



**RESEARCH ARTICLE**

**IMPACT OF DIETARY ADVICE ON OVERWEIGHT CHILDREN – RANDOMIZED CONTROL TRIAL**

**Kushboo S. Arora<sup>1</sup>, Mubashir Angolkar<sup>\*2</sup>, Jitendra Kumar Sah<sup>3</sup> and Deepchand Hirach Agre<sup>3</sup>**

<sup>1</sup>MPH, Field Investigator at AIIMS, New Delhi

<sup>2,3</sup>Department of Public Health, J.N. Medical College, KLE University, Belagavi, Karnataka, India

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**ABSTRACT**

**Background:** Overweight and obesity are among the most prevalent nutritional problems both in developed and developing countries. The problem of obesity is confined not only to adults but also to children and adolescents.

**Objectives:** To study the impact of dietary advice on overweight children.

**Materials and Methods:** A randomized control trial was conducted among 8th, 9th and 10th grade aged 11-16 yrs boys in St. Paul High School of Belagavi city. 46 overweight and obese students were randomly assigned into case and control group. A combination of dietary-physical activity intervention was practiced for a period of 6 months. Frequency, percentage and paired t test were calculated.

**Result:** The mean weight of 8th, 9th and 10th grade students of case group after 6 month of intervention decreases from 56.38 to 50, 60.5 to 54.6 and 64.8 to 57.2 which was statistically significant at  $p < 0.05$ . Similarly, mean weight of 8th, 9th and 10th grade students of control group after 6 month of follow up increases from 56.75 to 60.5, 60.6 to 64.8 and 64 to 69.4 which was statistically significant at  $p < 0.05$  only among 9th grade controls.

**Conclusion:** There was a significant reduction in mean weight of cases after 6 month of intervention compared to controls.

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**INTRODUCTION**

Obesity has reached epidemic proportions globally. More than 1 billion adults are overweight and at least 300 million of them are clinically obese. Significantly, obesity is increasing rapidly in developing countries due to undergoing rapid nutrition and lifestyle transition which often coexists with under-nutrition (Bhardwaj *et al.* 2008). Developing countries confront a double jeopardy of epidemics of non-communicable diseases. A continuing burden of infectious diseases and under nutrition among the poorest in these countries has led to excess infant mortality (CECHE, 2008).

The infants that do survive malnutrition and infection are predisposed to obesity, reduced stature, diabetes mellitus, a host of respiratory, musculoskeletal and cardiovascular conditions in adulthood. The incidence of chronic disease is escalating much more rapidly in developing countries than in industrialized countries. According to World Health Organization estimates, by the year 2020, non-communicable diseases will account for approximately three quarters of all deaths in the developing world (Roya *et al.*, 2007). India continues to suffer from malnutrition and infant and maternal

deaths which are the consequences of poverty and underdevelopment. However, major economic and social changes in recent decades have brought a new brand of health problems – non-communicable lifestyle diseases among the rich, the middle class and the poor (CECHE, 2008).

Obesity is a state in which there is generalized accumulation of excess fat in the body leading to a body weight of more than 20% of the required weight. Usually obesity is due to positive energy balance. That is the intake of calories more than the expenditure of calories (Dial for Health, 2000).

Childhood obesity is associated with a higher chance of obesity, premature death and disability in adulthood. But in addition to increased future risks, obese children experience breathing difficulties, increased risk of fractures, hypertension and early markers of cardiovascular disease, insulin resistance and psychological effects (WHO, 2011). For clinical practice and epidemiologic studies, child overweight and obesity are assessed by means of indicators based on weight and height measurements, such as weight-for-height measures or Body Mass Index (CECHE, 2008). A general misconception is prevalent that the obese child is a healthy child and the so

*\*Corresponding author: Mubashir Angolkar*

Department of Public Health, J.N. Medical College, KLE University, Belagavi, Karnataka, India

called “baby fat” will vanish as the child grows. Since the child is constantly fed it becomes obese and remains the same throughout the life. Burdening the students with the studies and academic activities has left no room for physical activities as most of the children are found to be spending more time in front of the computers and the television (Health Directory, 2011). Also junk food joints have become a hot spot for children now days. These junk items taste nice and are exciting for children but are unable to provide the nutrition that is required for healthy living (Kumar *et al.*, 2007). This ensures that our children are getting more than enough calories but not the fiber, vitamins and minerals present in natural food (Dial for Health, 2000). Since most of the parents are working they find it extremely difficult to manage time for preparation of healthy and nutritious food. Thus, with the plethora of fast food and junk food available today, children are finding it hard to eat sensible and wholesome food (Health Directory, 2011).

