

ASSOCIATION OF IDF CRITERIA OF WAIST CIRCUMFERENCE WITH DIABETES MELLITUS IN A RURAL DIABETIC POPULATION

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ABSTRACT

INTRODUCTION

IDF definition of metabolic syndrome uses waist circumference as the main criteria without which metabolic syndrome cannot be diagnosed. The IDF cut-offs for waist circumference is ethnicity specific, but there is a vast heterogeneity amongst South Asians and within the Indian subcontinent itself.

MATERIALS AND METHODS

This cross-sectional study was conducted on 100 consecutive cases of diabetes in a medical college catering to predominantly rural population who attended the Medicine Department OPD. Demographic data and anthropometric data with relevant biochemical values were collected with patient's permission and the study was conducted. The IDF criterion of cut-off for waist circumference was solely used to identify the correlation between waist circumference and development of diabetes.

RESULTS

Study comprised of 55 males and 45 females with diabetes. 40% amongst males with diabetes had a waist circumference below the cut-off for metabolic syndrome. Amongst females, 8% did not fit into the IDF criteria of waist circumference for metabolic syndrome.

CONCLUSION

Many countries have proposed different cut-off values for waist circumference for diagnosis of metabolic syndrome. India being a heterogenous population requires region and population specific study to identify exact cut-off point. The authors believe 90 cm as waist circumference in males is too high and many metabolic syndrome cases are likely to be missed using this criteria.

KEYWORDS

IDF, Waist Circumference, Diabetes Mellitus.

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INTRODUCTION: Gerald Reaven described syndrome X in 1988 as a clustering of risk factors for Coronary Vascular Disease (CVD). Other names given include metabolic syndrome, insulin resistance syndrome, the plurimetabolic syndrome and the deadly quartet of glucose intolerance, hypertension, dyslipidaemia and obesity. Metabolic syndrome has been shown to increase the risk of type 2 diabetes mellitus and various diagnostic criteria like EGIR (European group for the study of insulin resistance), WHO

(World Health Organization), NCEP (National cholesterol education program), ACE (American college of endocrinology), updated NCEP-ATP (NCEP-adult treatment panel) III and IDF (International diabetes federation) are causing complications with different criteria or complicated tests in each. The IDF criteria places Waist Circumference (WC) with cut-off values different for different ethnic groups as primary diagnostic criteria without which metabolic syndrome criteria is not fulfilled. NCEP-ATP III considers WC along with other four criterias to be part of the diagnostic criteria. Reaven in his recent article believes IDF as the most dangerous criteria.⁽¹⁻⁵⁾

All these multiple criteria are causing confusion and so controversy exists over the exact diagnostic criteria. All the criteria's differ in several aspects and IDF criteria in particular has different cut-off for WC in Asian population. Studies have shown different optimal cut-off points in different population for WC for metabolic syndrome for predicting CVD risk or risk of developing type 2 diabetes

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mellitus.^(4,6) Studies have shown that in Asian Indians visceral and central abdominal adiposity correlate strongly with Type II diabetes mellitus and hence optimal cut-off point is essential.⁽⁷⁾

Here, we examined the adequacy of WC according to IDF criteria for metabolic syndrome in rural diabetic population.

MATERIALS AND METHODS: This cross-sectional study was conducted on 100 consecutive diabetic cases - new and old who attended the outpatient clinics of medicine department of DM Wayanad Institute of Medical Sciences, Wayanad. The institute predominantly caters to the rural population. A complete history along with demographic details, patient consent for study and treatment data was taken.

The study was based on IDF criteria of WC, which is central obesity (defined as WC with ethnicity specific values) - South Asians - Males ≥ 90 cm, females ≥ 80 cm. The WC was measured in the horizontal plane midway between the lowest ribs and iliac crest.

The patients were divided into 2 groups. Group 1 consisted of diabetic patients who fit into the criteria of metabolic syndrome for WC, while Group 2 consisted of diabetic patients with normal WC.

RESULTS: Amongst 100 cases of diabetes mellitus, 45 were females and 55 males. The mean age range amongst males was 53.29 with a minimum age of 32 years and maximum age of 75 years. Amongst females, the mean age range was 51.15 years ranging between 29-69 years.

The mean WC amongst males was 92.32 mean with a minimum of 77 to a maximum of 110. Amongst males, 22 (40%) patients did not fit into the waist criteria for metabolic syndrome. The mean WC amongst females was 94 with a minimum of 74 and a maximum of 116. Amongst 45 females, 4 (8%) female patients did not fit into the group of metabolic syndrome.

Based on the IDF guidelines for WC, the groups were formed. Group 1 consisted of 74 diabetic patients with increased WC fitting into the IDF criteria while group 2 consisted of 26 diabetic patients with normal WC. Group 2 consisted of 4 females and 22 males. The comparison between group 1 and 2 is as shown in table 1. All the values were expressed as mean and standard deviation. All the anthropometric measurements were significantly high along with WC in the group 1 (Table 1). Other biochemical and physiological parameters were not significantly different among the groups. WC as a component of metabolic syndrome seems to be positively associated with other anthropometric parameters, but not significantly with other variables (Table 2).

