Gross Correlation between Waist Hip Ratio and Blood Sugar Level in a Village

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ABSTRACT

Introduction: Diabetes is one of the major public health problems in Nepal. Very few studies on correlation between waist hip ratio and random blood sugar have been done in remote areas of Nepal particularly in minor ethnic groups like Thami. This study attempted to compare waist hip ratio and blood sugar level in Thami community.

Methods: This cross sectional study was conducted in sub-health post of Lapilang village of Dolakha district of Nepal. A total of 243 local inhabitants from Thami Tribe participated in the study. Waist hip ratio was calculated after taking measurements of waist and hip using flexible measuring tape; and, blood glucose level was measured by glucometer.

Results: The mean age of the participants was 46.02 years; among participants 126 (51.9%) were males and 117 (48.1%) were females. Mean waist hip ratio was 0.87, mean blood sugar level was 124.5 mg%. Increase in Waist hip ratio correlated significantly with increase in random blood sugar level both in males (p=0.008) and females (p=0.007).

Conclusions: Increase in waist hip ratio is associated with increase in random blood sugar level. Therefore, there is a need of public awareness program to reduce waist circumference thus reducing weight of people to prevent development of diabetes mellitus in long run.

Keywords: blood sugar level; diabetes; thami community; waist hip ratio.

INTRODUCTION

Prevalence of Diabetes in Nepal is (3.58%).¹ Mean diabetes related expenditure per person with diabetes in Nepal is 43.89 US dollar, a quite expensive figure.¹ In Rural areas of Nepal 191,010 diabetes cases were reported in 2012.¹ Few researches were conducted to measure Diabetes prevalence and its association with waist hip ratio. According to the 2011 Nepal census, there are a total of 28,671 Thami people in Nepal.² Lapilang village of Dolakha is the highly populated area with Thami tribe.

Waist hip ratio has been a significant tool to find people at risk of diabetes. People having high blood sugar level and high waist hip ratio are more prone to diabetes mellitus than people with normal value of blood sugar and waist hip ratio.^{4,5} There is substantial evidence that achieving a healthy body weight and moderate physical activity can help prevent the development of type 2

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diabetes. The aim of this study is to see correlation of waist hip ratio and random blood sugar level in Thami Tribe.

METHODS

An observational study was conducted at a sub-health post of Lapilang, Dolakha, Nepal from 5th July to 11th July, 2008. The respondents were the people of Thami ethnicity visiting health camp held in sub-health post. People with known diabetes under treatment and those taking steroids were excluded from the study.

Participants (126 males and 117 females; total of 243) of 30 years of age and older were included in the study. The study was clearly explained to the respondent and informed consent was taken from each of them before including them in this study.

As per WHO protocol, waist circumference (cm) was measured at the midpoint between the lower margin of the last palpable rib and the top of the iliac crest, using a flexible, stretch resistant tape that provides a constant tension. Hip circumference (cm) was measured around the widest portion of the buttocks, with the tape parallel to the floor. Waist hip ratio (WHR) was calculated after dividing waist circumference by hip circumference. WHO states that abdominal obesity is defined as a WHR above 0.90 for males and above 0.85 for females.³

Random blood sugar level was measured using standard Glucometer (One- Touch, Ultra Smart, Blood Glucose Monitoring System, USA) after taking aseptic precaution using spirit swab to clean the sample site.

Data were processed using the Statistical Package for the Social Sciences (SPSS) version 16. Chi square test was done to find the correlation between random blood sugar level and waist hip ratio.

RESULTS

The maximum number of subjects was found to be in the age group 30-39 years mean age was 46.02 (Table 1, 2).

Table 1. Age distribution.	
Age groups(years)	n=243 (%)
30-39	97 (39.9)
40-49	60 (24.7)
50-59	48 (19.8)
60-69	24 (9.9)
70-79	14 (5.8)

Table 2. Mean and standard deviation of variables.				
Variables	Mean	Std. deviation		
Age(years)	46.02	12.53		
Waist hip ratio	0.88	0.06		
Random blood sugar (mg%)	124.53	26.89		

Mean waist hip ratio was 0.88 and mean random blood sugar level was 124.5 mg% (Table 2). There was male predominance; female: male ratio was 1.07:1 (Figure 1).



