Research Article

EFFICACY OF SNACKING KNOWLEDGE, ATTITUDE AND PRACTICES (KAP) THROUGH FUN BASED LEARNING AMONG SELECTED PRE-ADOLESCENTS (10-12 YEARS)

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A R T I C L E   I N F O

A B S T R A C T

Background: When compared with traditional instructional methods, fun-based learning promises a higher motivation of learners by presenting contents in an interactive, rule-based and competitive way providing fun along with learning the concept.

Aim: A Study was designed to find the efficacy of snack based knowledge, attitude and practices changes developed through fun based leaning among selected school going pre-adolescents studying in grade 5 to 7 from various board of schools in Coimbatore city.

Methodology: The study was totally around 8 months, fun based intervention for the school going adolescents (10-12 years) constituting both boys and girls (N=384) with the multi- factorial study design. Three boards of schools namely Government (n=19), Government aided (n=82) and Matriculation (n=283). According to BMI percentiles, overweight and obese adolescents were only selected and further sub-divided into control group (n=192) and experimental group (n=192) by multi stage random sampling for the conduct of the study. Data was collected using a pretested, semi- structured schedule. Personal Information, socio-demographic profile, anthropometric measurements like height and weight were taken as per the standards and BMI percentiles was derived. Knowledge, Attitude and Practices (KAP) on snacking pattern were collected. The study was carried out for 21 continuous working days and with repeated education on snack topics for 3 weeks were planned. Follow up's for the assessment of snacking knowledge; attitude and practices immediately after, after one month and after 3 months and after 6 months of study was done.

Results/Findings: Majority of the school going adolescents selected for the study were in government aided (35%), followed by government (33%) and matriculation (32%) schools. Experimental groups 56.3% suffer from overweight and 43.7% from obesity totally whereas control group constitutes 51% from overweight and 49% obese.

Conclusion: Majority of selected adolescents have remarkable results after intervention in knowledge, attitude and practices. The developed nutrition games tool was effective in imparting nutrition education for the adolescents.

INTRODUCTION

Knowledge of nutrition is important for everyone to eat balanced meal at proper time in exact quantities to maintain optimum health and wellbeing. It also helps to develop explicit attitude towards food and helps to build sound eating habits. Adolescence period is marked with rapid growth spurt and nutritional needs are higher than any other period during the life cycle, which places adolescents into a nutritionally vulnerable group with unhealthy dietary habits that do not meet the daily recommended dietary allowances[1,2]. Adolescents face various challenges like

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independence, conscious of physical appearance, identity crisis and exposed to mixed messages through mass media[3]. Healthy adolescents reflect the nation's human resource potential and countries future utmost depends on them. Adolescents do not realise the beneficial effect of healthy eating in the long term. They indulge in poor and limited food choices consists of soft drinks, fast foods , frequent snacking and leaves less chance for having balanced meals rich in optimum and adequate nutrients. Skipping meals can contribute to consumption of energy dense, nutrient poor diets that may add to malnutrition[4]. Games help in cognitive development and consolidate the skills, action and meanings acquired through play way of teaching[5] by creating a broader zone of proximal development. Games are challenging, delightful, imaginative and exhibit clear rules to imbibe while playing[6,7]. Hence this study attempts

to study the nutritional scenario of adolescents and to evaluate the efficacy of fun based learning snacking pattern in pre-adolescents.

METHODS

Selection of Population

The author contacted 5 Government schools and 5 government aided and 5 Matriculation schools. Government schools are run by government where the fee ranged from Rs.1000-2000/year, government aided school collected a fee of Rs.10,000-20,000/year whereas matriculation school collected a fee of Rs.30,000-50,000 and even above/year . Permission was granted and data collection was done among 3 government, 2 government aided and 2 matriculation schools respectively. Consenting male and female students of class 5-7 were included in the study.

Selection of Sample

Our estimated sample size was 400 school going adolescents but only 384 adolescents 10-12 years who were willing to participate in the study was collected after receiving a consent from children and their parents. Gender differences were not considered in our calculation. However, we collected data from all the students from the grades 5-7 who were willing to take part in the study.

