

Original Research Article

Assessment of Body Mass Index, Waist Hip Ratio, Blood Pressure, Pulse Pressure among Obese Male Population

Dr. R. Sri Krishna Sasi¹, Dr. S. Usha Devi²¹Assistant Professor, Department of Physiology, Government Medical College, Anantapuram, Andhra Pradesh²Professor & HOD, Assistant Professor, Department of Physiology, Government Medical College, Anantapuram, Andhra Pradesh***Corresponding author**

Dr. R. Sri Krishna Sasi

Email: srikrishnasasi@gmail.com

Abstract: Obesity is defined by Body mass index (BMI), Waist to Hip ratio (WHR), assessing cardiovascular risk factors. The aim of the study is to evaluate the blood pressure, pulse pressure, WHR, BMI among obese male persons and their correlation with normal healthy people. This study was done from September 2015 to march 2016 at Department of Physiology, Government Medical College, and Anantapuram. A total of 136 obese male people were selected to do this study. Among them 68 obese patients who came for follow up were selected and considered as cases, remaining 68 were normal healthy persons, considered as controls. Controls were selected such that they correlate mostly with cases in respect to age, sex. Details regarding age, socioeconomic status, height, weight were collected. Body Mass Index (BMI), Waist to Hip (WHR), Pulse pressure, Blood pressure was measured. All the results were entered into spread excel sheet and were analyzed. Out of 68 obese male persons, obesity was most prevalent in 41-50 years age group (36.7%) followed by 31-40 years (27.9%). Blood pressure, Pulse pressures were higher among obese male persons when compared to Normal healthy persons. BMI, WHR, Blood pressure, Pulse pressure are important predictors of hypertension, diabetes, chronic heart disease etc. Assessing these predictors, will help in reducing the incidence of hypertension, diabetes and aids to start appropriate early treatment, which leads to decrease in morbidity and mortality incidence.

Keywords: Body mass index (BMI), Waist to Hip ratio (WHR), assessing cardiovascular risk factors

INTRODUCTION:

Obesity is a medical condition resulted by a exercise body fat to such an extent that alters the health status of a person [1]. Obesity has many causes such as genetic factors, endocrine disorders, food habits, lack of physical activity, mental illness [2, 3]. Worldwide, obesity is the one of the leading preventable cause of death [4, 5]. Globally, 600 million of adults and 42 millions of under five children were estimated as obese people in 2014 [1].

Obesity is defined by Body mass index (BMI), Waist to Hip ratio (WHR), assessing cardiovascular risk factors [6, 7]. Obesity can result in various health problems like Diabetes mellitus type 2, Hypertension, Chronic Heart disease (CHD), Deep vein thrombosis (DVT), asthma, stroke/TIAs (Transient ischemic attacks), PCOD etc. BMI, WHR, Blood pressure, Pulse

pressure are important predictors of hypertension, diabetes, chronic heart disease etc.

The aim of the study is to evaluate the blood pressure, pulse pressure, WHR, BMI among obese male persons and their correlation with normal healthy people.

MATERIALS AND METHODS:

A Prospective randomized study was done on obese male people attending General Medicine OPD at Government General Hospital, Anantapuram. Institutional ethical committee approval was taken before doing this study. Informed consent was taken from the selected population who were involved in this study. This study was done from September 2015 to march 2016 at Department of Physiology, Government Medical College, and Anantapuram.

Exclusion criteria:

- Obese patients with >50 years
- Female patients
- Bed ridden patients
- Obesity with mental illness
- Obesity with co-morbidities like DM, HTN, CHD, Cancer, Asthma

Inclusion criteria:

- Obese patient aged between 18-50 years
- Male patients.

Obese male people who came to Medicine OPD presented with minor complaints related to gastrointestinal symptoms, respiratory, urinary symptoms were selected, explained to them regarding this study. Advise to come for follow up after deterioration of present problems.

A total of 136 people were selected to do this study. Among them 68 obese patients who came for follow up were selected and considered as cases, remaining 68 were normal healthy persons, considered as controls. Controls were selected such that they correlate mostly with cases in respect to age, sex. Details regarding age, socioeconomic status, height, weight were collected. Body Mass Index (BMI), Waist to Hip (WHR), Pulse pressure, Blood pressure was measured.

