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Risk Awareness and Protective Behaviors of Food Service Workers Against Communicable Diseases in a District Center

Bir İlçe Merkezinde Yemek Servisi Çalışanlarının Bulaşıcı Hastalıklara Karşı Risk Farkındalıkları ve Korunma Davranışları

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** The research is derived from the master's thesis titled "Risk Awareness and Protective Behaviors of Food Service Workers Against Communicable Diseases in a District Center".

ABSTRACT

Aim: *This study aims to determine food and beverage service workers' risk awareness and protective behaviors against communicable diseases in a district center.*

Material and Method: *This descriptive study, conducted between July and August 2023, included 198 food service workers from cafes, diners, and restaurants in a district center. Data was collected through face-to-face interviews and self-reports using a Survey Form and the Communicable Diseases Risk Awareness and Protection Scale. Data were analyzed using descriptive statistics, the Mann-Whitney U test, the Kruskal Wallis test, and multivariate regression analysis.*

Results: *It was found that 24.7% of the participants did not receive hygiene training, and 62.6% worked at the workplace while having a communicable disease. The participants' mean total scale score was 129.23 ± 17.5, indicating lower awareness of communicable disease risks compared to other adult studies using the same scale. A positive and significant relationship was found between the participants' level of education and hygiene training status and the total scale scores.*

Conclusion: *Deficiencies in hygiene practices and awareness of communicable disease risks among food service workers were identified. Accordingly, the development of comprehensive training programs is recommended to enhance both worker and public health protection.*

Keywords*: Awareness, Communicable disease, Food service, Hygiene training*

ÖZET

Amaç: *Bu araştırmanın amacı, bir ilçe merkezinde yiyecek içecek sektörü servis çalışanlarının bulaşıcı hastalıklara karşı risk farkındalıkları ve korunma davranışlarını belirlemektir.*

Gereç ve Yöntem*: Tanımlayıcı türde olan bu araştırma bir ilçe merkezindeki kafe, restoran ve lokantalarda aktif olarak çalışan 198 yemek servisi çalışanı ile Temmuz-Ağustos 2023 tarihleri arasında gerçekleştirilmiştir. Veriler yüz yüze görüşme ve öz bildirim yöntemiyle Anket Formu ve Bulaşıcı Hastalıklar Risk Farkındalığı ve Korunma Ölçeği kullanılarak toplanmıştır. Araştırmada verilerin analizi için tanımlayıcı istatistikler, Mann Whitney-U testi, Kruskal Wallis testi, ve Çok Değişkenli Regresyon Analizi kullanılmıştır.*

Bulgular: *Katılımcıların %24,7'sinin hijyen eğitimi almadığı ve %62,6'sının bulaşıcı hastalık geçirdiği dönemde işyerinde çalıştığı tespit edilmiştir. Katılımcıların toplam ölçek puanı ortalaması 129,23 ± 17,5 olarak bulunmuş olup, bu bulgu, aynı ölçeği kullanarak yetişkinlerde yapılan diğer çalışmalara kıyasla bulaşıcı hastalık riskleri konusundaki farkındalıklarının daha düşük olduğunu göstermektedir. Katılımcıların eğitim durumu ve hijyen eğitimi alma durumları ile toplam ölçek puanı arasında pozitif yönde anlamlı ilişki bulunmuştur.*

Sonuç: *Yemek servisi çalışanları arasında hijyen uygulamaları ve bulaşıcı hastalık risklerine ilişkin farkındalık konusunda eksiklikler tespit edilmiştir. Buna göre, hem çalışanların hem de halk sağlığının korunması için kapsamlı eğitim programlarının geliştirilmesi önerilmektedir.*

Anahtar kelimeler: *Bulaşıcı hastalık, Farkındalık, Hijyen eğitimi, Yemek servisi*

INTRODUCTION

Consuming contaminated food causes one in 10 people in the world to become ill and more than 420,000 deaths every year. The significant health issues resulting from foodborne diseases encompass kidney and liver failure, reactive arthritis, brain and nerve disorders, cancer, and mortality. Foodborne diseases are becoming a growing public health problem worldwide due to increased international trade, more complex, long food chains, and the ability of infected food products and food contamination to cross national borders (World Health Organization, 2022).

