

Research Article

A STUDY TO ASSESS THE EFFECTIVENESS OF HAND HYGIENE PRACTICE IN PREVENTION OF DIARRHOEAL INFECTION AMONG HIGHER PRIMARY SCHOOL CHILDREN IN SELECTED SCHOOL AT TUMKUR

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ABSTRACT

Background of the study: Diarrhoeal infection is a major public health problem among school children and contributes to absenteeism, poor academic performance, malnutrition, and dehydration. Proper hand hygiene is a simple and effective measure to prevent diarrhoeal infections. This study assessed the effectiveness of hand hygiene practice in preventing diarrhoeal infection among higher primary school children in selected schools at Tumkur. **Objectives:** 1. to assess the diarrheal risk among higher primary school children in experimental and control group. 2. To assess the practice of hand hygiene among higher primary school children in experimental group. 3. To evaluate the effectiveness of hand hygiene practice in prevention of diarrheal infections among higher primary school children in experimental group. 4. To find the association with pretest diarrheal risk among higher primary school children with their selected socio demographic variables. **Methods:** A quasi-experimental pre-test and post-test control group design was adopted. Sixty higher primary school children were selected, with 30 participants each in the experimental and control groups. Data were collected using a socio-demographic proform a, hand hygiene practice checklist, and diarrhoeal risk assessment checklist. The experimental group received hand hygiene education and demonstration, while the control group received no intervention. **Results:** Before intervention, 66.7% of children in the experimental group had high diarrhoeal risk. Following hand hygiene education, 76.7% shifted to the low-risk category and no child remained at high risk. Hand hygiene practices also improved considerably, with 86.7% demonstrating good practice in the post-test compared to none in the pre-test. The mean diarrhoeal risk score decreased from 17.03 to 9.50 in the experimental group, whereas only a slight reduction was observed in the control group (16.03 to 15.27). Statistical analysis showed a significant reduction in diarrhoeal risk in the experimental group ($t = 11.955$, $p < 0.05$). Significant associations were found between diarrhoeal risk, age, and class of study. **Conclusion:** The study demonstrated that hand hygiene education and practice significantly reduced diarrhoeal risk and improved hand hygiene behaviour among higher primary school children. Regular school-based hand hygiene programmes can play an important role in preventing diarrhoeal infections and promoting child health.

Keywords: Hand hygiene practice, diarrhoeal infection, higher primary school children, school health, and prevention.

INTRODUCTION

Every year there are about 2 billion cases of diarrheal disease exist in the worldwide. Diarrheal disease is a one of the leading causes of child mortality and morbidity in the world. But the most results from contaminated food and water sources worldwide, around 1 billion people lack access to improved safe water and 2.5 billion have no access to basic sanitation.⁽¹⁰⁾

In addition to, the diarrheal is the passage of three or more loose or liquid stools per day, or more frequently than is normal for the individual. It is usually a symptom of gastrointestinal infection, which can be caused by bacterial, viral and parasitic organisms. Infection is spread through contaminated food or drinking water, or person to person as a result of poor hygiene. Diarrhoea can last several days and can leave the body without the water and salts that are necessary for survival. Children who are malnourished or having impaired immunity are most at risk of life-threatening diarrhoea.⁽⁸⁾⁽⁹⁾

Moreover, the hand washing is the act of cleaning one's hands with water and soap to remove dirt, bacteria, viruses, and other harmful microorganisms. This process typically involves scrubbing all parts of the hands, including the palms, backs of the hands, fingers, and nails, for at least 20 seconds to ensure thorough cleaning. Proper hand washing is essential for maintaining hygiene and to prevent the spread of infections in children.

