A non-pharmacological diagnostic approach to study correlation between anthropometric indices and lipid profile in adult females-A review

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Abstract

The prevalence of dyslipidaemia has increased manifold in the industrialized, developed and the developing countries to an extent that it is becoming an escalating epidemic. Obesity, an important risk factor of dyslipidaemia, places individuals at risk of various chronic diseases such as Diabetes Mellitus, Hypertension and Cardiovascular diseases especially in females. However, because of the difficulty in obtaining accurate measures of body fatness in the population, measures of height and weight have been widely used to identify overweight and obesity. Obesity is currently defined using Body Mass Index. Body Mass Index is the most frequently used measure of obesity because of the ease of the measurement of height & weight and the widespread use of their measurements in large scale health surveys. Body Mass Index does not, however, measure the proportion of weight which is related to increased muscle or the uneven distribution of abnormal excess fat within the body, which seriously affect the health risks associated with overweight and obesity. It is a good but not a perfect surrogate for body fatness. For the above mentioned reason, a measure of obesity and overweight that takes in to account increased incidence of obesity related morbidity because of accumulation of abdominal and visceral fat is more desirable. Waist Hip Ratio & Waist Circumference are significantly associated with the incident Cardiovascular disease events and these simple measures give a better measure of abdominal & visceral fat & hence serve as better indicators of a deranged lipid profile and the adverse effects of the same.

Keywords: Anthropometry, BMI, WC, WHR, Dyslipidaemia, Obesity.

Introduction

Cardiovascular diseases (CVD) constitute one class of common contributors to morbidity and mortality worldwide.[1] Of the many risk factors for the development of CVD, age, gender, family history and genetic inheritance are un-modifiable, while smoking, physical inactivity, poor diet, obesity, and dyslipidaemia are modifiable.[2-3] Prevalence of overweight and obesity has dramatically increased in developing countries and is related to cardiovascular risk factors.[4]

Obesity is a major independent risk factor for hypertension. The performance of different anthropometric measurements and indices in predicting obesity-related outcomes has been addressed in several reports.[5-8]

There is a general increasing trend in dyslipidaemia with increasing obesity, in both males and females, in many communities.[9-16] Many will be unaware of the risk factors associated with dyslipidaemia and may patients will be on different drugs for conditions like obesity, diabetes, hypertension etc. in especially females who are housewives. Many practitioners and health care workers will not be much aware about the non-pharmacological diagnostic approach correlating anthropometric indices with Lipid profile in adult females. Hence this study was undertaken with an objective to determine correlation between anthropometric indices and Lipid profile in adult females.

Dyslipidaemia is one of the most important known and modifiable risk factor for the development of coronary artery disease and other complications. Obesity, being one of the important reversible causes of dyslipidaemia, is simply a condition of excess body fat. This study was done to correlate simple anthropometric measurements with lipid profile parameters and hence to signify the importance of implementing anthropometry in routine screening procedures.

In a study done by X Zhang, XO Shu, Y- T Gao, G yang et al., "Anthropometric predictors of coronary heart disease in Chinese women", it was concluded that, Waist Hip Ratio was positively associated with the risk of Coronary Artery Disease in both younger and older women, while other anthropometric indices, including Body Mass Index, were related to Cardiovascular disease risk primarily among younger women.[17]

In another study done by A Esmaillzadeh, P. Mirmiran & F. Azizi, it was concluded that Waist Hip Ratio, as compared to Body Mass Index, Waist Circumference & Waist Hip Ratio, may be a better indicator of cardiovascular risk factors.[18]

In my study, Body Mass Index, Waist Circumference & Waist Hip Ratio& lipid parameters were high in subjects in the age group of 40-59 years, which shows that menopause has great effect of body fat and lipid profile. Waist Hip Ratio which measures central & abdominal obesity is thus a better predictor of dyslipidemia and its observed consequences. In a study done by Crystal Man Ying Lee, Rachel R. Huxely, Rachel P. Wildman et al, it was concluded that measures of centralized obesity proved superior over Body Mass Index for detecting cardiovascular risk factors in both men &women.[19] In another study done by John B. Dixon, Boyd J.G.Strauss, Cheryl Laurie et al, it was said that smaller hip and larger waist circumference is

associated with Dyslipidemia & the Metabolic Syndrome in obese women.[20]

In a study done by Fu-Ling Chu, ChungHuei Hsu &Chi Jeng on premenopausal taiwanese women it was concluded that Waist Hip Ratio had the best performance in predicting hypertension and Diabetes Mellitus.[21]

Liu, Pengju BM, Ma, Fang MS et al, in a study "Utility of obesity indices in screening Chinese post-menopausal women for metabolic syndrome" concluded that Waist Hip Ratio and Waist Height Ratio are the best indicators of Metabolic Syndrome development. It was also said in that study that a Waist Hip Ratio of 0.85 or higher should be incorporated in to the identification of metabolic syndrome risk in Chinese post- menopausal women.[22]

