

A convergence study on handwashing awareness and practices among middle school students

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일개 중학교 학생들의 손씻기 인식 및 실천에 관한 융합적 연구

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Abstract This descriptive research aimed to get the effects of handwashing awareness and practices among 294 students in J middle school, using revised tool developed by Korean CDC(2005). As a result of analyzing data using SPSS/Win 23.0, 42.9% of the subjects experienced common cold within the last 6 months, the scores of handwashing awareness was 3.47 out of 4, and the scores of handwashing practices at home and school was 3.36 and 3.35 each. 39.1% wash hands for 4~6times a day, average handwashing time was 11~15 seconds and 47.0% of the subjects who did not wash their hands due to not having a habit of handwashing. The explanation rate of handwashing awareness on practice was 23.2%, handwashing awareness had a significant effect on practices($p=.001$). This study suggests the necessity of strengthening handwashing practices by educating handwashing awareness in order to prevent infectious diseases.

Key Words : Middle School, Middle school students, Handwashing awareness, Handwashing practices, Convergence

요 약 본 연구는 중학생의 손씻기 인식이 실천에 미치는 영향을 조사하기 위하여, J 중학교 학생 294명을 대상으로 한 서술적 조사연구로, 질병관리본부(2005)의 도구를 수정하여 사용하였다. 수집된 자료의 SPSS Win 23.0 분석결과, 최근 6개월간 질병경험으로 감기가 42.9%으로 가장 많았고, 손씻기 인식의 평균은 4점 만점에 3.47점, 가정과 학교에서의 손씻기 실천 평균은 각각 3.36, 3.35점이었다. 일일 손씻기 횟수는 4~6회가 39.1%, 손씻기 평균시간은 11~15초 및 47.0%가 습관이 되지 않아 손을 씻지 않는다고 응답하였다. 손씻기 인식의 실천에 대한 설명력은 23.2%로, 손씻기 인식이 실천에 유의한 영향을 미치는 것으로 나타났다($p=.001$). 본 연구결과는 감염병예방을 위해 손씻기 인식에 대한 교육으로 손씻기 실천강화의 필요성을 시사한다.

주제어 : 중학교, 중학생, 손씻기 인식, 손씻기 실천, 융합

1. Introduction

1.1 Importance of the study

During the middle school period, most of the time is

spent at school activities and there is a high possibility of contamination of the hands by continuous activities and the possibility of cross infection[1]. Students are required to take essential health-promoting behaviors

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Received April 03, 2018

Accepted April 20, 2018

Revised April 11, 2018

Published April 30, 2018

because they may experience potential health problems due to insufficient nutrition and various kinds of stress as well as lack of sleep during school and after school activities with almost no rest, but it has not been taken in action properly[2]. Maintaining personal hygiene of handwashing is the most important in managing infectious diseases, to prevent the spread of colds that are easily infected through coughs or nasal discharge[3-4].

Koreans perceived handwashing as helping factor to prevent diseases, but actual practice rate was low. The reason for this was revealed to be either annoying or habitual[4]. According to the 'Handwashing awareness and practice' survey conducted by CDC, handwashing awareness increased from 77.6% in 2005 to 84% in 2011, handwashing practice increased from 63.2% in 2006 to 66.7% in 2013, awareness and practice rate of handwashing is increasing every year. the average handwashing rates 8.5 times and they are washing hands for 6 to 10seconds every time[5].

Despite the increasing awareness and practice rate of handwashing, the incidence rate per 100,000 persons, infectious diseases surveyed by the CDC continues to increase from 101.3 in 2012 to 143.3 in 2013, 181.0 in 2014, 185.7 in 2015 and 201.5 in 2016[6]. The most common infectious diseases among elementary, middle and high school students were flu and influenza, resulting in about 39students per 1,000 students, followed by chicken pox(4.59), mumps(3.79), conjunctivitis(3.69), meningitis(0.34) and pneumonia(0.33)[3].

Handwashing is an act of rubbing the surface of hands repeatedly in running water[2]. It is necessary to try to prevent infection because the hand contacts pathogen firstly more than any part of the body[1,7]. In addition, health habits formed during middle school students are highly likely to lead to adulthood, therefore, it is necessary to educate effective handwashing to prevent infectious diseases among students and to maintain and promote health throughout the life cycle[2].

