

Original Research Article

Prevalence of subclinical hypothyroidism in metabolic syndrome: our experience from Karnataka

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ABSTRACT

Background: Metabolic syndrome is a collection of factors which can increase the risk of heart disease, stroke and diabetes. Subclinical hypothyroidism is a state of mild thyroid failure. There are few factors which increase the risk for developing subclinical hypothyroidism such as female gender, advanced age and greater dietary iodine intake. Subclinical hypothyroidism as it is more common than overt hypothyroidism. Objectives were to study prevalence of subclinical hypothyroidism in patients of metabolic syndrome and its association with demographic and clinical parameters.

Methods: This cross-sectional observational study was conducted on patients attending General Medicine OPD and in-patients admitted at Navodaya Medical College and Hospital, Raichur including 103 cases of metabolic syndrome. The data was analyzed using statistical package for the social sciences (SPSS) 24.0 version.

Results: Prevalence of subclinical hypothyroidism in our study was 30.1%. Majority were from 41-50 years age group i.e., 9 (29%) and majority were females i.e., 17 (54.8%). We did not find any association between Subclinical hypothyroidism and gender ($p>0.05$). Prevalence of overweight in our study among SCH was 35.5% compared to 18.1% of normal patients. Elevated levels of TG were observed in 64 i.e., 62.1%, elevated TC 23.3%, elevated levels of LDL in 30.1% patients.

Conclusions: Prevalence of subclinical hypothyroidism in our study was 30.1%. Majority were from 41-50 years age group i.e., 29% and majority were females i.e., 17 (54.8%). We did not find any association between subclinical hypothyroidism and body mass index (BMI) in our study.

Keywords: Metabolic syndrome, Subclinical hypothyroidism, Clinical profile

INTRODUCTION

Metabolic syndrome is a collection of factors which can increase the risk of heart disease, stroke and diabetes. Metabolic syndrome comprises of group of multiple risk factors for atherosclerotic cardiovascular disease (ASCVD) such as central obesity, hypertension, impaired fasting glucose (IFG) or type 2 diabetes mellitus (T2DM), elevated triglyceride levels (TG) and reduced high density lipoprotein cholesterol (HDL-C).¹ It is estimated that one out of four people in the world suffer from metabolic syndrome.¹ There is an increase in prevalence of metabolic

syndrome all over the world. Different regions are having individual clusters of epidemic risk factors and there is a distinct evidence for high prevalence of metabolic syndrome in India and other South Asian countries.²⁻⁴

Studies have revealed that in South Asians residing on the Indian subcontinent (e.g. India, Pakistan, Nepal and Bangladesh) the prevalence of obesity and metabolic syndrome is rapidly increasing leading to increased morbidity and mortality due to T2DM and ASCVD.^{2,4}

Metabolic syndrome is diagnosed based on modified Asian national cholesterol education program-adult treatment panel III (NCEP-ATP III) panel criteria. Diagnosis is made if three out of five risk factors are present- abnormal waist circumference, triglycerides levels ≥ 150.0 mg/dl or pharmacologic treatment (Rx), high density lipoprotein (HDL) cholesterol levels <40.0 mg/dl in man and <50.0 mg/dl in woman; or Rx, blood pressure: systolic >130 mm Hg and diastolic >85 mm Hg, and fasting blood glucose concentration >100.0 mg/dl. Modified Asian ATP III criteria is same as original ATP III except waist circumference (WC) greater than 90 cm in men and 80 cm in women.^{2,5}

Subclinical hypothyroidism (SCH) is defined as a state of high serum thyroid stimulating hormone (TSH) concentration and normal serum free/total thyroxine (T4), tri-iodothyroxine (T3) concentrations associated with few or no symptoms/signs of hypothyroidism.⁶ TSH concentration of more than 5 mIU/l and less than 10 mIU/l with a normal fT4 and fT3 concentration is taken as criteria for its diagnosis.^{7,8}

