



ORIGINAL RESEARCH PAPER

Pediatrics

LIFE STYLE FACTORS, BMI AND BIO IMPEDENCE BODY FAT ANALYSIS IN ADOLESCENTS

KEY WORDS: obesity, overweight, technology, physical inactivity, unhealthy diet, adolescents

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ABSTRACT

BACKGROUND: The World Health organization (WHO) defines obesity as 'global epidemic'. It was estimated that around 400 million people were suffering from obesity in which 84 million were teenagers. Obesity is a challenging multi-factorial problem increasing at an alarming rate across the globe in all age groups Physical inactivity, sedentary behaviour and an unhealthy diet are factors that may increase weight and general and/or abdominal obesity. **OBJECTIVES OF THE STUDY:** The objectives of the study were to estimate the prevalence of overweight and obesity among adolescents and to study and correlate various life style factors like time spent in exercise, time spent in technology, household income, household education and weekly consumption of fast foods with BMI in these adolescents. **MATERIALS AND METHODS:** A written informed consent was obtained from each participant. The study protocol was approved Institutional Ethical Committee. In this cross-sectional study, we included 96 high school students of 13-17 years' age studying in Indu IT School Bhilai, Chhattisgarh. A pre-designed and pre-tested questionnaire was used to elicit the information for the study. **RESULTS:** In our study, we included a total of 96 adolescents aged between 13-17 years. Body mass index (BMI) was calculated. In our study, we found the prevalence of overweight is 15.6% and obesity 7.3% among Adolescents. Time spent in last 24 hours in exercise, parent's education is negatively correlated to BMI. Time spent in last 24 hours in technology, household income is positively correlated with BMI. **CONCLUSION:** It is essential to maintain good BMI for a healthy lifestyle Our study shows that a large % of the student body has a BMI outside of the normal range the contributing factors include increased use of technology; lack of exercise, increased consumption of fast food. With the growth in household income, we need to keep the focus on maintaining a good lifestyle. Our study strongly recommends: No less than 2 hrs of exercise, No more than 2 hrs of technology time and 30 min of Yoga.

INTRODUCTION:

The World Health organization (WHO) defines obesity as 'global epidemic'. It was estimated that around 400 million people were suffering from obesity in which 84 million were teenagers. Developed nations are not only recognized obesity as a major public health problem; even developing countries consider obesity as an important health problem. Studies from different states of India suggested that the prevalence of obesity ranged from 10–50%. The pace of developmental transitions - urbanization, modernization, globalization marked in recent years has led to the double burden of 'undernutrition' and 'obesity' in developing countries.¹⁻³ There are various factors that can cause obesity among teenagers and unhealthy lifestyle is on the top in the list. Childhood obesity is a known precursor to obesity and other non-communicable diseases (NCDs) in adulthood. However, the magnitude of the problem among children and adolescents in India is unclear due to paucity of well-conducted nationwide studies and lack of uniformity in the cut-points used to define childhood overweight and obesity. Overweight and obesity are the fifth leading risk for global deaths. At least 2.8 million adults die each year as a result of being overweight or obese. According to WHO 1 in 6 adults were obese. It was estimated that half a billion people i.e. 12% of the world's population were obese.⁴⁻⁶

OBJECTIVES OF THE STUDY:

The objectives of the study include

1. To estimate the prevalence of overweight and obesity among adolescents.
2. To study and correlate various life style factors like time spent in exercise, time spent in technology, household income, household education and weekly consumption of fast foods with BMI in these adolescents.

MATERIALS AND METHODS:

A written informed consent was obtained from each participant. The study protocol was approved Institutional Ethical Committee. In this cross-sectional study, we included 96 high school students of 13-17 years' age studying in Indu IT School Bhilai, Chhattisgarh. A pre-designed and pre-tested questionnaire was used to elicit the information for the study. The general information on individual characteristic like age, sex, ordinal position, education, school and residential address with contact number and family characteristics like family size, type of family, religion, caste, mother tongue, parents' education ((High School, Graduate, Post Graduate), occupation and income, details about family members, total income of the family, living conditions at home, Time spent in sleep (number of hours /day), Time spent in study (number of hours /day), Time spent in Technology (number of hours /day), Time spent in exercise (number of hours /day), calorie intake/day, calories deficiency and frequency of fast food per week. The specific information on teenager's daily activities, TV viewing behaviour pattern, eating habits while watching TV were included.

