



Assessment of the relative prevalence of different criteria of metabolic syndrome in a rural population of northern India

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Abstract

Background: Studies on metabolic syndrome (MS) in rural population are scanty.

Objective: To assess the relative prevalence of different criteria of MS in patients with MS in rural population.

Material and Methods: The material comprised adult patients with metabolic syndrome, residing in a rural area (N=279). The metabolic syndrome was defined as the presence of 3 or more of the following: elevated blood pressure (BP), low high-density lipoprotein cholesterol (HDL) level, high fasting plasma triglyceride (FPTG) level, elevated fasting plasma sugar (FPS) level, and high waist circumference (WC).

Results: The most prevalent criterion of MS was low HDL (N= 238 or 85.3%). High fasting plasma sugar (N=237 or 84.95%) was the next, followed by high serum triglycerides (N=228 or 81.72%). High blood pressure (N=167 or 59.85%) and increased waist circumference (N=71 or 25.45%) were found to be the fourth and fifth commonest criteria respectively.

Conclusion: These findings suggest that the metabolic syndrome occurs in rural population and its leading criteria are low HDL followed by high fasting plasma sugar and high plasma triglyceride. Due to the rural lifestyle and environment, obesity is not a common feature of MS in rural population.

Keywords: Metabolic Syndrome (MS), Rural population.

Introduction

Over the last few decades, the number of people with MS has massively increased, becoming one of the most important public health challenges globally. It has been estimated that around 20 to 25 % of the world's adult population has MS^[1]. The MS is defined by different criteria by different organizations. Most recently, Asia Pacific guideline of modified National Cholesterol Education Program's Adult Treatment Panel-III, 2000 (NCEP ATP-III)^[2] followed by the Indian researchers includes a minimum of three criteria out of the five: waist circumference (≥ 90 cm for Asian men, and ≥ 80 cm for Asian women),

fasting plasma triglyceride (≥ 150 mg/dl), HDL(< 40 mg /dl for men and < 50 mg/dl for women), blood pressure ($\geq 130 / 85$ mm Hg), and fasting plasma glucose (≥ 100 mg/dl). These factors have been investigated in various combinations for more than eighty years^[3]. However, the relative prevalence of these criteria in MS patients in rural India is unknown. The present study was undertaken to fill this gap in knowledge.

Material & Methods

The sample comprised of 279 patients with MS residing in a rural area near Jaipur. Primary data was collected after biochemical analysis of blood.

Blood samples were drawn in fasting state from the subjects under aseptic condition after obtaining their consent. Ethical clearance was obtained from the institutional ethical committee of NIMS University, Jaipur (Ref.no.NIMSUNI/IEC/2017/23-7). Fasting plasma sugar (FPS) was estimated by glucose oxidase method^[4]. Fasting plasma triglycerides (FPTG) were estimated by an enzymatic method^[5]. Plasma HDL cholesterol was estimated by an enzymatic method^[6]. Anthropometric data were collected through direct measurements and personal interview. Body mass index (BMI) was calculated by body weight in kg divided by square of height in meters. Blood pressure (BP) was measured using standard mercury sphygmomanometer. As per NCEP: ATP-III criteria^[2], blood pressure was considered to be high if it was more than or equal to 130/85mm of Hg. The data was statistically analyzed by using the software:

statistical package for social sciences (SPSS) version-20.

Results

Among patients with MS, three criteria of MS were present in 75.63%, four in 20.79% and five in 3.58% of the subjects. Lower than normal value of HDL was found in 85.3% and higher value of fasting plasma sugar (FPS) (166.64±79.76 mg/dl) than normal was found in 84.95% subjects. Higher triglyceride (211.86±61.38 mg/dl) than normal was observed in 81.72% subjects. Patients with hypertension were 59.85% of the total. The waist circumference was more than normal in 25.45% patients (Table-1 & Chart-1). The maximum number of subjects (N=75 or 26.88%) were reported in 41-50 year age group followed by 51-60 year age group (Table-2 & Chart-2). Obesity according to BMI was seen in 23.66% subjects (Male-20.98%, Female-26.47%).

