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PREVENTION OF DIARRHEA IN CHILDREN THROUGH PLAY AS A HEALTH PROMOTION EFFORT: SYSTEMATIC REVIEW

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ABSTRACT

Introduction: Diarrhea is a health problem that children are prone to. Currently, prevention efforts with media games are still rare. The purpose of this study was to examine game educational media in an effort to prevent diarrhea in children.

Method: The method in this research is a systematic review. The stages of article selection use the PRISMA guideline. The results obtained are that there are ten articles that are feasible to be analyzed.

Results: The results include journal from the search database Sage, Science Direct, Taylor & Francis and Proquest using 25 journal. There are three themes found, namely the types of games used in health promotion for preventing diarrhea, the age group of children, and health promotion settings.

Conclusion: This research is expected to be the basis for community nurses to develop educational media that are interesting and effective in preventing diarrhea in children.

Keywords: diarrhea; children's games; health promotion

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INTRODUCTION

Diarrhea is the main cause of the highest morbidity and mortality rates in infants and toddlers in Indonesia. As many as 9.8% of the post-neonatal age group died from diarrhea in 2020. In addition, diarrhea is also the largest contributor to mortality rates in the toddler age group, namely as much as 4.55% (Kementerian Kesehatan Republik Indonesia, 2021). This health problem becomes one of the potential for Extraordinary Events (KLB) if it does not receive intensive attention from parents and the environment in which the child grows. This is in line with research by Nurhaedah, Pannyiwi, and Suprapto (2022) which states that there is a significant relationship between community participation and the incidence of diarrhea in children in Indonesia.

Outbreaks of diarrhea are associated with several preventable risk factors, such as sanitation, clean water quality, and daily hygiene behaviors. Soboksa, Gari, Hailu, and Alem (2020) stated that sanitation, household water treatment, defecation areas, and hand washing habits are factors associated with the incidence of diarrhea in children in Ethiopia. In addition, Pahmi and Endah (2019) stated that toilet facilities, sources of drinking water, mothers' education, and place of residence were significantly related to the incidence of diarrhea in toddlers in Indonesia. Abuzerr, Nasseri, Yunesian, and Hadi (2020) emphasize that the incidence of acute diarrhea in the toddler age group in Gaza is caused by the behavior of washing hands with soap before and after eating, before going to bed, and after going to the toilet. The majority of respondents did not wash their hands before going to bed or after going to the toilet in this study.

Diarrheal disease poses a worrying risk of complications if it is not handled and prevented properly. Lwin and Putra (2018) stated that untreated diarrhea results in growth delays in children. In addition, the risk of malnutrition also has the potential to occur in children who have a history of diarrhea. Anzani and Saftarina (2019) also added

that diarrhea can actually be cured without therapy. However, failure to treat diarrhea causes recurrent diarrhea and resistance. Thus, children are striving to maintain hand hygiene and the food or drink they consume.

Efforts are currently being made to emphasize the curative aspect. Rotavirus vaccination, which is a preventive effort, has not yet become a national mandatory immunization program. In addition, some of the media used to provide health education are still relatively monotonous. Thus, school-age children do not understand optimally how to prevent diarrheal diseases that can be applied every day. Games are one way to increase children's interest in the transfer of information. Arbianingsih et al. (2018) stated that an educational game called Arbi Care was able to improve the behavior of pre-school children in preventing diarrhea. In addition, Satriana et al., (2020) stated that Team Games Tournament Smart Cards can significantly influence children's knowledge of hand washing at the age of 5-6 years.

The development of science and technology requires that health promotion activities try to adjust the methods to be used. Educational games are one of the methods used especially for children. Based on some of the results of previous studies, in general there are two types of game education, namely traditional game education and internet-based game education. Traditional educational games such as board games. Internet-based educational game is a type of game that can be accessed in the form of an application or website-based (Andrew et al., 2023; Nakao, 2019). Both types of educational games have their advantages and disadvantages.

Based on some of the above phenomena, educational media with a game approach are needed. The preparation of this media requires further literature review so that the game education provided is appropriate to the age and stage of child development. So the researchers are interested in conducting a literature review related to efforts to prevent diarrheal diseases with game media. The purpose of this study was to examine educational games in an effort to prevent diarrhea in children.