Anthropometric measurements included body weight, height, mid upper arm circumference. Measurements were recorded by the Investigator using standardized procedures [Jelliff, 1966]. Body weight was measured to the nearest to 100g with minimal clothing and without shoes, using portable personal weighing balance. Height was measured to the nearest cm with subject in the full standing position without shoes using stature meter. Mid-upper arm circumference was taken at biceps using non-stretchable measuring tape. BMI-for-age and sex appropriate z-score classification was used as indicator to classify underweight, normal weight, overweight and obesity.

Body fat analysis was carried out using bioelectrical impedance technique which is based on the principle that electric current flows at different rates through the body depending upon its composition. The body is composed mostly of water with ions, through which an electric current can flow. On the other hand, the body also contains non-conducting materials (body fat) that provide resistance to the flow of electric current. Adipose tissue is significantly less conductive than muscle or bone. The principal of BIA is that electric current passes through the body at a differential rate depending on body composition. Hence, there is a direct relationship between the concentrations of ions and the electrical conductivity and an indirect relationship exists between the ion concentration and the resistance of the solution. The procedure is as follows: a. Participant stands on the machine barefoot b. low-grade current enters body c. impedance to current offered by tissue is measured d. impedance offered depends on the moisture content of the tissue e. difference in impedance is translated into percentage of tissue in body.

STATISTICAL ANALYSIS:

The collected data were analysed using IBM SPSS Statistics 19 version. The prevalence of underweight, overweight and obesity was calculated under each gender and age. Frequency distribution and Percentages were computed. Mean and Standard deviation was also calculated for television viewing time, sleeping time and time spent on physical activities. Group comparisons were performed using t-Test, ANOVA test and Chi-square test as appropriate.

RESULTS:

In our study, we included a total of 96 adolescents aged between 13-17 years. Body mass index (BMI) was calculated. We divided the students into 3 groups depending on their BMI.

Table 1: Shows Distribution Body Mass Index (kg/m²) among the Adolescents

BMI	No of Students	Percentage
Group 1 <18.5 kg/m ²	36	37.5%
Group 2 18.5 - 24.9 kg/m ²	38	39.58%
Group 3 >25 kg/m ²	22	22.91%

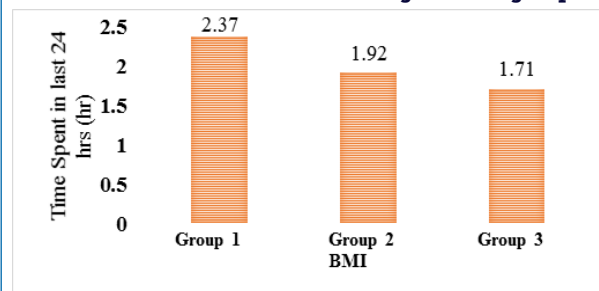
It is evident from the table that 36 students have BMI less than 18.5 kg/m², 38 students have BMI in normal range and 22 students have BMI >25 kg/m².

Table 2: Distribution of Students with Body Mass Index (kg/m²) >25 kg/m²

BMI	No of Students	Percentage
25-30 kg/m ² (over weight)	15	15.6 %
>30 kg/m ²	07	7.3 %

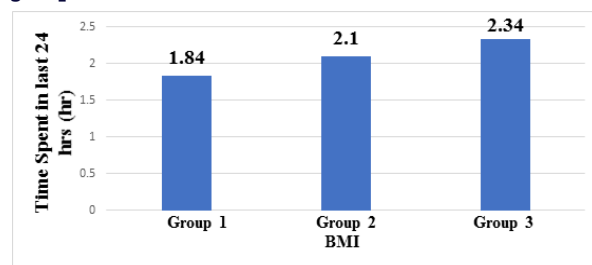
It is evident from the table 2 that the prevalence of overweight is 15.6% and obesity 7.3%.

