Hypothyroidism in an urban slum area: A hidden epidemic

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Abstract

Hypothyroidism is emerging as a common health problem in India. However, there are only few studies on the prevalence of hypothyroidism in adult population of India. A hospital based participative study was undertaken among adult population of UHTC of tertiary care hospital. All adult male and female natives residing in that urban area for at least 5 years were invited to participate in a general health check up camp and those persons who consented for their participation by contributing charges for their investigations were included in this study. Patients with history of hypothyroidism who are taking treatment or those with serum free T4< 0.89 ng/dl and TSH > 5.5 µIU/ml were considered as having hypothyroidism. It was reflected that as age increases risk of developing hypothyroidism also increases thus age is an independent risk factor for hypothyroidism with P value of 0.017 which is statistically significant. More number of females (22.69%) than males (6.89%) were affected by hypothyroidism and the difference in the gender was found to be statistically highly significant.(P – 0.006) with females having four times more risk of hypothyroidism. Subjects having family history of thyroid disorders were 3 times more prone to hypothyroidism than those without family history. The difference being statistically highly significant.(P – 0.002). There was 2 times more risk of hypothyroidism in subjects with BMI ≥ 25. Prevalence of hypothyroidism was higher among female gender and increases with age. The family history and obesity were found to have significant association with hypothyroidism.

Keywords: Hypothyroidism, Iodine deficiency disorder, Non Communicable Diseases, prevalence of hypothyroidism, Thyroid disorders.

Introduction

The WHO had reported that Non Communicable Diseases (NCD) is the leading cause of mortality in the world. This shift in mortality towards NCD and away from acute infectious diseases is being experienced in developing countries including India. The NCD Alliance, as well as other global stake holders, list four main diseases which contribute to 80% of the mortality burden of NCD, which includes cardiovascular diseases, stroke, cancer and diabetes.[(1)] Nowhere in the list of NCD, is thyroid disease is mentioned. But the thyroid disorders are a leading cause of morbidity worldwide. The incidence of hypothyroidism is rising rapidly, as is the prevalence. Thyroid disorders share bidirectional association with virtually all the NCD's like CVS disorders, cancer, mental health problems and diabetes. The public health impact of thyroid diseases had been appreciated in recent years.[(2)]

Though the pictures of huge goitres, stunted growth and florid hypothyroidism are, mercifully, a snap shot of the past. According to projection from various studies on thyroid disease, it has been estimated that about 42 million people in India suffer from thyroid diseases.[(3)] The prevalence of hypothyroidism in the developed world is about 4-5%.[(4-5)] The prevalence of subclinical hypothyroidism in the developed world is about 4-15%.[(4,6)] Hypothyroidism is characterized by a broad clinical spectrum ranging from an overt state of myxoedema, end-organ effects and multisystem failure to an asymptomatic or subclinical condition with normal levels of thyroxin and triiodothyronine and mildly elevated levels of serum thyrotropin.[(7)]

In India, hypothyroidism was usually categorized under the cluster of iodine deficiency disorders (IDDs), which were represented in terms of total goitre rates and urinary iodine concentrations, typically assessed in school-aged children.[(8-10)] The overall prevalence of hypothyroidism is 10.95%.[(11)] India is supposedly undergoing a transition from iodine deficiency to sufficiency state. A recent review of studies conducted in the post-iodization phase gives some indication of the corresponding change in the thyroid status of the Indian population.[(12)] The central role of iodine in thyroid function in undisputed; several other minerals and trace elements are also involved in thyroid metabolism. These include iron, selenium and zinc. Co-existing deficiencies of these micro nutrients can interfere with thyroid function. Iron deficiency reduces the activity of heme- dependent thyroid peroxidise and iron supplementation improves the efficacy of iodine supplementation.[(13)] This is of immense public health importance in India, where the prevalence of iron deficiency anaemia is very high.[(14)]

Hypothyroidism is emerging as a common health problem in India. However, there are only few studies on the prevalence of hypothyroidism in adult population of India. The aim of the present study is to estimate the prevalence of hypothyroidism among the population in urban slum area.

Aims and Objectives

1. To study the prevalence of Hypothyroidism in an urban slum area.
2. To study hypothyroidism with its some associated socio demographic factors.

