	10.27±0.746	6.241±0.168
HYPOTHYROID n =126	1.02±0.44	5.36±3.9	15.05±4.58

Table-2 Percentage And Gender Distribution Of Subclinical Hypothyroidism In The Study.

STATUS	MALE	FEMALE	TOTAL	PERCENTAGE
EUTHYROID	75	343	418	56.6%
SUBCLINICAL HYPOTHYROID	21	173	194	26.28%
PRIMARY HYPOTHYROID	21	105	126	17.07%
TOTAL	117	621	738	100%

Age & gender dispersion of cases in different bandwidths is given in Table-3(A&B)

TABLE-3 (A) CASE DISTRIBUTION COMPARISON IN TWO DIFFERENT AGE BAND WIDTH

AGE GROUP	*MALE*	*%*	*I FEMALE*	*%*	*TOTAL*	
					TOTAL	*%*
20-29	2	1.03	44	22.68	46	23.7
30-39	2	1.03	45	23.19	47	24.22
40-49	2	1.03	46	23.71	48	24.74
50-59	4	2.06	17	8.76	21	10.82
>60	6	3.09	10	5.15	16	8.24

Table-3(b) Case Distribution Comparison In Two Different Age Band Width

AGE GROUP	MALE	II %	FEMALE	%	TOTAL	
					TOTAL	%
20-30	2	1.03	51	26.28	53	27.31
31-45	2	1.03	78	40.20	80	41.23
46-59	6	3.09	23	11.85	29	14.94
>60	6	3.09	10	5.15	16	8.24

on comparing the 2 groups data revealed that females were 89.97% and males were 10.82% among the 194 subjects and maximum females affected were between 20-59 yrs (79.3%) n=163. Male, female overall ratio was 1:8 but in the age group of 31-45 (40.2%) n=78 females were 38 times higher than males with maximum density was recorded. Maximum case of SCH observed were between 20-59 yrs (79.4%) no gender variation was observed with increasing age in 60yrs and above. Males appeared to be modestly affected as age increased from 1% at 29 yrs to 3.09% at 60yrs. While females preponderance was very high from age of 20-49. Male Female ratio being 1:20. Consistently between period of 20-29/30-39/40-49 yrs. From 50-59 and >60yrs it was 1:3 and 1:1.6 respectively. Data of present study is compared with studies from Nepal & Kashmir in Table 4.

Table-4 Comparison Of Different Studies With Present Study

CASE STUDY	NEPAL[11](1 YEAR)	KASHMIR[12] (1YEAR)	VISAKHAPATNAM (1 YEAR) (PRESENT STUDY)
n	1714	2550	738
MALE	24.5%	44.6%	15.85%
FEMALE	75.5%	56.4%	84.14%
HYPOTHYROID	26%	30.5%	4.5%
EUTHYROID	54%	69.4%	56.6%
HYPER THYROIDISM	19%	NA	43.36%
SCH	350(20%)	550(21.56%)	194(26.28%)
MALE	84(4%)	454(18.2%)	21(2.8%)
FEMALE	266(15%)	2096(81.8%)	173(23.44%)
MAXIMUM AGE GROUP	20-59	20-65	20-60

DISCUSSION

The overall prevalence reported in the general population in literature is marginally variable from 4-10%[5,6] and up to 20% in women older than 60yrs to 5-13.2% [7] depending on population studied. Some studies[8,9] have reported a prevalence of 3.4–10.8% . SCH is more common disorder in the older population with 1.4 to 7.8 %, prevalence being greater in women[10] and increases with age, but data is less consistent with men. Indian studies in Nepal[11] and Kashmir [12] have reported prevalence of 20%, males 4%, females 15% and 21.56 % , males 18.2% females 81.8% respectively. Present study has recorded similar date of 26.28%, males 2.6% and females 23.44% in the study group. In the present study there were 194 females and 21 males, this may indicate a clinical bias in suspecting thyroid disorder in female patients more often compared to males. Previous studies also report a higher rate of testing in females.[13,14]

Analysis of age and gender wise susceptibility to subclinical thyroid disorders revealed maximum number of patients to be between 20-59 yrs in females within the band width of 31-45 yrs recording 41.23% while in males it was 1.03%. Such high prevalence of thyroid disorders are reported in previous studies[13,15]. It is known that 20% of patients taking thyroid medication have SCH[6], present study identified 9.2% of such cases. About 2-5% per year progress to overt hypothyroidism [4] it is necessary to identify such patients and the key to accurate diagnosis is accurate measurement and appropriate interpretation of S.TSH and thyroid hormone levels. This entails harmonization of TSH assays with emphasis on functional sensitivity of S.TSH[16] measured a goal identified by international federation of Clinical Chemists. Attention must be paid to assay bias, inter assay variation and methodology which may impact reporting of TSH values as normal or abnormal because antibodies in different TSH assays do not recognize all isoforms to the same extent which differ in bioactivity and immune reactivity between healthy subjects and those with thyroid or pituitary disease.

In SCH often asymptomatic, upto 30% of patients are known to experience nonspecific physical and psychiatric symptons[17,18] considerable evidence implicates SCH as a risk factor for atherosclerotic cardiovascular disease. One meta analysis of 15 studies[19] found patients under the age of 65 yrs only had increased risk of IHD, that treatment with thyroxin for SCH in those with S.TSH >5µIU/ml was beneficial in younger, but not older patients[20]. Patients over 65 yrs old with TSH between 4.5-6.9 µIU/ml were shown to have a 46% chance of TSH reducing within 2 yrs [21] However in such elderly patients replacement of thyroxin should be gradual and closely monitored to avoid over replacement as evidence that such therapy improves mortality is meager.[22]

CONCLUSION

Prevalence of 26.28% in the present study group compared to 1-10% in various parts of the world may be due to an increased level of awareness and education of thyroid disorders through community level programs as well as and availability of cost effective Thyroid function tests. Female patients had highest percentage of SCH in the age group of 20-60 yrs. As age, sex, environmental factors and different assay techniques influence the diagnostic accuracy; proper guidelines for screening, evaluation and management of SCH are to be implemented for the benefit of those who may be erroneously classified as having SCH or inadequately treated if undergoing thyroxin replacement therapy.

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