The rising prevalence of obesity in developing countries is largely due to rapid urbanization and mechanization which has led to reduction in the energy expenditure along with an increase in energy intake due to increased purchasing power and availability of high fat, energy-dense fast foods (Edurite Official Blog's, 2011).

National representative data for childhood obesity in India is unavailable, however available studies of Chennai and Delhi has shown that prevalence of 6.2% and 7.4% respectively. It has been estimated that obesity accounts for 2% to 7% of total healthcare costs (Kumar *et al.*, 2007). There are also other costs to consider such as reduced quality of life and productivity loss attributed to medical leave (Ramachandran *et al.*, 2010).

With this background, the present study was undertaken to intervene and assess the impact of dietary advice on overweight children in the Belagavi city.

## **METHODOLOGY**

A randomized control trial was conducted in St. Paul High School in Belagavi city among 8<sup>th</sup>, 9<sup>th</sup> and 10<sup>th</sup> grade school students aged 11-16 yrs boys for a period of one and half year (August 2010 to February 2012). Children who were found obese and overweight were included in the study. Adolescent who cannot stand, children having chronic illness and parents/children who were not willing to give informed consent/assent were excluded. After seeking permission from the school authority, the class teachers of all three levels were explained about the purpose of the study and also rapport was built with school adolescents. Height and weight of each student of grade 8<sup>th</sup>, 9<sup>th</sup> and 10<sup>th</sup> were checked under the guidance of their physical training teacher. Body weight was recorded to the nearest 0.1 kg using a standardized calibrated scale with subject's bare foot and wearing light clothes. Height was measured to the nearest 0.1 cm with standard wall mounted height board with a sliding head piece according to the protocol: no shoes, heel together, child's heel, buttocks, shoulder and head touching the vertical wall surface with line of sight aligned horizontally and nothing over the head. This helped to calculate the BMI i.e. body mass index thus we could remove the prevalence of obesity and overweight among

students of St. Paul High School. The overweight and obese students, that is 92 and 46 respectively, were traced and they were explained the purpose of the study. Among them only 65 showed interest to participate in the study and rest 75 students quitted due to various reasons (shown in the participant flow chart).

Students who showed interest to participate were requested to call their parents so that a rapport could be built with the parents and a briefing shall be done about the study. Care was taken that this session is only an introductory session in order to avoid bias.

Among these only 46 students parents and students gave assent and consent. Finally, after obtaining a written informed consent and assent we enrolled 46 students. Randomization was then done by using lottery method. Numbers like 1 and 2 were written on the small slips of paper respectively. The paper slips were of the same size. The slips or the balls were thoroughly mixed and students were then requested to pick one. Students who picked up slip with number 1 written were apart of cases group whereas those with 2 were included in control group. Thus, we got 23 students in case and 23 among control groups. Parents of students belonging to cases group were then counseled regarding the risks of obesity and also the effects of overweight on the child's self-image and social interactions. The mothers of the students from cases group were given a questionnaire to fill in order to get an idea about the lifestyle, the type of food the child consumes. Questions were explained to mothers who were illiterate or found difficult to answer any question. Parents were provided a specific calorie-per-day diet chart including guidelines for percentages of fat, protein, and carbohydrates along with micro nutrients to be taken per day according to RDA.

Follow up of the participants after 1 week was done to know how well they are following the diet and if any modification required was done. Every month the weight was checked and noted. And this follow up was continued for about 6 months in both case and control groups.

Keeping food and exercise diaries which will help the child to maintain a daily pattern was suggested. Parents especially mothers were also motivated to keep an eye on their child's diet and behavior. Ethical clearance was obtained from Institutional Ethics Committee (IEC) of KLEU, J.N.M.C. Data was analyzed using SPSS version 16 software. Frequency, percentages and paired t test were calculated.

