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Research Paper

Effectiveness of a training program on improving the hand washing among children in primary schools

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Abstract

Background: Hand washing with soap has been viewed as one of the most cost-effective ways of reducing the global infectious disease burden. Proper hand washing technique is easy to learn and can significantly reduce the spread of infectious diseases among children.
Aim: the study was conducted to evaluate the effectiveness of a training program on improving the hand washing among children in primary schools.
Methods: quasi experimental design was used in the study. The data was collected from 450 students, aged 6 to 12 years. The study data were collected by a self-administered questionnaire sheet and observation checklist, the field data was collected in Port Said city elementary schools in six months periods.
Results: The study concluded that there were highly significant statistical differences in total knowledge and practice score of the studied sample after implementation of educational program. Conclusion: Based on the findings of the current study, it is concluded that, the hand washing practices of children in primary schools was improved after the program implementation.

Keywords: *Hand Washing; Training Program; School-Age Children.*

1. Introduction

Hand washing with soap (HW) is important for school-age children in the improvement of health and disease prevention such as diarrhea and gastrointestinal infections, which in turn reduces absenteeism due to illness Chittleborough, et al.(2013). According to World Health Organization estimates from 2008; diarrhea and lower respiratory infections are responsible for killing of primary school-aged children worldwide O'reilly, etal. (2008) and Graves, etal. (2012) .Most diarrhea is caused by bacteria, viruses and protozoa in human feces spread from the stool of one person to the mouth of another. Hands can act as a vector for transmission of fecal pathogens; either via direct person-to-person transmission or by contaminating food that is later consumed Curtis, et al. al. (2011) and Vindigni, et al. al. (2011). Hand washing promotion could also play a role in mitigating pandemic influenza, particularly during the early stages. The practice is significant for schoolchildren Blanton, etal. (2010) and En WL, et al. al. (2011) they might suffer a more severe burden of hygiene-related diseases compared to adults. In addition, the Global Hand Washing Day are focused on transform the theory of hand washing with soap into an automatic behavior at homes, schools and communities worldwide WHO,(2009) and Xuan, etal. (2011). The hands are probably single most important route for transmission of infection at home and community, as they are often indirect contact with in to the-mouth, nose and conjunctiva United Nations Children's Fund Water, Sanitation, Hygiene Annual Report(2009) and Garg, etal. (2013).The The increased burden of communicable diseases among school children due to poor personal hygiene practices and inadequate sanitary conditions remains a concern on the public health agenda in developing country's Global Hand washing Day and Halder, etal.(2010). Hand washing with warm water and soap can greatly reduce the chances of spreading or getting germs when done correctly. The mechanical action of scrubbing loosens up the dirt and microbes on hands and the soap picks up and binds to the microbes so that the water can wash away Luby, etal.(2011) and Pengpid & Peltzer Oyiboand Nicholson, etal.(2014).

1) The aim of this study: was to evaluate the effectiveness of a training program on improving the hand washing among children in primary schools.

2. Subjects and methods

3.1. Research hypotheses

Students receiving a training program on proper hand washing will improve their hand washing practice at school and at home.

3.2. Research design

Design: Quasi-experimental deign was used.

3.3. Setting

This study was carried out at two schools in Port Said governmental primary schools. The Schools are; Kasm Ameen and Ashtoon

3.4. Sample

Port Said consists of four educational districts; Two-stage cluster sample methods were used. At the first stage, two districts were randomly selected and then one school per district (with the highest students' number) was selected as the second stage. Four hundred and fifty students who attending the previously selected schools during the study period at all grades were included.
The sample size was determined by using the single proportion equation as following:

$$n = \frac{Z^2 \times P\,(1-P)}{d^2}$$

Where n = minimum sample size required
Z= 1.96 (corresponds to 95% confidence level)
P= 50 % (proportion with good personal hygienic practices)
(1-P) = q = 50 % (proportion with poor personal hygienic practices)
d = level of precision = 0.05
n = (1.96) 2 (0.50) (0.50) = 384
(0.05) 2
A minimum sample size of 450was obtained using the Fischer's formula for population above ten thousand Araoye, (2003).
Accordingly, the estimated size is 384 subjects. After adjustment for a dropout rate of 15% the sample size will be increased to 450 students
A total study sample were 450 students