However, Hand hygiene practices are essential in preventing diarrhoea in children because it helps reduce the transmission of harmful pathogens (bacteria, viruses, and parasites) that cause gastrointestinal infections. Here's why hand hygiene is crucial:

- **Pathogen Spread:** Diarrhoea is often caused by pathogens like *E. coli*, *Salmonella*, *Norovirus*, and *Rotavirus*, which can be present in contaminated food, water, or surfaces. These pathogens can be transferred to hands when someone touches contaminated objects.
- **Transmission Pathways:** Hands are the main route through which pathogens spread. After touching contaminated surfaces, food, or objects, unwashed hands can transfer germs to the mouth, food, or other surfaces, facilitating the spread of diarrhoea-causing pathogens.
- **Preventing Faecal-Oral Transmission:** Many diarrheal diseases spread through the faecal-oral route. This means that pathogens in feces can contaminate food, water, or surfaces that are then touched by people. Washing hands with soap and water helps remove these harmful germs and break the cycle of transmission.
- **Global Health Impact:** Poor hand hygiene contributes significantly to the spread of diarrhoea, which remains a leading cause of illness and death, particularly in children under five years old in developing countries. Regular hand washing with soap can reduce the risk of diarrheal diseases by over 40%.
- **Simple and Effective:** Hand hygiene, especially washing with soap and water for at least 20 seconds, is a simple yet highly

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effective measure to prevent diarrhoea and other infections. It reduces the likelihood of transmitting harmful microorganisms that can lead to outbreaks.

In summary, practicing good hand hygiene is one of the most effective and affordable ways to prevent diarrhoea, protect public health, and reduce the burden of infectious diseases.

Hand washing can significantly help prevent diarrhoea in school children. Schools are environments where children interact closely, often touching surfaces, playing, and sharing food, which can easily lead to the spread of germs that cause diarrhoeal diseases. When children wash their hands regularly, particularly after using the bathroom, before eating, and after playing outside, they reduce the chances of ingesting harmful bacteria, viruses, or parasites that can cause diarrhoea. Proper hand hygiene can be especially effective in preventing the transmission of common pathogens like *E.coli*, *Salmonella*, *Rotavirus*, and *Norovirus*, which are responsible for many diarrhoeal infections.

NEED FOR THE STUDY

Globally, there are nearly 1.7 billion cases of childhood diarrhoeal disease every year. Diarrhoea is a leading cause of malnutrition in children under 5 years old. Diarrhoeal disease is the third leading cause of death in children under 5 years old and is responsible for killing around 443 832 children every year.⁽¹¹⁾

However, each year diarrhoea kills around 443 832 children under 5 and an additional 50 851 children aged 5 to 9 years. A significant proportion of diarrhoeal disease can be prevented through safe drinking-water and adequate sanitation and hygiene. Globally, there are nearly 1.7 billion cases of childhood diarrhoeal disease every year.⁽¹¹⁾

The Cochrane database of systemic reviews published by John Wiley and Sons, Ltd. On behalf of the Cochrane Collaboration. Hand washing promotion probably reduces diarrhoea episodes in both child day care in high income countries and among communities living in LMICs by about 30%.⁽¹²⁾

Moreover, the most deaths associated with diarrhoea are caused by pathogens acquired as a result of unsafe drinking water, poor sanitary conditions, and lack of hygiene. Washing hands with soap and water removes the bacteria, viruses, and parasites that cause disease. Programmes and activities encouraging people to wash their hands have been developed for use in communities and schools, including hygiene training, posters, leaflets, comic books, songs, and drama.

In addition to this proper hand hygiene is regarded as prime element of infection control activities. Considering the ever-increasing burden of health care associated infections, complexity of treatment, rise in severity of illness superimposed by multi-drug-resistant pathogen infections, health care practitioners are referring back to basics of infection preventions by basic measures like proper hand hygiene. Same is due to the fact that abundant scientific evidences support that if properly implemented, hand hygiene alone can greatly reduce risks of cross-transmission of infections.⁽¹³⁾

A study was conducted to assess impact of hand hygiene practice in prevention of diarrhoea and hand washing hygiene behaviour interventions were given to subjects. (Hand washing not an intervention but measured the effectiveness of hand disinfection with alcoholic rubs). Diarrhoea episodes were not assessed rather hygiene behaviour change. Outcome was measured not directly on

diarrhoea but they observed infectious illness and school absenteeism.⁽¹²⁾

Effective and appropriate hand-washing practice for schoolchildren is important in preventing infectious diseases such as diarrhoea, which is the second most common cause of death among school-age children.

