

Prevalence and Determinants of Obesity and the Impact of an Educational Intervention on Obesity Management Knowledge among Adolescents in Selected Salem Schools

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How to cite this article: Nithya. A, Nagalakshmi. E, Stephina Immaculate. V, Tamizharasi K. Prevalence and Determinants of Obesity and the Impact of an Educational Intervention on Obesity Management Knowledge among Adolescents in Selected Salem Schools. International Journal of Nursing Care / Vol 14 No. 01, January - June 2026

Abstract

A Study was done to assess the prevalence and associated factors of obesity and evaluate the effectiveness of an educational package on knowledge regarding obesity Management among Obese Adolescents in selected Schools, Salem. The subjects were adolescents, who are studying in 8th and 9th standard aged 13 and 14 years. Non Experimental Descriptive Survey and Quasi Experimental Research Design were used for the phase -I & phase-II respectively. During phase-I, based on BMI calculation prevalence of obese adolescents were identified and as 30 subjects for experimental and control group. Using rating scale the associated factors of obesity were assessed and closed ended questionnaire was used to assess the knowledge regarding obesity management. The results of phase-I shows that majority 22(73%) of them had moderate risk of obesity. The results of phase II reveal the estimated 't' value is 13.47 is significantly higher than table value 3.46 at p<0.001 level. Hence the Educational Interventional Package is significantly effective in gaining adequate knowledge regarding obesity management among obese adolescents in experimental group and control group. Also study results showed there was a significant association between gender and the post-test scores on knowledge regarding obesity management among obese adolescents in experimental group at p<0.05 level.

Key words: Prevalence, Associated factors, Educational Interventional Package, Obese Adolescents, Obesity, Obesity Management.

Introduction

Overweight and Obesity are defined as abnormal or excessive body fat accumulation that presents a risk to health. Overweight and Obesity among adolescents have emerged as one of the most serious public health concerns in the 21st century⁷. The magnitude and the severity of this problem are reached at an alarming rate and more than quadrupled in the past three decades in adolescents.¹⁰

Overweight and obesity in adolescents can be assessed using body mass index (BMI) cut-off points of World Health Organization (WHO), Communicable Disease Control (CDC), and International Obesity Task Force (IOTF)². Owing to lifestyle changes, such as balanced organic foods to processed foods, more cell phone and television use, a more sedentary lifestyle and a decrease in physical activity may be risk factors for teenage obesity.¹³

Adolescent overweight and obesity are critical which strongly track into adulthood and having a great chance to develop non-communicable diseases like type 2 diabetes mellitus and cardiovascular diseases.(WHO, 2010)¹⁵. Morbidity from cardiovascular disease, diabetes, cancers and arthritis because of obesity was 50-100% higher among obese individuals suffering childhood or teenage obesity.⁶

Need For The Study

Childhood obesity affects both developed and developing countries of all socio-economic groups, irrespective of age, sex or ethnicity. More than 1 billion people worldwide are obese – 650 million adults, 340 million adolescence and 390 million children. WHO estimates that by 2025, approximately 167 million people – adult and children will become less healthy because they are overweight or obese.¹⁷ The rate of obesity among the world's children and adolescents in 2022 is four times higher that it was in 1990. Four million people die each year as a result of obesity.¹⁶

The number of obese children in India increased dramatically, 12.5 million of those between the ages of 5-19 being obese in 2022 compared to 0.4 million in 1990. 5.3 million of the 12.5 were boys and 5.2 million were girls.¹⁴The total prevalence of overweight and obesity were 23.9% among adolescents in India.¹²

Based on the WHO, UNICEF and Non Communicable Diseases Risk factor Collaboration (NCD-RisC) data, World Obesity Federation (WOF) published the first global atlas on childhood obesity in 2019, providing the latest estimates of infant, childhood and adolescent obesity in 191 countries.⁴