Data Collection

Using validated questionnaire, data like personal information, socio-demographic background, anthropometric measurements was obtained. Details on snacking pattern, knowledge, attitude and the behavior was collected using direct interview schedule method as it allows the researcher to build a rapport and gives the validation to the data.

Socio-Economic Status

India, a country with vast differences among people based on their economy so this is assessed using revised Kuppuswamy Scale 2012[8] as tabulated below;

Socio-Economic Category	Monthly Income (Rs)
Upper	≥ 32,050
Upper Middle	12020-32,049
Middle/Lower Middle Income	12,019-8,010
Lower/Upper Lower	8,009-4,810
Lower	4,809- 1,600/ and less

* Revised Kuppuswamy Scale 2012

For of the convenience, we have merged upper middle and Middle/lower Middle income to a category of middle SES, in the same way lower SES comprises of lower/ upper lower and lower income.

Anthropometry

Height

A stadiometer was used to measure the height of the individual. The subject were made to stand erect without shoes on a flat floor by the scale with heels together and toes apart. The head was comfortably held erect and the arms were relaxed and held in a natural manner. The head piece of the stadiometer was lowered slowly and was placed in the sagital plane over the head of the child

applying a slight pressure to reduce the thickness of hair and make contact with the top of the head. Using this technique, the height of the children was measured to the nearest 0.1cm accuracy[9]

Weight

Body weight is the most widely used and the simplest reproducible anthropometric measurement for the evaluation of nutritional status of young children. Body weight of all the children was measured using a digital weighing balance. The balance was validated using known weight for every 5 readings. The children were made to stand erect with minimum clothing and barefoot. The weight was noted to the nearest 0.1 kg[9].

BMI Percentiles

BMI, age and sex, specific percentile values for children both boys and girls (CDC,2000)[10] were used to find out Underweight, Normal, Overweight, and Obese. In clinical practice, BMI for age growth charts can be used to determine an adolescent's BMI for age percentile and to track relative weight status through childhood to adolescence.

Percentile	BMI Category*
<5th Percentile	Underweight
≥5th to <85th Percentile	Normal
≥85th Percentile to <95th Percentile	Overweight/At risk
≥95th Percentile	Obesity

*CDC, 2000

BMI percentiles were calculated using the online calculator for grouping the selected pre-adolescents according to the BMI category. At risk (≥85th percentile to <95th percentile) individuals was termed as 'Overweight' adolescents and obese individuals who were ≥95th percentile were only considered for the study.

Knowledge, Attitude and Practices (KAP)

Knowledge, attitude and practices on snacking pattern were collected before the start of the study, immediately after study (after 21 days), after one month of study and after three months of study and six months after study.

Game tool for Fun Based Learning

The game tool for learning was given in the figure 1 given below;

Figure 1

Gaming approach was used to make the learning effective, efficient and interesting. The study groups were independent and the gain in knowledge levels were studied to evaluate the efficiency of nutritional games compared to control group not exposed to treatment. Nutrition education intervention programs are multifaceted and on-going[11] and found effective when behaviorally focused based on appropriate theory and prior research rather than knowledge alone. Sound understanding of nutrition and healthy life style help people to make better food selection and to overcome myths about food and protect people from obesogenic environment[12,13]. The information and methods of teaching can be boring and tedious for adolescents who show lack of interest in nutritional topics[14]. Games can provide as an effective medium for presenting educational information on nutrition to children. Educational games combine both learning new skills and concepts more fun, and attractive[15,16].Participatory method like puzzles and fun games namely word search game, crossword puzzles, magic box game, snake and ladder games, learning box, hands on training includes personal hygiene and nutrition labeling, electro light game. The education tools like puzzle kit, posters, charts, toys and pamphlets were done in English and Local language Tamil. Education was given for the period of 3 weeks (21 working days) as a study in the year 1960 stated that "It takes 21 days to form a new habit[17]". 45-60 minutes of learning through a game or puzzle in every working day based on healthy snack consumption and its negative consequences on the consumption of unhealthy snack was taught. An assessment was done at the end of each game and the scores were out of 10. Scores was calculated for 3 weeks.

