

Body mass index and body weight perception: A relation between an indicator and misperception

¹ Chinmay Muralidharan, ² Dr, Leena Muralidharan, ³ Dr. Sangeeta Gaur ,
^{2,3} V. K. K. Menon College of Commerce and S.S. Dighe College of Science, Bhandup (east). Mumbai 400093.
¹ Thadomal Sahani Engineering College , Bandra , Mumbai , Maharashtra, India.
Email : ²leena.doctor@gmail.com

Abstract: The National Institute of Health uses BMI (Body mass index) to define a person as underweight, normal weight, overweight, or obese. The present study investigate BMI in teenagers (Male and female students, 18 to 19 years age) as well as their body weight perception (BWP) according to them. The aim of the present investigation is to: (i) Identify students who may be at nutritional risk, (ii) Identify students who are at risk for eating disorders (iii) Identify students who are underweight, overweight, or obese (iv) To promote healthy eating and physical activity among teenagers (v) To create awareness among people of the extent of weight problems, and provide an evaluation measure for the effectiveness and efforts to improve health. The result shows that most of the girls had misperception about their body weight, even if they were in normal BMI.

Key Words: Body mass index, Body weight perception, Teenagers.

1. INTRODUCTION:

Adolescence (between 10 and 19 years) is a crucial time in the development of physical and psychological health (Pesa *et. al.*, 2000). Due to modern life style overweight and obesity in adolescents have increased and most of the affected population belongs to developed countries (Ogden *et. al.*, 2014). Barker *et. al.*, (2007) reported that obesity is related to be a risk factor for death from cardiovascular disease. According to Geserick *et. al.*, (2018) among obese adolescents, the most rapid weight gain had occurred between 2 and 6 years of age and most children who were obese at that age were obese in adolescence.

Body mass index [weight (kg) /height (m²)] (Quetelet, 1871) is used as a measure of body fatness. It is an indicator of the risk of overweight (Himes and Dietz, 1994). According to GBD Obesity Collaborators (2017) high BMI contributed to an estimated 4 million deaths globally in 2015. BMI is an accurate calculator for obesity in children and adolescents. During childhood, BMI above the 85th percentile is identified as overweight and more than 95th percentile is identified as obese (Velasquez-Mieyer *et. al.*, 2005).

Several studies suggest that physical activity is associated with improved psychological well-being and lower levels of cardio metabolic risk factors among kids and teenagers (Strong *et. al.*, 2005; Skrede *et. al.*, 2018). Underweight and overweight condition among teenagers and children could be associated with low physical-fitness levels (Abdelkarim *et. al.*, 2020). Jago *et. al.*, (2020) suggested that the amount of physical activity of a person is affected by BMI, gender and socio-economic position. According to Velasquez-Mieyer *et. al.*, (2005) Obesity is related with the complications of metabolic (Diabetes, Metabolic syndrome, Hypertension, Lipid abnormalities, CVD, Cancer, Infertility, Hyperandrogenism, Polycystic ovarian disease, Gout , Gallbladder disease, and Hyper coagulability), mechanical (Sleep apnea/hypoventilation, Pseudotumor cerebri, Slipped capital femoral, Kidney structural abnormalities, Cardiomyopathy , Degenerative arthritis, Flat feet, Blount disease, Respiratory disease) and psychological (Depression, Eating disorders, Anxiety, Deterioration of social interactions) complications. Obesity is the one of the most severe health problem in the world (Lusting *et. al.*, 2004). Velasquez-Mieyer *et. al.*, (2005) reported that life expectancy can reduced (5 to 20 years) in youth whose BMI is more than 45 kg/m². Underweight condition is related with under-nutrition (energy expenditure > intake) and is a significant problem in lower middle-income countries (Tanumihardjo *et. al.*, 2007).

Wang *et. al.*, (2018) suggested that body weight perception may refer to one's estimate of body image with all of the accompanying feelings, attitudes, and thoughts concerning weight, size, shape, and appearance. They also reported that many adolescents are unable to perceive their weight status accurately. Almost one-third of adolescents misperceive their body weight; moreover, compared to boys, girls are more likely to hold misperceptions.