Foodborne diseases are a critical public health issue, attributable to the consumption of food contaminated with pathogenic microorganisms. Such contamination can be introduced at any point throughout the food production continuum, preparation, processing, cooking, sale, service, packaging and consumption. The ingestion of contaminated food products may precipitate a wide array of clinical manifestations, from self-limiting gastrointestinal disorders to life-threatening systemic infections, often culminating in long-term morbidity, mortality, and substantial economic repercussions. The burden of foodborne illnesses is markedly elevated in low- and middle-income countries and disproportionately affects vulnerable populations, including neonates, young children, the elderly, and immunocompromised individuals (Velusamy, Arshak, Korostynka, Vaseashta, & Adley, 2012).

Factors such as cross-contamination of food and food handlers, antimicrobial-resistant bacteria, eating behavior and technology, globalization and climate change contribute to the occurrence of foodborne diseases. In addition, poor hygiene practices of food handlers and lack of public awareness are key factors triggering the spread of these diseases. (Salleh, Lani, Abdullah, Chilek, & Hassan, 2017). Control of foodborne diseases is of great importance due to the high risk of transmission and especially affecting food handlers, as infected food handlers can cause foodborne disease outbreaks affecting the local community or a large population (Park, You, Cho, Hong, & Ghim, 2017).

The effective implementation of food hygiene practices is not limited to the hygiene training provided to workers; it is also important to provide appropriate physical conditions and a supportive social environment where workers feel safe. In Clayton, Clegg Smith, Neff, Pollack, & Ensminger's (2015) study on the factors affecting the compliance of individuals working in the food sector with hygiene practices, it is seen that the lack of physical infrastructure negatively affects hygiene behaviors. In addition, it is stated that workers are hesitant to inform their employers when they are sick; this hesitation is mostly due to loss of income, fear of dismissal or the perception that they will not be taken seriously by managers. On the other hand, the importance given by managers to hygiene rules strengthens the motivation of workers towards hygiene practices and the supportive culture formed in the organizational context and increases compliance with hygiene rules. Therefore, ensuring food safety is not only possible by raising individual awareness, but should be addressed in a holistic manner by organizing the physical environment, strengthening social security mechanisms and implementing systematic institutional policies.

Humans are the source of many harmful bacteria. The throats, noses, skin, hands, intestines and feces are of individuals are colonized by numerous bacteria. Many bacteria are found in small wounds, cracks and cuts on people's skin; on unwashed hands after going to the restroom; on clothes, hair and beards; in nasal secretions and in saliva that is released into the air when people cough, sneeze and talk loudly (Bilici, Uyar, Beyhan, & Sağlam, 2006). Insufficient knowledge, attitudes, and practices related to hygiene among food handlers, as well as inappropriate food handling techniques, can result in the contamination of food with pathogenic microorganisms, leading to foodborne illnesses (Baş, Ersun, & Kıvanç, 2006; Sezgin & Özkaya, 2014; Sezgin & Artık, 2015). According to the study by Shojaei, Shooshtaripoor, & Amiri (2006), it was emphasized that the most important factor regarding the personal hygiene of personnel working in the food sector is their hands, and that hands carry the risk of cross-contamination. This situation poses a great risk, especially in the spread of infections transmitted by the fecal-oral route. The study emphasized that one of the most effective methods in preventing such communicable diseases is for workers to disinfect their hands frequently and correctly. Workers in the food sector have a great responsibility both to protect their own health and to ensure public health. In addition to protecting the health of workers, it is also extremely important to comply with hygiene rules in the work environment. This

should not be limited to the cleanliness of hands, but attention should also be paid to body hygiene, work clothes, the cleanliness of the tools and equipment used, and general hygiene standards (Yaman & Özgen, 2007).

With the Hygiene Training Regulation (2013), hygiene training is mandatory for individuals working in workplaces for food production, sales and cleaning services that have contact with the human body. The primary objective of this regulation is to establish a structured framework for the provision of hygiene training to individuals engaged in food production, sales, and cleaning services involving direct contact with the human body. It also aims to define the responsibilities of business owners, workers, and operators in ensuring hygiene standards, as well as to outline procedures for the identification and management of infectious and dermatological diseases that may preclude workers from performing their duties in the workplace. The course completion certificate obtained because of the training remains valid as long as the individual continues to work in the same line of business. Workers' possession of hygiene training certificates is monitored, and penalties are imposed on those who fail to fulfil their obligations (Hygiene Training Regulation, 2013).