Ethical Statement

The study was granted approval by the Ethics Review Committee of the PSG Institute of Medical Research, Coimbatore. Consent forms, in both English and Tamil, for all students of grades 5 to 7 were signed by either of the parents of the pre-adolescents, and data were collected only from them

Inclusion Criteria

Adolescents of both sexes, studying in class 5th, 6th and 7th class between 10 to 12 years who were not ill and present during the study period and was willing to participate were included in the study.

Exclusion Criteria

Students of 5th to 7th class who were seriously ill or absent during the study period or non- willing to participate were excluded from the study.

RESULTS AND DISCUSSION

Age and Gender of the Selected Adolescents

Age and Gender of the selected adolescents was given in the table below;

Table I Age and Gender of the selected adolescents (N=384)

School Board	Age (Years)												Total	
	10 (n=126)				11 (n=134)				12 (n=124)					
	Boys		Girls		Boys		Girls		Boys		Girls			
	No	%	No	%	No	%	No	%	No	%	No	%	No	%
Government	26	**21**	31	**25**	25	**19**	25	**19**	26	**21**	24	**19**	126	33
Government aided	20	16	20	16	21	16	20	15	21	17	23	18.5	134	**35**
Matriculation	14	11	15	12	20	15	25	**19**	16	13	12	10	124	32
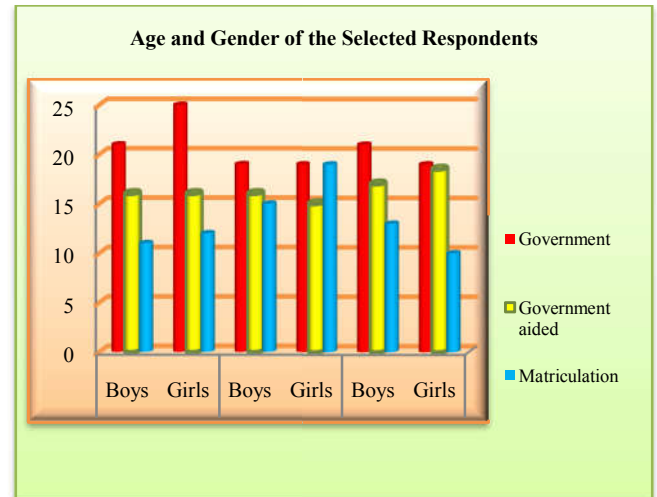
Figure 2

Majority of the school going adolescents selected for the study were in government aided (35%), followed by government (33%) and matriculation (32%) schools.

Socio-Demographic Profile of Selected School Adolescents

Individual's health and nutrition status is greatly influenced by family background, so it is tabulated below;

Table II Socio-economic background of selected adolescents (N=384)

| S. No | Socio-Economic Details | Adolescents | | | | | |
		Government (n=19)		Government Aided (n=82)		Matriculation (n=283)	
		No.	%	No.	%	No.	%
1.	**Living Area**						
	- Rural	10	**53**	45	**55**	117	41
	- Urban	9	47	37	45	166	**59**
2.	**Religion**						
	- Hindu	12	**63**	51	**62**	121	**43**
	- Christian	4	21	20	24	97	34
	- Muslim	3	16	11	13	65	23
3.	**No of persons at home**						
	- 1-2	2	10.5	13	16	67	24
	- 2-4	8	**42**	45	**55**	102	**36**
	- 3-6	6	31.5	20	24	79	28
	- > 6	3	16	4	5	35	12
4.	**Type of Family**						
	- Nuclear	10	**53**	58	**71**	169	**60**
	- Joint	9	47	24	29	114	40
5.	**Total Monthly Income**						
	- < 10,000	10	**53**	49	**60**	83	29
	- 10,001- 30,000	5	26	20	24	109	**38.5**
	- 30,001 - 50,000	4	21	10	12	47	17
	- 50,001 - 70,000	-	-	3	4	44	15.5
	- 70,001 - 90,000	-	-	-	-	-	-

