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RESEARCH ARTICLE

EFFECTIVENESS OF GAME BASED LEARNING ON KNOWLEDGE OF HEALTH PROMOTION AMONG PRIMARY SCHOOL CHILDREN – A QUASI EXPERIMENTAL STUDY

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ABSTRACT

A study was conducted to find the effectiveness of game based learning on knowledge of health promotion among primary school children of selected rural schools of Udupi Taluk Karnataka". Objectives of the study were to find the effectiveness of game based learning on knowledge of health promotion, and also to find the association between knowledge on health promotion and the selected variables. Demographic proforma and structured knowledge questionnaire on health promotion were administered eighty primary school children selected using proportionate sampling technique. The findings of the study showed that majority 36(45.0%) children belonged to the age group of 10 years, 48(60%) were boys and 41(51.25%) children were in fifth standard. The mean post-test knowledge score in each area of knowledge in the experimental group was higher than the control group. Game based learning was an effective method increase the knowledge level of the higher primary school children. (t=13.77, p=0.001)

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INTRODUCTION

Children are the most valuable resource. Childhood play's a very important role in our life. Through play children are able to express their needs and feelings. It is natural and most easily available method for children. It also provides enjoyment for children (Jorenen and Rankin 2008). Educational games promote interest in children and facilitate learning. Games help children to achieve good creativity, thinking capacity and problem solving skills. The games based on fitness will help the child to keep healthy and active (Cooper and Luvy 2012).
Joronen, Rankin and Kurki (2008) conducted an experimental study on school based drama interventions in health promotion among 260 children and adolescents. The interventions were drama and role play which was based on the individual's social, mental and health behavior. The study result showed that, the use of drama was effective t=12.45 ($p<0.01$) in improving the knowledge of the children as well as adolescents on health promotion (Jorenen and Rankin 2008). Boeker and Kumie (2013) conducted randomized controlled trial in Germany among 160 medical students.

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The study compared the learning outcome of a game-based e-learning instruction with a conventional script-based instruction in the teaching of phase contrast microscopy urinalysis. The study showed the students in the game based learning group have achieved good results in the cognitive knowledge test whereas the students from the script group performed low. The mean score of the game based learning instruction group was 28.6 and the mean score of script group was 26.0. Attitudes towards the recent learning experience were significantly more positive with game based learning instruction group.

The students also reported that they had more fun while learning with the game than the script-based approach (Boeker *et al*., 2013). The goal of the health education is to bring changes in school children's health, knowledge and their practices. When information is provided to children, they will share with their parents and family members that will help to improve the knowledge on the health. Some of the minor ailments are commonly seen among school children, through achieving health promotion, minor ailments can be prevented so knowledge regarding the same will help them to detect health problems in early stage and can prevent major complications. Moreover game based learning has been proved effective in improving knowledge of school children.

This study aimed to educate the school children about health promotion and helping them to improve their future life. This will help to improve the life of individual as well as communities.

MATERIALS AND METHODS

Research design was quasi experimental pre-test post -test control group design. Conceptual frame work of the study was based on Panders health promotion model. Proportionate sampling technique was used for the study. There were total 60 higher primary schools in Udupi Taluk. Among the 60, six schools were selected randomly through chit method. The total population of the six schools 5th, 6th and 7thstandard was 242. The proportion of the student strength of each class 5th, 6th and 7th standard was calculated for six schools and same proportion was used to take the sample from respective classes. Total sample size included in the study was 80; 40 in control and 40 in experimental group.

Data Collection

Data were collected by the primary investigator in the schools using demographic proforma and structured knowledge questionnaire on health promotion. The data was collected from the students of 5th, 6th, and 7th standard students. Between the age group of 10-12 years in six randomly selected schools of Udupi Taluk, from January to February 2015. Ethical clearance was obtained from institutional ethical committee, from district block officer and the principal of the school. Informed written consent from the parents and assent form the participants were obtained before collecting the data. Instructions were given to students regarding how to fill questionnaire.

Pretesting was conducted by administering knowledge questionnaire on health promotion. After completion of questionnaire they were instructed to sit in a circle facing each other to play snake and ladder game. After playing snake and ladder, puzzle game was given .After completing these two games students were instructed to be stand in queue for playing teaching machine. Followed by teaching program was given through Lecture method for 30 minutes. And on the 14th day, post test was conducted by administering same structured knowledge questionnaire for both the groups. Control group did not receive the teaching.