The utility of Waist Hip Ratio as an effective screening measure of obesity has been observed in a study done by Farzard Hadaegh, Azadeh Zebetian, Hadi Harati & Feridoun Azizi in which it was revealed that a high Waist Hip Ratio& general obesity is the important predictors of Type-II Diabetes Mellitus.[23]

A similar finding was observed in a study done by Prabhdeep Kaur, Ezhil Radhakrishnan, Suresh Sankarasubbain et al, in which it was concluded that Waist Hip Ratiowas the best predictor of Type-II Diabetes Mellitus& that it should be used as a routine measurement along with Body Mass Index for screening.[24]

A study in which Body Mass Index & Waist Hip Ratio was compared as a risk of Hypertension, which was done by Carlos A Feldstein, Maia Akopian, Antonio O, Oliveri et al, it was observed that Waist Hip Ratio offers additional information beyond Body Mass Index & Waist Circumference to predict the hypertension risk.[25]

Waist Hip Ratio is a more reliable tool than Waist Circumference when ethnic differences are taken into account. In such a situation, Waist Hip Ratio proves superior. In a study done by V M Herrera, J P Casas, J J Miranda, P Perel, R Pichardo et al, it was concluded that Waist Hip Ratio was the most accurate anthropometric indicator to screen for high risk Coronary artery disease in the presence of inter- ethnic differences. It was also seen that Body Mass Index was almost uninformative & Waist Circumference was less reliable.[26]

In a study done by Azza Farrag, Amr Hassan, Basem El Zarief, Dalia Ahmad &Amal Al Haj, it was demonstrated that Waist Hip Ratio had the best association with Coronary artery disease severity.[27]

In another study done by Sunil Gupta & Anjali Kapse," Lipid profile pattern in diabetes from central India", it was seen that Waist Hip Ratio was a better marker of dyslipidemia than Body Mass Index.[28]

Some studies have said that Waist Circumference is a better predictor of lipid profile, for eg, in a study done by Lemos Santos, J. Valente et al, it was seen that Waist Circumference was a good predictior of lipid profile compared to Body Mass Index and Waist Hip Ratio.[29] In another study done Lemieux S, Prud`Homme A et al, it was suggested that changes in visceral adipose tissue accumulation that occur with age in women are better predicted by changes in waist girth or sagittal diameter than by changes in Waist to Hip Ratio. But studies conducted on Asian population do not confirm this finding.[30-35]

Several factors may account for the discrepancy in findings. Firstly, the predictive power of Waist Circumference is population dependent, secondly it also varies from race to race. A study done by Lear et al, also reported that ethnic descent modifies the relationship between Waist Circumference& metabolic risk factors. Although most studies showed that Waist Circumference may be a better reflection of the accumulation of visceral fat than Waist Hip Ratio, it should be noted that Waist Hip Ratio has been introduced as an appropriate index for evaluation of chronic disease risk &it has been suggested that an increased Waist Hip Ratio may reflect both relative abundance of abdominal fat (increased Waist Circumference)and a relative lack of gluteal muscle (decreased hip circumference).Waist Hip Ratio not only shows body fat distribution but also reflects most of the lifestyle related factors of a person. It is also independently associated with cardiovascular risk factors.[33-35]

Therefore, using Waist Hip Ratio as a screening measure could definitely provide much more useful information to identify subject with cardiovascular risk factors.

The principal limitation of my study is that it was done on a smaller population and also the fact that the causes for dyslipidaemia are multi factorial. So, besides anthropometric measures other factors like heredity & life style changes should also be considered.

A small amount of error can be attributed to the measurements of Waist Circumference & Waist Hip Ratio done on extremely obese subjects, in whom the exact site of waist and hip circumference become difficult to measure. However, the problem with the measurement of Waist Circumference & Waist Hip Ratio are restricted to the very obese population, for whom further investigation of dyslipidaemia & other Cardiovascular disease risk factors is done as a routine in any case .Therefore, considering that measurement of obesity in the clinical setting is usually conducted primarily to inform further investigations, these measurements(Waist circumference & Waist Hip Ratio) can be easily used to screen people for dyslipidaemia & obesity related complications.

Conclusion

To conclude, Waist Hip Ratio was a better indicator of dyslipidaemia when compared to WC and BMI. WHR had the highest correlation signifying the importance of measuring abdominal and visceral fat in predicting dyslipidaemia and associated complications. It can be used as an effective screening tool to predict

dyslipidaemia and the grave complications which it can lead to.

Females in the younger age group can also increase physical activity, practice yoga and adjust dietary intake to prevent overweight and obesity and hence the complications like Dyslipidaemia, Diabetes Mellitus, Hypertension, Cardiovascular disease, Polycystic ovarian syndrome etc., which are prone to occur in obese adult females.

Finally, it can be said that obesity is a health epidemic across the world and we have a responsibility as a society to do all we can to promote good nutrition, healthy eating and physical activity so that we can stop the rising trend.

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