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ANTHROPOMETRY AND DIABETIC CONTROL IN PAKISTAN

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Abstract:

Objective: *To find an association between various anthropometric measures (Body Mass Index, Waist Circumference, Waist to Hip Ratio, Waist to Height Ratio) and glycemic control in Pakistani diabetics.*

Patients and Methods: *A cross-sectional analytical study was conducted over a period of six months that is from December 2015 to May 2016 on 332 Pakistani type 2 diabetic males and non-pregnant females irrespective of age presenting to the diabetic clinic at Medical Unit 3, Ward 7, Jinnah Postgraduate Medical Centre, Karachi. A form with incorporated parameters required for recording gender, age and anthropometric measurements was used. Statistical analyses were performed on SPSS version 22.0. Frequencies of abnormal anthropometric measurements under categorized variables were seen. Chi square testing was done to see if there is a significant correlation between the deviant measurements and deranged HbA1c values. For data expression, percentages were used.*

Results: *More females (64.2%) of females were enrolled in the study and majority (72.7%) of the diabetics were having HbA1c value of more than 7 which pointed towards poor glycemic control. About 2/3rd of the diabetic population fell under increased and high risk categories while hardly 12.6% having a normal body mass index. A significantly high number of people had deranged circumferences of waist and hip as well as waist to hip and waist to height ratios. When seen in conjunction with poor diabetic control, none of these measurements showed a statistically noteworthy correlation in general.*

Conclusion: *None of the anthropometric measurements became a statistically significant pointer towards deranged sugars. Hence the serological testing for glycemic control remains the gold standard.*

Keywords: *Anthropometry, Diabetes mellitus and Body mass index*

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INTRODUCTION:

Diabetes mellitus its control and complications, mean a great deal. The burden is sadly anticipated to rise to 366 million people by 2030 [1] Despite all the advancements and research, timely screening and prevention of complicationsof this major chronic illness are still much needed in order to improve public health. Physicians come across the challenge of picking up a clinical clue for development of complications. Sometimes with laboratory investigations it manifests and at other times it does not at all. Genetically determined factors play a major role for development as well as control of diabetes. On the other hand modifiable factors also play their part. For the latter, apart from detailed history, a thorough clinical examination is crucial. We need to have some tool that nearly exactly gives us a hint as to which complications are going to develop and when, in the clinic only. Our study is focused at anthropometric measurements and their role in bad diabetic control hence development of complications. Since our population differs from the rest genetically, we expect to generate useful information for the achievement of less complicated diabetes. There has been data on the usefulness of Body Mass Index (BMI) alone, BMI plus Waist Circumference (WC), WC alone, Waist to Hip Ratio (WHR) and Waist to Height Ratio (WHtR). All these point towards the fact that obesity and mainly central fat deposition rather than general, is the main culprit for development of cardiovascular and other life-threatening risks in diabetics worldwide [2].

Gender-wise variation due to sex steroid hormonal control on fat and central adiposity has been shown [3]. But overall, type 2 diabetics, carry notorious fat that at variable points in age harms their micro and macrovascular circulation, no matter which gender group they belong to. And therefore age too, stays as a significant contributor in adipose deposition, mobilization and insulin resistance. Interestingly, unlike in the West, where older populations are most affected, the burden of diabetes in Asian countries is disproportionately high in young to middle-aged adults [4]. Diabetes and especially complicated diabetes has been continuously on a rise for non-established reasons during the last one or two decades in our part of the globe. It is said that, by 2025, more than 60% of the world's population with diabetes will come from Asia, because it remains the world's most populous region [5]. So ethnicity, as expected, increases chances of variability due to genetic reasons. Asian and then South-east Asian populations have been studied but sparsely with regards to anthropometric measurements and results have been diverse. The current WHO BMI cut-off points of <16 kg/m2 (severe underweight), 16·0–16·9kg/m^2 (moderate underweight), 17·0–18·49 kg/m^2 (mild under weight), 18·5–24·9 kg/m^2 (normal range), 25 (overweight), 25–29·9 kg/m^2 (pre-obese), 30–34·9 kg/m^2 (obese class I), 35–39·9 kg/m^2(obese class II), 40 kg/m^2 (obese class III) should be retained as international classification. But the cut-off points of 23, 27·5, 32·5, and 37·5 kg/m^2 are to be added as points for public health action. For many Asian populations, additional trigger points forpublic health action were identified as 23 kg/m^2 or higher, representing increased risk, and 27·5 kg/m^2 or higher as representing high risk [6]. Waist circumference related to BMI, hip measurement or height, certainly values more for quantifying central obesity than the waist circumference alone mainly due to population and ethnicity variation [7]. Asians appear to have an increasedmetabolic risk at lower waist circumference and waist–hip ratio than Europeans. We hypothesized that anthropometric measurements (Body Mass Index, Waist circumference, Waist to Hip Ratio, and Waist to Height Ratio) serve as a weighty indicator of poor diabetic control. By studying these dimensions, a liaison with uncontrolled sugars can be established for our population.