Materials and Methods

A hospital based participative study was undertaken during 1st January 2012 to 31st December 2012 among adult population of UHTC of tertiary care hospital. All adult male and female natives residing in that urban area for at least 5 years were invited to participate in a general health check up camp and those persons who consented for their participation by contributing charges for their investigations were included in this study. To create awareness of this health camp pamphlet were distributed door to door in that locality and also mouth to mouth publicity was done by health care workers in that area. Participants were excluded if they were pregnant or if they were receiving drugs like lithium or steroids that could interfere with thyroid function tests. Permission of institutional ethical committee was taken before starting the study. The study questionnaire used for data collection was based on the STEPS approach of WHO. It included questions related to socio demographic information and any known morbidities. The height, weight, BMI, blood pressure measurements were done at UHTC as per study protocol. Weight was recorded using a standard weighing scale (Krups weighing scale, New Delhi, India) that was kept on a firm horizontal surface. Weight was recorded to the nearest 50 gm. Height was recorded using a measuring tape to the nearest 1 cm. Subjects were requested to stand upright without shoes with their back against the wall, heels together and looking forward. Body mass index (BMI) was calculated using the formula, weight (kg) / height (m^2). A person was considered to be obese if body mass index. (BMI) $\geq$ 25 kg/$m^2$and overweight when BMI $\geq$ 23 kg/m^2.[15]Blood pressure was measured on the right arm in a sitting posture, with the subject in a relaxed state. Standardized mercury sphygmomanometer (Diamond deluxe BP apparatus, Pune, India) with adult size cuff was used. The first appearance of (phase 1 of korotkoff sounds) sound was used to define Systolic Blood Pressure (SBP). The disappearance of sound (phase 5) was used to define Diastolic Blood Pressure (DBP). Two readings were taken five minutes apart and the average of the two readings was taken as the final blood pressure reading. A person was considered to be a hypertensive if he / she was an already diagnosed case of hypertension and / or on treatment or with a current SBP of $\geq$ 140 mm Hg or DBP $\geq$ 90 mm Hg (JNC VII criteria).[16]

The blood sugar estimation was done by glucometer, and random blood sugar of 200mg/dl was taken as cut off for diagnosing the person to be diabetic.[17]Fasting venous blood sample was taken for Thyroid Function tests and sent to laboratory for further analysis. The TSH estimation was done by the chemiluminescence method using Advia Centaur automated immunoassay analyzer. Patients with history of hypothyroidism who are taking treatment or those with serum free T4< 0.89 ng/dl and TSH > 5.5 µIU/ml were considered as having overt or clinical hypothyroidism and normal T4 and TSH > 5.5 µIU/ml as subclinical hypothyroidism.[18]The study subjects were imparted health education in relation to hypothyroidism and life style modifications they needed and those in need of referral were referred to tertiary care hospital for further management. The data entry and analysis was done using Epi-info 7. The prevalence of hypothyroidism was reflected as frequency and percentage. A chi-square test is used to assess the trends in the prevalence of hypothyroidism, among different age groups and gender categories, family history of thyroid disorders and BMI.

Results

The total 340 people participated in this study of which 58 were male (17.1%) and 282 were female (82.9 %). The mean age of study population was 41.88 years (SD ±13.35). The inclusion of study subjects in this study was voluntary and study subjects were expected to pay contribution for the investigations to know their health status. Among them majority 282 (82.9%) were female and 58 (17.1%) were male. The higher the percentage of female in this study might be due to higher health consciousness among urban female than their male counterpart.

Among the study subjects, 113 (33.23%) were from age group 36-45 years and 104 (30.58%) were from18-35 years of age. This contributes 64 % of study sample which was representative of socially and economically active group among urbanites. The majority of 129 (37.94%) study subjects were from class III of SES as per Modified Prasad classification followed by 99 (29.11%) study subjects who were from class II. The majority of 220 (64.7%) were from nuclear families, followed by 92 (27.1%) from joint families and 28(8.2%) were from third generation family. When these study subjects were analyzed as per their job profiles, there was an equal distribution among semiskilled 104 (30.58%), unskilled 101(29.70%) and skilled 98(28.82%). The professional (7.35%) and businessman (3.52%) were in minority. Among the study population 125(36.76%) had family history of hypertension while 116(34.11%) were from diabetic families and 32 (9.4%) had family history of thyroid disorders (Table 1).