Body Mass Index (BMI) Measurement:

BMI is calculated as the weight in kilograms divided by the square of the height in meters (kg/m^2). BMI was categorized by the World Health Organization (WHO) was followed [8]. A BMI of less than 18.5 was classified as underweight, BMI of 18.5 to 24.9 as normal weight, BMI of ≥ 25.0 up to 30.0 was classified as overweight and BMI of ≥ 30.0 was classified as obese.

Waist circumference:

In women, the abdominal circumference (waist) was measured as the narrowest part of the body between chest and hips and in men it was measured at the level of the umbilicus, measured in centimeters.

Hip circumference:

The participant's hip circumference was measured as the maximum circumference around the

buttocks posterior side at the level of greater trochanters (hip bones) and measured in centimeters.

Waist to Hip Ratio (WHR):

WHR was determined by dividing waist circumference by hip circumference. WHO [9] recommends cut-off points for waist circumference as 85 cm and 80 cm and WHR cut-off values of 0.90 and 0.80 for men and women respectively, where a higher ratio indicates an increased risk of various health complications.

Blood pressure:

Normal blood pressure was considered between < 120 mmHg (SBP) and <80 mmHg (DBP). Blood pressure values of 120-139 mmHg (SBP) and 80-89 mmHg (DBP) were classified as prehypertensive. Stage-I hypertension was taken as 140-159 mmHg (SBP) and 90-99 mmHg (DBP), whereas blood pressure of ≥ 160 mmHg (SBP) and ≥ 100 mmHg (DBP) were classified as stage II hypertension [10].

Pulse Pressure:

Pulse pressure is measured in millimeters of mercury (mmHg), defined as the difference between systolic and diastolic blood pressure. All the results were entered into spread excel sheet and were analyzed. Statistical analysis was done using graph pad software, by considering p value <0.05 as significant.

RESULTS:

In this study controls were selected such that they match with obese people with respective to age. Out of 68 obese male persons, obesity was most prevalent in 41-50 years age group (36.7%) followed by 31-40 years (27.9%). Most of the obese people were observed among Lower Middle and Upper lower, was 45.5% and 23.5% respectively. Majority of the obese male persons were observed among Muslims and Hindus (Table No.1).

Height, Weight, BMI, WHR, Blood pressure, Pulse pressure were measured, noted. These parameters were compared between controls (healthy people) and obese male people. All the variables were extremely statistically significant, when calculated using Graph pad software and the p value <0.05 were considered as significant statistically. Blood pressure, Pulse pressure was higher among obese male persons when compared to Normal healthy persons (Table No.2).

Table 1: Demographic data among healthy persons and obese male persons

	Healthy Persons (n=68)	Obese Male People (n=68)
Age in Years		
18-30	15 (22%)	15 (22%)
31-40	19 (27.9%)	19 (27.9%)
41-50	24 (36.7%)	25 (36.7%)
51-60	9 (13.2%)	9 (13.2%)
Socioeconomic Status		
Upper	4 (5.8%)	7 (10.2%)
Upper Middle	12 (17.6%)	14 (20.5%)
Lower Middle	28 (41.1%)	31 (45.5%)
Upper Lower	22 (32.3%)	16 (23.5%)
Lower	2 (2.9%)	0
Ethnicity		
Hindu	26 (38.2%)	22(32.3%)
Muslim	28(41.1%)	30(44.1%)
Christian	12(17.6%)	16(23.5%)
Other religions	2(2.9%)	0

Table 2: Parameters comparison between normal healthy persons and obese male persons

	Normal Healthy Persons (Mean±S.D)	Obese Male Persons (Mean±S.D)	P value	Significance
Height in cms	158.2±3.5	157.1±2.4	0.0344	SS
Weight in Kgs	53.1±1.06	86.3±7.8	<0.001	ESS
BMI in Kg/m ²	18.7±1.2	27.4±5.02	<0.001	ESS
Waist to Hip Ratio				
<1	66	16	<0.001	ESS
>1	2	52		
Blood pressure				
Systolic Blood pressure (mmHg)	116.4±5.6	158.3±3.05	<0.001	ESS
Diastolic Blood pressure (mmHg)	78.3±4.2	91.2±1.2	<0.001	ESS
Pulse pressure (mmHg)	38.4±4.5	70.3±2.4	<0.001	ESS

ESS - Extremely Statistically significant; SS- Statistically significant

DISCUSSION:

Obesity is now-a-days become a public health concern, in relation to cosmetic problems, health problems, social problems. Obesity is found to be associated with significant risk of morbidity and mortality [11]. In this study, obese people with mental illness and co morbidities were excluded, as because co morbidities may change the results of blood pressure and affects this study analysis, as here evaluating the blood pressure in obese people without any problems.