As a result of continuous study and sponsorship of handwashing at the national level, the incidence of

various infectious diseases related to handwashing has been increasing although the rate of handwashing awareness and practice has increased. There are not many studies on handwashing among middle school students, but they are limited to some areas and rarely targeted to rural areas.

Therefore, this study was conducted to investigate the awareness and practice of handwashing among middle school students in a rural area, and to provide basic data on the development of an effective handwashing education program as an intervention for prevention of infectious diseases.

1.2 Purpose of the study

The purposes of this study are as follows:

- 1) Find out the degree of handwashing awareness and practice according to general characteristics of the subjects.
- 2) Investigating the relationship between handwashing awareness and practice.
- 3) Identifying the effects of handwashing awareness on practice.

2. Methods

2.1 Design

This is a descriptive research to identify handwashing awareness and practice of middle school students, correlation between these variables and factors affecting handwashing practice.

2.2 Participants

The subjects of this study were the students from grade 1 to grade 3 who were in J junior school in J gun, and agreed to the purpose of this study and accepted the participation. The number of subjects was determined by using the G-power 3.1 program. Out of the 299 respondents who responded to the questionnaire, 294 questionnaires were analyzed except 5 of them that were written incorrectly or insufficiently.

2.3 Equipments of the study

The equipment of this study was a questionnaire composed of 4 points Likert scale and multiple choices. It was developed by CDC, revised and supplemented by Park Dae Kwon(2008)which included 5 items of general characteristics[9] , 11 items of handwashing awareness, 18 items of handwashing practice, 6 items of handwashing educational experience and 4 items of school facilities. The Cronbach's α of handwashing awareness and handwashing practice were .919 and .865 each in Park's study(2008)[9], and .919 and .824 each in this study.

2.4 Data gathering

This study was conducted from 2017 August 28 to September 1. Researcher visited the school and explained the purpose, aim and procedure of the study to the subjects. After the explanations were sufficiently made that the subject could withdraw his/her consent to participate in the study at any time during the course of the research, the subjects recorded the questionnaire directly, and the questionnaire was retrieved and given a gift in return for responding to the questionnaire.

2.5 Data Analysis method

Using SPSS/WIN 23.0, general characteristics and rate of handwashing awareness and practice were calculated by descriptive statistics. The differences in awareness and practice according to the general characteristics were analyzed by t-test, chi-square test and ANOVA. The relationship between handwashing awareness and practice was analyzed using Pearson's Correlation Coefficient. And the effects of handwashing awareness on practices were analyzed by simple linear regression.

2.6 Ethical considerations

This study was conducted following the approval of the Institutional Review Board(IRB) of C University(No. CIRB-2017-07-10). The questionnaire was designed including the introduction and purposes

of study, the explanation of the contents and participation agreement to take the ethical aspects of the study into consideration. The subjects were asked to confirm the contents of the study participation agreement with signature and fill out the questionnaire and the collected data were used only for research purpose as it was written in the agreement.

3. Results

3.1 General characteristics

Table 1 shows, among the 294 subjects, 149(50.7%) were male, 134(45.6%) were in third grade and 161(54.8%) were living in residence, the economic level was the highest among 257(87.4%) in the middle level and common cold 126(42.9%) was the most common disease experience within the last 6 months.

Table 1. General Characteristics of Subject

(N=294)

Characteristics	Division		N(%)
	Female	Male	
Sex			149(50.7)
			145(49.3)
Grade	1		32(10.9)
	2		128(43.5)
	3		134(45.6)
			134(45.6)
Type of residence	Apartment		133(45.2)
	House		161(54.8)
Economic status	High		28(9.5)
	Medium		257(87.4)
	Low		9(3.1)
Disease experiences	Common cold		126(42.9)
	Common cold and food poisoning		1(0.3)
	Common cold and eye disease		2(0.7)
	Food poisoning		2(0.7)
	Eye disease		3(1.0)
Total	None		160(54.4)
			294(100.0)

3.2 Handwashing awareness

The Table 2 shows that handwashing awareness of the subjects was 3.47 out of 4 points. Among them, 'washing hands before cooking is effective in preventing infectious diseases' was the highest with 3.57 points and 'should dry hands completely after

washing' was the lowest with 3.15 points.

