

A GOOD ANTHROPOMETRIC INDEX FOR PREDICTING THE RISK OF TYPE 2 DIABETES: WAIST TO HIP RATIOM. Ramadevi¹, O. Padmini², Kali Vara Prasad Vadlamani³**HOW TO CITE THIS ARTICLE:**

M. Ramadevi, O. Padmini, Kali Vara Prasad Vadlamani. "A Good Anthropometric Index for Predicting the Risk of Type 2 Diabetes: Waist to Hip Ratio". Journal of Evolution of Medical and Dental Sciences 2015; Vol. 4, Issue 59, July 23; Page: 10363-10366, DOI: 10.14260/jemds/2015/1494

ABSTRACT: An increasing trend of type2 Diabetes mellitus is seen with age. Visceral or central obesity is a very common risk factor for developing type 2 diabetes Mellitus. Hence any index which reliably measures obesity can be used as a tool to predict the risk of Diabetes. We have attempted to correlate waist to hip ratio (WHR) as an anthropometric index to predict the risk of diabetes. When WHR of men is more than 0.9 and women is more than 0.8 the risk increases. **MATERIALS & METHODS:** 300 diabetic patients (150 males, 150 females) and 300 controls (150 males, 150 females) were selected and their WHR were measured. The study was done in Gandhi medical college over a period of 2 years. Individuals were grouped according to gender and HWR. Data analysis was done by excel sheet and SPSS software. **RESULTS:** There was significant association between WHR and DM in both males and females. **DISCUSSION:** Obesity especially visceral leads to insulin resistance and finally DM. This is because adipocytes produce biologic products which modulate insulin action. **CONCLUSIONS:** Our study proves that HWR screening is a simple and cost effective anthropometric predictor of risk for diabetes. This can be used for mass screening as it is quick and needs less expertise.

KEYWORDS: Waist Hip Ratio (WHR), Type 2 diabetes, Anthropometric index.

INTRODUCTION: Incidence of obesity is increasing at an alarming rate throughout the world. Today it is estimated that there are more than 250 million obese people worldwide. Close to 300,000 deaths each year occur in the US.¹ Several studies in India have shown that changes in dietary patterns, physical activities, and lifestyle are associated with diseases, such as diabetes and coronary heart disease. Globalisation is also playing an important role for modernisation and sedentary life. In near future obesity will emerge as a challenging problem for India. Therefore attention should be given to this problem as prevention is better than cure. Obesity or adipose tissue excess particularly in the visceral compartment is associated with insulin resistance, hypoglycaemia, dyslipidaemia and hypertension. Studies indicate that the presence of obesity increases the risk for developing diabetes and cardiovascular diseases.^{2,3,4,5}

There is increasing prevalence of Type 2 Diabetes Mellitus with age. So a disturbing trend has become apparent in which the prevalence of obesity and type 2 diabetes in children is rising dramatically. Obesity, particularly visceral or central (As evidenced by the hip waist ratio), is very common in Type 2 Diabetes Mellitus. Adipocytes secrete a number of biologic products (Leptin TNF - Alpha, free fatty acids, resistin, and adiponectin) that modulate insulin action, and body weight and may contribute to the insulin resistance. In the early stages of the disorder, glucose tolerance remains normal despite insulin resistance because the pancreatic beta cells compensate by increasing insulin output.

ORIGINAL ARTICLE

As insulin resistance and compensatory hyper insulinaemia progress, the pancreatic islets in certain individuals are unable to sustain the hyper insulinaemia state, Impaired Glucose Tolerance, characterized by elevations in postprandial glucose then develop with a further decline in insulin secretion, with fasting hyperglycaemia. Ultimately, beta cell failure may ensue. Markers of inflammation such as IL-6 and C reactive proteins are often elevated in Type 2 diabetes. High frequencies of impaired glucose tolerance, shown by those studies, ranging from 3.6-7.1% indicate the potential for further rise in prevalence of diabetes mellitus in coming decades. Therefore our study focuses on simple, cost effective, less expertise anthropometric measurement like HWR to screen masses for risk of central obesity which leads to Type 2 diabetes, so that prevention and early diagnosis should be possible. The risk for diabetes increases steeply when the waist hip ratio rises above 0.9 in men and above 0.8 in women.

MATERIALS & METHODS: Our study was a descriptive observational study, done in Gandhi medical college, Secunderabad, over a period of two years. A systematic random sample was taken where in every third known diabetic patient who attended the outpatient departments of Medicine and Endocrinology was chosen until 150 males and 150 females with Type 2 Diabetes were obtained. 300 non-Diabetics i.e, 150 males and 150 females were selected by the same systematic random sample selection method, to be used as controls.

Fasting and post prandial blood sugar–confirmation of DM was done by latest fasting and postprandial blood sugar reports obtained from patients.

Demographic Data: WHO recommended standard protocol⁶ was followed.

This Protocol can be Summarized as Outlined below:

- Measure the waist circumference at the end of several consecutive natural breaths, at a level parallel to the floor, midpoint between the top of the iliac crest and the lower margin of the last palpable rib in the mid- axillary line.
- Measure the hip circumference at a level parallel to the floor, at the largest circumference of the buttocks.
- Make both measurements with a stretch-resistant tape that is wrapped snugly around the subject, but not to the point that the tape is constricting. Keep the tape level and parallel to the floor at the point of measurement.
- In males Hip Waist Ratio (HWR) of 0.9 and above and in females 0.8 and above were taken as centrally obese individuals and considered for study.
- Following this data analysis was done by data entered in to excel sheet and double checked for errors using SPSS software.

