The Effects of Adolescents' Perceived Handwashing Attitudes, Health Beliefs, and Internal Control on Handwashing Practices in the COVID-19 Pandemic Situation

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Abstracts:
This study aims to provide basic data for developing a hand washing education program to prevent infection by identifying the factors that affect hand washing practice for high school students who need to establish healthy lifestyles in the COVID-19 outbreak situation.
Data collection was conducted from December 10 to 31, 2020 for 149 in high school students. The collected data were analyzed using the SPSS 20.0 program. As a result, internal control($p<.05$) and hand washing attitude($p<.05$) had a significant effect on dependent variables. the result of this study indicates that the internal control means a tendency to attribute the cause or effect of an action to internal factors, such as ability, attitude, and effort of one's own, educational plans that can increase the hand washing practice rate by cultivating a positive hand washing attitude and improving internal control through education on the importance of personal quarantine should be prepared.

Keywords: Adolescent, Hand Disinfection, COVID 19, internal-External control, Attitude.

1. INTRODUCTION

Recently, the health care environment has experienced various crisis situations caused by infectious diseases, the number of infectious diseases occurring worldwide has increased every year since the 1980s, and the types of new infectious diseases have also increased[1]. The number of legal infectious diseases in Korea was 76,574 cases in 2014, 129,253 cases in 2015, and 135,982 cases in 2016, which has increased every year[2]. In particular, coronavirus disease 2019(COVID-19) was first discovered with an outbreak of unexplained pneumonia in Wuhan, China in December 2019[3], rapidly spreading around the world centering on China, leading to the declaration of a pandemic by the World Health Organization on March 11, 202[4]. In response to this situation, KDCA has recommended thorough compliance with 'hand washing, wearing masks and social distancing, precaution against droplet infection, and precaution against standard infection' in order to prevent the spread of infection[5]. In particular, hand washing, which is important as the basics for personal hygiene and the most basic method for promoting national health as it can block the route of various germs and viruses to the human body through hands, is emphasized in terms of preventing infectious diseases and food pollution due to hand contamination[6]. Looking at the previous researches on hand washing, Larson[7] classified factors that affect hand washing into internal and external factors, and reported that internal factors such as attitudes and perceptions about hand washing are more important than external factors such as lack of hand washing facilities. In the study of Choi Yoo-jeong and Jeong Hye-seon[8], factors affecting hand washing performance were perceived probability, perceived benefits, perceived barriers, and action cues. In addition, the variables that best explain the hand washing behavior were perceived benefits, perceived barriers, career, and action cues, which were found to account for 27.5% of the hand washing behavior. Park Dae-kwon[9] reported that the knowledge, attitude, and practice of hand washing of high school students had an effect on their hand washing behavior. Lifestyles are established relatively early in life, and the formation of good health behaviors and habits during adolescence not only has a great impact on maintaining and promoting the health of adolescent individuals throughout their lives, but also on the health promotion of families and communities in the future. Health promotion in adolescence can be a very important means of achieving the goal of improving national health[10], so proper health education in schools can not only form desirable health behaviors but also maximize its effectiveness. However, lifestyle education in adolescence is not only not recognized for the purpose of education in an educational environment centered on entrance exams, but it is also out of the scope of interest. In order to lead a healthy life through the promotion of hand washing behavior in the infectious disease outbreak situation such as the COVID-19, away from entrance- oriented education, a systematic and appropriate education should be carried out to ensure that individual's changes in perception and behavior on

the importance of hand washing among adolescent students can take place. Although there is an urgent need to develop a hand washing education program for this, studies related to hand washing to date have mainly been investigations on the actual condition of hand washing of nurses in the general ward of internal and surgical departments, or most of the papers have pointed out the shape effect of the hand washing education program on the degree of implementation[11, 12, 13, 14]. In fact, researches on the factors affecting the hand washing practice of high school students in the infectious disease outbreak situation are insufficient. Accordingly, this study aims to provide basic data for developing a hand washing education program to prevent infection by identifying the factors that affect hand washing practice for high school students who need to establish healthy lifestyles in the COVID-19 outbreak situation.

2. MATERIALS AND METHODS

2.1. Study Design

This study is a descriptive survey study for adolescents to understand the impact of their Health beliefs, internal control, and hand washing attitude on the hand washing practice.

