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DIETARY PRACTICES AMONG OVERWEIGHT / OBESE SCHOOL GIRLS BEFORE AND AFTER THE INTERVENTION

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ABSTRACT

Overweight or obesity is due to the excess energy than the energy requirement of the body due to more intakes of food or less physical activity. Overweight is prevalent not only in developed countries and in adults but also in developing countries and is common among children and adolescents. Educating on improving healthy practice and reduction of unhealthy dietary practice are vital in young age like in adolescents or even before. So that, they can follow healthy lifestyle in dietary practice and maintain normal weight from younger age. It can prevent overweight in adult age and prevent the ill effects related to overweight. This study was conducted in two phases to know the effect of educational weight management module on selected healthy and unhealthy dietary practices among school girls. In phase –I school girls of 6th–8th standard from 4 schools were assessed for weight status using world health organization's BMI percentile. In phase-II among them only 120 overweight/obese for experimental group and 120 for control group were chosen. Using interview schedule demographic details and selected dietary practices were assessed for both groups. Followed by pretest the intervention group were received the module on weight management and learned the module in the planned sessions in the school, taught by the researcher. Reinforced teaching, group counseling and focus group discussion were conducted to motivate them to adhere healthy eating and avoid unhealthy eating. The post test was conducted to assess the selected dietary practices. Using descriptive and inferential statistics the data was analyzed. The finding showed that the intervention was effective in reducing all the 3 unhealthy dietary practices and all the healthy dietary practices except for the intake of vegetables.

Key words: Overweight, obesity, school girls, healthy and unhealthy dietary practices.

INTRODUCTION

Overweight or obesity is due to the excess energy than the energy requirement of the body due to more intakes of food or less physical activity. The intake (Food) needs to be burnt to produce heat and energy utilized as output (Energy requirement for body and physical activities). For about 500 of excess calories per day can produce one pound of fat within a week. Just an extra 100 calories a day can mean 10 pounds in a year. In fact, most obese children demonstrate a slow but consistent weight gain over several years (Dietz et al, 1990). The prevalence of obesity has become a global epidemic not only in the adult population, but also in children and adolescents (Parizkova, & Chin, 2003). Obesity is increasing in children and adolescents globally (Proimos, 2001).Numerous studies across the country have shown that the emerging problems of over nutrition among children are mainly due to changing lifestyle and substantial reduction in physical activity. It has been observed that gradual decrease in physical activity, increased screen time & decreased sleep and increase of portion size with less fiber in food. Processed food with fructose and less fiber replaced the country foods. Fructose is the major causing for hyper-insulinemia cause insulin resistance and obesity. Therefore it can be stated that decreased physical activity and unhealthy eating are the preventable reasons for obesity in children. WHO recognizes that the increasing prevalence of obesity results from changes in society like Socio economic development, policies on agriculture, transport, urban planning, environment, food processing, distribution, marketing and education. Over 30-40 years the dramatic changes in diet and life style pattern of people has given rise to childhood obesity. Both genetic and environmental influences play a role in the development of obesity (Buiten and Metzger, 2000).

Eliminating poor dietary practices and following healthy dietary practice is the way to overcome obesity. In general healthy dietary practice involves, eating recommended serving from all food groups during each

meal. The intake of fresh, seasonal fruits & vegetables, fibre rich foods, whole grains, using variety of cereals & pulses, eating healthy homemade snacks are recommended in age appropriate portions. Sweden, Norway, Austria and Luxembourg have banned television advertising of junk food to children. Belgium, France and Portugal have banned junk food marketing at school. In Thane, Mumbai, India a school has banned students from bringing junk food in their lunch boxes in a bid to curb childhood obesity.

STATEMENT

Dietary practices among overweight / obese school girls before and after the intervention.

OBJECTIVE

The objective of the study is to assess and compare the selected unhealthy dietary practices during pretest and posttest among school girls. To assess and compare the selected healthy dietary practices during pretest and posttest among school girls.

HYPOTHESES

H_1: There is no significant difference between the mean pretest and mean posttest unhealthy dietary practices among school girls.

H_{1a}: There is no significant difference between the mean pretest and mean posttest preference to unhealthy foods among school girls.

H_{1b}: There is no significant difference between the mean pretest and mean posttest frequency of eating unhealthy meals per day among school girls.

H_{1c}: There is no significant difference between the mean pretest and mean posttest frequency of eating unhealthy snacks per week among school girls.

H_2: There is no significant difference between the mean pretest and mean posttest healthy dietary practices among school girls.