Figure 1: Shows the correlation between Time Spent in last 24 hours in Exercise versus BMI among the three groups.



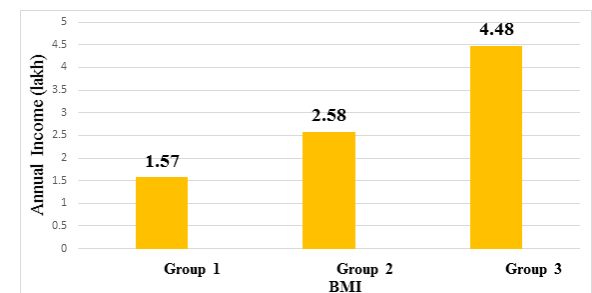
From the figure 1 it is evident that the Time spent in last 24 hours in exercise is inversely correlated to BMI. Participants who spend more time in Exercise had less and normal BMI as compared to those participants who spend less time in Exercise.

Figure 2: Shows the correlation between Time Spent in last 24 hours in Technology versus BMI among the three groups.



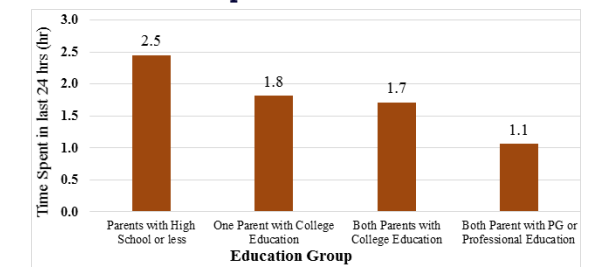
From the figure 2: It is evident that the Time spent in last 24 hours in technology is positively correlated with BMI. Participants who spend more time in technology had increased BMI as compared to those participants who spend less time in Technology.

Figure 3: Shows the correlation between BMI and Household Income



From the figure 3: It is evident that the household income is positively correlated with BMI. Participants whose parent's annual income is more had increased BMI as compared to those parents who had less annual income.

Figure 4: Shows the correlation between time spent in 24 hours in exercise and parent's education



From the figure 4: It is evident that the parent's education is negatively correlated with time spent in exercise. Parents with high school education spend more in exercise as compared to both parents with post-graduation or professional education.

Table 3: Shows Comparison of Duration of Exercise and Body Fat among the Adolescents based on BMI

BMI	Duration of Exercise (in hours)	Body Fat Analysis
Group 1 <18.5 kg/m ²	2.36	14.37
Group 2 18.5 - 24.9 kg/m ²	1.92	22.63
Group 3 >25 kg/m ²	1.71	26.69

Table 3: it is evident that the students of Group 3 have significantly, lesser exercise time with high BMI and increased Body fat analysis

DISCUSSION:

In the present study, we included 96 Adolescents aged between 13-17 years, the prevalence of overweight and obesity were estimated. We found that the prevalence of

overweight and obesity (based on BMI) among adolescents were 15.6% and 7.3% respectively. Our study results are consistent with previous studies conducted by various authors of Delhi⁷⁻⁸, Ludiana⁹⁻¹¹ and Udiapur¹²⁻¹⁵.

The studies on determinants of Adolescent obesity clearly stated that more hours of TV viewing, lack of sleeping time, physical inactivity, high socioeconomic status and dietary transitions were major lifestyle factors causing overweight and obesity among adolescents. BMI is positively correlated with body fat, as evidenced in our study that, those who had increased BMI had increased body fat as compared to those with BMI less than 18.5 kg/m².

