

A Study to Assess Prevalence of Metabolic Syndrome and its Socio Demographic Risk Factors in Rural Area of District Ambala, Haryana

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Abstract

Introduction: Metabolic Syndrome is a state of deranged metabolic and anthropometric status. Its prevalence is on the rise in most part of the world. It is considered as a precursor to various cardiovascular and metabolic diseases.

Objectives: 1. to determine the prevalence of Metabolic Syndrome in adults aged 20 years and above in rural area of district Ambala, Haryana. 2. To determine the socio-demographic factors associated with Metabolic Syndromes.

Methods: In a community based cross-sectional study, total 1200 subjects aged 20 yrs and above were studied using multistage random sampling.

Results: Prevalence of Metabolic Syndrome was estimated by using criterion given by International Diabetes Federation. Metabolic Syndrome was found in 110 (9.2%) subjects and it was more prevalent among females 73 (66.36%) as compared to males 37(33.63%). Sedentary occupation and age were significantly associated with Metabolic Syndrome.

Conclusions: Metabolic Syndrome is a health problem in the region and proper emphasis should be given on its prevention and control.

Keywords: Metabolic syndrome; Health problems in rural area

Introduction

The rapid rise of non communicable diseases (NCDs) is presenting a formidable challenge in 20th century which is threatening economic and social development of the world as well as the lives and health of millions across the globe. As many countries are struggling to control infectious diseases, they are facing an explosion in chronic diseases—a situation for which they have neither the resources, personnel nor the health service infrastructure required to respond effectively [1].

Of the 57 million deaths that occurred globally in 2008, 36 million – almost two thirds – were due to NCDs, comprising mainly cardiovascular diseases, cancers, diabetes and chronic lung diseases [2]. Especially in developing countries, the burden of chronic diseases is increasing rapidly and will have significant social, economic, and health consequences [3].

India is also undergoing rapid urbanization with increased industrialization, rising incomes, expanded education and improved health care [4]. There is increased consumption of tobacco, an unhealthy diet, physical inactivity and adoption of other unhealthy lifestyles leading to rise in prevalence of non communicable diseases. Modern medical care is now enabling many with chronic diseases to survive. The impact of chronic diseases on the lives of people is serious when measured in terms of loss of life, disablement, family hardship; poverty and economic loss to the country [5].

The metabolic syndrome is characterized by clustering of risk factors, which predisposes subjects to increased risk of diabetes and cardiovascular disease (CVD) [6,7]. The main components of the syndrome are glucose intolerance, obesity, raised blood pressure and dyslipidemia. It is increasingly attracting the attention of international research institutions and scientific societies, as a major modifiable determinant of cardiovascular disease and type 2 diabetes [8-10]. The criteria employed in this study are the one given by International Diabetes Federation [11].

Apart from its association with cardiovascular disorder and diabetes mellitus, metabolic syndrome is also associated with various other morbidities. Risk for several cancers increases in subjects affected by Metabolic Syndrome [12]. Several studies have found that there is a significant association of Metabolic Syndrome with pancreatic, colorectal, prostatic and breast cancer [13,14]. In recent years lot of work is being done on metabolic syndrome but most of the studies have been confined to hospitals and very few studies have been conducted at community level. Therefore this study was conducted to assess the prevalence of metabolic syndrome in rural adult population of district Ambala, Haryana and to determine socio-demographic factors associated with Metabolic Syndrome.

Material and Methods

A community based cross-sectional design was adopted for studying the prevalence of metabolic syndrome. As the data on prevalence rate of metabolic syndrome for Haryana state is not available, the sample size was calculated by presuming the prevalence of metabolic syndrome to be 26% (mean reported prevalence in India 18% [15] to 34% [16] and as such the sample size for the study came out to be 1138 using the formula.

The equation for calculating sample size is as follows:

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$$N = Z^2 P (1-P)/e^2$$

Where,

- Z = level of confidence (1.96)
- P = Prevalence of the disease
- e = margin of error

To compensate for the non response, survey was conducted in 1200 individuals.