Parameters	Group 1	Group 2
Number	74	26
Hypertension	33	10
Systolic blood pressure	136.22±15.14	137.31±15.38
Diastolic blood pressure	87.43±10.08	87.69±8.15
Weight	68.18±9.64*	56.73±9.94
Height	161.66±9.92	164.65±7.74
Hip	99.09±6.47*	88.92±5.18
Waist	96.64±7.37*	82.96±4.13
Waist hip ratio	0.98±0.05*	0.93±0.04
Triglycerides	164.53±99.14	158.54±94.76
HDL	44.84±15.51	41.12±13.03

Table 1: Comparison Anthropometric, Physiological and Biochemical Parameters between Group 1 and Group 2

*indicates a 'p' value <0.001. The comparison was done by Student's 't' test except for TAGs and HDL-C for which Mann-Whitney U test was used.

Parameters	r Value	p Value
Systolic BP	-0.015	0.899
Diastolic BP	0.111	0.347
Weight	.615**	0.000
Height	0.219	0.06
Hip	.783**	0.000
Waist	.534**	0.000
Waist hip ratio	0.176	0.133
Triglycerides (TAG)	-.242*	0.038

Table 2: Association of Waist Circumference with Other Parameters

Note: Pearson's correlation analysis was used to explore an association among the variables. For TAG and HDL, we have used Spearman's correlation analysis as the values were non-parametric.

DISCUSSION: There is no universally accepted definition of metabolic syndrome and multiple published studies use different modifications and comparing different studies with our present study is complicated at best. However, studies have shown that metabolic syndrome is not a significant predictor of incident diabetes compared to CVD. The changing definitions of metabolic syndrome and its predictive ability in the diagnosis of type 2 diabetes mellitus are under study. Lowering the WC would include more cases making it more sensitive, however, specificity could get affected.⁽⁷⁾

To our knowledge, this is the first prospective study in a rural population in India to assess the WC as an associate factor of diabetes mellitus. Other secondary criteria data were not considered. Multiple studies have shown NCEP-ATP III criteria sensitivity was much better compared to IDF in predicting DM. IDF criteria is expected to raise the prevalence of metabolic syndrome, however, between IDF defined metabolic syndrome and ischaemic stroke was not

significant and similar subjects had less insulin resistance and also less carotid atherosclerosis.^(3,4)

NCEP definition of metabolic syndrome increases the relative risk of incident diabetes by 2.1 fold while WHO definition increases the risk by 3.6 fold highlighting the importance of insulin resistance in pathogenesis of type 2 DM.⁽³⁾ Abdominal or upper body obesity is known to correlate more with insulin resistance compared to visceral fat and abdominal subcutaneous fat.^(8,9)

This analysis strongly suggests that including WC as an optional component as in ATP would have minimal impact on predicting metabolic syndrome as a risk factor for DM. 40% of males with diabetes mellitus falls outside the IDF criteria for metabolic syndrome. This is a large gap and needs to be addressed as metabolic syndrome is often considered a prediabetic state. Some studies do in fact suggest FPG as a better predictor of DM rather than other metabolic syndrome components.^(4,6)

Asians compared to Europeans are known to have lower levels of obesity. Asian Indians are known to have lower BMIs than Europeans. However, for any given BMI, Asian Indians have greater waist-to-hip ratios and abdominal fat than Europeans. Even though, ethnic racial cut-offs are present, larger studies are necessary to account for the different distribution of norms of WC and body weight in relation to different population, ethnicities and nationalities.^(1,4,7,6)

CURES studies have demonstrated ≥ 87 cm in males and ≥ 82 cm in females in Indians as optimal cut-off point. When we checked the impact of reducing it to CURES studies, a further 10% improvement in sensitivity in males was seen. Reducing WC in males to further 85 cm will improve sensitivity by another 10%. Studies in Japan have proposed WC be reduced to 85 cm in males and our study also supports it. Korea, China and Iran have also proposed local cut-off values particularly in males. A consensus statement for Asian Indians has suggested a cut-offs of 78 cm in males and 72 cm in females suggesting further research for it to be standardised. 99% of subjects in our study fit into this criteria. Even a recent WHO study has suggested lowering BMI values in the Indian population, however, concrete action is lacking in the action report and despite this the optimal cut-off point for WC is still at higher levels.^(4,10-16)

Even though, IDF is known to overestimate metabolic syndrome, the higher cut-off of WC by including the heterogeneous Indian population in the South Asian category is probably inappropriate. Identification of metabolic syndrome is necessary to reduce the risk of developing diabetes mellitus and CVD. Hence, a population specific WC criterion is the need of the hour.

CONCLUSION: India comprises of a large heterogeneous population as a consequence of which population and region specific criteria are necessary to define metabolic syndrome for our country. A correction in values of WC in IDF criteria is necessary to identify more metabolic syndrome patients in order to control and hopefully reverse the epidemic of diabetes mellitus in the Indian subcontinent.

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