International Journal of Contemporary Pediatrics
Gornale VK et al. Int J Contemp Pediatr. 2015 Nov;2(4):317-320
http://www.ijpediatrics.com
pISSN 2349-3283 | eISSN 2349-3291
DOI: http://dx.doi.org/10.18203/2349-3291.ijcp20150913

Research Article

A study of effect of physical activity quotient on central obesity (waist hip ratio) in adolescent girls and boys of central India

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Received: 12 May 2015
Revised: 18 August 2015
Accepted: 24 September 2015

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ABSTRACT

Background: Malnutrition not only refers to undernutrition but also indicates over nutrition in form of obesity. Obesity in childhood, a predisposing factor for obesity in adult hood is on rise. Various factors are like urbanization, technology based sedentary life style, high-fat, high-sugar junk food consumption, increasing purchasing power, lack of exercise, excessive TV viewing are considered responsible for it. Level of physical activity has an implication over obesity. This study has been carried out to identify correlation between obesity and physical activity. The objective of the study was to correlation between physical activity and obesity.
Methods: The present study was a prospective, cross sectional, observational, cohort study and was undertaken in private sector secondary school in Rewa. 250 school going girls/boys of 11th and 12th standard selected on random basis. Body mass index and physical activity questionnaire score (PAQs) were recorded.
Results: Girls and boys with abnormal WHR indicating obesity were 10% each. Abnormal WHR was found to be significantly associated with saturated fat consumption. A better correlation was found between WHR and physical activity level.
Conclusions: More objective testing of physical activity may be undertaken in place of or in conjunction with self-reported assessment. Measurement of WHR should be considered more sensitive indicators of obesity as these are also better correlates of CVD.

Keywords: Obesity, Waist hip ratio, Physical activity questionnaire

INTRODUCTION

India is a vast country having different population groups. We are having significant proportion of malnourished children in our country and at other end of this spectrum, number of obese children is also on rising trend because of various factors like - urbanization, technology based sedentary life style, high-fat, high-sugar junk food consumption, increasing purchasing power, lack of exercise, excessive TV viewing etc. Obesity in childhood is an important risk factor for obesity in adulthood and up to 80% of them become obese adults.[1]

In a study by Marijana Bosnar-Puretic et al it was found that obesity was associated with cerebrovascular disease in young adults.[2] Being overweight increases the risk of cardiovascular disease (CVD).[3,4]

There is strong need for studies related to physical activity and obesity, and recommendation to prevent it so as to control future complications related to it. The present study has been undertaken to study correlation of physical activity and obesity in adolescent boys and girls of central India.

METHODS

Design and setting

The present study was a prospective, cross sectional, observational, cohort study and was undertaken between June 2011 to September 2011 in a private sector secondary school of Rewa (central India) catering to mostly middle and high income group children.

Study population

Participants

250 school going girls/boys of 11thand 12thstandard selected on random basis.

Data collection

Waist-hip ratio

It is the ratio of the circumference of the waist to that of the hip. The waist-to hip ratio was calculated using the formula, WHR = waist circumference (cm) / hip circumference (cm).

World Health Organization has reported that waist-to hip ratio of more than 0.85 for girls and more than 0.9 for boys is considered as obesity.[5] National nutrition survey of Australia (1995) says that WHR greater than 0.9 in men and 0.85 in women is considered to be of concern.

Physical examination

A detailed pretested questionnaire was filled under following heading-

1. Personal data regarding age, religion, residence, maternal and paternal education including sibling illness.
2. Physical examination was done by the Investigator.
3. Questions regarding their physical activity, food habits, diet, family and siblings were asked and entered in proforma.

Physical activity questionnaire score (PAQs)

The PAQ-A is a self-administered, 7-day recall instrument. It was developed to assess general levels of physical activity for high school students in grades 9 to 12 and approximately 14 to 19 years of age (PAQ-A Bailey[6], Kowalski & McGrath[7]). The PAQ-A can be administered in a classroom setting and provides a summary physical activity score derived from eight items, each scored on a 5-point scale. The PAQs' measurement of general physical activity levels is one of its strengths because it is difficult to precisely measure intensity, frequency, and duration of young people's activities, especially with self-report (Kowalski, Crocker, & Faulkner) The PAQ-A is cost and time efficient, easy to administer to large-scale populations, and display normal distribution properties.[7]

Dietary Information is recorded by last 24hr recall method.

Data analysis

The information thus obtained has been arranged systematically and tabulated in Master Chart. The data was analysed statistically. We used XP version of Microsoft Office as software and Windows XP as operating system for documenting information and analysis of data.

RESULTS

In present study 10% of girls and 10% boys have abnormal WHR indicating obesity, abnormal WHR was associated with consumption of Saturated Fat. No statistical difference is observed in relation to non-vegetarian and junk food consumption. According to WHR, truncal adiposity was present in 10% of adolescents. In our study, WHR had better correlation with PA level. Those adolescents who had high level of PA had normal WHR longitudinal study i.e. in centrally obesity group of WHR adolescent having ≤4 of PAQs no one scored.[5]

In centrally obesity group of WHR adolescent having ≤4 of PAQs no one scored 5.

