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Review Article

Relationship between Cardiovascular Parameter and General and Visceral Obesity Indices- A Review

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Abstract: Obesity is a growing problem particularly in countries of Asia-Pacific region where individuals may exhibit a relatively normal BMI (<25 kg/m2) but have a disproportionately large waist circumference. Asian Indians have significantly greater total abdominal fat and visceral fat area compared with white Caucasians resulting in increased risks of metabolic disorders at much lower levels of BMI.
Keywords: Resting heart rate, Waist Circumference, Waist Hip ratio, Waist Stature ratio.

INTRODUCTION

Obesity is a leading preventable cause of death worldwide, with increasing prevalence in adults and children, and authorities view it as one of the most serious public health problems of the 21st century. In 2013, the American Medical Association classified obesity as a disease [1].

Obesity can be defined cluster of non-communicable diseases called "new world syndrome," creating an enormous socioeconomic and public health burden, mainly in developing countries. Obesity increases risk of various diseases like heart disease, type 2 diabetes, obstructive sleep apnoea, certain types of cancer, and osteoarthritis [2].

INCIDENCE & PREVALENCE

Before the 20th century, obesity was rare. In 1997 the WHO formally recognized obesity as a global epidemic. As of 2008 the WHO estimates that at least 500 million adults (greater than 10%) are obese, with higher rates among women than men. Once considered a problem only of high-income countries, obesity rates are raising worldwide and affecting both the developed and developing nations [3].

GENERAL VESSUS VISCERAL OBESITY

Throughout the Asia–Pacific region, there are differences in obesity prevalence and body fat distribution for example, South Asians (Indians) have a more centralized distribution of body fat, with thick trunk skin–folds and markedly higher mean WHR for a given level of BMI compared to Euripides [4].

Abdominal obesity is considered to be more dangerous than general obesity because the visceral fat has been shown to secrete certain cytokines and chemicals that are involved in atherogenesis and alterations in the autonomic balance. Visceral adipose tissue secretes a variety of bioactive substances, termed adipocytokines, such as leptin, tumour necrosis factor–α (TNF–α), interleukin–6 (IL–6), angiotensinogen, and non–esterified fatty acids (NEFA), which play a role in development of hypertension and metabolic syndrome [5]. These adipokines increase the production of reactive oxygen species in the brain, through activation of nicotine adenine di nucleotide hydrogen phosphatase oxidase, increasing the oxidative stress in rostral ventro laleral medulla, which determinates the basal sympathetic activity [6].

BMI should be considered as medically significant index for therapeutic intervention. But this measurement does not account for variation in body fat distribution and abdominal fat mass, which can differ greatly across populations and can vary substantially within a narrow range of BMI [7].

WC, WHR and WSR are good indicators of abdominal obesity. Increased WC represents increased abdominal fat or visceral fat. WHR represents the distribution of body fat in the abdominal region but it may remain the same when there is a change in body size because waist circumference and hip circumference can increase or decrease proportionately. WSR takes into consideration both the height and waist circumference and

the WSR will change only when there is a change in WC in grown up adults [8].

EFFECT OF OBESITY ON HEART RATE

In obesity, as excessive adipose tissue accumulates. It produces altered metabolic profile along with a variety of adaptations and alterations in cardiovascular function even in the absence of co–morbidities. Obese people have altered autonomic balance that could lead to elevated RHR and altered responses to postural changes.

Heart rate (HR) is an easy to measure but important indicator of cardiovascular health. A number of studies have linked an increase in resting heart rate to increased incidence of cardiovascular and non-cardiovascular mortality. Obese people tend to have increased Resting heart rate as autonomic responsiveness is diminish in obese individuals [9].

EFFECT OF OBESITY ON BLOOD PRESSURE

Overweight and obesity are associated with elevated blood pressure. The Framingham Heart Study showed that approximately 65% to 75% of overweight and obese patients are at risk for hypertension [10].

Concerning the mechanism relating obesity to hypertension, most obese humans have increased sympathetic activity. Moreover, most obese patients have hyper insulinemia, and it is well known that insulin stimulates sympathetic activity [11]. The renin-angiotensin-aldosterone system (RAS) has also been identified as an additional abnormality that can explain the association between obesity and hypertension [12].

Hirsch J. & his colleagues (1991) studied and indicate that heart rate increases with increase in percentage of body fat. A 10% increase in body weight is associated with a decline in parasympathetic tone accompanied by a rise in mean heart rate and conversely, heart rate declines during weight reduction [13].