H_{2a}: There is no significant difference between the mean pretest and mean posttest frequency of eating healthy meals per day among school girls.

H_{2b}: There is no significant difference between the mean pretest and mean posttest frequency of eating healthy snacks per day among school girls.

H_{2c}: There is no significant difference between the mean pretest and mean posttest frequency of eating fruits per week among school girls.

H_{2d}: There is no significant difference between the mean pretest and mean posttest frequency of eating vegetables per week among school girls.

OPERATIONAL DEFINITIONS

I. SCHOOL GIRLS: It refers to girl students from sixth to eighth standard, with body mass index 85th percentile and above from the selected schools in Salem.

II. BODY MASS INDEX: BMI calculated by the formula "weight (kg)/height (m²)."

III. WEIGHT STATUS: The calculated BMI value is compared with BMI percentile-for-age girls 5 to 19 years, 2007 WHO Reference chart for weight status and diagnosed as underweight (<15th percentile), normal weight (15th – 84th percentile), overweight (BMI 85th-97th percentile) and obesity (BMI >97th percentile).

IV. SELECTED DIETARY PRACTICES: It refers to unhealthy and healthy dietary practices.
a) The unhealthy dietary practices include the following 3 aspects.

- Preference to unhealthy food,
- Frequency of eating unhealthy meals per day and
- Frequency of eating unhealthy snacks per week

b) The healthy dietary practices include the following 4 aspects.

- Frequency of eating healthy meals per day
- Frequency of eating healthy snacks per week,
- Intake of fruits per week and
- Intake of vegetables per week

V. MODULE FOR MANAGEMENT OF OVERWEIGHT AND OBESITY

It is the process of maintenance of existing weight or gradual weight reduction till reaching ideal weight. It is the effectiveness of the intervention. Module for management of overweight and obesity was prepared by the researcher. It aims to orient and follow healthy eating, limit unhealthy foods and enhance moderate physical activity and limit sedentary behaviors in a desirable manner. It was planned to educate the samples on healthy lifestyle in diet & physical activity using module on weight management.

SAMPLING TECHNIQUE AND SAMPLE SIZE

Sample size estimated using $\{[(Z\alpha+ Z\beta) \sqrt{PQ}] / d\}$ $^2 = \{[((1.96+0.84) \sqrt{0.119}) / 0.10] ^2\} = 91$ cases. The non probability purposive sampling used & samples were matched based on their school, physical activity & class. Initially 150 samples were planned to be enrolled. (Approximately 50 from each class: 6th, 7th and 8th). Girls from 6th standard gave more willingness than the girls from 7th and 8th standard. The sample drop outs form study and sample elimination by researcher were due to their personal reasons, academic pressure, distracting group during exercise session or took long leave during the intervention. Though there were few difficulties in retaining the samples effort and

care were taken to see that the remaining members were retained. Therefore sample size was finalized with 120 in experimental group and 120 samples in control group were finalized. The total sample size was 240.

DATA COLLECTION TOOLS

1. Structured interview to assess Demographic and dietary variables.
2. BMI percentiles for age -girls 5 to 19 years - (WHO- 2007) is to assess BMI percentile.

VALIDITY AND RELIABILITY

The tools and intervention was validated by 11 experts in the field of nursing, physiotherapy, nutrition, pediatric medicine, general medicine and epidemiology. After the necessary modification the tools and intervention was finalized with the approval of the research supervisors. Demographic & dietary variable was tested by inter rater

method (r=0.98). BMI percentile chart for girls aged 5-19 years was recommended by WHO is standardized.

DEVELOPMENT OF INTERVENTION: MODULE ON WEIGHT MANAGEMENT

The intervention includes learning the weight management module. For the purpose of this study the researcher developed, validated and finalized an intervention for weight management for school girls using the module. The intervention is health oriented in terms of not putting further weight gain and can be achieved by maintaining existing body weight or slow reduction of weight for about minimum of 1 pound per month.

