

ORIGINAL RESEARCH ARTICLE

RELATIONSHIP OF BODY MASS INDEX AND WAIST-HIP RATIO AMONG DENTAL INTERNS, RESIDENTS AND DENTAL PRACTITIONERS

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ABSTRACT

Background: Obesity is common global problem associated with co-morbid condition such as diabetes and hypertension. There is change in fat distribution pattern in both male and female during the process of aging. Body mass index along with waist circumference, waist-hip ratio and waist to height ratio are major anthropometric measures used to define the adiposity. This study aimed to assess the prevalence of overweight and obesity in individuals of different age-groups as dental interns, residents, and dental practitioners.

Methods: This cross-sectional study was conducted among 90 male and female subjects. Census method of sampling was used as all the interns, residents and dental practitioners were involved. Unstretchable measuring tape was used to measure waist circumference, digital weighing machine was used to measure weight and Stadiometer was used to measure height as per world health organization guidelines. Body mass index was calculated from the weight of participants in kilograms divided by square of height in meters (kg/m²). Waist-hip ratio and waist to height ratio were calculated from measured data. Data was analyzed by Statistical Package for Social Sciences (SPSS) version 16.

Results: Body mass index was found to be higher in male i.e 62.5% for overweight category compared to female where it was 24.2% and obesity was also higher among males while comparing with females. Waist circumference has significant correlation in male and female P<0.05. Waist hip ratio and different age groups also has positive correlation.

Conclusions: Prevalence of overweight and obesity was seen among different age-groups and coherently the associated disease risk was explored.

INTRODUCTION

Body mass index (BMI) is common and simple parameter for classifying the level of obesity. As suggested by WHO expert committee BMI is used to classify subjects into underweight (<18.5kg/m²), normal weight (>18.5 to 24.9kg/m²), overweight (>25 to 30kg/m²), obese (>30 to 40). WHO has correlated WC, WHR and WHtR with BMI and also have suggested these indices were associated with increased disease risk in different populations. WC > 94 cm in male and >80 cm in female and WHR ≥0.90 in male and ≥ 0.85 in female were correlated with increased risk of metabolic complication.¹ WHtR is based on the following boundary values: 'no increased risk' (WHtR ≤0.5), 'increased risk' (WHtR ≥0.5 and <0.6) and 'very high risk' (WHtR ≥0.6) to determine cardio-metabolic risk factors.²

In Nepal the prevalence of overweight and obesity has been found in certain population along with different co-morbidities as hypertension and diabetes etc.³ Studies done in different regions of world also showed increase and decrease of BMI is significantly associated with change in blood pressure.^{4,5} Another study also suggested waist circumference and waist-hip ratio better predictor of hypertension, diabetes and

dyslipidemia.⁶ Some studies in different region of Nepal also showed increasing pattern of obesity in certain population and other showed higher BMI values in male medical students.⁷⁻⁹ This study was conducted to determine relationship of different age-groups with waist circumference and waist hip ratio and also to find out the prevalence of overweight and obesity among dental interns, residents and dental practitioners.

METHODS

The descriptive cross-sectional study was performed after obtaining approval from institutional review committee (ref-1, CH.no-05, 2077/78) of People's Dental College and Hospital. The study period was from January 2021 to March 2021. Census method of sampling was used as all the interns, residents and dental practitioners of People's Dental College and Hospital were involved. Total 90 healthy subjects with no weight losing disease within one month before sampling time and subjects above 22 years and below 55 years were included. Participants having any heart, renal disease and pregnant females were excluded. After taking written and verbal consent, subject were asked to fill proforma followed by measurement of weight, height, waist circumference and hip circumference as per

WHO protocols.¹⁰ Height was measured using stadiometer and weight with digital weighing machine. Waist circumference was measured using Unstretchable measuring tape at the midpoint between the top of the iliac crest and lower margin of the last palpable rib in the mid axillary line. Hip circumference was measured at the level parallel to floor, at the largest circumference of the buttocks. Then BMI, WHR, WHtR were calculated. The data was entered in excel sheet and analyzed using SPSS version 16. The different categorical variables were explained by use of chi-square test and Fisher exact test. Various categories with p-value less than 0.05 were considered statistically significant. The mean of different variables were compared using Annova test.

RESULTS

There were 66 (73.3%) female and 24 (26.7%) males. The mean age being 29.66(7.06) years, mean weight and mean height were 63.74(±13.04) kg and 158.90(±10.48) cm respectively. Similarly, mean waist circumference and hip circumference were 83.44(±10.04) and 94.72(±9.81) respectively. Also mean waist hip ratio and waist to height ratio were 0.88(±0.07) and

0.53(±0.07) respectively (Table1).

Table 1: Details of the study participants

Variables	Min	Max	Mean	Std. Dev
Age	23	53	29.66	7.06
Height(m)	1.3	1.84	1.59	0.10
Height (cm)	130	184	158.90	10.48
Weight (Kg)	41	100	63.74	13.04
BMI	17.3	49.4	25.20	5.04
Waist circumference (cm)	55	115	83.44	10.04
Hip circumference (cm)	58	128	94.72	9.81
Waist Hip ratio	0.73	0.98	0.88	0.07
WHtR (cm)	0.37	0.83	0.53	0.07

Among the total subjects 1(1.1%) was underweight, 48 (53.5%) were normal weight, 31(34.4%) were overweight and 10(11.1%) were obese. Similarly 72(80%) male and female had WC less than 102cm and 88 cm respectively which suggests increased disease risk while 18(20%) male and female had WC more than 102cm and 88cm respectively which suggests high disease risk to such individual (Table 2).