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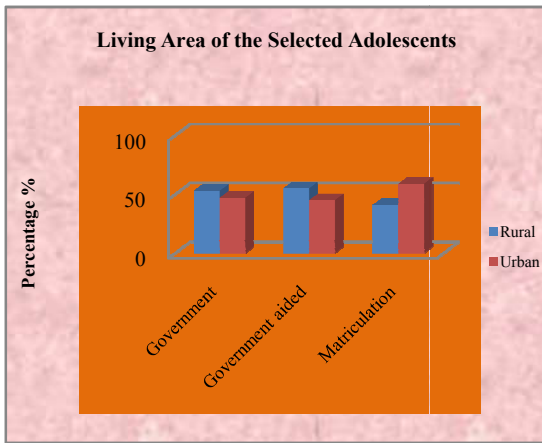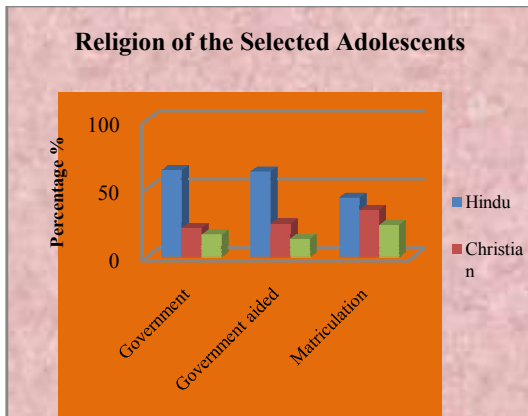
Figure 3

Figure 4

Figure 5

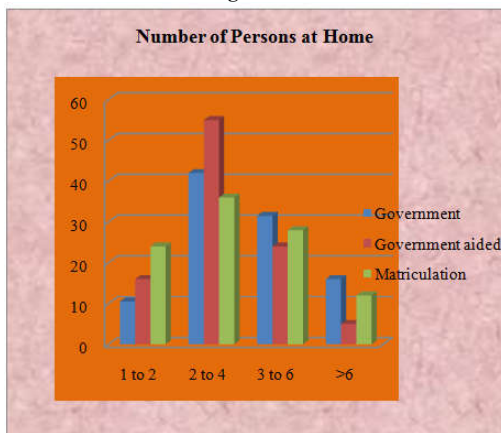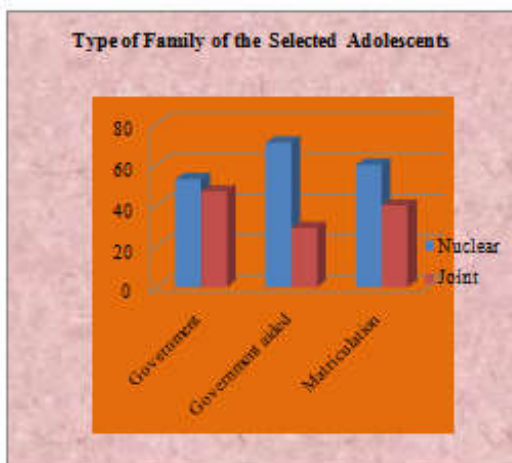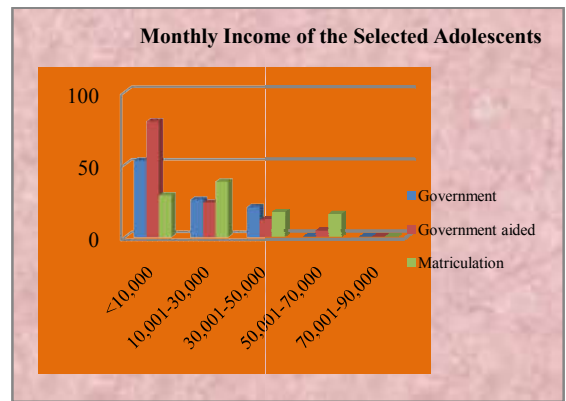**Figure 6**