By 2050 it is estimated that 60% of males and 50 % of females will be obese. The current trend shows that around 80% of 10-14 year olds will become obese adults. Some estimates tag the prevalence of obesity among Indian children aged 5-19 years at between 3.6 and 11.7%. It is predicted that by 2025, there will be 17 million obese children in India. Urbanization is the single most important factor

linked to obesity in India. Epigenetic, dietary, familial, psychosocial, parental education and parental occupation are other important factors.¹¹

Objectives

1. To assess the prevalence of obesity among adolescents in experimental and control group.
2. To assess the associated factors of obesity among obese adolescents in experimental and control group.
3. To assess the knowledge regarding obesity management among obese adolescents in experimental and control group.
4. To evaluate the effectiveness of an educational interventional package on level of knowledge regarding obesity management among obese adolescents in experimental group.
5. To find out the association between the pre-test, post-test scores on knowledge regarding obesity management and their selected demographic variables among obese adolescents in experimental and control group.

Hypothesis

H₁: There is a significant difference between pre-test and post-test scores on knowledge regarding obesity management among obese adolescents in experimental group at $P \leq 0.05$ level.

H₂: There is a significant difference between post-test scores on knowledge regarding obesity management among obese adolescents in experimental and control group at $P \leq 0.05$ level.

H₃: There is a significant association between pre-test scores on knowledge regarding obesity management among obese adolescents and their selected demographic variables in experimental and control group at $P \leq 0.05$ level.

H₄: There is a significant association between post-test scores on knowledge regarding obesity management among obese adolescents and their selected demographic variables in experimental and control group at $P \leq 0.05$ level.

Research Methodology: (Materials and Methods)

Quantitative Research Approach was used among adolescents who are studying in 8th and 9th standard aged 13 and 14 years. The research design was a Non Experimental Descriptive Survey for phase-I by using convenient sampling technique and a Quasi Experimental Research Design for phase-II by using purposive sampling technique. The study was conducted in Sri Vidhya Bharathi Matriculation higher secondary school, Salem for experimental group (N=155) and Sri Vidya Mandir higher secondary school, Salem for control group (N=123). Tool had demographic variables, assessment of level of obesity based on BMI, Rating scale to assess the associated factors of obesity and closed ended structured questionnaire for knowledge assessment.

Ethical clearance was obtained from Institutional ethical committee (Ref No: IECSGH/2024/13) and also obtained permission from the head of the school and from the participants. The data was collected over 4 weeks. In phase-I, BMI was calculated and adolescents who were overweight and obese, 30 subjects in experimental and control group respectively were selected. In Phase -II initially using a rating scale the associated factors of obesity were assessed using 17 statements were designed to assess adolescent practice for past one month. Following a pre-test, Educational Interventional Package on obesity management was taught to the experimental group using PowerPoint, for every 5 adolescents in a group with the duration of 40 minutes. After 7 days of intervention, post-test was conducted.

Data Analysis and Interpretation

Table 1. Distribution of adolescents according to BMI in experimental and control group.

BMI Classification	Experimental group (N =155)		Control group (N = 123)	
	f	%	f	%
Underweight	76	49	36	29.2
Normal	48	30.9	57	46.3
Overweight	19	12.2	21	17
Obese	12	7.7	9	7.3

Table 2. Frequency and percentage distribution of obese adolescents according to their demographic variables in experimental and control group. n=60

Si. No	Demographic variables		Experimental group n=30		Control group n=30	
			f	%	f	%
1.	Age in years	a) 13	8	26.6	8	26.6
		b) 14	22	73.3	22	73.3
2.	Gender	a) Male	14	46.6	17	56.6
		b) Female	16	53.3	13	43.3