In present study we aimed to examine in detail the association of BMI (physical measurement i.e. height and weight) with gender in teenagers. We also investigate body weight perception (by face-to-face questionnaire) in individuals (for teenagers).

2. MATERIALS AND METHOD:

Teenagers (age 18 to 19) were selected for the present investigation. Height and weight were measured by trained investigators using standardized protocols. BMI was calculated by weight in kilogram divided by height in square meter (kg/m^2). Body weight perception was recorded by using a single questionnaire item that asked what they think about their body size? From the following four options i.e. underweight, normal weight, overweight, and obese, they have to choose only one option. The relation between BMI and BWP was subdivided into three different categories: (1) Underestimation, (2) Normal weight and (3) Overestimation. For height and weight measurement following precautions were taken:

(1) Shoes, hat, and hair ornaments /buns,/braids to extent possible should be removed. (2) Candidate should stand on the uncarpeted floor with back against height measuring meter rule. (3) Legs are straight, arms are at sides, and shoulders are relaxed. (4) Back of the candidate touches/has contact with the wall or height measuring meter at some point, preferably with heels, buttocks, upper back and head touching the measuring surface. (5) Assure that the student's body is in a straight line (mid-axillary line parallel to the height measuring meter)

Descriptive analyses (percentage, sum, and mean) were used to describe the sample. Separate analyses were conducted for factors presumed to be of importance (sex and age) to address differences in frequency distribution of BMI and body weight perception.

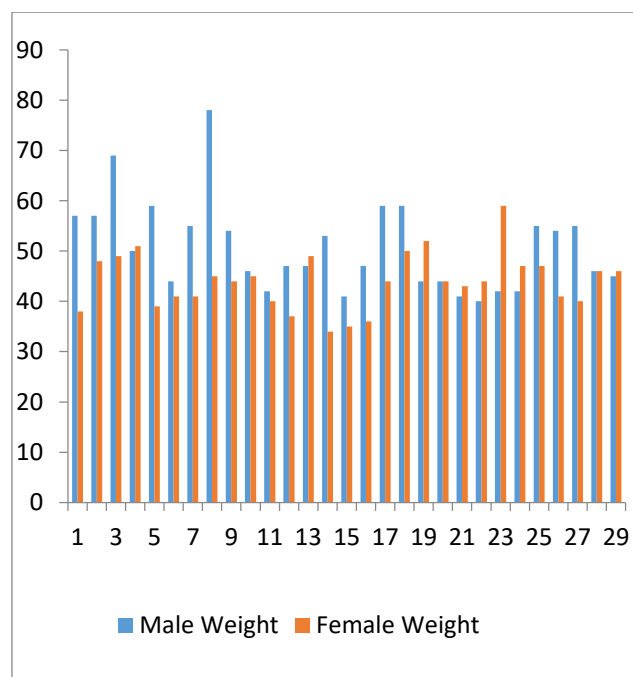
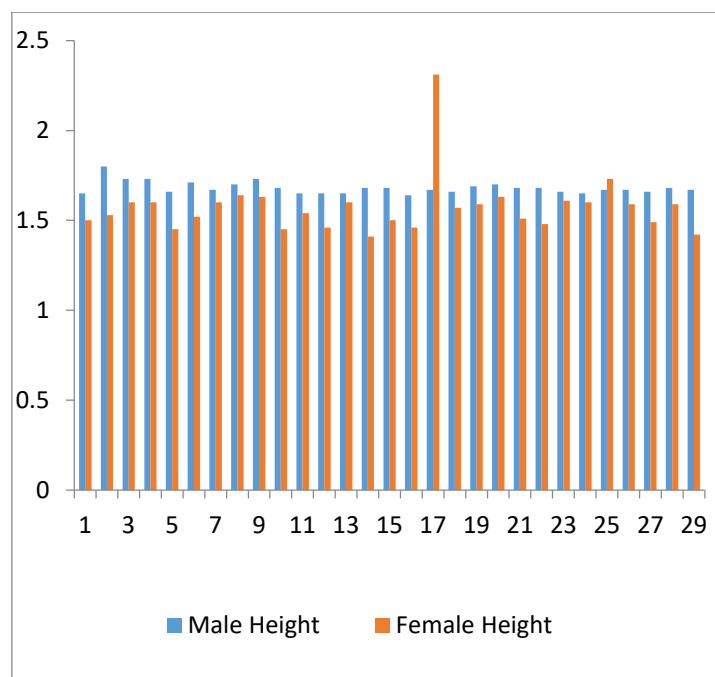
3. RESULT AND DISCUSSION:

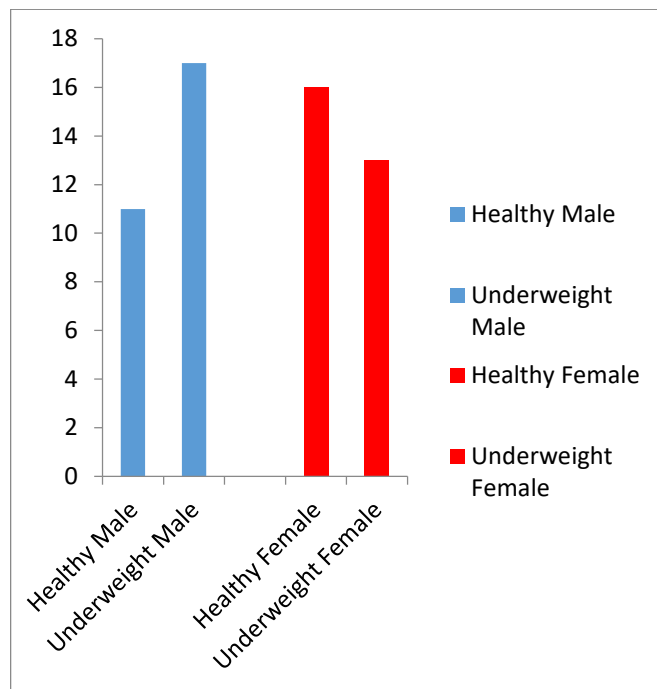
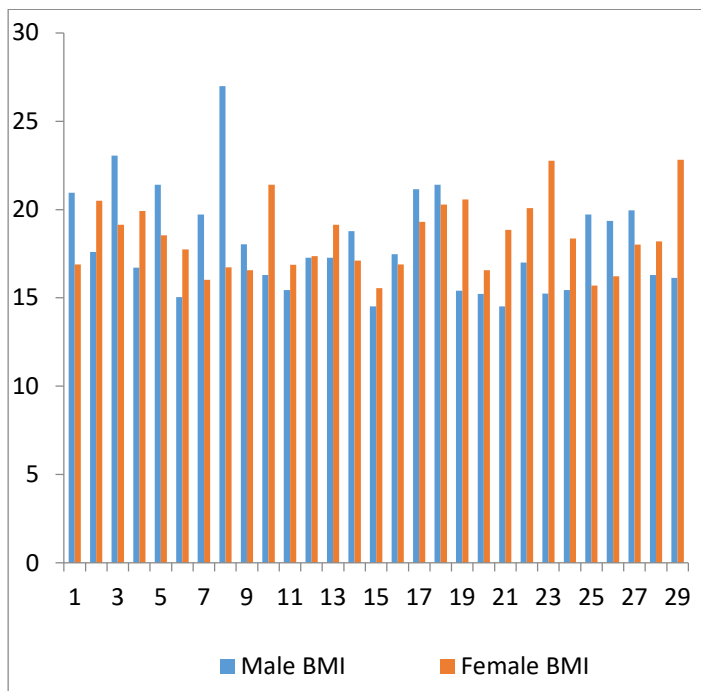
Present study reveals that there is a mismatch between BMI and BWP among these teenagers. The result are supported by the study of Wang *et. al.*, (2018). Approximately 6.89% of these youth perceived themselves as underweight, 75.86% as normal weight, 6.89% as overweight and 10.34% as obese . In reality, 51.72% were underweight, 46.55% were normal weight (healthy), and 1.72% were overweight. Furthermore, Girls were more likely than boys to overestimate their weight, whereas males were more likely than females to misperceive themselves as healthy.