Figure 7

The above table clearly depicts that rural adolescents prefer nearby government aided (55%) and government school going adolescents (53%) whereas urbanities select matriculation (59%) schools. Hindu religion is highly prevalent among south India, which is again confirmed from our study. The selected school going adolescent's family dwell as nuclear family as we could note that majority of the family comprises only 2-4 members. Family income of Rs.≤10,000/- is noted among government and government aided school adolescents whereas matriculation adolescent's family income was between Rs. 30,000/-70,000 per month.

Nutritional Status

The best indicator of adolescents' well-being is growth which acts as a single measurement that best defines the nutritional and health status of children and helps to estimate the quality of life of population at large in the community. BMI percentiles of the adolescents and groups are given in table below;

Table III Distribution of BMI Percentiles of adolescents by gender and group (N=384)

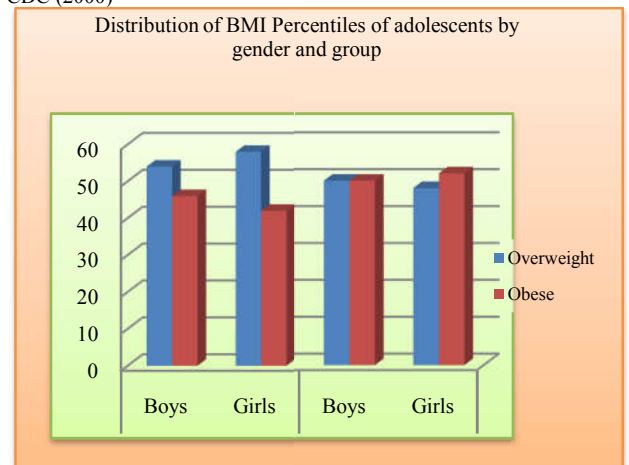| BMI Percentile	Groups											
	Experimental (n=192)				Total		Control (n=192)				Total	
	Boys (n=96)		Girls (n=96)		No.	%	Boys (n=96)		Girls (n=96)		No.	%
	No.	%	No.	%			No.	%	No.	%		
> 95th Percentile (Obese)	44	46	40	42	84	43.7	48	**50**	50	**52**	98	**51**
85-95th Percentile (Overweight)	52	**54**	56	**58**	108	**56.3**	48	**50**	46	48	94	49

*CDC (2000)[10]

Figure 8

From the table it is evident that from experimental group 56.3% suffer from overweight and 43.7% from obesity totally. Control group totally contains 51% from overweight and 49% obese. Therefore a need was felt to provide intervention strategies for adolescents to make them aware of good eating practices.

Knowledge, Attitude and Practices (KAP)

Knowledge, Attitude and Practices (KAP) on dietary and snacking pattern of the selected adolescents was given in the table below. The number of respondents who correct answers was given below;

Table IV Knowledge of the Selected Adolescents (N=384)

S. No	Knowledge	Experimental Group (n=192)				Control Group (n=192)			
		Pre-Test	Post Test 1	Post Test 2	Post Test 3	Pre-Test	Post Test 1	Post Test 2	Post Test 3
1	Eating Fruits is better than drinking fruit juice	69 (36)	166 (86)	159 (83)	153 (80)	64 (33)	72 (37.5)	79 (41)	65 (34)
2	Eating fruits and vegetables everyday good for our body to fight against cold and fever	53 (28)	159 (83)	153 (80)	149 (78)	57 (30)	56 (29)	61 (32)	62 (32)
3	Dry fruits and Nuts as snacks are essential to build muscles?	59 (31)	175 (91)	162 (84)	157 (82)	83 (43)	74 (38.5)	78 (41)	71 (37)
4	Eating packet snacks will make you unhealthy?	71 (37)	154 (80)	150 (78)	142 (74)	97 (50.5)	82 (43)	75 (39)	73 (38)
5	Fried foods make you increase weight	66 (34)	161 (84)	158 (82)	154 (80)	89 (46)	65 (34)	68 (35)	72 (37.5)
	Total Mean Percentage	33.2	**85**	81.4	79	40.5	36.4	**38**	36