3.5. Tools of data collection

Data was collected by three tools, these tools was developed based on the review of related literature. Data was collected by the following two tools:
A Structured Interviewing questionnaire Sheet:
The interviewing sheet consisted of 41 questions and was divided into four parts; socio-demographic characteristics; knowledge about hand washing at school and homes; practices about hand washing at school and homes and observational checklist about proper hand washing practices. Tools consist of two tools.
ToolI –This tool divided into 2 parts;
Part (1) related to socio-demographic data of the studied sample, including biosocial data such as; age, sex, class, father education, mother education, father occupation mother occupation.
Part (2) related to knowledge of studied sample including ; important of hand washing , time of hand washing, factors effecting on health, diseases translation by contaminated of hand washing
Tool2 –This tool observational checklist about proper hand washing practices

3.6. Health educational program

An educational program the intervention was developed in a simple Arabic language.

3.6.1. The objective of the program

The aim of the program was to improve pupils' knowledge and practices related to their hand washing.

3.6.2. The content of the program

An educational program to study group included: knowledge about hand washing as; Importance of hand washing, time of hand washing, factors effecting on health, disease's translation by contaminated of hand washing. Furthermore, the practices related to methods of hand washing and how to apply in the school and home, methods of drying of hand and how to clip the nails.

3.6.3. First phase preparatory or assessment phase

A review of advanced national and international related literature Guideline and available published information using books, articles, magazines, and internet to develop the study tools for data collection.

3.6.4. Validity and reliability

The interview questionnaire sheet was constructed after review of related literature, and revised by five experts in the field to test content validly and applicability. Recommended modifications were done. The questionnaire was compiled in Arabic ,translated into English. Adequately-translated questions were important in this study into Arabic because the first language of most of the study population.

3.6.5. Pilot study

A pilot study was carried out on 10% of the study sample to test tools for clarity, applicability and the time required to filling in the tools.The results of the pilot indicated that some questions were not clear enough, and some to be more concise. Data obtained from the pilot study were analyzed and accordingly the necessary modification on the study tools were done those who participated in the pilot study were excluded from the main study sample.

3.6.6. Implementation of the program

The pupils were divided into 45 groups. Each group, including(10 students small group) and implementation of the program was done for each group separately. The total duration of the program was 24 hours. These were divided into weekly sessions of two hours each. These weekly sessions were conducted for each group a long period of three months. Each group according to their available times and place for attendance which commonly in the morning between 10.00 AM until 12.30 AM, it started. The first session (knowledge) took about one hour. A presentation focus upon the concept of hand washing and a discussion on why and when children should wash their hands, the second session included (practices) took about one hour. This focus on skills methods your hand washing with the soap ,how to clip the nails and care. At the end the end of each session, the researcher ensured the pupils ` understanding of the instructions.

3.6.7. Teaching methods and aids

Different teaching methods as short lecture, group discussion, role playing, demonstration, and re -demonstration were used. Also different audio visual materials were used as pamphlets; hand out, pictures, and posters to facilitate the teaching of each topic. In addition equipment such as soaps, wipes or handkerchiefs, if the classroom without the basin for hand washing, the researchers uses small basin and clean water

3.6.8. Evaluation of the effectiveness of the educational program

The impact of the program was based on the improvement of the pupils` knowledge and practices. This was done immediately after implementation of the program. Then, another one was carried out after six months to evaluate the retention of gaining knowledge and improvement of practices, compared to pre- test.
The questionnaire was filled out by the researchers. collected from the selecting settings by the researchers within seven months, which started from the 28th September 2012 and extended to 30 April2013. This period consumed for data collection was governed by the availability time for both the researcher and the study respondents. The questionnaire was collected from all the pupils for two hours/weekly. Each student explained the purpose of the study and assured them about the confidentiality of all the data they will provide, and that it will be used for research purpose only. The research team members were present all the time. Each student takes30-45 minutes with filling by researcher.