A combination of factors including over activity of the sympathetic nervous system (SNS), insulin resistance, and abnormities in vascular structure and function may contribute to obesity-related hypertension [14].

WHR is the most useful measurement of obesity to use to identify individuals with CVD risk factors [15]. A waist-to-height stature (WSR) is a valid method for assessing accumulation excessive amount of upper body fat that poses a risk to health.

Talay Yar (2010) in his study shows that there is a significant positive correlation between obesity indices and RHR with the obese group exhibiting a significantly faster RHR compared to normal weight group. This continuous faster RHR in these young individuals exhibiting either abdominal obesity or general obesity could contribute to various cardiovascular problems later in life. Their findings strengthen the previously reported usefulness of RHR in providing an early sign of cardio-vascular risks in young adults. It further stresses the need to prevent obesity early in life to avoid life-threatening consequences in advancing age [16].

CONCLUSION

Thus a healthy life style, including dietary & physical activity modification can play an essential part in the battle against atherosclerosis, obesity & metabolic syndrome.

REFERENCES

1. Pollack, Andrew; A.M.A. Recognizes Obesity as a Disease. The New York Times. Archived from the original on June 18, 2013.
2. Haslam DW, James WP; Obesity. Lancet, 2005; 366 (9492): 1197–209.
3. Tsigosa Constantine; Hainer, Vojtech; Basdevant, Arnaud; Finer, Nick; Fried, Martin; Mathus-Vliegen; Management of Obesity in Adults: European Clinical Practice Guidelines". The European Journal of Obesity 2008; 1 (2): 106–16.
4. Mc Keigue P, Shah B, Marmot M; Relation of central obesity and insulin resistance with high diabetes prevalence and cardiovascular risk in South Asians. Lancet. 1991; 337: 382-386.
5. Katagiri H, Yamada T, Oka Y; Adiposity and cardiovascular disorders: disturbance of the regulatory system consisting of humoral and neuronal signals. Circ Res 2007; 101(1):27–39.
6. Hirooka Y, Sagara Y, Kishi T, Sunagawa K; oxidative stress and central cardio vascular regulations. Cir J, 2010; 74: 827–35.
7. World Health Organization. Obesity – Preventing and Managing the Global Epidemic: Report of a WHO Consultation on Obesity. Geneva: World Health Organization, 1998.
8. Ashwell M, Hsieh SD; Six reasons why the waist-to-height ratio is a rapid and effective global indicator for health risks of obesity and how its use could simplify the international public health message on obesity. Inj J Food Sci Nutr, 2005: 56(5): 303-7.
9. Cole, Christopher R, Blackstone, Eugene H, Pashkow, Fredric J, Snader, Claire E, Lauer Michael S; Heart-Rate Recovery Immediately after Exercise as a Predictor of Mortality". New England Journal of Medicine, 1999; 341 (18): 1351–7.
10. Whitlock G, Lewington S, Sherliker P; Body-mass index and cause-specific mortality in 900 000 adults: collaborative analyses of 57 prospective studies. Lancet 2009; 373 (9669): 1083–96.
11. Landsberg L; Insulin resistance and the metabolic syndrome. Diabetologia, 2005; 48(7): 1244–1246.
12. Rossi GP, Belfiore A, Bernini G; Body mass index predicts plasma aldosterone concentrations

in over weight obese primary hypertensive patients. Journal of Clinical Endocrinology and Metabolism, 2008; 93(7): 2566–2571.

13. Hirsch J, Leibel RL, Mackintosh R, Aguirre A; Heart rate variability as a measure of autonomic function during weight change in humans. Am J Physiol. 1991; 261:1418-23.
14. Sorof J, Daniels S; Obesity hypertension in children: a problem of epidemic proportions. Hypertension 2002; 40: 441-7.
15. Dalton M, Cameron AJ, Zikmmet PZ , Shaw JE; Form the International Diabetes and school of health science Deakin University Melbourne. Waist circumference, waist-hip ratio and body mass index and their correlation with cardiovascular disease risk factors in Australian adults Journal of Internal Medicine, 2003; 254:555-563.
16. Talay Yar University of Damman, Damman, Soudi Arabia. Resting Heart rate and its relationship with general and abdominal obesity in young male Saudi University Students Pak J Physiol ,2010; 6(1).