International Journal of Science and Healthcare Research
Vol.5; Issue: 1; Jan.-March 2020
Website: ijshr.com
Original Research Article *ISSN: 2455-7587*

"Visceral Fat for Miserable Life"!! - Determinants of Increased Waist Circumference among College Age Population

V. Bhavani[1], N. Prabhavathy Devi[2]

[1]Dietician, ESIC Medical College and Hospital, KK Nagar, Chennai, India
[2]Assistant Professor, Queen Marys College, Chennai, India

Corresponding Author: V. Bhavani

ABSTRACT

Background: India was always focused for "undernutrition" and poverty with poor health status. Recently, India is undergoing a greater transition phase in nutrition. Obesity can be noted as the initial wave of a defined group of non-communicable diseases called **"New World Syndrome,"** generating a huge socioeconomic and public health burden in low and middle income countries

Aim: To study the factors contributing to the increased waist circumference among the study population

Materials and Methods: About 1000 samples were selected using stratified and simple random sampling technique. Waist circumference and hip circumference were measured for the subjects using appropriate methods. Interview schedule was used to collect the details. Food frequency questionnaire was used to collect the food consumption pattern. The obtained details were coded and subjected to statistical analysis. The required data were correlated.

Results and Discussion: Our study clearly showed the lower intake of wheat, ragi, oats, and barley. The lower intake of above mentioned cereals has an effect of increased waist circumference among the study group with the correlation value of -0.231, -0.103,-0.189 and -0. 137 and it is also statistically significant ($p<0.001$). Chocolates, sweets and carbonated beverages are positively associated with increased waist circumference ($p<0.001$). Physical inactivity and eating energy dense food during watching television become reasons for increased BMI and waist circumference in our study. a strong significant positive correlation was observed between the BMI and waist circumference (0.679, $P<0.001$), Hip Circumference (0.795, $P<0.001$) and waist to hip ration (0.168, $P<0.001$).

Conclusion In order to prevent diabetes and cardiovascular diseases, waist circumference must be normal. Thus it is essential to consume fiber and antioxidant rich foods and avoid consuming sugar loaded foods and other empty calorie foods.

Keywords: Metabolic Syndrome, BMI, Waist Circumference, Antioxidant, Diabetes, Television watching

INTRODUCTION

India was always focused for "undernutrition" and poverty with poor health status. Recently, India is undergoing a greater transition phase in nutrition. Interventions have to be taken to understand this phase of transition and reduce its prevalence because obesity has an ability to cause diseases that reduce the life expectancy of an individual[1]. Obesity is defined as an "abnormal growth of the adipose tissue due to an enlargement of fat cell size (hypertrophic obesity) or an increase in fat cell number (hyper plastic obesity) or a combination of both"[2]. It is more prevalent form of malnutrition in both developed as well as many developing countries. Commonly, obese are at more risk of man-made disease or health conditions such as hypertension, type 2 diabetes mellitus, cardiovascular (CVS) diseases, stroke, gall bladder disease,

osteoarthritis, sleep apnea and respiratory problem and certain types of cancers (breast, colon, endometrial). Basically, active individuals require more calories compare to less active ones. It is believed that obesity increases in the last 25 years of life, due to decreased level of physical activities in everyday life[3]

Obesity can be noted as the initial wave of a defined group of non-communicable diseases called **"New World Syndrome,"** generating a huge socioeconomic and public health burden in low and middle income countries[4]**.** Obesity is often expressed in terms of BMI is a measure of weight adjusted for height. Though several techniques are available to evaluate body fat, the variables for BMI are simple to measure. The value of BMI has been identified to be closely correlated with body fat in adults and children.

Waist circumference and waist-to-hip ratio are common adjuvant measures for classification of body fat distribution in people who are overweight, since obesity-related complications are closely related to abdominal fat distribution.

Consumption of refined carbohydrates, high fatty foods, and markers of metabolic syndrome all have been related to alterations in cognitive functions (possibly lower academic performance) through hippocampal and frontal lobe volume loss and dysfunction. This dysfunction may be attributed to inflammation of neurons, oxidative stress leading to blood–brain barrier damage, and/or abnormal lipid metabolism in central nervous system. A Norwegian study among 2,432 adolescents aged 15–17 years demonstrated that a regular meal pattern, consumption of healthy foods, and regular physical activity were all related to high odds of high academic performance in contrast to decreased odds of high academic achievements in adolescents consuming unhealthy foods, beverages, and smoking[5]**.**

