Research Article

A Study to Determine the Effectiveness of a School-based Intervention Program on Selected Health-related Behavior Patterns Among Adolescents in Vellore

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Abstract

Adolescent obesity is an epidemic in both developed and developing countries. Some countries in Asia showed an increase in obesity rate among children; for example, China 11.3%, Malaysia 8.4%, Japan, 21.7% in boys and 17.4% in girls, and Singapore 19.4% in boys and 14.6% in girls [1]. Lack of physical activity among adolescents is the main reason for obesity among all age group especially adolescents. In addition they are not provided with adequate time to participate in games and other physical activities. The natural consequences of over-nutrition, sedentary lifestyles, unhealthy eating, and wrong choices of food preferences and lack of exercise will increase the childhood obesity in developing countries like India [1,2].

Many studies done in Tamil Nadu show the increasing prevalence of obesity among the adolescents. The prevalence of overweight and obesity among young female college students aged 17-21 years was found to be 13.2% and 5.2%, respectively in Chennai city in Tamil Nadu [3].

A study done on 1898 school going adolescents (6th to 10th std) in Salem city, Tamil Nadu. The overall prevalence rate of overweight/obese among adolescents was found to be 12.11%. The highest prevalence was observed at the age of 14 years (15.76%). The prevalence rate of overweight/obese was higher in rural (13.16%) than urban (11.33%) area. Consequently, the prevalence rate of overweight/obesity was higher in rural girls (15.88%) and urban girls (13.74%) compared with boys (12.18%) in rural and (10.45%) urban areas. The highest rate of prevalence was observed at the age of 15 years (14.42%) in urban and 12 years (8.30%) in a rural area [4]. Studies have reported 12% overweight and 6.3% obese among boys and girls aged 12-16 years in Thiruvananthapuram [5], A total of 900 adolescents in the age group of 12 to 15 years were analysed in south Karnataka. Out of these 461 (51.2%) subjects were males. The mean BMI of the sample was 17.3 kg/m2, 13.1%.

Overweight and 4.3% obese among school girls (9-18 years) in Bengaluru [6]. An interventional study was conducted among 6000 Indian school children at Hyderabad, Andhra Pradesh. This study finding revealed the degree of obesity (>30% body fat) in all subjects was 30.19%, where in affluent schools obesity percentage was 50.47 and in non- affluent schools it was 19.92%.The overall prevalence of overweight among adolescents was 9.9% and obesity was 4.8%. The prevalence of overweight was 9.3% among boys and 10.5% among girls; 5.2 and 4.3% were obese, respectively. However, according to the Body Mass Index cut off values, 23.9% (215) were underweight (< 18.5), 60.6% (546) were normal (18.5 - 24.9), 11.4% (103) were overweight (25 - 29.9), and 4% (36) were obese (30 and above). A multivariate logistic regression analysis revealed that the risk of overweight was two times higher among the adolescents of high SES, 21 times higher among those participating < two hour/week in any type of physical activity, 7.3 times higher among those who reported watching television and playing games on the computer for ≥ four hours/day, and 5.6 times higher among those who ate chocolates daily in addition to a normal diet [7,8] and 15.8% overweight and 2.7% obese among girls (13-18 year) in Chennai.

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Prevalence of obesity increased from rural (12.8%) than in urban (14.6%) area and overweight is increased from rural (25.8%) than urban (26.3%) area in the age 14-16 years Surat, Gujarat [8]. A study conducted in Amristar, Punjab on 10-15year old adolescents, the prevalence was found to be 9-11% [9]. A study in urban areas of India (WHO criterion used) showed that overweight and obesity among early adolescent school girls was 12.9% and 9.9%, respectively. Bose., et al. [7] reported that the extent of overweight and obesity was 17.63% and 5.10% among affluent Bengalee school girls [10].

Keywords: Adolescents; Obesity; Overweight; Effectiveness

Introduction

The aim of this study was to assess the effectiveness of interventional program which consisted of structured training on over weight and obesity reduction and Zumba exercise for adolescents who attend school (both private and government) from randomly selected schools in Vellore.

Operational definitions

- **Overweight:** Refers to the Body Mass Index above 25 up to 30.
- **Obesity:** Refers to the Body Mass Index over 0 up to 35.
- **Effectiveness:** In this study, "effectiveness" means change in the intervention group's health-related behavior like the physical activity, eating and sleeping habits of the adolescents
- Each Zumba session was done for an hour, three days a week for three months. The duration was standardised. It was done between 9 am and noon or 2 pm and 4 pm in the evenings.
- The physical education teacher of each school helped in assessing the physical fitness of the participants.
- **School-based Intervention:** In this study, "school-based intervention" means an hour of physical activity (Zumba aerobic dance exercise for three days a week over three months and four sessions of structured training twice a month for two months (The training focused on the definition, prevalence, risk factors, consequences, prevention and management of obesity in four sessions on divided topics. Each session was for 30-40 minutes. Pamphlets in English and Tamil were given to them on the topic "prevention and management of obesity" (Appendix 3).
- **Hypothesis:** Interventions provided to adolescents at school will increase the physical activity and change the eating, sleeping as well as sedentary behavior at 3 and 6 months as compared to the control group.