The intervention is prepared after a wide research literature review, the personal experience of the researcher, expert's opinion in the field of nursing, pediatric medicine, nutrition, physiotherapy, psychology & epidemiology.
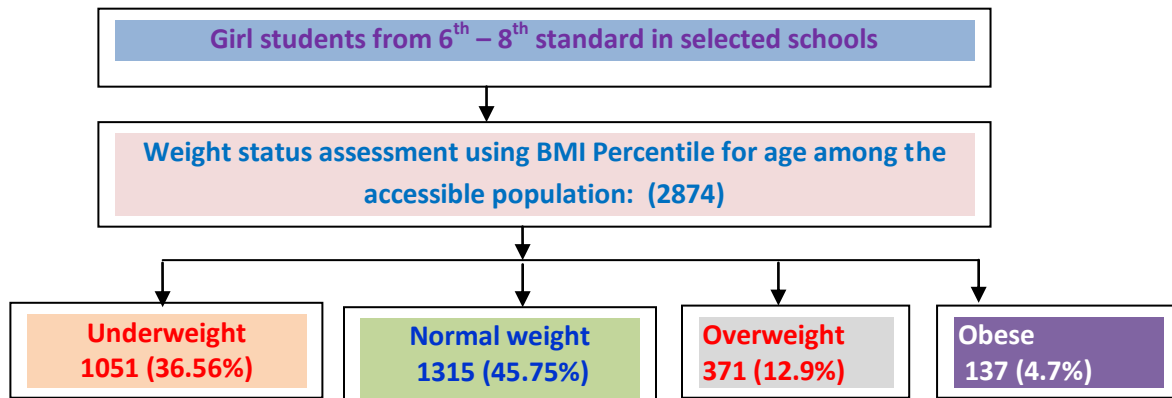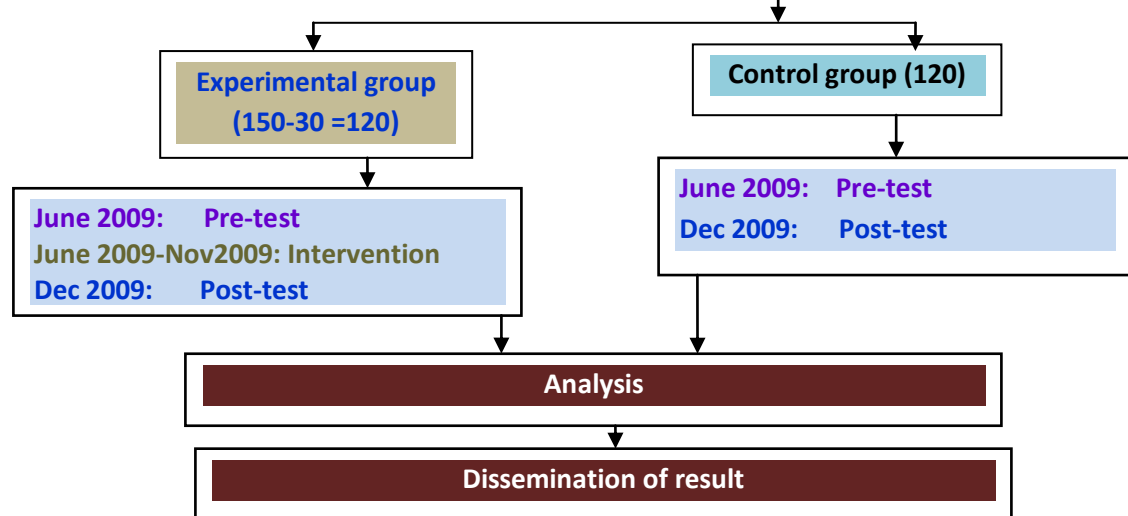
Phase-I

Figure 1: Schematic representation of data collection

The module on weight management for school girls was prepared as a part of maintenance health by following healthy lifestyle in diet and physical activity in day to day life. It is not imposing them to follow rather encourage them to follow as routine healthy behavior as a part of life. The module on weight management was planned to issue to experimental group and educate them in small sessions for 5 days after the pretest.

PILOT STUDY

Formal permission was obtained for pilot study from school authorities. The pilot study was conducted in 4 coeducation schools namely Anderson Matriculation School and Golden Gates Matriculation School for control group, Holy Flower Matriculation School and Vinayaka Vidyalya Matriculation School for experimental group. The timing allotted by the school for administration for intervention was between 2.50 p.m. and 3.30 p.m. in Holy Flower Matriculation School and 3.30p.m to 4.15 p.m. in Vinayaka Vidyalya Matriculation School. Both the schools were close to each other in opposite direction.