Training in hygiene practices is of critical importance for food handlers, who play an important role in preventing food contamination, to realise their responsibilities. Food handlers should be considered as potential carriers of pathogenic microorganisms and should be trained until they have sufficient knowledge and skills in food production practices (Food and Agriculture Organization & World Health Organization, 2023). To improve the hygiene quality of foods prepared for consumption, situations that may pose a risk in the field of hygiene should be identified, and necessary precautions should be taken (Demirel, 2009).

The objective of this research is to assess the risk awareness and protective behaviors of food service workers in the food and beverage sector within a district center concerning communicable diseases. It is thought that the results of this research will be useful in determining the health education needs of food service workers and creating the content of training programs.

Research Hypotheses

H1: Food service workers have high levels of communicable disease risk awareness and protective behaviors.

H2: There is a significant difference between the sociodemographic characteristics of food service workers and their communicable disease risk awareness and protective behaviors.

H3: There is a significant difference between the communicable disease risk awareness and protective behaviors of food service workers according to their status of receiving hygiene training.

MATERIALS AND METHODS

Research Type

This research is a descriptive study.

Study Population and Sample

This descriptive study was conducted between July and August 2023 among food service workers actively working in restaurants, cafes, and diners in a district center. No sample selection was made in the study, and it was aimed at reaching the entire population. In preliminary interviews with the Chamber of Tradesmen and Craftsmen, the Chamber of Commerce, and food sector workplaces in the district, it was planned to include approximately 350 food service workers in the survey. Participants were given 15 minutes to answer the survey form and scale, which were the research data. The research was completed by 198 actively working adult food service workers. Six participants who had missing data in the survey and scale, were illiterate, and wanted to withdraw from the research voluntarily were not included in the study.

Data Collection Tools

Data collection was done through self-reporting in face-to-face interviews using the Survey Form and the Communicable Diseases Risk Awareness and Protection Scale.

Survey Form: The survey form created by the researchers comprises 16 questions. The survey form was created using the relevant literature (Aksoy & Ersoy, 2011; Ünlüönen & Cömert, 2013; New South Wales Food Authority, 2015; Köksal, Soysal, Ergör, & Kaner, 2016; Bazaid, Aldarhami, Binsaleh, Sherwani, & Althomali, 2020). The survey consists of two parts. The first part contains the sociodemographic information of the participants. In the second part, in addition to the participants' perceptions and behaviors related

to hygiene, there are questions about their hand washing status while working at work.

Communicable Diseases Risk Awareness and Protection Scale (CDRAPS): CDRAPS is a Likert-style scale developed by Ener, Seyfeli, & Çetinkaya (2022). The scale evaluates the general risk awareness, attitude level, and protective behaviors of individuals aged 18 and over against communicable diseases. The scale has a total of 36 items and consists of six subscales. The subscales of the scale are Common Life Risk Awareness, Self-Protection Awareness, Protection Behaviors, Handwashing Behaviors, Social Protection Awareness,–Personal Contagion Awareness. The minimum score achievable on the scale is 36, while the maximum score is 180. An increase in the total score obtained from the scale indicates that individuals' awareness, attitudes, and protective behaviors towards communicable diseases have improved, reflecting a more conscious and proactive approach to their health (Ener et al., 2022). In addition, the internal consistency of the CDRAPS, which had been previously analyzed for validity and reliability, was evaluated with Cronbach's α and found to be 0.90. The internal consistency coefficients of the subscales of the scale are between 0.66 and 0.79, including Common Life Risk Awareness 0.73, Protection Behaviors 0.74, Self-protection Awareness 0.79, Social Protection Awareness 0.69, Handwashing Behaviors 0.66, and Personal Contagion Awareness 0.72.

Ethical Consideration

Ethics committee approval for the study was obtained from the ethics committee of a state university (Date: 19.04.2023, Protocol No: 26). Permission for the research was obtained from the author, who developed the CDRAPS. Permission was obtained from the institutions to be included in the research, and written permission was obtained from the District Governor's Office. After the participants were informed about the study, their written consent was obtained.

Data Analysis

The SPSS 26.0 package program was used in the statistical analysis of the research data. In the study, parametric test assumptions in independent groups were evaluated with the Kolmogorov-Smirnov test and because of the test, it was determined that the data were not normally distributed. In the study, descriptive statistics were used to analyze sociodemographic data, and the Mann Whitney-U test and Kruskal Wallis test were used to compare the groups. Multivariate regression analysis was performed to determine which characteristics of the participants were associated with the differences found in the comparison between groups. The significance level was accepted as $p<0.05$.