Table 2. Handwashing awareness of Subjects (N=294)

Division	M±SD
Awareness	3.47±0.05
1. Handwashing is effective in preventing diseases	3.49±0.55
2. Handwashing after using toilet is effective in preventing diseases	3.56±0.53
3. Handwashing before cooking is effective in preventing infectious diseases	3.57±0.52
4. Frequent handwashing is effective in removing microbes from hands	3.51±0.55
5. Handwashing after touching coins or bills is effective in removing bacteria/virus stained with money	3.47±0.60
6. Frequent handwashing is effective in preventing infectious diseases	3.52±0.54
7. Should wash hands with soap or detergent	3.41±0.56
8. Should wash hands after rubbing nose, coughing or sneezing	3.37±0.60
9. Should dry hands completely after washing	3.15±0.68
10. Should wash hands after contact with pets	3.56±0.54
11. Should wash hands in flowing water	3.51±0.57

3.3 Handwashing practices contents

Table 3 shows the contents of handwashing practices of the subjects. 247 subjects use towel at home and 173 use dryer to dry hand after washing at school. Among the number of handwashing per day 4~6 times a day was the highest 115. Among them 143 use soap to wash hands for 'less than 3 times a day' was the highest. The average time for handwashing for '6~10 seconds' was the highest 125. Among the 17 students who answered their reasons for not washing their hands 'don't have habit' 47.0% was the highest.

Table 3. Contents of study on subject's handwashing (N=294)

Characteristics		Division	N (%)
Methods to dry after handwashing	Home	Wipe with towel	247(84.0)
		Wipe with tissue paper	4(1.4)
		Dry with hand dryer	9(3.1)
		Use nothing (Just dries)	15(5.0)
		others	19(6.5)
	School	Wipe with towel	13(4.4)
		Wipe with tissue paper	86(29.3)
		Dry with hand dryer	173(58.8)
		Use nothing (Just dries)	22(7.5)
		Others	0(0.0)

Handwashing contents	Number of handwashing	Less than 3 times	48(16.3)
		4~6 times	115(39.1)
		7~10 times	102(34.7)
		More than 11	29(9.9)
	Number of handwashing by soap	0 time	39(13.3)
		Less than 3	143(48.6)
		4~6 times	80(27.2)
		7~10 times	24(8.2)
	Time of handwashing	More than 11	8(2.7)
		1~5 seconds	54(18.4)
		6~10 seconds	125(42.5)
		11~15 seconds	71(24.1)
		16~20 seconds	25(8.5)
	Reason for not washing hands *	More than 21 seconds	19(6.5)
		It's annoying	6(35.3)
Don't have soap		2(11.8)	
No place to wash		1(5.9)	
	Don't have habit	8(47.0)	
*N=17			

3.4 Handwashing practices

Table 4 shows that the average handwashing practices at home were 3.36 out of 4, and at school was 3.35. Among the practices at home 'wash my hands before cooking food' was the highest by 3.67 and 'wash hands after touching coins or paper money' was the lowest by 2.88. Among the practices at school, 'washing hands after using toilet' was the highest with 3.71 and 'washing hands after outdoor classes such as physical education' was the lowest with 2.80.

Table 4. Handwashing practices of Subjects (N=294)

Division	M±SD
Handwashing practice at home	3.36±0.11
1. before meal	3.40±0.61
2. before cooking	3.67±0.52
3. after using toilet	3.65±0.51
4. after contact with pets	3.54±0.64
5. after touching coins or bills	2.88±0.84
6. after rubbing nose, coughing or sneezing	3.09±0.74
7. Wash hands using soap	3.28±0.72
8. Wash hands after getting home from outside	3.38±0.73
Handwashing practices at school	3.35±0.15
9. before lunch	3.66±0.57
10. after using toilet	3.71±0.51
11. Wash hands with soap after using toilet (if there is soap)	3.22±0.81
12. after outdoor classes such as physical education	2.80±0.79

3.5 Characteristics related to handwashing practices

Table 5 shows the characteristics related to the handwashing practices. In the school, there were 170 subjects who did not have education experience of handwashing practices, 124 subjects had. Among the subjects who had education experience 47 had education experience twice a year which was the highest. 55 subjects had education experiences for 'more than 30minutes to less than 1 hour' followed by 'lecture' as a educational method 51. 192 subjects answered handwashing is necessary and 39 subjects answered it is 'absolutely necessary'.