3.7. Ethical consideration

The researchers fulfilled the official steps required to get the approval for carrying out the study from Dean of faculty of Nursing

in Port Said University. And also, permission from managers of schools (mention setting) was taken to carry out the study... A brief explanation of the purpose and importance of the study was-clarified to the student and assured them that obtained information will be confidential and used only the purpose of the study.

3.8. Statistical analysis of the data

Data were fed to the computer and analyzed using IBM SPSS software package version 20.0. Qualitative data were described using number of and percentage. Quantitative data were described using mean and standard deviation for normally distributed data. Discrete scores for knowledge and practice items were summed together and the mean % was calculated by dividing the actual score multiplied by 100 over the maximum score for both knowledge then for practice separately. The score % was categorized into unsatisfactory if client had a score % < 60.0% and satisfactory if more (≥ 60%). Comparison between pre and post program regarding categorical variables was assessed using Mc-Nemar test. Significance test results are quoted as two-tailed probabilities. Significance of the obtained results was judged at the 5% level.Change at the knowledge and practice scores was calculated by subtracting the baseline score from the post intervention one, then mean score change was calculated with 95% confidence interval. Any overlap at the limits of the confidence interval diagnoses non-significant differences between the different characterizes of the students.

3. Results

Table 1: Distribution of Studied Sample According to Their Demographic Data (N = 450)

	No.	%
Age		
<8	36	8.0
8 – 10	228	50.7
>10	186	41.3
Min. – Max.	6.0– 18.0	
Mean ± SD.	10.11 ± 1.43	
Sex		
Male	228	50.7
Female	222	49.3
Father education		
Illiterate	34	7.6
Primary	11	2.4
Preparatory	45	10.0
Secondary	76	16.9
University	185	41.1
Don`t know	99	22.0
Mother education		
Illiterate	47	10.4
Primary	21	4.7
Preparatory	39	8.7
Secondary	68	15.1
University	173	38.4
Don`t know	102	22.7
Father occupation		
Working	419	93.1
Not working	31	6.9
Mother occupation		
Working	206	45.8
Not working	244	54.2

Table (1) the study results revealed that less than one half of the studied school age children were in the age group between 10 – 12 years (41.3%), with a mean age of 10.11 ± 1.43 years. As regard gender, slightly more than one half (50.7%) of the studied school age children were males, while the rest of them were females (49.3%). It is clear from the same table that the heist percentage of their mother and father has university education (38.4%, 41.1% respectively).

As shown from the table (2) there is highly significance between pre and post the program implementation of the studied school children regarding to reported practices of hand washing, in addition to the mother`s practices related hand washing before and after preparing the food.