The data collection period was during June 2008 to December 2008. After obtaining consent from the parents and the samples 15 girls were enrolled in each group. Pre-test was conducted to assess their BMI, selected dietary practices, daily caloric intake by 24 hours recall for 2 days: one on school day and one on holiday. Followed by pre-test, intervention was administered for experimental group. During the intervention period there were 3 dropouts in the experimental group due to feeling of shyness to perform the aerobic exercises or school boys noticing their involvement in the study. From the control group 6 of them dropped out due to academic pressure and personal reasons Post-test was conducted in December 2008. The data was analyzed using descriptive and inferential statistics. The findings showed that there was no significant change in BMI ($t_{11} = 0.065$, P= 0.05) but significant change was found in increase in intake of fruits & vegetables and decreased intake of unhealthy snacks. The following changes were made after the pilot study: During the pilot study it was very difficult to get many parents together at one point of time, so orienting and involving them in the study to orient about health lifestyle in diet and physical activity at home was excluded. The 24 hours recall on diet was excluded due to data gap provided by the samples and short duration of time allotted by the school. After the pilot study the menarche status was included in the demographic variable. Only girls' schools were suggested for the main study to involve more samples for participation and to retain them throughout the intervention period.

DATA COLLECTION

The purpose and nature of the study was explained and formal permission obtained from Chief Educational Officer, Salem and Inspector for Matriculation School, Salem and to school authorities / Principals / Head Masters of the schools. The data was collected from June 2009 to December 2009.
The following 4 girls' schools included for the main study

FOR EXPERIMENTAL GROUP
1. Holy angels Matriculation Higher Secondary School and
2. Sarada Vidyalaya Higher secondary school for girls.

FOR CONTROL GROUP
1. Cluny Matriculation Higher Secondary School and
2. Sarada Matriculation Higher Secondary School.

The data collection process was conducted in two phases. In phase- I, all the girls' students from $6^{th} – 8^{th}$ standard were assessed for BMI percentile and grouped as underweight, normal weight, overweight and obese. In phase-II only overweight and obese girls were retained. It was planned to include all of them in the study, those who fitted with selection criteria. But not all of them gave willingness. Therefore to avoid drop outs, those are really willing and able to spent time with researcher to learn the module were informed to participate in the study after getting permission from their parents. It was planned to include 50 students from each class of 6th, 7th and 8th standard. There was more enrolment from 6th standard than from 7th and 8th standard. Firstly for experimental group 150 of them were enrolled due to their inability and other reasons found by the researcher 30 of them were not continued. Therefore the sample size was 120 in experimental group, similarly 120 samples were included for control group.

A multipurpose hall or large class room was allotted by each school for data collection. With class teacher or allotted teacher in charge's guidance the samples were assembled in the place foe assessment and intervention. Pretest was conducted followed by administration of intervention for the experimental group by distributing and educating the module on weight management. The education of module was in 5 sessions on 5 days for 30 minutes duration of each session. Followed by education the group was allowed to ask doubts and asked them to share their difficulties in practicing healthy diet. Reinforced teaching on weight management and group counseling on the importance of eating healthy diet and reduce or avoiding the intake of unhealthy foods was done. On world anti obesity day the

samples of experimental group were given group activity to prepare charts on healthy and unhealthy foods. In December 2009 posttest was conducted.

FINDINGS

a. ASSESSMENT OF STUDENTS FOR WEIGHT STATUS IN PHASE-I

Over all 2874 girls were assessed for weight status. In the target population the underweight were 1051 (36.57%), normal weight 1315 (45.76%), overweight 371 (12.91%) and obese were 137 (4.76%). The school wise weight status of adolescent girls is presented in table 1.

Table: 1- School wise weight status among the school girls

S.no	Name of the school	Weight status								Total
		Underweight		Normal weight		Overweight		Obese		
		f	%	f	%	f	%	f	%	
1.	Cluny (Control group)	112	17.81	321	51.03	146	23.21	50	7.95	629
2.	Holy Angels (Exp. group)	149	22.68	352	53.58	104	15.83	52	7.91	657
3.	Sarada Matric (Control group)	199	37.55	248	46.79	62	11.70	21	3.96	530
4.	Sarada Vidyalaya (Exp. group)	591	55.86	394	37.24	59	5.58	14	1.32	1058
	Total	1051 (36.57%)		1315 (45.76%)		371 (12.91%)		137 (4.76%)		2874

Overweight and obesity is more or less equal in Holy Angels & Cluny. Similarly the weight status is observed in Sarada Matriculation and Sarada Vidyalaya. The underweight was less 30(13.95%) among 8th standard girls of Holy Angels and more 24(57.53%) among 7th standard girls of Sarada Vidyalaya. The normal weight was less 115 (36.62 %) among 8th standard girls of Sarada Vidyalaya and more 132 (61.40%) among 8th standard girls of Holy Angels. The overweight was less 17(4.57%) among 7th standard girls of Sarada Vidyalaya and more 49(23.44%) among 8th standard

girls of Cluny Matriculation. Obese girls were less among 7th standard girls of Sarada Vidyalaya and more among 7th standard girls of Cluny Matriculation.

b. SCHOOL WISE NUMBER OF OVERWEIGHT AND OBESE STUDENTS ENROLLED FOR THE STUDY

The frequency and percentage of number of students enrolled for the study was presented with school wise in table 2.

