

Education Games Effective to Improve Knowledge, Attitudes, and Handwashing Practices in School-Age Children

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Abstract

Background: Washing hands is a form of Clean and Healthy Living Behavior. Proper handwashing behavior needs to be instilled from an early age. One way to improve children's handwashing behavior is by using educational games.

Aim: This study aims to determine the effect of educational games on children's knowledge, attitudes, and handwashing practices.

Methods: This type of research was a quasi-experiment with a pre-posttest design without a control group. The research was conducted at SDN Jabung, Semarang City, Central Java, Indonesia. A sample of 72 respondents was taken by total sampling. A questionnaire measured the seven steps of handwashing knowledge and attitudes. Seven-step handwashing practices were measured using standard operating procedures. The educational game used is snake and ladder. Data were tested using the Wilcoxon Test.

Result: Most of the respondents were female (52.8%), grade 3 (36.11%), and the average respondent was nine years old. The mean pretest scores for knowledge and attitude of washing hands were 5.44 and 29.47. All respondents cannot practice washing their hands properly. The mean posttest scores for knowledge and attitude of washing hands were 7.18 and 34.60. The majority of respondents were able to wash their hands properly during the posttest (79.2%). The results of the pretest-posttest bivariate test for knowledge, attitudes, and handwashing practices obtained $p = 0.000$, $p = 0.000$, and $p = 0.000$.

Conclusion: The snake and ladder educational game for children effectively increases knowledge, attitudes, and the practice of washing hands with seven steps at SDN Jabung Kota Semarang.

Keywords: *Game, hand hygiene, health promotion, school-age*

Introduction

One of the main pillars in Healthy Indonesia and is one of the strategies to reduce the burden on the state and society on health financing, namely Clean and Healthy Living Behavior (CHLB) (1). Clean and healthy living behaviors are a set of behaviors that are practiced based on awareness of learning outcomes that enable a person or family to help themselves in the health sector and play an active role in realizing public health (2). Implementing clean and healthy living habits (CHBL) is useful for preventing, overcoming, and protecting oneself from the

threat of disease and utilizing quality, effective, and efficient health services (3). In the Clean and Healthy Behavior indicator, one of them is washing hands with running water and soap.

Washing hands with soap is a healthy behavior that has been scientifically proven to prevent the spread of infectious diseases such as diarrhea, upper respiratory tract infection, and bird flu. It is even recommended to prevent influenza transmission (4). Hands are the part of our body that is most contaminated with dirt and germs. When holding something, and shaking hands, of course, some germs stick to the skin of our hands. Worm eggs, viruses, germs, and parasites that contaminate hands, will stick to other people we shake hands with or even when we eat with unclean hands, dirt will be swallowed, and of course, the dirt will be swallowed and will disturb digestion (5)(6). So, washing hands correctly and according to health is very important so that viruses and diseases do not enter the human body. Many parties have introduced hand washing as a health intervention that is very easy, simple, and can be done by the majority, of Indonesians.

The age of the child is an essential step in implementing proper handwashing habits. Children at these ages are very active and susceptible to disease, so awareness is needed from them. The importance of healthy behavior by washing hands with soap is applied in their daily lives. School children are children aged 6-12 years, which means that school becomes the child's core experience. The period when children are assumed to be responsible for their behavior in relationships with their parents, peers, and others. School-age is when children acquire the basics of knowledge to adjust to adult life and acquire specific skills (7).

The awareness of the Indonesian people to wash their hands with soap is proven to be still low. The Indonesian people have not fully implemented the culture of washing hands. The habit is seen that washing hands with soap is done after eating. Ideally, this behavior is done before eating to reduce bacteria on the hands (8). At school age, children have not developed a sound immune system, so they are prone to contracting diseases. The concrete steps of this effort are in the form of counseling or provision of knowledge information (transfer of knowledge), a good habit from an early age, accompanied by direct assistance or practice. One of the efforts that can be made to improve the implementation of proper handwashing is by promoting health to elementary school children. Health promotion media plays a significant role in changing a person's behavior (9).

To facilitate the delivery of information and implement PHBS in schools, children can use various media, including audio media, visual media, audiovisual media, printed media, board media, and traditional media in the form of games. The method in the form of games is beneficial, and this is because school-age children are the times when children are still delighted to play. It would be better if given information through games that contain messages or material about health. Playing is a fun activity for children. Through play, children will experience a sense of happiness. With this feeling of joy, the nerves or neurons in the child's brain quickly connect to form a new memory. That is why children quickly learn something through games (10).