METHOD

The research method used in this study is systematic review. Literature is selected and analyzed according to the research objectives. The online databases used are Sage, Science Direct, Taylor& Francis and Proquest 2018-2022. The keywords used are diarrhea, children's games and health promotion. There are 25 articles selected after the selection results through the PRISMA chart in Figure 1.

RESULTS

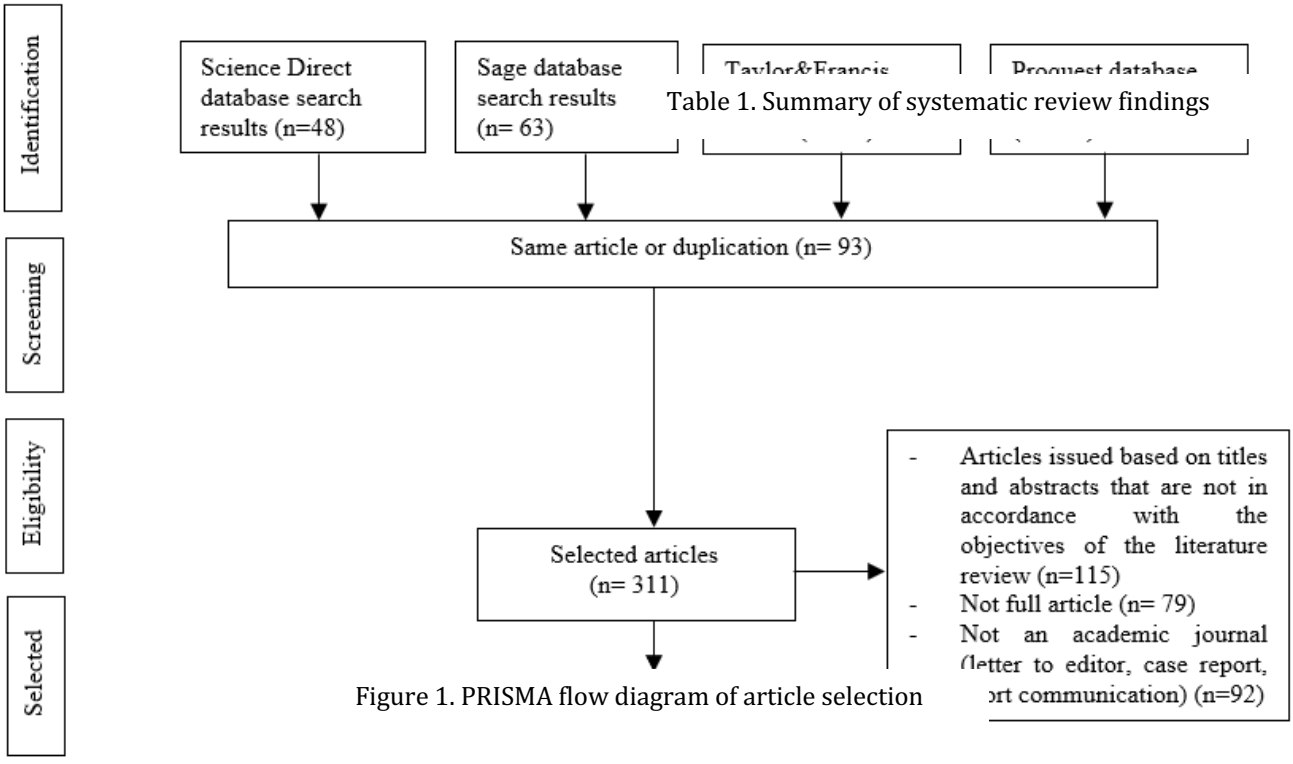

Figure 1. PRISMA flow diagram of article selection

Table 1. Summary of systematic review findings

Following are the results of the analysis of ten selected articles in this literature review. There are three main themes found in this literature review, namely (1) types of games, (2) children's age groups, and (3) health promotion settings.