School-based and early care and education (ECE) programs promoting hand hygiene can result in less gastrointestinal and respiratory illness and fewer missed days. Encourage cleaning hands at key times with soap and water or using a hand sanitizer if soap and water are not readily available.⁽¹⁴⁾

Considering increasing access to hand hygiene infrastructure and supplies, such as sinks, soap dispensers, portable hand washing stations, and hand sanitizer dispensers. It is also important to provide a way for children and staff to dry hands by providing paper towels or hand dryers. Germs spread more easily when hands are wet, so making sure children and staff have a way to dry hands completely can help keep them safe. When hand hygiene facilities and supplies are available, children and staff are better able to make hand hygiene part of their routine.⁽¹⁴⁾

However, educational programs in schools should emphasize the importance of hand washing, along with providing access to soap and clean water. Studies have shown that promoting hand washing in schools can lead to fewer instances of diarrhoea among children, improving overall health and attendance rates.

Hence as a researcher I got interest to assess the effectiveness of hand hygiene practice in prevention of diarrhoea among high school children. With the aim of preventing Communicable diseases such as Diarrhoea.

OBJECTIVES:

1. To assess the diarrheal risk among higher primary school children in experimental and control group.
2. To assess the practice of hand hygiene among higher primary school children in experimental group.
3. To evaluate the effectiveness of hand hygiene practice in prevention of diarrheal infections among higher primary school children in experimental group.
4. To find the association with pretest diarrheal risk among higher primary school children with their selected socio demographic variables.

HYPOTHESIS:

- **H1:** There will be a significant difference between pre and post interventional risk score among higher primary school children in the experimental group.
- **H2:** There will be a significant difference between post intervention Diarrheal risk score among higher primary school children in the experimental and control group.
- **H3:** There will be a significant association between pre-interventional Diarrheal risk score among higher primary school children and their baseline demographic in both experimental and control groups.

METHODOLOGY:

The study adopted a quantitative research approach with a quasi-experimental pre-test and post-test control group design to assess the effectiveness of hand hygiene practice in the prevention of

diarrhoeal infection among higher primary school children. The study used a structured socio-demographic data sheet, hand hygiene observation checklist, and diarrhoeal risk assessment checklist, which were developed through literature review, expert consultation, and validated by experts before obtaining ethical approval.

The study was conducted among 60 higher primary school children (30 experimental and 30 control) studying in Classes VI, VII, and VIII in selected schools of Tumkur using a random sampling technique. After obtaining permission and informed consent, a pre-test was conducted for both groups. The experimental group received a structured hand hygiene education programme with demonstration, while the control group continued routine activities. A post-test was conducted 15 days after the intervention using the same tools. The collected data were analysed using descriptive and inferential statistics, and confidentiality and ethical principles were maintained throughout the study.

MATERIAL AND METHODS

RESEARCH APPROACH:

A quantitative research approach.

RESEARCH DESIGN:

A quasi-experimental pre-test and post-test control group design will be used for the study.

SCHEMATIC REPRESENTATION OF RESEARCH DESIGN

Experimental Group - Pre-test → Hand Hygiene Education Programme → post-test **Control Group** - Pre-test → No Intervention → post-test

STUDY SETTING:

The study will be conducted in selected higher primary schools such as Anikethana Vidya Mandira, HMS New Model English School, Government Model Higher Secondary School, Shridevi Vidya Mandira at Tumkur.

