Original Article

Effectiveness of Tippy Tap as Appropriate Technology for Handwashing in Low Resource Settings in India

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Abstract

Background: Hand washing is one of the simplest, most affordable, and effective means of stopping the spread of infection. It is easy to learn how to wash your hands and how to stop the spread of infection by washing the germs away. It is estimated that washing hands with soap and water could reduce diarrheal disease-associated deaths by up to 50%.Handwashing can reduce the risk of respiratory infections by 16%. Low resources are a challenge, in places like school if this challenge is met with the use of appropriate technology, reduction in infectious diseases will be seen. The aim of this study was to assess the effectiveness of Tippy Tap as appropriate technology to increase handwashing in school children.

Methodology: School based interventional study was conducted over 3 months with the study area being 10 government schools of Bhopal District. Sampling techniques- random selection 5 urban schools, 5 rural schools. A total of 580 students were registered in the study with their consent. Knowledge and Practice regarding handwashing was assessed, then a tippy tap was installed and handwashing practices assessed.

Result: A total of 580 students were registered for the study form 10 schools. Two schools were not having handwashing facility, so they were provided with Tippy Tap a sanitary handwashing system. The overall preintervention score in urban area was 81.6 % and in rural was 58.04 %. In post intervention assessment improvement in scores were substantial. The urban area school students had a mean score of 92% while of rural area students scored 77.1% which was a significant improvement. In preintervention assessment the mean score

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of urban area came out to be 77.5 % and that of rural schools 57.3 %. In post intervention the score was 90.5 % and 74.9 % of urban and rural respectively.

Conclusion: The facilities of the urban school were up to the mark and the students had adequate knowledge about hand washing techniques. The rural schools had poor infrastructure and the pre-interventional knowledge of the students was low. After the intervention there was significant improvement in their knowledge and the facilities of hand washing provided to the students.

Keywords: Communicable Diseases, Handwashing, Sustainable Development Goals, Water

Introduction

Hand hygiene through handwashing is one of the most important factors in the prevention of infections. Its importance has been seen during the Covid Pandemic. Cleaning hands with water and soap may look like a small act, but can have a significant impact on health. Handwashing enables cleaning of hands along with removal of microorganisms and unwanted substances leading to prevention of infectious diseases. Handwashing becomes more effective with soap. In many low-income countries, people use ash, mud or sand as an alternatives to soap. These alternatives however may be contaminated with microorganisms leading to increase in infectious diseases.[1,2,3]

Children however are most prone to the dangers of not following hand hygiene. The commonest cause of death in under 5 children is Pneumonia and Diarrhoea. Handwashing with soap could protect about 1 out of every 3 young children who get sick with diarrhoea[4-6] and almost 1 out of 5 young children with respiratory infections like pneumonia.[6-8] Estimated global rates of handwashing after using the toilet are only 19%with 13-17% in low and middle income countries and 42-49% in high income countries[9].

The tippy tap is a hands-free way to wash hands that is especially appropriate for rural areas where there is no running water. Two poles are dug in the ground, around 2 feet apart, these poles have a forked end at their top. Both Poles are bridged through a horizontal bar which is supported between the tines of the forked end. To this horizontal bar a soap is suspended vertically with the help of a thread. A container containing water is also suspended vertically from this bar, the mouth end of this container is kept close with a lid and tied with a string which is attached to a pedal foot lever. A hole is made in the container such that the water flows out of it whenever the pedal foot level is pressed. This foot lever reduces the chance for bacteria transmission as the user touches only the soap. It uses only 40 millilitres of water during handwashing compared to 500 millilitres required when washed through a mug Additionally, the used "waste" water can go to plants or back into the water table .Availability of soap and water along with amusement will encourage handwashing behaviour. The first tippy tap was built by Dr. Jim Watt and Jackson Masawi oin Zimbabwe using a gourd. As per a systematic review on effectiveness of tippy tap has proven effective in been various African countries, very little literature is available from India has been found.[10]

The effectiveness of tippy tap in Indian settings needs to be explored which will enable promotion of handwashing, hence this study was undertaken to assess the effectiveness of tippy tap for handwashing in low resource settings.

Methodology

This was a school based interventional study. The study was conducted over 3 months in 10 government schools of Bhopal District. School selection was done on random basis, 5 urban schools, 5 rural schools were selected for the study. Permission was obtained from the concern authorities to perform the interventional study. All the students present on the day of visit and willing to participate in the study were registered. A total of 580 students were registered as participants. Our study was structured as - Pre-intervention, Educational intervention along with tippy tap installation, Post intervention .The pre intervention assessment and educational intervention along with tippy tap installation were carried out on the same day, while the post intervention assessment was performed after 30 days.