No	Autors, Publication year	Country	Title	Sample, setting	Method, Intervention	Findings
1	Mendes et al., (2020)	Brazil	Does a Playful Intervention Promote Hand Hygiene? Compliance and Educator's Beliefs about Hand Hygiene at a Daycare Center	126 children age 2-4 year Setting: Daycare center	Quasi-experimental study Intervention: Puppets, card games, songs, and a practice of washing hands colored with tempera paint.	Playful interventions performed by nurses promote hand hygiene compliance among children at daycare centers.
2	Taware et al., (2018)	India	Outcome of School-Based Intervention Program in Promoting Personal Hygiene in Primary School Children of Mumbai, India	516 children age 8-9 year Setting: school	A comparative study among intervention and non-intervention groups Intervention: Flashcard dan Jigsaw Puzzle	Health education program clubbed with entertainment and interaction can bring positive attitudinal shift for primary school children
3	Arıkan et al., (2018)	Turkey	The Effect of Therapeutic Clowning on Handwashing Technique and Microbial Colonization in Preschool Children	195 preschool children Setting: school	A Randomized controlled trial was conducted using pre-test and post-test experimental and control groups Intervention: therapeutic clowning	Hygienic hand washing techniques taught in clown therapy and videos improve children's hand washing behavior marked by reduced bacterial colonization on children's hands
4	Ozcan et al., (2020)	Turkey	Hand washing in primary school students using "demonstration , puzzle, dance, song": A nursing project based on multifaceted skills training	744 children grade 1-4 Setting: school	A quasi-experimental, training research format with a pre- and posttest Intervention: demonstration, puzzle, dance, song (DPDS)	Hand washing skills and times increased after undergoing hand washing training using the DPDS method
5	Arbianingsih et al., (2018)	Indonesia	Arbi Care: an innovative educational game to increase healthy behavior in diarrhea prevention among preschoolers	120 children age 4-6 year Setting: school	A pure experiment with time series design Approach Intervention: educational games (video game) called as Arbi Care	Arbi Care is effective in improving the knowledge of healthy behavior to prevent diarrhea among preschoolers
6	Kusumawardani et al., (2018)	Indonesia	Improving diarrheal preventive behavior through therapeutic sociodramatic play in school-aged children	76 children age 6-12 year Setting: school	A quasi-experimental with pre- and post-tests Intervention: socio dramatic play	Therapeutic sociodramatic play significantly affects knowledge, attitudes and diarrheal prevention skills
7	Suen &	Hongko	Effectiveness of	53	A quasi-	The knowledge

No	Autors, Publication year	Country	Title	Sample, setting	Method, Intervention	Findings
	Cheung, (2020)	ng	"hand hygiene fun month" for kindergarten children: A pilot quasi-experimental study	children age 5-6 year Setting: school	experimental study Intervention: A musical game by passing around a small toy sprinkled with Glo Germ™ powder that contained florescent properties	and proper hand hygiene (HH) practice of children can be positively influenced by the use of an age-appropriate education program
8	Pasewaldt et al., (2019)	Afrika	Impact of a Hand Hygiene Curriculum and Group Handwashing Station at Two Primary Schools in East Africa	95 children grade 3-8 Setting: school	A one-group pretest–posttest experimental design Intevention: F-diagram matching game to teach students about germ transmission	This intervention can improve student knowledge and hand washing frequency
9	Dingman et al., (2020)	United States	School-based, blacklight handwashing program can improve handwashing quality and knowledge among pre-school aged children	200 children age 3-5 year Setting: school	A pre post design Intervention: Linear puzzle	This intervention can increase knowledge and quality of hand washing
10	Rissman et al., (2021)	Malawi	A pilot project: handwashing educational intervention decreases incidence of respiratory and diarrheal illnesses in a rural Malawi orphanage	65 children age 5-18 years Setting: Orphanage	An ecological assessment and a pilot study of a hand hygiene intervention Intervention: Role play	There is an increase in hand washing skills
11	Mendes et al., (2020)	Brazil	Does a playful intervention promote hand hygiene? compliance and educator's beliefs about hand hygiene at a daycare center	126 children aged 2-4 years	A quasi-experimental study was Intervention: Story told through puppets, card games, songs, and a practice of washing hands colored with tempera paint	The results showed that the playful intervention with children and caregivers increased hand hygiene compliance
12	Kusumawardani et al., (2019)	Indonesia	Parental knowledge influenced the effectiveness of therapeutic sociodramatic	102 school age children (6-12 years)	A quasi-experimental with pre- and post-tests Intervention:	There is an increase diarrheal prevention skills

