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Effect of Snake and Ladder Game on Knowledge, Attitude, and Expressed Practices Regarding Personal Hygiene among Primary School Children: A Randomized Controlled trial

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ABSTRACT

Introduction: Children are most vulnerable group; therefore, they are more prone to various health-related problems. They should be taught regarding importance of personal hygiene to maintain good health. Primary school children learn mainly through imitation and therefore play method enhances better learning. Snake and ladder game is very familiar to children so it will enhance better learning. **Materials and Methods:** A prospective, open-label, parallel group, randomized controlled trial was conducted on a sample size of 300 primary school children with disproportionate stratified random sampling technique. The interventional group (n = 150) received snake and ladder game regarding personal hygiene for a period of 5 days with pre-test on day 1 followed by intervention with the help of snake and ladder game focusing on 10 different components of personal hygiene such as brushing of teeth, bathing, hair wash, nail cutting, hand washing, clean clothes, wearing foot wear, and ear, food and water hygiene and subsequently post-test on day 5. The control group (n = 150) received routine activities. A self-structured questionnaire was used to assess knowledge, attitude, and expressed practices regarding personal hygiene among children in both the groups. Mann–Whitney U and Wilcoxon signed-rank tests were used for analysis. **Results:** There was a significant improvement in knowledge, attitude, and expressed practices regarding personal hygiene among children in interventional group as compared to control group ($p < 0.05$). **Conclusion:** Snake and ladder game was effective in improving knowledge that ultimately improved attitude and practices regarding personal hygiene among primary school children.

Keywords: Attitude, Expressed practices, Knowledge, Personal hygiene, Primary school children, Snake and ladder game

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Introduction

A child is precious not only to his family but also to society and country and whole universe at large. Children are the future citizens of our country, therefore, it is the responsibility of us to look after their interest and provide care so that they can inculcate good habits which will largely demonstrate their state of well-being in future.[1] The children compromise one-third of total population and are most vulnerable group. There are about 200.6 million children in the age group of 6–12 years globally, out of which 40% are in India.[2]

At the beginning of the 20th century, major cause of child mortality in the age group of 5–14 years was due to many infectious diseases which mainly resulted from lack of personal hygiene.[3] Therefore, maintaining good personal hygiene helps to prevent development and spread of infection. Childhood plays a crucial role in shaping and developing personality and also in promoting intellectual growth of an individual. During this period, a child can learn as much as much as he can, that is, it is a period of maximum learning. If the child develops proper knowledge, attitude, and practices regarding maintenance of healthy habits during this learning period, these will have a positive impact on his life and as a result, our nation will have qualitative production of citizens.[4] A child spends most of his time other than home in school only.[5] School serves as a central place in our community because they create an environment for learning and developing skills and knowledge among children.[6] Health education given to primary school children in school will help them to inculcate good habits and to mold their personality.[7] This health education is more fruitful to school-aged children, especially primary school children when it is given along with some form of play therapy because children mainly express their feeling and emotions through play.[8] Snake and ladder game is very familiar to primary school children as it does not require any specific new skill. Therefore, children may feel relaxed and may be more involved in game. This may promote better learning along with play therapy. The children may gain knowledge each time they throw dice and may face consequences either of climbing the ladder (which will teach a good personal hygiene habit to be adopted) or bitten by the snake (which will teach a negative habit related to personal hygiene that child needs to give up). Thus, this made researcher to assess the effect of snake and ladder game on knowledge, attitude, and expressed practices regarding personal hygiene among primary school children.

The objectives of the study are

1. To assess pre-test and post-test knowledge, attitude, and expressed practices regarding personal hygiene among primary school children in interventional and control group.
2. To compare pre-test and post-test knowledge, attitude, and expressed practices regarding personal hygiene among primary school children in interventional and control group.
3. To determine association of knowledge, attitude, and expressed practices regarding personal hygiene with selected sociodemographic variables.

Materials and Methods

Research design and research setting

The research approach was quantitative research. A prospective, open-label, parallel group randomized control trial design was used. In this design, interventional group received snake and ladder game on personal hygiene while control group received no intervention (routine activities were done). The variables used in study were snake and ladder game (independent variable), knowledge, attitude, and expressed practices regarding personal hygiene (dependent variables).
The research setting used for main study was Nirmal Ashram Deepmala Pagarani Public School, Rishikesh, Uttarakhand, India. The population was primary school children of class 3rd, 4th, and 5th standard.