RESULTS: On analysis it was confirmed that WHR was statically very significant among male and female Diabetics compared to controls.

DISCUSSION: The positive association between obesity and the risk of developing type 2 diabetes has been repeatedly observed, both in cross-sectional studies.^{7,8} (Hartz et al., 1983; Shaten et al., 1993;) and in prospective studies.^{9,10,11} (Cassano et al., 1992; Colditz et al., 1990; Ohlson et al., 1985). The consistency of the association across populations–despite differences in measures of fatness and

ORIGINAL ARTICLE

diagnostic criteria for diabetes in adults – reflects the strength of this relationship. The risk of type 2 diabetes in adults increases continuously with increasing obesity, and decreases with weight loss. A careful analysis of the relationship between obesity and adult-onset diabetes confirms that abdominal obesity is an important risk factor, even after controlling for age, smoking and family history. Since waist circumference correlates more closely with abdominal adipose tissue than BMI, the association between indicators of such obesity (e.g. waist circumference and waist-hip ratio) has been studied extensively in the last two decades¹² that, with respect to type 2 diabetes, all anthropometric measures (BMI, waist circumference, waist-hip ratio and waist-height ratio) performed similarly in predicting risk. However, data from most of the cross-sectional studies suggested that waist circumference or waist-hip ratio is better indicators than BMI of the risk of diabetes.

CONCLUSION: We conclude that there is a strong association between Waist Hip Ratio and Incidence of Type 2 diabetes, so WHR can be used as a good predictor of risk of Type 2 Diabetes Mellitus for prevention and early detection.

REFERENCES:

1. Allison DB Fontain KR Manson JE Stevens J. Annual Deaths attributable to obesity in the US JAMA 282 1530-1538.
2. Atkintewe TA Adetubi A: obesity and hypertension in Diabetic Nigerians Tropical Geographic Medicine 1986, 38(2): 146-149.
3. Beegon R, Niaz Ma, Singh RB; Diet, central obesity and prevalence of hypertension in the urban population of south India Centre of Nutrition Research, Moradabad, India.
4. Foster C, Rotimi C. hypertension, Diabetes and obesity in Barbados: Findings from a recent population based survey. Ethnic Diseases 1993, 3(4): 404-412.
5. Cassano PA, Segal MR Vokonas PS Weiss ST: Body fat distribution blood pressure and hypertension Ann Epidemiology 1990: 1: 33-48.
6. WHO recommended standard protocol (WHO, 1995: WHO, 2000a: WHO/FAO, 2003).
7. Hartz AJ, Rupley DC, Jr., Kalkhoff RD et al. Relationship of obesity to diabetes: influence of obesity level and body fat distribution. Preventive Medicine, 1983, 12(2): 351-357.
8. Shaten BJ, Smith GD, Kuller LH et al. Risk factors for the development of type II diabetes among men enrolled in the usual care group of the Multiple Risk Factor Intervention Trial. Diabetes Care, 1993, 16(10): 1331-1339.
9. Cassano PA, Rosner B, Vokonas PS et al. Obesity and body fat distribution in relation to the incidence of non-insulin-dependent diabetes mellitus. A prospective cohort study of men in the normative aging study. American Journal of Epidemiology, 1992, 136(12): 1474-1486.
10. Colditz GA, Willett WC, Stampfer MJ et al. Weight as a risk factor for clinical diabetes in women. American Journal of Epidemiology, 1990, 132(3): 501-513.
11. Ohlson LO, Larsson B, Svardsudd K et al. The influence of body fat distribution on the incidence of diabetes mellitus. 13.5 years of follow-up of the participants in the study of men born in 1913. Diabetes, 1985, 34(10): 1055-1058.
12. Nyamdorj R, Qiao Q, Lam TH et al. BMI compared with central obesity indicators in relation to diabetes and hypertension in Asians. Obesity (Silver Spring), 2008, 16(7): 1622-1635.

ORIGINAL ARTICLE

WHR	DM	%	NoDM	%	Total	%	P value
Normal	63	42	107	71.33	179	59.66	P < 0.001
Obese	87	58	44	29.33	131	43.66	P < 0.001
Total	150	100	150	100	300	100	

Table 1: Distribution of waist to hip ratio among female diabetics

WHR	DM	%	No DM	%	Total	%	P value
Normal	86	57.33	124	82.66	210	70	P < 0.001
Obese	64	42.66	26	17.33	90	30	P < 0.001
Total	150	100	150	100	300	100	

Table 2: Distribution of waist to hip ratio among male diabetics

AUTHORS:

1. M. Ramadevi
2. O. Padmini
3. Kali Vara Prasad Vadlamani

PARTICULARS OF CONTRIBUTORS:

1. Associate Professor, Department of Physiology, Gandhi Medical College, Secunderabad.
2. Associate Professor, Department of Physiology, Gandhi Medical College, Secunderabad.

FINANCIAL OR OTHER

COMPETING INTERESTS: None

3. Associate Professor, Department of Orthopaedics, Osmania Medical College, Hyderabad.

NAME ADDRESS EMAIL ID OF THE CORRESPONDING AUTHOR:

Dr. M. Ramadevi,
1-1-565, Raghavendra Apartments,
New Bakaram, Musheerabad,
Hyderabad-20.
E-mail: drramajvv@gmail.com

Date of Submission: 11/04/2015.

Date of Peer Review: 13/04/2015.

Date of Acceptance: 16/07/2015.

Date of Publishing: 23/07/2015.