A study of effect of physical activity intervention on the BMI of school going children

Sanket Nagrale[1*], Mariya P Jiandani[2]

[1]Assistant Professor, Sancheti Institute College of Physiotherapy, Pune, Maharashtra, INDIA.
[2]Associate Professor, Physiotherapy School and Center, Seth G. S Medical College, KEM HOSPITAL, Parel, Mumbai, Maharashtra, INDIA.
Email: nagralesanket@gmail.com, mpjiandani@gmail.com

Abstract
Background: Adolescence is transitional phase between childhood and adulthood characterized by marked acceleration in growth. **Aims and Objectives:** To Study effect of physical activity intervention on the BMI of School Going Children. **Material and Methods:** This study was Carried at the Modern English School and Bharat English high school and stfrancis high school in all the Students 8th and 9th standard having age 13 and 14 were i.e. 200 students enrolled into the study the written and explained consent was taken from the parents the baseline data like Weight, height and BMI was recoded in pre-intervention group during three month i.e. From June 2016 to Sep 2016. All of them instructed to the physical activities like **Curl ups** and **Push ups** for the study Duration and after that Weight, height and BMI again calculated. The statistical analysis was done by Chi-square test and Paired t-test calculated by SPSS 17 version of software. **Result:** Children with BMI Underweight were 119 and 54; Normal or Healthy Weight were 26 and 145; Overweight were 31 and 1 and Obese were 24 and 0 in Pre- intervention and post- intervention group respectively. The Chi-square test was applied to see the statistical significance here the BMI of the children slightly raised but it was statistically highly significant. ($p < 0.001$, $\chi^2 = 159.4$, df=3.) The average BMI (Mean $\pm$ SD) was 25.79 ± 2.49 and 18.95 ± 2.97 in the Pre- intervention and post- intervention group respectively and this observed difference was statistically highly significant (Paired t-test ; $P < 0.0001$, t = 24.95, df = 198). The average weight in the Pre-intervention group was (Mean $\pm$ SD) 42.82 ± 8.2 and average weight in Post-interventional group is 38.21 ± 8.32 this difference was statistically Significant ($p < 0.001$, t = 23.510, df=198). It is also clear that some underweight children gain the weight. **Conclusion:** The school-based physical activity intervention was effective to reduce levels of BMI and average weight(i.e. Obesity and Overweight) in children, so it is useful to prevent future complications of Obesity and coronary heart disease.
Key Words: BMI, physical activity intervention, School Going Children.

Access this article online	
Quick Response Code:	Website: www.statperson.com
	DOI: 22 April 2017

INTRODUCTION

Adolescence is transitional phase between childhood and adulthood characterized by marked acceleration in growth. Failure to achieve optimum nutrition intake at this time can potentially retard physical growth, intellectual capacity and sexual maturation[1]. Around 20% of Global population constitutes of adolescence and most of it resides in developing countries. Hence Health and well-being of such a vast resource must be of high priority. Recently health has become a major instrument of overall socio-economic development and creation of a new social order[2]. In many developing countries, progress of nutritional transition has been characterized by presence of nutritional deficiencies and also increased prevalence of obesity in adolescents. These are fundamentally associated with changes in lifestyle and eating habits simultaneously[3]. Inadequate nutrition and changing lifestyle behavior in adolescence not only leads to problems of under-nutrition and developmental deficiencies but also put them at high risk of chronic diseases. Several socioeconomic and demographic factors are of prime importance which affects adolescence nutritional status. Recently, eating habits in children are changing like low consumption of fruits, green leafy

vegetables and milk and at the same time increase consumption of dry snacks, bakery products and soft drinks. Thus increases adiposity in children[4]. From the recent fitness study, it is came to know that one out of 3 school going children are lacking from healthy **Body Mass Index** (BMI).Recently **EduSports** conducted the Seventh Annual School Health and Fitness Study (2016) in which they revealed that despite of gender, age or city- BMI levels of school going children are not up to the mark[5]. Childhood obesity is a major public health problem, given its increasing prevalence and adverse health consequences.[6]

MATERIAL AND METHODS

This study was Carried at the Modern English School high school and stfrancis high school in all the Students 8th Standards having age 13 were enrolled into the study the written and explained consent was taken from the parents the baseline data like Weight, height and BMI was recoded in pre-intervention group during three month i.e. June 2016 to July 2017. All of them instructed to the physical activities like **Curl ups** and **Push ups** for near about 12 wks. Duration and after that Weight, height and BMI again calculated. BMI is calculated by weight in kg divided by height in Meter square. The nutritional status of children calculated by CDC growth[20] charts –The BMI-for-age percentile growth charts are the most commonly used indicator to measure the size and growth patterns of children and teens in the United States. BMI- for-age weight status categories and the corresponding percentiles were based on expert committee recommendations and are shown in the following table

Weight Status Category	Percentile Range
Underweight	Less than the 5th percentile
Normal or Healthy Weight	5th percentile to less than the 85th percentile
Overweight	85th to less than the 95th percentile
Obese	Equal to or greater than the 95th percentile

Similarly for Girls are also available on the CDC's website used to classify Underweight, Normal or Healthy Weight, Overweight, Obese for girls also respectively. Totally 200 student were participated into study. The statistical analysis was done by Fisher's exact test and Paired t-test calculated by SPSS 17 version of software.