Sample size and sampling technique

Sample size

$$\text{Sample size}: \frac{Z^2.\text{p}(1-p)}{e2} = 384$$

Z= 1.96, standard error= 0.05, $P = 0.5$
However, based on time constraints and distribution of equal number in each strata of both interventional and control groups, a total of 300 children were enrolled with 150 in each intervention and control group.

Sampling Technique

- School was selected using simple random sampling technique from five primary schools in Rishikesh which were found in its proximity from AIIMS Institute and feasibility of estimated sample size. It was done using lottery method.
- After selecting schools, list of students of 3rd, 4th, and 5th standard was made.
- Sampling technique for selecting sample was disproportionate stratified random sampling. Children were divided into three strata, as children studying in 3rd, 4th, and 5th standard. Out of them, 50 students from each stratum were selected for both interventional and control groups, respectively.
- At the end, 300 children were selected with 150 in each interventional and control group, respectively.

Randomization

Sequence generation

Block randomization was carried out with block size of two before the recruitment of eligible children. Randomization list was generated using specific online software at www.sealedenvelope.com

Allocation concealment mechanism

Sequentially Numbered Opaque Sealed Envelopes was used.

Implementation

The envelopes were opened, after receiving consent from the interested mothers and children, by teachers of every

section of 3rd, 4th, and 5th standard. There were four sections in every class. Based on randomization, two sections each of every standard were allotted to either interventional or control group.

Blinding

Due to nature of study, blinding was not done. It was an open-label randomized controlled trial.

Inclusion and exclusion criteria

Inclusion criteria

The following criteria were included in the study:

1. Primary school children studying in 3rd, 4th, and 5th standard.
2. Children who were present at time of data collection and willing to participate in research study.
3. Children who were able to carry out activity.

Exclusion criteria

1. Children who were sick at time of data collection were excluded from the study.

Data collection tools, ethical considerations, and pilot study

Tools of data collection comprised sociodemographic profile of child, structured knowledge questionnaire, Likert scale for the assessment of attitude, and checklist for the assessment of expressed practices regarding personal hygiene. The level of knowledge was subdivided in categories such as poor, fair, good, and excellent knowledge. The level of attitude was categorized into unfavorable, moderately favorable, and favorable, while the level of expressed practices was categorized into poor, average, and good practices. The validity and reliability of tool was assessed before implementation in final study data collection.

The ethical consideration was obtained from Ethical Committee of All India Institute of Medical Sciences, Rishikesh, Uttarakhand, India. The trial has been designed in accord with, and adheres to, the guidelines detailed in the Consolidated Standards of Reporting Trials statement (Trial number is REF/2018/09021714, Registration number for trial is CTRI/2018/10/015954). A written permission was taken from the school authorities before conducting research study. A written consent was taken from children's mothers and assent was obtained from children regarding their willingness to participate in research study.

The pilot study was conducted at Foothill Academy Senior Secondary Co-educational Day School, Rishikesh, Uttarakhand, India, among primary school children studying in class 3rd, 4th, and 5th Std. for a period of 1 week in month of October 2018 with sample size of 30 children with 15 in each group. Pre-test and post-test were done with the help of structured knowledge questionnaire, Likert scale for attitude, and expressed practiced checklist. Education was given with the help of snake and ladder game on personal hygiene in between the pre-test and post-test in interventional group. The data were analyzed using descriptive and inferential statistics Figure 1.

Procedure for data collection

The main study was conducted for a period of 2 ½ months, that is, November–January 2018–2019. Before randomization, nature and purpose of study was explained. Pre-test child's knowledge, attitude, and expressed practices were assessed using structured questionnaire on day 1. The children in interventional group were allowed to play snake and ladder game with necessary instructions regarding game from day 2 to 4. After a period of 3 days of intervention, post-test was done to assess knowledge, attitude, and expressed practices in both interventional and control groups on day 5 Figure 2.

Intervention

The conventional snake and ladder game was modified by incorporating the 10 components of personal hygiene: Brushing of teeth, bathing, hair wash, nail cutting, hand washing, clean clothes, wearing foot wear, and ear, food and water hygiene. This game consisted of 100 square boxes, with 10 ladders which indicated benefits of maintaining good personal hygiene and nine snakes which indicated ill effects of neglecting personal hygiene. Most of boxes indicated components of personal hygiene while few boxes were kept empty.

