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

Ja Gyung Heo1 and Jee Hye Lee2*

1Miryang Donggang Middle School, Miryang, Korea
2Department 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 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 schools1,2). 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 followed3). Hazard Analysis Critical Control Point (HACCP) has been established at schools in order to secure school foodservice safety3).

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 spread4,5). 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 directly6,7,8).

Thus, foodservice employees’ attitude toward sanitation, food safety knowledge, and hygiene practices are essential to prevent foodborne disease outbreaks in schools9,10).

Determinations 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 supported11). 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 practices12,13,14,15,16).
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 foodservice 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: personal 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 Gyeungnam province 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>
<thead>
<tr>
<th>Variables</th>
<th>Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
</tr>
<tr>
<td>31-40</td>
<td>15(8.1)</td>
</tr>
<tr>
<td>41-50</td>
<td>104(56.2)</td>
</tr>
<tr>
<td>51-60</td>
<td>65(35.1)</td>
</tr>
<tr>
<td>≥ 61</td>
<td>1(0.5)</td>
</tr>
<tr>
<td>Education</td>
<td></td>
</tr>
<tr>
<td>Elementary school</td>
<td>2(1.1)</td>
</tr>
<tr>
<td>Middle school</td>
<td>9(4.9)</td>
</tr>
<tr>
<td>High school</td>
<td>163(88.1)</td>
</tr>
<tr>
<td>College or more</td>
<td>11(5.9)</td>
</tr>
<tr>
<td>Working experience (years)</td>
<td></td>
</tr>
<tr>
<td>&lt; 1</td>
<td>7(3.8)</td>
</tr>
<tr>
<td>1 ~ 3</td>
<td>24(13.0)</td>
</tr>
<tr>
<td>3 ~ 5</td>
<td>36(19.5)</td>
</tr>
<tr>
<td>5 ~ 10</td>
<td>63(34.1)</td>
</tr>
<tr>
<td>≥ 10</td>
<td>55(29.7)</td>
</tr>
<tr>
<td>Number of cooking certification</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>128(69.2)</td>
</tr>
<tr>
<td>≥ 1</td>
<td>57(30.8)</td>
</tr>
<tr>
<td>Total</td>
<td>185(100.0)</td>
</tr>
</tbody>
</table>
and 42.3%\textsuperscript{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 \textit{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.

\textbf{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).

\textbf{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 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 = 0.45) 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.

\begin{table}[h]
\centering
\begin{tabular}{lcc}
\hline
Variables & Frequency (%) \\
\hline
\textbf{Frequency of feeding /1 day} & & \\
1 time & 129(69.7) \\
2 times & 46(24.9) \\
3 times & 10(5.4) \\
\hline
\textbf{Type of foodservice operation} & & \\
Direct & 176(95.1) \\
Indirect & 9(4.9) \\
\hline
\textbf{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) \\
\hline
\textbf{Total feeding number} & & \\
< 900 & 75(40.5) \\
≥ 900 & 110(59.5) \\
\hline
\textbf{Number of foodservice employees} & & \\
< 10 & 129(69.7) \\
≥ 10 & 56(30.3) \\
\hline
\textbf{Total} & 185(100.0) \\
\hline
\end{tabular}
\end{table}

\begin{table}[h]
\centering
\begin{tabular}{lcc}
\hline
\textbf{Category} & \textbf{Contents} & \textbf{M ± S.D} \\
\hline
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 \\
\hline
\textbf{Food hygiene} & Total (4 items) & 4.47 ± 0.48 \\
& 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 \\
\hline
\textbf{Food handling hygiene} & Total (4 items) & 4.58 ± 0.45 \\
& 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 \\
\hline
\textbf{Equipment hygiene} & Total (4 items) & 4.62 ± 0.43 \\
& 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 \\
\hline
\textbf{General hygiene (16 items)} & Total (4 items) & 4.65 ± 0.45 \\
& 4.58 ± 0.41 \\
\hline
\end{tabular}
\end{table}

Note. 5-point Likert scale: 1 = Strongly disagree ~ 5 = Strongly agree
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 = 0.47). 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. For instance, the effects of sanitation education, total feeding number, and type of foodservice operation 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.

**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 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 |       |
| ≥ 900                           | 133    | 4.58 ± 0.42 |       |
| Number of foodservice employees |        |             |    |
| < 10                            | 129    | 4.57 ± 0.40 |       |
| ≥ 10                            | 55     | 4.61 ± 0.41 | −0.65 |
| Category                        | n      | M ± S.D.    | Duncan F-value |
| Type of foodservice             |        |             |    |
| Elementary school alone         | 60     | 4.65 ± 0.35 | a    |
| Middle school alone             | 34     | 4.68 ± 0.35 | a    | 11.57*** |
| 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    |
| 2 times                         | 46     | 4.41 ± 0.47 | b    | 6.44**   |
| 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

| Table 5. Foodservice employee’s hygiene practices depending on attitudes toward food safety education |
|---------------------------------|--------|-------------|----|
| Attitude toward food safety education |        |             |    |
| Low (n = 60)                    |        |             |    |
| 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. Even though monthly hygiene education is being enacted at the most schools, continuous 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.

References

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