One of the games that can be used to convey material is the snake and ladder educational game. This game is played in groups according to school-age children's characteristics and developmental stages; those school-age children prefer group games with specific rules. The Snake and Ladder Educational Game methods have been widely applied in schools in various countries. Research conducted by Behrooz Golchai et al. (2012) in (11)

illustrates that the snake and ladder game method can be a suitable method to make it easier for respondents to understand the message conveyed. By playing in groups, children learn that labor division is an effective strategy for achieving goals. Everyone on the team has specific duties and functions that increase the team's chances of winning. Children work hard to develop the skills needed to become team members (12).

Based on the survey results at the location, it was found that many children did not know about washing their hands properly. Based on the observations of ten students, it was found that all of them were unable to practice washing their hands properly. Some students said they had read and heard information about washing hands properly but did not understand. The results of the interviews with the principal found that in this school, there had never been any education or health education about washing hands properly using the snake and ladder educational game method. Based on this, the authors are interested in examining the effect of educational games through snakes and ladders on knowledge, attitudes, and handwashing practices. Snakes and ladders game is a child's game with a group method which is a distinct advantage. The snake and ladder game is also straightforward to play and is well known among children. Easy, functional, and fun games are essential in designing children's games as educational media.

Methods

Study Design

This type of research is an experiment with a pre-post without a control group design. Data were collected at elementary school, SDN Jabungan Kota Semarang, from November to December 2019.

Samples

The study population was 72 students in classes III, IV, and V. The sampling technique used was total sampling. The sample used is by the inclusion criteria, namely willingness to be a respondent and read and write. The exclusion criteria were students with visual and hearing impairments.

Instruments

The instrument used for the educational game is the snake and ladder game that has been modified with handwashing material with seven steps. Knowledge of hand washing was measured using a questionnaire consisting of 8 questions consisting of definitions, objectives, benefits, and time to wash hands. Attitudes about washing hands were measured using a questionnaire of as many as eight questions. Hand washing practice is measured by how students wash their hands using soap and running water measured using standard operating procedures.

Data Collection

The collection process was carried out for three weeks with details of week 1 for class III, week two for class IV, and week three for class V. Before being given the intervention, the respondents were measured the pretest score, namely filling out a questionnaire about knowledge and attitudes about seven steps hand washing. Respondents were also assessed as a pretest to practice handwashing seven steps. Providing educational games is done by giving a game of snakes and ladders. The game of snakes and ladders is a game played by two or more people, the game board is divided

into squares, and snakes and ladders draw some; snakes are required to go down, and ladders are required to go up. Playing the snake and ladder is that each player starts the game with their pieces in the first box and takes turns rolling the dice. Pawns are executed according to the number of dice that appear (adding up the numbers of dice that appear). Information, simulations, and practices about washing hands were given when the snake and ladder game was held. The snake and ladder game is done in groups. After being given the intervention, the respondent was measured the posttest score, namely filling out a questionnaire about knowledge and attitudes about handwashing with seven steps. Respondents were also assessed as a posttest to practice handwashing in seven steps using soap and running water.

Data Analysis and Ethical Consideration

The data normality test used the Kolmogorov-Smirnov test with abnormal results, so the statistical test uses the Wilcoxon test. All respondents signed informed consent as an agreement to participate as research respondents. The study permission was also obtained from the Principal of SDN Jabung Semarang city.

Result

Table 1 Distribution of Respondent Characteristics

Characteristics of Respondent	Frequency (f)	Percentage (%)
Gender		
Male	34	47.2
Female	38	52.8
Total	72	100.0
Grade		
3 rd	26	36.2
4 th	24	33.3
5 th	22	30.5
Total	72	100.0
Age		
8	14	19.4
9	30	41.7
10	16	22.2
11	12	16.7
Total	72	100

Table 1 shows that most of the respondents were female (52.8%), 3rd-degree students (36.2%), and were nine years old (41.7%).