A room was allotted for game on which snake and ladder game flex board was spread on the floor. A group of five children based on their roll numbers was selected at a time to play game. The game was explained to children and they were allowed to play game by tossing dice and based on dice throw, children moved through boxes. The first square was starting point which depicted basic introduction to personal hygiene. As child moved through game, there were sentences on each aspect of personal hygiene which was explained by researcher.

When a child landed on a square at the foot of ladder, three questions were asked regarding that concerned area of personal hygiene and he/she could climb up the ladder when he/she answered correctly. In addition, the researcher explained missed out boxes. If responses were wrong, they were allowed to stay on that box only. When a child landed on a square at the mouth of snake, three questions were asked regarding that concerned area of personal hygiene and he/she was asked to stay on that box only if he/she answered correctly. If responses were wrong, they went back at tail of snake and were made to continue game from that square onwards.

When a child reached 100th square box (last box) first, she/he was appreciated with a gift. Every group of children played

for consecutive 3 days followed by post-test assessment of knowledge, attitude, and expressed practices.

Results

Sociodemographic details of children

There were 149 primary school children in intervention (snake and ladder game) and 150 primary school children in control group. The mean age group in interventional group was 9.87 ± 1.015 while in control group was 10.04 ± 0.904. The Chi-square and Fisher's exact test were used to assess homogeneity in group and it was found that both the groups were homogenous at $P < 0.05$ level of significance Table 1.

Pre-test level of knowledge, attitude, and expressed practices regarding personal hygiene among primary school children

As per the findings, 81% had fair knowledge regarding personal hygiene in intervention group as compared to 83% in control group. The pre-test mean score of knowledge in intervention group was 23.76 ± 3.572 while in control group was 23.64 ± 3.226. About 82% had "moderately favorable" attitude regarding personal hygiene as compared to 85% in control group. The pre-test mean score of attitude in intervention group was 58.07 ± 4.518 as compared to 56.43 ± 4.097 in control group. Majority of mothers (87%) reported that their children had "average" personal hygiene practices as compared to control group (95%). The pre-test mean score of expressed practices in intervention group was 117.49 ± 12.840 as compared to 116.25 ± 10.458 in control group Table 2.

Post-test level of knowledge, attitude, and expressed practices regarding personal hygiene among primary school children

As per the findings, 72% had excellent knowledge regarding personal hygiene in intervention group as compared to none of children in control group. The post-test mean score of knowledge in intervention group was 35.97 ± 2.053 as compared to 24.76 ± 3.349 in control group. About 91% had "favorable" attitude regarding personal hygiene in intervention group as compared to 15% in control group. The post-test mean score of attitude in intervention group was 66.68 ± 2.372 as compared to 57.19 ± 3.858 in control group. Majority of mothers (86%) reported that their children had "good" personal hygiene practices in intervention group as compared to none of children in control group. The post-test mean score of expressed practices in intervention group was 154.94 ± 9.267 as compared to 116.32 ± 10.112 in control group Table 3.

Effectiveness of snake and ladder game on knowledge, attitude, and expressed practices regarding personal hygiene among primary school children

The normality test was done using Kolmogorov–Smirnov test. The calculated $p < 0.05$ depicted that data were not

Table 1: Sociodemographic variables of primary school children, *n*=299

Demographic variables	Interventional group (*n1* =149) f (%)	Control group (*n2* =150) f (%)	χ2/Fischer's Exact	df	*p* value
Age (in years)					
8	17 (12)	08 (5)			
9	33 (22)	31 (21)			
10	54 (36)	61 (41)	18.746[a]	16	0.513
11	42 (28)	47 (31)			
12	03 (2)	03 (2)			
Gender					
Male	79 (53)	85 (57)	1.034[a]	1	0.300
Female	70 (47)	65 (43)			
Educational status of mother					
No formal education	14 (10)	06 (4)	7.883[b]	9	0.468
Primary education	09 (6)	09 (6)			
Higher secondary	55 (37)	53 (35)			
Graduate and above	71 (47)	82 (55)			
Number of siblings					
0	15 (10)	20 (13.3)			
1	108 (73)	107 (71.3)	2.424[b]	6	0.882
2	21 (14)	23 (15.3)			
3	05 (3)	-			
Previous information regarding personal hygiene					
Yes	37 (25)	33 (22)	0.237[a]	1	0.627
No	112 (75)	117 (78)			

n1: Total number of children in interventional group, *n2*: Total number of children in control group; *χ2*: Chi-square value; df: Degree of freedom; significant at $P < 0.05$ level; f: Frequency; SD: Standard deviation; a: Chi-square value; b: Fishers' exact value