Obesity prevalence is higher in females than males globally, but many studies shown that prehypertension and hypertension was higher among male population [12, 13]. Also there is higher risk of

Chronic Heart disease (CHD), dyslipidemia among obese male patients. Suman Dua *et al.*; [14] documented that high prevalence of pre hypertension among males (SBP 81.2%, DBP 48.7%) than females (SBP 37.4%, DBP 44.7%). Based on many of such studies, we have selected male population in this study to evaluate blood pressure. Most of the obese people were observed among Lower Middle and Upper lower, was 45.5% and 23.5% respectively. Majority of the obese male persons were observed among Muslims and Hindus. These percentages many vary from place to place, because obesity depends on their food habits, lack of physical activity, genetic predisposition and so on. People predict that obesity is a sign of wealth and even more commonly observed in upper class status

[15]. But as this study done at government medical college, we have observed most of the patients were from lower middle and upper lower socioeconomic classes.

As per this study, out of 68 obese male persons, obesity was most prevalent in 41-50 years age group (36.7%) followed by 31-40 years (27.9%). 13.2% male persons >50 years were obese, as elderly people were less commonly reported as obese. This may be due to as declines with age there is reduction of lean body-fat mass, which accounts for the lower occurrence of obesity in the later years [16, 17]. BMI, WHR, Height, Weight, Blood pressure and Pulse pressure were measured among all selected population. All the variables were Extremely Statistically significant, when calculated using Graph pad software. Blood pressure, Pulse pressure was higher among obese male persons when compared to Normal healthy persons.

For assessing nutritional status BMI is the best indicator in adults [18, 19]. WHR is a indicator of central fat distribution and also a strong measure, assessing for risk of diabetes and hypertension [20-22]. BMI and also WHR are important predictors of Hypertension. BMI also strongly associated with cardio vascular disease and hypertension [23, 24]. BMI is not shown a significant risk factor of chronic illness such as CHD, TIAs [25]. BMI is a good predictor and shown significant association of greater risk of developing hypertension, diabetes and heart diseases [26, 27].

CONCLUSION:

BMI, WHR, Blood pressure, Pulse pressure are important predictors of hypertension, diabetes, chronic heart disease etc. Assessing these predictors, will help in reducing the incidence of hypertension, diabetes and aids to start appropriate early treatment, which leads to decrease in morbidity and mortality incidence. Using single anthropometric measurement may be inadequate to assess. There is a need of panel of measurements which provides accurate and significant risk assessment of medical conditions.

REFERENCES:

1. "Obesity and overweight Fact sheet N°311". WHO. January 2015. Retrieved 2 February 2016.
2. Yazdi FT, Clee SM, Meyre D. Obesity genetics in mouse and human: back and forth, and back again. PeerJ. 2015 Mar 24; 3:e856.
3. Bleich SN, Cutler D, Murray C, Adams A. Why is the developed world obese? Annu. Rev. Public Health. 2008 Apr 21; 29:273-95.
4. Encyclopedia of Mental Health. 2 ed. Academic Press. 2015: 158.
5. Mokdad AH, Marks JS, Stroup DF, Gerberding JL. "Actual causes of death in the United States, 2000". JAMA. 2004 Mar; 291 (10): 1238-45.
6. Haslam DW, James WP. "Obesity". Lancet (Review).2005; 366(9492):1197-209.
7. Bleich SN, Cutler D, Murray C, Adams A. Why is the developed world obese? Annu. Rev. Public Health. 2008 Apr 21; 29:273-95.
8. World Health Organization. Preventing and Managing the global epidemic. Geneva: Switzerland, obesity RoaWco. 1998.
9. World Health Organisation. Waist Circumference and Waist-hip Ratio: Report of a WHO Expert Consultation, Geneva, 8-11 December 2008, World Health Organization. 2011.
10. Reference card from the Seventh report of the Joint National Committee on Prevention, Detection, Evaluation and Treatment of Blood pressure (JNC7). <https://www.nhlbi.nih.gov/files/docs/guidelines/phycard.pdf>.
11. Tyagi R. Body composition and nutritional status of the institutionalised and non-institutionalised senior citizens. EAA Summer School eBook. 2007 Jun; 1:225-319.
12. Gupta S, Kapoor S. Sex differences in blood pressure levels and its association with obesity indices: who is at greater risk. Ethnicity & disease. 2010 Sep 1; 20(4):370.
13. Ferguson TS, Younger NO, Tulloch-Reid MK, Wright MB, Ward EM, Ashley DE, Wilks RJ. Prevalence of prehypertension and its relationship to risk factors for cardiovascular disease in Jamaica: analysis from a cross-sectional survey. BMC Cardiovascular Disorders. 2008 Aug 28; 8(1):20.
14. Suman Dua, Monika Bhuker, Pankhuri Sharma, Meenal Dhall, and Satwanti Kapoor. Body Mass Index Relates to Blood Pressure Among Adults. N Am J Med Sci. 2014 Feb; 6(2): 89-95.
15. Bloomgarden ZT. Prevention of obesity and diabetes. Diabetes Care. 2003 Nov 1; 26(11):3172-8.
16. Kapoor S. Blood pressure, waist to hip ratio and body mass index among affluent Punjabi girls of Delhi. Acta Medica Auxologica. 2000; 32(3):153-8.
17. Okosun IS, Prewitt TE, Cooper RS. Abdominal obesity in the United States: prevalence and attributable risk of hypertension. Journal of human hypertension. 1999 Jul 1; 13(7):425-30.

18. Shetty PS, James WP. Body mass index. A measure of chronic energy deficiency in adults. *FAO Food and Nutrition paper*. 1993 Dec; 56:1-57.
19. Kapoor S, Dhall M, Kapoor AK. Nutritional status and ageing among populations inhabiting varied geographical regions in India. *Biennial Book of EAA*. 2010; 6:85-100.
20. Dowse GK, Gareeboo H, Zimmet PZ, Alberti KG, Tuomilehto J, Fareed D, Brissonnette LG, Finch CF, Mauritius Noncommunicable Disease Study Group. High prevalence of NIDDM and impaired glucose tolerance in Indian, Creole, and Chinese Mauritians. *Diabetes*. 1990 Mar 1; 39(3):390-6.
21. Schmidt MI, Duncan BB, Canani LH, Karohl C, Chambless L. Association of waist-hip ratio with diabetes mellitus: strength and possible modifiers. *Diabetes care*. 1992 Jul 1; 15(7):912-4.
22. Grievink L, Alberts JF, O'niel J, Gerstenbluth I. Waist circumference as a measurement of obesity in the Netherlands Antilles; associations with hypertension and diabetes mellitus. *European journal of clinical nutrition*. 2004 Aug 1; 58(8):1159-65.
23. Murden RA, Ainslie NK. Recent weight loss is related to short-term mortality in nursing homes. *Journal of general internal medicine*. 1994 Nov 1; 9(11):648-50.
24. Margetts BM, Thompson RL, Elia M, Jackson AA. Prevalence of risk of undernutrition is associated with poor health status in older people in the UK. *European Journal of Clinical Nutrition*. 2003 Jan 1; 57(1):69-74.
25. Kristjansson K, Sigurdsson JA, Lissner L, Sundh V, Bengtsson C. Blood pressure and pulse pressure development in a population sample of women with special reference to basal body mass and distribution of body fat and their changes during 24 years. *International journal of obesity*. 2003 Jan 1; 27(1):128-33.
26. Sanya AO, Ogwumike OO, Ige AP, Ayanniyi OA. Relationship of waist-hip ratio and body mass index to blood pressure of individuals in Ibadan North local government. *African Journal of Physiotherapy and Rehabilitation Sciences*. 2009; 1(1):7-11.
27. Zhang L, Zhang WH, Wang PY. Prevalence of overweight/obesity and its associations with hypertension, diabetes, dyslipidemia, and metabolic syndrome: a survey in the suburban area of Beijing, 2007. *Obesity facts*. 2011 Aug 5; 4(4):284-9.