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Prevalence of Metabolic Syndrome in Hypothyroidism Patients

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ABSTRACT

Introduction: Hypothyroidism and Metabolic Syndrome (MetS) is well-established predecessor of atherogenic cardiovascular disease. MetS includes a group of risk factors characterized by hypertension, hyperglycemia, dyslipidemia, prothrombotic, and proinflammatory conditions, which speed up the body's atherogenic process. Hypothyroidism causes hyperlipidemia, diastolic hypertension, endothelial dysfunction, and cardiovascular disease. Hypothyroidism is also associated with increased cardiovascular morbidity for which various theories have been proposed. One of the hypotheses suggested is causal interaction with the metabolic Syndrome (MetS). The Adult Treatment Panel III report (ATP III) of the National Cholesterol Education Program has identified the MetS as a Multiplex risk factor for cardiovascular disease that deserved more clinical attention. The prevalence rates vary greatly depending upon MetS, population, age, ethnicity etc. in India a rapid increase in its prevalence has been noted due to socioeconomic transitions to increasing mechanization, affluence, urbanization and urban migration. Useful changes within the thyroid organ might have an affiliation with MetS and its related components counting weight, affront resistance (AR), lipid and glucose digestion system anomalies, raised blood weight, and cardiovascular brokenness. MetS and Thyroid dysfunction (TD) are both characterized by a cluster of common variations from the norm such as stomach weight, hyperglycemia, and hypertension, decreased high-density lipoprotein cholesterol (HDL-C), and raised triglycerides (TG). Additionally, IR, distinguished as a fundamental component for MetS, too plays a part in hypothyroidism. Worldwide the most prevalent endocrine disorders are among thyroid diseases. Various studies in India showed that about 42 million people suffer from thyroid diseases.

Aim: The main aim of this study is to find Prevalence of metabolic syndrome in hypothyroidism patients.

Material and Methods: In this study, 100 patients known to have hypothyroidism with different age groups from 20 years to 60 were included. It was reported from all the patients who visited the hospital as detailed history of Outdoor patients and Indore patients, and laboratory analysis was also done. History regarding hypothyroidism symptoms was recorded as well as laboratory examination results like thyroid profile tests and Glucose and lipid analysis were also recorded.

Result: In this study out of total 100 patients, 32 were males and 68 were females. The ratio of female to male was 2.125:1. The mean age was 42.7 years old. The mean TC, TG, LDL-C, and HDL-C levels in males were 179mg/dL, 142 mg/dL, 92 mg/dL, 34.5 mg/dL and females were 166 mg/dL, 140 mg/dL, 85 mg/dL, and 43 mg/dL respectively. The mean WC in male and female was 110.5 and 105.2, respectively. Elevated TG (>150 mg/dL) was found in 17(53.1%) males and 60 (88.2%) females. Low HDL-C (≤40 mg/dL in men and ≤50 mg/dL in female) was found in 14 (43.8%) male and 62 (91.2%) female. Increased WC was found in 19 (59.4%) male and 66 (97.1%) female. Hypertension was found in 6 (18.8%) male and 30 (44.1%) female with an overall prevalence of 36%. MetS with three or more component was found in 19(59.4%) male and 65 (95.6%) females with overall prevalence of 84%.

Conclusion: This study showed significant association between subclinical hypothyroidism and MetS. The overall prevalence rate of the MetS in this study was little bit higher than the rates reported in the general population in various studies and comparable to studies of hypothyroid patients. In Indian MetS patients' hypothyroidism was the most common TD.

Key Words: Prevalence, Metabolic syndrome, Hypothyroidism, TD, MetS

INTRODUCTION

Hypothyroidism and Metabolic syndrome (MetS) is well-established predecessor of atherogenic cardiovascular disease. MetS includes a group of risk factors characterized by hypertension, hyperglycemia, dyslipidemia, prothrombotic and proinflammatory conditions which speed up the atherogenic

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process in the body[1,2]. Thyroid disorders are the most common disorder among endocrine disorders, with an overall prevalence of hypothyroidism is about 10.95% in the general populati[3] . Hypothyroidism causes hyperlipidemia, diastolic hypertension, endothelial dysfunction, and cardiovascular disease[3,4].

Hypothyroidism is also associated with increased cardiovascular morbidity for which various theories have been proposed [5]. One of the hyhpotheses suggested is causal interaction with the metabolic syndrome (MetS). The Adult Treatment Panel III report (ATP III) of the National Cholesterol Education Program has identified the MetS as a Multiplex risk factor for cardiovascular disease that deserved more clinical attention.