Table 2 The Effect of Educational Games on Knowledge and Attitudes about Seven-Step Handwashing

Variable	Pretest-Posttest			Difference of Mean	p-value
	Min	Max	Mean±SD		
Knowledge	4-6	6-8	5.44±0.69 – 7.14±0.64	1.7	0.000
Attitude	18-30	35-40	29.47±2.87 – 34.60±2.09	5.13	0.000

Table 2 shows that at the pretest, the student's knowledge about washing hands properly obtained a minimum value of 4, a maximum of 6, and a mean of 5.44. At the time of the posttest, the data obtained a minimum value of 6, a maximum of 8, and a mean of 7.14. There was an increase in the thecorrectlyowledge of washing hands properly. The results of the bivariate test of protests-knowledge obtained p-value = 0.000, which means that educational games are effective in increasing knowledge about washing hands properly in students of SDN Jabung Kota Semarang. The pretest results also showed that the students' attitudes about washing hands adequately obtained an effectively increase mum of 35 and a mean of 29.47. At the post-test, the data obtained a minimum value of 30, a maximum of 40, and a mean of 34.60. There was an increase in the mean attitude about washing hands properly. The bivariate test results for the pretest and posttest attitudes obtained p-value = 0.000, meaning that educational games effectively improve attitudes about washing hands properly in students of SDN Jabung Semarang city.

Table 3 The Effect of Educational Games on Handwashing Practices Seven Steps

Handwashing Practices	Can not		Can		Total		p-value
	f	%	f	%	F	%	
Pretest	72	100.0	0	0.0	72	100.0	0.000
Posttest	15	20.8	57	79.2	72	100.0	

Table 3 shows that all students could not practice washing their hands properly at the time of the pretest. Meanwhile, during the post-test, the majority of respondents were able to practice washing hands properly. The results of the bivariate test of washing hands properly during the pretest and posttest obtained p-value = 0.000, which means that educational games are effective in improving the ability to practice washing hands properly in SDN Jabung City Semarang students.

Discussion

Respondents were dominated by the female gender (52.8%). Information on the number of children based on gender determines the respondent's group in playing. According to Wong's theory, children of primary school age group according to gender, namely boys associate with boys and girls with girls, where each group has its interests. Sex mismatch can manifest itself in identified childhood (13). The age of the respondents was dominated by nine years (41.7%).

Age shows the time measure of an individual's growth and development (14). In terms of psychological development, at the age of 9 years is a time when curiosity is very high and sees things from their point of view, this also affects the way of thinking and capturing information and knowledge that is obtained, besides that at the age of 9 there is brain growth rapidly so that they can easily accept and remember the information provided (15).

The results show that all respondents are willing and active in playing the snake and ladder educational game. Piaget's theory states that elementary school-age children are included in the stage of playing social play games with rules ($\pm$ 8-11 years). Children at this age begin to be good at social interaction and playing with their peers and obey the game rules. For children, peer relations are among the most essential components of their interpersonal relationships (16). School-age children involved in playing the game find that the game can be accessed with varying degrees of effectiveness as an attractive learning tool depending on the game (17). This is by the research results that researchers conducted that all respondents actively play the snake and ladder educational game containing handwashing material.

The results showed a change in knowledge about handwashing seen from the change in the pretest to posttest scores. The mean post-test results of measuring knowledge about handwashing showed a significant increase. After the intervention was carried out, the respondents already knew several things related to hand washing seven steps. According to the constructivist approach, knowledge is not a fact that is being studied but as a person's cognitive construction of objects, experiences, and environment. Knowledge is not something that already exists and is available while others accept it. Knowledge is a continuous formation by someone who at any time experiences reorganization due to new understandings. Factors that affect a person's level of knowledge are information, education, socio-culture and economy, environment, experience, and age (18). Based on this theory, a person's level of knowledge is influenced by education and information obtained after counseling using the snake and ladder game. Knowledge of cognitive is an essential domain for the formation of someone's actions. The learning process influences the level of knowledge. Syawaludin (2020) state that the game of snakes and ladders has several advantages, namely that it can create a pleasant learning atmosphere, stimulate students to carry out individual or group learning activities, the cognitive structures obtained by students as a result of the learning process will be stable and relevant structured so that they will be preserved in memory. This will make it easier for students to recall what they have learned if students are faced with a problem, and the knowledge contained in memory (thoughts) can be retrieved at any time.