2.2. Subjects of Study

The subjects of this study were students who were enrolled in high school located in Gongju city, Chungcheongnam province, and who understood the purpose of the study and agreed to participate in the study. Students who wished to participate with the help of the school teachers were selected as subjects for the survey. As for the determination of the number of samples, when 3 predictors, effect size .15, significance level .05, and power(1-β)95% were applied based on the G*power 3.1.9.2 program, the estimated minimum number of samples was 124, and 149 people were selected as the study subjects, considering 20% dropout rate.

2.3. Study Tools

2.3.1 Hand Washing Practice

It was measured using a tool which Jeong Jin-kyung(2009) developed by referring to the literature, and the subjects' hand washing practice consisted of 8 items of hand washing habits at home, and 5 items of hand washing habits at school. For each item, if hand washing was practiced, 1 point was given, and if it was not, 0 point was done. There was a minimum of 0 to a maximum of 13. The higher the score, the more positive the hand washing practice.

2.3.2 Hand Washing Attitude

It was measured using a tool which Jeong Jin-kyung(2009) developed by referring to the literature, and the hand washing attitude was composed of questions about when hand washing should be performed. For each item, 1 point was given for correct attitude, and 0 point was done for wrong attitude. There was a minimum of 0 to a maximum of 6. The higher the score, the more positive the hand washing attitude.

2.3.3 Health Beliefs

It was measured using a tool which Lee Chul-ho(2015) modified and supplemented with a tool that Im Mi-hee(2013) developed based on a health belief model. A five-point Likert Scale was applied. The higher the score, the higher the health beliefs in hand washing.

2.4. Data Collection Period

The data collection was conducted from December 10, 2020 to December 31, 2020, and was implemented with the permission and assistance of the principal and supervisor. In addition to the contents of research purpose, privacy, confidentiality, data anonymity, and the method of filling out a questionnaire were explained to the subjects who voluntarily agreed to participate in the research through the recruitment announcement on the school bulletin board. A written consent form was filled in only by those who had confirmed voluntary participation, and a certain gift

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was provided in return after completing the questionnaire.

2.5. Data Analysis Method

The collected data were analyzed using the SPSS 22.0 program, and the general characteristics of the subjects were done with real number and percentages, health beliefs, internal control, and hand washing attitudes, and the degree of hand washing practice were done with averages and standard deviations. The difference in health beliefs, internal control, and hand washing attitudes, and the degree of hand washing practice according to the general characteristics was done with t-test, and ANOVA. The relationship between health beliefs, internal control, and hand washing attitudes, and the degree of hand washing practice was analyzed with the Pearson's correlation coefficient, and factors influencing hand washing practice were analyzed through regression analysis.

3. RESULTS

3.1. The General, Hand Washing-related Characteristics of Subjects

The general and hand washing-related characteristics of the subjects include age, gender, school life satisfaction, number of hand washing per day, hand washing time, hand washing education experience, and the necessity of hand washing education. The results of analyzing them are as follows<Table 1>. The average age of the subjects was 16.88 years, and females accounted for the majority with 98.5%. For school life satisfaction, 36.5% of students answered that they were very satisfied with school life and 56.9% of students answered that they were moderately satisfied with it. For the number of times of washing hands per day, 4-5 times was 40.1%, which was the most, followed by 6-7 times, 2-3 times, and more than 8 times. For hand washing time, 6-10 seconds was 48.2%, which was the most. 95.6% of students experienced hand washing education, and 89.8% said they needed education.

Table 1. General Characteristics of Participants.