Table 2: Pre-test level of knowledge, attitude, and expressed practices regarding personal hygiene among primary school children, *n*=299

Level of knowledge	Score	Interventional group (*n1*=149) f (%)	Mean±SD	Control group (*n2*=150) f (%)	Mean±SD
Poor	≤20	26 (18)	18.08±1.853	23 (15)	18.61±1.699
Fair	21–30	121 (81)	24.84±2.456	124 (83)	24.39±2.305
Good	31–35	02 (1)	31.00±0.000	03 (2)	31.33±1.528
Excellent	36–40	-	-	-	-
Mean±SD		23.76±3.572[a]		23.64±3.226[b]	
Level of attitude	**Score**	**Interventional group (*n1*=149)**	**Mean±SD**	**Control group (*n2*=150)**	**Mean±SD**
Unfavorable	15–45	07 (5)	43.71±1.60	09(6)	43.11±1.90
Moderately favorable	46–60	122 (82)	54.66±3.16	127 (85)	52.86±2.91
Favorable	61–75	20 (13)	61.40±1.09	14 (9)	61.36±1.45
Mean±SD		58.07±4.518[c]		56.43±4.097[d]	
Level of expressed practices	**Score**	**Interventional group (*n1*=149)**	**Mean±SD**	**Control group (*n2*=150)**	**Mean±SD**
Poor	44–110	14 (9)	85.86±1.70	8 (5)	86.25±1.49
Average	111–143	132 (87)	106.85±10.94	142 (95)	105.27±9.80
Good	144–176	3 (2)	137.33±0.57	-	-
Mean±SD		117.49±12.840[e]		116.25±10.458[f]	

a: Range: 13–31, b: Range: 13–33; c: Range: 40–65, d: Range: 41–64; e: Range: 84–149, f: Range: 84–138

Table 3: Post-test level of knowledge, attitude, and expressed practices regarding personal hygiene among primary school children, *n*=299

Level of knowledge	Score	Interventional group (*n1*=149) f (%)	Mean±SD	Control group (*n2*=150) f (%)	Mean±SD
Poor	≤20	-	-	17 (11)	19.18±2.007
Fair	21–30	02 (1)	29.00±0.000	121 (81)	25.00±2.384
Good	31–35	40 (27)	34.08±1.071	12 (8)	30.25±1.545
Excellent	36–40	107 (72)	36.93±0.839	-	-
Mean±SD		35.97±2.053[a]		24.76±3.349[b]	
Level of attitude	**Score**	**Interventional group (*n1*=149)**	**Mean±SD**	**Control group (*n2*=150)**	**Mean±SD**
Unfavorable	15–45	-	-	06 (4)	43.29±1.11
Moderately favorable	46–60	13 (9)	59.46±2.15	121 (81)	52.74±2.99
Favorable	61–75	136 (91)	67.58±2.32	23 (15)	61.40±1.40
Mean±SD		66.68±2.372[c]		57.19±3.858[d]	
Level of expressed practices	**Score**	**Interventional group (*n1*=149)**	**Mean±SD**	**Control group (*n2*=150)**	**Mean±SD**
Poor	44–110	-	-	07 (5)	86.43±1.718
Average	111–143	21 (14)	128.81±2.46	143 (95)	105.20±9.52
Good	144–176	128 (86)	145.58±6.82	-	-
Mean±SD		154.94±9.267[e]		116.32±10.112[f]	

a: Range: 29–38, b: Range: 14–31; c: Range: 58–72, d: Range: 43–65; e: Range: 123–160, f: Range: 84–129

normally distributed. Histogram did not show normal bell-shaped curve. Therefore, non-parametric test was used for analysis.

Table 4 reveals that there is no significant difference in pre-test and post-test knowledge, attitude, and expressed regarding personal hygiene among primary school children in control group. Hence, null hypothesis was accepted ($p < 0.05$).