## **RESULT**

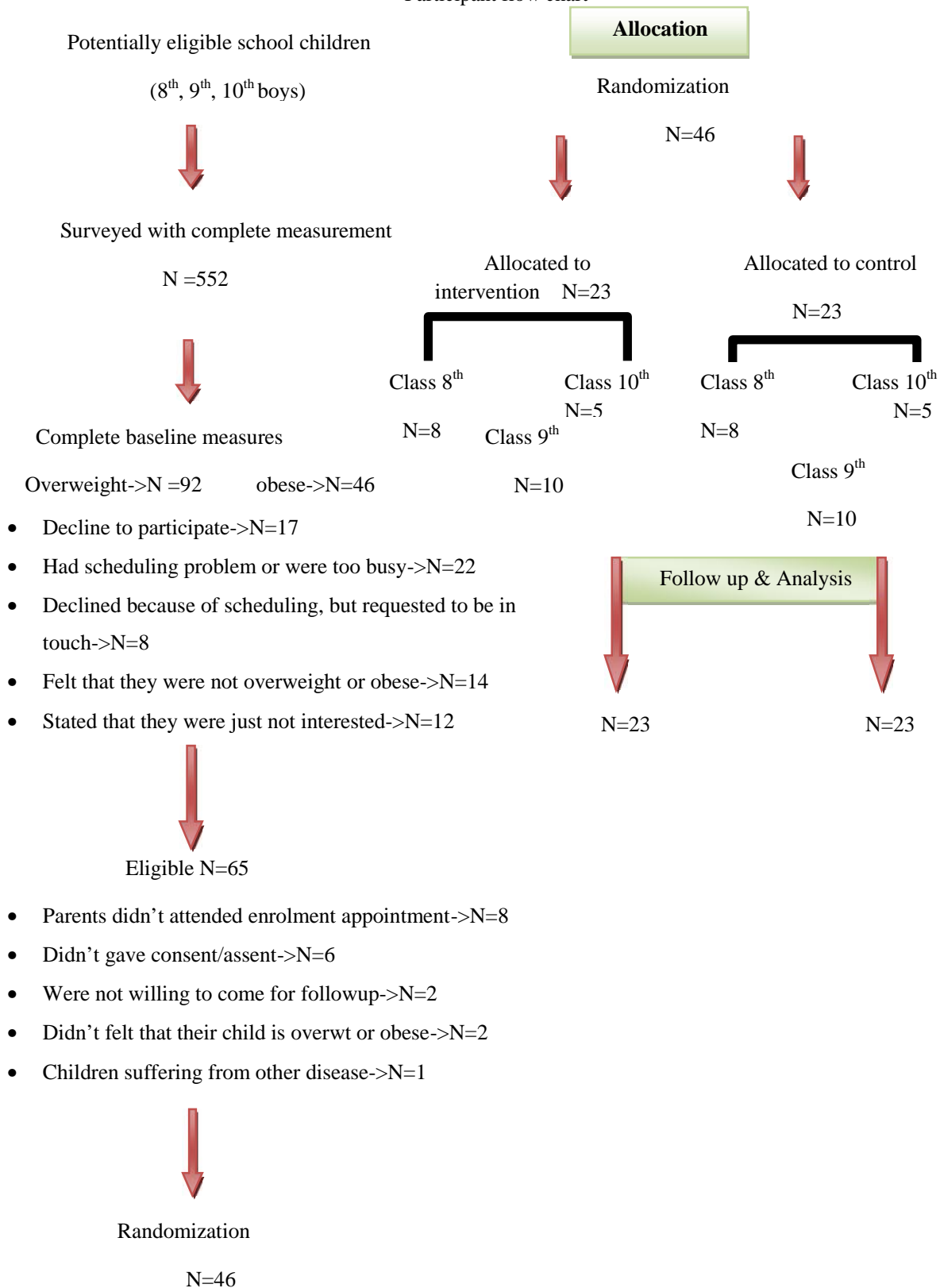
According to WHO Age specific BMI percentiles cut off 414 (75%) children were diagnosed with normal nutritional Status. Of the remaining 138 (25%) students, 46 (8.3%) children were found obese and 92 (16.7%) were found to be overweight. Majority 20 (43.48%) students were from 9<sup>th</sup> grade, 16 (34.78%) were from 8<sup>th</sup> grade and only 10 (21.74%) were from 10<sup>th</sup> grade.