Table 2- School wise detail about the sample's enrolment

S.No	Experimental schools		Control schools	
	Holy Angels	Sarada Vidyalaya	Cluny	Sarada Matriculation
Number	76/156	44/73	69/196	51/83
Percentage	48.7	60.2	35.2	61.4

COMPARISON OF SELECTED DIETARY PRACTICES

The dietary practices were analyzed in the following headings namely

UNHEALTHY DIETARY PRACTICES

a) preference to Unhealthy food, b) Intake of unhealthy snack per week, and c) Intake of unhealthy meal per day.

a) PREFERENCE TO UNHEALTHY FOOD

The samples' preference to unhealthy food as yes / no was analyzed between the experimental and control group during pre-test and post-test and is presented in table 3. Both groups did not differ in pre-test (χ^2 = 1.187; D.F=1, P=0.276: NS) at the same time there was significant difference in post-test (χ^2 = 95.238;

Table 3- Preference to unhealthy food among Experimental and Control Group (n=120 +120=240)

Preference to Unhealthy food		Experimental Group		Control Group		Chi square test and P value
		f	%	f	%	
Pre-test	**a. Yes**	90	75.0	97	80.8	χ2= 1.187,D.F. = 1
	b. No	30	25.0	23	19.2	P = 0.276 (N.S)
Post-test	**a. Yes**	30	25.0	105	87.5	χ2= 95.238,D.F = 1
	b. No	90	75.0	15	12.5	P = 0.001 ***

Note: * - P<0.001 Level of Significant, N.S. – Not Significant**

D.F=1, P=0.001***). It may be due to the influence of the intervention, because in post-test 90 (75%) of experimental group reported non-preference and 105 (87.5%) of control group reported preference. Therefore the H_{1A} is accepted.

Table 4- Comparison of unhealthy snack intake among experimental and control group in pre and post-test (n=120 +120=240)

Intake of Unhealthy snack		Experimental Group		Control Group		Chi square test and P value
		f	%	f	%	
Pre-test	**a. < 3 times per week**	110	91.7	102	85.0	χ2= 2.588,D.F. = 1
	b. ≥ 3 times per week	10	8.3	18	15.0	P = 0.108 (N.S)
Post-test	**a. < 3 times per week**	56	46.7	103	86.6	χ2=42.690,D.F.= 1
	b. ≥ 3 times per week	64	53.3	16	13.4	P = 0.001 ***

Note: * - P<0.001 Level of Significant, N.S. – Not Significant**

INTAKE OF UNHEALTHY SNACK PER WEEK

The frequency and percentage of sample's intake of Unhealthy food snacks per week in pre-test and post-test is analyzed using chi- square test and presented in table 4. In pre-test majority of them both the group reported less than 3 times intake of unhealthy snack per week and they did not differ significantly in pre-test (χ^2 = 2.588; D.F=1, P=0.108: NS), at the same time there was significant difference in post-test (χ^2 = 42.690; D.F=1, P=0.001***). Though there was statistical significance in post-test in intake of unhealthy snack per week, it can be observed the in control group the frequency of samples eating unhealthy snack remains nearly same as in pre-test 102(85%) and post-test 103(86.6%). At the same time in experimental group the majority of school girls 64 (53.3%) in post-test had unhealthy snack for 3 or more time per week in comparison with control group16 (13.4%). It may be because of reduction in the frequency of eating unhealthy meal among the experimental group samples might have tempted them to eat snack time, availability of unhealthy snack in home and school canteen. Therefore H_{1B} is

accepted. So, the intervention is not effective among experimental group in bringing changes in frequency of eating unhealthy snack.

