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A Study on the Relationship between School Foodservice Employees' Attitudes toward Food Hygiene Education and Hygiene Practices

Ja Gyung Heo[1] and Jee Hye Lee[2]*

[1]*Miryang Donggang Middle School, Miryang, Korea*
[2]*Department of Foods & Nutrition, College of Human Ecology, Ulsan, Korea*
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ABSTRACT - In order to provide efficient information ensuring school food safety, this current study investigated the relationship between general characteristics of food service operation and food hygiene practices and employee's attitudes toward food hygiene education and food hygiene practices. Data were collected from a total of 185 school food service employees in the *GyeongSangNam-do* area. As for the differences in the overall the evaluation of sanitary practice level in accordance with the general characteristics about the school food service employees, there were significant differences in the type of school food service and times of serving food per day. Also, hygiene practices in solo foodservice were better than in joint foodservice. The respondents who had positive attitudes toward food safety education showed better food safety practices. It is recommended that consistent food safety education based on various methods can contribute to appropriate food safety performance.

Key words : school foodservice employee, general characteristics, attitudes toward food hygiene education, food hygiene practices

The law for school food service was enacted for the first time in 1981, the law for special-education school enacted in 1992, the law for elementary school in 1997, and law for high school in 1999. In 2003, all the elementary schools, middle schools, and high schools in Korea started to provide meals for school students. Quantitative growth of school meals contributes to nutrition, convenience, and favorableness. However, it also increases the chances of foodborne disease outbreaks in Korean schools[1,2)].

In 2014, 349 foodborne outbreaks with 7,466 illness occurred. Among these foodborne outbreaks, 54 outbreaks with 4,171 instances of illness occurred at school (Ministry of Food and Drug Safety, 2015). All over the country, 7,400,000 student at 11,000 schools use school meals, and thus food hygiene and safety of school meals must be followed[2)]. Hazard Analysis Critical Control Point (HACCP) has been established at schools in order to secure school foodservice safety[3)].

In addition, the Korean Ministry of Food and Drug Safety and the Ministry of Education established and manage the school foodborne outbreaks prevention system, which can respond immediately and block the spread[4,5)]. Until 2012, foodborne disease outbreaks in Korean schools showed a tendency to decrease. However, as of 2014, foodborne disease outbreaks in Korean schools were on the rise (Ministry of Food and Drug Safety, 2015).

Thorough sanitation management is important because foodservice operations possess risks of foodborne disease outbreaks at all times. In particular, foodservice employees' sanitation is critical because they handle foods directly[6,7,8)].

Thus, foodservice employees' attitude toward sanitation, food safety knowledge, and hygiene practices are essential to prevent foodborne disease outbreaks in schools[9,10)].

Determination of influencing factors on school foodservice employees' hygiene practices is required since hygiene practices are regarded as critical in the prevention of foodborne outbreaks. The association between foodservice employees' general information such as working experience, feeding numbers, and cooking certification and their hygiene practices has been studied by previous studies. For example, the positive influence of the presence of cooking certification on hygiene practices has been supported[11)]. However, only limited studies have considered the types of employees' general characteristics. Thus, this current study examined the influence of various employees' general information on hygiene practices. In addition, much research supported employees' food safety knowledge as a critical variable in hygiene practices[4,9,12,13,14,15,16)].

*Correspondence to: Jee Hye Lee, Department of Foods & Nutrition, College of Human Ecology, University of Ulsan, Ulsan 93 Daehaklo, Nam-gu, Ulsan 44610, Korea
Tel: 82-52-259-2371, Fax: 82-52-259-1698
E-mail: lljh2000@ulsan.ac.kr

An effective food hygiene education must take precedence in order to increase food safety knowledge, and positive attitudes toward hygiene education must take precedence in order for effective food hygiene education. Although attitude is regarded as an important variable in successful education, there is a lack of research about foodservice employees' attitudes toward hygiene education.

Thus, this current study aims to explore school foodservice employees' general characteristics and the general characteristics of foodservice operation. Also it determined employees' hygiene practices depending on the characteristics of foodservice operation and employees' hygiene practices depending on attitudes toward food safety education.

Methods

Data collection

From March 26th to April 16th, a survey was administered to foodserivce employees. The employees working at 23 elementary schools, middle schools, and high schools in the *GyeongSangNam-do*. Two hundred questionnaires were distributed to employees via mail. 185 questionnaires out of 200 were used in this current study.