POPULATION:

The population for the study comprises higher primary school children studying in classes VI, VII, and VIII in selected schools of Tumkur.

SAMPLE:

The sample consists of 60 higher primary school children.

SAMPLE SIZE:

The sample size for the study will be 60 higher primary school children, with 30 participants in the experimental group and 30 participants in the control group.

SAMPLING TECHNIQUE:

Random sampling technique.

INCLUSION CRITERIA:

The study includes:

1. Higher primary school children studying in classes VI, VII, and VIII.
2. Children who are willing to participate in the study.
3. Children who are present during the data collection period.

EXCLUSION CRITERIA:

The study excludes: 1. Children who are absent during data collection. 2. Children who are severely ill during the time of data collection.

RESULTS:

A total of 60 higher primary school children participated in the study, with 30 children in the experimental group and 30 children in the control group. The demographic characteristics of both groups were comparable at baseline.

Before the intervention, the majority of children in both the experimental (66.7%) and control (66.7%) groups had high diarrhoeal risk. Following the hand hygiene intervention, 76.7% of children in the experimental group demonstrated low diarrhoeal risk, whereas only 6.7% of children in the control group achieved low-risk status. Conversely, 60.0% of children in the control group continued to have high diarrhoeal risk after the study period.

Hand hygiene practices improved substantially in the experimental group. At baseline, 70.0% of participants exhibited poor hand hygiene practices, while none demonstrated good practice. Following the intervention, 86.7% of participants achieved good hand hygiene practices, and no participant remained in the poor practice category. In contrast, only minimal improvement was observed in the control group, where 56.7% of participants continued to demonstrate poor hand hygiene practices after post-test. The mean diarrhoeal risk score in the experimental group decreased significantly from 17.03 ± 2.51 at pre-test to 9.50 ± 2.24 at post-test. In the control group, the mean score showed only a slight reduction from 16.03 ± 2.63 to 15.27 ± 2.61 .

Paired t-test analysis revealed a statistically significant reduction in diarrhoeal risk scores within the experimental group ($t = 11.955$, $p < 0.05$). Independent t-test analysis demonstrated a significant difference in post-test diarrhoeal risk scores between the experimental and control groups ($t = 9.179$, $p < 0.05$), indicating the effectiveness of the hand hygiene intervention.

Chi-square analysis showed that age and class studying were significantly associated with pre-test diarrhoeal risk ($p < 0.05$), whereas gender, parents' education, family income, toilet facility, and previous exposure to hand hygiene information showed no statistically significant association.

The findings indicate that the structured hand hygiene education programme with demonstration was effective in improving hand hygiene practices and significantly reducing diarrhoeal risk among higher primary school children.

TABLE 1: PRE TEST AND POST TEST LEVEL OF DIARRHEAL RISK AMONG HIGHER PRIMARY SCHOOL CHILDREN IN EXPERIMENTAL GROUP

N = 30

Level of Diarrheal risk	Pre test		Post test	
	Frequency	%	Frequency	%
Low Diarrheal risk	0	0.0	23	76.7
Moderate Diarrheal risk	10	33.3	7	23.3
High Diarrheal risk	20	66.7	0	0.0
Total	30	100.0	30	100.0