Characteristics	Categories	Mean ± SD or n(%)
Age (years)		16.88±0.33
Sex	Female	135(98.5)
	Male	2(1.5)
School life satisfaction	Good	50(36.5)
	Normal	78(56.9)
	Bad	9(6.6)
Number of hand washing per day	2~3times	26(19.0)
	4~5times	55(40.1)
	6~7times	35(25.5)
	≥ 8times	21(15.3)
Hand washing time	≤ 5seconds	13(9.5)
	6~10seconds	66(48.2)
	11~15seconds	24(17.5)
	16~20seconds	18(13.1)
	≥ 21seconds	16(11.7)
Hand washing education experience	Yes	131(95.6)
	No	6(4.4)
Hand washing necessity	Yes	123(89.8)
	No	14(10.2)

3.2. The Scores of Hand Washing Practice, Health Beliefs, Internal Control, and Hand Washing Attitude of Subjects

The hand washing practice, health beliefs, internal control, and hand washing attitude of the subjects are as follows<Table 2>. The subjects' hand washing practice was a minimum of 16 points and a maximum of 23 points, with an average of 19.62 points. As a result of looking at the compositional areas of hand washing practice, hand washing practice at home was 12.25 points and hand washing practice at school was 7.37 points. The subjects' health beliefs were a minimum of 73 points and a maximum of 126 points, with an average of 99.41 points, the internal control was a minimum of 43 points and a maximum of 87 points, with an average of 62.64 points, and hand washing attitude was a minimum of 8 points and a maximum of 12 points, with an average of 9.64 points.

Table 2. The Scores of Hand Washing Practice, Health Beliefs, Internal Control, and Hand Washing Attitude of Participants.

Variable	Min	Max	Mean ± SD
Hand Washing Practice Score	16	23	19.62±1.23
Home	10	15	12.25±0.87
School	6	9	7.37±0.80
Health Belief Score	73	126	99.41±11.62
Internal Control Score	43	87	62.64±7.83
Hand Washing Attitude Score	8	12	9.64±0.85

3.3. Differences in hand washing practice, health beliefs, internal control, and hand washing attitude according to the general and hand washing-related characteristics of subjects

<Table 3> shows hand washing practice, health beliefs, internal control, and hand washing attitude according to the subjects' general characteristics. The subjects' health beliefs showed a statistically significant difference according to school life satisfaction(F=3.38, p=.037), hand washing time(F=4.10, p=.004), and hand washing necessity(t=2.26, p=.025). As a result of post-hoc analysis, health belief score was significantly higher in the students with more than average school life satisfaction than those with school life dissatisfaction, significantly higher in those with a washing time of 16-20 seconds than those with less than 20 seconds, and significantly higher in those who answered that hand washing education was necessary than those who answered that it was not. There was no significant difference in the internal control according to the general characteristics of the subjects, and the hand washing attitude showed a statistically significant difference according to the school life satisfaction(F=5.70, *p=.004*). As a result of post-hoc analysis, the hand washing attitude score was significantly higher for students with more than average school life satisfaction than those with school life dissatisfaction.

Table 3. Differences in Hand Washing Practice, Health Beliefs, Internal Control, and Attitude by General Characteristics.

Characteristics	Categories	Practice		Health Beliefs		Internal Control		Attitude	
		Mean±SD	t or F (p)	Mean±SD	t or F (p)	Mean±SD	t or F (p)	Mean±SD	t or F (p)
Sex	Female	19.63±1.23	0.72	99.48±11.68	0.60	62.66±7.87	0.30	9.63±0.84	-0.61
	Male	19.00±1.41	(.473)	94.50±4.95	(.549)	61.00±4.24	(.767)	10.00±1.41	(.542)
School life satisfaction	Gooda	19.60±1.25	0.92	101.50±11.10	3.38*	64.46±8.06	3.04	9.52±0.86	5.70*
	Normalb	19.69±1.22	(.402)	99.05±11.64	(.037)	61.95±7.57	(.051)	9.79±0.81	(.004)
	Badc	19.11±1.17		90.89±11.20	a,b>c	58.44±6.86		8.89±0.60	a,b>c
Number of hand washing per day	2~3times	19.50±1.24	0.86	98.88±11.58	1.03	62.62±6.87	1.66	9.31±0.79	2.04
	4~5times	19.82±1.14	(.466)	97.78±11.94	(.384)	61.44±8.50	(.179)	9.80±0.91	(.112)
	6~7times	19.43±1.46		100.37±11.84		65.06±7.62		9.63±0.81	
	≥ 8times	19.57±0.98		102.71±10.31		61.76±6.99		9.62±0.74	
Hand washing time	≤ 5sec	19.77±1.30	0.36	93.15±10.72	4.10*	58.00±7.76	1.71	9.46±0.88	1.00W
	6~10sec	19.59±1.39	(.834)	98.59±12.07	(.004)	63.17±8.32	(.151)	9.53±0.93	(.415)
	11~15sec	19.83±1.17		97.67±11.24	d>a,b,c	63.04±6.79		9.88±0.85	
	16~20sec	19.50±0.86		108.17±8.68		64.72±5.53		9.72±0.75	
	≥ 21sec	19.44±0.89		100.63±9.27		61.25±8.64		9.75±0.45	
Hand washing education experience	Yes	19.63±1.21	0.59	99.66±11.62	1.17	62.77±7.90	0.95	9.66±0.84	1.39
	No	19.33±1.63	(.559)	94.00±11.10	(.245)	59.67±5.61	(.344)	9.17±0.98	(.167)
Hand washing necessity	Yes	19.65±1.24	0.85	100.15±11.23	2.26*	62.73±7.89	0.43	9.66±0.84	0.96
	No	19.36±1.08	(.398)	92.86±13.27	(.025)	61.79±7.42	(.670)	9.43±0.94	(.338)