PATIENTS AND METHODS:

A cross-sectional analytical study was conducted over a period of six months that is from December 2015 to May 2016 on 332 Pakistani type 2 diabetic males and non-pregnant females irrespective of age presenting to the diabetic clinic at Medical Unit 3, Ward 7, Jinnah Postgraduate Medical Centre, Karachi. A form with incorporated parameters required for recording gender, age and anthropometric measurements was used. Height, hip and waist circumferences were measured in cm as per WHO method. Waist circumference was measured at the midpoint between the lower margin of the least palpable rib and the top of the iliac crest with the subjects standing and breathing normally and hip was measured around the widest portion of the buttocks, with the tape parallel to the floor [8] Weight was taken in kg. Waist Circumference cutoffs were set to be >90cm for men and >80cm for women to be at disease risk [9]. The cutoffs for Waist to Hip Ratios were 0.88 and 0.81, respectively for men and women [10]. And Waist to Height Ratios cutoff was 0.5 for both genders [11]. Glycemic control was assessed by measuringglycosylated hemoglobin (HbA1c). A value more than 7% was labeled as poor control and below and equal to 7% was considered acceptable and risk-free. The Asian cutoffs for BMIwas taken in use by generally grouping them into underweight (less than 18.5kg/m^2), healthy (18.6-22.9kg/m^2), at

increased risk (23-26.9kg/m^2) and at high risk (more than 27kg/m^2) [12].

Statistical analyses were performed on SPSS version 22.0. Frequencies of abnormal anthropometric measurements under categorized variables were seen. Chi square testing was done to see if there is a significant correlation between the deviant measurements and deranged HbA1c values. For data expression, percentages were used.

RESULTS:

The general population characteristics are summarized in Table 1. The grouping details in percentages are given in Table 2 while the anthropometric measures are presented in Figure 1, Table 3, 4 and 5 respectively. More females (64.2%) of females were enrolled in the study and majority (72.7%) of the diabetics was having HbA1c value of more than 7 which pointed towards poor glycemic control. About 2/3rd of the diabetic population fell under increased and high risk categories while hardly 12.6% having a normal body mass index. A significantly high number of people had deranged circumferences of waist and hip as well as waist to hip and waist to height ratios. When seen in conjunction with poor diabetic control, none of these measurements showed a statistically noteworthy correlation in general.

TABLE 1: MEAN ±SD FOR QUANTITATIVE VARIABLES

	N	Minimum	Maximum	Mean	Std. Deviation
Age (years)	332	22	80	52.95	9.500
Height (cm)	332	131.00	188.00	157.4108	9.26935
Weight (kg)	332	40.00	110.00	67.9261	12.42568
Hip Circumference (cm)	332	37.00	155.00	102.6254	12.34398
Waist Circumference(cm)	332	47.00	141.00	97.6083	11.33296
Waist: Hip	332	.71	1.27	.9545	.06929
Waist: Height	332	.31	.95	.6223	.07819
BMI (kg/m2)	332	14.71	43.70	27.4451	4.63161

TABLE 2: THE DEMOGRAPHICAL AND CLINICAL PROFILE OF THE PATIENTS

Groups	Percentage
Gender	
Male	35.8
Female	64.2
Glycemic control	
Good Control	7.3
Poor Control	72.7
BMI	
Underweight	2.0
Normal	12.6
increased risk	31.0
high risk	54.5
Waist to Hip Ratio	
WHR<0.88	10.1
WHR>=0.88	89.9
Waist to Height Ratio	
NormalWHtR	5.2
AbnormalWHtR	94.8
Waist Circumference	
47-80	5.1
81-90	12.8
91-100	37.9
>100	44.2

