

# Prevalence of Metabolic Syndrome among adult population in a rural area of Goa

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## Abstract :

**Background:** Metabolic syndrome is a complex disorder and an emerging clinical challenge. Metabolic syndrome is recognized clinically by the findings of obesity; elevated blood pressure, triglyceride, blood glucose and low HDL.

**Aims/objective:** To study the prevalence of metabolic syndrome among adult population of a rural area and to study the association between Metabolic Syndrome and some study variables.

**Materials and Methods:** The study was a community based cross sectional study wherein total of 325 subjects were selected from the rural area of goa using systemic random sampling. Data was collected through a pre tested questionnaire and Anthropometric, clinical, and biochemical data was recorded. Metabolic Syndrome was diagnosed based on the Modified NCEPATP III guidelines. Statistical significance was tested with Chi-square.

**Result:** The prevalence of metabolic syndrome among adult population was found to be 36.9% (33.6% male and 39.8% female). Waist Circumference was increased in 51.7% of the subjects while, FBSL, TG, BP was increased in 26.8%, 16.3% and 13.3 % respectively. Low HDL was found in 24% of the study subjects. Majority of the population with Metabolic Syndrome were from age group 35-45 years. 57.1% prevalence was seen in subjects from obese class II. This was followed by 50% in pre obese, 39.1% in obese class I.

Age was found to be significantly associated. Statistical significance was also seen with BMI, WHR and Metabolic Syndrome.

**Conclusion:** Though it impression that Metabolic Syndrome generally exists mainly in Urban areas, it was found to be substantially present in the rural setting.

**Key Words:** Metabolic syndrome, rural adult.

## Introduction:

The Metabolic Syndrome is a multiplex risk factor for cardiovascular disease. It consists of dyslipidemia, elevation of blood pressure, obesity and elevated blood glucose. The risk of CVD accompanying the Metabolic Syndrome is approximately doubled compared to the risk in the absence of the syndrome. Individuals with Metabolic Syndrome have a 30% to 40% probability of developing diabetes and/or CVD within 20 years, depending on the number of components present<sup>[1]</sup>.

It is estimated that Metabolic syndrome is prevalent in about a quarter of the world's adults. In the United States (US), the prevalence of the Metabolic Syndrome in the adult population was estimated to be more than 25%. Similarly, 20% – 25% of South Asians have developed Metabolic Syndrome and many more may be prone to it.<sup>[2,3]</sup> Prevalence of it is high in India and other developing countries and is rising, particularly with increasing and

rapid unplanned urbanization, which has led to lifestyle characterized by unhealthy nutrition, reduced physical activity, and tobacco consumption<sup>[4]</sup>.

Most studies are carried out mainly in urban areas. Now days the population in rural areas is seen to adopt an urbanized lifestyle, which could put them to a risk of developing Metabolic Syndrome. Hence the present study was undertaken among the population in the rural area of Goa.

## Material and Methods:

This Community based cross sectional study was carried out in the rural adult (above 25 yrs age group) population of Mandur village of Goa from January 2012 to June 2012. Sample size was calculated using the formula,

$$N = Z\alpha^2 pq / d^2$$

Where N = Sample size,  $Z\alpha$  = Confidence level = 1.96, P = Prevalence of Metabolic Syndrome from previous studies in India,  $q = 1 - p$  = Permissible error

Systematic random sampling method was used for the selection of the houses. Every fifteenth house was visited. Ethical clearance was obtained for the proposed study from the institutional ethical committee.

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Data was collected using pre-designed structured proforma, designed for the same. Anthropometric measurements like height, weight, waist circumference, hip circumference and blood pressure measurements were taken and recorded. Height was recorded using measuring tape to the nearest 0.1cm. A standardized portable weighing machine (bathroom scale) was used for recording the weight of the subjects and weight was recorded to nearest of 0.5 kg. Body Mass Index (BMI): BMI was calculated using the following formula

$$\text{BMI} = \frac{\text{weight (kg)}}{\text{height (m)}^2}$$

And the different classes of BMI were defined using WHO classification<sup>[5]</sup>. Waist circumference was measured as the smallest horizontal girth in-between the coastal margin and the iliac crest, with the help of a measuring tape to the nearest of 0.1 cm. Hip circumference was taken as the greatest circumference at the level of greater trochanter (the widest portion of the hip) on both the sides with the help of the measuring tape to the nearest of 0.1 cm.

Blood Samples were analyzed in the institutional biochemistry laboratory Study subjects who were found to have presence of any component of Metabolic Syndrome were provided health education and medical advice was given as per the requirement.

Data obtained was analyzed with SPSS 14, using Pearson's Chi-square test.