In the Indian population overall prevalence of the MetS is about 31.6%, with the prevalence of 39.9% in women and 22.9% in men[5]. The prevalence rates vary greatly depending upon MetS, population, age, ethnicity etc. in India a rapid increase in its prevalence has been noted due to socioeconomic transitions to increasing mechanization, affluence, urbanization and urban migration[6]. Worldwide the most prevalent endocrine disorders are among thyroid diseases. Various studies in India showed that about 42 million people suffer from thyroid diseases [4,7]. Useful changes within the the thyroid organ might have an affiliation with MetS and its related components counting weight, affront resistance (IR), lipid and glucose digestion system anomalies, raised blood weight, and cardiovascular brokenness. MetS and TD are both characterized by a cluster of common variations from the norm such as stomach weight, hyperglycemia, and hypertension, decreased high-density lipoprotein cholesterol (HDL-C), and raised triglycerides (TG).

Additionally, IR, distinguished as a fundamental component for MetS, too plays a part in hypothyroidism [5,8]. Unmistakable Hypothyroidism (Goodness) and subclinical hypothyroidism (SH) are characterized by weakened basal plasma affront and insulin sensitivity may move forward taking after substitution treatment[9]. With quick industrialization and urbanization, the predominance of metabolic disorder has expanded drastically. By NCEP (National Cholesterol Instruction Program) basis, 41.1% of Asian Indians were enduring from metabolic disorder[10]. One reality is evident that clinicians frequently translate expanded TSH levels with typical thyroid hormone levels in stout people as and prove of subclinical hypothyroidism and endorse thyroxine substitution treatment to fortify the euthyroid status which as of now exists. It has too been famous that the pointless utilize of thyroxine substitution can lead to its poisonous quality.

The instrument of typical levels of T3, T4 with increased TSH in metabolic disorder isn't defined, but it has been hypothesized that metabolic disorder is related with affront resistance due to the deformity in post-receptor flag transduction in target tissue, a comparative instrument of thyroid receptor resistance could be working in these hefty people[11]. Patients with affront resistance may increase cardiovascular chance when related to other related chance figures such as hyperlipidemia and hoisted blood weight[12]. The main aim of this study is to find Prevalence of metabolic syndrome in hypothyroidism patients.

MATERIAL AND METHODS

This study was conducted in Department of General Medicine of Govt. Medical College. In this study, 100 patients known to have hypothyroidism with different age group from 20 years to 60 years old were included. It was reported from all the patients who visited the hospital as detailed history of OPD and IPD patients, and laboratory analysis was also done. History regarding hypothyroidism symptoms was recorded as well as laboratory examination results like thyroid profile tests and Glucose and lipid analysis were also recorded. Adult patients with previously diagnosed hypothyroidism on treatment and willing to participate in the study were included.

The patients who met the consideration criteria were included and history relating to hypothyroidism, administration modalities and the nearness of comorbidities which included diabetes mellitus and hypertension was taken. In laboratory examination parameters that were evaluated included fasting blood glucose and fasting lipid parameters (add up to cholesterol [TC], high-density lipoprotein cholesterol [HDL-C], low-density lipoprotein cholesterol [LDL-C], and triglycerides TG]). The nearness of the MetS was decided utilizing the ATP III criteria. The proximity of three or more of any of the followings: WC ≥102 cm in men and ≥88 cm in ladies; serum TG level ≥150 mg/dL; HDL C ≤40 mg/dL in men and ≤50 mg/dL in ladies; blood weight ≥130/85 mmHg (or already analyzed hypertensive on antihypertensive treatment); and fasting serum glucose ≥110 mg/dL (or already analyzed diabetic on antidiabetic treatment).

RESULT

In this study out of total 100 patients, 32 were males and 68 were females. The ratio of female to male was 2.125:1.

Table 1: showing baseline patient characteristics

Parameters	Range	Mean value ± SD (male)	Range	Mean value ± SD (female)
Age (years)	20-60	50.3±10.3	20-59	41.9±11.1
BMI (kg/m²)	15.6-49.4	28.4±6.1	17.5-35.3	28.2±5.5
WC (cm)	85.6-105.4	110.5±11.2	80.2-135.2	105.2±12.1
TC (mg/dL)	80-340	179±67.2	71-349	166±69.8
LDL (mg/dL)	60-240	92±41.5	56-287	85±44.2
HDL (mg/dL)	13-60	34.5±10.6	22-75	43±12.6
TG (mg/dL)	65-450	142±64.1	54-379	140±64.9
Duration of hypothyroidism (years)	2-39	10.5±15.2	1-49	12.6±17.1

Note: BMI: Body mass index, TC: Total cholesterol, LDL: Low-density lipoprotein, HDL: High-density lipoprotein, TGs: Triglycerides, SD: Standard deviation, WC: Waist circumference.

The mean age was 42.7 years old. Baseline characteristics of patients were shown in table no 1 and components of MetS in table no 2 below. The mean TC, TG, LDL-C, and HDL-C levels in males were 179mg/dL, 142 mg/dL, 92 mg/dL, 34.5 mg/dL and females were 166 mg/dL, 140 mg/dL, 85 mg/dL, and 43 mg/dL respectively as shown in table no 1 below.