On the other hand, we know that malnutrition is a double edge sword. Whereas adolescents from families of elite higher income group are having higher BMI. Their lifestyles are luxurious with increased consumption of junk food. These adolescents come to school in lavish cars and have limited exercise. Adolescents coming from middle class families are coming to school in their bicycles which itself is a good exercise. Also, these adolescents had clinical anaemia due to undernutrition hence BMI is less than 18.5 kg/m².

CONCLUSION:

It is essential to maintain good BMI for a healthy lifestyle Our study shows that a large % of the student body has a BMI outside of the normal range the contributing factors include increased use of technology; lack of exercise, increased consumption of fast food. With the growth in household income, we need to keep the focus on maintaining a good lifestyle. Our study strongly recommends: No less than 2 hrs of exercise, No more than 2 hrs of technology time and 30 min of Yoga.

REFERENCES

1. Elizabeth KE (2007) Nutrition and Child Development, 3rd Revised Edition, Hyderabad Paras Medical Publisher.
2. World Health Organization (2000) Obesity: Preventing and Managing the Global Epidemic Report of a WHO Consultation. WHO Tech Rep Ser No 894. Geneva:World Health Organization.
3. World Health Organization (1996) World Health Statistics Annual 1995. Geneva:WHO
4. Zehra Aycan (2009) Obesity in Childhood: Definition and Epidemiology. J Clinical Research Pediatric Endocrinology (Suppl 1): 44-53, doi: 10.4008/jcrpe.v1i1.25
5. World Health Organization (2013) Obesity and Overweight, WHO Fact sheet N°311 as updated on March 2013. Geneva:WHO.
6. BBC News (2008) Obesity: In Statistics. Published on 2008/01/02, <http://news.bbc.co.uk/1/hi/health/7151813.stm>
7. Marwaha Raman, Tandon Nikhil, Singh Yashpal, Aggarwal Rashmi, Grewal Khushi and Mani Kalivani, (2006). Indian Pediatric. Vol 43, November 17:943-952
8. Sharma A, Sharma K AND Mathur KP, (2007). Growth Pattern and Prevalence Of Obesity In Affluent School Children Of Delhi. Public Health Nutrition. Vol 10 (5) May: 485-491
9. Kaur Supreet, Sachdev HPS, Dwivedi S.N, Lakshmy R and Kapil Umesh, (2008).
10. Prevalence of overweight and obesity amongst school children in Delhi, India. Asia Pac. J. Clin. Nutr. Vol 17 (4): 592-596
11. Chhatwal Jugesh, Verma Manorama and Riar Sandeep Kaur (2004). Obesity among Pre- Adolescent and Adolescent of a Developing Country (India). Asia Pac. J. Clin. Nutr. Vol 3: 231-235.
12. Mohan, Kumar N, Aslam N, Rangbulla A, Kumbkarni S, Sood NK and Wander GS (2004). Prevalence of Sustained Hypertension and obesity in Urban and Rural School going children in Ludhiana. Indian Heart Journal. Vol 56 (4) July-August: 310-31
13. Marwah Poonam, Marwah Ashish and Kaur Paramjeet (2012) To Assess The Prevalence of Obesity Among Affluent School Children In Patiala Punjab And Identify Its Associated Risk Factors. Pediatric Oncall [serial online]: Nov. Vol.9 (11), Art#73. [http:// www.pediatriconcall.com/for doctor/medical](http://www.pediatriconcall.com/for doctor/medical) doi: 10. 7199/ped.oncall.2012.73
14. Kaneria Y, Singh P and Sharma DC, (2006). Prevalence of Overweight and Obesity In Relation To Socioeconomic Conditions in Two Different Groups of School Age Children of Udaipur City (Rajasthan). Journal Indian Academy of Clinical Medicine. Vol. 7 (2) April-June :133-135
15. Jain Seema, Pant Bhawna, Chopra H and Tiwari R. (2011). Obesity among Adolescents of Affluent Public Schools in Meerut. Indian Journal of Public Health. Vol 54 (3) July-September: 158-160.