INTAKE OF UNHEALTHY MEAL

The frequency of intake of unhealthy meal per day was analyzed using frequency, percentage and Chi square test and presented in table 5. In pre-test most of them in experimental group 78(65%) and control group 97(80.8%) had unhealthy meals 3 times per day. Both groups differed in pre-test (χ^2 = 9.192; D.F=1, P=0.010 **). I*n post-test* most of them in experimental group 90(75%) had 2 unhealthy meals per day and control group76 (63.3%) had unhealthy meals 3 times per day. It can be observed that there is reduction of frequency of eating unhealthy meal among experimental group than in control group. At the same time both the group significantly differed in post-test (χ^2 = 47.087; D.F=2, P=0.001***). It can be said that the intervention was effective in experimental group in bringing change in intake of unhealthy meal. Therefore H_{1C} is accepted. Regarding the

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Table 5- Comparison of unhealthy meal intake among experimental and control group in pre and post-test.
(n=120 +120=240)

Intake of Unhealthy meal per day		Experimental Group		Control Group		Chi square test and P value
		f	%	f	%	
Pre-test	a. In 3 meals	78	65.0	97	80.8	$\chi2$= 9.192,
	b. In 2 meals	39	32.5	23	19.2	D.F. = 2
	c. In 1 meal	3	2.5	0	0.0	P = 0.010 **
Post-test	a. In 3 meals	30	25.0	76	63.3	$\chi2$= 47.087,
	b. In 2 meals	90	75.0	38	31.7	D.F. = 2
	c. In 1 meal	0	0.0	6	5.0	P = 0.001 ***

Note: ** - P<0.01 Level of Significant *** - P<0.001 Level of Significant.

unhealthy dietary practices among the samples there was significant difference found in all the 3 selected practice. Therefore H_1 is accepted. It can be interpreted that the intervention is effective in reducing unhealthy dietary practices among the samples.

HEALTHY DIETARY PRACTICES

a) Intake of Healthy snack per week, b) Intake of Healthy meal per day c) Intake of fruits and d) Intake of vegetables.

INTAKE OF HEALTHY SNACK PER WEEK

The frequency, percentage and Chi square test was used to analyze the intake of eating healthy snacks per week among experimental and control group in pre and post-test and is presented in table 6. In pre-test majority of them in experimental group 71(59.2%) and control group 59(49.2%) reported the intake of healthy snack less than 3 times per week. Both groups statistically did not differ in pre-test (χ^2 = 2.417; D.F=1, P=0.120: NS). At the same time in post-test among the experimental group samples the frequency of eating healthy snacks in less than 3 times per day was

increased to 109(90.8%) from pre-test 71(59.2%). In control group there was nearly no change in pre-test and post-test. The experimental group 109 (90.8%) had less frequency of snacks (<3 times) in comparison with control group 60(50%). There was significant difference observed in post-test (χ^2 = 48.024; D.F=1, P=0.001***). So, it can be interpreted that the intervention is effective among experimental group in reduction in intake of healthy snacks. Therefore H_{2a} is accepted.

INTAKE OF HEALTHY MEAL

The frequency and percentage of healthy meals per day among experimental and control group in pre and post-test is presented in table 7. In pre-test majority in experimental 81 (67.5%) and control group 82 (68.3%) reported intake of healthy meals 2 times per day. Both groups did not differ significantly in pre-test (χ^2 = 0.146; D.F=1, P=0.930: NS), but there was significant difference in post-test (χ^2 = 32.441; D.F=2, P=0.001***). In post-test 101 (84.2%) of experimental group had 3 healthy meals per day than control group 60 (50%). It may be due to the effectiveness of the intervention. Therefore the H_{2b} is accepted. Percentage of samples eating healthy meals per day among experimental and control group is presented in the figure 3.

INTAKE OF FRUITS

The intake of fruits per week among the samples of both the group in pre-test and post-test is presented in table 8.

In pre-test majority of them in experimental group reported intake of fruits as ≤1 per week 62(51.7%) per week, in control group majority of them reported intake of fruits as 2-5 times 65(54.2%) per week. Both groups differed in pre-test (χ^2 = 19.285; D.F=1, P=0.001***). In post-test the control group samples remained nearly same as pre-test level in intake of fruits, among experimental group there was increase of samples form ≤1 per week 62(51.7%) to 2-5 times 66(55%) per week, but not in post-test (χ^2 = 3.977; D.F=2, P=0.137: NS).