The results also showed a change in attitude about handwashing seen from the change in the pretest to posttest scores. The mean post-test results of measuring attitudes about handwashing showed a significant increase. A positive or kind attitude towards a child towards health may not directly impact the child's behavior to be positive. However, a hostile or lousy attitude towards health will almost certainly have an impact on the behavior. An attitude is a form of closed behavior that combines knowledge, emotions, beliefs, and thoughts. However, from all these aspects, knowledge is a very dominant aspect in forming an attitude. A person's attitude can be seen by making observations or by giving statements. Changes in a person's attitude involve aspects of knowledge as the dominant aspect. So a change in attitude cannot be separated from the influence of education. The knowledge obtained through health education can later lead to awareness, desire, and habits to care more about health. This awareness, desire,

and habit are what is known as a positive attitude. When someone already has the awareness and desire to carry out positive activities, it can have a good attitude (20). Attitude predisposes to action or behavior and is not yet an action or activity. The change in the attitude of these respondents cannot be separated from the increased knowledge process. Respondents previously did not know, so they knew, then understanding would change their attitude patterns. Respondents behave well after knowing that if they do not change their hygiene and healthy living habits, they will be at risk of becoming sick. With this exemplary attitude, the score increases, and the number of respondents who have a good attitude also increases.

Changes in the ability to practice handwashing are also evident. Before the intervention, all respondents could not practice washing their hands properly. After being given education through the game of snakes and ladders, most respondents can practice washing their hands properly. Reasonable changes in these respondents occurred because the form of intervention carried out was not only in the form of one-way counseling but also a simulation intervention that involved all targets in the group in participating. In this case, it has also been stated by Robert (2014) in (21) that new challenges require the learning process to be more focused on personality and the changes that occur to it during the learning process, but not only on the accumulation of knowledge. However, in practice, this challenge is faced in conditions in the traditional classroom learning system; although it is enriched with new teaching tools, methods and forms, it aims to provide children with a fixed amount of information within 45 minutes after learning (22).

Increasing the ability to practice handwashing can be seen after providing the snake and ladder educational game intervention. Several factors can influence this. The influencing factors are divided into two, namely intrinsic factors, which include knowledge, motivation, age, and extrinsic factors, which include advice, family, and the use of learning media. The results of research by Rofiyarti & Sari (2017) explain that play is the right way because it can provide higher motivation for children to learn. Play activities prepare children for their social experiences. Activities carried out in the classroom include games and other activities that require cooperation from children, including several activities related to decision making, which are very important to foster their social, emotional development.

For most children, playing is the most satisfying activity (24). The snake and ladder educational game is one type of APE (Educational Education Tool). Educational game tools are play tools that are deliberately designed to support the implementation of effective and fun learning for children, and a means that can stimulate children's activities to learn something without the child realizing it and designed in a multipurpose way (25). Behrooz Golchai, et al. (2017), state that this educational game gives rise to fun learning and positive attitudes towards the learning process (11).

Based on observations from researchers at the time of the intervention, information was obtained that educational game media can make students more active. Although in practice it creates a busy atmosphere in the class, the students look enthusiastic because without realizing it, they are experiencing a learning process in the games they are playing, so this can erase the notion that learning is boring. As stated (26), educational games are specifically designed to teach users specific learning, develop concepts and understandings, and guide them in practicing their abilities and motivating them to play them.

This study found that counseling about handwashing with the playing method that had been given affected changing practices before and after the intervention resulted in changes for the better. As children enter the new school year, children's play reflects a new stage of development. Play involves increasing physical abilities, intellectual abilities, and fantasy, but children play by forming groups. Being a member of a group is an integral part of the culture of childhood. In group games, children will learn to work together and share work assignments with friends. Group play also contributes to children's social, intellectual, and skill growth (12). Through the snake and ladder educational game, you can solve problems, namely, answer questions and carry out commands in the snake and ladder educational game board. This snake and ladder educational game provides information to children about washing hands to apply it in everyday life. Games are played for entertainment and provide a positive stimulus for learning. The snake and ladder game is designed to make respondents aware (27).

Conclusion

The results showed that educational play through snakes and ladders effectively improved knowledge, attitudes, and handwashing practices in grade III, IV, and V students at SD Jabung Kota Semarang, Central Java, Indonesia. Primary school managers are expected to be able to use the snake and ladder educational game media as an educational tool (APE), optimize both in terms of facilities for carrying out handwashing practices by providing a place and handwashing soap, and holding routine activities or agendas such as a 7-step handwashing demonstration using running water and soap. The development of further research on the practice of washing hands properly in school-age children using other play methods and other educational media in order to find more effective methods to improve the practice of washing hands properly in school-age children

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