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## Research Article

# ASSOCIATION OF BODY MASS INDEX AND WAIST HIP RATIO WITH KNOWLEDGE OF HEALTH CONSEQUENCES OF OBESITY AMONG THE INDIVIDUALS WITH SEDENTARY LIFESTYLE

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### ABSTRACT

Obesity is one of the conventional modifiable risk factor of cardiovascular disease. Knowledge about risk factor and awareness of its existence in self is the first step in reducing risk factors. This article aims to find the association of BMI, WHR and the knowledge regarding health consequences of obesity amongst the Individuals with sedentary lifestyle. Total 304 individuals willing to participate, above 25 years and living sedentary life were selected using convenient sampling. Data was collected regarding knowledge about health consequences of obesity, awareness about own BMI, WHR, and measurements of BMI, WHR. Present study showed equal prevalence of obesity in both gender. Only 10.20 % were aware of the normal value of BMI and none of them were aware of normal WHR. Awareness of participants about their own BMI and WHR was poor. There was no significant association between BMI, WHR and knowledge of Health Consequences of obesity.

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## INTRODUCTION

Body Mass Index (BMI) is a simple index of weight-for-height that is commonly used to classify underweight, overweight and obesity in adults. World health organization defines normal BMI, pre-obese/overweight and obese as BMI of 18.50 - 24.99 kg/m<sup>2</sup>,  $\geq 25.00$  kg/m<sup>2</sup> and  $\geq 30.00$  respectively (WHO guidelines). Due to ethnic differences, the Asian guidelines for Indians residing in India to classify BMI are different than global guidelines. As per these guidelines BMI of  $\geq 23$  kg/m<sup>2</sup> and  $\geq 25$  kg/m<sup>2</sup> is defined as overweight and obese, respectively (Asia Pacific perspective, 2000). Distribution of body fat in Indians is more centralized and have higher mean WHR for a given BMI compared to European (Shrivastava, 2017). Asians tend to have more accumulation of intra-abdominal fat without generalized obesity. Higher BMI can be due to high muscle mass or more accumulation of fat. And more than amount of fat, it's the distribution of fat in the body that determines the CVD risk. Abdominal obesity is associated with the cardiovascular risk factors. Hence waist circumference is the preferred measure of abdominal obesity (Patel *et al*, 2017). Recent studies in India have shown high prevalence of abdominal obesity as well as general obesity (Eshwar *et al*,

2017; Nagendra *et al*, 2017; Pradeepa *et al*, 2015). There is significant association between abdominal obesity and female gender, hypertension, diabetes, higher socio-economic status, physical inactivity and urban residence. Studies have shown that central obesity (High WC-waist circumference) and general obesity (BMI  $\geq 25.0$  kg/m<sup>2</sup>) had the strongest correlation with all Cardiovascular risk factors (Ch, 2017). Combined measurement of BMI and WC is practical and easy measure to find person at risk for developing CVD. Having knowledge about risk factor and awareness of its existence in self is the first step in reducing that risk factors. This article aims to find the association of BMI, WHR and the knowledge regarding health consequences of obesity amongst the Individuals with sedentary lifestyle.

## METHODOLOGY

Quantitative research approach was used to assess the body mass index and waist hip ratio of Individuals with sedentary lifestyle. Data was collected from various institutions like banks, corporate offices, and IT companies of Navi Mumbai. Data was collected from 304 Individuals meeting inclusion criteria using convenient sampling. The individuals who were willing to participate, between age of 25 years - 58 years and

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living sedentary life were included in the study. Females who were pregnant at the time of data collection were excluded from the study. Data was collected regarding demographic variables, knowledge about body mass index and waist hip ratio, awareness about own BMI and WHR, and physical measurements (Body Mass Index, Waist Hip ratio, blood pressure and random blood pressure). Global physical Activity Questionnaire developed by WHO was used as screening tool to select individuals living sedentary lifestyle (GPAQ, WHO). The tool assessed moderate and vigorous intensity physical activities performed by individuals per week under three domains: at work, while traveling and recreational activities. Those who performed less than any of the following activities in a week were considered sedentary and included in the study; 150 minutes of moderate-intensity physical activity OR 75 minutes of vigorous-intensity physical activity OR an equivalent combination of moderate- and vigorous-intensity physical activity achieving at least 600 MET-minutes. Semi structured questionnaire was used to assess knowledge and awareness of individuals about body mass index and waist hip ratio. Assessment sheet was used to record body weight in kilogram, waist and hip circumference in centimetre. Ethical clearance from the MGM Institute of Health Sciences, Navi Mumbai was obtained before data collection. The purpose of study and role of participants was explained to them before obtaining written consent. Data was analysed based on the objectives of the study using statistical software package SPSS 21 and Microsoft Excel 2007. Categorical data were expressed as frequency and percentage. Continuous data was analysed using mean and standard deviation. Chi square test was used to find association between variables.

