

Review Article
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A Study to Determine the Prevalence, Risk Factors and Perception of Overweight and Obesity by Parent and Adolescent and Evaluate the Effectiveness of a School-Based Intervention Program on BMI, Body Fat Composition and Selected Health-Related Behaviour Patterns among Adolescents in Kanyakumari District

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ABSTRACT

Adolescents are increasingly susceptible to obesity, and thus at risk of later non-communicable diseases, due to changes in food choices, physical activity levels and exposure to an obese environment. This review aimed to synthesize the literature investigating the effectiveness of health education interventions delivered in school settings to prevent overweight and obesity and/ or reduce BMI in adolescents, and to explore the key features of effectiveness

Aim: To find the effectiveness of a school-based intervention program provided to adolescents regarding changes in body mass index (BMI), body composition and selected health-related behaviour.

Objectives:

1. To determine the prevalence of overweight and obesity in 10-18 year-old school going adolescents in Kanyakumari District.
2. To assess the perception of the adolescent about overweight/ obesity.
3. To evaluate the effectiveness of a school-based intervention program for three months and after six months follow up in changing the BMI, body composition, fitness and health-related Behaviour of adolescents aged 10-18years on both groups

Conclusion: Overweight and obesity continue to be a pressing issue among adolescents as the prevalence rate is 10.2 and 2% respectively among the school going adolescents of Kanyakumari district. Interventional programs such as Zumba exercise and structured training was effective in reducing the BMI to 5% compared to the baseline BMI. This impact continued even 3months after the intervention was discontinued (2.5% reduction at the 6th month after the intervention) which reveals that the school adolescents would have continued to do the Zumba exercise as instructed by the investigator.

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Introduction

A healthy adolescent period is a foundation for healthy adult life. Habits are formed in childhood, and they may have a long-term irreversible impact on health and wellbeing. It's the parents and the significant others who need to impact them by being good role models and nurture them to develop healthy habits to last for lifetime. Cultivating healthy habits is imperative as they contribute to optimal health.

Adolescent period is the transitional period between puberty and adulthood in human development, extending mainly over the teen years and terminating legally when the age of adulthood is

reached. Adolescent stage is the process or state of growing to maturity. According to WHO, the adolescent period begins at 10 years and completes at 19 years [1].

Adolescence is a very important period of growth and development, as it involves lot of physical, physiological, emotional and various other changes which occur during this stage. It takes time for them to adapt to these changes and further requires the guidance of the significant members especially the parents, teachers and elders in the society. It would be very desirable to prevent obesity, but there are great difficulties in achieving this objective. Even if it were possible and acceptable to ensure that each person, each

day, had energy intake from food which was exactly the amount recommended by various government committees, this policy would not prevent obesity. Co operation of parents, teachers, community leaders, stake holders and adolescents themselves is very essential to achieve this goal.

An interventional study was conducted among 6000 Indian school children at Hyderabad, Andhra Pradesh. This study finding revealed that 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% [2]. 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 socio economic status (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 \geq four hours/day and 5.6 times higher among those who ate chocolates daily in addition to a normal diet and 15.8% overweight and 2.7% obese among girls (13-18 year) in Chennai.

Indian data regarding current trends in adolescent obesity are emerging. A recent study conducted among 24,000 school children in south India showed that the proportion of overweight children increased from 4.94 per cent of the total students in 2003 to 6.57 per cent in 2005 demonstrating the time trend of this rapidly growing epidemic. Socio-economic trends in childhood obesity in India are also emerging. A study from northern India reported a childhood obesity prevalence of 5.59 per cent in the higher socio-economic strata when compared to 0.42 per cent in the lower socio-economic levels.

Like in developed countries, obesity is becoming a pressing concern in the pediatric population in developing countries including India. The investigator has noticed in his experience of attending to children in the wards and outpatient departments that the trend is changing. The investigator has visited all the schools in Kanyakumari to identify the physical activity pattern in the schools and learnt that in most of the schools the physical education (PT) hour is only an hour per week which may not be sufficient. Research on the measurement practices for childhood obesity provides insight into the providers who care for children, the children themselves, and the communities in which they live.

