Survey of nutritional assessment in relation to waist to hip ratio and waist to height ratio among school going children

■**PRADEEP SINGH CHAHAR**

Author for correspondence

PRADEEP SINGH CHAHAR
Department of Physical Education,
Manipal University, JAIPUR
(RAJASTHAN) INDIA

■**ABSTRACT**

The purpose of this study was to survey the nutritional status in relation to waist-to hip ratio and waist to height ratio among school going children of Gwalior city. A total of hundred (n = 100) male subjects from KendriyaVidyalayas of Gwalior city studying in classes from 10th to 12th standard with age ranged from 14 to 18 years were selected for this study. All the subjects were examined for nutritional status, waist hip ratio and waist to height ratio. Results revealed that majority of subjects in waist hip ratio fall under the ideal-very low risk, while extremely slim category in waist to height ratio. Further, pearson product moment correlation result revealed that nutritional status was significantly correlated with waist to hip ratio (-0.340; p<0.05) and insignificantly correlated with waist to height ratio (-0.073; p>0.05). Therefore, it may be concluded that waist hip ratio can be used as a predictor for nutritional deficiencies. There are many plausible reasons behind the school going childrens' being suffering from indecent nutritional status. Developing good practices early in life, will benefited in future.

■ **KEY WORDS :** Nutritional status, Waist to hip ratio, Waist to height ratio

■ **HOW TO CITE THIS PAPER :** Chahar, Pradeep Singh (2016). Survey of nutritional assessment in relation to waist to hip ratio and waist to height ratio among school going children. *Internat. J. Phy. Edu.*, **9** (1&2) : 5-9, **DOI : 10.15740/HAS/IJPE/9.1&2/5-9**.

Nutritional assessment is an integral part of patient care since nutritional status affects a patient's response to illness (Asim Maqbool *et al.*, 2013). Nutrition assessment is working to assist people to begin to 'self-assess' their nutritional status. From an understanding of their present nutritional health, they may ask the right question to the right health professional or fitness expert (Nutrition Assessment, 2013). The original term of nutritional assessment was used by a sub-committee of the League of Nations (1932) referring to a set of medical tasks to determine the nutritional status of a population (Gibson, 2005). After 1976 (Bistrian *et al.,* 1976), it became a standardized, hospital-based set of tools to predict nutrition and health outcomes in individual patients with post-op complications, trauma or malnutrition. In 1996, Theresa Schneider RD decided to take assessment tools out of the hospital to assess the health of athletes, those with chronic diseases and corporate executives (What is nutritional assessment, 2013).

In developing countries like India various forms of malnutrition affect a large segment of population and both macro and micronutrient deficiencies are of major concerns. The school age period is nutritionally significant because this is the prime time to build up body stores of nutrients in preparation for rapid growth of adolescence.

Nutrition plays a vital role, as inadequate nutrition during childhood may lead to malnutrition, growth retardation, reduced work capacity and poor mental and social development (Awasthi *et al.,* 2000).

WHtR is a slightly better predictor than waist circumference alone. This is probably because there is a positive association between waist and height in global populations of mixedethnicity that include a wide range of heights (Ashwell, 2009).Waist to height ratio is a better predictor of heart disease and diabetes risk than BMI, according to new research presented at a scientific meeting recently. An advantage of WHtR is the simplicity of the health message "keep your waist circumference to less than half your height" (Waist to height ratio better than EMI, 2013). The WHR has been used as an indicator or measure of the health of aperson, and the risk of developing serious health conditions. Research shows that people with "apple-shaped" bodies (with more weight aroundthe waist) face more health risks than those with "pear-shaped" bodies who carry more weight around the hips (Waist Hip Ratio, 2012). Hence, this study was undertaken to survey the nutritional status in relation to waist-to hip ratio and waist to height ratio among school going children of Gwalior city.

■ **METHODOLOGY**

A total of hundred (n = 100) male subjects from KendriyaVidyalayas of Gwalior city studying in classes from 10th to 12th were selected and their age ranged from 14 to 18 years. Nutritional Assessment, Waist to Hip Ratio and Waist to Height Ratio were the variables selected for this study. The subjects of these grades were educated enough to understand and provide relevant responses to the statements asked in the scales.

Life style assessment inventory by Anspangh *et al.* (1994) was adopted to collect data for nutritional assessment.Validity of this questionnaire in Indian conditions was found .89. Before the administration of the scale, all the subjects were explained about the purpose of the study and were ensured strict confidentiality, following which verbal informal consent was taken from each of them before the administration of scale. The subjects were given the option of not participating in the study if they did not want to. Scale was distributed personallyby the researcher to all subjects and they were requested to fill the scales during school hours.Height of the subjects was measured through

marked scale on the wall, which was having plane horizontal surface and was measured correct to the nearest 0.1 centimeter.