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3.	Year of studying	a) 8 th standard	11	36.6	14	46.6
		b) 9 th standard	19	63.3	16	53.3
4.	Type of family	a) Nuclear	16	53.3	19	63.3
		b) Joint	14	46.6	11	36.6
5.	Birth order	a) First	14	46.6	12	40
		b) Second	15	50	16	53.3
		c) Third and above	1	3.3	2	6.6
6.	Religion	a) Hindu	30	100	25	83.3
		b) Muslim	-	-	3	10
		c) Christian	-	-	2	6.6
		d) Others	-	-	-	-
7.	Place of residence	a) Urban	16	53.3	18	60
		b) Rural	14	46.6	12	40
8.	Dietary habits	a) Vegetarian	2	6.6	3	10
		b) Non vegetarian	-	93.3	-	-
		c) Both	28		27	90
9	Previous knowledge	a) Yes	9	30	7	23.3
		b) No	21	70	23	76.6
9.1	If yes,source of information	a) Family member	5	55.5	3	42.8
		b) Teacher	2	22.2	1	14.2
		c) Health personnel	1	11.1	-	-
		d) Mass media	1	11.1	3	42.8
		e) Peer group	-	-	-	-

Table 3. Frequency and percentage distribution of obese adolescents according to their health related variables in experimental and control group. n=60

Si. No	Demographic variables		Experimental group n=30		Control group n=30	
			f	%	F	%
10.	Suffering from any chronic illness	a) Yes	3	10	3	10
		b) No	27	90	27	90

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10.1	If yes, mention	a) Type 2 DM / hypertension/ heart disease	2	66.6	1	33.3
			1	33.3	1	33.3
		b) PCOD	-	-	-	-
		c) Thyroid dysfunction	-	-	1	33.3
		d) Others				
11.	Taking regular medication for any illness	a) Yes	3	10	3	10
		b) No	27	90	27	90
11.1	If yes, mention what is the medication	a) Steroids	-	-	1	33.3
		b) Antidepressant	-	-	-	-
		c) Anti-epileptic	-	-	-	-
		d) Insulin	2	66.6	1	33.3
		e) Hormone supplement	1	33.3	1	33.3

Table 4. Frequency and percentage distribution of obese adolescents according to their parent related variables in experimental and control group. n=60

Si. No	Demographic variables		Experimental group n=30				Control group n=30			
			f		%		f		%	
12	Parent's education		Father		Mother		Father		Mother	
		a) No formal education	f	%	f	%	f	%	F	%
		b) Primary education	-	-	-	-	-	-	-	-
		c) Secondary education	4	13.3	3	10	3	10	1	3.3
		d) Higher secondary education	10	33.3	8	26.6	5	16.6	15	50
		e) Diploma/graduate	8	26.6	10	33.3	9	30	5	16.6
		f) Post graduate	7	23.3	6	20	12	40	7	23.3
13	Parent's occupation	a) Government employee	4	13.3	1	3.3	8	26.6	2	6.6
		b) Private employee	6	20	2	6.6	8	26.6	1	3.3
		c) Farmer	2	6.6	-	-	1	3.3	-	-
		d) Self employee	17	56.6	5	16.6	10	33.3	5	16.6
		e) Labour	1	3.3	-	-	3	10	1	3.3
		f) Unemployed/Homemaker	-	-	22	73.3	-	-	21	70

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14.	Family history of obesity	a) Yes				
		b) No	23	76.6	17	56.6
15.	Family monthly income	a) Rs.≥20482	7	23.3	13	43.3
		b) Rs.10241 -20481	22	73.3	23	76.6
		c) Rs.7681-10240	8	26.6	7	23.3
		d) Rs.5120-7680	-	-	-	-
		e) Rs.3072-5119	-	-	-	-
		f) Rs.1034-3071	-	-	-	-
		g) Rs.≤1033	-	-	-	-

Table 5. Frequency and percentage distribution of obese adolescents according to their diet related associated factors of obesity in experimental and control group. n=60