Paired samples correlation table was constructed to assess the correlation of waist hip ratio with random blood sugar level in both sexes; it was observed that statistical significance was observed both in males (p = 0.008) and females (p = 0.007) (Table 4, 5).

Table 3. Paired sample statistics of waist hip ratioand random blood sugar.						
Gender	Mean	Std. deviation	Std. error of Mean			
Male: Waist hip ratio Random blood Sugar (mg%)	0.87 123.44	0.06 25.54	0.005 2.27			
Female: Waist hip ratio Random blood Sugar (mg%)	0.88 125.70	0.06 28.34	0.005 2.62			

Table 4. Paired samples correlation of waist hip ratio and blood sugar.					
Gender	Ν	Correlation	P=value		
Male: Waist hip ratio and Random blood sugar	126	0.235	0.008		
Female: Waist hip ratio and Random blood sugar	117	0.248	0.007		

DISCUSSION

In this study, there was significant relation between waist hip ratio and random blood sugar level; increased waist hip ratio was associated with increased random blood sugar level, thus predicting the population at risk of potential diabetes mellitus type 2. Waist Hip Ratio was taken because it was the most common obesity related predictor of diabetes.^{4,5} However, some have argued against the use of WHR as a measure of obesity because of its ambiguous biological interpretation, its lesser sensitivity to weight gain, its greater variability across age, sex, and ethnic groups.⁶

The mechanism whereby body fat distribution might influence the predisposition to diabetes independently of overall adiposity has received considerable attention. It has been demonstrated by variety of techniques that for any degree of total adiposity objects with central fat distribution are more insulin resistant than subjects with predominantly lower body fat.⁷

This study showed WHR is the good predictor of blood sugar level. This contradicts with the study conducted by Wei et al (7-year prospective study).⁸ here they found waist circumference as a best predictor of non-insulin dependent diabetes mellitus compared to body mass index (BMI) and WHR. This difference could be attributed to the difference in the population studied.

Similar study was conducted by Patil SP et al where they found increased level of blood sugar level with increasing waist circumference and body mass index.⁹ Another study by Oboh HA and Adedeji AA in Nigeria also showed strong correlation of waist hip ratio and waist height ratio to cardiovascular risk factors like high blood sugar level and diabetes.¹⁰

Another study conducted by Lopatynski J et al found weakest relation of random blood sugar level with WHR; rather they found Waist circumference (WC) showed strongest correlation with glycemic status.¹¹

In a similar study of Abdominal Adiposity and Diabetes risk by Hanley A. JG and Wagenknecht LE, found that significant correlation of WHR and chance of having

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diabetes mellitus.¹² A similar association of WHR and Blood Glucose Level was shown in the study conducted by Qing Q et al,¹³ It can be said that abdominal adiposity is the one of the major culprits for developing diabetes mellitus type.

In this study, paired samples correlation was done to assess the correlation of waist hip ratio with random blood sugar level in both sexes; it was observed that statistical significance was observed both in males (p = 0.008) and females (p = 0.007).

As central obesity is a predictor of future diabetes and also future coronary and cerebro-vascular disease, it is important to reduce waist hip ratio. In favor of this proposition, it is known that weight loss in overweight patients reverses the state of insulin resistance and can restore normal glucose level.^{14,15} Healthy life style like regular exercise, intake of vegetables and fruits, avoiding junk foods help to reduce incidence of Diabetes.^{16,17}

CONCLUSIONS

We found significant association between WHR with random blood sugar level in the community. However, further research is needed to find out possible intervening or confounding factors before drawing firm conclusion based on the gross correlation presented in this study.

Health education about weight reduction, particularly reduction of waist circumference, through regular exercises and healthy life style should be provided to the community to reduce the prevalence of diabetes mellitus type 2 through different media such as diabetes awareness campaigns through health screening camps, radio, television, role play and other local programmes.

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