Waist circumference measurement was taken at the level of narrowest point between the lower costal (rib) border and the iliac crest. If there was no obvious narrowing then the measurement was taken at the mid point between these two land marks. The researcher stood in front of the subject to correctly locate the narrowing of the waist. The measurement was taken at the end of the normal expiration with the arms relaxed at the sides and slightly abducted. Hip circumference measurement was taken at the level of the greatest posterior protuberance of the buttocks which usually corresponds anteriorly to about the level of the symphysis pubis. The participant stood with feet together and was asked to tense the gluteal muscles. The researcher stood at the side of the subject to ensure that the tape was held in a horizontal plane when measuring this site (Kavin and Tim, 2006).

The cross hand technique was used for measuring circumference and thereading was taken from the tape where, for easier viewing, the zero was located more lateral than the medial on the subject. The reading was taken to the nearest 0.1 centimeter.

■ **OBSERVATIONS AND DISCUSSION**

The characteristics of the study subjects with the help of descriptive statistics are presented in Table 1. The mean and standard deviation for age, height and weight were14.87 ± 0.98, 167.28 ± 7.75 and 54.24 ± 11.42, respectively. In case of waist to hip ratio, waist to height ratio and nutritional status mean and standard deviation of subjects were 0.83 ± 0.05, 0.41 ± 0.04 and 71.71 ± 11.998.

Table 1 : Subject's characteristics		
	Mean	Std. deviation
Age	14.87	0.98
Height	167.28	7.75
Weight	54.24	11.42
Waist to hip ratio	0.83	0.05
Waist to height ratio	0.41	0.04
Nutritional status	71.71	11.99

Table 2 and Fig. 1 displays percentage and number of subjects, falling under five different categories of Nutritional Status. Nutritional Status determines the

individual status of nutrition. Among all the subjects only 5 per cent (n=5) had excellent status of nutrition, 38 per cent (n=38) had good, 30 per cent (n=30) had average, 25 per cent (n=25) had below average and 2 per cent (n=2) subjects needs improvement regarding nutritional status.

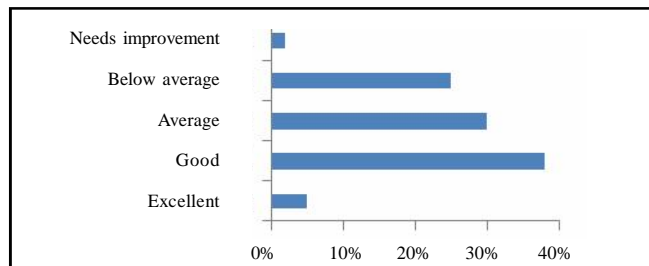| Table 2 : Total percentage and categories of subjects in nutritional status		
Categories	Number of subjects	Percentage
Excellent	5	5%
Good	38	38%
Average	30	30%
Below average	25	25%
Needs improvement	2	2%
Total	100	100%

Fig. 1 : Total percentage and categories of subjects in nutritional status

It is evident from Table 3 and Fig. 2 that there were 90 per cent (n=90) subjects who fell in ideal category of Waist to Hip Ratio, 7 per cent (n=7) subjects fell under low risk category, Moderate and high risk categories were

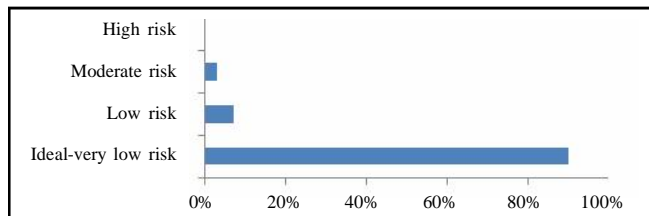| Table 3 : Total percentage and categories of subjects in waist hip ratio		
Category	Number of subjects	Percentage
Ideal- very low risk	90	90%
Low risk	07	07%
Moderate risk	03	03%
High risk	00	00%
Total	100	100%

Fig. 2 : Total percentage and categories of subjects in waist hip ratio

observed in 3 per cent (n=3) and 00 per cent (n=0), respectively among subjects

Table 4 and Fig. 3 revealed the percentage of subjects, falling under different categories of waist to height ratio. Among all the subjects, 66 per cent (n=66) fell in extremely slim category of waist to height ratio, 16 per cent (n=16) subjects fell under slender and healthy, 16 per cent (n=16) also fell under Healthy, Normal, Attractive Weight, 1 per cent (n= 1) in overweight and highly obese category, respectively and 0 per cent (n=0) subjects who fell under abnormally slim to underweight and extremely overweight/obese, respectively.