## Result

Out of the total 325 study subjects 149 (45.8%) were male and 176 (54.2%) were females. Majority of the subjects were from the age group 35-45 (25.5%) and minimum numbers of subjects were from the age group 75-85 i.e. (3.4%).

Socio demographic and general characteristic of study population is given in table 1.

In the present study WC was increased in 51.7% of the subjects while, FBSL, TG, BP was increased in 26.8%, 16.3% and 13.3 % respectively. Low HDL was found in 24% of the study subjects. Significant WC was seen in 15.4% males and 82.3% females.

Metabolic Syndrome was found to be present among 120 of the total study population i.e. a total prevalence of 36.9 %, 33.6% among males and 39.80% among the female subjects.

Maximum percentage (43.7%) of people had presence of two of the five criteria's, 22.8% had three followed by 12.6% and 1.5% with four and five criterias respectively and the least i.e. 1.2 % had no criteria's positive among the subjects having Metabolic Syndrome .61.7% of the subjects had presence of three of the five criteria's

followed by 34.2% and 4.2%, who showed the presence of four and five criterias respectively.

Majority of the population with Metabolic Syndrome were from age group 35-45 years. i.e. 25.8%.

Maximum prevalence of 57.1% was seen in study subjects from obese class II. This was followed by 50% in pre obese, 39.1% in obese class I and 31.8% in normal.

Among subjects with significant waist hip ratio, the prevalence of Metabolic Syndrome was 64.14% and it was 15% among subjects with no significant waist hip ratio.

## Discussion and Conclusion:

In the present study the overall prevalence of Metabolic Syndrome was found to be 36.9%, 33.6% among males and 39.80% among the female subjects. Similar study conducted by Ramchandran A et al in 475 subjects aged 20-75 years among Asian Indians in South India using modified ATP III criteria Metabolic Syndrome was found in 41.1%. Prevalence was more in women (46.5%) than in men (36.4%). The present study shows the similar findings in overall prevalence but not much difference is seen among gender<sup>[6]</sup>. Gupta R et al study in 1800 population (male: 960, female: 840) from urban area of India, found the prevalence of Metabolic Syndrome in 345 subjects (31.6%); 122 (22.9%) in men and 223 (39.9%) in women<sup>[7]</sup>

Pranita Kambli et al (2007); cross sectional study in a population above 18 years of rural Wardha, central India found the overall prevalence as 5%. It was significantly higher in females (7.6%) as compared to males (2.9%)<sup>[8]</sup>. The present study findings are seen to be more similar to the studies conducted in urban areas, the reason could be that this area is more developed with increase in literacy and employment and people are increasingly going towards western ways of living and eating. Also this area is more close to urban town of Panaji.

Age was found to be significantly associated with Metabolic Syndrome. The prevalence of Metabolic Syndrome was seen to increase with increasing age, i.e. 24.1% in 25-35 age group, 37.3%, 38.3%, 39.3%, 51.3% among 35-45, 45-55, 55-65, 65-75 age group respectively with maximum prevalence of 54.5% among 75-85 age group.

Similar study conducted by Ramchandran A et al<sup>[5]</sup> in 475 subject aged 20-75 years among Asian Indians in South India using modified ATP III criteria and by Gupta R et al<sup>[6]</sup> study in 1800 population (male-960, female-840) from urban area of India showed significant increase in Metabolic Syndrome with age. Monopriya Thiruvangounder et al also showed that age is a

significant predictor of Metabolic Syndrome as prevalence increase with age<sup>[9]</sup>.

Aldi et al showed that Metabolic Syndrome percentage in ages 50-55 and older were almost 2 times higher than in the younger age groups<sup>[10]</sup>. Similar findings were seen in the present study.

Statistical significance was also seen with BMI, WHR and Metabolic Syndrome. Prevalence of Metabolic Syndrome among subjects with normal BMI was 31.8% and among pre obese, obese class I and obese class II, it was 50.7%, 39.1%, 57.1% respectively. Metabolic Syndrome was seen in 64.14 % (p value-0.000) of subjects with significant WHR. Study by Gupta R et al

study in urban population above 20 years also showed that increase in BMI is significantly associated with increase in hypertension and Metabolic Syndrome. Significant positive correlation of WHR with systolic BP diastolic BP, fasting glucose, and LDL cholesterol, and negative correlation with physical activity and HDL cholesterol in both men and women with increasing WHR, Metabolic Syndrome increased significantly.<sup>[7]</sup>

**Conclusion:**

Though the impression that Metabolic Syndrome generally exists mainly in urban areas, it was found to be substantially present in the rural setting, more so with people in rural area adopting an urban type of lifestyle.

