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Thyroid Dysfunction in Elderly

(Original Article)

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ABSTRACT

Background: *There is limited data regarding the prevalence of thyroid disorders in elderly from India.*

Methods: *All subjects aged ≥ 60 years, who underwent estimation of thyroid function tests (TFTs) on their first visit to the hospital from 2009-2013 were included in the study.*

Results: *A total of 1479 subjects (males-671, females-808), aged between 60-94 (Mean 69.02 SD: 7.21) years, were studied. Thyroid disorders were present in 13.99% of subjects. The prevalence rate of thyroid disorders was higher in females (14.73%) than males (13.11%) and in those aged ≥ 70 years [14.74%] than subjects in the age group of 60-69 years [13.57%]. Overt hypothyroidism (OH) was the commonest (5.81%) disorder followed by Subclinical hypothyroidism (SCH) in 5.54% subjects. Majority (90.69%) of cases OH were of primary hypothyroidism. The hyperthyroidism was prevalent in 1.76% followed by subclinical hyperthyroidism (SH) in 0.88% of subjects. All disorders were common in males than females; OH and hyperthyroidism were common in those aged ≥70 years and SCH and SH were common inage group of 60-69 years.*

Conclusions: *The thyroid disorders are common in elderly subjects; affecting about ~ 14 % in study population. The OH was the commonest thyroid function disorder, followed by SCH, hyperthyroidism and SH with prevalence rates of 5.81, 5.54, 1.76 and 0.88% respectively; all were more common in females than males. The OH and hyperthyroidism showed an increasing trend with age; both in males and females.*

Key-words: *Hypothyroidism, Hyperthyroidism, Subclinical Hypothyroidism, Thyroid disorders in elderly.*

INTRODUCTION

The thyroid function disorders are one of the commonest endocrine disorders in the world, however scarce data regarding their prevalence of thyroid disorders India. The etiologic factors for thyroid disorders in elderly are multiple as in adults (autoimmunity, drugs, surgery, radiotherapy). [1,2]In addition to above factors; numerous changes occur in thyroid with age, contributing to raise in prevalence of thyroid disorders in elderly.

[3,4] The aging shown to increase the process of autoimmunity; anti TPO titres more females in than males.[5] The mode of presentation varies widely in elderly, most are asymptomatic unlike young patients. [6,7,8] The reported prevalence rates of thyroid disorders in elderly are vary; from up to 8.9 % in a community study in USA,[9] 20.4% in Norway [10] and most (73%) of the elderly (>60 years) sick and hospitalised having abnormal thyroid parameters [11] There is limited data regarding thyroid disorders in elderly from India with reported prevalence rates of 13.11% for hypothyroidism and 8.9 % for subclinical hypothyroidism in one study [12] and 25 % (all thyroid disorders) in another report [13]The patient number was smaller (100) in one the study from Bengaluru, [13]and another multicentre study included 1601 subjects aged >55 years (no subjects from Kerala). This study was done to estimate the prevalence of thyroid disorders in elderly (age ≥ 60 years) in Kerla.

MATERIALS AND METHODS

Study design and subjects

This retrospective study was conducted at EMS Memorial Cooperative Hospital and Research Centre, Perinthalmanna, Malappuram, Kerala, a tertiary care, referral centre in northern Kerala. All subjects aged ≥ 60 years, who underwent estimation of thyroid function tests (TFTs) on their first outpatient visit from September 2009 to December 2013, were included in the study. The subjects were categorised into two groups based on age (60-69 and ≥ 70 years) and gender for analysis. Aims of the study were to measure the prevalence of thyroid disorders and to classify them based on the TFTs into various categories to estimate their prevalence.

Thyroid function test estimation, diagnosis and statistics

The triiodothyronine (T3), tetraiodothyronine (T4) and thyroid stimulating hormone (TSH) were analysed by electrochemiluminescence assay (Cobas-Roche ElecysCore immunoassay system - Roche Diagnostics, Mannheim, GmbH). Normal range for T4, T3 and TSH were 5.1-14.1 µg/dL, 60-180 ng/Dl and 0.35 to 5.5 µIU/mL respectively, with intra assay and inter assay coefficient of variation (CV) being less than 7 % for all three parameters. There was no specified normal range for the local population; hence, the TFTs were classified as abnormal if values were beyond normal limits of according to TFT kit.