At the start of the study the mean weight of 8<sup>th</sup> grade students in case group was 56.38 which decreased to 50 after

intervention. The mean weight of 9<sup>th</sup> grade students was 60.5, within 6<sup>th</sup> month of intervention it was 54.6. Similarly the mean

The mean weight of non vegetarian cases was 59.91 before intervention which decreased to 52.64 after intervention. At the

Participant flow chart



weight of 10<sup>th</sup> grade students also decreases at 6<sup>th</sup> month of intervention and there was significant association between weight of the children and impact of dietary advice given to them in the course of 6 month of intervention. (Table 1)

start of the study the mean weight of vegetarian cases was 59.75, within 6<sup>th</sup> month of intervention it was 54.25. The mean weight of vegetarian cases decreases from 60.25 to 54.64. The difference between weights of children in relation to their

dietary status was only significant in non vegetarian cases. (Table 2)

**Table 1** Comparison between body weight of case group before and after 6 months

Grade	Before	After	P value
8 <sup>th</sup> (n=8)	56.38±4.37	50±4.5	0.0123*
9 <sup>th</sup> (n=10)	60.5±4.6	54.6±4.81	0.0118*
10 <sup>th</sup> (n=5)	64.8±5.22	57.2±4.66	0.0412*

\*- Significant at p<0.05

**Table 2** Comparison between body weight of case group in relation to dietary status before and after intervention.

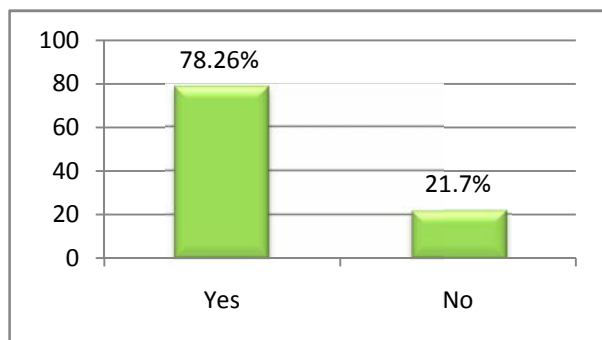
Dietary status	Before	After	P value
Non-vegetarian (n=11)	59.91±4.89	52.64±4.78	0.0021*
Eggetarian (n=4)	59.75±8.42	54.25±6.9	0.3513
Vegetarian (n=8)	60.25±5.39	54.64±5.68	0.0568

\*- Significant at p<0.05

**Table 3** Comparison between body weight of control group before and after 6 months.

Grade	Before	After	P value
8 <sup>th</sup> (n=8)	56.75±2.66	60.5±4.54	0.0633
9 <sup>th</sup> (n=10)	60.6±3.75	64.8±4.61	0.017*
10 <sup>th</sup> (n=5)	64±5.74	69.4±5.68	0.1735

\*- Significant at p<0.05



**Figure 1** Parents opinion on dietary advice and weight loss among cases.

**Table 4** Comparison of mean reduction of weight in both case and control group.

	8 <sup>th</sup> grade		9 <sup>th</sup> grade		10 <sup>th</sup> grade	
	Case group	Control group	Case group	Control group	Case group	Control group
Mean	6.38	4.25	5.9	4.8	7.6	5
SD	2.5	2.31	3.25	2.57	2.3	3.16
P value	0.0001*		0.0001*		0.0001*	

\*- Significant at p<0.05

At the start of the study the mean weight of 8<sup>th</sup> grade students in control group was 56.75 which increased to 60.5 after 6 months. The mean weight of 9<sup>th</sup> grade students was 60.6, within 6<sup>th</sup> month of follow up it was 64.8. Similarly the mean weight of 10<sup>th</sup> grade students also increases from 64 to 69.4 after 6<sup>th</sup> month of follow up and the difference between weight of the children was only significant among 9<sup>th</sup> grade controls. (Table 3)

18 (78.26%) parents of case group agreed that dietary advice leads to weight loss, where as 5 (21.70%) disagreed. This reveals that majority of the parents were aware with the fact that dietary advice leads to weight loss among their kids. (Figure 1)

More reduction in weight was found in case group as compare to control group. The difference between case and control

group in terms of mean weight reduction was statistically significant. (Table 4)

## DISCUSSION

Obesity is a global nutritional concern. In the present study the proportion of children who are overweight (16.7%) is higher compared to obese (8.3%) children. Similar findings were reported in Surat city using same definition i.e. BMI >85<sup>th</sup> percentile is overweight and >95<sup>th</sup> is obese. Though difference was very small and statistically non-significant but still the percentage of obesity and overweight was higher 6.7% and 15.1% in boys and 6.4% and 13.35% in girls, respectively (Goyal et al., 2010).