According to OFI (obesity foundation India), BMI guidelines for India are given as below:

Healthy Range = 18.5 to 25; Overweight = 25 to 30; Obese = 30 to 35; Severely obese = Above 35

Previous studies have concluded that girls are more likely than boys to perceive themselves as overweight even though they are actually of normal weight, or even underweight (Xie *et. al.*, 2003; Xie *et. al.*, 2006). Urban youth tend to weigh more and more readily assess themselves as having an abnormal body image compared to rural youth (Niu *et. al.*, 2014). These results are in accordance with present study.





According to ter Bogt *et al.*, (2006) both BMI and BWP are associated with internalizing and externalizing problem behavior, social attention and thought problems. They reported that the underweight or overweight person who considered themselves as healthy had no more problems than normal BMI person. In Present study girls are more disappointed with their weight as compared to boys. Same results were observed by ter Bogt *et al.*, (2006) Zainuddin *et al.*, (2014) and Sirassamee *et al.*, (2018).

In present study, female candidates who considered themselves as overweight/ obese were more likely to lose weight. They also admit the use of fasting for weight loss. These weight control strategies are found to be less in male candidate as compare to females.

Significant differences in dietary intake and physical activity between females and males were also observed. Males were more comfortable with many kinds of food (such as vegetables, milk, 100% fruit juice), they were also more likely to participate in vigorous physical activity and strength exercises. Whereas, desire of fasting was more frequently observed in female candidates. Less participation in strength game, and physical activity (for example running and throw disc game) were found in females. A possible explanation for this finding relates to gender norms. Males were more likely to participate in sport activity and were less concerned about their body weight than females. In present investigation the dietary intake and physical activity data were based on self-reports of candidates. Hence, the information might have been affected by recall bias and social desirability.

Females were more likely to misperceive themselves as overweight and obese whereas, males were more likely to misperceive themselves as healthy. However, most of the males were underweight. The present study suggests that, parents should take steps to help their child to improve weight management and overall health awareness.

REFERENCES:

1. Abdelkarim O., Ammar a., Trabelsi K., Cthourou H., Jekauc D., Irandoust K., Taheri M., Bös K., Woll A., Bragazzi N.L. and Hoekelmann A. (2020): Prevalence of underweight and overweight and its association with physical fitness in egyptian schoolchildren. *Int. J. Environ. Res. Public Health* 17, 75.
2. Baker J.L., Olsen L.W., and Sørensen T.I.A. (2001): Childhood body-mass index and the risk of coronary heart disease in adulthood. *N. Engl. J. Med.*,357:2329-37.
3. GBD Obesity Collaborators. (2017): Health effects of overweight and obesity in 195 countries over 25 years. *N. Engl. J. Med.*, 377: 13–27.
4. Geserick M., Vogel M., Gausche R., Lipek T., Spielau U., Keller E., Pfäffle R., Kiess W., and Körner A. (2018): Acceleration of BMI in early childhood and risk of sustained obesity. *N. Engl. J. Med.*, 379:1303-12.
5. Himes J.H. and Dietz W.H. (1994): Guidelines for overweight in adolescent preventive services: recommendations from an expert committee. The Expert Committee on Clinical Guidelines for Overweight in Adolescent Preventive Services. *Am. J. Clin. Nutr.*, 59: 307- 316.