Consumption of carbonated drinks was reported to be high among the male students whereas the consumption of sweets and pastries was higher among female medical students. There was no significant difference among both genders with respect to the consumption of coffee/tea and fruit juices[6]**.**

Studies have shown that increasing trend the fast food consumption among college students. This may be attributed to many factors including the following: spending time with friends, staying away from home for long periods of time, pressure of studies, ease of fast food availability combined with limited choices of availability of healthy foods in the universities in addition to the influence of mass media[7]**.**

The sedentary habits in terms of median hours of gadget usage were similar to studies from Iran and India. With growing affluence and a dramatic increase in TV watching and laptop usage documented in India, it is more likely to observe more sedentary habits among adolescents[6]**.** The world is facing an epidemic of non-communicable diseases, and lack of physical activity is a major risk factor for these diseases. It is estimated that lack of physical activity causes 1.9 million deaths worldwide. As per WHO estimates, 80% of premature heart diseases as well as incidence of diabetes could be well prevented by a strategy of combined healthy diet, physical activity and avoidance of tobacco.

MATERIALS AND METHODS

Adopting stratified and simple random sampling, 1000 college students in the age group of 19-22 years were selected from Chennai city, Capital of the southern state Tamilnadu, India. Ethical clearance was obtained to conduct the study, permission from college authorities and consent from students to participate in the study was also obtained. After all these preliminary procedures, research was commenced. Waist circumference and Hip circumference of the study population was obtained.

a.Waist Circumference:

Waist circumference can be obtained by measuring the smallest area below the rib cage and above the umbilicus (belly button) with the use of the non-stretchable tape measure. This measurement can be used to assess the abdominal fat content [8].

b.Hip Circumference:

The hip circumference should be measured as the maximal circumference over the buttocks. Grid lines on a mirror can be used to verify horizontal position of the tape all around the body. Participant must be made to stand with feet fairly close together (about 12-15 cm apart) with weight equally distributed on each leg. The participant is asked to breathe normally and the reading of the measurement should be noted down at the end of gentle exhaling. The tape should be let loose enough to allow the observer to place one finger between the tape and the subject's body.

Waist to Hip Ratio

Waist-Hip Ratio or Waist-to-Hip Ratio (WHR) is the ratio of the circumference of the waist to circumference of the hips. WHR has been used as a potential indicator of health of an individual and marker of developing serious health ailments. Research literature show that individuals with "apple-shaped" bodies (more weight distributed around the waist) face more health risks compared to "pear-shaped" bodies who carry more weight around the hips. The WHR is used as a measurement of obesity which also is a potential indicator of serious health issues. WHO steps state that abdominal obesity can be defined as a waist-to-hip ratio above 0.90 for males and above 0.85 for females, or a body mass index (BMI) above 30.0. The National Institute of Diabetes, Digestive and Kidney Diseases (NIDDK) states that women with waist-to-hip ratios of more than 0.8, and men with more than 1.0, are prone to a greater health risk because of their fat distribution[9]

Interview schedule was used to collect the background details and the television viewing habits of the participants. Food frequency questionnaire was used to collect the intake pattern of the subjects. The Food Frequency Questionnaire (FFQ) is a retrospective review of intake frequency, that is, food consumed per day, per week, and per month. The FFQ is an advanced form of the checklist in dietary history method, and asks respondents how often and how much food they ate over a specific period. Presenting about 100 to 150 foods, food frequency questionnaire takes 20-30 minutes to complete and can self-administered or collected via interview. This method enables the assessment of long-term dietary intakes in a relatively simple, cost-effective, and time-efficient manner

After collecting the required details, data are coded in excel and subjected to statistical analysis using SPSS Version 20.0. Food frequency data and waist circumference data were correlated and the results were interpreted.

RESULTS AND DISCUSSION

Table-1: ***Effect of food on Waist Circumference***

Food Items	Correlation coefficient	P value
Wheat	-0.231	<0.001**
Ragi	-0.103	0.001**
Maida	0.447	<0.001**
Barley	-0.189	<0.001**
Oats	-0.137	<0.001**
Vanaspathi	0.318	<0.001**
Root Vegetables	0.411	<0.001**
Traditional fried foods	0.416	<0.001**
Packet foods	0.474	<0.001**
Chocolate	0.330	<0.001**
Carbonated beverages	0.388	<0.001**
Sweets	0.299	<0.001**
Chats	0.400	<0.001**
Noodles	0.438	<0.001**
Parota	0.429	<0.001**