Table 5 reveals that there is significant difference in pre-test and post-test knowledge, attitude, and expressed regarding personal hygiene among primary school children in control group. Hence, null hypothesis was rejected ($p < 0.05$).

Table 6 reveals that there was a significant difference in knowledge, attitude, and expressed practices score between interventional and control groups during post-test at $p = 0.001$. Therefore, snake and ladder game was effective in improving knowledge, attitude, and expressed practices regarding personal hygiene in interventional group.

Association between post-test level of knowledge, attitude, and expressed practices regarding personal hygiene with selected sociodemographic variables of primary school children in interventional group

A statistically significant association was found between age, gender, grade/class, educational status of mother, and previous information regarding personal hygiene with post-test knowledge score in intervention group. As age of child increased, there was an increase in knowledge level regarding personal hygiene. The girls were more knowledgeable

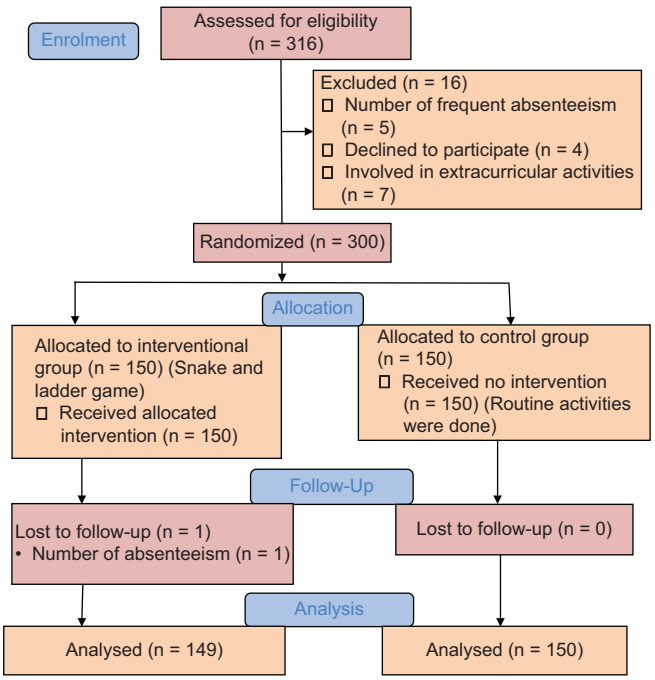

Figure 1: Consort flow diagram

Table 4: Comparison of pre- and post-test score of knowledge, attitude, and expressed practices regarding personal hygiene in control group, *n1*=150

	Pre-test score median (IQR)#	Post-test score median (IQR)#	Z value$	*p* value
Knowledge	24 (22, 26)	25 (22, 27)	−0.133	0.531
Attitude	56 (54, 60)	57 (55, 60)	−0.173	0.458
Expressed practices	115 (108, 123.25)	116 (108, 122.25)	−0.071	0.944

Significant at $P < 0.05$ *level;* #: Interquartile range; $: Wilcoxon signed-rank test; *n*1=Total number of subjects in control group

Table 5: Comparison of pre- and post-test score of knowledge, attitude, and expressed practices regarding personal hygiene in interventional group, *n2*=149

	Pre-test score median (IQR) #	Post-test score median (IQR) #	Z value$	*p* value
Knowledge	24 (22, 27)	36 (35, 37)	−10.612	0.001*
Attitude	59 (55, 61)	67 (65, 68)	−10.616	0.001*
Expressed practices	118 (107, 129)	156 (148, 163)	−10.593	0.001*

*Significant at $P<0.05$ level; #: Interquartile range; $: Wilcoxon signed-rank test; *n2*=Total number of subjects in interventional group

regarding personal hygiene in post-test assessment. The higher the class of study of child, the more knowledgeable he/she was regarding personal hygiene in both intervention and control groups. The more the educational status of mother, the more the child was knowledgeable regarding personal hygiene in both intervention and control groups**.** In addition, if the child received previous education on personal hygiene had better knowledge than those who did not receive education.