Table 1: Socio-demographic characteristics of study subjects (N= 340)

Characteristics	Hypothyroidism(%) (n = 68)	Normal (%) (n = 272)	Total (%) (n = 340)
Gender-			
Male	4(6.89)	54(93.10)	58 (17.1)
Female	64(22.69)	218(77.30)	282 (82.9)
Age groups (years)			
18-35	15(14.42)	89(85.58)	104 (30.58)
36-45	20(17.70)	93(82.30)	113 (33.23)
46-54	17(25.38)	50(74.62)	67(19.71)
≥ 55	16(28.58)	40(71.42)	56 (16.48)
Socioeconomic status			
I (above 5546 Rs)	9(20)	36(80)	45(13.23)
II (2773 Rs - 5545.44 Rs)	20(20.20)	79(79.80)	99 (29.11)
III (1663.8 Rs - 2717.54 Rs)	25(19.37)	104(80.62)	129(37.94)
IV (831.9 Rs - 1663.24 Rs)	11(19.64)	45(80.35)	56 (16.47)
V (below 831.9 Rs)	3(27.27)	8(72.72)	11 (3.23)
Type of family			
Nuclear	42(19.09)	178(80.90)	220 (64.7)
Joint	19(26.02)	73(79.34)	92 (27.1)
3rd generation	7(25)	21(75)	28 (8.2)
Job profile			
Professional	5(20)	20(80)	25 (7.35)
Business	2(16.66)	10(83.33)	12 (3.52)
Skilled	20(20.40)	78(79.59)	98 (28.82)
Semi-skilled	21(20.19)	83(79.80)	104 (30.58)
Unskilled	20(19.80)	81980.19)	101 (29.70)
Family H/O NCD			
Hypertension			
Diabetes	25(20)	100(80)	125 (36.76)
Mellitus	23(19.82)	93(80.17)	116 (34.11)
Thyroid disorders	13(40.62)	19(59.37)	32(9.4)

The results reflected that prevalence of hypothyroidism was 20% including subclinical hypothyroidism. 38 subjects (11.18%) out of 68 subjects were having their TSH ≥ 5.5 µL/ dl and T4 was 0.89 ng/dl and 30 subjects (8.82%) were having isolated elevation of TSH only with normal T4 levels. This high percentage of hypothyroidism among study population might be due to majority of females (82.9%) among study group. Among the study subjects, 63 (18.52%) were having BMI (≥ 23 kg/m^2) i.e. overweight and 196 (57.634%) were obese. The totals of 78.16% study subjects were either overweight or obese. Hence they are at high risk for NCDs. The prevalence of diabetes mellitus was low (2.9 %) as a criterion for diagnosis for diabetes was RBS ≥ 200 mg/dl and they were the new cases. The total of 15 (4.38%) were found to be hypertensive (BP ≥ 140/90) but 106 (31.17%) had pre-hypertension. Though only 10 (2.9%) study subjects were having their random blood sugar above 200 mg/dl and were diagnosed as diabetic as per study protocol. This was limitation of this study. Similarly only 15(4.38%) reported to have their blood pressure above 140/90. Though these prevalence's are definitely less than or equal to national averages, it can be due to limitation in present study design. As compare to low prevalence of DM and HTN among study subjects, the prevalence of hypothyroidism including subclinical form as diagnosed with TSH ≥ 5.5 was 20% which was definitely higher than national average of around 10%. This high prevalence of hypothyroidism among study subjects could be due to higher percentage of female study subjects (82.9%) (Table 2).