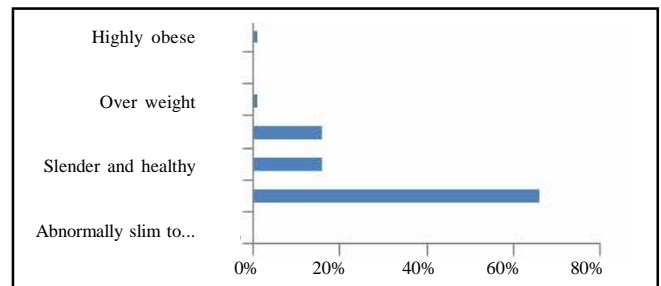| Table 4 : Total percentage and categories of subjects in waist to height ratio		
Category	Number of subjects	Percentage
Abnormally slim to underweight	00	00%
Extremely slim	66	66%
Slender and healthy	16	16%
Healthy, normal, attractive weight	16	16%
Overweight	01	01%
Extremely overweight/obese	00	00%
Highly obese	01	01%
Total	100	100%

Fig. 3 : Total percentage and categories of subjects in waist height ratio

Table 5 depicts that nutritional status was significantly correlated with waist to hip ratio as calculated value of 'r' was greater than the tabulated value at 0.05 level of significance with 98 degree of freedom, while in significantly correlated with waist to height ratio as calculated value of 'r' was lower than the tabulated value

Table 5 : Correlation between nutritional status, waist to hip ratio and waist to height ratio				
	Waist to hip ratio	p-value	Waist to height ratio	p-value
Nutri. status	-.340[*]	.001	-.073	.473

* Significant at the 0.05 level; $r_{.05}$ (98) = .195; p<.05

at 0.05 level of significance with 98 degree of freedom.

Conclusion and discussion:

Obesity has become an epidemic in many parts of the world. Indeveloping countries like India, obesity co exists with malnutrition. Dietand nutrition play a great role in the development of obesity.Consumption of energy rich, nutrient deficient food items is the majorfactor contributing to obesity (Died or Exercise, 2011).

Results showed that large number of subjects had average and good nutritional status while only two per cent subjects needs improvement, it means subjects fell in this category have to concern more about the diet with full nutrition. Sati and Dahiya (2012) conducted a study in Hisar district, Haryana to assess the nutritional status of 200 rural school going children. Regarding prevalence of malnutrition, they found that 54.11 per cent of the children were stunted and 55.5 per cent were underweight. They suggested that there is an urgent need to promote the importance of balanced diet and preparation of nutrient-rich recipes based on locally available food stuffs to improve their nutritional status.

These findings also supported by the study done by Anand *et al.* (1999), their findings showed that prevalence of stunting (low height for age as per NCHS reference) among boys declining from 56 per cent at 12 years of age to 25 per cent at 17 years of age.The prevalence of thinness among boys varies between 31 per cent-52 per cent and in girls it varies between 4 per cent-59 per cent. The prevalence of anemia was 27.8 per cent in young boys compared to 41.3 per cent in older boys.

Further, results revealed the significant relationship between nutritional status and waist to hip ratio at .05 level. These results were in a partial consonant with the study done by Pruenglampoo *et al.* (2012), concluded that average waist hip ratioin some age groups showed a statistically significant difference from that in others. Regarding nutritional status, which they categorized into 4 groups of under-nourished, normal, overweight and obese children and adolescents, all mean waist hip ratio had a statistically significant difference (p<0.05) from each other. The undernourished group had the lowest waist hip ratio, whereas the obesity group had the highest.

While insignificant relationship found between nutritional status and waist to height ratio at .05 level. These findings supported by the study done by Chiara *et al.* (2009) who conducted a study entitled as correlation and agreement between central obesity indicators and body mass index in adolescents in which they found insignificant correlation between nutritional status and waist to height ratio.

In the past fewdecades there have been increases in the consumption of fast foods, pre-preparedmeals, soft drinks, and candy. At the same time, physicalactivity patterns in youth have changed as a result of an increase in timespent watching television, the advent of video games and the internet,and a decrease in the opportunities for physical activity in schools and communities (Ian Janssen *et al.*, 2004). These are the plausible reasons behind the school going childrens' being suffering indecent nutritional status. Developing good practices early in life, will benefited in future. Hence, parents, teachers and policymakers have to plan accordingly to make their child healthy and fit. Similar finding have been reported by Pandya *et al.* (2015) and Sodha *et al.* (2015).