Table-1: Prevalence of five criteria of MS in males and females, as per norms of modified NCEP: ATP-III definition.

Subject ↓ MS Criteria	Male (N=143)		Female (N=136)		Total (N=279)	
	Within normal Range	Outside normal Range	Within normal Range	Outside normal Range	Within normal Range	Outside normal Range
WC (N=143) (%)	110 (76.92%)	33 (23.07%)	98 (72.06%)	38 (27.94%)	208 (75.36%)	71 (25.45%)
BP (N=143) (%)	60 (41.96%)	83 (58.04%)	52 (38.24%)	84 (61.76%)	112 (40.14%)	167 (59.85%)
FPS (N=143) (%)	20 (13.99%)	123 (86.01%)	22 (16.18%)	114 (83.82%)	42 (15.05%)	237 (84.95%)
TG (N=143) (%)	27 (18.88%)	116 (81.19%)	24 (17.65%)	112 (82.35%)	51 (18.28%)	228 (81.72%)
HDL (N=143) (%)	29 (20.28%)	114 (79.72%)	12 (8.82%)	124 (91.18%)	41 (14.7%)	238 (85.3%)

WC-Waist Circumference, BP-Blood Pressure, FPS-Fasting Plasma Sugar, TG-Triglyceride, HDL-High Density Lipoprotein

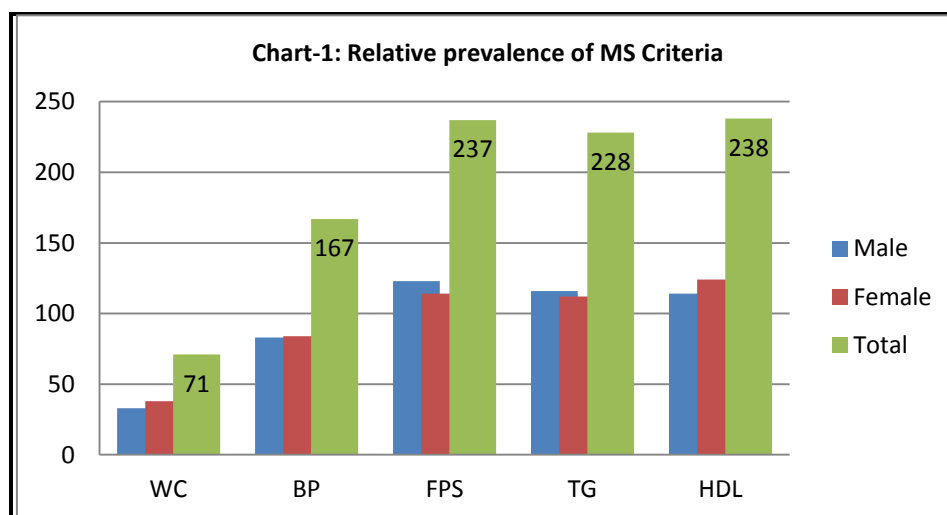


Table-2: Age distribution of MS patients

Age group	Male (N=143)	Female (N=136)	All cases (N=279)
≤30	15 (10.50%)	14 (10.29%)	29 (10.39%)
31-40	25 (17.48%)	18 (13.24%)	43 (15.42%)
41-50	36 (25.17%)	39 (28.67%)	75 (26.88%)
51-60	36 (25.17%)	32 (23.53%)	68 (24.37%)
61-70	24 (16.78%)	24 (17.65%)	48 (17.21%)
>70	07 (04.90%)	09 (06.62%)	16 (05.73%)