In the improvement of the contents of education 95 subjects answered 'educate consistently' In the survey on the school facilities, number of subjects who answered 'not available sometime' was the highest 133. In case of hand dryer or paper towel majority of subjects 123 answered 'never available'. About 130 subjects answered 'not enough' about the handwashing environment in school restrooms. The number of subjects who responded to 'fit soap and hand detergent' in order to revitalize their handwashing was the highest with 128.

Table 5. Characteristics of Subjects related to handwashing practice

Characteristics		Division	N(%)
Education contents	Educational experience	Yes	124(42.2)
		No	170(57.8)
	Number of Education*	1	15(12.1)
		2	47(37.9)
		3	44(25.5)
		more than 4 times	18(14.50)
	Education time*	less than 10 minutes	32(25.8)
		Less than 10~30 minutes	30(24.3)
		More than 30 minutes~ less than 1 hour	55(44.3)
		More than 1 hour	7(5.6)
	Education Method*	Lecture	51(41.1)
		Audio-visual materials (video etc)	30(24.2)
		Training	7(5.6)
		Handouts such as home correspondence	33(26.7)
		others	3(2.4)
	Necessity of Education	Not necessary at all	11(3.7)
		Not necessary	52(17.7)
		Necessary	192(65.3)
	Educational	Absolutely necessary	39(13.3)
Educate consistently		95(32.3)	

Improvement	Show specifically(use videos)	73(24.8)	
	Explain in detail about methods of handwashing	48(16.4)	
	Change to the new contents	78(26.5)	
Availability of soap or detergent	Never available	120(40.8)	
	Not available	17(5.8)	
	Available sometimes	133(45.2)	
Availability of hand dryer or paper towels	Always available	24(8.2)	
	Never available	123(41.8)	
	Not available	100(34.0)	
School restroom facilities	Available sometimes	53(18.1)	
	Always available	18(6.1)	
	Restroom environment for handwashing	Not well equipped at all	65(22.1)
	Not well equipped	130(44.2)	
School restroom improvement	Well equipped	88(29.9)	
	Very well equipped	11(3.8)	
	Fit soap and detergent	128(43.5)	
School restroom improvement	Wash sink repair and improvement	49(16.7)	
	Fit hand dryer	71(24.2)	
	Fit water heater	46(15.6)	

*N=124

3.6 Differences in handwashing awareness and practices according to general characteristics

Table 6 shows, there was no significant difference in handwashing awareness according to gender, economic level, grade and educational experience. There was significant differences in handwashing practice at home and school according to the grade ; the third grade was higher than the second grade and the second grade was higher than the first grade($F=4.333, p=.014$),($F=5.932, p=.003$). In addition, the degree of handwashing practices at home was significantly higher in subjects who had handwashing education experience($t=2.387, p=.018$).

3.7 Correlation between handwashing awareness and practices

Table 7 shows, there was a positive correlation between handwashing awareness and practice at home and at school($p<.01$). This means higher the handwashing awareness, higher the hand washing practices at home and at school.

3.8 Effect of handwashing awareness on handwashing practices

Table 8 shows, regression equation expressed

Table 6. Differences in handwashing awareness and practices according to general characteristics

(N=294)

Characteristics	Division	Awareness	F/t(p)	Practice			
		M±SD		Home(M±SD)	F/t(p)	School(M±SD)	F/t(p)
Sex	Male	38.11±4.77	.017(.896)	26.89±3.90	.089 (.929)	13.82±1.83	1.947(.164)
	Female	38.14±4.48		26.85±3.31		13.53±1.78	
Grade	1 ^a	37.34±4.34	.534(.587)	25.37±3.19	4.333(.014) c>b,b>a	13.50±1.88	5.932(.003) c>b
	2 ^b	38.15±4.66		26.71±3.47		13.32±1.95	
	3 ^c	38.28±4.66		27.39±3.75		14.07±1.58	
Economic level	High	39.21±4.57	.914(.402)	27.75±3.93	.972(.380)	13.89±1.89	.222(.801)
	Medium	38.02±4.61		26.79±3.56		13.65±1.80	
	Low	37.63±5.63		26.37±4.37		13.62±2.13	
Educational Experience	Yes ^a	38.49±4.65	1.003(.317)	27.30±3.65	2.387(.018) a>b	13.90±1.90	1.845(.067)
	No ^b	37.65±4.91		25.74±3.82		13.28±1.97	

*p<0.05

handwashing practice = 20.802 + 0.518* and the explanation rate of handwashing awareness on practice was 23.2%. Finally, handwashing awareness has significant effect on handwashing practices(p<.001).