6. Jago R., Salway R., Emm-Collison L., Sebire S.J., Thompson J.L. and Lawlor D.A. (2020): Association of BMI category with change in children's physical activity between ages 6 and 11 years: a longitudinal study. *International Journal of Obesity*, 44:104–113
7. Lustig R., Preeyasombat C. and Velasquez-Mieyer P. (2004): Treatment of childhood obesity. In *Pediatric Endocrinology: From Mechanisms to Management*. Eugster E, Pescovitz O, Eds. Charlottesville, Va., Lippincott, Williams, and Wilkins, p. 682–714
8. Niu J., Seo D.C., and Lohrmann D.K. (2014): Weight perception and dietary intake among Chinese youth, 2004–2009. *International journal of behavioral medicine*. 21(4):691–9.
9. OFI (2009): Obesity Foundation India. <http://obesityfoundationindia.com/bmi.htm>
10. Ogden C.L., Carroll M.D., Kit B.K. and Flegal K.M. (2014): Prevalence of childhood and adult obesity in the United States, 2011-2012. *JAMA*, 311:806-14
11. Pesa J.A., Syre T.R. and Jones E. (2000): Psychosocial differences associated with body weight among female adolescents: the importance of body image. *The Journal of adolescent health: official publication of the Society for Adolescent Medicine*. 26(5):330–7.
12. Sirirassamee T., Phoolsawat S. and Limkhunthammo S. (2018): Relationship between body weight perception and weight-related behaviours. *Journal of International Medical Research*, 46(9) 3796–3808
13. Skrede T., Steene-Johannessen J., Anderssen S.A., Resaland G.K. and Ekelund U (2018): The prospective association between objectively measured sedentary time, moderate-to-vigorous physical activity and cardiometabolic risk factors in youth: a systematic review and meta-analysis. *Obes Rev.*, 20:55–74
14. Strong W.B., Malina R.M., Blimkie C.J., Daniels S.R., Dishman R.K., Gutin B., Hergenroeder A.C., Must A., Nixon P.A., Pivarnik J.M., Rowland T., Trost S., Trudeau F. (2005): Evidence based physical activity for school-age youth. *J. Pediatr.*, 146:732–7.
15. Tanumihardjo S.A., Anderson, C., Kaufer-Horwitz, M., Bode, L., Emenaker, N.J., Haqq, A.M., Satia, J.A., Silver, H.J. and Stadler, D.D. (2007): Poverty, obesity, and malnutrition: An international perspective recognizing the paradox. *J. Am. Diet. Assoc.* 11, 1966–1972
16. ter Bogt T.F., van Dorsselaer S.A., Monshouwer K., Verdurmen J.E., Engels R.C., Vollebergh W.A. (2006): Body mass index and body weight perception as risk factors for internalizing and externalizing problem behavior among adolescents. *J Adolesc Health*, 39(1):27-34..
17. Velasquez-Mieyer P., Perez-Faustinelli S., and Cowan P.A. (2005): Identifying children at risk for obesity, type 2 diabetes, and cardiovascular disease. *Diabetes Spectrum*, 18, (4): 213-220.
18. Wang Y., Liu H., Wu F., Yang X., Yue M., Pang Y., Li X., Ma J., Zhou G., Gong P., Liu M., Zhang X. (2018): The association between BMI and body weight perception among children and adolescents in Jilin City, China. *PLoS ONE* 13(3): e0194237.
19. Xie B., Chou C.P., Spruijt-Metz D., Reynolds K., Clark F., Palmer P.H., Gallaher P., Sun P., Guo Q. and Johnson C.A. (2006): Weight perception and weight related sociocultural and behavioral factors in Chinese adolescents. *Preventive medicine*. 42 (3):229–34.
20. Xie B., Liu C., Chou C.P., Xia J., Spruijt-Metz D., Gong J., Li Y., Wang H. and Johnson, C.A. (2003): Weight perception and psychological factors in Chinese adolescents. *The Journal of adolescent health: official publication of the Society for Adolescent Medicine.*, 33(3):202–10.
21. Zainuddin A.A., Manickam M.A., Baharudin A., Omar A., Cheong S.M., Ambak R., Ahmad M.H. and Ghaffar S.A. (2014): Self-perception of body weight status and weight control practices among adolescents in Malaysia. *Asia Pac. J. Public Health*, 26(5 Suppl):18S-26S.