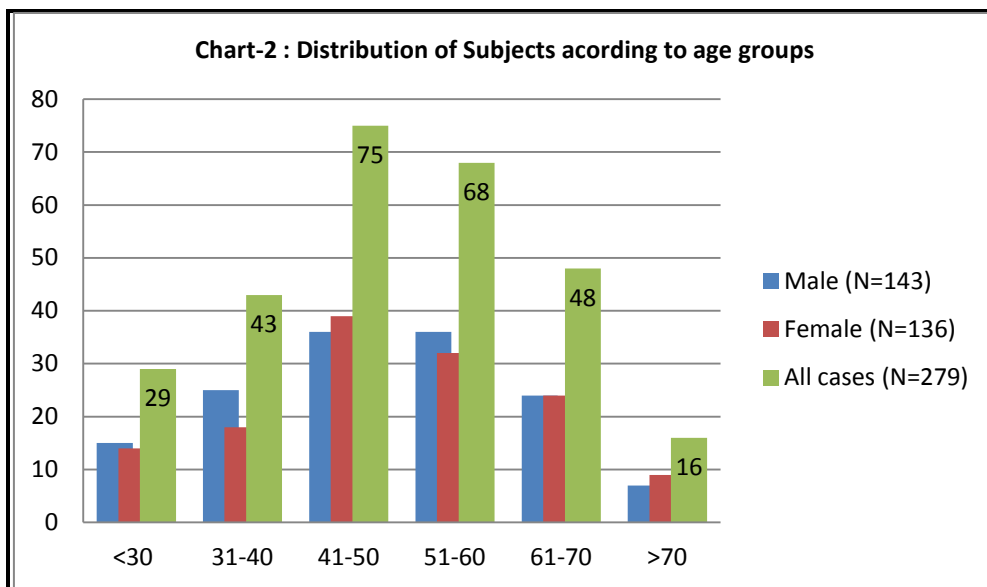


Table-3: Prevalence of different criteria of MS according to age.

MS Criteria		High WC (N=71)	High BP (N=167)	High FPS (N=237)	High FTG (N=228)	Low HDL (N=238)
Age group						
All Cases (N=279)	≤30	07	16	25	18	26
	31-40	09	26	33	31	39
	41-50	18	50	67	64	62
	51-60	20	33	62	62	52
	61-70	14	28	41	41	43
	>70	03	14	09	12	16
Female (N=136)	≤30	06	07	11	09	13
	31-40	02	13	13	12	18
	41-50	08	26	35	34	36
	51-60	12	16	28	29	26
	61-70	09	13	20	20	22
	>70	01	09	07	08	09
Male (N=143)	≤30	01	09	14	09	13
	31-40	07	13	20	31	21
	41-50	10	24	32	64	26
	51-60	08	17	34	62	26
	61-70	05	15	21	41	21
	>70	02	05	32	12	07

WC-Waist Circumference, BP-Blood Pressure, FPS-Fasting Plasma Sugar, FTG-Fasting Triglyceride, HDL-High Density Lipoprotein

Discussion

In the present study, low HDL (85.3%), hyperglycemia (84.95%) and hypertriglyceridaemia (81.72%) were commonest criteria of MS. Only 25.45% cases were found to be with high WC. According to BMI obesity was seen in

23.66% subjects (Male-20.98%, Female-26.47%) and central obesity was the least common criterion of MS in the rural population. The prevalence of obesity was more in females (26.47%) than males (20.98%). Obesity was earlier reported as a significant criterion of MS in one urban study,

with 43% of the subjects in the study population being physically inactive and 54.4% subjects having low physical activity score^[7]. Another study from eastern India found similar results in MS along with low HDL levels being more prevalent in females compared to males^[8]. In a study on MS in Pakistan, low HDL (83.23%) was found to be the most common abnormality^[9]. One report from India found the prevalence of individual risk factors of MS to be higher in the rural population^[10] when compared to other similar studies across India^[11,12] and worldwide,^[13] indicating the growing influence of modernization in the rural areas. A report from Ghana showed low HDLc, high BP, and central obesity as the predominant of criteria of MS in their study population^[14]. Similar results have also been reported from Nigeria^[15] and the US^[16]. High BP and central obesity were found to be the most prevalent determinants among males and females respectively in Swedish^[17], Hungarian^[18] and Hong Kong Chinese^[19]. Thus, relative prevalence of different criteria of MS differs in different geographical areas and different ethnicities. The relative prevalence of different criteria of MS in a rural north Indian population found in the present study is different from that reported from elsewhere.

Conclusion

This study found that metabolic syndrome is not uncommon in rural population and low HDL followed by high FPS and high FPTG are the predominant criteria of MS in north Indian rural population. Due to life style and environment, obesity is not a common criterion in rural population.

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