RESULTS

The mean age of the participants was 27.8 ± 9.91 years; 52% were between 18-24 years old, 58.1% were male, 65.2% were single, 57.1% were high school graduates, 53.5% had income equal to expenses, and 11.1% had chronic diseases (Table 1).

It was found that 53.5% of the participants cut their nails every week, 46.5% do not wear jewelry on their hands or wrists while working, 50% change their work clothes every day, 53.5% think they have sufficient knowledge about hygiene practices, and 37.4% do not work at work when they have an infectious disease (Table 1).

It was determined that 24.7% of the participants did not receive hygiene training, 38.4% had been working as a food service worker for less than one year, 2.5% had experienced a case of poisoning at their workplace, and 80.3% did not wear a mask when they had an infectious disease (Table 1).

It was determined that 46.5% of the participants did not wash their hands before going to the restroom, 41.9% did not wash their hands after touching their hair or body, 32.3% did not wash their hands after coughing, 29.8% before eating, 14.1% after touching their mouth and nose and 13.1% after using wipes. On the other hand, 99% of the participants reported washing their hands after going to the restroom, 98% washed their hands before touching ready-to-eat foods, and 97% washed their hands after touching raw foods, 95.5% after sneezing and 91.4% after eating. (Table 2).

The average total score of the participants was 129.23 ± 17.5 out of 180. The mean subscale total scores of the individuals were 29.98 ± 5.24 out of 45 points for Common Life Risk Awareness, 28.22 ± 4.64 out of 40 points for Protection Behaviors, 31.69 ± 5.23 out of 40 points for Self-Protection Awareness, 13.66 ± 3.13 out of 20 points for Social Protection Awareness, 10.68 ± 2.65 out of 15 points for Handwashing Behaviors, and 14.98 ± 3.01 out of 20 points for Personal Contagion Awareness. The participants' average scores for all items in the same sub-dimension in

Table 1. Characteristics and Hygiene Practices of Food Service Workers (n=198)

Age (Mean ± SD)	27.8 ± 9.91	
Variables	**n**	**%**
Age group		
18-24 years old	103	52.0
25-34 years old	46	23.2
35-44 years old	29	14.6
45 years and above	20	10.1
Sex		
Female	83	41.9
Male	115	
Marital status		
Single	129	65.2
Married	69	
Educational Status		
Primary and secondary school	26	13.1
High school	113	57.1
Associate degree	39	19.7
Bachelor's degree	20	10.1
Income Status		
Income is less than expenses	58	29.3
Income equal to expense	106	53.5
Income more than expenses	34	17.2
Working time in the field		
1 year or less	76	38.4
2-5 years	69	34.8
6 years and more	53	26.8
Nail Cutting Frequency		
Once a week	106	53.5
Biweekly	74	37.4
When it gets longer	18	9.1
Wearing Jewelry While Working		
Yes	65	32.8
No	92	46.5
Sometimes	41	20.7
Frequency of changing work clothes		
Everyday	99	50.0
Every other day	74	37.4
When it gets dirty	25	12.6
Occurrence of poisoning incidents among customers		
Yes	5	2.5
No	185	93.4
I don't know	8	4.0
Perceived Hygiene Self-Knowledge Status		
Sufficient	106	53.5
Insufficient	48	24.2
Undecided	44	22.2
Presence of Chronic Disease		
Absent	176	88.9
Available	22	
Status of Holding a Hygiene Training Certificate		
Yes	149	75.3
No	49	
Have you ever worked while suffering from an infectious disease?		
Not working	74	37.4
Working	124	
Wearing a mask when having an infectious disease		
Yes	39	19.7
No	159	

n: Number, %: Percentage, SD: Standard Deviation

the scale were calculated at the item level and as a result, the subscale in which the participants had the lowest mean score was common life risk awareness, while the subscale in which they had the highest mean score was self-protection awareness (Table 3).