RESULT

Table 1: Distribution of the Children as per the BMI in Pre - intervention and Post -intervention (n=34)

BMI	Pre - intervention	Post - intervention
Underweight	119	54
Normal or Healthy Weight	26	145
Overweight	31	1
Obese	24	0
Total	**200**	**200**

(p< 0.001, χ^2 = 24.24, df=3)

From above Table 1 the Children with BMI Underweight were 119 and 54;Normal or Healthy Weight were 26 and 145; Overweight were 31 and 1 and Obesewere24 and 0 in Pre- intervention and post- intervention group respectively. The Chi-square test was applied to see the statistical significance here the BMI of the children slightly raised but it was statistically highly significant. (p< 0.001, χ^2=159.4, df=3.)

Table 2: Distribution of the Children as per theAverageBMI in Pre - intervention and Post -intervention (n=34)

	Average BM (Mean ± SD)	P-value (Paired t-test)
Pre -intervention	25.79 ± 2.49	P<0.0001, t = 10.2907 df = 66.
Post - intervention	18.95 ± 2.97	

The average BMI (Mean ± SD) was 25.79 ± 2.49and 18.95 ± 2.97in the Pre- intervention and post- intervention group respectively and this observed difference was statistically highly significant (Paired t-test ; P<0.0001, t =24.95, df = 198). The average weight in the Pre-intervention group was (Mean ± SD) 42.82 ± 8.2 and average weight in Post-interventional group is 38.21 ± 8.32 this difference was statistically Significant (p<0.001, t = 23.510, df=198). It is also clear that some underweight children gain the weight.

DISCUSSION

In the United States, the prevalence of obesity among children, defined as body mass index (BMI) greater than or equal to the 95th centile, has more than tripled since 1970.[7,8] The proportion of children 6 to 11 years old exceeding the 95th centile increased from 4.0% in 1971– 1974 to 18.8% in 2003–2004, and the proportion of obese adolescents (12 to 19 years of age) increased from 4.6% in 1966–1970 to 17.4% in 2003–2004.[7,10] Similar trends have been observed in Canada,[9] the United Kingdom[10] and Europe.[11] In addition to the growing numbers of obese children, the proportions of children with BMI greater than the 10th, 50th, 85th and 90th centiles continue to increase, which indicates an increase in

weight for height across the entire population.[7,12] These trends are likely to result in significant increases in the rates of coronary artery disease, hypertension, diabetes mellitus and other obesity-related diseases in young and middle-aged adults.[13–15] This in turn may result in the first-ever decline in life expectancy in the developed world.[16] Reversing the trend of increasing weight for height in children has proven difficult. It is widely accepted that increasing energy expenditure and reducing energy intake form the theoretical basis for management. Therefore, interventions aiming to increase physical activity and improve diet are the foundation of efforts to prevent and treat childhood obesity. Such lifestyle interventions have been supported by recent systematic reviews,[17,18] Children with BMI Underweight were 119 and 54; Normal or Healthy Weight were 26 and 145; Overweight were 31 and 1 and Obese were 24 and 0 in Pre- intervention and post- intervention group respectively. The Chi-square test was applied to see the statistical significance here the BMI of the children slightly raised but it was statistically highly significant. ($p < 0.001$, $\chi^2 = 159.4$, df=3.) The average BMI (Mean ± SD) was 25.79 ± 2.49and 18.95 ± 2.97in the Pre-intervention and post- intervention group respectively and this observed difference was statistically highly significant (Paired t-test ; $P < 0.0001$, t = 24.95, df = 198). The average weight in the Pre-intervention group was (Mean ± SD) 42.82 ± 8.2 and average weight in Post-interventional group is 38.21 ± 8.32 this difference was statistically Significant ($p < 0.001$, t = 23.510, df=198). It is also clear that some underweight children gain the weight. These findings are similar to Participants had mean age of 10.4 years, mean body mass index (BMI) of 19.59 kg/m^2, and 36.8 % of them were overweight or obese at baseline survey. The change in BMI in intervention group (-0.02 ± 0.06 kg/m^2) was significantly different from that in control group (0.41 ± 0.08 kg/m^2). The adjusted mean difference was -0.43 kg/m^2 (95% CI: -0.63 to -0.23 kg/m^2, $P < 0.001$). **Xiao-Hui Li _et al_ [19]** they found the change in BMI in intervention group (-0.02 ± 0.06 kg/m^2) was significantly different from that in control group (0.41 ± 0.08 kg/m^2). The adjusted mean difference was -0.43 kg/m^2 (95% CI: -0.63 to -0.23 kg/m^2, $P < 0.001$).

