Online Journal of Health and Allied Sciences
Peer Reviewed, Open Access, Free Online Journal
Published Quarterly : Mangalore, South India : ISSN 0972-5997
Volume 11, Issue 2; Apr-Jun 2012

Original Article

Minimization of Illness Absenteeism in Primary School Students Using Low-Cost Hygiene Interventions

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Citation
Tambekar DH, Shirsat SD. Minimization of Illness Absenteeism in Primary School Students Using Low-Cost Hygiene Interventions. *Online J Health Allied Scs.* 2012;11(2):7. Available at URL: http://www.ojhas.org/issue42/2012-2-7.htm

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Submitted: Apr 2, 2012; Accepted: Jun 29, 2012; Published: Jul 25, 2012

Abstract: Objective: Safe water and hygiene intervention was evaluated to assess its impact on students' health, hygiene practices and reduction in illness absenteeism in primary school students. **Method:** After evaluatingprimary schools of Amravati district; 50 students with high enteric illness absenteeism were selected for study. Families with problem of in-house water contamination were provided earthen pot with tap for water storage and soap for hand washing at school and home. Household drinking waters (before and after intervention) were analyzed for potability. **Results:** By adopting correct water storage (water container with tap), handling and hand washing practices found to improve health and reduction in 20% illness absenteeism in school. Promoting these interventions and improvement in water-behavioral practices prevented in-house-water contamination. **Conclusion:** These low cost intervention (water storage container with tap) promises to reducing school absenteeism by minimizing risk of transmission of enteric infections by promoting water and student hygiene.

Key Words: Illness-Absenteeism; Intervention; Hygiene; Hand washing

Introduction:

Water-related diseases continue to be one of the major health problems globally, there are several gastrointestinal disorders, such as diarrhea, dysentery, gastroenteritis etc.(1) In developing countries, 80% of the diseases are associated with poor domestic and personal hygiene and about 2.2 million people; mostly children and school students die annually due to diarrhea.(2) The home and school environments are causes for the transmission of infections among young children or aged persons, who are at the greatest risk.(3) School and household lacked safe drinking water leads to high school absenteeism rates among students with poor water quality.(4) Hand washing is one of the hygiene promotion interventions that can interrupt the transmission of diarrhea-causing pathogens.(5) Interventions improve the drinking water quality and hand washing practices are effective in minimizing enteric infections for populations of all age groups including school age children. Appropriate intervention practices can potentially results in reduction of the spread of infection and illness absenteeism. School-based student hygiene education programs can improve behavior in the home and significantly reduce illness absenteeism.(6) The goal of intervention was to improve hygiene; the hand washing, water quality in the home and school and thus minimizing infections among school going children. Consequences of infectious disease in children may have significant economical and social impact beyond the direct effects of the disease on the health of the child; including absenteeism in school, transmission of infectious disease to other pupils, staff, and family members, and loss of working days for parents/guardians.(7) The primary objective of this study was to evaluate impact of low cost interventions; use of water storage container with tap, improvement in hygiene practices, and thus reduction in illness absenteeism in primary school students by minimizing incidence of enteric diseases in children/students. This study may help in developing hygiene improvement programs for school children to reduce illness absenteeism related to enteric disease transmission in primary school students.

Materials and Methods:

Criteria for inclusion: The study was conducted during the academic session 2010-2011 among the students from three primary schools of different taluka viz Chandur Rly, Dhamangaon Rly and Bhatkuli of Amravati district, Maharashtra state.

School's surveys: For the study, primary school students (below 12 years) were selected based on baseline survey of student's previous year data with high rate of illness absenteeism among all primary schools in the particular taluka with prior permission of District Education Officer. The teachers in each of the three primary schools were interviewed regarding the number of students, their attendance in school and functional toilets; drinking water collection, storage and handling practices; hand washing facilities; and availability of soap at the school by using a standard questionnaire at baseline and final evaluation by providing low cost intervention (a water storage container with tap) and soap.

Student's surveys: Students with frequent enteric illness absenteeism mainly due to gastrointestinal illness were selected from these schools by conducting baseline survey. By using a standardized questionnaire the students and their parents were interviewed on water hygiene practices regarding water sources, water storage, hand washing, sanitation, and health information. Proper hand washing training/technique was provided (including six steps: wet hands, rub all hand surfaces completely for 10–15s, rubbing between fingers, cleaning under nails, rinsing, and air dry) and each student washing their hands to assess whether they correctly used the hand washing practices taught to them was observed.

Student absenteeism: From these three primary schools (high illness absenteeism) students' attendance record with the causes of absenteeism were collected and determined and analyzed the impact of project; before and after implementation of the intervention.

Collection and processing of water samples: The 100 drinking water samples before (freshly collected water) and after use (residual/remnant water in container) were collected from households of 50 students (two samples from each family) from water storage container/vessel of the house for detection of fecal contamination or thermo-tolerant coliform (TTC) by Eijkman test. These investigation were performed to provide earthen pot with tap for water storage and soap for hand washing at school and home. Household drinking waters (before and after intervention) were analyzed for potability.