In our study subjects were classified using following definitions:

Primary hypothyroidism: TSH > 5.5 µIU/mL and T4<5.1 µg/dLorT3 < 60 ng/dL.

Subclinical hypothyroidism: TSH > 5.50 µIU/mL and normal T4, normal T3.

Secondary hypothyroidism:T4 <5.1 µg/dLor T3 <60 ng/dL and a TSH level that is not appropriately elevated.

Hyperthyroidism: TSH <0.35 µIU/mL and T3 >180 ng/dLor T4 >14.1 µg/dL.

Subclinical hyperthyroidism: TSH < 0.35 µIU/mL and normalT3, normal T4.

Secondary hyperthyroidism: T3 >180 ng/dLor T4 >14.1 ng/dL and a TSH level that is not appropriately supressed.

Statistical analysis was performed using SPSS (Version 17) for Windows. The quantitative variables (age, TSH, T3, T4) have been described as mean ± SD and range.The prevalence of hypothyroidism and other thyroid disorders was summarized as counts and percentages. A Chi-square test was used to assess the trends in the prevalence of hypothyroidism, SCH and hyperthyroidism among different age groups and gender categories. A p value of <0.05 was taken as significant.

OBSERVATIONS

A total of 1479 subjects (males-671, females-808), aged between 60-94 years, who underwent estimation of TFTs from 2009 to 2013 were included in the study [Table 1]. The majority (85%) of the study population was reportedly consuming iodized salt. The range, mean and standard deviation of age, TSH, T3, and T4 are summarised according to age groups in table 1.

Thyroid function abnormalities were present in 13.99 %of subjects [table 2].The prevalence rate

of thyroid function abnormalities was higher in females (14.73%) than males (13.11 %) [Table 2].Thyroid function abnormalities were more prevalent in those aged ≥ 70 years [14.74%] than subjects in the age group of 60-69 years [13.57%]. [Table 3].

Overt Hypothyroidism

Overt hypothyroidism (OH) was the commonest [5.81 % (*n*-86)]of the thyroid function abnormalities; with prevalence rates slightly higher in males [5.96% (*n*-40)]than males [5.69% (*n*-46)],[Table 2] statistically insignificant. Majority (90.69 %, 78 out of 86) of cases OH were of primary hypothyroidism[Table 2]. The prevalence rate of hypothyroidism was higher in those aged ≥ 70 years (7.55 %) than those of 60-69 years (4.84%), statistically insignificant (p=0.13). [Table 4, 5]The difference in prevalence rates between males and females in both age groups was also not significant. [Table 4, 5]

Subclinical hypothyroidism

Subclinical hypothyroidism (SCH) was the second commonestof the thyroid function abnormalities; observed in 5.54 % (*n*-82) of subjects; affecting females (5.57%) more than males (5.51%), statistically insignificant[Table 2]. The prevalence rate of SCH was higher in those aged 60-69 years (6 %) than ≥ 70 (4.72 %), statistically significant[Table 3]. There was no statistically significant difference in prevalence rates of SCH based on gender in both age groups [Table4 &5].

Hyperthyroidism

The hyperthyroidism was the third commonest thyroid disorder; was seen 1.76 % (*n*-26) of subjects[Table 2]. The prevalence rate of hyperthyroidism higher in in females (2.22%) than males (1.19%) [Table 2]; however, it was statistically insignificant. The prevalence rate of hyperthyroidism was higherin those aged ≥70 years (2.08 %) than those of 60-69 years (1.58 %) [Table 3]; but it was statistically insignificant. In both above age groups females were more affected than males [Table 4 & 5]; but the difference was statistically insignificant.

Subclinical Hyperthyroidism

The subclinical hyperthyroidism (SH) was the fourth commonest thyroid disorder; was seen 0.88 % (*n*-13) of subjects [Table 2]. The prevalence rate of subclinical hyperthyroidism was higher in females (1.24 %) than males (0.45 %) [Table 2]; but was statistically insignificant. The prevalence rate of hyperthyroidism was higher in those aged 60-69 years (0.84 %) than those of ≥70 years (0.38%) [Table 3]; but it was statistically insignificant. In both above age groups females were more affected than males [Table 4 & 5]; but the difference was not statistically significant.