Subclinical hypothyroidism is a state of mild thyroid failure. It is essentially a laboratory diagnosis. The patient should not have any classical signs/symptoms of hypothyroidism to label him/her as having subclinical hypothyroidism.⁹

There are few factors which increase the risk for developing subclinical hypothyroidism such as female gender, advanced age and greater dietary iodine intake. Few authorities consider that subclinical hypothyroidism should be treated with l-thyroxine.¹⁰⁻¹²

It is important to study subclinical hypothyroidism as it is more common than overt hypothyroidism and therefore its early diagnosis and treatment may prevent the onset of overt hypothyroidism and its associated effects.¹³

Hence, we conducted this study at Navodaya Medical College and Hospital, Raichur with the objective to study prevalence of subclinical hypothyroidism in patients of metabolic syndrome and its association with clinical parameters.

Objective

The objective of the research was to study prevalence of subclinical hypothyroidism in patients of metabolic syndrome and its association with demographic and clinical parameters.

METHODS

This cross-sectional observational study was conducted on patients attending general medicine outpatient department (OPD) and in-patients admitted at Navodaya Medical College and Hospital, Raichur who satisfied eligibility criteria. The study was conducted from January to

December 2018 including 103 cases of metabolic syndrome.

Inclusion criteria

Patients with age between 18-60 years, diagnosed cases of metabolic syndrome and willing to participate in study after giving written consent were included.

Exclusion criteria

Past or present history of anti-thyroid drugs intake; history of thyroid dysfunction including hypothyroidism, hyperthyroidism, goitre, thyroid malignancy; post thyroid surgery patients, external radiotherapy of neck; patient taking iodine or iodide containing drugs, computed tomography (CT) contrast within 2 weeks, corticosteroids >2 weeks within 3 months; pregnant woman; history of chronic medical disorder including diabetes mellitus, end stage renal disease, cardiovascular disease, stroke, active liver disease and other autoimmune diseases; and patients with acute medical illness admitted in intensive care unit (ICU).

Patients who came to medicine outpatient department (OPD) already being diagnosed with metabolic syndrome and who fulfilled inclusion and exclusion criteria were recruited for this study after taking their consent to use their data. Detailed history including demographic details (age, gender, and address) was noted. Clinical examination findings and details of investigations which were already done by the patient were recorded in the pre-designed study proforma.

Criteria for diagnosed cases of metabolic syndrome as defined by modified Asian NCEP-ATP III panel was taken in this study as follows - any 3 out of 5 of the following was present: abnormal waist circumference - male >90 cm, female >80 cm; triglyceride level ≥ 150 mg/dl or on pharmacologic treatment; HDL cholesterol level <40 mg/dl for male, <50 mg/dl for female or on pharmacologic treatment; systolic blood pressure >130 mm Hg or diastolic blood pressure >85 mm Hg or patient is on pharmacological treatment; and fasting blood glucose concentration >100 mg/dl or on treatment.¹⁴ Criteria for diagnosis of subclinical hypothyroidism was TSH levels between 5 to 10 mIU/l with normal free T3, free T4 concentration.¹⁵ Prevalence of subclinical hypothyroidism in metabolic syndrome patients was calculated.

Statistical analysis and methods

Data was collected by using a structure proforma. Data thus was entered in Microsoft excel sheet and analysed by using statistical package for the social sciences (SPSS) 24.0 version IBM USA. Qualitative data was expressed in terms of percentages and proportions. Quantitative data was expressed in terms of Mean and Standard deviation. Association between two qualitative variables was seen by using Chi square/Fischer's exact test. Descriptive statistics

of each variable was presented in terms of mean, standard deviation, standard error of mean. A p value of <0.05 was considered as statistically significant whereas a p value <0.001 was considered as highly significant.

RESULTS

In our study, we included all 103 subjects fulfilling the eligibility criteria. Out of 103 patients, majority were from 31-40 and 51-60 years i.e. 23.3% each, followed by 23 i.e. 22.3% from 41-50 years age group. Least number of patients were from above 70 years age group (3, 2.9%) (Table 1).