Statement of the Problem

A study to determine the prevalence, risk factors and perception of overweight and obesity by parent and adolescent and evaluate the effectiveness of a school-based intervention program on BMI, body fat composition and selected health-related behaviour patterns among adolescents in Kanyakumari District.

Aims of the Study

To find the effectiveness of a school-based intervention program provided to adolescents regarding changes in body mass index (BMI), body composition and selected health-related behaviour.

Objectives of the Study

1. To determine the prevalence of overweight and obesity in 10-18 year-old school going adolescents in Kanyakumari District.
2. To assess the perception of the adolescent about overweight/obesity.
3. To evaluate the effectiveness of a school-based intervention program for three months and after six months follow up in changing the BMI, body composition, fitness and health-related behaviour of adolescents aged 10-18 years on both groups.

Hypothesis

H₁ Interventions provided to adolescents at school will change the BMI Z score, fitness level and body composition at 3 and six months as compared to the control group.

H₂ There will be a significant association between overweight and obesity with health-related behavior.

Research Approach and Design

The research approach used was quantitative and the research design was in this study was true experimental design.

Setting of the Study

The study was conducted in private schools of Kanyakumari. There were 504 higher secondary schools in Kanyakumari and 254 were Private schools. From these schools two private schools were selected randomly and allocated in to control and experimental groups randomly two each. So, there were two private schools in control group as well as experimental group.

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 private schools. There were 600 adolescents in the intervention group and 600 in the control group.

Data Analysis and Findings

Table 1: Cross Tabulation of Demographic Characteristics of Subjects in Both Groups (n=1200)

Variable	Group	
	Experimental	Control
Gender		
Boy	301 (50.2)	300 (50.0)
Girl	299 (49.8)	300 (50.0)
Age		
Earlier Adolescent	360 (60.0)	389 (64.8)
Late Adolescent	240 (40.0)	211 (35.2)
Student Class		
6th Class	120 (20.0)	120 (20.0)
7th Class	120 (20.0)	120 (20.0)
8th Class	120 (20.0)	120 (20.0)
9th Class	120 (20.0)	119 (19.8)
11th Class	120 (20.0)	121 (20.2)
Father Working Status		
Govt. Sector	62 (10.4)	71 (11.8)
Pvt. Sector	384 (64.0)	333 (55.5)
Other Business	137 (22.8)	187 (31.2)
Not Working	17 (2.8)	9 (1.5)
Mother Working Status		
Govt. Sector	28 (4.7)	28 (4.7)
Pvt. Sector	222 (37.0)	122 (20.3)
Other Business	64 (10.7)	44 (7.3)
Not Working	286 (47.6)	406 (67.7)
Area		
Rural	152 (25.3)	150 (25.0)
Urban	448 (74.7)	450 (75.0)
Education of Father		
Illiterate	11 (1.8)	09 (1.5)
Primary School	41 (6.8)	59 (9.8)
Above Primary School	317 (52.8)	286 (47.7)
Graduate and above	231 (38.6)	246 (41.0)
No. of Siblings		
No siblings	14 (2.3)	34 (5.7)
Only one Sibling	219 (36.5)	329 (54.8)
More than one Sibling	367 (61.2)	237 (39.5)

The majority (50.3) of the adolescents had more than one sibling, and 4.4% of them did not have any siblings. It's shown in above table the various demographic features of the subjects. On analysis of socio-demographic data of the total 1200 adolescents, 50.1% were boys, and 49.9% were girls. Adolescents from sixth, seventh, eighth, ninth and eleventh standards (20% each) were selected for the study. Majority of fathers were working in private sectors (59.8%) as against 2.2% of them not working. 28.7% of the adolescents' mothers were working in private sectors in comparison to 57.7% of who were not working. The majority (35.5%) of them had a monthly family income of Rs.5,000-10,000/- Whereas only 27.7% of them earned more than Rs.20,000/- per month. Majority of them belonged to nuclear family (86.2%). Majority of them (74.8%) were in urban, Majority (50.3%) of the fathers had more than primary education as against only (7.2%) were illiterates.