Measures

Demographic proforma was developed by the investigator for the purpose of collecting background information of the samples. It consisted items namely age, gender, class in which child is studying, education status of father and mother, age, gender, class in which child is studying, type of diet, interesting game, watching television, brushing teeth, bed time, sharing information and sources of information. Health promotion questionnaire had four areas namely nutrition, exercise/ physical activity, personal hygiene and environmental hygiene. Total items in the questionnaire were 30. There were 4 options for each question and the maximum score possible was 30. Correct response for each item was given score of 1 and for the wrong or unanswered items was scored 0. The knowledge score was arbitrarily categorized as poor knowledge 0-10, average knowledge 11- 20, and good knowledge 21- 30 respectively. The content validity of the tool was established by taking the suggestions from the subject experts. Three games i.e. Snake and ladder, puzzles and teaching machine were developed by the researcher based on the literature review and opinion and suggestions of the experts. Snake and ladder was prepared on the content of health promotion. If the children reach the mouth of the snalke the unhealthy behavior was written. If there is a healthy habit that was kept in the ladder so that the score will be increased by moving through the ladder. Puzzle had ten questions, where students have to fill the empty boxes after reading the questions.

It is an electrical device, where it provides information in planned sequence. Student is presented with multiple choice items along with promoting information. Here they have record their response by pushing the button beside proper number. Machine responds to the each button when pressed. It has 2 lights red and white light. White light indicted correct answer and red light indicates wrong answer. Teaching programme was developed on knowledge of health promotion based on the literature review and opinions and suggestions of the guides and experts. The teaching programme consisted of nutrition, physical activity/ exercise, personal hygiene and environmental hygiene.

The reliability of the tool was assessed by administering the tool to 20 students studying in 5th, 6thand 7th standards students. To determine the reliability, test retest method was used for the tool on structured knowledge questionnaire on health promotion and the reliability coefficient obtained was r= 0.99. Thus the tool was found to be reliable. Feasibility of the study was confirmed by conducting the pilot study among 20 students from 5th 6th 7th standards in the month of January 2015.

RESULTS

Sample characteristics

The findings of the study showed that majority 36(45.0%) children belonged to the age group of 10 years, 48(60%) were boys and 41(51.25%) children were in fifth standard. Most of the children 27(67.5%) like outdoor games and watch television less than 1-2 hours 26(65%). In both the group very few 10 (25.0%) and 2(2.5%) were vegetarians. Majority of the students 30 (75.0%) & 33(82.5%) were brushing teeth once a day. Usual bedtime of the students was 10 pm. All the students share information among others. In the experimental group majority 24 (60.0%) had got information regarding health promotion from books, whereas in the control group 18 (45.0%) had got information from television. (Table 1)

Knowledge score of students on health promotion

Area wise knowledge assessment was analyzed. The analysis showed that, the mean post-test knowledge score in each area of knowledge in the experimental group was higher than the mean pre-test knowledge score in each area. Difference in the mean was found to be more in the area of nutrition than other areas.

Table 1. Frequency and percentage distribution of sample characteristics n=40+40=80

Sample characteristics	Experimental group		Control group	
	Frequency (f)	Percentage(%)	Frequency (f)	Percentage(%)
Favourite game				
Indoor game	13	32.5	8	20.0
Outdoor game	27	67.5	32	80.0
Watching T.V (per day)				
1-2 hour	26	65	23	57.5
3-4 hour	14	35.0	17	42.5
Type of diet				
Vegetarian	10	25.0	2	2.5
Non vegetarian	30	75.0	38	95.0
Brushing teeth				
Once a day	30	75.0	33	82.5
Twice a day	10	25.0	7	17.5
Bed time				
8 pm	4	10.0	7	17.5
9pm	17	42.5	9	22.5
10 pm	19	47.5	24	60.0
Sharing information				
Yes	40	100	40	100
Source of information				
Television				
News paper	6	15.0	18	45.0
Books	7	17.5	11	7.5
Family	24	60.0	5	12.5
	3	7.5	6	15.0

Table 2. Mean and standard deviation of area wise knowledge score on health promotion n=40+40=80

Areas of Knowledge	Max. possible score	Control group			
		Mean± SD		Mean± SD	
		pre	post	pre	post
Exercise	5	1.97 ± 0.86	3.22 ±0.69	1.80 ± 0.64	1. 97 ± 0.76
Nutrition	10	4.35 ± 1.71	7.25±1.33	3.77± 1.25	3.80 ± 1.28
Environmental hygiene	6	2.75 ± 1.00	4.67±1.26	2.90 ±1.03	2.92± 0.99
Personal hygiene	9	4.87 ± 1.41	7.2±1.04	4.30±1.31	4.25± 1.31