Household surveys: For the baseline household survey, the homes of the 50 selected students were visited and the mother or guardian was interviewed. Drinking water sample (before and after used) from household of individual student was analyzed for bacteriological/fecal contamination. Families with problem of in-house contamination of drinking water were provided with specially designed earthen pot with tap (20L) for water storage and antibacterial soap were distributed free of cost for hand washing, both at school and home for students. A similar procedure for water quality analysis was used for the individual student with in-house water contamination after intervention for follow-up study to assess its effectiveness.

Photo plate 1: A water storage container with tap (A low cost intervention)

The baseline household questionnaire included questions about household demographic and socioeconomic characteristics, water sources, collection, storage, handling and hygiene practices, sanitation, and health information, number of children etc were also been recorded. Observations were also made about water storage vessels, hand washing facilities and latrines, and storage and handling practices of water.

Statistical methods: To find out the probable cause of the illness absenteeism and contamination in drinking water, a questionnaire was recorded, along with information on the respondent's personal and domestic hygiene practices and related data from respective house. The data of baseline and final evaluation were statistically analyzed by using SPSS software (SPSS version 15.0 for window) in relation to absenteeism and overall health of students.

Student absenteeism: To determine whether the project had an impact on student absenteeism, data from weekly absenteeism reports by each of the three project schools were collected before and after implementation of the intervention and analyzed.

Informed consent: For the study written informed consent was obtained from District Education Office and from Head teacher of schools and all participants.

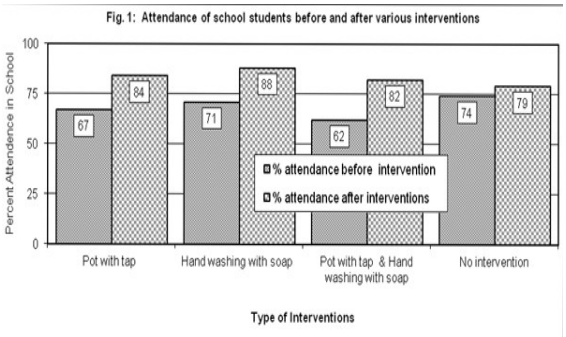
Results and Discussion:

A school-based hygiene intervention was developed and implemented in three taluka of Amravati district with the active participation of members of the target group, with the objective of reducing childhood diarrhea by altering sanitation, personal and food hygiene practices such as the washing hands before handling food and after defecation-related activities, cutting fingernails, proper water storage etc.

The three projected schools were selected because of its high illness absenteeism due to poor hygiene and sanitation conditions. Fifty Students between the ages of 6-12 years from primary schools were targeted for the interventional study. A final survey was conducted using the same questionnaire as for the baseline survey. We included interventions that combine improvements in hand washing practices with other components such as improvements in water quantity, proper storage, sanitation or hygiene.

In a project, the provision for safe storage of drinking water, hand washing facilities and hygiene education in primary schools students in semi-urban Amravati (taluka places) reduced student absenteeism by 17-20%. Hammond *et al* (8) reported 19.8% overall reduction in absenteeism due to infection in the schools under study. Intervention for safe storage of household drinking water by providing earthen pot with tap prevented contamination of drinking water from fecal coliform after eight months of follow-up study. There was 17% increased in attendance of students by both pot and soap intervention. Combination of pot with tap and soap intervention for group of students increased their attendance by 20% (Fig.1). This conclusion was strengthened by the finding that absenteeism in students without any intervention increased by 5% during the same period. The findings are consistent with evaluations of school-based hand hygiene programmes in the United States which showed a reduction in absenteeism following the implementation of use of hand sanitizers, hygiene education, or a combination of these interventions (9) and similar with the findings in the pilot study from Kenya that student absenteeism reduced by 35 %.(10)

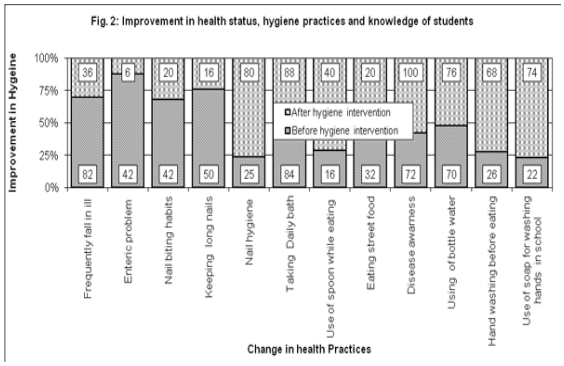
Fig. 1: Attendance of school students before and after various interventions