Table 1: Descriptive data of T3, T4, and TSH levels according to gender

Parameter	Gender		
	All subjects (n = 1479) Mean ±SD & Range	Males (n = 671) Mean ±SD & Range	Females (n = 808) Mean ±SD & Range
Age	69.02 ± 7.21 60-94	68.75 ± 6.91 60-92	69.25 ± 7.45 60-94
T3 ng/dL	98.51 ± 36.06 35.32 – 409.6	98.49 ± 32.16 7.49 – 409.6	98.53 ±39.02 19.53-651
T4 µg/dL	8.40 ± 2.53 0.43 – 24.86	8.09 ± 2.28 0.56- 20.63	8.65 ± 2.69 0.43-24.86
TSH µIU/mL	3.69 ± 9.36 0.005 – 100	3.84 ± 9.08 0.005 – 100	3.57 ±9.59 0.005-100

Table 2: Prevalence rate of thyroid dysfunction in elderly and its variation according to gender

Parameter	Gender			Chi square test (prevalence in males vs females) p value
	All Subjects (1479) n (%)	Males (671) n (%)	Females (808) n (%)	
Hypothyroidism (primary)	78 (5.27)	37 (5.51)	41 (5.07)	0.70
Hypothyroidism (secondary)	8 (0.54)	3 (0.45)	5 (0.62)	0.65
Subclinical Hypothyroidism	82 (5.54)	37 (5.51)	45 (5.57)	0.96
Hyperthyroidism (primary)	26 (1.76)	8 (1.19)	18 (2.22)	0.13
Hyperthyroidism (secondary)	0	0	0	
Subclinical Hyperthyroidism	13 (0.88)	3 (0.45)	10 (1.24)	0.10
Total subjects with thyroid dysfunction	207 (13.99)	88 (13.11)	119 (14.73)	0.37

Table 3: Prevalence rate of thyroid dysfunction and its variation according to age

Parameter	Age groups (Years)			Chi square test (prevalence in males vs females) p value
	All subjects (1479) n (%)	60-70 (950) n (%)	≥ 71 (529) n (%)	
Hypothyroidism (primary)	78 (5.27)	42 (4.42)	36 (6.8)	0.91
Hypothyroidism (secondary)	8 (0.54)	4 (0.42)	4 (0.75)	0.37
Subclinical Hypothyroidism	82 (5.54)	57 (6.0)	25 (4.72)	0.03
Hyperthyroidism (primary)	26 (1.76)	15 (1.58)	11 (2.08)	0.65
Hyperthyroidism (secondary)	0	0	0	
Subclinical Hyperthyroidism	13 (0.88)	11 (0.84)	2 (0.38)	0.12
Total subjects with thyroid dysfunction	207 (13.99)	129 (13.57)	78 (14.74)	0.53

Table 4: Prevalence rate of thyroid dysfunction in according to gender in age group of 60-70 years

Parameter	Age group of 60-70 Years			Chi square test (prevalence in males vs females) p value
	All subjects (950) n (%)	Males (446) n (%)	Females (504) n (%)	
Hypothyroidism (primary)	42 (4.42)	20 (4.48)	22 (4.36)	0.78
Hypothyroidism (secondary)	4 (0.42)	2 (0.45)	2 (0.39)	0.98
Subclinical Hypothyroidism	57 (6.0)	26 (5.83)	31 (6.15)	0.44
Hyperthyroidism (primary)	15 (1.58)	4 (0.90)	11 (2.18)	0.06
Hyperthyroidism (secondary)	0	0	0	
Subclinical Hyperthyroidism	11 (0.84)	3 (0.67)	8 (1.59)	0.49
Total subjects with thyroid dysfunction	129 (13.57)	55 (12.33)	74 (15.47)	0.11

Table 5: Prevalence rate of thyroid dysfunction in according to gender in age group of ≥ 71 years