The study was conducted in rural population of district Ambala from January 2010 to June 2011. Multi stage cluster sampling technique was employed to draw the required sample size. District Ambala has 6 blocks namely Ambala I, Ambala II, Saha, Naraingarh, Barara and Shahzadpur. In the first stage, out of six blocks of the district Ambala, one block namely Barara was selected by simple random sampling. Further in the second stage, simple 2 stage cluster sampling method was adopted. Villages were taken as primary sampling units. The total population of block Barara was 128,425 living in 75 villages. Out of these, a total of 15 villages (clusters) were selected. Households were taken as secondary sampling units. The households were selected by random sampling. All the family members of selected households satisfying the inclusion criterion were included in the study. A total of 80 respondents were interviewed in each cluster. The study was conducted in both males and females in the age group of 20 years and above. Pregnant women were excluded from the study. A written informed consent was obtained after explaining the objectives and procedures of the study. Clinical definition of the metabolic syndrome given by International Diabetes Federation was used to define metabolic syndrome [11]. It requires the presence of central obesity (waist circumference 90 cm in men and 80 cm in women); Plus any two of the following four factors:

1. Raised Triglycerides level: ≥ 150 mg/dl or specific treatment for this lipid abnormality
2. Reduced HDL Cholesterol: <40 mg/dl in males and <50 mg/dl or specific treatment for this lipid abnormality
3. Raised Blood Pressure: systolic BP ≥ 130 or diastolic BP ≥ 85 mm Hg or treatment for previously diagnosed hypertension
4. Raised Fasting Plasma Glucose (FPG) ≥ 100 mg/dl (5.6 mmol/L) or previously diagnosed type 2 diabetes

To study the risk factors of metabolic syndrome, World Health Organization's STEPS proforma was adopted. Anthropometric measurements like height, weight and waist circumference were measured using standard guidelines [17]. Blood pressure was measured using calibrated blood pressure monitor (Omron). After 5 minutes rest, three readings of blood pressure were taken with a gap of 2 minutes between them and a mean of the three was taken as the final reading.

Laboratory analysis

An overnight fast blood sample (10 ml) was collected. The fasting blood sugar was analyzed by glucose oxidase peroxidase (GOP-PAP) method [18] 13; total cholesterol was analyzed by CHOD-PAP method [19], triglycerides by GPO-PAP Trinder method [20] and HDL-C by phosphotugstic acid method [21]. ERBA kits supplied by Transia Biochemicals Ltd., Mumbai, were used.

Strategy

The eligible population was contacted twice for data collection. In

the first visit, information about risk factors was taken by interview technique (as specified in STEPS questionnaire) followed by anthropometry. In case the central obesity was found to more than the prescribed guidelines by International Diabetes Federation, the participants were asked for their fasting blood samples. Informed and written consent was taken from participants before taking interview, general physical examination and collecting blood samples. Ethical clearance was obtained from the ethics review committee of Maharishi Markandeshwar University, Mullana before conducting the study. Data was analyzed using SPSS17.0 (SPSS Inc, Chicago, IL).

Results

In Table 1, a total of 110 (9.2%) subjects out of 1200 were found to be having Metabolic Syndrome as per the criteria laid down by International Diabetes Federation (IDF). On studying association of metabolic syndrome with sex, it was found to be more prevalent in females (11.64%) than males (6.45%) (Table 1) This association was statistically significant ($p < 0.01$).

Maximum numbers of metabolic syndrome cases were found in the age group of > 65 years (43.6%) while minimum in the age group of 20-34 (6.4%) (Table 2).

MS was found to be maximum in participants 23 (15.5%) who had studied till graduation level while minimum number of metabolic syndrome was found in illiterate participants 5(5.3%) (Table 3) Level of education was found to be significantly associated with prevalence of metabolic syndrome ($p = 0.012$).

In Table 4, maximum number of cases of metabolic syndrome was found in businessman (29.41%) while minimum number was

Sex	Metabolic syndrome		Total n (%)
	Present n (%)	Absent n (%)	
Male	37(33.63%)	536(49.17%)	573(47.8%)
Female	73(66.36%)	554(50.82%)	627(52.3%)
Total	110(9.2%)	1090(90.8%)	1200

χ^2 - 9.67 ($p < 0.0018$)

Table 1: Prevalence of metabolic syndrome according to sex.

Age categories	Metabolic syndrome		Total n (%)
	Present n (%)	Absent n (%)	
20-34 years	7 (6.4%)	383 (35.13%)	390 (32.5%)
35-49 years	22 (17.3%)	450 (41.28%)	472 (39.3%)
50- 64 years	33 (32.7%)	196 (17.70%)	229 (19.1%)
≥ 65 years	48 (43.6%)	61 (5.59%)	109 (9.1%)
Total	110 (9.2%)	1090 (90.8%)	1200 (100%)
Mean \pm SD	45.74 \pm 6.45	49.66 \pm 7.88	45.94 \pm 15.60

χ^2 - 203.70 ($p < 0.01$)

Table 2: Prevalence of metabolic syndrome according to age.