Table 2: Categorization of subjects on basis of body mass index and waist circumference cut-off points made for overweight or obesity and association with disease risk

Variables	Body mass index	Number (N) of males and female (%)	Disease risk (relative to normal weight and waist circumference)	
			Men<102cm	Men>102cm
			Female<88 cm (N/%)	Women>88 cm (N/%)
Underweight	<18.5	1(1.1%)	72 (80%)	18(20%)
Normal	18.5-24.9	48(53.3%)		
Overweight	25.0-29.9	31(34.4%)	Increased risk	High
Obesity	>30	10(11.1%)	High	Very High

Significant difference of BMI between male and female was seen. BMI being 62.5% in male compared to 24.2% in female for overweight category, obesity was also observed to be higher in male than in female (Table 3).

Significant correlation between WHR and different age-groups were seen. WHR being highest in age-group ≥40 years and ≤ 39 years compared to individual < 30 years (Table 4).

Table 3: Comparison of BMI categories between male and female

BMI	<18.5	18.5-24.99	25-29.99	≥30	Total	p-value
Female	1(1.5%)	44(66.7%)	16(24.2%)	5(7.6%)	66(100%)	< 0.001
Male	0(0%)	4(16.7%)	15(62.5%)	5(20.8%)	24(100%)	

Table 4: Correlation of different age- groups with waist hip ratio (WHR)

Age-group (years)	WHR			p-value
	0.90 in Male, ≥0.85 in Female	<0.90 in Male, <0.85 in Female	Total	
<30	27(50.9%)	26(49.1%)	53	<0.004
30-39	19(70.4%)	8(29.6%)	27	
≥40	10(100%)	0(0%)	10	

Table 5: Correlation of different age-groups with waist to height ratio (WHtR)

Age-group/ WHtR	Minimum	Maximum	Mean	SD	p-value
<30	0.37	0.68	0.50	0.05	<0.001
30-39	0.44	0.7	0.56	0.06	=0.061
≥40	0.48	0.83	0.61	0.01	

Age group < 30years has significant difference in WHtR ($p<0.001$) compared to age groups ≤ 39 years and ≥ 40 years who has insignificant difference in WHtR ($p=0.061$). This shows individual above 30 years had increased early health risk (Table 5).

Significant difference of waist circumference was seen between male and females. WC being higher in male 24(95.8%) than female 49 (74.2%) (Table 6).

Table 6: Comparison of waist circumference between male and female

WC	>102 cm in male, >88 cm in Female	<102Male, <88 in Female	Total	p value
Female	17(25.8%)	49(74.2%)	66	<0.047
Male	1(4.2%)	23(95.8%)	24	

DISCUSSION

Obesity and overweight is global problem which has tripled since 1975. The mean BMI of study subjects was 25.20 Kg/m² which is higher than the average for South Asian population. WHO also supports the rising trends of obesity as imminent global threat and rapidly growing public health problems.¹ This study showed that out of 90 subjects, 31 subjects were overweight and 10 were obese which can be due to their unhealthy lifestyle. Study done by Vaidya et al have shown increase in obesity between 25-64 years age groups while WHR was increased in both genders aged between 35-65 years,⁷ which is congruent with the findings of this study. Age-related change of body composition results in decrease of muscle mass and strength while re-distribution of fat occurs gender-wise. This study showed 80% of subjects were at increased risk of disease and 20% were at high risk due to overweight and obesity. Several studies showed men had more upper body fat while female had higher lower body fat and both men and women experienced age-related decrease in muscle mass with often increase in fat mass,^{9,11} which also matches with finding of this study as WHR was found to be higher in older age group compared to younger ones. Furthermore two separate study carried out by Amatya et al and Vaidya et al showed overweight in males^{8,9} which is similar with the findings of the present study. This may be due to lack of exercise and lack of intake of healthy diet due to hectic work schedule.

Different studies done in Nepal and worldwide showed

increased prevalence of overweight and obesity and its association with different co-morbidity.^{3,7,9,12} Another study found WC larger in older male adults aged upto 70 years compared to young adults males as well as females of the same age.¹³ This finding is almost same with the findings of present research as WC of male is found to be significantly higher compared to female. It can be due to android pattern of fat distribution ensued by lack of physical movement during clinical practice. Other research revealed that higher the WHtR more the risk of cardiovascular problem among the individuals which illustrated positive correlation between higher WHtR and hypertension particularly in older age.^{2,14} Similar relation between WHtR and cardiometabolic risk was demonstrated in this study as it showed the age-group above 30 years were in increased risk category for development of cardiovascular problems. This can be due increased adiposity which increases the chance of cardiovascular disease.

Although the current study included dental interns, residents and dental practitioner, its findings were significant for future study as it provides a base for assessing prevalence of obesity and overweight along its association with cardio-metabolic risks. There is no doubt that the present study was conducted within a small sample, so, study in large population is of greater importance.

CONCLUSION

Obesity and overweight were significant in the participants of this study. Additionally, there is always higher risk of diet related non-communicable diseases in those individuals. So, this study recommends that every dental practitioner should priorities their physical health while working chair bound for long hours. However, the healthy diet should be the foremost factor to maintain appropriate weight which might reduce the probability of diseases.

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CONFLICT OF INTEREST: None

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