Questionnaire design

Assessments were composed of general characteristics of foodservice employees (4 items), general characteristics of foodservice operation (5 items), hygiene practices (4 categories), and attitudes toward food safety education. Measurement of attitudes toward food safety education had three items based on the 5-point Likert scale (1 = very negative; 5 = very positive) and was adapted from the scale of [17]. The hygiene practices measurement is composed of four categories: personnal hygiene practices (4 items), food handling hygiene practices (4 items), equipment hygiene practices (4 items), and equipment handling practices (4 items). The hygiene practices were adapted from the scale of [18] and were assessed based on the 5-point Likert scale (1 = Not at all; 5 = Very much).

Data analysis

All statistical analyses were conducted using SPSS for Windows (version 20.0, 2014). Statistical significance was set $p < 0.05$, $p < 0.01$, $p < 0.001$. Frequency analysis was conducted to analyze foodservice employees' general characteristics and the current status of food safety education. Independent sample t-test and ANOVA were conducted to compare employees' hygiene practices depending on the foodservice employees' general characteristics.

Results and Discussion

Participants

One hundred eighty five of the 200 foodservice employees replied to the questionnaire from 23 schools, with a response rate of 92.5%. Demographic characteristics of the respondents are presented in Table 1. In terms of age, a 56.2% majority of participants ranged from 51 to 60, 35.1% were 31-40, and 0.5% were over 61. In general, foodservice employees who were over 41 accounted for 91.8% of the respondents. This result was consistent with the previous studies[12,13,19,20], which showed the majority of the foodservice employees were between 41 and 50 years of age.

With regards to educations of the respondents, education level of the majority of respondents (88.1%) was high school compared with middle school (6.0%) and bachelor's degree (5.9%). This result was consistent with the previous studies[19,20,21], showing that the highest education level of foodservice employees in Gyungnam providence was a high school degree.

Thirty four percent of the respondents had 5 to 10 years' working experience, and 29.7% respondents had more than 10 years of experience. Around twenty percent of the respondents had 3 to 5 years' experience, and 13.0% of respondents had 1 to 3 years' experiences. This result was similar to the findings of previous studies showing that 5 to 10 years of working experience accounts for the highest proportion of respondents such as 41.9%[4], 34%[12], 39.7%[20],

Table 1. General characteristics of foodservice employees

Variables		Frequency (%)
Age	31-40	15(8.1)
	41-50	104(56.2)
	51-60	65(35.1)
	≥ 61	1(0.5)
Education	Elementary school	2(1.1)
	Middle school	9(4.9)
	High school	163(88.1)
	College or more	11(5.9)
Working experience (years)	< 1	7(3.8)
	1 ~ 3	24(13.0)
	3 ~ 5	36(19.5)
	5 ~ 10	63(34.1)
	≥ 10	55(29.7)
Number of cooking certification	0	128(69.2)
	≥ 1	57(30.8)
Total		185(100.0)

Table 2. General characteristics of foodservice operation

Variables		Frequency (%)
Frequency of feeding /1 day	1 time	129(69.7)
	2 times	46(24.9)
	3 times	10(5.4)
Type of foodservice operation	Direct	176(95.1)
	Indirect	9(4.9)
Type of school foodservice	Elementary school alone	60(32.4)
	Middle school alone	34(18.4)
	High school alone	58(31.4)
	Middle school + High school	29(15.7)
	Etc.	1(0.5)
Total feeding number	< 900	75(40.5)
	≥ 900	110(59.5)
Number of foodservice employees	< 10	129(69.7)
	≥ 10	56(30.3)
Total		185(100.0)

and 42.3%[21]. The majority feeding number per day was 1 time (69.7%). Two times per day was 24.9%, and 3 times per day was 5.4%. 69.2% of foodservice employees had a food cook certification, and 62.7% of among them had a Korean food cook certification, as compared to the previous studies, which had 54.1% in *Junju*.

With regards to type of foodservice operation, direct management was 95.1% and consignment management was 4.9%. In terms of type of foodservice, 'elementary school alone' was 32.4%, 'high school alone' was 31.4%, 'middle school alone' was 18.4%, and 'middle school and high school joint foodservice' was 15.7%. In terms of feeding number, above 900 was 59.5%, below 900 was 40.5%. 69.7% of foodservice operations showed fewer than nine employees, and 30.3% showed more than 10 employees.

