

## Effect of Twelve Weeks Behaviour Modification Programme on Obesity

Surajit Majumder<sup>1</sup>

### Abstract

---

The aim of this study was to finding out the effect of 12 weeks behavior modification programme on Obesity. Forty subjects were selected from two different schools at Ashokenagar, West Bengal, India. All the subjects were randomized by [www.randomizer.org](http://www.randomizer.org) into two groups: Experimental Group (N = 20) and Control Group (N = 20). The Experimental Group received 12 weeks behavior modification (BM) programme. The Behavior-modification programme consisted of two components, namely a Physical activity component and a Nutrition education component. Control Group did not receive any treatment. The Body Mass Index (BMI), Body Composition and Abdominal Adiposity were selected as variables. The collected data were analyzed by using ANCOVA. The results showed that there were significant effect on BMI, Body Composition and Abdominal Adiposity. This finding strongly supports that behavior modification programme reduced BMI, Body Composition and Abdominal Adiposity significantly.

---

**Keywords:** Obesity, BMI, Body Composition, Behavior Modification

### 1. Introduction

The World Health Organization (*WHO*) defines overweight and obesity as “abnormal or excessive fat accumulation that may impair health” (*World Health Organization, 2006*). Obesity represents the most common chronic illness of children and adolescents.

---

<sup>1</sup> Research Scholar, Department of Physical Education, University of Kalyani, Village- Banipur (Near Physical College), Post Office- Banipur, Dist.- North 24 Parganas, Pin No.- 743233, State- West Bengal, India. Mobile No.- 9933733126, E-mail: [majumdersurajit98@gmail.com](mailto:majumdersurajit98@gmail.com)

The World Health Organization has declared obesity as a “worldwide epidemic” since the pattern has been repeated in developing countries combined with the increase in more developed nations (*WHO, June 1997*). Childhood obesity has been called “one of the most serious public health challenges of the 21st century”, (*WHO, 2012*). Obesity can harm nearly every system in a child’s body—heart and lungs, muscles and bones, kidneys and digestive tract, as well as the hormones that control blood sugar and puberty and can also take a heavy social and emotional toll (*Ebbeling et al., 2002*).

Obesity treatment programmes for children and adolescents include Drugs, Surgery, Physical activity, Diet Management and Behavior Modification. Behavior Modification is the systematic approach to change behavior. Young et al. (2004) investigate the effect of behavior modification on body image, depression and body fat in obese elementary children. The experimental group received 60-70 minutes of behavior modification, once a week, for 8 weeks. The result indicates a significance improvement of body image and a reduction in the increase rate of body fat for the experimental group. This finding strongly supports the theory that behavior modification can be used as an effective strategy in the treatment of obese children. There were many other studies that support the findings of Young et al., 2004 (Raheleh et al., 2008; Hitomi et al., 2009; Mak et al., 2010; Meghan et al., 2011; Tahereh et al., 2012; Toulabi et al., 2012).

Very little effort had been made so far in the area of obesity management through behavior modification of obese school boys. Furthermore no such evidence was found which evaluating the treatment containing a behavior modification programme on Indian obese population. Thus the researcher was interested to investigate in this area.

## **2. Methods**

For the present study 40 subjects were selected from two different schools at Ashokenagar, North 24 parganas, West Bengal, India. The age of the subject was 10 to 13 years. The percentile value of Body Mass Index (BMI) of all the subjects was 95th to 100th percent. In the present study the criterion measures were Body Mass Index, Body Composition and Abdominal Adiposity. Body Mass Index (BMI) was calculated as a person’s *Body Mass* in kilograms divided by the *squared Height* in meters i.e. in  $\text{kg}/\text{m}^2$ . Body Composition was measured by Bio-Impedance-Analyzer (BIA) machine (Omron Body Fat Analyzer, HBF-306).

Abdominal Adiposity was measured by measuring Waist circumference of the subjects through steel tape (M/s. Fremans Ltd.).

**Figure 1 & 2: Subjects**



## 2.1 Study Design

In total, 40 subjects were included in the study on the basis of inclusion and exclusion criteria. All the subjects were randomized by [www.randomizer.org](http://www.randomizer.org) into two equal groups: Experimental Group (N = 20) and Control Group (N = 20). The Experimental Group received 12 weeks behavior modification (BM) treatment and Control Group did not receive any treatment.

## 2.2 Behavior Modification Training Programme

The duration of the behavior-modification programme was 12 weeks and took place five times a week after school hours. It consisted of two components, namely a Physical activity component that was offered four days a week and a Nutrition education component which took place once a week.