- **Limitation:** Data on physical activity, eating, sleeping habits and sedentary behavior of children were reported by parents (self-reporting of parents) and, therefore could have memory and recording errors.
- **Projected outcome of the study:** The study results will enable us to determine the prevalence of overweight and obesity among Vellore school going adolescents; it will enable also to determine the perception about obesity among the adolescents and their parents as well determine the risk factors the risk factors. It will help to appreciate and be aware of the effectiveness of 'Zumba exercise and the structured teaching program on BMI, and it's reduction, and its effect on the modification of health risk behaviours. It will enable us to recommend to the state to include physical fitness for adolescents every day an hour. The interventions would be continued in the schools of Vellore as an ongoing effort. There would also be community educational programs initiated to highlight this issue.

Conceptual frame work

Figure a

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Methods
Research design: Experimental design
Setting of the study

The study was conducted in both private and government schools of Vellore city.

There were 32 higher secondary schools in Vellore of which 12 were Government schools, and 20 were Private schools. From these schools four private and four government schools were selected randomly and allocated in to control and experimental groups randomly two each. So there were two private schools and two government schools in control group as well as experimental group.

Experimental group

The private schools under experimental group were Shristi, and Bharat Matriculation and the government schools under experimental group were Virupatchipuram and Thorapadi higher secondary schools.

Control group

The private schools under control group were Desia Matricualtion, and Seventh Day Adventist, Higher Secondary school. The government schools under control group were Sathuvachari higher secondary, Katpadi, and EVRN girls Higher secondary schools.

Population

All adolescents are attending schools in Vellore city and their parents. There are thirty two schools in Vellore. Each school (higher secondary) has a minimum of four sections in each grade and in each section there are 40-50 students. Minimum of thousand students study in each of these schools.

Sample

The adolescents and their mothers who consented to be part of the study fulfilling the selection criteria were the samples for the study.

Sample size calculation

$$n_0 = \frac{Z^2 pq}{e^2}$$

The proportion of overweight or obesity was reported to be nearly 15% [1]. It was proposed that the intervention would reduce the outcome by 5% to 6%. Keeping alpha and beta errors at 5% and 20% respectively, the sample size needed was nearly 700 for 5% reduction and 370 for 6% reduction. However, we have decided to study 400 in each arm. As this is a cluster based design and in the absence of Intra-class Correlation Coefficient (ICC), the investigator inflated this number by 1.5 times more. It was calculated to study nearly 600 subjects per arm.

Formula for calculating sample size is

$$n_0 = \frac{Z^2 pq}{e^2}$$

Where:
- e is the desired level of precision (i.e. the margin of error),
- p is the (estimated) proportion of the population which has the attribute in question,
- q is 1 - p.

The z-value is found in a Z table.

Criteria for sample selection

Adolescents from 1-18 years of age are studying in sixth, seventh, eighth, ninth and eleventh standard were included for the study.

Inclusion criteria for subjects in the school

- Subjects who were from 10-18years of age.
- Subjects who can read and write either English or Tamil.

Exclusion criteria for subjects

- Subjects who are sick requiring medical attention
- Subjects with any co-morbid conditions such as renal disorders etch where there is physician recommended
- Subjects from 10th physical activity and 12th standard were excluded due to their board exams.

Inclusion criteria for parent

- Parent of the subject who can read and write either Tamil or English.

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Exclusion criteria for parent:

- Parent who is not consenting to participate.
- Parent who is sick and unable to participate.

Method of sample selection

The adolescents were from 6th std to 9th std, and 11th std were considered for selection. There were 4 to 5 sections in each standard and 30 to 40 children in each class. From each section of a class, the investigator selected randomly 5 to 6 children using lottery method. There were 150 to 200 children per class per school who are the potential numbers to be selected. Totally there were 300 subjects, each from Government and private schools. There were 600 adolescents in the intervention group and 600 in the control group.

Concealment and blinding

Randomization of schools and also a random selection of children from each section of each grade in schools were done to avoid sampling bias.

Prevention of contamination

The investigator finished data collection of the control group first and then only collected data of the experimental group. Different schools were selected for intervention which was away from the schools in control group to minimise contamination of information.