Table 2: showing the prevalence of patients components of metabolic syndrome

Components	Male n=32	Percentage (%)	Female n=68	Percentage (%)	Total n=100
DM	7	21.9	37	54.4	44
HTN	6	18.8	30	44.1	36
TG (≥150 mg/dL)	17	53.1	60	88.2	77
HDL (<40 mg/dL in men, <50 mg/dL in female)	14	43.8	62	91.2	76
WC (>102 cm in men, >88 cm in female)	19	59.4	66	97.1	86
Three or more components simultaneously (metabolic syndrome)	19	59.4	65	95.6	84

Note: DM: Diabetes mellitus, HTN: Hypertension, HDL: High-density lipoprotein, TGs: Triglycerides, WC: Waist circumference.

The mean WC in male and female was 110.5 and 105.2, respectively. Elevated TG (>150 mg/dL) was found in 17(53.1%) males and 60 (88.2%) females. Low HDL-C (≤40 mg/dL in men and ≤50 mg/dL in female) was found in 14 (43.8%) male and 62 (91.2%) female. Increased WC was found in 19 (59.4%) male and 66 (97.1%) female. Hypertension was found in 6 (18.8%) male and 30 (44.1%) female with an overall prevalence of 36%. MetS with three or more components was found in 19(59.4%) males and 65 (95.6%) females with an overall 84% prevalence.

DISCUSSION

Hypothyroidism is regularly related with expanded cardiovascular horribleness, but the components that increment this hazard are hazy. Different instruments have been proposed to be possibly mindful for it and the MetS is one of these. Thus, our point of consider was to discover the predominance of MetS in hypothyroid patients. Gupta et al.[13] showed the prevalence of the MetS in the Indian population was about 31.6%. Predominance of person components of the MetS in men and ladies, individually, were as takes after: central weight (WC; men >102 cm, ladies >88 cm) 25.6% and 44.0%; moo HDL cholesterol (men < 40 mg/dL, ladies < 50 mg/dL) 54.9% and 90.2%; tall TGs (≥150 mg/dL) 32.3% and 28.6%; and impeded fasting glucose or diabetes in 16.9% and 16.1%. The predominance of physical inertia, hypertension, hypercholesterolemia, and tall LDL-C was more noteworthy within the MetS bunch in both men and ladies.

Another study of Chow et al.[14] showed that prevalence of MetS of 26.9% in males and 18.4% in females in Southern India and study of Deepa et al.[15]. reported a prevalence of MetS of 18.3%. According to studied done by Shantha et al.[16]. showed the prevalence of overt hypothyroidism was

7.4% and that of subclinical hypothyroidism was 21.9% in the MetS population. Uzunzulu et al.[17] the studied showed a significant combination of subclinical hypothyroidism and MetS that support our results. The predominance of MetS and its component was essentially higher in our think about bunch of hypothyroid patients than within the general population, as detailed within the over ponders. Not much-published writing exists with respect to the predominance of MetS in hypothyroid persistent, but a report from Nigeria found the predominance of MetS in hypothyroid patients being as tall as 40%[18].

Common lipid abnormalities include hypercholesterolemia and elevated LDL-C levels was seen in In hypothyroidism but HDL-C levels may be normal or even elevated in severe hypothyroidism[19] Whereas in this study the mean levels of TG and TC were high and mean HDL-C was low and also mean LDL was within normal limits. Hypertension findings in this study were similar to the study of Saito et al.[20] which showed significantly higher prevalence of hypertension in hypothyroid patient (15.8%) in comparison with euthyroid subjects (5.5%). In this study the prevalence of hypertension was 36% in hypothyroid patients. The possible mechanism of pathophysiology responsible for this includes changes in circulating catecholamines, their receptors, and abnormalities in the aldosterone system of rennin-angiotensin[21]. Another study of Gyawali et al.[22] In Korea, which was done showed that relationship between abnormal thyroid function and individual MetS components such as BP, TC, TG, HDL-C and fasting glucose and showed that higher levels of TSH may predict MetS in population and also cohort to this study. In this study WC was increased and showed that the most common component of MetS which showed the similar to the study of Cameron AJ et al[23].

CONCLUSION

This study showed significant association between subclinical hypothyroidism and MetS. The overall prevalence rate of the MetS in this study was little bit higher than the rates reported in the general population in various studies and comparable to studies of hypothyroid patients. In Indian MetS patients' hypothyroidism was the most common TD. It is prudent to evaluate the thyroid work in all patients with MetS since unless hypothyroidism is prohibited, a huge number of patients with thyroid brokenness will be mislabeled as MetS, which is influence impact the administration of these cases.

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