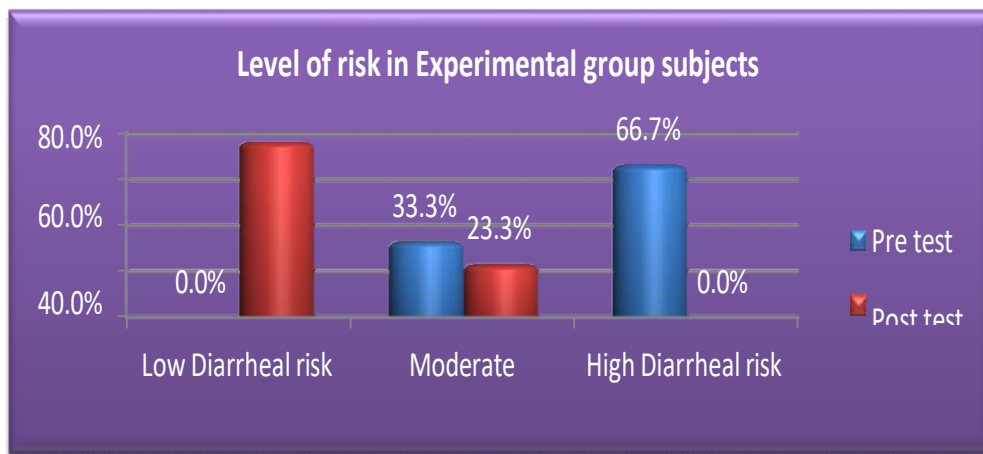


Fig: 1 - Analysis of level of Diarrheal risk among higher primary school children in experimental group

TABLE 2: PRE TEST AND POST TEST LEVEL OF HAND HYGIENE PRACTICE AMONG HIGHER PRIMARY SCHOOL CHILDREN IN CONTROL GROUP

N = 30

Level of Diarrheal risk	Pre test		Post test	
	Frequency	%	Frequency	%
Poor practice	21	70.0	17	56.7
Moderate practice	4	13.3	8	26.7
Good Practice	5	16.7	5	16.7

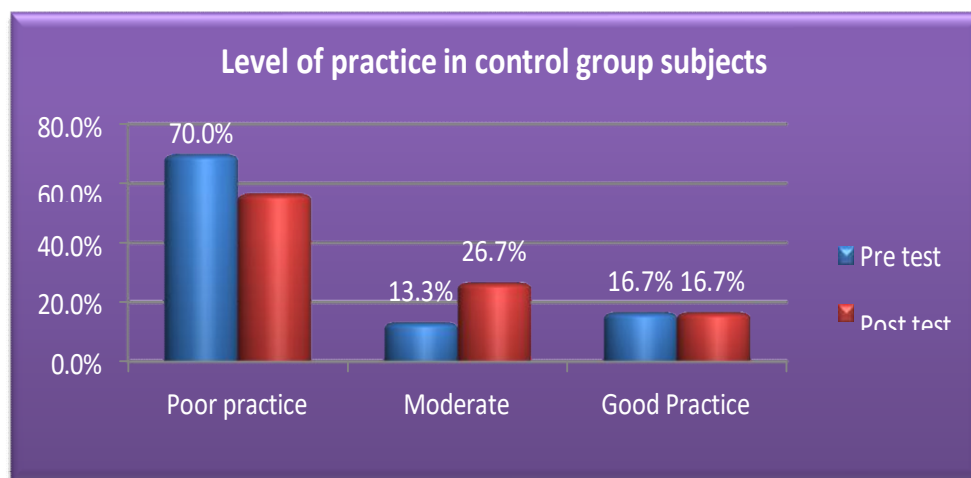


Fig-2: Analysis of level of Diarrheal risk among higher primary school children in experimental group

TABLE 3: COMPARISON OF PRE TEST AND POST LEVEL OF DIARRHEAL RISK OF EXPERIMENTAL AND CONTROL GROUP HIGHER PRIMARY SCHOOL CHILDREN

N = 60 (E = 30, C = 30)

Group	Pre test		Post test		Mean Difference	t Value	Df	Inference
	Mean	S D	Mean	S D				
Experimental Group	17.03	2.512	9.5	2.24	7.53	11.955	29	S
Control Group	16.03	2.632	15.27	2.612	0.76	5.139	29	S
Mean Difference	1.0		5.76					
Independent t Value	1.505		9.179					
Inference	S		NS					

TABLE 15: ASSOCIATION OF PRE TEST DIARRHEAL RISK SCORES OF HIGHER PRIMARY SCHOOL CHILDREN WITH DEMOGRAPHIC VARIABLES**N = 60**