**RESULT**

Study was conducted on 304 individuals with sedentary lifestyle in Mumbai. It included 170 (55.92%) females and 134 (44.08%) males. Mean age of participants were 43.15 ± 9.53 years with majority of the participants in the age group of 30 to 40 years. Majority were married (87.83 %) and working (84.21%).

**Table 1** Distribution of participants based on knowledge of health consequences of obesity.

n=304

Grades of Knowledge	f	%
Poor (0-6)	163	53.62
Average (7-13)	112	36.84
Good (14-20)	29	9.54

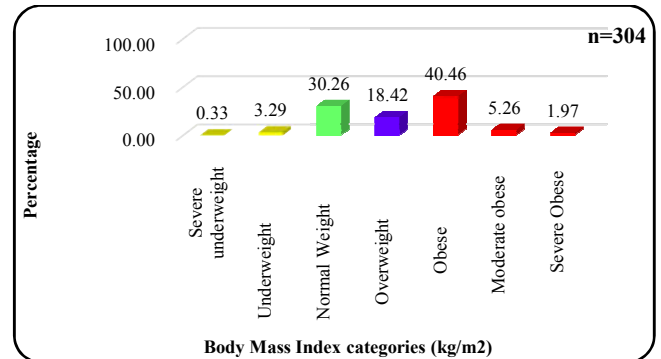
Table 1 illustrates that majority (53.62%) of the participants had very less knowledge of risk factors of Coronary artery disease.

**Table 2** Comparison of knowledge and self-awareness of biophysical parameters amongst the study participants.

n=304

Biophysical Parameter	Knowledge		Self-Awareness	
	f	%	f	%
Blood pressure	151	49.67	22	9.44
Blood sugar	98	32.24	13	5.58
Body Mass Index	31	10.20	12	5.15
Waist hip ratio	0	0	0	0

Table 2 explains that only 10.20 % of participants knew the normal value of BMI but less than half of them (5.15%) of them were aware of their BMI. It showed that amongst the participants who had knowledge about biophysical parameters very few of them had self-awareness of these parameters. None of them were aware of the waist hip ratio.



**Fig 1** Distribution of participants based on BMI categories

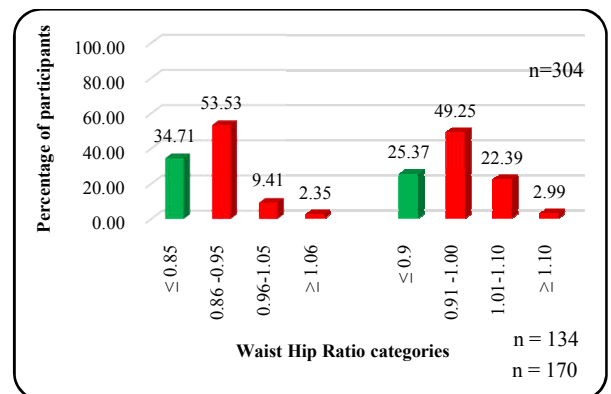
The figure 1 illustrates that the body mass index of 66.12% of participants was found under overweight and obese, which is double the percentage of participants having normal BMI. The total percentage of participants under overweight and obese category was found 20 times more than the underweight participants. As per World Health Guidelines, percentage of participants having BMI more than normal were 48 %. Median BMI of male and female participants was 25.05kg/m<sup>2</sup> and 24.76 kg/m<sup>2</sup> respectively, while the total median BMI was 24.83kg/m<sup>2</sup>.

**Table 3** Comparison of BMI in male and female participants.

n=304

Body Mass Index		Male		Female		Total	
Values	Categories	f	%	f	%	f	%
15.0 - 15.99	Severe underweight	1	0.75	0	0.00	1	0.33
16.0 - 18.49	Underweight	7	5.22	3	1.76	10	3.29
18.50 - 22.99	Normal Weight	38	28.36	54	31.76	92	30.26
23.0 - 24.99	Overweight	20	14.93	36	21.18	56	18.42
25.0 - 29.99	Obese	57	42.54	66	38.82	123	40.46
30.0 - 34.99	Moderate obese	6	4.48	10	5.88	16	5.26
35.0 - 39.99	Severe Obese	5	3.73	1	0.59	6	1.97

Table 3 showed that obesity was found to be equal in both females (66.47%) and males (65.47%). It also showed that less than half (30.26%) of participants had normal BMI as per Asian guidelines.



**Fig 2** Distribution of participants based on waist hip ratio at baseline

Figure 2 illustrates that WHR was found higher (74.63%) in males compared to females (65.29). The mean WHR in all the participants was  $0.92 \pm 0.08$ . The mean WHR in male and female was  $0.96 \pm 0.08$  and  $0.89 \pm 0.07$  respectively.