3.4. Correlation Among Hand Washing Practice, Health Beliefs, Internal Control, and Hand Washing Attitude of Subjects

The Pearson correlation coefficient was used to analyze the degree of correlation among the scores of hand washing practice, health beliefs, internal control, and hand washing attitude of the subjects <Table 4>. Hand washing practice had a significantly positive correlation with internal control score(r=.181, p=.034) and hand washing attitude score(r=.198, p=.020), and health beliefs had a significantly positive correlation with internal control score(r=. 480, p<.001).

Table 4. Correlation Among Hand Washing Practice Score, Health Belief Score,Internal Control Score, Hand Washing Attitude Score.

r(p)	Practice	Health Beliefs	Internal Control	Attitude
Hand Washing Practice	1			
Health Beliefs	-.037 (.667)	1		
Internal Control	.181* (.034)	.480** (<.001)	1	
Hand Washing Attitude	.198* (.020)	-.015 (.859)	.032 (.712)	1

3.5. Factors Affecting Hand Washing Practice

To conduct regression analysis, the autocorrelation of the dependent variables and the multicollinearity between the independent variables were examined. The autocorrelation of the dependent variables was examined using Durbin-Watson index, and Durbin-Watson index was 1.879, which was independent without autocorrelation. The multicollinearity between independent variables was examined using VIF index, which is a variance inflation factor, and VIF index between independent variables was 1.002~1.302, which was less than 10, so there was no multicollinearity. Therefore, this data is suitable for performing regression analysis. As a result of performing multiple regression analysis, internal control($p<.05$) and hand washing attitude($p<.05$) had a significant effect on dependent variables. The higher the internal control (*B=.039*) and the more positive hand washing attitude(*B=.272*), the higher the hand washing practice rate, and the explanatory power that these variables explain the hand washing practice is 6.7%. In independent variables, internal control(*β=.249*) was found to have a greater effect on the hand washing practice score.

Table 5. Factors Affecting Hand Washing Practice.

	B	SE	β	t	p	VIF
Constant	16.173	1.512		10.699	<.001	
Health Beliefs	-.016	.010	-.154	-1.625	.106	1.301
Internal Control	.039	.015	.249	2.631	<.05	1.302
Hand Washing Attitude	.272	.120	.188	2.268	<.05	1.002
adj R2=.067, F=4.276 (p<.001)						

* Durbin-Watsom's d=1.879

4. DISCUSSIONS

This study examined the relationship between hand washing practice, health beliefs, internal control, and hand washing attitude for adolescents in the COVID-19 outbreak situation, and confirmed that internal control and hand washing attitude are influencing factors on hand washing practice. The subjects' hand washing practice was 19.62 points on average, which was more than normal, and as for each compositional area score of the hand washing practice, hand washing practice at home was 12.25 points, and hand washing practice at school was 7.37 points. This result is also supportive of Park Dae-kwon's [9] study of high school students reporting a high response rate in 'Always washing hands'. It can be inferred that this is the result of public advertisement through mass media and education in schools along with Corona 19 outbreak. The subjects' health belief score was an average of 99.41, indicating that more than half perceived health. As there are no previous studies for the adolescents' health beliefs, it is difficult to directly compare with them. However, the more an individual perceives that the likelihood and severity of a specific disease is high, and the more it is judged that the benefit from taking action to prevent disease is great and that there are fewer difficulties encountered when performing the action, the greater the likelihood of taking healthy actions to prevent the disease[15, 19, 20, 21, 22], so it is thought to be the result of recognizing in order not to be infected with the infectious disease in the pandemic situation of the corona 19 outbreak. The subjects' internal control score was an average of 62.64 points, which was above average. As there are no prior studies for adolescents, it is difficult to compare with them. However, Wallston et al. [16] proposed that by applying locus of