Table 7. Correlation between Subjects' handwashing awareness and practices

(N=294)

	Handwashing awareness	Handwashing practice at home	Handwashing practice at school
Handwashing practice at home	.473**	1	
Handwashing practice at school	.377**	.614**	1

**p<.01

Table 8. Effect of handwashing awareness on handwashing practice

(N=294)

Independent variable	B	S.E.	β	t	Adj R ²	F (p)
Constant	20.802	2.100		9.905	0.232	89.746 (0.001)
Handwashing awareness	0.518	0.055	0.485	9.473		

4. Discussion

This study was conducted to investigate the handwashing awareness and practices to get basic data of effective handwashing education program. In this study, 42.9%of subjects reported that they had colds within the last 6 months which was similar with the

study of students from 11years to 18years[9]. In addition, the result was similar with the results of school infectious disease monitoring that showed the prevalence of colds among middle school students was higher52.9% than other infectious diseases[3].

The average scores of handwashing awareness of subjects was 3.47 out of 4. Among the questions about handwashing awareness 'handwashing before cooking is most effective in preventing infectious diseases' gets the highest mark and 'should dry completely after washing hands' gets the lowest mark, this suggests the need to educate that residual water can become the source of infections after washing hands.

This study, showed the scores of 'handwashing is effective in preventing infectious disease' was 3.49 out of 4 which is relatively lower and this result was similar to the result of the study that shows 4.4 out of 5. In addition the result was similar to the result of the study, in which 87.0% of the respondents were aware of the fact that handwashing is helpful in preventing diseases[10,11].

The result of this study shows high score in 'before cooking' and lower was 'after touching coin or paper money' at home which was similar to the 'yearly handwashing survey'[3], this indicates generally the practice of handwashing before cooking was high among all the citizens. The result of this study showed that 'washing hands after using toilet' was the highest in the handwashing practice at school, which is similar with the results of the study done among youths[2]. On

the other hand, the practice of handwashing after school physical activities showed the lowest rate of handwashing practice which was similar to the result of the study among all citizens[12]. This suggests it is necessary to educate the necessity of handwashing practice after physical activity.

In this study, it was found that hand towels were used most often at home, followed by hand dryers at school. The result of this study was similar to the result of the studies done among middle school students[2], among elementary, middle and high school students and also the result of the study among elementary school students where 61.7% of the total students use towel to dry hand at home[10,13]. However, in this study, 7.5% of the students answered that they just dry up hand without using hand dryer although it is available. This is similar with the result of in which 56.3% of the students just dry up or wiped in clothes to dry hand after washing[7], it is necessary to educate the importance of a more desirable attitude in the process of drying after handwashing[14].

In this study, 4~6 times of handwashing was the most frequent, which was similar to the study of adolescents and elementary, middle and high school students[2,10]. In the study among late school-aged children, 62% performed handwashing 8 times a day after handwashing training, showed that the number of handwashing could be increased through education. There is a need for intervention studies on the possibility of increasing the number of handwashing, emphasizing handwashing for middle school students[15]. And, the average time of handwashing was 6~10 seconds in this study, which was similar to the result of the study among youths and citizens[2,4]. However, there was an desirable encouraging result in the study of elementary, middle and high school students, who had washed their hands for 21 seconds or more[2,10]. The result is different with the result of this study and suggests the necessity of education about handwashing time.

In this study, among the 17 students who answered

the reasons for not washing their hands 47.1% answered 'don't have a habit', most of the students in the related studies responded that handwashing is troublesome and not habitual, suggesting the necessity of handwashing practice and teach the importance of handwashing [10,11,13] In this study, majority of the students 57.8% did not receive handwashing training at school, the result was more likely to the study of youth which showed 47.2% of the students who did not receive handwashing training at school, and also similar with this study among high school students, that showed 70.2% of students did not have handwashing education experience[2,8]. In this study, among the subjects who had experience of handwashing training, the number of education experience was the highest at 2times which was similar to the result of high school students although the result was higher than the results of the studies among youths, and whole citizen which showed the number of times of education once a year as the highest, it suggests that handwashing training is still needed to increase the number of handwashing[2,8,9].