Table 2: Distribution of biological risk factors in study subjects

Biological risk factors	Hypothyroidism (%) n = 68	Normal (%) n = 272	Total (%) n = 340
BMI(kg/m^2) -			
< 23	19(23.45)	62(76.54)	81 (23 .82)
≥ 23-24.99	9(14.28)	54(85.71)	63 (18.52)
≥25-29.99	25(18.65)	109(81.34)	134 (39.41)
≥30	15(24.19)	47(75.80)	62(18.23)
BP(mm of Hg) –			
< 140/90	67(20.62)	258(79.38)	325 (95.59)
≥ 140/90	1(6.67)	14(93.33)	15 (4.41)
BSL(mg%) –			
≤ 200	65(19.70)	265(80.30)	330 (97.06)
> 200	3(30)	7(70)	10 (2.94)

When association between age and hypothyroidism was seen, it was reflected that as age increases risk of developing hypothyroidism also increases thus age is an independent risk factor for hypothyroidism with P value of 0.017 which is statistically significant. More number of females (22.69%) than males (6.89%) were affected by hypothyroidism and the difference in the gender was found to be statistically highly significant.(P – 0.006) with females having four times more risk of hypothyroidism. It was also seen that there was association between family history of thyroid disorders and hypothyroidism. Subjects having family history of thyroid disorders were 3 times more prone to hypothyroidism than those without family history. The difference being statistically highly significant.(P – 0.002).Association between BMI and hypothyroidism was seen. There was 2 times more risk of hypothyroidism in subjects with BMI ≥ 25 (Table 3).

Table 3: Association of Age, Sex and Family H/O of Thyroid disorders with Hypothyroidism

Age(yrs)	Hypothyroidism present	Hypothyroidism absent	Total	OR(95%CI)
18-35	15	89	104	1
36-45	20	93	113	1.28
46-54	17	50	67	2.02
≥ 55	16	40	56	2.37
Total	68	272	340	Chi-square for trend-5.64 P – 0.017
Sex	**Hypothyroidsm present**	**Hypothyroidsm absent**	**Total**	Chi-square -7.504 P- 0.006 OR(95%CI) -3.963
Female	64	218	196	
Male	4	54	144	
Total	68	272	340	
Family H/O Thyroid disorders	**Hypothyroidsm present**	**Hypothyroidsm absent**	**Total**	Chi-square -9.391 P- 0.002 OR(95%CI) -3.147
Present	13	19	32	
Absent	55	253	308	
Total	68	272	340	
BMI	**Hypothyroidsm present**	**Hypothyroidsm absent**	**Total**	Chi-square -5.830 P- 0.015 OR(95%CI) -2.010
≥ 25	48	148	196	
< 25	20	124	144	
Total	68	272	340	

Discussion

In population based study in Cochin on 971 adult subjects, the prevalence of hypothyroidism was 3.9%.[19] The prevalence of subclinical hypothyroidism was still high at 9.4%. Present study reflected total 20% prevalence of hypothyroidism could be due to higher percentage of female study subjects (82.9%). The present study reflected that prevalence of hypothyroidism was higher in females (22.69%) than males (6.89%) and it was also shown that as the age increases, the prevalence of hypothyroidism also increases. Similar findings were reflected in above study. The prevalence of hypothyroidism was higher in female (11.4%) than male (6.2%) and it showed increase with age.

Unnikrishnan et al[18] in their study of prevalence of hypothyroidism in adults also found that there was significant interaction of patient age and gender with the prevalence of hypothyroidism. A larger proportion of females (15.86%) than males (5.02%) were found to be affected by hypothyroidism with P- value of 0.0001. The prevalence of hypothyroidism was highest in the age group of 46-54 years. This was contrary to our study findings and it may be due to higher number of females in the present study with age group of ≥ 55 years.

Abraham R et al[20] in the study conducted in women of Puducherry also found the prevalence of 11.5% and 19% women over 60 years of age were hypothyroid.

Conclusion

The prevalence of hypothyroidism in present study was high as compared to national averages. Female gender, older age and obesity were found to have significant association with hypothyroidism. Looking at high prevalence of hypothyroidism in study population especially in older obese females, it is required that thyroid diseases should be highlighted in National NCD Control Programme in India. Identification of risk factors earlier is important. Access to thyroid investigations and treatment to all, especially antenatal mother and children, should be made available as a part of control programme. There are many opportunities which are unutilized for generating awareness for thyroid disorders. The "Think Thyroid" month (January), Iodine Deficiency Disorder month (October). Global IID day (21st October), World Thyroid day (25th May) and Thyroid cancer awareness month (September) should be utilized for spreading thyroid awareness among masses. The patient advocacy groups duly supported under National NCD Control Programmes can be catalytic in this regard.

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