Categories	Metabolic syndrome		Total n (%)
	Present n (%)	Absent n (%)	
No formal education	5(4.5%)	89(98.2%)	949(7.8%)
Primary education	5(4.5%)	76(7.0%)	81(6.8%)
High school education	37(33.6%)	341(31.3%)	378(31.5%)
Senior secondary	25(22.7%)	354(32.5%)	379(31.6%)
Graduation	23(20.9%)	125(11.5%)	148(12.3%)
Post graduation	15(13.6%)	105(9.6%)	120(10.0%)
Total	110(100%)	1090(100%)	1200(100%)

χ^2 - 14.55 ($p = 0.012$)

Table 3: Prevalence of metabolic syndrome according to highest level of education.

Categories	Metabolic Syndrome		Total n (%)
	Present n (%)	Absent n (%)	
Service	20(18.18%)	85(7.79%)	105(8.75%)
Businessman	45(40.90%)	108(9.90%)	153(12.75%)
Student	1(0.90%)	264(24.22%)	265(22.08%)
Homemaker	30(27.27%)	421(38.62%)	451(37.58%)
Retired	13(11.81%)	89(8.16%)	104(8.66%)
Unemployed	1(0.90%)	121(11.10%)	122(10.16%)
Total	110(9.2)	1090(90.8)	1200(100%)

χ^2 - 127.22(p<0.01)

Table 4: Prevalence of metabolic syndrome according to occupation.

found in students (0.37%). A good number of cases were also found in homemakers (6.65%) and government employees (19.04%) This relationship of occupation with MS has been found to be statistically significant (p<0.01).

Discussion

In the present study, the overall prevalence of metabolic syndrome was found to be 9.2% among individuals aged 20 years and above in the rural part of district Ambala of state Haryana. Out of the total 1200 participants, 110 were found to be having metabolic syndrome. In India several studies have shown different rates of prevalence in different parts of the country [15] found the prevalence of MS in south Indian population to be 25.8% by IDF as compared to 18.3% by ATP-III. Another study from Bangalore [16] concluded that prevalence of MS (by ATP-III) was 40.3% as compared to 34.9% by IDF definition. The prevalence in Bhatia community in Rajasthan by ATP-III definition and it was 36.2% in males and 47.8% in females [22]. The ICMR task force [23] collaborative study reported the prevalence of metabolic syndrome to be 30 per cent in urban areas of Delhi and 11 per cent in rural Haryana using ATP-3 criteria. Similar results were found in another study conducted [24] in rural area of district Wardha, Maharashtra who found that overall prevalence of metabolic syndrome was 9.3 %. Higher prevalence of MS was found [25-27], who reported prevalence of MS to be 47.5%, 29.7%, and 41.3% respectively [28,29].

In the present study, maximum (43.6%) number of metabolic syndrome cases was found in the age group of 65 years and above and minimum (6.4%) in the age group of 20-34 years. An overall increasing trend was observed in prevalence rates with increase in the age. This finding was in concordance with the study conducted [16] in Bangalore (INDIA) and in African-American population who found that maximum prevalence was seen in 65-74 year age group and lowest was seen among 21-34 year age group [30]. Metabolic syndrome was found to be comparatively higher among females as compared to males. Same results were seen in the study conducted [21,22,31-34] who found a higher prevalence of Metabolic Syndrome among females as compared to males. In the present study, metabolic syndrome was found to be maximum (15.5%) in participants who had studied till graduation level while minimum (5.3%) number of metabolic syndrome cases were found in illiterate participants. Higher abdominal fat (android obesity) is known to be a risk factor for hypertension, hypertriglyceridaemia, hyperinsulinaemia and diabetes [33-35]. The present study was done keeping in consideration the suggested cut offs in IDF criterion for metabolic syndrome for south Asian population. Abdominal obesity is a prerequisite condition in the definition of metabolic syndrome by International Diabetes Federation. If BMI >30 Kg/m², then central obesity is assumed and waist measurement need not to be taken. The prevalence of metabolic syndrome is on the rise throughout the India. But initially it was seen in urban areas only. Now even the rural areas are increasingly getting affected because of the transformation in the

life style of the people living there. Increase in the average income of rural households has led to an increase in the purchase capacity of the people and reluctance to do any manual work leading to an increase in the metabolic syndrome components. Excess money means excess food to eat. So this is leading to a tendency of over nutrition in them. India has already become the diabetic capital of the world and the other non communicable diseases are also on the rise. Metabolic syndrome is considered to be a precursor to many non communicable diseases. In order to slow down this progression we need to conduct multi centric studies to assess the national prevalence of Metabolic Syndrome and to initiate remedial measures.

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