AGE DISTRIBUTION AND SIGNIFICANCE OF BODY MASS INDEX AND WAIST TO HIP RATIO IN NORMOTENSIVE MIDDLE AGED MALES

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ABSTRACT

This study aims to investigate the age distribution and significance of body mass index (BMI) and waist to Hip ratio (W/H) in middle aged normotensive males (40-60 years) in preventing obesity related morbidity and mortality. Height, Weight, Waist Circumference, Hip Circumference, BMI and W/H were measured on 60 normotensive male patients aged between 40-60 years. Statistical comparisons were carried out between 40-50 year age group and 50-60 year age groups as well as between obese and Non-obese subjects at 5 % level of significance. In the Age group between 40-50 years (n = 33), 14 were non-obese (23.3 %) and 19 were obese (31.7 %). In the Age group between 50-60 years (n = 27), 6 were non-obese (10 %) and 21 were obese (35 %). Highly significant increase in BMI and W/H ratio were observed in obese subjects compared to Non-obese subjects in both 40-50 years and 50-60 year age groups. Percentage of population at risk among normal middle aged males if identified at early stages can adopt the preventive strategies to reduce the obesity related morbidity and mortality.

Keywords: Body Mass Index, Waist to Hip ratio, Obesity, Middle aged males.

INTRODUCTION

In the modern era of rapid economic development and globalization, changing life style and altered dietary habits is complementing an imbalance between energy intake and energy expenditure, which, in turn leads to obesity. Overweight and obesity may account for as many as 15-30 % of deaths from Coronary Heart Disease (CHD) and 65-75 % of new cases of type 2 Diabetes Mellitus. Thus, Obesity is said to be a state of chronic low grade inflammation which is associated with risk factors for cardiovascular diseases, hypertension, diabetes, gallstones etc.[1,2] In the age group 40-60 years the prevalence of grade II obesity (BMI > 30) has been estimated at between 15 and 25 % among males. Thus, the direct and indirect economic costs of obesity are substantial.[3] The analysis of these data, if properly collected, could be informative about the health status of the middle aged males before the manifestation of dyslipidemia, diabetes mellitus and hypertension - thereby predicting the future risk for cardiovascular diseases, metabolic syndrome and other obesity related disorders. This study aims to investigate the distribution of the categories of body mass index (BMI) and waist to Hip ratio in middle aged normotensive males (40-60 years) as predictors of obesity related morbidity and mortality.

MATERIALS AND METHODS

This Pilot Study was conducted on 60 male patients aged between 40-60 years selected by employing Systemic random sampling method. Subjects with hypertension, diabetes mellitus, liver disorders, cardiac diseases, kidney diseases, smoking, alcoholism, other endocrinal disorders, bronchial asthma, acute or chronic inflammatory diseases, autoimmune diseases and on other medications like steroids, antipsychotic drugs were excluded from the study. The information was collected about various socioeconomic factors, family history, addiction, exercise, associated disorders, life style etc. on preformed, pre tested interview schedule by investigator himself. The following anthropometric parameters were recorded for the study group- Weight, Height, Waist circumference, Hip circumference, BMI (body weight in Kg/height in m^2) and Waist to hip ratio (waist circumference /hip circumference). Blood pressure was measured with a mercury sphygmomanometer using the appropriate sized cuff.[4] Measuring instruments were centrally gauged and measurements were performed using standardized procedures. Subjects were categorized as: A BMI below 20 is considered as underweight and between 20 and 24.9 as desirable. From 25 on three categories of being overweight are distinguished: 25 - <30 = grade I obesity, 30 - <40 = grade II obesity and >40 = grade III or morbid obesity.

Statistical Analysis

Values were expressed as Mean ± SD. Statistical comparisons were carried out by student 't' test at 5 % level of significance using SPSS software, version 16.

RESULTS

Out of 60 subjects studied, we categorized our data as follows: In the Age group between 40-50 years (n = 33), 14 were non-obese (23.3%) and 19 were obese (31.7 %). In the Age group between 50-60 years (n = 27), 6 were non-obese (10 %) and 21 were obese (35%) (Table 1 and 2).