Si.no	Associated factors	Experimental group						Control group					
		Never		Sometimes		Always		Never		Sometimes		Always	
		f	%	f	%	f	%	f	%	f	%	F	%
1	I eat more than 3 meals per day.	4	13	20	67	6	20	6	20	18	60	6	20
2	I skip breakfast daily.	8	27	16	53	6	20	7	23	18	60	5	17
3	I skip lunch daily.	19	63	11	37	-	-	24	80	6	20	-	-
4	I skip dinner daily.	13	43	17	57	-	-	18	60	12	40	-	-
5	I consume meat more than 3 times per week.	22	73	8	27	-	-	23	77	7	23	-	-
6	I consume snack daily.	3	10	22	73	5	17	1	3.3	15	50	14	47
7	I consume sweet more than 2 times per week.	6	20	20	67	4	13	6	20	19	63	5	17

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8	I consume vegetables and fruits daily.	-	-	14	47	16	53	1	3.3	9	30	20	67
9	I consume carbonated sweetened drinks daily.	10	33	17	57	3	10	5	17	23	77	2	7
10	I eat junk food daily.	3	10	26	87	1	3	2	7	27	90	1	3

Table 6. Frequency and percentage distribution of obese adolescents according to their physical activity related associated factors of obesity in experimental and control group. n=60

Si. No	Associated factors	Experimental group						Control group					
		Never		Sometimes		Always		Never		Sometimes		Always	
		f	%	f	%	f	%	f	%	f	%	F	%
11	I spend more than 2 hours per day on screen time like TV, phone, video games and computer.	-	-	21	70	9	30	-	-	14	47	16	53
12	I go to school by cycle or walk.	29	96	1	3	-	-	25	83	1	3	4	13
13	I sleep more than 10 hours/day.	14	47	16	53	-	-	13	43	16	53	1	3
14	I have the habit of watching TV while eating daily.	-	-	8	27	22	73	-	-	12	40	18	60
15	I engage in regular physical exercise at home everyday.	7	23	16	53	7	23	10	33	16	53	4	13
16	I have physical work besides my education everyday.	2	7	6	20	22	73	1	3	13	43	16	53
17	I play outdoor games daily.	2	7	20	67	8	27	5	17	20	67	5	16

Table-7. Frequency and percentage distribution of obese adolescents based on scores of associated factors of obesity according to their level of risk in experimental and control group. n= 60

Risk level of obesity	Score	Experimental group n = 30		Control group n = 30	
		F	%	f	%
Low risk of obesity	1-17	-	-	-	-
Moderate risk of obesity	18-34	22	73	22	73
High risk of obesity	35-51	8	27	8	27

The results of phase-I shows that the risk level of obesity in both groups were having similar high percentage, 22(73%) of them had moderate risk of obesity, 8 (27%) of them had high risk of obesity and none of them had low risk of obesity.

Risk level of obesity was assessed using a researcher-developed rating scale consisting of 17 statements was used to assess adolescents' practices over the past month

Table 8. Frequency and percentage distribution of obese adolescents regarding obesity management according to their pre-test scores on knowledge in experimental and control group. n=60

Level of knowledge	Score	Experimental group n = 30		Control group n = 30	
		F	%	f	%
Inadequate knowledge	0-8	19	63	15	50
Moderately adequate knowledge	9-16	11	37	15	50
Adequate knowledge	17-25	-	-	-	-

a) Distribution of obese adolescents to their post-test scores on knowledge regarding obesity management in experimental and control group.