*Pre-Test (Before Intervention), Post Test 1 (21 days after intervention), Post Test 2 (one month after intervention, Post Test 3 (3 months after intervention)

From the above table, we could note that the experimental group had an effective mean percentage of 85% to the post test 1 (21 days after intervention), followed by 81.4% from post test 2 (one month after intervention), 79% from post test 3 (3 months after intervention) when compared with the control group values. This shows the education had an impact on knowledge.

Table V Attitude of the selected adolescents (N=384)

S.No	Attitude	Experimental Group (n=192)				Control Group (n=192)			
		Pre-Test	Post Test1	Post Test 2	Post Test 3	Pre-Test	Post Test 1	Post Test 2	Post Test 3
1	We can consume carbonated beverages as an alternative for water	65 (34)	149 (78)	153 (80)	148 (77)	74 (38.5)	68 (35)	66 (34)	69 (36)
2	Home made snacks are always healthy to outside foods	69 (36)	153 (80)	149 (78)	153 (80)	82 (43)	62 (32)	82 (43)	81 (42)
3	Consuming packet snacks once a week is healthy?	75 (39)	147 (76.5)	151 (79)	156 (81)	78 (41)	87 (45)	84 (43.7)	78 (41)
4	Eating fried foods is healthy?	52 (27)	136 (71)	147 (76.5)	151 (79)	83 (43)	66 (34)	87 (45)	69 (36)
5	Eating packed foods is good for your health	61 (32)	159 (83)	149 (78)	148 (77)	81 (42)	83 (43)	89 (46)	75 (39)
	Total Mean Percentage	34	**94.3**	78	79	41.5	38	42	39

*Pre-Test (Before Intervention), Post Test 1 (21 days after intervention), Post Test 2 (one month after intervention, Post Test 3 (3 months after intervention)

The above table clearly depicts that experimental group had the better attitude in 21 days after the intervention showed the post test value of 94.3% followed by 79% in post test 3 (3 months after intervention, whereas one month after intervention (post test 2) had the mean percentage of 78% when compared with the control group. The results showed that the education benefitted more in experimental group while comparing with control group.

Table VI Practices of the Selected Adolescents (N=384)

S.No	Practices	Experimental Group (n=192)				Control Group (n=192)			
		Pre-Test	Post Test 1	Post Test 2	Post Test 3	Pre-Test	Post Test 1	Post Test 2	Post Test 3
1	Do you eat fruits when you are hungry?	47 (24)	142 (74)	157 (82)	132 (69)	82 (43)	74 (38.5)	86 (45)	87 (45)
2	Do you eat dry fruits and nuts regularly?	53 (28)	154 (80)	154 (80)	140 (73)	97 (50.5)	82 (43)	96 (50)	83 (43)
3	Do you prefer home prepared snacks ?	51 (26.5)	156 (81)	161 (84)	157 (82)	98 (51)	82 (43)	87 (45)	91 (47)
4	Do you consume packet snacks 3-4 times a week?	65 (34)	159 (83)	158 (82)	151 (79)	82 (43)	89 (46)	90 (47)	82 (43)
5	Do you consume of fried foods daily?	52 (27)	153 (80)	161 (84)	150 (78)	94 (49)	88 (46)	91 (47)	59 (31)
	Total Mean Percentage	28	80	82	76	47	43	47	42

*Pre-Test (Before Intervention), Post Test 1 (21 days after intervention), Post Test 2 (one month after intervention, Post Test 3 (3 months after intervention)

Majority of selected adolescents had remarkable results after intervention in practices showing post test 2 (one month after education) with 82%, followed by 80% for post test 1 and post test 3 (76%). Thus, the education benefited in changing good dietary and snacking practices.