Table 1: Measured Parameters in Non-Obese Males

Adult Males aged 40-50 years					Adult Males aged between 50-60 years				
Age (Years)	BMI (Kg/m²)	Waist (cm)	Hip (cm)	W/H ratio	Age (Years)	BMI (Kg/m²)	Waist (cm)	Hip (cm)	W/H ratio
41	21.4	80	90	0.88	52	22.7	85	96	0.88
49	22.7	85	95	0.89	53	22.4	78	87	0.89
45	20.3	79	91	0.86	52	22.1	87	96	0.9
41	22.6	79	88	0.89	60	24.3	88	98	0.89
40	20	80	88	0.9	59	25	85	94	0.9
40	22.9	83	95	0.87	59	24.5	85	96	0.88
47	21.8	81	90	0.9					
42	20.5	82	93	0.88					
49	19.9	77	88	0.87					
43	22.9	79	87	0.9					
41	23.6	75	86	0.87					
47	21.5	81	92	0.88					
43	24.6	84	97	0.86					
41	21.4	84	96	0.87					

Table 2: Measured Parameters in Obese Males

Adult males aged 40-50 years					Adult males aged between 50-60 years				
Age (Years)	BMI (Kg/m²)	Waist (cm)	Hip (cm)	W/H ratio	Age (Years)	BMI (Kg/m²)	Waist (cm)	Hip (cm)	W/H ratio
47	30.79	111	108	1.02	53	35.46	120	114	1.05
43	30.88	117	119	0.98	59	34.24	119	117	1.01
40	32.69	122	119	1.02	50	37.28	119	115	1.03
49	36.17	127	120	1.05	53	33.22	115	117	0.98
41	32.1	109	111	0.98	58	38.84	118	119	0.99
42	32.5	116	111	1.04	56	30.14	113	110	1.02
41	31.7	109	103	1.05	54	31.2	114	116	0.98
41	30	105	107	0.98	58	33.08	121	111	1.09
45	32.9	113	110	1.02	59	37.55	113	109	1.03
41	32.4	113	111	1.01	60	30.7	110	112	0.98
40	32.8	112	107	1.04	59	32.28	118	121	0.97
47	31.65	106	104	1.01	52	31.6	116	110	1.05
46	36.87	119	114	1.04	51	31.91	110	109	1
41	30.1	112	110	1.01	57	30.44	107	102	1.04
46	33.68	114	109	1.04	53	31	106	99	1.07
41	31	111	100	1.11	57	33.96	110	105	1.04
40	34.6	109	102	1.06	53	35.31	118	120	1
45	31.25	112	114	0.98	51	38.09	118	115	1.02
42	30.5	102	97	1.05	51	39.1	117	112	1.04
					60	31.1	122	116	1.05
					51	32.8	120	118	1.01

From these tables it is evident that obese subjects were prominent in both the groups, more so in the 50-60 years age group. BMI was increased in the obese males in both the age groups and the increase was statistically significant. W/H ratio was also increased in obese males in both the age groups and the increase was statistically significant (Table 3, 4 and 5).

Table 3: Mean ± S.D values for the obesity indicators

Adult males 40-50 years			Adult males 50-60 years		
Non-obese (n = 14)	Age	43.5 ± 3.3	Non-obese (n = 6)	Age	55.8 ± 3.9
	BMI	21.9 ± 1.4		BMI	23.5 ± 1.2
	W/H	0.88 ± 0.014		W/H	0.9 ± 0.009
Obese (n = 19)	Age	43.1 ± 2.9	Obese (n = 21)	Age	55.0 ± 3.5
	BMI	32.3 ± 1.9		BMI	33.8 ± 2.9
	W/H	1.0 ± 0.033		W/H	1.0 ± 0.032

Table 4: Comparison of Obesity indicators between non-obese and obese subjects

Groups	Parameters	Non-obese	Obese	T value	P value	Significance
40-50 Years	BMI	21.9 ± 1.4	32.3 ± 1.9	17.2850	<0.0001	Highly Significant
	W/H	0.88 ± 0.014	1.0 ± 0.009	29.9703	<0.0001	Highly Significant
50-60 Years	BMI	23.5 ± 1.2	33.8 ± 2.9	8.4003	<0.0001	Highly Significant
	W/H	0.9 ± 0.009	1.0 ± 0.032	7.4741	<0.0001	Highly Significant

Table 5: Comparison of Obesity indicators between 40-50 and 50-60 year age groups

Groups	Parameters	40-50 years	50-60 years	T value	P value	Significance
Non-obese	BMI	21.9 ± 1.4	23.5 ± 1.2	2.4335	0.0256	Significant
	W/H	0.88 ± 0.014	0.9 ± 0.033	1.9451	0.0676	Not Significant
Obese	BMI	32.3 ± 1.9	33.8 ± 2.9	1.9125	0.0634	Not Significant
	W/H	1.0 ± 0.009	1.0 ± 0.032	0.0000	1.0000	Not Significant