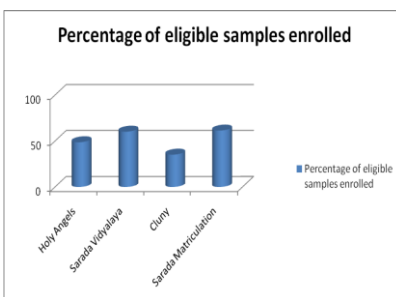**Figure1- Percentage of eligible samples enrolled for the study**

Table 6- Frequency and percentage of eating healthy snacks per week among experimental and control group in pre and post-test (n=120 +120=240)

Intake of Healthy snack		Experimental Group		Control Group		Chi square test and P value
		f	**%**	**f**	**%**	
Pre-test	**a. < 3 times per week**	71	59.2	59	49.2	$\chi2$= 2.417,D.F. = 1
	b. ≥ 3 times per week	49	40.8	61	50.8	P = 0.120 (N.S)
Post-test	**a. < 3 times per week**	109	90.8	60	50.0	$\chi2$= 48.024,D.F. = 1
	b. ≥ 3 times per week	11	9.2	60	50.0	P = 0.001 ***

Note: *** - P<0.001 Level of Significant, N.S. – Not Significant

From the table it can be observed that the intake of fruits increased among the experimental group that is the reason for non-significance in post-test comparing to the significant difference in pre-test. Therefore it can be said that the intervention influenced the experimental group in improving their intake of fruits. Though they did not reach the intake of fruits daily it can be considered the intervention is effective. Therefore H$_{2c}$ is accepted. It may be due to the fact that fruits were considered as expensive and most of them ate fruits less frequently.

Table 7- Frequency and percentage of healthy meals among experimental and control group in pre and post-test. (n=120 +120=240)

Intake of Healthy meal per day		Experimental Group		Control Group		Chi square test and P value
		f	**%**	**f**	**%**	
Pre-test	**a. In 3 meals**	33	27.5	31	25.8	$\chi2$= 0.146,
	b. In 2 meals	81	67.5	82	68.3	D.F. = 2
	c. In 1 meal	6	5.0	7	5.8	P= 0.930 (N.S)
Post-test	**a. In 3 meals**	101	84.2	60	50.0	$\chi2$= 32.441,
	b. In 2 meals	19	15.8	57	47.5	D.F. = 2
	c. In 1 meal	0	0.0	3	2.5	P = 0.001 ***

Note: *** - P<0.001 Level of Significant, N.S. – Not Significant

Table 8- Frequency, percentage and Chi square of samples intake of fruits among experimental and control group in pre and post-test (n=120 +120=240)

Intake of Fruits per week		Experimental Group		Control Group		$\chi2$ test and P value
		f	**%**	**f**	**%**	
Pre-test	**a. Daily**	17	14.2	26	21.7	$\chi2$= 19.285,
	b. 2-5 times	41	34.2	65	54.2	D.F. = 2
	c. ≤1 per week.	62	51.7	29	24.2	P = 0.001 ***
Post-test	**a. Daily**	29	24.2	18	15.0	$\chi2$= 3.977,
	b. 2-5 times	66	55.0	68	56.7	D.F. = 2
	c. ≤1 per week	25	20.8	34	28.3	P= 0.137 (N.S.)

Note: *** - P<0.001 Level of Significant, N.S. – Not Significant

Table 9-Frequency, percentage and Chi square on intake of vegetables per week among experimental and control group in pre and post-test (n=120 +120=240)

Intake of Vegetables per week		Experimental Group		Control Group		Chi square test & P value
		f	**%**	**f**	**%**	
Pre-test	**a. Daily**	30	25.0	73	60.8	$\chi2$= 31.873,
	b. 2-5 times	64	53.3	36	30.0	D.F. = 2
	c. ≤1 per week.	26	21.7	11	9.2	P = 0.001 ***
Post-test	**a. Daily**	69	57.5	40	33.3	$\chi2$= 14.504,
	b. 2-5 times	43	35.8	64	53.3	D.F. = 2
	c. ≤1 per week.	8	6.7	16	13.3	P = 0.001 ***

Note: *** - P<0.001 Level of Significant

INTAKE OF VEGETABLES

The intake of vegetables among the samples of both the group in pre-test and post-test is presented in table 9. Both groups did not differ in pre-test ($\chi^2 = 31.873$, D.F=1, P=0.001[***]) and in post-test ($\chi^2 = 14.504$; D.F=2, P=0.001[***]). It may be due to the family practice of preparing vegetable for meal and availability in range of prices. Therefore H_{2d} is not accepted. In regard to effectiveness of intervention on selected healthy dietary practices, except $H_{2d,}$ all the other three healthy dietary practices were found effective.

DISCUSSION

DIET

In this study majority of them in experimental (88%) and control group (89.2%) were non vegetarians. Similarly the http://readperiodicals.com, revealed that prevalence of overweight is 18.4% among non-vegetarians and is 14.7% among vegetarians. At the same in an another study it was found the prevalence of overweight and obesity is 18.4% among non vegetarians and is 14.7% among vegetarians found different finding in his assessment of dietary habit among 12 – 18 years girls, as among vegetarian 93.7% and 95.25 were overweight and obese respectively. Among non-vegetarians 6.35 and 4.8% were overweight and obese respectively (Ramesh K, 2010).