Table 1: Distribution according to age.

Age group in years	Frequency	Percent
20-30	14	13.6
31-40	24	23.3
41-50	23	22.3
51-60	24	23.3
61-70	15	14.6
>70	3	2.9
Total	103	100.0

Out of 103 patients, 62 (60.2%) were males and 41 i.e. 39.8% were females (Figure 1). Prevalence of subclinical hypothyroidism in our study was 30.1% (Table 2). Out of 31 patients with SCH, majority were from 41-50 years age group i.e., 9 (29%) followed by 7 i.e. 22.6% from 31-40 years age group and 5 each i.e. 16.1% from 51-60 and 61-70-years age group (Table 3). Out of 31 patients with SCH, majority were females i.e. 17 (54.8%) and remaining i.e. 14 (45.2%) were males. We did not find any association

between Subclinical hypothyroidism and gender (p>0.05) (Table 4).

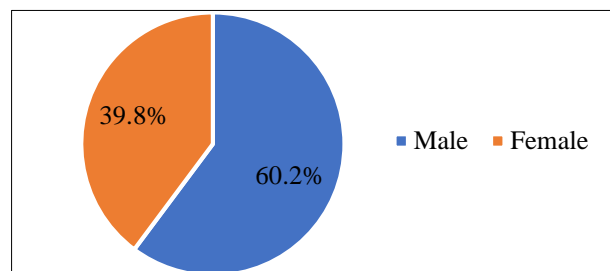


Figure 1: Distribution according to gender.

Table 2: Prevalence of subclinical hypothyroidism.

SCH	Frequency	Percent
Yes	31	30.1
No	72	69.9
Total	103	100.0

Prevalence of overweight in our study among SCH was 35.5% compared to 18.1% of normal patients. The difference in the proportion of overweight between SCH and normal subjects was found to be statistically not significant and we did not find any association between subclinical hypothyroidism and body mass index (BMI) in our study (p>0.05) (Table 5). Elevated levels of TG were observed in 64 i.e. 62.1% patients. Elevated levels of TC were observed in 24 i.e. 23.3% patients. Elevated levels of LDL were observed in 31 i.e. 30.1% patients. Reduced levels of HDL were observed in 56 i.e., 54.4% patients (Table 6).

Table 3: Distribution of SCH according to age.

Age group in years	Subclinical hypothyroidism				Total
	Yes		No		
	Frequency	Percent	Frequency	Percent	
20-30	3	9.7	11	15.3	14
31-40	7	22.6	17	23.6	24
41-50	9	29.0	14	19.4	23
51-60	5	16.1	19	26.4	24
61-70	5	16.1	10	13.9	15
>70	2	6.5	1	1.4	3
Total	31	100.0	72	100.0	103

Chi square=4.18, p=0.041 (<0.05), significant

Table 4: Distribution of SCH according to gender.

Gender	Subclinical hypothyroidism				Total
	Yes		No		
	Frequency	Percent	Frequency	Percent	
Male	14	45.2	48	66.7	62
Female	17	54.8	24	33.3	41
Total	31	100.0	72	100.0	103

Chi square=3.68 p=0.055 (>0.05), not significant

Table 5: Distribution of SCH according to BMI.

BMI grading	Subclinical hypothyroidism				Total
	Yes		No		
	Frequency	Percent	Frequency	Percent	
Normal	20	64.5	59	81.9	79
Overweight	11	35.5	13	18.1	24
Total	31	100.0	72	100.0	103

Chi square=0.02, p=0.88 (>0.05), not significant

Table 6: Distribution according to lipid profile.