According to present study there is a significant association between weight of the child and impact of dietary advice given to them in the course of 6 month of intervention. At the start of the study there wasn't any significant difference in the weight of the cases, but as we reached to the 6<sup>th</sup> month of follow up a statistically significant difference was seen in the weight of the cases. However no significant difference was found in the weight of the controls.

At 12 months, children in the intervention group had reduced their waist and BMI z-scores by 0.47 and 0.23 respectively (Paul et al., 2010). Family based dietary and behaviour counselling strategies resulted in reduction of obesity among cases compared to controls (Epstein et al., 2000).

There was significant difference between mean of weight among non vegetarian case group but it was not significant in terms of eggetarian and vegetarian case group. The main reason for weight loss in non vegetarian case was that during intervention quantity and also the frequency of consumption of non vegetarian within a week was restricted and calculated based on their RDA.

According to present study, (78.26%) parents of case group agreed that dietary advice leads to weight loss. A study done among children revealed that greater parental nutrition knowledge is associated with lower prevalence of overweight children (Variyam, 2001).

## CONCLUSION

There was a statistically significant association between dietary advice and weight loss among all students belonging to case group and significant difference was seen among non vegetarian. Thus, we conclude that inculcating healthy lifestyle and beneficial dietary habits will not only keep them in shape but will also prevent them carrying from health problems into adult life and reduce their likelihood of developing disease like diabetes, cancer and cardiovascular diseases.

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## References

1. Bhardwaj, S., Misra, A., Khurana, L. *et al.* 2008. Childhood obesity in Asian Indians: a burgeoning cause of insulin resistance, diabetes and sub-clinical inflammation. *Asia Pac J Clin Nutr*, 17 (S1):172-175.
2. CECH.org. A Symposium- Caring For Children: A Global Perspective. 2008. Retrieved from: <http://www.ceche.org/programs/gtucdc/globalhlth.htm>.
3. CECH.org. India Faces New Health Challenges in 21<sup>st</sup> Century. 2008. Retrieved from: <http://www.ceche.org/publications/infocus/spring2007/IndiaHealthChallenges.html>.
4. DialforHealth.net.org. Diet & Nutrition>Obesity. 2000. Retrieved from <http://www.dialforhealth.net/diet/obesity.asp>.
5. Edurite Official Blog's. Rise in the child obesity in India. 2011. Retrieved from <http://www.edurite.com/blog/rise-in-the-child-obesity-in-india/1554/>.
6. Epstein, L.H., Paluch, R.A., Gordy, C.C., Dorn, J. 2000. Decreasing sedentary behaviors in treating pediatric obesity. *Arch Pediatr Adolesc Med*, 154:220-226.
7. Goyal, J., Kumar, N., Parmar, I. *et al.* 2011. Determinants of overweight and obesity in affluent adolescent in Surat city, South Gujarat region, India. *Indian J Community Med*, 36:296-300.
8. Health Directory. Childhood obesity: Common Causes. 2011. Retrieved from <http://www.mdhil.com/childhood-obesity-common-causes/>.
9. Kumar, S., Mahabalaraju, D.K., Anuroopa, M.S. 2007. Prevalence of Obesity and its Influencing Factor among Affluent School Children of Davangere City. *Indian Journal of Community Medicine*, 32(1):15-17.
10. Paul, M., Kolotourou, M. *et al.* 2010. Randomized Controlled Trial of the MEND Program: A Family-based Community Intervention for Childhood Obesity. *Obesity*, 18(S1):62-68.
11. Ramachandran, A., Snehalatha, C. 2010. Rising Burden of Obesity in Asia. *Journal of Obesity*, 2010:8.
12. Roya, K. 2007. Childhood Overweight, Obesity, and the Metabolic Syndrome in Developing Countries. *Oxford Journals*, 29(1):62-67.
13. Variyam, J.N. 2001. Overweight children: Is parental Nutrition Knowledge a factor? *Food Review*, 24(2):18-22.
14. WHO. Obesity and overweight. 2011. Retrieved from <http://www.who.int/mediacentre/factsheets/fs311/en/>.

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