### 2.2.1 Physical Activity Component

The physical activity component, with the aim of promoting a pleasant exercise experience with the company of their peers. The investigators chose not to emphasize training intensity and did not request heart rate monitoring or a rating of perceived exertion. The emphasis instead focused on attaining a high degree of calorie expenditure. The physical activity session was given once a day, 4 days per week (Monday to Thursday) after school hours. All physical activity sessions included a warm-up, aerobic activities, a recreational activity and a cool-down exercise supervised by investigator. Children of the training group participated 40 to 70 minutes supervised physical activity session for 12 weeks. There was a 10-min warm-up at the beginning of each session, which included Jogging, stretching, bending and rotation exercise. Aerobic activities included in the program were walking and running. These activities were organized into five minute bouts of each exercise. Five minutes were added to the aerobic phase each two weeks until the total duration of aerobic phase reached 30 minutes. In each session there was a recreational programme of 15 minutes duration followed by the aerobic phase with a view to refresh the children and reenergize for the next day. Recreational activities included playing basketball, football, hand ball, volley ball, badminton and various minor games. At the end of each session, there was a 5 minutes cool-down with light activities which relaxed subjects to their resting condition.

**Table 1: 12 Weeks Specific Physical Activity Programme**

Week	Training In Minutes
Warm Up	10 Minutes (Jogging, stretching, rotation and bending exercise)
First two weeks	Walking 5 Minutes and Running 5 Minutes
Third and fourth weeks	Walking 10 Minutes and Running 5 Minutes
Fifth and sixth weeks	Walking 10 Minutes and Running 10 Minutes
Seventh and eighth	Walking 15 Minutes and Running 10 Minutes
Ninth and tenth	Walking 15 Minutes and Running 15 Minutes
Eleventh and twelfth	Walking 20 Minutes and Running 15 Minutes
Recreational activity	15 Minutes (Modified football, hand ball, basket ball, tunnel ball relay, under and over relay and various tag games)
Cool down	5 Minutes (slow jogging, light stretching and slow rotation exercises)

### 2.2.2 Nutrition Education Component

The nutrition education component, with the aim of adapting the healthy lifestyle of the subjects, took place over a period of three months, generally from month of February to May. There are twelve lessons each lesson should last about 30 minutes and last five minutes of each lesson was interactive. The purpose of the program is to influence obese children to think about what they are eating and to make wise choices. The children are introduced to the concepts of major components of food (proteins, fats and carbohydrates), to the food pyramid and a balanced diet and to the relationship of exercise to health. It also consisted of lessons on healthy eating habits, nutrition choices, self-perception, methods to increase physical activity and addressing physical activity goals.

### 2.3 Statistical Procedure

Analysis of co-variance (ANCOVA) statistical technique was used to test the differences among the experimental and control groups.

### 3. Results and Discussion

#### 3.1 Results

The statistical analysis comparing the initial and final means of experimental group and control group on Body Mass Index is presented in table 2.

**Table 2: Computation of Analysis of Covariance on Body Mass Index (Scores in kg / m<sup>2</sup>)**

Test	Exp. Group	Control Group	Source of Variance	Sum of Squares	df	Mean Squares	Obtained F
Pre-Test Mean $\pm$ SD	24.805 $\pm$ 01.230	24.460 $\pm$ 01.237	Between	1.1902	1	1.1902	0.7826
			Within	57.797	38	1.521	
Post Test Mean $\pm$ SD	22.110 $\pm$ 01.254	24.295 $\pm$ 01.214	Between	47.742	1	47.742	*31.34
			Within	57.888	38	1.5234	
Adjusted Mean	21.950	24.455	Between	61.5	1	61.5	*282.34
			Within	8.06	37	0.218	

\*Table value of 'F' Indicates Significant at 0.05 level of confidence for df (1, 38) = 04.10 and for df (1, 37) = 04.11

The statistical analysis comparing the initial and final means of experimental group and control group on Body Composition is presented in table 3.

**Table 3: Computation of Analysis of Covariance on Body Composition (Scores in Percentage)**

Test	Exp. Group	Control Group	Source of Variance	Sum of Squares	df	Mean Squares	Obtained F
Pre-Test Mean $\pm$ SD	28.365 $\pm$ 02.318	28.235 $\pm$ 02.444	Between	0.169	1	0.169	0.0298
			Within	215.55	38	5.6724	
Post Test Mean $\pm$ SD	26.440 $\pm$ 02.221	28.590 $\pm$ 02.445	Between	2.445167	1	46.225	*8.4716
			Within	207.35	38	5.4565	
Adjusted Mean	26.378	28.652	Between	51.71	1	51.71	*219.37
			Within	8.72	37	0.236	

\*Table value of 'F' Indicates Significant at 0.05 level of confidence for df (1, 38) = 04.10 and for df (1, 37) = 04.11

The statistical analysis comparing the initial and final means of experimental group and control group on Abdominal Adiposity is presented in table 4.