The investigator after obtaining clearance from the College of Nursing, ethical committee and Institutional Review Board of C.M.C Vellore, sought permission from the Chief Educational Officer to conduct the study in the schools of Vellore city. The school principals were contacted to obtain permission and to learn the feasibility of the study methods.

Data collection tools

The demographic details were filled by one of the parents (Appendix 1).

To assess the health related factors, a questionnaire with 27 questions were used, which was completed by the participants and one of the parent's (Appendix 2). This was assessed before and after intervention.

The school based intervention program (Zumba exercise and structured teaching sessions) was used for the experimental group which were physical activity; eating, sleeping and sedentary behavior in children before and after the intervention was assessed.

Validity and reliability

The content validity of the tools had been already checked by the investigator who had done a study on obese children attending Child Health OPD in the year 2009, this study involved only teaching and no physical activity interventions. The validated tool was used for the study. (Content Validity score: 1) Reliability was checked by performing a pilot study.

Statistical analysis

The data was screened for outlier and extreme values using the histogram, Box-Cox plots. Independent "t" test was used to find the effectiveness of the school based intervention on the risk factors such as eating, sleeping and physical activity.

Results

Health-related behaviour (risk factors)

Physical Activity								
Student Class	Inadequate	%	Moderately Adequate	%	Adequate	%	Total N0	%
6th Class	139	11.58	66	5.55	35	2.90	240	20.03
7th Class	126	10.5	80	6.66	34	6.70	231	23.86
8th Class	115	9.58	79	6.58	46	3.83	240	19.99
9th Class	109	9.08	81	6.75	49	4.08	239	19.91
11th Class	109	9.08	92	7.66	49	4.08	250	20.82
Total	598	49.82	398	33.2	204	21.59	1200	100

Table 1: Distribution of adolescents' physical activity based on the grade (N = 1200).

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It's shown in the above table that the adolescents of lower classes such as sixth and seventh had poor or inadequate physical activity (57.9%) in comparison to the higher grades such as ninth and eleventh students (45.2%).
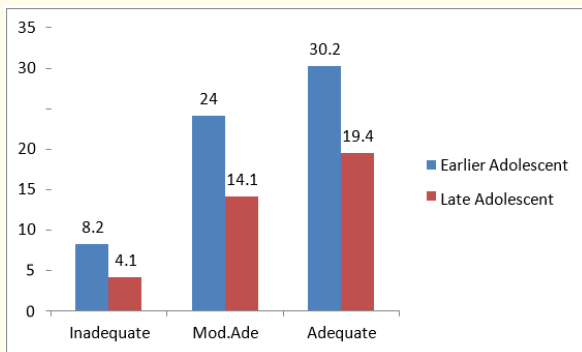

Figure 1: Distribution of subjects age and eating habits (N = 1200).

It's shown in the above figure that the early adolescents had poor or inadequate eating practices (8.2%) much more than the late adolescents (4.1%).
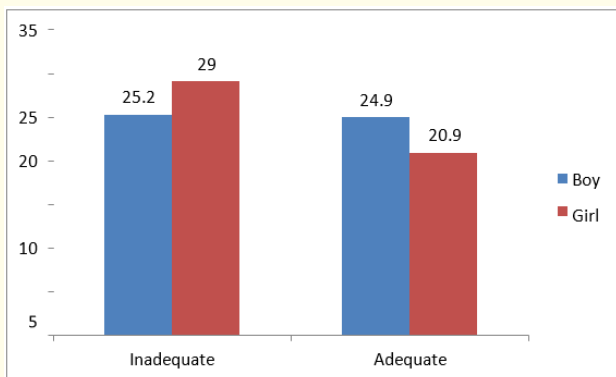

Figure 2: Sleep pattern of adolescents based on gender (N = 1200).

Adolescent boys had better or adequate sleep practices (49.8%) when compared to the adolescent girls (41.6%).

Figure 3: Father's working status and sleeping practices of adolescents (N = 1200).

Adolescents of fathers working in private sectors had better or adequate sleep practices (27%) as compared to the other adolescents. Only 1.5% of the adolescents' whose fathers who were unemployed had adequate sleep.
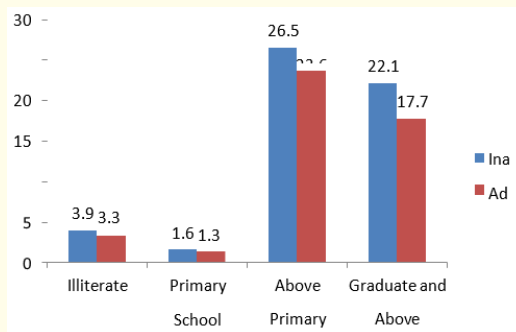

Figure 4: Educational status of fathers and sleeping pattern (N = 1200).