No	Autors, Publication year	Country	Title	Sample, setting	Method, Intervention	Findings
			play on diarrheal preventive behavior in school-age children		Sociodramatic	
13	Rissman et al., (2021)	Africa	A pilot project: handwashing educational intervention decreases incidence of respiratory and diarrheal illnesses in a rural Malawi orphanage	65 children (5-18 years) in a rural Malawi orphanage	An ecological assessment and a pilot study Intervention : playing role play	At six months post-intervention, handwashing with soap increased significantly (p<0.001)
14	Pasewaldt et al., (2019)	East Africa	Impact of a Hand Hygiene Curriculum and Group Handwashing Station at Two Primary Schools in East Africa	95 students at primary school	One-group pretest–posttest experimental design Intervention: games, role play	increase in students' knowledge (p<.001) and frequency of handwashing (p<.001).
15	Watson et al., (2019)	Iraq	Child's play: Harnessing play and curiosity motives to improve child handwashing in a humanitarian setting	71 children (6-12years) in a households	a controlled before-and-after (CBA) study design intervention: glitter game	Effect of the intervention on handwashing with soap (p value= 0,003)
16	Liu, Hou, et al., (2019)	China	A hand hygiene intervention to decrease hand, foot and mouth disease and absence due to sickness among kindergarteners in China: A cluster-randomized controlled trial	8275 children and 18 kindergartens	a cluster-randomized controlled trial intervention: a hand tablet based hy- giene e-game (Ella's Handwashing Adventure, Tork)	Our intervention is effective at reducing HFMD infections and absence due to sickness in children attending kindergartens in China (p < 0.05).
17	Huang et al., (2021)	Philippines	Nudging Handwashing among Primary School Students in the Philippines: Evidence from a Cluster Randomized Trial	132 student (grades 1–6) Philippines	a Cluster Randomized Trial intervention: posters and eye sticker	Mediation analysis suggests the pro-gram simultaneously nudged students to wash hands with soap in classrooms that already had soap, and nudged teach- ers to provide soap where it was not already available (p<0,05)
18	Suen & Cheung, (2020)	Hong Kong	Effectiveness of "hand hygiene fun month" for kindergarten children: A pilot	52 children aged 2–6 years	Quasi-experimental study intervention:	Significant improvements knowledge; in hand hygiene performance at the

No	Autors, Publication year	Country	Title	Sample, setting	Method, Intervention	Findings
			quasi-experimental study	kindergarten	play a musical game by passing around a small toy sprinkled with Glo Germ™ powder that contained florescent properties	left and rigtht palm and dorsum (p< 0.05)
19	Andrade et al., (2019)	Salvadoran	Evaluating the effectiveness of a community-based hygiene promotion program in a rural Salvadoran setting	751 (grades 1–9 rural Salvadoran setting	Quasi-experimental study Intervention: role playing, games, contests, andstorytelling	improvements in the areas of: knowledge of disease transmission and key times for handwashing,water container hygiene, sanitation,practice, personal hygiene and food hygiene (p< 0.05)
20	Mushota et al., (2021)	India	Effect of school-based educational water, sanitation, and hygiene intervention on student's knowledge in a resource-limited setting	1.781 students studying in grades: 8th–12th; age: 14–19 years) in schools located in Ujjain, Madhya Pradesh, India.	The present pre–post intervention study Intervention: role-playing	These proportions increased (P<0.001) after the educational intervention
21	Younie et al., (2020)	United Kingdom	Improving young children's handwashing behaviour and understanding of germs: The impact of A Germ's Journey educational resources in schools and public spaces	72 school age children	a randomised control design intervention: website, song, online games and glo- gel activities	Significant improvements knowledge and behavioural scores (p<0,05)
22	Arıkan et al., (2018)	Turkey	The Effect of Therapeutic Clowning on Handwashing Technique and Microbial Colonization in Preschool Children	195 students Preschool Children	This randomized controlled trial was conducted using pre-test and post-test experimental and control groups Intervention: Therapeutic Clowning	The hygienic handwashing technique taught in the therapeu- tic clowning and videos reduced the bacterial colonization on the preschool children's hands (p< .000).
23	Wichaidit et al., (2019)	Kenya	Effect of an equipment-behavior change intervention on handwashing	476 primary school children Kenya	stepped-wedge cluster-randomized trial intervention: Povu Poa ("Cool	After intervention, we observed handwashing after 62% of 383 toilet use events (PR = 5.96, 95% CI =