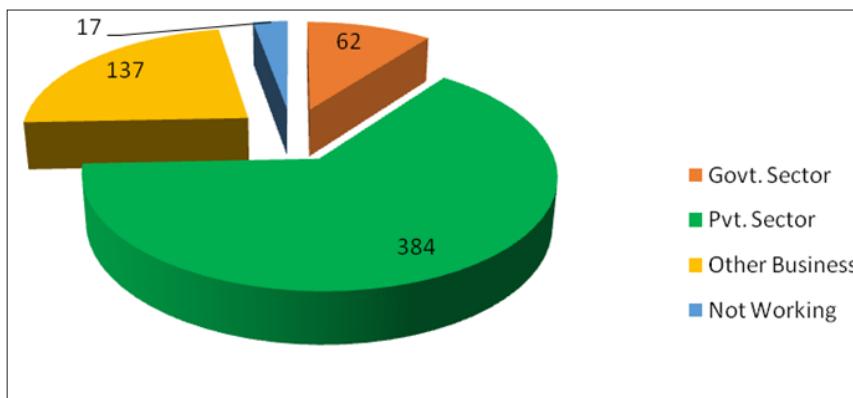


Figure 1: Father's Working Status

Analysis of Subject's Perception towards Obesity and Overweight in both Groups.

n=1200

Sl. No.	Perception of the Subject Statements on Obesity	Frequency of Subjects Responded as "Yes"
1	Obesity as a health problem	842
2	Thinks that he/she is overweight	1044
3	Thinks that an overweight child will have health problems when older	1046
4	Agrees that child needs exercise and diet control to reduce weight	1046
5	Thinks that a fat child is a healthy child	1098
6	Feels embarrassed among friends and relatives due to his/her weight status	741
7	Agrees that he/she needs support and encouragement from parents to reduce weight	1098
8	Believes that obesity in childhood can cause obesity during adulthood	638
9	Obesity is hereditary	740
10	The Parent's weight status affecting the child's weight	536

The above table presents the analysis of subject's perception towards obesity and overweight. Most of the subjects reported that obesity is a health problem (70.2%). Eighty-seven per cent admitted that they were overweight. Majority of them were also aware of the risk of health problems due to obesity when older (87.2%). And that exercise and diet control is necessary to lose weight (87.2%). However, the majority (91.5%) of the subjects reported that a fat child is a healthy child. 62% of the subjects also felt embarrassed by friends and relatives due to their weight status. Majority of the subjects also reported that they need support and encouragement from their parents to lose weight (91.5%). Most of the subjects believed that childhood obesity would cause obesity during adulthood (53.2%). 61.7% of the subjects thought that obesity is hereditary. The subjects had divided opinion about the effect of parental weight status on the subject' weight status 44.7% felt that the parental weight status affects the adolescents' weight status. The overall perception of the subjects was 73.6% which is positive according to the perception scale standard.

Analysis of Parent's Perception towards Obesity and Overweight in both Groups.

n=1200

Sl. No.	Perception of the Subject	Frequency of Subjects Responded as "Yes"
1	Obesity as a health problem	101
2	Thinks that he/she is overweight	937
3	Thinks that an overweight child will have health problems when older	1086
4	Agrees that child needs exercise and diet control to reduce weight	1142
5	Thinks that a fat child is a healthy child	1040
6	Feels embarrassed among friends and relatives due to his/her weight status	528
7	Agrees that he/she needs support and encouragement from parents to reduce weight	707
8	Believes that obesity in childhood can cause obesity during adulthood	1109
9	Obesity is hereditary	648
10	The Parent's weight status affecting the child's weight	653

Distribution of Adolescents' Physical Activity based on the Grade (n=1200)

Student Class	Physical Activity					Total N0	%	
	Inadequate	%	Moderately Adequate	%	Adequate	%		
6 th Class	139	11.58	66	5.55	35	2.90	240	20.03
7 th Class	126	10.5	80	6.66	34	6.70	231	23.86
8 th Class	115	9.58	79	6.58	46	3.83	240	19.99
9 th Class	109	9.08	81	6.75	49	4.08	239	19.91
11 th 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

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%).