DISCUSSION

Obesity is one of the leading preventable causes of death worldwide. It is a strong risk factor for several major public health problems such as dyslipidemia, hypertension, glucose intolerance, inflammation, obstructive sleep apnea, hypoventilation, atherosclerosis, leading to substantial economic costs due to the increased use of health care facilities and other costs associated with disease, disability and death. A comparable finding was also reported by Rosmond *et al*. among middle-aged men.[5,6] BMI is a measure of relative weight and is largely independent of height. It can be used to estimate the prevalence of obesity within a population and the risks associated with it. The waist-to-hip ratio (W/H) is a better discriminator of subclinical disease than other common measures of obesity, such as body-mass index (BMI) or waist circumference alone.[7,8] W/H is an indexed value to lower body girth and provides a more precise assessment of relative central adiposity (visceral obesity) across the body sizes compared with waist circumference. Visceral obesity is associated with metabolic abnormalities that increase the risk of type 2 diabetes mellitus and atherosclerosis in the coronaries and the aorta. Normal reference value for W/H is <0.85 in females and <0.95 in males.[9-11] In this study, 31.7 % obese subjects in 40-50 years age group and 35 % obese subjects in 50-60 years age group had increased BMI and W/H ratio. These subjects though normotensive, are more prone to develop future obesity related complications. This pilot study was an attempt to find the percentage of population at risk among normal middle aged males and to educate them regarding the preventive strategies to be adopted for a healthy well-being.

CONCLUSION

The problem of obesity in the middle aged men >40 years warrants further research and efforts to prevent obesity. The rising prevalence in developing countries is a major public health problem and a population based prevention strategy to reduce overweight and obesity seems to be the most appropriate strategy to tackle the problem.

REFERENCES

1. Nishtar S. Prevention of coronary heart disease in South Asia. Lancet 2000; 360 (9338): 1015-1018. http://dx.doi.org/10.1016/S0140-6736(02)11088-9
2. Jousilahti P, Tuomilehto J, Vartiainen E, Pekkanen J, Puska P. Body weight, cardiovascular risk factors, and coronary mortality: 15 year follow-up of middle-aged men and women in castern Finland. Circulation 1996; 93: 1372-1379. http://dx.doi.org/10.1161/01.CIR.93.7.1372
3. Seidell JC. Obesity in Europe: scaling an epidemic. Int J Obesity 1995; 19(Suppl.3): S1-4.
4. Ravisankar P, Mohan M, Udupa K, Sankarnarayana EP. Correlation between BMI and blood pressure indices, handgrip strength and handgrip endurance in under weight, normal weight and over weight adolescents. Indian J Physiol Pharmacol 2005; 49(4): 455-461.
5. Puhl RM, Heuer CA. The stigma of obesity: a review and update. Obesity (Silver Spring) 2009; 17: 941–964. http://dx.doi.org/10.1038/oby.2008.636
6. Rosmond R, Lapidus L, Bjorntorp P. The influence of occupational and social factors on obesity and body fat distribution in middle-aged men. Int J Obesity 1996; 20: 599-607.
7. See R, Abdullah SM, McGuire DK, Khera A, Patel MJ, Lindsey JB *et al*. The association of differing measures of overweight and obesity with prevalent atherosclerosis. J Am Coll Cardiol 2007; 50(8): 752-759. http://dx.doi.org/10.1016/j.jacc.2007.04.066
8. Rodríguez A, Catalán V, Gómez Ambrosi J, Frühbeck G. Visceral and subcutaneous adiposity: are both potential therapeutic targets for tackling the metabolic syndrome? Curr Pharm Des 2007; 13(21): 2169-75. http://dx.doi.org/10.2174/138161207781039599
9. Sharma B, Mahajan H, Suryavamshi SR, Bhondve A. Assessment of Co-Morbidities and Self Esteem in Obese Population of Urban Slum of Mumbai. International Journal of Prevention and Treatment 2012; 1(4): 61-66. http://dx.doi.org/10.5923/j.ijpt.20120104.02
10. Suresh Nayak B, Suresh DR. Study of Body Mass Index and hypertensive status in adult males between 40-60 years. Res. Rev.: J. Med. Health Sci 2014; 3(2): 84-88.
11. Nirmitha D, Suresh DR. Significance of hs-CRP and Oxidative Stress as Early Novel Markers of Subclinical Atherosclerosis in Young Healthy Obese Males. J Biomed Sci and Res 2010; 2(3): 143-150.