The Factors Affecting Risk Perception for Particulate Matter in Nursing College Students

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ABSTRACT

This study is a descriptive research study to establish the influence of knowledge and attitudes for particulate matter on the perception of particulate matter risk among nursing students in Chungbuk.The subjects of this study were 230 nursing students enrolled in J University and M University in Chungbuk, and those who understood the purpose of this study and agreed to participate. Data were analyzed by frequency, percentage, mean, standard deviations, t-test, and multiple regression analysis.This study found that particulate matter cognition score was the highest, and the scores were the lowest among nursing college students. A significant positive correlation existed between knowledge and particulate matter risk perception (r=.30, $p<.001$), also attitude and fine particulate matter perception (r=.35, $p<.001$). According to the multiple regression analysis, the attitude 12.7%(β=.29, $p<.001$) and knowledge 4.3%(β=.217, $p=.001$) affected particulate matter risk perception. Knowledge and attitudes for particulate matter have been identified as factors affecting risk perceptions of particulate matter. To increase the knowledge and attitude for particulate matter among nursing students and help managing the health of the community and patients from particulate matter which seriously emerges, the researchers have produced reliable educational materials onparticulate matter and included them in the curriculum to cultivate and maintain the correct attitude towardparticulate matter.

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INTRODUCTION

It was found that the air pollution level in Korea is the worst among OECD countries, and is the 26th most serious in the world(The ChosunIlbo, 2020). As a result of the 2019 National Environmental Consciousness Survey, 46.5% of the survey participants pointed out the air quality as the most urgent environmental problem to be solved (particulate matter, etc.), and this rate is much higher than 30.6% of the 2018 survey result(Jeon H. C. *et al*., 2020). In addition, the social survey results of the Statistics Korea(Statistics Korea, 2018) showed that overall anxiety about environmental problems was higher than that of non-anxiety, and among environmental problems, anxiety for particulate matter was the highest at 85%. In addition, particulate matter has the greatest effect on health among air pollutions and ranks fifth among the causes of death in the world after high blood pressure and smoking(The Seoul Institute, 2019). This is because they saw that there is sufficient evidence that particulate matter can cause a cancer. As it is known that the risk of disease due to particulate matter increases among environmental factors, Korea has been conducting a particulate matter forecast since 2014 as the public's anxiety increases, and the Revision of Framework Act On the Management of Disasters And Safety was passed in the 2019 National Assembly(Joint ministries, 2017).

According to the WHO report(World Health Organization, 2013), respiratory and cardiovascular diseases have a clear causal relationship to the risk of disease due to particulate matter. However, a recent studies on the risk of particulate matter reveal that particulate matter affects not only respiratory and cardiovascular diseases, but also cancer, diabetes, obesity, and skin. In addition, particulate matter affects mental health, and as the concentration of particulate matter increases, the risk of stress, deterioration in quality of life, depression, and suicidal thoughts increased(Lee S. B., 2019).

As the severity of particulate matter on the health threat increases, studies on the health effects of particulate matter are increasing rapidly, and efforts to raise social awareness about the health risks of particulate matter are continuing. As a professional who cares closely for patients, nurses should try to raise awareness of the dangers of particulate matter by grasping objective research results on the effects of particulate matter on the human body and understanding pathologies that cause disease.

Awareness of particulate matter risk includes concern, severity, and feel to particulate matter (whether experienced health symptoms or not) and refers to the degree to which an individual is aware of the risk of particulate matter. According to previous researches, the

higher the awareness of particulate matter risk is, the higher the interest in particulate matter occurrence status, health impacts, and solutions, andpreventive action to reduce exposure to risks and policies to reduce risk itself(Kim Y. W. *et al*., 2016). It is also reported that the higher theawareness to particulate matter is,the higher the health care practices related toparticulate matter is(Park E. S. *et al*., 2018). However, studies on the factors affecting the risk perception of particulate matter among future nursing students are insufficient.

College students have a strong tendency to overconfident about their health and lack of interest in health management, which is more likely to cause health problems than other age groups. Moreover, nursing students are future nurses who need to take care of and educate others, and as primary health managers who need to maintain and promote their own health, high risk awareness of particulate matter, which is the cause of many diseases, is significant.

Therefore, this study attempted to find out what factors affect the perception of risk of particulate matter among nursing students who will be responsible for the health of Korean citizens in the future.

MATERIALS & METHODS

Research design

This study is a descriptive research to establish the influence of knowledge and attitudes for particulate matter on the perception of particulate matter risk among nursing students in Chungbuk.