Variables	Below Median	Above Median	Chi square	Df	P value (0.05)	Inference
1. Age in years						
a. 11 years	5	11	16.700	2	0.000	S
b. 12 years	3	19				
c. 13 years	16	6				
2. Gender						
a. Male	9	15	0.104	1	0.747	NS
b. Female	15	21				
3. Class studying						
a. 6th Standard	5	15	11.250	2	0.004	S
b. 7th Standard	5	15				
c. 8th Standard	14	6				
4. Mothers' education						
a. No formal education	5	7	2.969	3	0.396	NS
b. Primary education	11	13				
c. Secondary education	7	9				
d. PUC and above	1	7				
5. Fathers' education						
a. No formal education	1	3	2.603	3	0.457	NS
b. Primary education	8	6				
c. Secondary education	4	9				
d. PUC and above	11	18				
6. Family income						
a. Less than Rs. 15000/ Month	3	6	0.303	3	0.959	NS
b. Rs. 16000-30000/ Month	10	13				
c. Rs. 31000-45000/ Month	8	12				
d. Above Rs. 46000/ Month	3	5				
7. Availability of toilet facility						
a. Yes	13	20	0.011	1	0.916	NS
b. No	11	16				
8. Previous exposure						
a. Social media	6	11	2.394	3	0.495	NS
b. Friends and family	5	8				
c. Health Personnel	5	11				
d. School Teacher	8	6				

CONCLUSION

The study was conducted to assess the effectiveness of hand hygiene practice in the prevention of diarrhoeal infection among higher primary school children in selected schools at Tumkur. A quasi-experimental pre-test and post-test control group design was adopted. The study included 60 higher primary school children, comprising 30 participants in the experimental group and 30 participants in the control group. The findings of the study revealed that before the intervention in pretest both experimental and control groups had similar levels of diarrhoeal risk. In the experimental group, 66.7% of children had high diarrhoeal risk and 33.3% had moderate diarrhoeal risk, while none of the children had low diarrhoeal risk. Similarly, in the control group, 66.7% of children had high diarrhoeal risk and 33.3% had moderate diarrhoeal risk, indicating that both groups were comparable during the pre-test assessment.

Assessment of hand hygiene practices showed that before the intervention, the majority of children in the experimental group (70%) had poor hand hygiene practices and 30% had moderate practices, whereas none demonstrated good hand hygiene practices.

After the hand hygiene education and demonstration programme, a remarkable improvement was observed. In the post-test, 86.7% of children demonstrated good hand hygiene practices and only 13.3% had moderate practices, while none remained in the poor-practice

category. The post-test assessment of diarrhoeal risk demonstrated a substantial reduction in risk among children who received the intervention. In the experimental group, 76.7% of children were categorized as having low diarrhoeal risk and 23.3% had moderate risk, while none remained in the high-risk category. In contrast, the control group continued to show higher levels of risk, with 60% of children remaining in the high-risk category, 33.3% in the moderate-risk category, and only 6.7% in the low-risk category.

Further evidence of the effectiveness of the intervention was observed in the comparison of mean diarrhoeal risk scores. In the experimental group, the mean diarrhoeal risk score decreased from 17.03 (85.15%) during the pre-test to 9.5 (47.5%) during the post-test, showing a mean reduction of 7.53 points. In comparison, the control group showed only a slight reduction from 16.03 (80.15%) to 15.27 (76.35%), with a mean difference of only 0.76 points.

The statistical analysis further supported the effectiveness of the intervention. The obtained paired t-value for the experimental group was 11.955, indicating a significant reduction in diarrhoeal risk following the hand hygiene intervention. The post-test comparison between the experimental and control groups also demonstrated a marked difference, confirming the effectiveness of hand hygiene practices in reducing diarrhoeal risk among higher primary school children.