Table 2: Reported Practices of Hand Washing during the Study Phases

		No		Rarely		Sometimes		Mostly		Always		p
		No.	%	No.	%	No.	%	No.	%	No.	%	
Perform wash hands before and after eating	Pre program	70	15.6	89	19.8	91	20.2	72	16.0	128	28.4	<0.001*
	Post program	25	5.6	25	5.6	81	18.0	76	16.9	243	54.0	
Perform wash hands after going to the bathroom	Pre program	63	14.0	70	15.6	109	24.2	65	14.4	143	31.8	<0.001*
	Post program	17	3.8	28	6.2	82	18.2	67	14.9	256	56.9	
Perform wash hands after sneezing	Pre program	65	14.4	80	17.8	143	31.8	51	11.3	111	24.7	<0.001*
	Post program	23	5.1	29	6.4	89	19.8	80	17.8	229	50.9	
wash hands after fondling animals	Pre program	67	14.9	78	17.3	143	31.8	30	6.7	132	29.3	<0.001*
	Post program	34	7.6	21	4.7	103	22.9	69	15.3	223	49.6	
wash hands after return home from the school	Pre program	61	13.6	81	18.0	131	29.1	41	9.1	136	30.2	<0.001*
	Post program	16	3.6	35	7.8	87	19.3	59	13.1	253	56.2	
wash hands after visiting a sick person	Pre program	80	17.8	92	20.4	118	26.2	27	6.0	133	29.6	<0.001*
	Post program	12	2.7	33	7.3	105	23.3	72	16.0	228	50.7	
wash hands with warm water	Pre program	72	16.0	98	21.8	160	35.6	42	9.3	78	17.3	<0.001*
	Post program	21	4.7	55	12.2	149	33.1	59	13.1	166	36.9	
wash hands with soap or disinfectant	Pre program	51	11.3	75	16.7	131	29.1	38	8.4	155	34.4	<0.001*
	Post program	10	2.2	24	5.3	83	18.4	60	13.3	273	60.7	
wash hands with soap after picking up something from the ground	Pre program	63	14.0	69	15.3	150	33.3	34	7.6	134	29.8	<0.001*
	Post program	9	2.0	21	4.7	125	27.8	42	9.3	253	56.2	
The mother wash her hands before and after preparing food	Pre program	48	10.7	62	13.8	111	24.7	55	12.2	174	38.7	<0.001*
	Post program	31	6.9	10	2.2	100	22.2	53	11.8	256	56.9	

P: Mac-Nemar test for related samples
*: Statistically significant at p ≤ 0.05

Table 3: Distribution of Studied Sample According to the Availability of Sinks, Warm Water, Dry or Liquid Soap, Sinks and Source of Water Operate Efficiently, Suitable Ways for Dying at School and Using Towels at Homes.

Items	Pre program		Post program		p
	No	%	No	%	
At school:					
Sufficient sinks and well distributed in the school	97	21.6	118	26.2	0.119
All the sinks with warm water	58	12.9	104	23.1	<0.001*
Dry or liquid soap distributed on the sinks	52	11.6	113	25.1	<0.001*
Sinks and source of water operate efficiently	100	22.2	139	30.9	0.004*
There a suitable ways for drying hands	60	13.3	137	30.4	<0.001*
At home:					
Use personal towel at home	188	41.8	304	67.6	<0.001*
all members of the family use one towel	160	35.6	162	36	0.940
didn't use cotton towel	132	29.3	191	42.4	<0.001*
use paper towels	81	18	136	30.2	<0.001*

P: Mac-Nemar test for related samples
*: Statistically significant at p ≤ 0.05

The table(3) illustrated that there is statistical significance differences between before and after the program implementation of the

studied school children regarding to availability of dry or liquid soap on the sinks, compared to highly statistical significance difference related to suitable ways for drying hands at schools. On the other hands, there is highly significance difference related to using personal towels at homes before and after the program implementation.

Table 4: Barriers of Hand Washing at School and Home as Reported by the Studied Sample

	Pre program		Post program		p
	No.	%	No.	%	
There any obstacles to prevent the hand washing at school					
Yes	162	36.0	159	35.3	0.891
No	288	64.0	291	64.7	
If yes, what are these obstacles					
Little sinks	160	98.8	159	100	0.997
No warm water and towels	2	1.1	0	0.0	
Are there any obstacles to prevent the hand washing at home					
Yes	33	7.3	10	2.2	0.001*
No	417	92.7	440	97.8	
If yes, what are these obstacles					
No water	33	100	10	100	-

P: Mac-Nemar test for related samples
*: Statistically significant at $p \leq 0.05$

The table (4) clarified that about two thirds of the students mentioned that there are no barriers of washing their hands at schools before and after the program implementation (64.0% and 64.7%) respectively.