**Table 4** Association between BMI and WHR

BMI Categories	WHR Categories				$\chi^2$	P value
	Normal		Above			
	f	%	f	%		
Underweight	8	8.51	3	1.42	1.04	0.59
Normal	44	46.80	48	22.85		
Overweight	42	44.68	159	75.71		
<b>Total</b>	<b>94</b>		<b>210</b>			

Table 4 showed that 210 (69.08%) of individuals had waist hip ratio above normal. Among participants with higher waist hip ratio, 75.71% were overweight, while, 24.27 % were having normal or below normal BMI. Among individuals with normal WHR, 44.48% were overweight. The table also showed that there is no significant association between body mass index and waist hip ratio of individuals with sedentary lifestyle.

**Table 5** Association between knowledge of health consequences of obesity and BMI measurement in participants.

Knowledge Categories	BMI category					$\chi^2$	P value
	< 23kg/m <sup>2</sup>		≥ 23kg/m <sup>2</sup>		Difference (%)		
	f	%	f	%			
Poor	4	12.50	28	87.50	75	0.136	0.934
Average	91	37.45	152	62.55	25.1		
Good	8	27.59	21	72.41	44.82		
Total	103	33.88	273	66.12			

Note: Percentage are within horizontal group

Table 5 showed that difference between the normal and overweight BMI was very high with poor knowledge as compared to average and good knowledge. However, chi square showed no statistically significant association between knowledge and BMI.

**Table 7** Comparison of studies on knowledge of BMI

Study participants	Place of Study	Sample Size	% of participants	
			Knowledge of BMI	Awareness of own BMI
Women vising gynaecology OPD	Bangalore, India (Eti <i>et al.</i> 2016)	300	None	-
Individuals with Diabetes	Ghana, West Africa.(Obirikorang <i>et al.</i> , 2016)	543	4.2	-
Primary Care patients	New Jersey, West Virginia. (Post <i>et al.</i> , 2015)	515	17.5	16.4
Graduate students	Malaysia. (Zainordin <i>et al.</i> , 2015)	179	10.6	-
Patients attending clinics	USA (Nanda <i>et al.</i> , 2015)	70	19	15.7
Adults	Britan (Johnson <i>et al.</i> , 2014)	315	15.4	-
Intermediate school students	Saudi Arabia. (Alasmaria <i>et al.</i> , 2017)	528	25.4	-
Pregnant women	New Zealand. (Okesene <i>et al.</i> , 2016)	644	66	-
Adults aged 18-74 years	Satu Mare, Romania (Cornelia <i>et al.</i> , 2012)	862	47.6	-
Women in weight management clinic	Southern California (James <i>et al.</i> , 2017)	121	64.5	35.5

## DISCUSSION

Cardiovascular disease has several risk factors that can be modified through lifestyle changes like eating, exercise, monitoring of blood pressure, weight, blood sugar etc. Individual can modify behaviour when he/she is aware of what

is good for health, and can maintain it when he is aware of limits of certain measurements like weight, blood pressure, blood sugar etc. Present study showed nearly equal prevalence of obesity in both gender. Whereas study done in Karnataka showed obesity prevalent in females (34.9%) as compared to males (28.4%).

The results also revealed that 51 (16.77%) of participants had BMI in normal or underweight category but had high waist hip ratio. Similarly, 42 (13.81%) of participants had normal WHR but had BMI in overweight category. This paper showed that only 10.20 % of participants were aware of the normal value of BMI and none of them were aware of normal waist hip ratio. This finding is similar to the study done in Bangaloreon women visiting gynaecology clinic, which showed that none of the participants were aware of concept of BMI. Studies conducted in West Africa, New Jersey, Malaysia, USA, Britan, Soudi Arabia showed that less than 25 % of participants had knowledge of BMI. Whereas, studies done in New Zealand, Romania and Southern Californiashowed good knowledge about BMI. Study conducted on Urban population of Varanasi, India(Singh *et al.*, 2014) showed that 37.6% of participants had knowledge of obesity. But this study included questions about reasons for increase in obesity and how it can be reduced but did not deal about knowledge of body mass index and waist hip ratio. This paper also revealed that awareness of participants about their own BMI ad WHR was very poor. Comparative table on studies done in various parts of world on knowledge and awareness of BMI shows that studies have been done to assess the knowledge about BMI but very few studies have been done to assess awareness of own BMI and WHR. Table shows that awareness about obesity as a risk factor for cardiovascular disease is adequate, but participants had poor knowledge about BMI and WHR. In spite of the awareness that obesity is a risk factor for CVD, very few have knowledge about obesity, Body mass index and waist hip ratio: – its normal values, categories and its measurement.

## CONCLUSIONS

Commonly, a visibly fat person is termed as obese. The concept of body mass index is less known to the population. Very few studies have been done on awareness of own BMI. As the knowledge of BMI is inadequate, people don't consider themselves as overweight. Hence the precautions to reduce weight are not implemented leading to obesity. This is a chain and need to be broken by creating awareness about the concept of BMI and making people know about their own BMI and waist hip ratio. Hence health education, frequent monitoring and organizing interventional program is necessary.

### Conflict of Interest

There are no declared conflict of interest

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