No	Autors, Publication year	Country	Title	Sample, setting	Method, Intervention	Findings
			behavior among primary school children in Kenya: The Povu Poa school pilot study		Foam") handwashing stations	3.02, 11.76) and handwashing with soap/soapy water after 26% of events
24	Winter et al., (2021)	Zambian	The potential of school-based WASH programming to support children as agents of change in rural Zambian households	grade 1 and 4 students (n = 392 and 369) rural Zambian households	a quasi-experimental intervention: WASH programming playing interactive games	Student knowledge increased significantly (p<0.001)
25	Skoradal et al., (2023)	Faroe Islands	"11 for Health" in the Faroe Islands: Popularity in schoolchildren aged 10–12 and the effect on well-being and health knowledge	A total of 261 children (137 boys and 124 girls) participated Faroe Islands	a cluster-randomized controlled trial intervention: football drills, small- sided games, and health education	Effect of the intervention on handwashing (p<0,001)

DISCUSSION

Types of games used in health promotion to prevent diarrhea

The results of this study stated that there were two categories of types of games used in health promotion for preventing diarrhea, namely games that were played face to face and using the internet. The games performed face to face included puppets, card games, tempera paint, flashcards, puzzles, therapeutic clowning, dance, socio dramatic, musical games, matching games, and role plays. Internet-based games are video games that are accessed via gadgets. All articles show that these types of games are effective as health promotion efforts to prevent diarrhea. The main topic given is about how to wash your hands. Hand washing is the main action to prevent diarrhea transmission that can be done by everyone (Azor-Martinez et al., 2020).

Vally et al., (2019) in his research used educational games, arts, and crafts as an effort to promote diarrhea health. The results of this study indicate an increase in knowledge, and behavior of hand washing, as well as reducing the incidence of diarrhea in children. Similar research was also carried out by Tidwell et al., (2020) that the use of educational games and songs can improve children's hand washing behavior. Other research on the online educational game "Lands of Hand" shows an increase in knowledge and practice of hand washing in children. These online games also create a fun learning atmosphere. The use of game educational games needs to be developed based on theory so that it is right on target and can increase children's intrinsic motivation in changing behavior (Kragić Kok et al., 2020). So, the types of games that are carried out directly or based on the internet can increase children's hand-washing knowledge and behavior because of children's interest in the health promotion methods provided. Based on this, it can be concluded that the most effective types of games for school-age children are games that stimulate role abilities, dexterity, and creativity in children. This type of game is like playing puzzles, matching games and role plays.

Child age group

Most of the respondents in the 25 articles were in the age range of 6-12 years. The category of school-age children according to Hockenberry & Wilson (2015) consists of early childhood aged 6-7 years or < 8 years, middle childhood 8-9 years and late childhood aged 10-12 years. Öncü and Vayısoğlu (2021) in their research found that the average age of the respondents was 8-9 years. The same thing was also found by Vally et al., (2019) with the characteristics

of the respondent's age of 5-12 years. Both studies show that health promotion through educational games is effective in increasing children's hand washing knowledge and behavior. This is consistent with the cognitive changes in school-age children characterized by the ability to start thinking logically. So, hand washing educational games can be given to all age groups of children according to the type of game needs in each age group.

Health promotion settings

The results of the study show that the age group of children is not only given health promotion at school but also at children's orphanages and daycare. Previous studies have found that diarrhea is the third most common disease among orphans after skin infections and ear problems (Toutem et al., 2018). Thobari et al., (2021) in his research explained that there was an increase in knowledge of diarrhea prevention among orphans after being given health education. Oliveira et al., (2019) in their research found that diarrhea is the main problem that occurs in children during daycare. So, health promotion for children is not only carried out in schools but in special groups of children in the community

CONCLUSION

Health promotion of hand washing through face-to-face and internet-based educational games is effective in increasing children's hand washing knowledge, skills and behavior. School age children range 6-12 years can use educational games according to the stage of growth and development of the child's age group. Groups of children in community settings such as schools, daycare or orphanages need to get handwashing health promotion in preventing diarrhea. Educational games in the future can be designed using a local culture-based approach so that they can take advantage of community resources

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