Figure -2 Percentages of eligible samples enrolled for the study
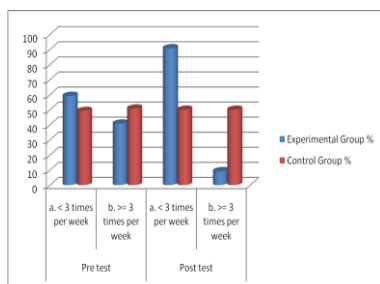
WEIGHT

In this study, followed by intervention 12(10%) of the experimental group reached normal weight. Similarly Adam reports about 34% of children showed reduction in percentage of weight loss and 30% were no longer overweight at 10 years.

BMI & BMI PERCENTILE

In this study the mean pre-test BMI was 23.93 & 24.27 in experimental and control group respectively. In a study the prevalence of overweight was 4.2% and of obesity 0.8% was assessed using the World Health Organization

standard (Bishwalata *et al*, 2010). Many studies found intervention was effective for weight management among girls. A systematic review and meta-analysis is used to determine the effect of school-based physical activity interventions on body mass index (BMI) in children (Kevin C. Harris *et al*,).

UNHEALTHY FOOD

This study revealed that 64 (53.3%) from experimental group and 16 (13.4%) in control group ate unhealthy food $\geq$ 3times per week. Similarly in a it was found that about one-third of the adolescent girls 29.4% ate fast food > 3 times a week (Singh et al. 2006). A study by NIN, Hyderabad observed the frequency of intake of fast foods was significantly (p <0.05) higher among the cases compared to the control group. A study conducted by Ramesh. K (2010) revealed that 63% of the overweight and 76.2 5 of the obese girls reported regular intake of junk food. Similarly in many studies it was observed a positive co-relationship between overweight and obesity with the consumption of fried foods, energy drinks, pastries and fruit juices regularly as the percentage is much higher in these (4.88% and 4.44%) compared to those who don't consume these regularly (0.72 and 1.81%).

HEALTHY FOOD

In experimental group (90.8%) and in control group (50%) had less frequency of snacks (<3 times) in post-test. There is 10% and 25.7% of samples increased the daily intake of fruits and vegetables respectively among the experimental group. Singh et al., 2006 found that extremely low consumption of fruits and vegetables across all groups, 39.4% adolescents had fruits daily. NIN Hyderabad found only 27.8% and 32.2% eats daily vegetables & fruits respectively. It was observed that using multivariate logistic regression, be obese (OR 1.9, 95% CI 1.4-2.6), not eating other type of vegetables in the past 1 week (OR 2.338, 95% CI 1.04-5.24) was found to be independent predictors of a higher BMI (Bishwalata R., *et al* 2010). In another study it was found that the fruits and vegetable component were comparatively lower (Srihari *et al*, 2007).

Figure- 3 Percentage of samples eating healthy snacks per week
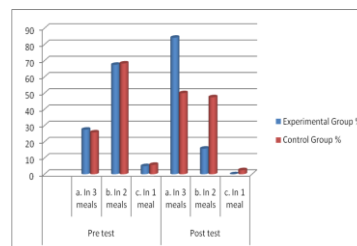
WHAT THIS STUDY ADDS

- Conducting school based intervention for weight management among overweight and obese school girls is possible for short duration of time.(For long term/ continuous intervention, creating school health policy by health sectors and education sectors of central and state government is required).
- Intervention was effective on weight management in the dietary variables on reduction of preference to unhealthy food and eating unhealthy meals, increase on eating healthy snacks, healthy meals and fruits.

ETHICAL CONSIDERATION

Ethical clearance obtained from ethical committee in 2008.
1. Formal permission obtained from Chief Educational Officer, Salem, and Inspector for Matriculation School Salem, School Authorities / Principals /Head Masters.
2. Informed written consent obtained from parent and samples.
3. No blood investigation is involved in the study.
4. Confidentiality of the information is maintained.

LIMITATIONS

1. Control over dietary practices in school canteen (other than school time lunch and snack) and outside the school was not feasible.
2. Recall bias in diet among the samples could have confounded some findings.
3. A finding is generalizable to the sample and setting.

CONCLUSION

Intervention is effective in reduction of all the selected unhealthy dietary practices. Intervention is also effective in improving all the selected healthy dietary practices except in intake of vegetables.

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