Table VII Mean score for KAP of adolescents

Variables	Research Time	Control Group	Experimental Group
Knowledge	Pre-Test	1.07 ± 0.85	1.02 ± 0.86
	Post Test 1	1.16 ± 0.81	**3.23 ± 1.01**
	Post Test 2	**1.18 ± 0.87**	3.02 ± 0.96
	Post Test 3	1.12 ± 0.86	3.12 ± 1.05
Attitude	Pre-Test	**1.26 ± 0.87**	1.05 ± 0.72
	Post Test 1	1.02 ± 0.81	**3.96 ± 0.85**
	Post Test 2	1.05 ± 0.85	3.82 ± 0.95
	Post Test 3	1.08 ± 0.83	3.36 ± 0.59
Practices	Pre-Test	**1.29 ± 0.84**	1.29 ± 0.98
	Post Test 1	1.24 ±0.85	3.70 ± 0.87
	Post Test 2	1.25 ± 0.91	3.86 ± 0.93
	Post Test 3	1.16 ± 0.95	**3.91 ± 0.82**

*Pre-Test (Before Intervention), Post Test 1 (21 days after intervention), Post Test 2 (one month after intervention, Post Test 3 (3 months after intervention)
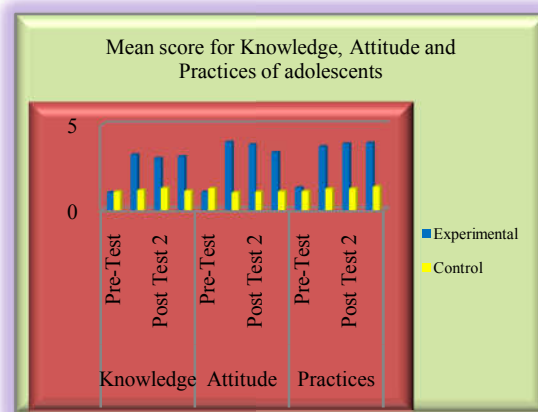

Figure 9

The mean score of KAP shows that there is higher mean of 3.23 ± 1.01 (Post Test 1) in knowledge, 3.96 ± 0.85 (Post Test 1) in attitude immediately after education and also 3.91

± 0.82 (Post Test 3) even after 3 months after education. This shows the education could give better results immediately after the education and even shows the sustainability of education's impact even after 3 months after the education was over.

Impact of Fun Based Learning

Impact of fun based learning through participation method of study and the mean for various puzzles and fun games for the 3 consecutive weeks is given below;

Table VIII Mean score for various activities of adolescents (N=384)

Games	Mean Scores		
	Week 1	Week 2	Week 3
Word Search	4.36±1.49	6.29±1.24	8.02±1.04
Crossword	3.22±2.01	6.66±0.95	8.66±1.90
Magic Box	5.92±1.94	7.02±2.22	8.02±1.02
Snake and ladder	5.66±2.21	7.91±1.97	9.13±0.5
Learning Box	5.31±1.94	6.34±2.54	8.52±0.5
Hands on training	6.24±2.26	6.22±3.01	8.36±1.0
Electro light	4.67±1.32	6.90±2.42	8.92±0.4

The selected adolescents co-operated well and participated with enthusiasm for all the games. Comparing to week 1 and week 2, week 3 had a better mean score. This shows that the study had a better impact on changing the knowledge, attitude and practices of the children.

CONCLUSION

The study revealed that experimental group 56.3% suffer from overweight and 43.7% from obesity totally. Control group totally contains 51% from overweight and 49% obese. The mean score of KAP shows that there is higher mean of 3.23 ± 1.01 (Post Test 1) in knowledge, 3.96 ± 0.85 (Post Test 1) in attitude immediately after education and also 3.91 ± 0.82 (Post Test 3) even after 3 months after education. This shows the education could give better results immediately after the education and even shows the sustainability of education's impact even after 3 months after the education was over. The fun based learning as intervention strategy was found effective for imparting nutrition education for adolescents.

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