DISCUSSION

Adolescence is a time when independence is established & dietary & activity pattern may be adopted that is followed for many years. The prevalence of overweight and obesity in young people is increasing exponentially and is now of pandemic proportions. Childhood obesity is multifactorial, involving genetic, social, cultural, and environmental components.

PAQ-A devised by Kowalski, Crocker and Kowalski[7], from Canada is administered in a classroom setting and provides a physical activity score derived from nine items, each scored, on 5 point scale has been used as a tool in this study. This tool has been used extensively in research to assess the level of physical activity in relation to various other parameters in our study we have tried to, correlate level of physical activity with waist hip ratio. Silventoinen et al; Yalcin et al have suggested that waist-to-hip ratio is also independent risk factor of cardiovascular disease for both sexes especially in female.[8,9] Although importance of blood pressure as a risk factor in cardiovascular disease is well established (Gardner and Poehlman, Badaruddoza, Gerber and Stern), however, how blood pressure is influenced by different factors such as WHR, BMI, adiposity and environmental factors is the key for the understanding of coronary diseases.[10-12]

Badaruddoza et al found waist circumference is highly correlated with SBP and MBP whereas, BMI has been found highly correlated with only DBP.[13]

In present study 10% of girls and 10% boys have abnormal WHR indicating obesity, abnormal WHR was associated with consumption of Saturated Fat. No statistical difference is observed in relation to non-vegetarian and junk food consumption. M. Neovious et al have reported that WHR is less useful diagnostic test for detection of obesity whereas Tailer et al from New Zealand concluded waist circumference, WHR, Conicity Index provide a simple yet effective measure to truncal adiposity in children and adolescents.[14,15] Another study from Punjab, India, Baddrudoza reports that there is a good correlation of WHR with systolic and diastolic blood pressure and obesity.[16] In our study WHR had better correlation with PA level those adolescents who had high level of PA had normal WHR longitudinal study.

Table 1: Baseline characteristics of study group in relation to waist hip ratio.

Subject profile	Waist hip ratio		Total
	Normal	Central obesity	
Gender			
Male	153(68%)	17(68%)	170
Female	72(32%)	8(32%)	80
Locality	131(58.20%)	16 (64%)	147
Urban	94(41.80%)	9(36%)	103
Periurban			
Family structure			
Joint	123(54.70%)	15(60%)	138
Nuclear	102(45.30%)	10(40%)	112
Dietary habits			
Veg	118(52.40%)	17(68%)	135
Non-veg	107(47.60%)	8(32%)	115
Consumption of junk food >3 times a week			
Yes	195(86.70%)	20(80%)	215
No	30(13.30%)	5(20%)	35
Socioeconomic status			
Upper	66(29.30%)	11(44%)	77
Upper middle	92(40.90%)	8(32%)	100
Middle	67(29.80%)	6(24%)	73

In a study by Hasson et al, multipronged intervention including nutritional intervention exercise & nutritional education was administered to obese girls for 6 months at the end of the study they reported highly significant reduction in WC whereas change in BMI was not significant they had advocated that diet restriction and exercise in combination can significantly change the body fat distribution, low PA level may be as important as excess energy in the in producing obesity.[17] While Swinbur et al found energy in take was a more important determined of high body weight and low PA. A total of hours per day of moderate intensity activity, such as walking on most day of the week are probably needed to maintain a healthy body weight.[18]According to our study high level of PA should be maintain to cause reduction & redistribution of fat in the body.

Summary

Many studies have indicated that central adiposity is more important correlate of hypertension, diabetes and hyperlipidaemia. Diet, consumption of saturated fat, junk fat and sedentary life style were major contributing factor to overweight in general.

Table 2: Relationship between waist hip ratio and PAQ.

PAQ	Waist Hip Ratio		Total
	Normal	Central Obesity	
1	35 (100%) (15.56%)	0 (0%) (0%)	35 (100%) (14%)
2	83 (94.32%) (36.89%)	5 (5.68%) (20%)	88 (100%) (35.2%)
3	95 (86.36%) (42.22%)	15 (13.64%) (60%)	110 (100%) (44%)
4	7 (58.33) (3.11%)	5 (41.67%) (20%)	12 (100%) (4.8%)
5	5 (100%) (2.22%)	0 (0%) (0%)	5 (100%) (2%)
Total	225 (90%)	25 (10%)	250 (100%)

χ^2=21.25; p=0.0003, Significant

We suggest that more objective testing of physical activity may be undertaken in place of or in conjunction with self-reported assessment. Measurement of WHR should be considered more sensitive indicators of obesity as these are also better correlates of CVD.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Gornale VK, Sathenahalli VB, Kuber M, Singh HP. A study of effect of physical activity quotient on central obesity (waist hip ratio) in adolescent girls and boys of central India. Int J Contemp Pediatr 2015;2:317-20.