It's shown in the above figure that adolescents whose fathers were educated had better or adequate sleeping practices (41.3) when compared to those adolescents whose fathers were illiterates (3.3%).

It's shown in the above figure that there is a statistically significant reduction in calorie intake in comparison to the baseline, after three months and six months of intervention (P < 0.001).

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Figure 5: Comparison of energy intake before and after intervention (N = 1200).

Intervention Interval	Protein intake	
	Experiment	Control
	Mean	Mean
Baseline	48.78	52.95
3 Month	42.98	47.67
6 Month	41.57	48.47

Table 2: Comparison of protein intake before and after intervention (N = 1200).

It's shown in the above figure that there is a reduction in protein intake after 3 months and six months of intervention but the differences are not statistically significant.

It's shown in above figure that there is a reduction in protein intake after 3months and six months of intervention but the differences are not statistically significant.

Intervention Interval	Fat intake	
	Experiment	Control
	Mean	Mean
Baseline	37.69	37.83
3 Month	35.23	35.04
6 Month	33.04	35.1

Table 2: Fat intake before and after intervention (N = 1200).

It's shown in the above figure that there is a significant reduction in the fat intake after three months and six months of intervention and they are statistically significant.

It's shown in the above figure that there is a significant reduction in the fat intake after three months and six months of intervention and they are statistically significant.

It's shown in the above figure that the prevalence of overweight and obesity was higher among girls (5.75%) as compared to boys (4.55%).

Figure 6: Protein intake before and after intervention (N = 1200).

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Figure 7: Fat intake before and after intervention (N = 1200).
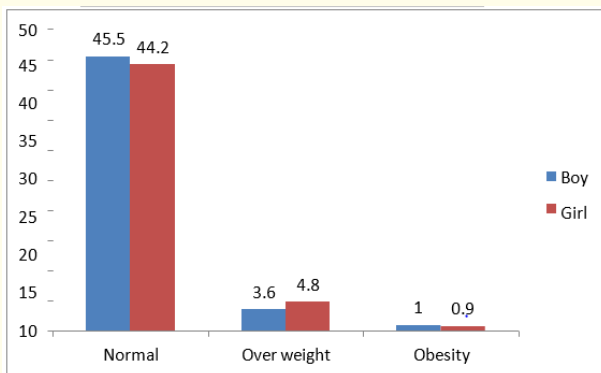

Figure 8: Adolescents Gender Based Weight Distribution (N = 1200).

Interpretation and Conclusion

Overweight and obesity continue to be a pressing issue among adolescents in India including Vellore city. There were significant beneficial changes (P < 0.001).

In eating, sleeping and physical activity patterns of adolescents after the intervention. We propose that such interventions if introduced in all the schools in Vellore city atleast twice a week in addition to the regularly scheduled physical education at school will be very beneficial in maintaining physical fitness of the adolescents at the optimum level or may be modified where physical education is made mandatory for all five to six days in a week.

Bibliography

1. Stephen MD., *et al.* "Self-assessment of sexual maturation in children and adolescents with diabetes mellitus". *Endocrine Practice* 14 (2008): 840-845.

2. Pesic M. "The history of obesity".

3. Ashok C K and Karunanidhi S. "Prevalence of overweight and obesity among young female college students in Chennai city". *Journal of Obesity and Metabolic Syndrome* 3 (2016): 23-31.

4. T Kowsalya and R Parimalavalli. "Prevalence of overweight/ obesity among adolescents in urban and rural areas of Salem, India". 1.3 (2014): 152-155.

5. K Ramesh. "Prevalence of overweight and obesity among high school students of Thiruvananthapuram City Corporation, Kerala, India". *Australasian Medical Journal* 3.10 (2010): 650-661.

6. Kotian M S., *et al.* "Prevalence and determinants of overweight and obesity among adolescent school children of South Karnataka, India". *Indian Journal of Community Medicine* 35 (2010): 176-178.

7. Rajan K Jinu. "Effectiveness of Planned Teaching Programme Regarding Importance of Exercise in Prevention of Obesity among Children in Hydrabad, Andrapradesh". *IOSR Journal of Nursing and Health Science (IOSR-JNHS)* 5.2 (2016): 1.

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8. Parekh Alok., *et al.* "Prevalence of overweight and obesity in adolescents of urban and rural area of Surat, Gujarat". *National Journal of Medical Research* 2.3 (2012): 326-329.

9. Znanstveni I., *et al.* "Prevalence of Overweight and Obesity among the Affluent Adolescent School Children of Amritsar, Punjab". *Collegium Antropologicum* 29.1 (2005).

10. Bose k., *et al.* "Overweight and obesity among affluent Bengalee schoolgirls of Lake Town, Kolkata, India". *Maternal and Child Nutrition* 3.2 (2007): 141-145.

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