**Table 4: Computation of Analysis of Covariance on Abdominal Adiposity (Scores in Centimeters)**

Test	Exp. Group	Control Group	Source of Variance	Sum of Squares	df	Mean Squares	Obtained F
Pre-Test Mean $\pm$ SD	88.525 $\pm$ 05.130	88.365 $\pm$ 05.725	Between	0.256	1	0.256	0.0087
			Within	1122.8	38	29.548	
Post Test Mean $\pm$ SD	86.005 $\pm$ 05.130	88.850 $\pm$ 05.781	Between	80.94	1	80.94	2.7098
			Within	1135	38	29.869	
Adjusted Mean	85.925	88.930	Between	90.27	1	90.27	*246.74
			Within	13.54	37	0.366	

\*Table value of 'F' Indicates Significant at 0.05 level of confidence for df (1, 38) = 04.10 and for df (1, 37) = 04.11

### 3.2 Discussions

This study investigated the effect of twelve weeks behavior modification programme on Body Mass Index (BMI), Body Composition and Abdominal Adiposity of obese school boys. It was seen that most of the subjects were habituated with unscientific caloric intake per day and also sedentary life style. The bad dietary habits and lifestyles were changed by the behavior modification program of the present study. In this context they have got sufficient knowledge in order to modify or control the calorie intake and increase activity so that the degree of obesity will eventually decrease. The result of the study shows that by getting the behavior modification treatment their body weight had reduced. As a result the BMI of the experimental group is also significantly reduced. It was also seen that due to the behavior modification program the Body Composition and Abdominal Adiposity reducing. Young et al., 2004, Raheleh et al., 2008; Hitomi et al., 2009; Mak et al., 2010; Meghan et al., 2011 etc. reported that behavior modification can be used as an effective strategy in the treatment of obese children. The findings of the present study confirm with the findings of Young et al., 2004, Raheleh et al., 2008; Hitomi et al., 2009; Mak et al., 2010; Meghan et al., 2011.

#### 4. Conclusions

Within the limitations of the study, the following conclusions were drawn:

- i. Twelve weeks behavior-modification programs significantly reduced Body Mass Index.
- ii. Twelve weeks behavior-modification programs resulted significantly decreases Body Composition.
- iii. Participation in twelve weeks of behavior-modification programs resulted significantly decreases Abdominal Adiposity.

#### References

- Ebbeling, C.B., Pawlak, D.B., & Ludwig, D.S. (2002). Childhood obesity: public-health crisis, common sense cure. *The Lancet*, 360(9331), 473-482.
- Lobstein, T., Bau,r L., & Uauy, R. (2004). Obesity in children and young people: a crisis in public health. *Obesity Review*, 5(1), 4-85.
- World Health Organization. (1997). *Obesity: Preventing and Managing a Global Epidemic*. Retrieved from [http://www.who.int/nutrition/publications/obesity/WHO TRS 894/en/index.html](http://www.who.int/nutrition/publications/obesity/WHO_TRS_894/en/index.html)
- World Health Organization. (2006). *Obesity and overweight*. Retrieved from <http://www.who.int/mediacentre/factsheets/fs311/en>
- World Health Organization. (2012). *Prioritizing areas for action in the field of population-based prevention of Childhood Obesity*. Retrieved from [http://www.who.int/dietphysicalactivity/childhood/Childhood\\_obesity\\_Tool.pdf](http://www.who.int/dietphysicalactivity/childhood/Childhood_obesity_Tool.pdf)
- Young, I.M., Ho, R.P., Hyun, y. K., & Hyo, S.K. (2004). Effect of behavior modification on body image, depression and body fat in obese Korean elementary school children. *Yonsei Medical Journal*, 45(1), 61-67.
- Raheleh, S.S., Marziye, K., Mohamad-Hosseini, K., & Hamidreza, T. (2008). The Effect of Dietary Behavior Modification on Anthropometric Indices in Obese Adolescent Female Students. *Iranian Journal of Pediatrics*, 18(1), 71-76.
- Hitomi, S., Yutaka, K., Sawako, T., Nana, T., Akinori, N., Takano, B., & Suguru, S. (2009). Psychological factors that promote behavior modification by obese patients. *Bio Psycho Social Medicine*, 3, 3:9. doi: 10.1186/1751-0759-3-9.
- Mak, K.K., Ho, S.Y., Lo, W.S., Thomas, G.N., McManus, A.M., Day, J.R., & Lam, T.H. (2010). Health-related physical fitness and weight status in Hong Kong adolescents. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/20178615>
- Meghan, L.R., Kate, A.H., Todd, B., & Nancy, F. (2011). Outcomes of a Family Based Pediatric Obesity Program - Preliminary Results. *International Journal of Exercise Science*, 4(4), 217-228.
- Bharati, D.R., Deshmukh, P.R., & Garg, B.S. (2008, Jun). Correlates of overweight and obesity among school going children of Wardha city. *Indian Journal Med Res.*, 127(6), 539-543.
- De, Onis. M., Blossner, M., & Borghi, E. (2010, November). Global prevalence and trends of overweight and obesity among preschool children. *American Society for Nutrition*, 92(5), 1257-1264.



- Tahereh, T., Fariba, A., Hedayat, N., & Mahnaz, M. (2012, March). The influence of a behavior modification interventional program on body mass index in obese adolescents. *Journal of the Formosan Medical Association*, 111(3), 153-159.
- Tahereh, T., Fariba, A., Hedayat, N., & Mahnaz, M. (2012, March). The influence of a behavior modification interventional program on body mass index in obese adolescents. *Journal of the Formosan Medical Association*, 111(3), 153-159.