GEE Analysis for Body Mass Index (N=1200)

Variables	Univariate GEE Analysis			Multivariate GEE Analysis		
	Coef.	95 % CI	P value	Coef.	95 % CI	P value
Group Experiment Control	-0.78 1.00	-1.12 - -0.44	<0.001	-0.60	-0.87 - -.32	<0.001
Time Baseline 3 Months 6 months	1.00 -1.41 -0.56	-1.51 - -1.31 -0.91 - -0.24	<0.001 0.001	-1.41 -0.58	-1.51 - -1.31 -0.91 - -0.24	<0.001 0.001
Gender Boy Girl	-0.05 1.00	-0.39 - 0.29	0.758			
Age <=13 Yrs. >13 Yr.	-1.09 1.00	-1.50 - 0.68	<0.001	0.37	-0.61 - 1.35	0.463
Physical fitness Yes No	-1.45 1.00	-1.62 - -1.27	<0.001			
Nutritional Assessment						
Energy	0.003	0.002 - 0.005	<0.001	0.002	-0.003 - 0.008	0.393
Protein	0.001	-0.001 - 0.004	0.340			
Fat	0.21	0.17 - 0.25	<0.001	0.386	0.29 - 0.50	<0.001

It's shown in the above table that the BMI significantly reduced (p<0.001) after intervention as well as after three months of intervention (p<0.001)

The above table also depicts that there was a significant improvement in physical fitness of the subjects (p<0.001) also there was a significant reduction in the fat intake by the subjects (p<0.001).

It was noted that the prevalence of overweight was 8.4 % and obesity was 1.9% among the subjects studied. The mean overall perception of overweight and obesity was 70% for mothers and 68% for adolescents. The BMI of the participants reduced to 5% from the baseline after three months of intervention as hypothesized and to 2.5% after 6months of intervention (p <0.001).

Overweight and obesity continue to be a pressing issue among adolescents as the prevalence rate is 10.2 and 2% respectively among the school going adolescents of Kanyakumari district Interventional programs such as Zumba exercise and structured training was effective in reducing the BMI to 5% compared to the baseline BMI. This impact continued even 3months after the intervention was discontinued (2.5% reduction at the 6th month after the intervention) which reveals that the school adolescents would have continued to do the Zumba exercise as instructed by the investigator. Therefore, we propose that such interventions if introduced in all the schools in Kanyakumari district at least twice a week in addition to the regularly scheduled physical education at school will be very beneficial in maintaining the BMI and 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 [3-7].

References

1. Jacqueline Arnone (2014) "Adolescents may be older than we think". *International Journal of Celiac Disease* 247-48.
2. Childhood obesity: A rising health problem in India. [Online]. Available from: URL: <http://www.bolohealth.com/news/2009-childhood-obesity-a-rising-health-problem-in-India>. Retrieved from <http://www.iosrjournals.org/iosr-jnhs/papers/vol5-issue2/Version-2/A05220117.pdf>.
3. Ashok C K, Karunanidhi S (2016) Prevalence of overweight and obesity among young female college students in Chennai city. *J Obese Meta Res* 3: 23-31.
4. T Kowsalya, R Parimalavalli (2014) Prevalence of overweight/obesity among adolescents in urban and rural areas of Salem India. *Gale Academic Online* 1: 152-155.
5. K Ramesh (2010) The prevalence of overweight and obesity among high school students of Thiruvananthapuram City Corporation, Kerala, India. *Australasian Medical Journal* 3: 650-661.
6. Longer bouts of exercise help prevent childhood obesity (2009) Longer Bouts Of Exercise Help Prevent Childhood Obesity | ScienceDaily.
7. Salmon J, Booth ML, Phongsavan P, Murphy N, Timperio A (2007) Promoting physical activity participation among children and adolescents. *Epidemiologic Reviews* 29: 144-159.

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