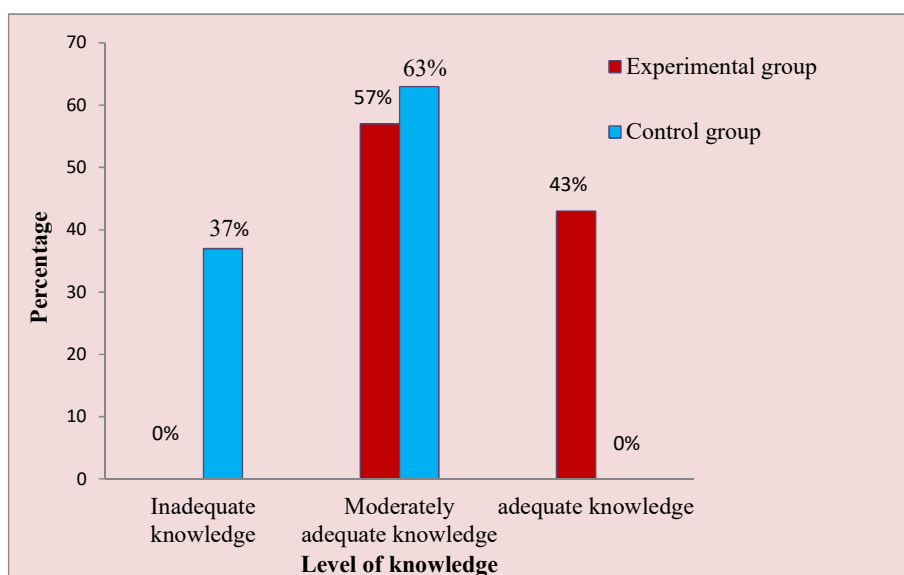
**Figure 1: Percentage distribution of obese adolescents according to their post-test scores on knowledge regarding obesity management.**

Table 9. Comparison of area wise mean, SD, mean difference and difference in mean percentage of pre-test and post-test scores on knowledge among obese adolescents in experimental group. n = 30

Si. No	Area of Knowledge	Max Score	Pre-test			Post-test			Difference in mean%
			Mean	SD	Mean%	Mean	SD	Mean %	
1.	Definition & BMI	4	1.7	0.6	42.5	2.8	0.8	70	27.5
2.	Causes of Obesity	2	0.6	0.6	30	1.2	0.6	60	30
3.	Dietary Management	12	4	1.2	33.3	6.9	1.6	57.5	24.2
4.	Non-dietary management	6	1.06	0.7	17.6	3.7	1.3	61.6	44
5.	Impact of obesity	1	0.4	0.5	40	0.8	0.3	80	40
	Total	25	7.76	3.6	30.8	15.4	4.6	61.6	30.8
	Overall	25	8	1.5	32	15.6	3	62.4	30.4

Table 10. Mean, SD, mean percentage and difference in mean percentage according to their pre-test and post-test scores on knowledge regarding obesity management among obese adolescents in experimental and control group. n=60

Si. No	Groups	Pre-test			Post-test			Difference in Mean %
		Mean	SD	Mean %	Mean	SD	Mean %	
1.	Experimental group	8	1.5	32	15.6	3	62.4	30.4
2.	Control group	8.5	1.3	34	9.4	1.5	37.6	3.6

Table 11. Mean, SD and paired 't' value on pre-test and post-test scores on knowledge regarding obesity management among obese adolescents in experimental group. n = 30

Si. No	Experimental group	Max score	Mean	SD	Mean Difference	df	't' Value	Table value
1.	Pre-test	25	8	1.5	7.6	29	15.2*	3.66
2.	Post-test		15.6	3				

*Highly significant at $p \leq 0.001$ level

The above table shows that, in experimental group, pre test mean score of knowledge is 8 ± 1.5 and post test mean score of knowledge is 15.5 ± 3 with a mean difference of 7.6. The estimated paired 't' value is 15.2 which is significantly higher than the table value 3.66 at $p \leq 0.001$ level.

Hence, it shows that Educational Interventional Package was significantly effective in gaining adequate knowledge regarding obesity management among obese adolescents in experimental group. Therefore, hypothesis H_1 is retained at $p \leq 0.001$ level.

Table 12. Mean, SD and independent 't' value on post-test scores on knowledge regarding obesity management among obese adolescents in experimental and control group. n = 60

Si. No	Group	Post test		df	't' value	Table value
		Mean	SD			
1.	Experimental group	15.6	3	58	13.47*	3.46
2.	Control group	9.4	1.5			

*Highly significant at $p \leq 0.001$ level.