Based on these findings, the study concludes that hand hygiene education and demonstration significantly improve hand hygiene practices and effectively reduce diarrhoeal risk among higher primary school children. The intervention proved to be an effective strategy for preventing diarrhoeal infections. Therefore, regular hand hygiene education programmes should be incorporated into school health services to prevent communicable diseases and improve overall health status of school children.

RECOMMENDATIONS:

- Regular health education programmes should be conducted in schools to improve knowledge and awareness regarding hand hygiene practices among children.
- Adequate hand washing facilities should be made available in all schools.
- School health nurses should conduct periodic assessments and health promotion activities related to personal hygiene and prevention of communicable diseases.
- Educational materials such as posters, charts, pamphlets, and audiovisual aids should be displayed in schools to reinforce hand hygiene messages.
- Similar studies can be conducted on a larger sample size and in different geographical areas to improve the generalizability of findings.

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REFERENCES

1. Sandora TJ, Shih M-C, Goldmann DA. Reducing absenteeism from gastrointestinal and respiratory illness in elementary school students: A randomized, controlled trial of an infection-control intervention. *Paediatrics*. 2008 Jun1; 121(6). doi:10.1542/peds.2007-2597
2. Wang Z, Lapinski M, Quilliam E, Jaykus L-A, Fraser A. The effect of hand-hygiene interventions on infectious disease-associated absenteeism in elementary schools: A systematic literature review. *American Journal of Infection Control*. 2017 Jun; 45(6): 682–9. Doi:10.1016/j.ajic.2017.01.018
3. Willmott M, et al, Effectiveness of hand hygiene interventions in reducing illness absence among children in educational settings: A systematic review and meta-analysis. *Archives of Disease in Childhood*. 2015 Oct 15; 101(1):42–50. doi:10.1136/archdischild-2015-308875
4. Khan S, Ashraf H, Iftikhar S, Baig-Ansari N. Impact of hand hygiene intervention on hand washing ability of school-aged children. *Journal of Family Medicine and Primary Care*. 2021 Feb; 10(2): 642–7. Doi: 10.4103/jfmprc.jfmprc_1906_20
5. Joshi A, Amadi C. Impact of water, sanitation, and hygiene interventions on improving health outcomes among school children. *Journal of Environmental and Public Health*. 2013; 2013:1–10. doi:10.1155/2013/984626
6. Gawai P, Taware S, Chatterjee A, Thakur H. A cross-sectional descriptive study of hand-washing knowledge and practices among primary school children in Mumbai, Maharashtra, India. *International Journal of Community Medicine and Public Health*. 2016; 2958–66. doi:10.18203/2394-6040.ijcmph20163391
7. Shrestha A. Improving hand washing among school children: an educational intervention in South India Improving hand washing among school children: an educational intervention in South India. Volume 8(1).2015
8. Whaley, L.F., and Wong, D.L.: Nursing care of infants and children. C.V. Mosby Co., St. LOUIS, MO, 1983
9. Centres for Disease Control and Prevention; <https://www.cdc.gov/>
10. Diarrhoeal disease. World Health Organization; <https://www.who.int/news-room/fact-sheets/detail/diarrhoeal-disease>
11. Diarrhoeal disease. World Health Organization; <http://www.who.int/news-room/fact-sheets/detail/diarrhoeal-disease>
12. Ejemot-Nwadiaro RI, Ehiri JE, Arikpo D, Meremikwu MM, Critchley JA. Hand-washing promotion for preventing diarrhoea. *Cochrane Database of Systematic Reviews*. 2021 Jan 7; 2021(1). Doi:10.1002/14651858.cd004265.pub4
13. Mathur P. Hand hygiene: Back to the basics of infection control. *Indian J Med Res*. 2011; 134:611–20. Doi: 10.4103/0971-5916.90985.
14. About hand hygiene in schools and early care and education settings. Centres for Disease Control and Prevention;