Research subjects

The subjects of this study are 230 nursing college students enrolled in J University and M University in Chungbuk, and those who understood the purpose of this study and agreed to participate in.

Research tools

Risk awareness of particulate matter

In this study, the risk perception for particulate matter assists of 4 questions for interest, 7 questions forseverity, and 4 questions for experience. The interest usedthe tool of Park et al. (Park E. S. *et al*., 2018), which modified and supplemented the tool of Kim et al.(Kim Y. W. *et al*., 2016), and the reliability of the tools in Park et al.(Park E. S. *et al*., 2018) was Cronbach's α=.78. The severity used the tool of Park et al.(Park E. S. *et al*., 2018) whichmodified and supplemented the tool of Kim et al.(Kim Y. W. *et al*., 2015), and the

reliability of the severity in Park et al.(Park E. S. *et al*., 2018) was Cronbach's α=.69. The feel applied the tool used in the study of Kim et al.(Kim Y. W. *et al*., 2016) and the reliability was Cronbach's α = .74. Each questionmeasured by Likert 5-point scale from not at all (1 point) to yes very much (5 points) and the higher the total score, the higher the awareness of the seriousness of the risk of particulate matter. In this study, the reliability was Cronbach's α=.74.

Knowledge for particulate matter

For the knowledge about particulate matter in this study, the tool ofChoi(Choi S. H., 2018) which modified and supplemented the tool developed by Park (Park S. H., 2014) Park was used. It consists of total 5 questions including the meaning of the scientific terms of particulate matter, the meaning of PM 10 and PM 2.5 among the terms used, the factor of particulate matter, the cause of particulate matter and the influence of particulate matter. Each question measured on a Likert 5-point scale from not at all (1 point) to yes very much (5 points), and the higher the total score, the higher the awareness of the seriousness of the risk of particulate matter while the question 3 was reverse coded. In the study of Choi(Choi S. H., 2018), the reliability was Cronbach's α=.66, and the reliability in this study was Cronbach's α=.63.

Attitude toward particulate matter

In this study, the attitude toward particulate matter used the tools of Choi (Choi S. H., 2018), which modified and supplemented the tools developed by Park(Park S. H., 2014). This consists of total 6 questions including the presence or absence of action to reduce the emission of particulate matter, and the response and attitude when the concentration of particulate matter increases. Each question measured on a Likert 5-point scale from nearly not practiced (1 point) to always practiced (5 points), and the higher the total score, the higher the awareness of the seriousness of the risk of particulate matter. In the study of Choi (Choi S. H., 2018), the reliability was Cronbach's α=.84, and in this study, the reliability was Cronbach's α=.80.

Data collection method

The data collection period took total 14 days from 30th April to 14th May 2019. For the ethical consideration of the research subjects, the purpose of the survey, the procedure, confidentiality, anonymity, and the fact anybody can withdraw from the participation at any time if they do not want to participate in the research were explained andthe survey was

conducted after obtaining consent of all subjects. The time required to fill out the questionnaire was about 10 to 15 minutes utilizing the rest time after class before the start of the study, and the researcher collected the questionnairesright after the preparation.

Data analysis method

Data analysis was performed using the SPSS/WIN 21.0 program, and the subject's general characteristics and risk perception, knowledge, and attitude for particulate matter were analyzed by technical statistics. The difference in the risk perception of particulate matter according to the general characteristics of the subjects was confirmed by t-test and One Way ANOVA and analyzed through the Scheffé post-test. The correlation analysis of the subject's knowledge, attitude and risk perception on particulate matter was analyzed by Pearson's correlation. In order to analyze the factors affecting the subject's risk perception of particulate matter, total two variables of perception and attitude toward particulate matter were analyzed using multiple regression analysis.

RESULTS

General characteristics of research subjects

Table 1 shows the general characteristics of the subjects. The average age was 20.1 years old, and the first grade was the most common at 49.1%. Most of the subjects (71.7%) did not have religion, and 49.1% of the subjects were satisfied with the department, and 94.3% of the type of residence was dormitory.