■ **REFERENCES**

Anand, K., Kant, S. and Kapoor, S.K. (1999). Nutritional status of adolescent school children in rural north India, rural health services project, Ballabgarh, All India Institute of Medical Sciences, NEW DELHI, INDIA.

Anspangh, Davids, Michael, H. Hamrich and Frank D. Rosato (1994). *Wellness-concepts and applications*, Mosby: Von Halfmon Press. Inc, pp. 25-33.

Ashwell, M. (2009). Obesity risk: Importance of the waist-to-height ratio nursing standard. *Nursing Standard*, **23** (41) : 49-54.

Awasthi, C.P., Kumar, S., Tiwari, P.P. and Singh, A.B. (2000). Nutritional status of preschool and school children in rural area of Sultanpur district. *J. Dairying Foods & Home Sci.*, **19**: 16-21.

Bistrian, B.R., Blackburn, B.R., Vitale, J., Cochran, D., Navlor, J. (1976). Prevalence of malnutrition in general medical patients. *J. American Medical Association*, **235** : 1567-1570.

Chiara, V.L., da Silva, Henyse, G.V., Barros, M.E., Rêgo, A.L., Ferreira, A.L., Pitasi, A.B. and Mattos, Thaís S. (2009). Correlation and agreement between central obesity indicators

and body mass index in adolescents. *Rev. Bras. Epidemiol.*, **12** (3) : 368-377.

Gibson, Rosalind S. (2005). *Principles of nutritional sssessment,* 2nd Ed., Oxford University Press, Oxford.

Janssen, I., Katzmarzyk, P.T., Boyce, W.F., King, M.A. and Pickett, W. (2004). Overweight and obesity in Canadian adolescents and their associations with dietary habits and physical activity patterns. *J. Adolescent Health*, **35** : 360-367.

Joshi, H.S., Gupta, R., Joshi, M.C. and Mahajan, Vipul (2011). Determinants of nutritional status of school children - A cross sectional study in the western region of Nepal. *NJIRM*, **2**(1): 10-15.

Kavin, Norton and Tim Olds (2006). *Anthropometrica, a text-book of body measurement for sports & health education*, CBS Publishers and Distributors, p.58, NEW DELHI, INDIA.

Mwaniki, E.W. and Makokha, A.N. (2013). Nutrition status and associated factors among children in public primary schools in Dagoretti, Nairobi, Kenya, *Afr. Health Sci.,* **13**(1): 39–46.

Pandya, Nidhi, Jadeja, Rekhaba and Joshi, Hasmukh (2015). Assessment of nutrient intake of school going girls of Surendranagar district of Gujarat State, India. *Internat. J. Appl. Soc. Sci.,* **2** (3&4) : 61-68.

Pruenglampoo, Sakda, Taejaroenkul, Sineenart and Sirisanthana, Virat (2012). Relationships between waist-to-hip circumference ratio and gender, age and nutritional status in Thai children in Mueang district, Chiang Mai Province. *Chiang Mai Medical J.*, **51**(2):29-37.

Sati, Vandana and Dahiya, Saroj (2012). Nutritional assessment of rural school-going children (7-9 Years) of Hisar district, Haryana. *Open Access Scientific Reports*, **1** (7) : 1-4.

Sodha, Shital, Jadeja, Rekhaba and Joshi, Hasmukh (2015). Anthropometric assessment of nutritional status of adolescents girls of Porbandar city of Gujarat state. *Internat. J. Appl. Soc. Sci.,* **2** (3&4) : 78-83.

■ **WEBLIOGRAPHY**

Asim, Maqbool, Irene, E. Olsen and Virginia, A. Stallings (2013). Clinical assessment of nutritional status, retrieved on April 27th, 2013 from *http://anhi.org/learning/pdfs/bcdecker/ Clinical_Assessment_of_Nutritional_Status.pdf*

Diet or Exercise? (2011). Which one Works best for Obesity?.(n.d.). Retrieved on October 12, 2011, from *http:// thumbi7.hubpages. com/hub/Diet-or-Exercise-Which-one-works-best-for-obesity.*

Nutrition Assessment (2013). How can I benefit, retrieved on February 18th, 2013 from *http://nutritionassessment.com/ index.php*

Waist Hip Ratio(n.d.) (2012). Retrieved on September 3, 2012, from *http://en.wikipedia.org/wiki/Waist-tohip_ratio.*

Waist to Height Ratio Better than BMI (2013). Retrieved on April 27th, 2013 from *http://www.medicalnewstoday.com/ articles/245328.php*

What is nutritional assessment? Retrieved on April 27th, 2013 from *http://nutritionassessment.com/index.php*

9th Year
★★★★★ of Excellence ★★★★★