control to the area of health, health locus of control plays an important role when a person has a disease and said that health-related locus of control generally refers to the expectation of what one thinks health is dictated by. so it can be inferred that in the case of the subjects of this study, they think that they are not infected with Corona 19 with hand washing.

The average hand washing attitude score was 9.64, which was above the average. This result is also supportive of the report that in Park Dae-kwon's[9] study for high school students, there was a high response rate in the question, 'It is necessary to wash hands to prevent infection.' It is believed that this result came from the emphasis on the importance of hand washing and the practice of personal quarantine at the national level due to the COVID-19 outbreak. The subjects' health beliefs showed a statistically significant difference according to school life satisfaction(F=3.38, $p=.037$), hand washing time(F=4.10, $p=.004$), and need for hand washing(t=2.26, $p=.025$). The hand washing attitude showed a statistically significant difference according to the school life satisfaction(F=5.70, $p=.004$), but hand washing practice and internal control did not show a statistically significant difference. As there are no prior studies for adolescents, this result is difficult to directly compare with them. Considering the characteristics of adolescents' developmental stage, since the proportion of life at school is high and they are affected by peer relations[17, 20], it can be inferred that the degree of school life satisfaction had a statistically significant difference with hand washing attitude and health beliefs. The subjects' hand washing practice had a significant positive correlation with internal control (r=.181, $p=.034$) and hand washing attitude score(r=.198, $p=.020$), and health beliefs had a significant positive correlation with internal control score(=.480, $p<.001$). Direct comparison is difficult due to the lack of previous studies, but this result is supportive of the result of Lee Cheol-ho's[18] research for adults that reported that in the case of hand washing behavior intention, health beliefs and locus of control are correlated with health beliefs. In other words, for hand washing practice, it is thought that plans for strengthening internal control, which refers to the cause or effect of an action as an inner factor of the ability, attitude, and effort of one's own, and cultivating a positive hand washing attitude should be prepared. The factors influencing the subjects' hand washing practice were internal control($p<.05$) and hand washing attitude($p<.05$). These variables had 6.7% explanatory power for hand washing practice, and internal control(β=.249) was found to have a greater influence on hand washing practice score. In other words, though this result shows that the higher the internal control(B=.039) and the more positive the hand washing attitude(B=.272), the higher the hand washing practice rate, since the explanatory power of the variables is low at 6.7%, there may be a need for repeated studies. In addition, as there are no prior studies for adolescents, it is difficult to directly compare with them. However, the result of this study indicates that the internal control means a tendency to attribute the cause or effect of an action to internal factors, such as ability, attitude, and effort of one's own, educational plans that can increase the hand washing practice rate by cultivating a positive hand washing attitude and improving internal control through education on the importance of personal quarantine should be prepared.

5. CONCLUSION

This study is a descriptive survey study to identify the factors influencing washing practice for adolescents in the COVID-19 outbreak situation. As a result of this study, the internal control and hand washing attitude of adolescents showed an influence on hand washing practice, and their explanatory power was 6.7% for hand washing practice. That is, based on the result of this study that the higher the internal control(B=.039) and the more positive the hand washing attitude(B=.272), the higher the hand washing practice rate, it is thought that the concrete, practical, and customized educational programs that can improve internal control, which is a belief in the ability to positively foster hand washing attitude, should be developed in consideration of the developmental stage of adolescents. Based on the results of this study, the following suggestions are made. Since this study was conducted on a local high school youth, there is a limit to generalizing the results of the study. In future studies, repeated studies that expanded regions are needed, and the development of educational programs and effect evaluation studies to improve the hand washing practice of adolescents are needed.

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