Note: ** denotes 1% level significance

The above table witnessesed the effect of various foods on increased waist line of the study population. Wheat, ragi, barley, and oats are the whole grains loaded with micronutrients. Because their high fiber property, they are well known as complex carbohydrate rich grains. The complex carbohydrate adds satiety to the consumers. This satiety nature of soluble fiber present in whole grains helps in reducing BMI and waist circumference of

the individual. Our study clearly showed the lower intake of wheat, ragi, oats, and barley. The lower intake of above mentioned cereals has an effect of increased waist circumference among the study group with the correlation value of -0.231, -0.103,-0.189 and -0. 137 and it is also statistically significant ($p<0.001$). A study conducted by ***Fulqoni*** showed that oat meal consumers had lower body weight, waist circumferences and body mass indices. Inversely maida or white flour intake increases the waist circumference of the study group with the correlation coefficient value of 0.447 and also statistically significant ($p<0.001$)[10]. A study conducted by ***Hyun Joon Shin*** showed the consumption of instant noodles more than twice a week was linked to the prevalence of metabolic syndrome in women[11] .

It is not surprising to note that traditional fried foods, packet fried foods, and chat items increase the waist line of the individuals. They are loaded with fat, carbohydrates, and sodium. The correlation coefficient values of traditional, packet foods, and chat items were 0.416, 0.474 and 0.400 respectively, which is also statistically significant ($p<0.001$).

Chocolates, sweets and carbonated beverages are positively associated with increased waist circumference ($p<0.001$). The above mentioned items are rich in calories, fat, and simple carbohydrates and are also deficient in fiber. The high calorie property of these foods increases the BMI as well as waist circumference. The correlation coefficient value found to be 0.330, 0.299 and 0.388 for chocolates, sweets and carbonated beverages respectively. A similar study conducted by ***Sundborn,*** reveled that waist circumference was significantly associated with soft drink consumption ($p<0.05$)[12].

In the present study, a positive association also found between vanaspathi intake and waist circumference (CR=0.318, $p<0.001$), root vegetables and waist circumference (CR=0.411, $p<0.001$). ***Halkajaer*** showed no association between intake of potatoes and waist circumference but in a similar cohort study, an increase of 0.1 cm in waist circumference over 5 years was observed in women for each increase in potato intake of 60 kcal/day[13] .

Table-2: ***Effect of Television watching on Waist circumference***

TV Watching		Mean Waist Circumference	SD	t value	P value
Watching TV for more than 2 hours	Yes	28.76	4.0	4.535	<0.001**
	No	27.41	3.82		
Eating and watching TV	Yes	29.31	4.12	5.601	<0.001**
	No	27.61	3.4		

Note: ** denote 1% level significance

Our study noted the increased waist circumference with the television watching patterns of the individuals. When it was analyzed, the mean waist circumference found to be 28.8 inches among those who have a habit of watching television for more than 2 hours whereas waist circumference of 27.4 inches have been reported among those who do not watch television for more than two hours. It is also statistically significant ($p<0.001$) with the t value of 4.535. During Television watching, the individuals are forced to sit in front of the screen thereby reducing the physical activity which pays the way for increased BMI and waist circumference. ***Lee smith*** also showed a significant association between watching TV for more than 6 hours per day and central obesity[14].

Consumption of food while watching television had become a habit nowadays. Physical inactivity and eating energy dense food during watching television become reasons for increased BMI and waist circumference in our study.

Television watching generally involves prolonged period of sitting and has been found to influence dietary habits by encouraging increased consumption of energy dense foods[14].

Table-3: ***Association of BMI with Waist Circumference, Hip Circumference and Waist to Hip Ratio***

BMI	Anthropoemetric Measurements	Correlation Coefficient	P value
	Waist Circumference	0.679	<0.001**
	Hip circumference	0.795	<0.001**
	Waist to Hip Ratio	0.168	<0.001**

Note: ** denotes 1% level significance

In the current study, a strong significant positive correlation was observed between the BMI and waist circumference (0.679, P<0.001), Hip Circumference (0.795, P<0.001) and waist to hip ration (0.168, P<0.001). The above data clearly reveal that subjects with increased BMI had higher waist circumference, hip circumference and waist to hip ratio.

Waist circumference and waist-to-hip ratio were both found to be more strongly associated with the risk of myocardial infarction than BMI in the INTERHEART study, a retrospective case control study covering 52 countries and 27,000 subjects[15].