Figure 1: Tippy Tap installed in the school and Tippy tap in use

Results

A total of 10 schools were assess, 5 being of urban and 5 being of rural area of Bhopal city of central India. The study could register 580 students with their consent, 79.31% were of urban schools. On initial assessment regarding available resource for hands washing we found that all the schools of urban area had all facilities and resources, while schools of rural area were lacking in resources such as soap, place for hands washing and towel as depicted in table 1. The facility such as separate toilets for male and female were available in all 10 schools.The pre-intervention assessment was based on knowledge and practice regarding handwashing. The knowledge was evaluated on the following points: benefits of handwashing, steps of handwashing, duration of hand wash, when it is necessary to wash hands. The practice was assessed by enquiring whether they washed hands before and after eating, after using the washroom, wash hands more than 7 times, wash hands for more than 30 sec, use soap, and use of towel after hands washing.

On assessing the knowledge, it was found that students of schools in rural area were having lesser information and knowledge regarding handwashing. The overall preintervention score in urban area was 81.6 % and in rural was 58.04 %. In post intervention assessment improvement in scores were substantial. The urban area school students had a mean score of 92% while of rural area students scored 77.1% which was a significant improvement. The students at rural area school were having limited knowledge regarding steps of handwashing, duration of handwash and importance of handwash before meals as depicted in table 2.

The practice part of handwashing also had difference in urban and rural school. In preintervention assessment the mean score of urban area came out to be 77.5 % and that of rural schools 57.3 %. In post intervention the score was 90.5 % and 74.9 % of urban and rural respectively as depicted in table 3.

Table 1: The available resources and facilities in various schools.

S.No	Variable	Urban	Rural	Total
1	No. of school	5(100%)	5(100%)	10 (100%)
2	No. of students	460 (79.31%)	120(20.68%)	580(100%)
3	Availability of soap	5(100%)	3(60%)	8(80%)
4	Availability of water	5(100%)	4(80%)	9(90%)
5	Availability of place for hand washing	5(100%)	3(60%)	8(80%)
6	Availability of towel	5(100%)	2(40%)	7(70%)
7	Separate toilets	5(100%)	5(100%)	10(100%)

Table 2: Knowledge regarding handwashing

S.No	Variables	Urban		Rural	
		Pre intervention	Post intervention	Pre intervention	Post intervention
1	Benefits of handwashing	85%	92%	63.5%	82%
2	Steps of handwashing	87%	94%	60.7%	76%
3	For how long you should wash hand	65%	86%	40%	73.5%
4	Is hand washing necessary before having meals	82%	93%	58%	75%
5	Is hand washing necessary after using washroom	89%	95%	68%	79%

Table 3: Practice regarding handwashing

S.No	Variables	Urban		Rural	
		Pre intervention	Post intervention	Pre intervention	Post intervention
1	Before and after eating	74%	89%	55%	73%
2	After using washroom	87%	94%	64.5%	76%
3	Wash hands more than 7 times	65.5%	84.5%	46%	78%
4	Wash hand more than 30 sec	78%	89.5%	66%	74.5%
5	Use of soap for hand washing	89%	95%	68%	79%
6	Use of towel after hand washing	72%	91%	44.5%	69%

Discussion

The present study focussed on enabling school children for handwashing with correct technique and minimal waste of water. The installation of tippy tap was done which ensured low wastage of water.

Study in Elementary School in Mongolia by Enkhbat M [11] et al found the knowledge and practice regarding handwashing was low and owed it to unavailability of water and soap.

Similar findings were seen by Berhanu[12]et al in Ethiopia which found that the knowledge and practice about handwashing was low and increases with presence of washing facilities. Low availability of water was also seen as constraints for proper technique for handwashing. Dekate P[13] et al found that urban schoolchildren had better knowledge regarding handwashing than rural children. The present study found increase in handwashing before and after meals post intervention as compared to that found in preintervention. The change was seen in both rural and urban schools. The change can be due to installation of tippy tap which ensured availability of running water making it convenient for students to wash their hands. Students in Urban schools had more knowledge regarding handwashing than students in rural schools, knowledge increased in both population after the intervention. In study by Shukla et al[14] in Karnataka India, showed increase in handwashing in children after installation of tippy tap in anganwadi centre.

Challenges related to practice must be sought and addressed. Implementing the principles of Primary Health Care, use of Appropriate Technology can prove to be helpful.