CONCLUSION

The school-based physical activity intervention was effective to reduce levels of BMI and average weight in children, so it is useful to prevent future complications of Obesity and coronary heart disease.

REFERENCES

1. World Health Organization: Global prevalence and secular trends in obesity. Obesity preventing and managing the global epidemic, report of a WHO consultation on Obesity. Geneva, WHO.1998:17–40.
2. K. Park; Concept of Health and Disease, K. Park, Park's Textbook of Preventive and Social Medicine, 21st Edition, Jabalpur, M/s BanarsidasBhanot Publishers, 2011 : 12.
3. Amin TT, Al-Sultan AI, Ali A. Overweight and Obesity and their Association with Dietary Habits and Sociodemographic characteristics among male primary school children in Al-Hassa, Kingdom of Saudi-Arabia. IJCM 2008; 33(3): 172-173.
4. R. V.Dhobale, Y R Kadam, A D Gore, G BDhumale. Pattern of BMI In School Going Children From Rural Area. Innovative Journal of Medical and Health Science 3 : 3 May – June. (2013) 83 - 87.
5. One among 3 Three Indian Kids Have Unhealthy BMI: Reveals Survey. Available at: http://www.edsys.in/one-among-3-three-indian-kids-have-unhealthy-bmi-reveals-survey/ accessed on 29 April 2017.
6. Reilly JJ, Methven E, McDowell ZC, et al. Health consequences of obesity. Arch Dis Child 2003; 88:748-52.
7. Ogden CL, Flegal KM, Carroll MD, et al. Prevalence and trends in overweight among US children and adolescents, 1999–2000. JAMA 2002; 288:1728-32.
8. Ogden CL, Carroll MD, Curtin LR, et al. Prevalence of overweight and obesity in the United States, 1999–2004. JAMA 2006; 295:1549-55.
9. Shields M. Overweight Canadian children and adolescents. Ottawa (ON): Statistics Canada; 2005 [modified 2008 Nov. 16]. Available: www.statcan.ca/english/research /82-620-MIE/2005001/articles/child/cobesity.htm (accessed 2009 Jan. 16).
10. Jotangia D, Moody A, Stamatakis E, et al.; National Centre for Social Research, Department of Epidemiology and Public Health at the Royal Free and University College Medical School. Obesity among children under 11 [revised]. London (UK): UK Department of Health; 2006. Available: www.dh.gov.uk/en/Publicationsand statistics/Publications/PublicationsStatistics/DH_410924 5 (accessed 2009 Jan. 16).
11. Rolland-Cachera MF, Castetbon K, Arnault N, et al. Body mass index in 7–9-y-old French children: frequency of obesity, overweight and thinness. Int J ObesRelatMetabDisord 2002; 26:1610-6.
12. Fredriks AM, van Buuren S, Wit JM, et al. Body index measurements in 1996-7 compared with 1980. Arch Dis Child 2000;82:107-12.
13. Bibbins-Domingo K, Coxson P, Pletcher MJ, et al. Adolescent overweight and future adult coronary heart disease. N Engl J Med 2007; 357:2371-9.
14. Hayman LL, Williams CL, Daniels SR, et al. Cardiovascular health promotion in the schools: a statement for health and education professionals and child health advocates from the committee on atherosclerosis, hypertension, and obesity in youth (AHOY) of the Council on Cardiovascular Disease in the

Young, American Heart Association. Circulation 2004; 110:2266-75.

15. Sorof JM, Lai D, Turner J, et al. Overweight, ethnicity, and the prevalence of hypertension in school-aged children. Pediatrics 2004; 113:475-82.

16. Olshansky SJ, Passaro DJ, Hershow RC, et al. A potential decline in life expectancy in the United States in the 21st century. N Engl J Med 2005; 352:1138-45.

17. Summerbell CD, Waters E, Edmunds LD, et al. Interventions for preventing obesity in children. Cochrane Database Syst Rev 2005;(3):CD001871.

18. Epstein LH, Goldfield GS. Physical activity in the treatment of childhood overweight and obesity: current evidence and research issues. Med Sci Sports Exerc 1999;31(11 Suppl):S553-9

19. Xiao-Hui Li, Shenting Lin, Hongxia Guo et al. Effectiveness of a school-based physical activity intervention on obesity in school children: a nonrandomized controlled trial.BMC Public Health 2014, 14:1282 http://www.biomedcentral.com/1471-2458/14/1282.

20. About Child and Teen BMI.Available at: https://www.cdc.gov/healthyweight/assessing/bmi/childrens_bmi/about_childrens_bmi.html. acessed on April 2017.

Source of Support: None Declared
Conflict of Interest: None Declared