In this study, the subjects who received handwashing training for more than 30 minutes~ less than 1 hour was the highest which was similar to the study result of all citizen, but was different from the result of the study among youths where handwashing education for less than 10 minutes was the highest[3]. So, it is necessary to review the training time of handwashing among students. Among different methods of education, most of the students had education through lecture which was similar to the result of the study among all citizens. But it was different from the result of the study among adolescents and high school students in which most students had educational experience through audiovisual media[2,8]. From the result of this study it can be concluded that the use of various handwashing training methods in rural areas is low and the improvement is necessary.

This study shows, 65.3% of the respondents said

that they need handwashing training at school which was similar to the result of study among adolescents among all citizens where 93.1% of the respondents answered they need handwashing training[2,9].

In this study, 32.3% of the subjects answered that they would like to be educated constantly in the improvement of education contents, which is similar to the result of the study among adolescents and elementary, middle and high school students, it seems that the subjects actually feel the need for continuous handwashing education[2,10,15]. At school facilities, 45.2% of the respondents said that sometimes there was no soap or detergent in the bathroom, and 41.8% answered that they did not have a paper towel at all times, this is similar with the results of a study that showed about 50% of the surveyed facilities related to school handwashing were not enough[2,8]. Therefore, it is necessary to support the handwashing because there are many people who mention that the school lacks the necessary equipment and facilities for handwashing and needs to be supplemented.

According to general characteristics, there was a significant difference in handwashing practice according to the grade at both home and at school($p=.014$, $p=.003$). There is no study on the handwashing practice at home, so it cannot be directly compared, these results suggest that school education on the importance of handwashing practice influence the handwashing practice at home.

Although, there are no studies on handwashing practice at home and school separately, the result is similar to the result of study among elementary school students that showed higher the grade level[13], higher the practice rate. In this way, the degree of handwashing practice at home and school was significantly higher as the grade increased, suggesting the need to include continuous handwashing training in the school curriculum as the emphasis accumulation of handwashing education experience at school.

This study shows a positive correlation between handwashing awareness and practice at home and at

school($p<.01$). The result was similar to the study of adolescents, and high school students that showed the positive correlation between handwashing awareness and practices. And the explanation rate of handwashing awareness on the handwashing practice was 23.2%($p=.001$), this is a similar result with the study that showed handwashing knowledge as a affecting factor of handwashing practice[2,8,16].

As discussed above, the degree of handwashing practice among middle school students was lower than handwashing awareness, there is a need to be careful about those who lack handwashing awareness and those who have low handwashing practices, people who do not wash their hands do not have a habit of washing their hands, there are some people who answered it's annoying to wash, suggests the need for education. It also indicates that students have little educational experience in handwashing, high educational needs, and need to supplement inadequate school facilities to practice handwashing.

There is a correlation between handwashing awareness and practice, and it is necessary to study how to improve handwashing practice by increasing awareness of handwashing as handwashing awareness has a significant influence on practice.

5. Conclusion and Suggetions

This descriptive research aimed to get the effects of handwashing awareness and practices among 294 students in J middle school, using revised tool developed by Korean CDC(2005). As a result of data, 42.9% of the subjects experienced common cold within the last 6 months, the scores of handwashing awareness was 3.47 out of 4, and the scores of handwashing practices at home and school was 3.36 and 3.35 each. 39.1% wash hands for 4~6times a day, average handwashing time was 11~15 seconds and 47.0% of the subjects who did not wash their hands due to not having a habit of handwashing.

There was significant difference in handwashing practice both at home and school according to the grade. In addition, the degree of handwashing practice was significantly higher in subjects who had handwashing education experience ($p=.018$). There was a positive correlation between handwashing awareness and practice ($p<.01$). And The explanation rate of handwashing awareness on practice was 23.2%, handwashing awareness had a significant effect on practices ($p=.001$). This study suggests the necessity of strengthening handwashing practices by educating handwashing awareness in order to prevent infectious diseases.

These results cannot be generalized as it is done among the students of middle school in one rural area, suggest repeated studies by expanding target area and subjects. And this study suggests the study to test the effect of handwashing education experience of middle school students.

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