Conclusion

Schoolsmay have challenges and financial constraints. Simple and fun methods just like tippy tap to improve facilities with the simple resource easily available at all level will increase the practice of handwashing among the students. As we strive towards SDG goal 6 Clean Water and Sanitation, a small change can help make a big difference.

Recommendation

A simple intervention just like handwashing can prevent many diseases transmission specially in Children. Basic disease prevention methods should be taught to school faculties and implementation should be centrally monitored. Tippy Tap is an incredibly good example of community involvement and appropriate technology in disease prevention intervention at a very less expenses. Tippy Tap can also be installed in all those areas where proper facilities are not provided yet or sustainability of fix structures are not possible.

Ethical Clearance: Signed Declaration of Helsinki was provided by all authors.

Conflict of Interest: No conflict of interest was present in this study

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Reference

1. Pradhan MR, Mondal S. Pattern.Predictors and clustering of handwashing practices in India. J Infect Prev. 2021 May;22(3):102-109. doi: 10.1177/1757177420973754. Epub 2020 Dec 4. PMID: 34239608; PMCID: PMC8113672.

2. Voss, A., WidmerA. F. (1997). No Time for Handwashing!? Handwashing Versus Alcoholic Rub: Can We Afford 100% Compliance? Infection control and hospital epidemiology, 18(3), 205-208. https://doi.org/10.2307/30141985.
3. Mathur P. Hand hygiene: back to the basics of infection control. Indian J Med Res. 2011 Nov;134(5):611-20. doi: 10.4103/0971-5916.90985. PMID: 22199099; PMCID: PMC3249958.
4. Ejemot RI, Ehiri JE, Meremikwu MM, Critchley JA. Hand washing for preventing diarrhoea.Cochrane Database Syst Rev. 2008;1:CD004265.
5. Aiello AE, Coulborn RM, Perez V, Larson EL. Effect of hand hygiene on infectious disease risk in the community setting: a meta-analysis.Am J Public Health. 2008;98(8):1372-81.
6. Huang DB, Zhou J. Effect of intensive handwashing in the prevention of diarrhoeal illness among patients with AIDS: a randomized controlled study. J Med Microbiol. 2007;56(5):659-63.
7. Rabie T and Curtis V. Handwashing and risk of respiratory infections: a quantitative systematic review.Trop Med Int Health. 2006 Mar;11(3):258-67.
8. Freeman MC, Stocks ME, Cumming O, Jeandron A, Higgins JPT, Wolf J et al. Hygiene and health: Systematic review of handwashing practices worldwide and update of health effects. Trop Med Int Heal 2014; 19: 906–916.
9. Wang Z, Lapinski M, Quilliam E, Jaykus LA, Fraser A. The effect of hand-hygiene interventions on infectious disease-associated absenteeism in elementary schools: A systematic literature review. Am J Infect Control 2017; 45: 682–689.
10. Mbakaya BC, Kalembo FW, Zgambo M. Use, adoption, and effectiveness of tippy-tap handwashing station in promoting hand hygiene practices in resource-limited settings: a systematic review. BMC Public Health. 2020 Jun 26;20(1):1005. doi: 10.1186/s12889-020-09101-w. PMID: 32586314; PMCID: PMC7316639.
11. Enkhbat M, Togoobaatar G, Erdenee O, Katsumata AT. Handwashing Practice among Elementary Schoolchildren in Urban Setting, Mongolia: A School-Based Cross-Sectional Survey. J Environ Public Health. 2022 Sep 16;2022:3103241. doi: 10.1155/2022/3103241. PMID: 36159758; PMCID: PMC9507677.
12. Berhanu A, Mengistu DA, Temesgen LM, Mulat S, Dirirsa G, Alemu FK, et al. Hand washing practice among public primary school children and associated factors in Harar town, eastern Ethiopia: An institution-based cross-sectional study. Front Public Health. 2022 Nov 3;10:975507. doi: 10.3389/fpubh.2022.975507. PMID: 36408055; PMCID: PMC9670311.
13. Dekate P, Mourya A. To Compare the Knowledge and Attitude towards Hand Washing Technique among School Children in Urban and Rural Area. Int J Sci Res Publ [Internet]. 2017;7(9):59.
14. Shukla, Maurvi. Implementing Innovative and Sustainable Methods to Tackle Grassroot Level Problems at Anganwadi Centers in Virpapura Village, Karnataka (India). Journal of Dental Research and Review 5(4):p 139-144, Oct–Dec 2018. | DOI: 10.4103/jdrr.jdrr_72_18.