Table 5: Distribution of Studied Sampling According to Observed Practice of Hand Washing

Hand washing practice	Pre program		Post program		p
	No	%	No	%	
Standing far from the sink	267	59.3	407	90.4	<0.001*
Remove rings and watch	326	72.1	394	87.6	<0.001*
Bare the clothes to the elbow	330	73.3	414	92.0	<0.001*
Open the source of water and chick it	360	80.0	415	92.2	<0.001*
Put hands in the sink	331	73.6	428	95.1	<0.001*
Put liquid soap in hands	326	72.4	422	93.8	<0.001*
Move the soap between fingers and hands	235	52.2	412	91.6	<0.001*
Rubbing when washing hands , fingers and wrists	183	40.7	392	87.1	<0.001*
Put the soles of the right hand on the left	160	35.6	409	90.9	<0.001*
Friction fingers interlaced	152	33.8	398	88.4	<0.001*
Rub rotation backward and forward	169	37.6	405	90.0	<0.001*
Clean between fingernails one by one	191	42.4	403	89.6	<0.001*
Rinse hands under running water	268	59.6	434	96.4	<0.001*
Drying hands	167	37.1	389	86.4	<0.001*
Turn off the source of water using a clean paper towel	148	32.9	404	89.8	<0.001*
Dispose the paper towel in the waste container	190	42.2	410	91.1	<0.001*

P: Mac-Nemar test for related samples
*: Statistically significant at $p \leq 0.05$

As shown from the table 5 there is highly significance between before and after the program implementation of the studied school children regarding to observed practice of hand washing.

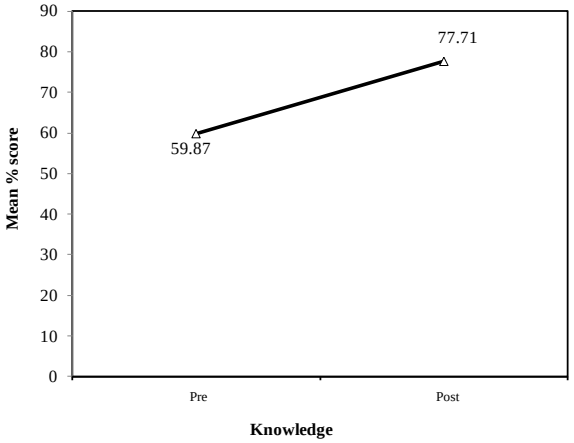

Fig. 1: Knowledge of Studied Children Per and Post Program

This figure (1) illustrate that 59.37% of the studied children have knowledge about hand washing before the program implementation, while this percentage was improved to 78.15% after the program.

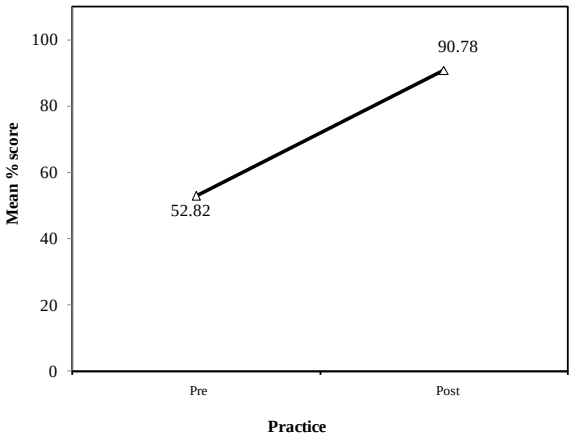

Fig. 2: Practice of Studied Children Per and Post Program

The present figure (2) clears that more than one half of the studied practiced hand washing before the program implementation while the percentage was increased to 91.33% of them after the program.