The likelihood of faecal contamination of the school and home environment is high because many households under study have

open air defecation, unhygienic latrines, inadequate water supplies, poor quality of available water sources, unhygienic storage and handling practices that contaminate stored water, and a lack of hand washing facilities. Besides impacting school attendance, the resulting burden of diarrhoeal diseases has a negative impact on students' growth, nutritional status, physical activities, cognition, concentration, and school performance.(11) Findings of other research studies have suggested that health education on personal hygiene and interventions to prevent disease and have a beneficial impact on the health of students and may be cost effective.(12)

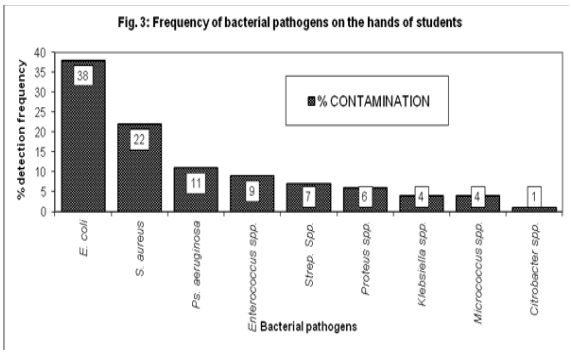
In baseline survey, about 82% students frequently fall ill due to the gastrointestinal diseases but after hygiene intervention, such as use of water storage container with tap and handing washing with tap, it reduced to 36%, which showed that there was significant reduction in disease transmission (Fig. 2). Improvement in hygienic practices of students in school as well as at home helps in minimizing enteric problems from 42% to 6% of these students.



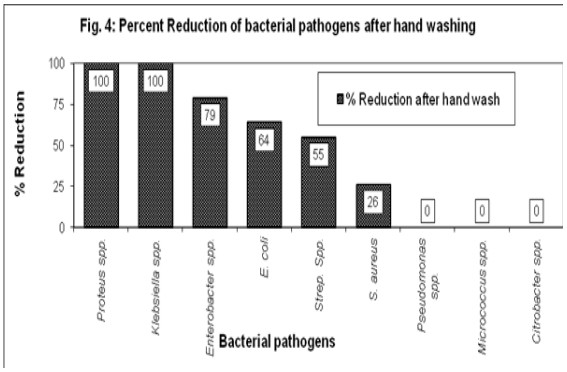
Improvements in hand hygiene resulted in reductions in gastrointestinal illness by 31%.(13) Awareness about hygiene changes behavior of the students that nail biting habit among 42% students remains only in 20% of students after hygiene intervention (Fig. 2). About 50% of the students used to keep long nails before intervention but in final survey it was observed that only 16% of students were with long nail which is the responsible factors for transmission of pathogens (Fig. 2).

After hygiene education and intervention, the maintains of nail hygiene in school students was increased from 25% to 80%, the bathing practices from 84% to 88%, use of spoon from 16% to 40% in mid-day meals which limits the food contamination by contact with dirty hands (Fig. 2). Due to health awareness, consumption of street vended food decreased from 32% to 20%. The study developed the cause of illness awareness among the students. The end evaluation recorded 100% knowledge of spread and prevention of hygiene related diseases mainly gastrointestinal infections, and use of water bottle water after intervention increase from 70% to 76% among the students (Fig. 2). With continued messages, changes in hygiene practices can take place over time.(14) The habit of hand washing before eating in school was increased to 68% and use of soap in school for hand washing at critical time's to74% after hygiene intervention (Fig. 2).

There were a variety of bacterial species found on the hands of the students. Prevalence of bacterial pathogens isolated includes *Escherichia coli*, *Staphylococcus aureus, Pseudomonas* spp*., Enterobacter* spp., *Streptococcus* spp., *Prote us* spp., *Klebsiella* spp., *Micrococcus* spp., and *Citrobacter* spp. (Fig.3). The occurrence of *Staphylococcus* spp.,*Klebsiella pneumoniae, Pseudomonas* spp. on the hands, was reported by Aiello et al.(15) Tambekar and Shirsat (1) observed the incidence of similar organisms on the palm of students.



After hand washing *Proteus* spp., and *Klebsiella* spp. were completely (100%) removed from hands of the students while percent reduction for *Enterobacter* spp., *E. coli*, *Strep.*spp., *S. aureus* were 79%, 64%, 55%, 26% respectively. *Pseudomonas* spp., *Micrococcus* spp., and *Citrobacter* spp. were present even after hand washing (Fig. 4). Similar findings were also reported.(16) These findings support claims that school children are a ready, reachable, and important target for health interventions.(16) Thus they should be strongly encouraged.



Conclusion:

The study suggests that hand washing and proper water storage intervention (a water storage container with tap) could be an effective tool to reduce illness absenteeism in primary school students. The use this simple low cost intervention can improve the health of student, attendance in school, over all hygiene of the family and prevent the family member from illness. Schools as well as parents should consider adopting these practices to reduce days lost to common illnesses. The safe water and hygiene programme described in this paper shows promise for reducing absenteeism by improving the hygiene, and for changing behaviors in the home through raising awareness and knowledge transfer.

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