CONCLUSION

Waist circumference is the one of the criteria and also vital criteria for metabolic syndrome. Thus it is very important to reduce the waist circumference among the population. Our study clearly revealed that physical inactivity like television watching and consumption energy densed food intake like carbonated beverages, sweets, noodles, fried items, chats, parota, maida increases the waist circumference. Our study also reported that low intake of whole grains like wheat, barley, oats among the subjects who had more waist circumference. High sugar and fat intake increases the waist circumference thereby raise the chance for metabolic syndrome and other non communicable disease. In order to prevent diabetes and cardiovascular diseases, waist circumference must be normal. Thus it is essential to consume fiber and antioxidant rich foods and avoid consuming sugar loaded foods and other empty calorie foods.

REFERENCES

1. Premlal, KS., Balaji Arumugam., Saranya Nagalingam., (2016). Prevalence of overweight and obesity among college going students at Kanchipuram Town, Tamilnadu. International Journal of Preventive and public health sciences, 1(6) : 15-19.
2. Jagannath S, Shete., Anjali V, Wagh., (2018). A cross sectional study to estimate prevalence of obesity and its risk factors in adolescent school children in Western Maharashtra, India. International Journal and research in Medical Sciences, 6(9):3072-3075.
3. Sohel Memon., Vineeia Nekhanti., Ravianandan, AR., Srinivasan , R., Apoorna Devi, Sanjay Sharma., (2015). Screening of college students for obesity. Asian journal of Pharmaceutical and chemical Research, 8 (12): 88-89.
4. Dhanuraja, V., Gopalakrishnan, S., Umadevi, R., (2017). A study on prevalence and determinants of overweight / obesity among medical college students in Kancheepuram district, TamilNadu, India. National Journal of Research in Community Medicine, 6: 033-036.
5. Rajeshwari Arasegowda., Asharani, N., Pranit Mukharjee., Alliya Nusrath., (2016). Assessment of dietary trends and its impacts on academic performance among young adult medical students of a tertiary care teaching hospital. International Journal of Medical Science and Public Health, 5(11):2346 - 2350.
6. Saranya, SV., Chythra R, Rao., Sravan C, Kumar., Veena kamath., Asha Kamath., (2016). Dietary habits and physical activity hospital in South India: A descriptive analysis. Tropical Journal of Medical Reseach, 19(2): 172-177.
7. Nora Nasir Al Hassan., (2015). The Prevalence of Iron deficiency anemia in a Saudi University female students. Journal of Microscopy and ultra structure, 3(1):25-28.
8. Kathleen Mahan, L., Sylvia Escott Stump., (2000). Krause's Food, Nutrition and Diet Therapy. 11th edition. USA: Saunders Publication.
9. Kankana De., (2017). Waist circumference, waist-hip ratio and Body Mass Index in

assessing nutritional status and central obesity of adolescents. Global Journal of Archaelogy and Anthropology, 1(1): 1-4

10. Fulqoni, VL., Chu, Y., Oshea, M., Slavin, JL., Di Rlenzo, MA., (2015). Oatmeal consumption is associated with better diet quality and lower BMI adults. The National Health and Nutrition examination survey, 2006-2010.
11. Hyun Joon Shin., Eunyoung cho., Haeo Jeung Lee., Teresa T, Fung., Eric Rumm., Bernard Rosner., Joann E, Manson., Kevin Wheelan., Frank B, Hu., (2014). Instant noodle intake and dietary patterns are associated with distinct cardiometabolic risk factors in Korea. The Journal of Nutrition, 144(8):1247-1255.
12. Sundborn, G., Utter, J., Teevale, T., Metcalf, P., Jackson, R., (2014). Carbonated beverages consumption among Newszland Youth and association with BMI and waist circumference. Pac Health Dialog, 20(1):81-6
13. Halkajaer, J., Tjonneland, A., Overvad, K., Sorensen., (2009). Dietary predictors of 5 year changes in waist circumference. J Am Diet Association, 109:1356-66.
14. Lee Smith., Abigail Fisher., Mark Hamer., (2015). Television viewing tune and risk of incident obesity and central obesity: The English longitudinal study of ageing. BMC Obesity 2:12.
15. Yusaf, S., Hawken, S., Ounpuu, S., (2005). Obesity and the risk of myocardial infarction in 27000 participants from 52 countries: a case-control study. Lancet, 366: 1640-9.

How to cite this article: Bhavani V, Devi NP. "Visceral fat for miserable life"!! - Determinants of increased waist circumference among college age population. International Journal of Science & Healthcare Research. 2020; 5(1): 49-54.

******