FIGURE 1

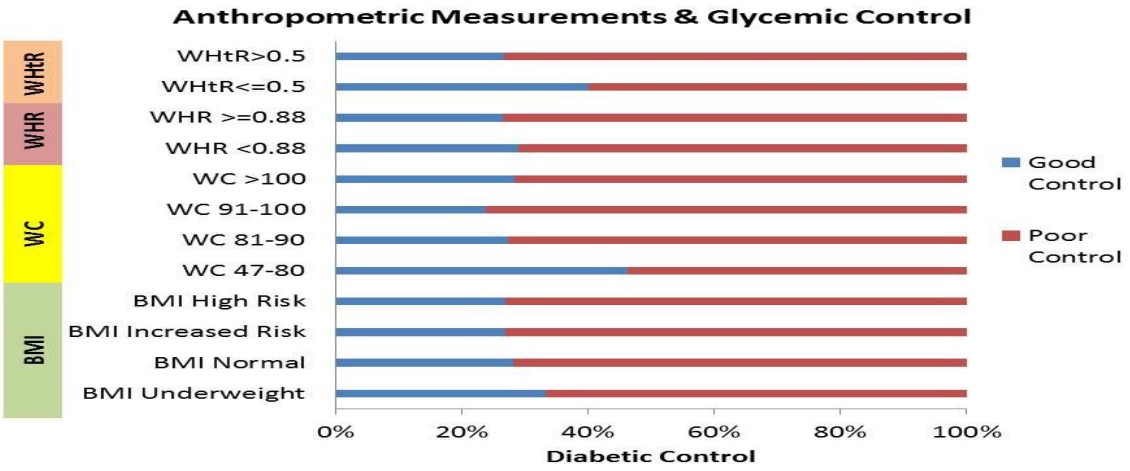

Table 3: Anthropometric Measurements alongside Diabetic Control

	Good Control (%)	Poor Control (%)
Waist to Height Ratio		
Normal	38.9	61.1
Abnormal	26.5	73.5
BMI		
Underweight	28.6	71.4
Normal	28.9	71.1
Increased risk	27.0	73.0
High risk	27.7	72.3

Table 4: Male Waist Circumference and WHR vs. Diabetic control

	Good Control (%)	Poor Control (%)
Waist Circumference		
Normal	31.8	68.2
Abnormal	19.8	80.2
Waist to Hip Ratio		
Normal	42.9	57.1
Abnormal	20.7	79.3

Table 5: Female Waist Circumference and WHR vs. Diabetic control

	Good Control (%)	Poor Control (%)
Waist Circumference		
Normal	42.9	57.1
Abnormal	29	71
Waist to Hip Ratio		
Normal	16.7	83.3
Abnormal	30.5	69.5

DISCUSSION:

The deranged anthropometric dimensions though have been seen to have an association with metabolic syndrome[i] in addition to cardiovascular risk, but did not show a link with poor glycemic control in Pakistani diabetic population [13, 14].

Various anthropometric cut off readings for different ethnic groups & population usually make the comparison difficult and can't be generalized. In former studies body mass index performed had poor yield as anthropometric predictor of type 2 diabetes mellitus consistent to present study. In the Uppsala study [15]. It has been found that overweight or obese

men without metabolic syndrome have an increase risk for diabetes mellitus and can comparable with present results. In former literature the WHR has contrast views as far as anthropometric measure are concerned [16].

WC was reported as good predictor of type 2 diabetes mellitus and [17] a former cohort research [18] also concurring with our series. The previous results [19, 20] detected wait to stature ratio as better clinical screening tool. The raised abdominal fat storage is a risk factor for cardiovascular disorders [21]. Contradictory former literature nominate waist circumference (WC) a predictor for diabetes mellitus [22, 23].

Vazquez et al shown that body mass index, waist circumference and waist to hip ratio had positive association with diabetes mellitus [24]. The study of Iran shown that type 2 diabetes mellitus incident is increasing in overweight women [25]. While the Indian study mass index shown, WHR in males and body mass index, waist circumference and weigh to hip ratio in females were the appropriate predictors for diabetes incident [26].

CONCLUSION:

None of the anthropometric measurements became a statistically significant pointer towards deranged sugars. Hence the serological testing for glycemic control remains the gold standard.

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