Foodservice employees' food hygiene practices

Food hygiene practice questions were grouped into four categories: personal hygiene, food hygiene, food handling hygiene, and equipment hygiene. The mean of responses for each food hygiene practice item is presented in Table 3. Equipment hygiene (M = 4.65, SD = 0.45) showed the highest score, whereas personal hygiene revealed the lowest score (M = 4.47, SD = 0.48).

Employees' hygiene practices depending on the characteristics of the foodservice operation

The results of employees' hygiene practices depending on the characteristics the foodservice operation are as follows

Table 3. Foodservice employee's food hygiene practices category (n = 185)

Category	Contents	M ± S.D
Personnel hygiene	1. Personnel working cloths	4.65 ± 0.52
	2. Washing hands	4.42 ± 0.66
	3. Using hand sanitizer	4.44 ± 0.60
	4. Health condition	4.40 ± 0.64
	Total (4 items)	4.47 ± 0.48
Food hygiene	1. Removal of food packages in the right place	4.61 ± 0.50
	2. The ingredients of FIFO (first -in, first-out)	4.51 ± 0.70
	3. Refrigeration	4.67 ± 0.48
	4. A separate area for the special purpose	4.65 ± 0.50
	Total (4 items)	4.58 ± 0.45
Food handling hygiene	1. Check temperature of foods	4.67 ± 0.47
	2. Appropriate food distribution time	4.64 ± 0.51
	3. Proper thawing of food	4.49 ± 0.58
	4. Storage of preserved foods	4.69 ± 0.46
	Total (4 items)	4.62 ± 0.43
Equipment hygiene	1. A disinfecting solution making	4.65 ± 0.50
	2. Using test paper to check a disinfecting solution	4.67 ± 0.47
	3. Disinfection by boiling & disinfection of the dishes	4.65 ± 0.49
	4. Disinfection of the utensils	4.64 ± 0.50
	Total (4 items)	4.65 ± 0.45
General hygiene (16 items)		4.58 ± 0.41

Note. 5-point Likert scale: 1 = Strongly disagree ~ 5 = Strongly agree

(Table 4). The results of employees' hygiene practices depending on the type of foodservice operation showed a significant difference between 'consignment management' and 'direct management' ($t = -4.881$, $p < 0.001$). 'Consignment management' foodservice operation (M = 4.85, SD = 0.14) was significantly higher than 'direct management' (M = 4.57, SD = 0.40). In terms of feeding number, hygiene practices score of 'less than 900' (M = 4.58, SD = 0.37) and 'more than 900' (M = 4.58, SD = 0.41) showed similar scores for both types. The results of employees' hygiene practices score depending on the number of foodservice employees revealed that 'less than 10' (M = 4.61, SD = 0.41) was higher than 'more than 10' (M = 4.57, SD = 0.40), but no significant difference was found.

The results of employees' hygiene practices depending on the type of foodservice showed significant differences ($F = 11.57$, $p < 0.001$). Additional post-hoc analysis (Duncan test)

Table 4. Employee's hygiene practices depending on the characteristics of foodservice operation

Category		n	M ± S.D.	t	
Type of foodservice operation	Direct management	176	4.57 ± 0.41	−4.88***	
	Consignment management	8	4.85 ± 0.14		
Feeding number	< 900	51	4.58 ± 0.37	0.17	
	≥ 900	133	4.58 ± 0.42		
Number of foodservice employees	< 10	129	4.57 ± 0.40	−0.65	
	≥ 10	55	4.61 ± 0.41		
Category		n	M ± S.D.	Duncan	F-value
Type of foodservice	Elementary school alone	60	4.65 ± 0.35	a	11.57***
	Middle school alone	34	4.68 ± 0.35	a	
	High school alone	58	4.65 ± 0.40	a	
	Middle school + High school	29	4.21 ± 0.39	b	
Frequency of feeding /1 day	1 time	128	4.65 ± 0.36	a	6.44**
	2 times	46	4.41 ± 0.47	b	
	3 times	10	4.48 ± 0.45	b	

Note: 5-point Likert scale: 1 = Strongly disagree ~ 5 = Strongly agree;
*** $p < 0.001$, ** $p < 0.01$

revealed that joint foodservice for middle school and high school (M = 4.21, SD = 0.39) was lower than solo foodservice for elementary school (M = 4.65, SD = 0.35), middle school (M = 4.68, SD = 0.35), and high-school (M = 4.65, SD = 0.40). The results of hygiene practices depending on the frequency of feeding per day showed a significant difference (F = 6.444, $p < 0.01$). Post-hoc analysis (Duncan test) revealed that the hygiene practice score for one feeding per day (M = 4.65, SD = 0.36) was higher than for two times (M = 4.41, SD = 0.46). And one time was higher than three times (M = 4.48, SD = 0.44).