The above table shows that, in experimental group, post test mean score of knowledge is 15.6 ± 3 and in control group, post test mean score of knowledge is 9.4 ± 1.5 . The estimated 't' value is 13.47 is significantly higher than table value 3.46

at $p \leq 0.001$ level. Hence, it shows that Educational Interventional Package was significantly effective in gaining adequate knowledge regarding obesity management among obese adolescents in experimental group and control group. Therefore, hypothesis H_2 is retained at $p \leq 0.001$ level.

Table 13. Association between the pretest scores on knowledge regarding obesity management among obese adolescents and their selected demographic variables in experimental and control group. n = 60

Si. No	Demographic variables	Experimental group (n = 30)			Control group (n = 30)		
		Df	χ^2	Table Value	Df	χ^2	Table Value
1.	Age in years	2	0.22	5.99	2	1.52	5.99
2.	Gender	2	0.06	5.99	2	0	5.99
3.	Years of studying	2	0.18	5.99	2	0.12	5.99
4.	Place of residence	2	0.06	5.99	2	1.24	5.99
5.	Dietary habits	2	0.13	5.99	2	0	5.99
6.	Suffering from chronic illness	2	0.23	5.99	2	0	5.99
7.	Taking regular medication for any illness	2	0.23	5.99	2	0	5.99
8.	Previous knowledge regarding obesity	2	0.02	5.99	2	0	5.99
9.	Family history of obesity	2	0.87	5.99	2	0	5.99
10.	Family monthly income	1	1.54	3.84	1	0	3.84

*significant at $p \leq 0.05$ level.

Table 12 shows that there is no significant association between the pre test scores of knowledge regarding obesity management among obese

adolescents and their selected demographic variables in experimental and control group. Hence, hypothesis H_3 is rejected at $p \leq 0.05$ level.

Table 14. Association between the post-test scores on knowledge regarding obesity management among obese adolescents and their selected demographic variables in experimental and control group. n = 60

Si. No	Demographic variables	Experimental group (n = 30)			Control group (n = 30)		
		df	χ^2	Table value	Df	χ^2	Table value
1.	Age in years	2	2.94	5.99	2	0.14	5.99
2.	Gender	2	6.91*	5.99	2	0.03	5.99
3.	Years of studying	2	0.3	5.99	2	0.23	5.99
4.	Place of residence	2	0.1	5.99	2	0.47	5.99
5.	Dietary habits	2	0.26	5.99	2	0.55	5.99
6.	Suffering from chronic illness	2	0.05	5.99	2	3.11	5.99
7.	Taking regular medication for any illness	2	0.05	5.99	2	3.11	5.99
8.	Previous knowledge regarding obesity	2	0.76	5.99	2	0.003	5.99
9.	Family history of obesity	2	0.21	5.99	2	0.04	5.99
10.	Family monthly income	1	0.39	3.84	1	0.003	3.84

*significant at $p \leq 0.05$ level.

Table shows 13, there is a significant association between gender and the post-test scores on knowledge regarding obesity management among obese adolescents in experimental group. Hence, hypothesis H_4 is accepted for gender at $p \leq 0.05$ level.

Implications

Nursing Practice

- The nurse plays an important role in school health services to provide continuous education to the obese adolescent regarding importance of dietary and non dietary management of practice.

Nursing Education

- Nurse educator acts a change agent to prepare the nursing students in order to identify and educate obese adolescents about obesity management.

- Nurse educator also should emphasize general public and health care professionals about the importance of avoiding negative stereotypes, discrimination and biased attitude towards the obese adolescents.

Nursing Administration

- The nurse administrator should implement specialized training programs for nursing staffs focused on effective communication and counselling techniques for obese adolescents and their families.

Recommendations

- A comparative study can be conducted between urban and rural school obese adolescents

- A long term study can be conducted to assess the impacts of obesity.

Conclusion

Adolescent period is treated as transition period from childhood to adulthood during transitional phase adolescents develop behavioural patterns and make lifestyles that can also affect their present health and future. And obesity is a social disease that is best treated with social solutions like addressing their issue by creating an awareness on obesity management.

Conflicts of Interest and Source of Funding: Nil

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