**TABLE 1:Socio demographic profile and general characteristic of study population.**

Age	Male		Female		Total	
	No	%	No	%	No	%
25-35	34	43	45	57	79	24.3
35-45	39	47	44	53	83	25.5
45-55	26	43.3	34	56.7	60	18.5
55-65	23	43.3	30	56.6	53	16.3
65-75	19	48.7	20	51.3	39	12.0
75-85	08	72.7	03	27.3	11	3.4
Religion						
Hindu	75	47.5	83	52.5	158	48.6
Christian	74	44.3	93	55.7	167	51.4
Socioeconomic class						
I	00	00	00	00	00	00
II	09	42.9	12	57.1	21	6.5
III	49	46.2	57	53.8	106	32.6
IV	75	46	88	54	163	50.2
V	16	45.7	19	54.	35	10.8
Occupation						
Sedentary	85	85.86	14	14.14	99	30.46
Moderate	62	27.68	162	2.32	224	68.92
Heavy	02	100	00	00	02	0.62
Smoking yes	46	90.2	05	9.80	51	15.69
No	103	37.59	171	62.41	274	84.31
Alcohol yes	80	100	0	0	80	24.62
No	69	28.16	176	71.84	245	75.38
BMI Class						
Underweight	10	6.7	04	2.3	14	4.3
Normal	103	69.1	111	63.1	214	65.8
Pre obese	27	18.1	40	22.7	67	20.6
Obese class I	08	5.4	15	8.5	23	7.1
Obese class II	01	0.7	06	3.4	07	2.2
Obese class III	00	00	00	00	00	00

**Table 2** : Association between study variables and metabolic syndrome

	Metabolic syndrome		P Value
	Number	Percentage	
<b>Age</b>		0.05df=5	
25-35	19	15.8	
35-45	31	25.8	
45-55	25	19.2	
55-65	21	17.5	
65-75	20	16.7	
75-85	06	5.0	
<b>Religion</b>			0.159df=3
Hindu	57	36.1	
Christian	63	37.7	
<b>Occupation</b>			0.929df=2
Sedentary	91	36.8	
Moderate	28	36.8	
Heavy	01	50	
<b>Socioeconomic class</b>			0.159df=3
I	00	00	
II	09	42.9	
III	43	40.6	
IV	51	31.3	
V	17	48.6	
Smoking yes	26	45.6	0.134 df=1
No	94	35.1	
Alcohol yes	32	35.6	0.752 df=1
No	88	37.4	
<b>BMI class</b>			0.019df=4
Underweight	05	35.7	
Normal	68	31.8	
Preobese	34	50.7	
Obese class I	09	39.1	
Obese class II	04	57.1	
Obese class III	00	00	
<b>WHR</b>			
Significant *	93	64.14	0.000
Nonsignificant	27	15	df=1

\*male WHR >=1 and female >=0.8

**References:**

1. E. A. Enas, V. Mohan, M. Deepa, S. Farooq, S. Pazhoor, and H. Chennikkara, "The Metabolic Syndrome and dyslipidemia among Asian Indians: a population with high rates of diabetes and premature coronary artery disease," *Journal of the Cardio Metabolic Syndrome*, 2007; 2(4): 267–75.
2. D. Eapen, G. L. Kalra, N. Merchant, A. Arora, and B. V. Khan, "Metabolic Syndrome and cardiovascular disease in South Asians." *Vascular Health and Risk Management*, 2009; 5:731–43.
3. Paeratakul S, Ferdinand DP, Champagne CM, Ryan DH, and Bray GA, "Fast-food consumption among US adults and children: dietary and nutrient intake profile". *J Am Diet Assoc*, 2003; 103:1332–8.
4. S.M. Grundy, "Metabolic Syndrome pandemic," *Arteriosclerosis, Thrombosis, and Vascular Biology*, 2008; 28(4): 629–36.
5. Park textbook of Preventive and Social Medicine. 21<sup>st</sup> edition, Banarsidas Bhanot Publishers, 2011.
6. Ramchandran A et al, "Metabolic Syndrome in urban Asian Indian Adults–Population study using modified ATP III Criteria". *Diabetes Res Clinical Pract*, Jun 2003; 60(3):199-204.
7. Gupta R et al, "Prevalence of Metabolic Syndrome in an urban Indian population". *Int. Journal of cardiology*, Nov 2004; 97(2): 257-61.
8. Pranita K et al, "Metabolic syndrome in adult population of rural Wardha, Central India". *Indian Journal of Medical Research*, Dec 2010; 132: 701-5.
9. Mohan V, Deepa M et al, "Prevalence of Metabolic Syndrome using WHO, ATPIII, and IDF definition in Asian Indians, Chennai urban rural epidemiology study". *Diabetes Metab Res Rev*, Feb 2007; 23(2):127-37.
10. Aldi T Kraja et al, "Longitudinal and age trends of Metabolic Syndrome and its risk factors: The Family Heart Study". *Nutrition & Metabolism (London)*, 2006;3:41.

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