The influences of the general characteristics of foodservice operations on hygiene practices had been supported by the previous studies[4,11,12,13]. For instance, the effects of sanitation education[12,13], total feeding number[4,11], and type of foodservice operation[4] on hygiene practices had been supported. Also, this result was consistent with the previous studies, showing an inverse relationship between frequency of feeding and hygiene practices scores[19,22].

Employees' hygiene practices depending on the level of their attitudes toward food safety education

In order to compare employees' hygiene practices depending on the level of employees' attitudes toward food safety education, two categories (low and high attitude group) have been created based on the average score using the mean split method. The average score of attitudes toward food safety education was 3.94 out of 5. Thus, the low group has scores under 3.94, whereas the high group has scores above 3.94.

Table 5. Foodservice employee's hygiene practices depending on attitudes toward food safety education

	Attitude toward food safety education		t
	Low (n = 60)	High (n = 124)	
Personnel hygiene practices (M ± S.D.)	4.35 ± 0.47	4.53 ± 0.47	−2.43**
Food handling hygiene practices (M ± S.D.)	4.49 ± 0.45	4.63 ± 0.44	−2.04
Equipment hygiene practices (M ± S.D.)	4.53 ± 0.44	4.66 ± 0.43	−1.89
Equipment handling practices (M ± S.D.)	4.56 ± 0.48	4.69 ± 0.44	−1.76
General hygiene practices (M ± S.D.)	4.48 ± 0.41	4.63 ± 0.40	−2.32**

Note: ** $p < 0.01$

The results of employees' hygiene practices depending on their attitudes toward food safety education are as follows (Table 5). The results of hygiene practices between low and high attitude group showed a significant difference (t = −2.433, $p < 0.01$). Hygiene practice scores in the low attitude group (M = 4.35, SD = 0.46) were lower than in the high attitude group (M = 4.53, SD = 0.47). A significant difference was shown between the low and high attitude group in personal hygiene (t = −2.433, $p < 0.01$). Personal hygiene practice scores in the low attitude group (M = 4.35, SD = 0.46) was lower than in the high group (M = 4.53, SD = 0.47). The results revealed that employees' good attitude has an in-

fluence on hygiene practices. This result emphasizes the important role of favorable attitude toward hygiene education on school foodservice sanitation[10,23,24]. Even though monthly hygiene education is being enacted at the most schools, continuos efforts for building favorable attitudes toward hygiene education are required. Hygiene education to promote interest or rewards for hygiene education completion can be helpful for school foodservice sanitation.

국문 요약

본 연구는 학교급식위생에 중요한 역할을 하는 조리종사자의 위생관리수행도에 도움이 될 수 있는 기초위생자료 제공을 위해 급식소의 일반사항, 위생교육에 대한 조리종사자의 태도, 그리고 위생관리수행수준의 관계를 규명하였다. 경남지역에 소재하고 있는 초・중・고등학교 급식소 23곳의 조리종사자 185명을 대상으로 데이터를 수집하고 분석한 결과, 급식운영형태에서는 직영보다 위탁이 위생관리 수행수준이 더 높게 나타났으며, 하루제공 끼니수 에서는 1식이 2식, 3식을 하는 집단보다 위생관리 수행수준이 더 높은 것을 알 수 있었다. 조리종사자의 위생교육 태도에 따른 위생관리 수행수준 차이를 살펴본 결과, 위생교육에 대한 태도가 좋을수록 위생관리 수행도가 높아짐을 알 수 있었다. 본 연구의 결과로부터 급식소의 일반사항과 학교 조리종사자의 위생교육에 대한 태도는 위생관리 수행수준을 결정하는 중요한 요인임이 밝혀졌다.

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