Table 3. Comparison of pre - test and post- test knowledge score of experimental group using paired 't' test.n=40+40

	Mean	SD	Std error mean	Mean zifference	't' value	df	p value
Experimental group							
Pre-test score	13.900	3.070	0.485	11.85	13.77	39	0.001*
Post test score	25.750	5.438	0.859				

*Significant at <0.05 level of significance

Table 4. Association beetween pretest knowledge and selected varaiables.n=(40+40)=80

	< median	>median	χ^2	df	P value
Gender					
Male	49	31	1.00	1	0.806
Female	49	31			
Class			0.132	2	1.000
5th std	21	22			
6th std	9	9			
7th std	10	9			
Education of father			0.457	1	0.652
Primary	24	21			
High school	26	27			
Education of mother			0.056	1	0.500
Primary	26	27			
High school	14	13			
Source of information			5.43	3	0.142
Television	20	10			
News paper	11	15			
Books	5	8			
Family	4	7			

the computed chi square value for gender ($\chi^2_{(1)}$=1.00, p<0.806), class ($\chi^2_{(2)}$=0.132, p<1.000), education of father ($\chi^2_{(1)}$=0.457, p<0.652), education of mother ($\chi^2_{(1)}$=0.156, p<0.500) and source of information was ($\chi^2_{(3)}$=5.43, p<0.142) and all of the above variables were not found to be statistically significant at 0.05 level of significance. The knolwedge was independent of all the selected variables.

Effectiveness of game based learning on health promotion

To find the difference between the pre-test and post- test knowledge levels of higher primary school children in the experimental group t test was computed. The obtained't' value is 13.77 which is significant at 0.001 level. It is inferred that game based learning was an effective method increase the knowledge level of the higher primary school children. (Table 3)

Association between pre test knowledge score and selected demographic proforma like age, gender, source of information and parental education

Chi square was done in order to find the association between knowledge on health promotion and selected demographic variables. The pretest knowledge score of both experimental and the control group was taken (n=80).The knowledge level was divided as below and above median.

DISCUSSION

Knowledge of the students on health promotion

This study was carried out among 80 rural primary school children studying in 5th, 6th and 7th standard. The mean post-test knowledge score in each area of knowledge in the experimental group was higher than the mean pre-test knowledge score in each area. A significant increase in the knowledge was found after the intervention. The findings were supported by an experimental study conducted by Yang and Hang (2007) on children's knowledge attitude and behavior on nutrition among 480 school children in Taiwan. Data were collected using knowledge questionnaire and attitude scale. The study result showed that 68% of children had good knowledge on nutrition whereas 37% of children had poor knowledge in the physiological function of nutrients. The study also signified that children are aware of the importance of nutrition. Regarding the food practice, their dietary pattern was not satisfactory and the diet of the most of the children did not meet the required amount of nutrients. Children had positive attitude towards knowledge on nutrition. It was also noticed that some students were skipping breakfast and meals to prevent obesity. Study concluded that the children have poor attitude regarding consumption of nutritious diet like fruits and vegetables. Hence the researcher recommended that children should be educated and motivated to have good nutritious diet.

Effectiveness of games on higher primary school children

Significant difference between post-test knowledge score of experimental and control group was computed with paired sample 't' test. The obtained 't' value was 13.77 which was significant at 0.05 level of level. Therefore it is inferred that the game based learning is effective method to increase the level of knowledge among primary school children. This finding is supported by an experimental study conducted by Cooper and Lucy (2012) on primary school-based behavioral interventions for preventing dental carries.

The study was conducted among 300 school children. Two groups were taken for the study. One group was taken as experimental and one group as control group. Children were given, games and home work as intervention. The study result showed that the intervention was effective't' value 37.73 ($p<0.05$) and there was a good improvements in the children's knowledge on oral health. The present study also supports the study conducted by Boeker and Kumie 2013, in Germany among 160 medical students.

It compared the effectiveness on the learning outcome of a game-based e-learning instruction with a conventional script-based instruction in the teaching of phase contrast microscopy urinalysis. The study showed `the students in the game based learning group have achieved good results in the cognitive knowledge test whereas the students from the script group performed low. The mean score of the game based learning instruction group was 28.6 and the mean score of script group was 26.0. Attitudes towards the recent learning experience were significantly more positive with game based learning instruction group. The students also reported that they had more fun while learning with the game than the script-based approach.

Conclusion

Game based learning is effective method to improve the children's knowledge on health promotion. Health care professionals have to conduct awareness programmes in the schools so that the children get more knowledge and may develop healthy habits in daily life.

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