4. Discussion

Hygienic behaviors can play an important role in the prevention of diseases related to water and sanitation. Hand washing with soap and water are an excellent component of a hand hygiene programto reduce the risk of infection through hand contact. Hand washing is a simple and effective measure to prevent transmission of fecal-oral disease and infectious disease among school children Nguyen, (2010). This study demonstrated the low rate of hand washing knowledge among school children and the poor physical environment at school and home that inhibited them from practicing hand washing before the program implementation. These findings were in agreement with Rheinländer, etal. (2012 and Rabbi &Dey,(2013)they found that the high level of knowledge related to basic personal hygiene recorded among the children studied could be attributed to the teaching of hygiene education in primary schools and the majority of the school children have poor physical environment at school and at home.

The present results were congruent with Asiedu, etal. (2011)who reported that; having knowledge about hand washing does not always translate into practice where although the pupils had good knowledge of hand washing practice, inadequate opportunities and lack of sanitation facilities at schools and homes did not allow them to practice the hand washing knowledge they had acquired. In contrary to the present observation, study by UNICEF, (2007)

and Ali,(2008) they found that majority of schools have handed washing facilities, and an appreciable number were found to supply soap for hand washing of children.

The findings of the present study have demonstrated statistically significant improvement in all aspects of knowledge about hand washing throughout the program phases compared to before the program implementation. Onwasigwe, (2002) stated that a marked improvement in knowledge of school children regarding hand washing after a health education program among primary school children in Enugu. Similarly, other researchers Ilika & Obionu, (2002) reported significant improvement in the health knowledge of school children pertaining to personal hygiene after the health education intervention program.

Regarded barriers of hand washing at school and home, the present study revealed that there were barriers of washing hands at schools before and after the program implementation. Vivas, etal. (2010) and Garg, etal.(2013) support these finding, who shown that lack of soap is one of the barriers to hand washing in schools, since most of these schools have neither soap nor appropriate hand washing facilities.

The studied school children mentioned that they did hand washing practices more commonly before and after eating, also after (visiting a bathroom, sneezing, fondling animals, return to home, visiting the sick people, picking up object from the ground) after the program implementation. While the hand washing practices rate was similar for boys and girls after the program implementation. Similar findings concerning student`s hand washing practices were revealed by Biran etal. (2012)who found that (hand washing in six situations such as after using the toilet, before and after eating, entering the home, cleaning the house, and after sneezing/coughing increases after education.

The observation being held in the present study indicated that the steps of the procedures of hand washing were not accurately followed before the program implementation. These results could be related to lack of the children`s knowledge about hand washing .In addition, they not attended any educational session about hand washing. The finding of this study was congruent with Dongre, etal. (2006) Banda etal.(2007) and Setyautami, et al .(2011al.(2011) who found that the hands washing behaviors (observed) are poor in both private and public school.

5. Conclusion

Based on the findings of the current study, it is concluded that, the hand washing practices of children in primary schools was improved after the program implementation.

6. Recommendations

Based on findings in this study, proper hand washing can be implemented by using various creative ideas for health promotion at schools such as reminders, cues and motivators for proper hand washing in many places within the schools. The facilities related to proper hand washing such as clean water, soap and hand washing stands should be more available in certain places in schools such as in the classroom, canteen and toilets, to enable and encourage students to wash their hands properly at any time, so that it will may be easy for teachers to act as role models in promoting proper hand washing at schools. Posters to remind students to wash their hands should be hung upon the wall above hand sinks. Educational and training to promote hand washing should be routinely done each year for each grade.

7. Footnotes

Declaration of Interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

Authors' contributions

Maha Moussa, conceived the study idea, designed the study protocol, reviewed the literature search results and collect the data, conducted the critical appraisal of the studies and drafted the manuscript.

Nabila Abdella, developed the search strategies, conducted the searches, conducted the critical appraisal of the studies and prepared the final manuscript for publication.

Nagwa Rizk, write reviewed the literature, assisted in designing the review methodology and search results and helped to modify the manuscript and finalized

Rehab Elkazaz, write reviewed the literature and search results, interpretation of data and helped to modify the manuscript and finalized

All authors read and approved the final manuscript.

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