A statistically significant association was found between age, grade/class, and previous information regarding personal hygiene with post-test attitude score in intervention group. As age and grade/class of child increased, they had more favorable attitude regarding personal hygiene. In addition, if child received prior information, he/she had more favorable attitude regarding personal hygiene**.**

A statistically significant association was found between age, gender, grade/class, educational status of mother, number of siblings, and previous information regarding personal hygiene with post-test expressed practices score in intervention group. As age and class of study of child increased, their frequency of good personal hygiene practices increased concurrently. The girls performed better personal hygiene practices as compared to boys. The more the educational status of mother, better personal hygiene practices were performed by children**.** The children who had less number of siblings and received previous information regarding personal hygiene performed better personal hygiene practices as compared to other children in interventional group.

Discussion

In the present study, the results showed a significant improvement in knowledge regarding personal hygiene in interventional group as compared to control group. The mean and standard deviation of knowledge score before and after snake and ladder game in interventional group was 23.76 ± 3.572 and 35.97 ± 2.05 ($p < 0.05$). These results are consistent with results of Devi (2016) which showed that there was significant improvement in mean knowledge level from 13.68 to 33.31 at $p \leq 0.01$ level.[9] Furthermore, another study by Saraswathy (2012) concluded that there was a significant difference in knowledge regarding oral hygiene before and after snake and ladder game in interventional

Table 6: Comparison of post-test score of knowledge, attitude, and expressed practices regarding personal hygiene in interventional and control groups *n*=299

	Interventional group median (IQR)# (*n1*=149)	Control group median (IQR)# (*n2*=150)	Mann–Whitney U-test value	*p* value
Knowledge	36 (35, 37)	25 (22, 27)	47.5	0.001*
Attitude	67 (65,68)	57 (55, 60)	427	0.001*
Expressed practices	156 (148, 163)	116 (108, 122.25)	12	0.001*

*Significant at $P<0.05$ level; #: Interquartile range; N: Total number of subjects

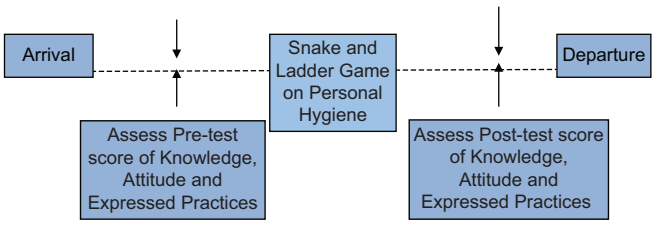

Figure 2: Procedural timeline for interventional group

group (10.07 ± 2.69 and 20.25 ± 2.86) ($p < 0.01$).[10] Another study conducted by Kutwal *et al*. assessed the effect of snake and ladder game on knowledge regarding balanced diet, noted that there was a significant difference in mean score of knowledge regarding before and after intervention in interventional group (9.68 and 17.38) ($p < 0.05$).[11]

The present study showed significant association between gender and post-test score of knowledge and expressed practices in both interventional and control groups. Majority of girls (82.86%) had better knowledge regarding personal hygiene as compared to more than half of boys (62.02%). These findings are consistent with studies of Motakpali *et al*. (2013) who conducted a cross-sectional study to assess personal hygiene status among primary school children at Mangalore, Karnataka. Findings revealed that girls (65.9%) had good knowledge regarding personal hygiene as compared to boys (60.5%) ($p < 0.05$).[12] A similar cross-sectional study was conducted by Seenivasan *et al*. (2015) to assess health hygiene status among primary school children in Chennai, which revealed that girls performed better hygienic practices as compared to males.[13]

The present study showed significant association between post-test score of knowledge, attitude, and expressed practices of children regarding personal hygiene in both interventional and control groups with educational status of mothers ($p < 0.05$). These findings are consistent with studies of Sarkar (2013) who conducted a cross-sectional study to assess knowledge, attitude, and practices regarding personal hygiene among children and found a statistically significant association between practices of personal hygiene among primary school children and literacy status of their mothers ($p < 0.01$).[14]

In the current study, it was noted that there is a statistically significant association between age of child and post-test score of expressed practices regarding personal hygiene ($p < 0.05$). These findings are consistent with Ahmadu *et al*. (2013) who conducted a cross-sectional study to asses personal hygiene and found that personal hygiene improved with age of child at $p < 0.01$ level.[15]

Conclusion

In the current study, it was seen that there was a significant improvement in knowledge, attitude, and expressed practices regarding personal hygiene through snake and ladder game in interventional group as compared to control group.

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Conflicts of Interest

There are no actual or potential conflicts of interest including any financial, personal, or other relationships with other people or organizations within 3 years of beginning the submitted work.

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