Parameter	Age group of ≥ 80 Years			Chi square test (Males vs females) p value
	All subjects (529) n (%)	Males (225) n (%)	Females (304) n (%)	
Hypothyroidism (primary)	36 (6.8)	17 (7.55)	19 (6.25)	0.55
Hypothyroidism (secondary)	4 (0.75)	1 (0.44)	3 (0.98)	0.47
Subclinical Hypothyroidism	25 (4.72)	11 (4.88)	14 (4.60)	0.87
Hyperthyroidism (primary)	11 (2.08)	4 (1.77)	7 (2.30)	0.67
Hyperthyroidism (secondary)	0	0	0	
Subclinical Hyperthyroidism	2 (0.38)	0	2 (0.65)	0.22
Total subjects with thyroid dysfunction	78 (14.74)	33 (14.66)	45 (14.80)	0.96

DISCUSSION

The present study was the first of its kind to estimate the prevalence rates of thyroid function abnormalities in elderly subjects (age ≥ 60 years) from northern Kerala and the data regarding their prevalence is very limited in India.[12, 13]

The thyroid function abnormalities were found in 13.99 % of subjects aged ≥ 60 years, with majority (85 %) consuming iodized salt. The prevalence rates in our study are consistent with an earlier reported rates.[12, 13]The prevalence rate of thyroid function abnormalities was more in females and in subjects aged ≥ 70 years. The rise in thyroid disorders with age and higher rates of prevalence rates in females than males are also consistent with earlier reports. [10,12,13]

The OH was the commonest [5.81 %] of the thyroid function abnormalities; with almost equal predilection for affecting both males than males. The prevalence rate of OH was higher in those aged ≥ 70 years than those of 60-69 years, with no difference in rates of prevalence between males and females in both age groups. Majority (90.69 %) of cases OH were of primary hypothyroidism. The OH being the commonest thyroid disorder and prevalence rates in the study are consistent with earlier reports. [6, 9, 12, 13, 14]

The SCH was the second commonest (5.54 %) of the thyroid function abnormalities; affecting females more than males; but the difference was not statistically significant. The prevalence rate of SCH was significantly higher in those aged 60-69 years than those of ≥ 70 years' group. The reported prevalence rates of SCH vary from 8.9 to 9.0 from India [12,13] and 4.8 to 7.0 % from abroad [10], more in females than males.

The hyperthyroidism was seen 1.76 % of subjects; common in females than males. The prevalence rate of hyperthyroidism was higher in those aged ≥70 years than those of 60-69 years. The reported prevalence rates of hyperthyroidism in elderly vary from 0.5-3 % from aboard [6, 9, 10] and up to 2 % from India [13]; a finding correlating with our study.

The SH was seen 0.88 % of subjects; higher in females than males consistent with earlier reports.[6, 10, 12]The prevalence rate of hyperthyroidism was higher in those aged 60-69 years (0.84 %) than those of ≥70 years; affecting females were more than males in both age groups. One of the studies reported prevalence of SHas 3 %, which might have overestimated the prevalence due its low total subject number in the study. [13]

To summarize the present study is to first of its kind to assess the prevalence of thyroid disorders in children and adolescents with majority consuming iodized salt.

Limitations

Our study has few limitations; firstly, study sample was relatively smaller; need large multicentre trials including elderly age groups; to estimate prevalence at national level. Secondly, classification was based on kit manufacturer's recommen-

dations regarding normal values of TFTs, as there were no reference values for the study population.

CONCLUSIONS

The present study was the first of kind to assess the prevalence of thyroid function abnormalities in elderly from Kerala.

Thyroid function disorders are common in elderly; affecting about ~ 14% in study population. Elective screening in suspecting subjects is recommended in elderly, due to varying symptomatology (majority asymptomatic in comparison to young).

Overt hypothyroidism was the commonest thyroid disorder (5.81%), followed bySCH (5.54), hyperthyroidism (1.76%) and subclinical hyperthyroidism (0.88%). Majority of cases OH were of primary hypothyroidism. Thyroid function abnormalities were more common in females than males. The thyroid function abnormalities have an increasing trend with age, both in females and males.

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