Table 1: General characteristics of subjects

Item	Classification	n(%)	M±SD
Gender	Male	62(27.0)	
	Female	168(73.0)	
Age			20.1±.10
Grade	1	113(49.1)	
	2	67(29.1)	
	3	31(13.5)	
	4	19(8.3)	
Religion	Yes, I have	65(28.3)	

	No, I don't	165(71.7)	
Satisfactory degree of department	Satisfactory	113(49.1)	
	Moderate	108(47.0)	
	Not satisfactory	9(3.9)	
Residence type	Dormitory	217(94.3)	
	Lodging/Live apart	7(3.0)	
	Together with parent	5(2.2)	
	Others	1(0.4)	

Subjects' knowledge, attitude and risk perception for particulate matter

Table 2 shows the subjects' knowledge, attitude and risk perception related to particulate matter. The knowledge for particulate matter was 3.09 points (1-5), the attitude toward particulate matter was 3.41 points (1-5), and the risk perception for particulate matter was 3.48 points (1-5).

Table 2: Subjects' knowledge, attitude and risk perception for particulate matter

Item	M±SD	Range
Knowledge for particulate matter	3.09±.65	
Attitude for particulate matter	3.41±.72	1~5
Risk perception for particulate matter	3.48±.41	

Differences in risk perception for particulate matter based on the general characteristics of the subjects

Table 3 shows the difference in risk perception for particulate matter according to general characteristics. There was no significant difference in gender, age, grade, religion, subject satisfaction, and residence type.

Table 3:Differences in risk perception for particulate matter based on the general characteristics of the subjects

Item	Classification	M±SD	t/F	*p*
Gender	Male	3.42±.43	-1.40	.162
	Female	3.50±.40		
Age		20.1±.10	1.31	.134
Grade	1	3.48±.42	.28	.837
	2	3.45±.39		
	3	3.53±.41		
	4	3.51±.42		
Religion	Yes, I have	3.47±.41	-.51	.606
	No, I don't	3.50±.41		
Satisfactory degree of department	Satisfactory	3.47±.42	.28	.752
	Moderate	3.48±.40		
	Not satisfactory	3.58±.40		
Residence type	Dormitory	3.48±.41	.73	.531
	Lodging/Live apart	3.67±.26		
	Together with parent	3.33±.35		
	Others	3.53		

Correlation between knowledge, attitude and risk perception for particulate matter

Table 4 shows the correlation between the subject's knowledge, attitude and risk perception for particulate matter. The relationship between knowledge and risk perception for particulate matter was found to have a statistically significant net correlation (r=.30, *p*<.001), and the relationship between attitude and risk perception for particulate matter was found to be also statistically significant. There was a significant net correlation (r=.35, *p*<.001).

Table 4:Correlation between knowledge, attitude and risk perception for particulate matter

	Knowledge	Attitude	Risk perception

Knowledge	1		
Attitude	.286**(<.001)	1	
Risk perception	.301**(<.001)	.356**(<.001)	1

Factors affecting risk perception for particulate matter

Table 5 shows the factors that affect the risk perception for particulate matter. In order to analyze the factors affecting the risk perception for particulate matter, a multiple regression analysis was performed using two variables of attitude and knowledge for particulate matter as independent variables, and there were no statistically significant variables in general characteristics. As a result, the variable that has the biggest influence on the risk perception for particulate matter among nursing students was the attitude for particulate matter, which was 12.7% (β=.29, p<.001), and the next variable was the knowledge for particulate matter of nursing students. The knowledge for particulate matter was 4.3% (β=.21, p=.001), and these two variables accounted for total 17.0% of nursing students' risk perceptions forparticulate matter.

Table 5: Factors affecting Fine Dust Risk Perception

Variables	B	SE	β	t	p	R^2	F	p
Constant	2.489	.149		16.72	<.001			
Attitude	.166	.036	.294	4.65	<.001	.127	33.14	<.001
Knowledge	.137	.040	.217	3.44	.001	.170		

RESULTS AND DISCUSSION

In Korea, due to prolonged exposure to air pollution such as fine particulate matter, domestic air pollution, and ozone, more than 17,000 people died in 2017 alone(MunhwaIlbo, 2019), and there is a prediction that in 2060, among OECD member countries, the death toll would be the highest in 2060 due to particulate matter and air pollution(OECD, 2016). Particulatematter is a matter of health and survival, and nurses should assess the environmental problems of the nursing subjects and mediate health promotion by preventing possible health problems. As such, it can be said that it is important for nursing students,

who are nurses in future, to respond sensitively to environmental problems such as particulate matter and pay attention to related health problems as medical personnel who will contribute to future health promotion. Therefore, this study was carried out to identify the knowledge, attitude, and risk perception of nursing students for particulate matter, and to identify the factors that affect nursing students' risk perception for particulate matter. Based on the results, the researcher would like to discuss as follows:

In this study, as a result of measuring knowledge, attitude, and risk perception for particulate matter of nursing college students on a 5-point scale, the average score was 3.09 points for knowledge, 3.41 points for attitude, and 3.48 points for risk perception. This result indicates that the degree of awareness of risk for particulate matter is high, but they do not have accurate knowledge, and the attitude score reflecting the practical aspect does not reach the perception. This is consistent with the previous research surveyed on general college students(Choi S. H., 2018), high school students(Kim J. M., 2018), and middle school students(Park S. H., 2014). In a previous study of general college students(Choi S. H., 2018), high school students(Kim J. M., 2018) and middle school students(Park S. H., 2014), the risk perception for particulate matter was high, but they did not have accurate knowledge, and the attitude score was also lower than the risk perception score. Among the questions asking for knowledge for particulate matter in this study including 'I think I know the terminology and scientific meaning of particulate matter', 'I know well what PM 10 and PM 2.5 mean', and ' I think the adverse effect due to particulate matter is related to the size of particulate matter', more than majority answered as ' less than moderate'. From this, we found thatit is believed that the efforts to publicize the dangers and impact of particulate matter socially to the general public through mass media had been helpful in the aspect of perception but need to provide professional and practical information for particulate matter. For the question, 'What brought you be careful for particulate matter?', the subjects answered it was internet by 50.4% and TV by 15.2%. For the question, 'why you don't take a preventative action to avoid particulate matter, if you don't?', they answered, 'because it's troublesome' by 53.9%, 'because I don't know the information about preventive action' by 14.3%, 'because I think it's not important' by 10%, 'because I don't have time' by 9.1% and 'because the people surrounding me did not do it either' by 6.1% respectively. It seems that this result came out because the curriculum for acquiring knowledge about the effect of particulate matter on the human body in the curriculum of nursing students is insufficient. In the previousstudies(Park E. S. *et al*., 2018), when analyzing the risk perception for particulate matter according to

undergraduate system, there was no significant difference between other general college students and nursing students (t= 0.04, p =.969), which shows that it lacks the differentiated professional education for nursing students.

The subjects' knowledge, attitude and risk perception for particulate matter were all significantly correlated. Also in multiple regression analysis, both attitude (β=.29, $p<.001$) and knowledge (β=.21, $p=.001$) for particulate matteraffected the risk perception for particulate matter. According to Zhang's research(Zhang j. Y., 2020), it was reported that the higher the awareness of the severity for particulate matter, the more positive the health care intention was. In other words, it was found that the correct knowledge and attitude forparticulate matter increased the risk perception (interest, seriousness, and feel) for particulate matter and affected the individual's lifestyle or behavior for health promotion. In addition, in studies related to particulate matter education(Jang N. R., 2019), it is important to acquire correct knowledge for particulate matter through education when investigate previous studies that showed that subjects who received education related to particulate matter had higher levels of knowledge and attitude than those of subjects who did not receive education.

In studies such as the comparison of knowledge and the risk perception and practice of responding to particulate matter(Song S. J., 2020), and the effect of students' attitudes according to the risk perception for particulate matter on the intention to continue behavior (Son M. A., 2019), it was found that the higher the knowledge, the higherperception and practice were, and that it affected the intention to continue behavior.

In Korea, the seriousness of air pollution is emerged to the point that there point out the improvement of air quality (particulate matter, etc.) as an environmental problem that needs to be addressed most urgently(Jeon H. C. *et al*., 2020). It is necessary to have a systematic education system and to produce reliable educational materials on particulate matter by accurately clarifying the medical meaning beyond the method learned. Such systematic education fosters and maintains the correct attitude for particulate matter of nursing college students, thereby providing direct assistance to many as future health managers who will manage the health of the community and patients from seriously emerging particulate matter.

CONCLUSION

This study investigated the knowledge, attitude, and risk perception level of nursing students for the particulate matter and identified factors that affect the risk perception of particulate

matter. As a result of the study, knowledge and attitude for the particulate matter were analyzed as factors that affect the degree of risk perception. However, nursing students' knowledge for particulate matter was similar to those of general college students, indicating that nursing students need to introduce a differentiated and specialized curriculum that can acquire correct medical knowledge. Until now, there have been many studies on elementary school students, middle school students, high school students, teachers and general college students, but they lacked studies on nursing students as future health managers. It is judged that repeated studies with more nursing students and medical personnel as subjects are needed in the future, and the development of educational materials including individual strategy to prevent particulate matter issuggested in the future.

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