Lipid profile	Normal		Elevated		Reduced	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
TG	39	37.9	64	62.1	0	0.0
TC	79	76.7	24	23.3	0	0.0
LDL	72	69.9	31	30.1	0	0.0
HDL	47	45.6	0	0	56	54.4

DISCUSSION

Age and gender

In our study, we included all 103 subjects fulfilling the eligibility criteria. Out of 103 patients, majority were from 31-40 and 51-60 years i.e. 23.3% each, followed by 23 i.e. 22.3% from 41-50 years age group. Least number of patients were from above 70 years age group (3, 2.9%). Out of 103 patients, 62 (60.2%) were males and 41 i.e. 39.8% were females. Mean age of study population was 46.81±13.24 years.

Aljabri et al in his study included 930 subjects with MS.¹⁵ There were 120 (12.9%) males and 810 (87.1%) were female with mean age 37.1±13.2 years. The mean age was less than our study findings.

Prevalence of subclinical hypothyroidism

Prevalence of subclinical hypothyroidism in our study was 30.1%.

Aljabri et al observed prevalence of SCH as 34.5% in his study which is more than our study findings.¹⁵

Meher et al showed a high prevalence of SCH (22%) in the MetS subjects.¹⁶ Shantha et al from India has shown a high prevalence of SCH (21.90%) in patients with MetS.¹⁷ Shrestha et al from Taiwan reported that SCH were present in 7.21%.¹⁸ Wang et al from Nepal showed that the prevalence of SCH (29.32%).¹⁹ In a study conducted by Fahimeh et al the prevalence of SCH among women was 19.2%.²⁰ A study by Khatiwada et al identified thyroid dysfunction as a common endocrine disorder in MetS patients; SCH (26.6%) was the commonest.²¹ These all studies showed less prevalence as compared to our study findings.

Gyawali et al studied the prevalence of thyroid dysfunction in patients with metabolic syndrome.²² Of the 128 subjects, 28.90% (37) had subclinical hypothyroidism which is more as compared to our findings.

Jayakumar et al included 120 patients with metabolic syndrome, of which 60% of patients had thyroid abnormalities.²³ 52 patients (44% of study group) had subclinical hypothyroidism which is more as compared to our findings.

Gaurav et al in a study done in south Indian women included 76 patients with metabolic syndrome, of which 53% had subclinical hypothyroidism which is more as compared to our findings.²⁴

Age and gender in SCH

Out of 31 patients with SCH, majority were from 41-50 years age group i.e. 9 (29%) followed by 7 i.e. 22.6% from 31-40 years age group and 5 each i.e. 16.1% from 51-60 and 61-70-years age group. Out of 31 patients with SCH, majority were females i.e. 17 (54.8%) and remaining i.e. 14 (45.2%) were males.

Aljabri et al observed SCH to be more common in females than male patients (74.4 % versus 25.6%, p=0.009).¹⁵

Our study findings are in agreement with Uzunulu et al and Meng et al and this has been observed in a number of studies including the general population.^{25,26} This is attributed to the higher iodine requirements in females; moreover, changes in reproductive hormones also cause changes in thyroid hormone levels. In addition, some females develop autoimmune antibodies to thyroid during pregnancy, which causes postpartum subacute thyroiditis and can increase the risk of developing permanent hypothyroidism.²⁶

In the present study, SCH was more common in the age group 41-50 years which is previously reported and in concordance with Singh et al.²⁷ Bermudez et al also reported that common age group of SCH was 40-60 years with 26% in his study.²⁸

Senthil et al also stated in age wise distribution of all cases, subclinical hypothyroidism is the most prevalent thyroid dysfunction in all age groups.²⁹ Subclinical hyperthyroidism is seen in 1.45% in 31-40 and 2.6% in the 41 to 50 age group, none in the 51 to 60 years. They also reported that subclinical hypothyroidism is slightly higher in males (39%) compared to the females.

CONCLUSION

Prevalence of subclinical hypothyroidism in our study was 30.1%. Majority were from 41-50 years age group i.e. 29% and majority were females i.e. 17(54.8%). We did not find any association between subclinical hypothyroidism and BMI in our study.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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