Table 2. Situations Where Participants Cannot Wash Their Hands (n*=198)

Situations	**n***	**%**
Before going to the restroom	92	46.5
After touching my hair or my body	83	41.9
After coughing	64	32.3
Before eating	59	29.8
After touching my mouth and nose	28	14.1
After using wipes	26	13.1
After eating	17	8.6
After sneezing	9	4.5
After touching raw food	6	3.0
Before contact with ready-to-eat foods	4	2.0
After going to the restroom	2	1.0

n*: Multiple options are ticked, %: Percentage

A statistically significant difference was found between the total score of the CDRAPS according to the participants' sex, age group, education level, income level, hygiene training status, and length of time working in the field as a food service worker ($p<0.05$, Table 4). The total score on the CDRAPS was found to be higher in participants who were female and had received hygiene training. According to the results of the analysis, participants in the 25-34 years range had higher total CDRAPS scores than those in other age groups; high school, associate's degree, and bachelor's degree graduates had higher scores than those with primary school-middle school graduates; associate's degree and bachelor's degree graduates had higher scores than those with high school graduates; those with more income than expenses had higher scores than those with less income than expenses; and those who had been working in the field for 3-5 years had higher scores than those who had been working in the field for a year or less (Table 4).

Based on the statistical analyses conducted to compare the groups, multivariate regression analysis was performed to determine which sociodemographic and other characteristics of the participants were associated with significant differences in CDRAPS total scores. As a result of the analysis, it was determined that a significant regression model, $F(6,191) = 6.62$, $p<0.000$, and 14% of the variance in the dependent variable (R^2 corrected = 0.14) were explained by the

independent variables. Accordingly, a positive significant relationship was found between the participants' education level (β=0.32, t(191)=4.35, p<0.000, pr2=0.09) and status of receiving hygiene training (β=0.19, t(191)=2.76, p<0.01, pr2=0.04) and the CDRAPS total score (Table 5).

Table 3. Participants' CDRAPS and Subscale Total Score Averages (n=198)

	At the item level	At the scale level		
Variables	$\bar{x}$	$\bar{x}$ ± **SD**	**Min**	**Max**
CDRAPS	3.58	129.23 ± 17.5	82	174
Common Life Risk Awareness Subscale	3.33	29.98 ± 5.24	15	43
Self-protection Awareness Subscale	3.96	31.69 ± 5.23	16	40
Protection Behaviors Subscale	3.52	28.22 ± 4.64	16	40
Handwashing Behaviors Subscale	3.56	10.68 ± 2.65	3	15
Social Protection Awareness Subscale	3.41	13.66 ± 3.13	4	20
Personal Contagion Awareness Subscale	3.74	14.98 ± 3.01	8	20

n: Number, $\bar{x}$: Mean, SD: Standard Deviation, Min: Minimum, Max: Maximum

Table 4. Comparison of CDRAPS total scores according to sociodemographic and other characteristics of the participants (n=198)

Variables	**n**	**Median (IQR)**	**Min-Max**	**Z***	***p***
Sex					
Female	83	136(124-144)	85-166	-2.024	**0.043***
Male	115	130(119-139)	82-174		
Marital status					
Single	129	131(120-140)	85-174	-1.640	0.101*
Married	69	136(123-143.5)	82-166		
Status of Receiving Hygiene Training					
Yes	149	133(123.5-142)	84-166	-2.175	**0.030***
No	49	128(110.5-140)	82-174		
Age group	**n**	**Median**	**IQR**	**KWχ^2****	***p***
18-24 years old (1)	103	130	120-139	21.623	**0.000****
25-34 years old (2)	46	141	132.5-144.75		**2>1,3,4***
35-44 years old (3)	29	131	110-141		
45 years and above (4)	20	124	113.75-134		
Educational Status					
Primary and secondary school (1)	26	122	98.5-131	30.590	**0.000****
High school (2)	113	131	122-138.5		**2>1***
Associate degree (3)	39	141	129-146		**3>1,2***
Bachelor's degree (4)	20	142	134.25-152.75		**4>1,2***
Income Status					
Income is less than expenses (1)	58	126	118.25-136	8.752	**0.013****
Income equal to expense (2)	106	133	122.75-141.25		**3>1***
Income more than expenses (3)	34	140	127.50-143		
Working time in the field					
1 year or less (1)	76	128	116-137.75	8.953	**0.011****
2-5 years (2)	69	134	126-144		**2>1***
6 years and more (3)	53	136	119-142		

n: Number, IQR: Interquartile range (25th-75th percentile), Min: Minimum, Max: Maximum, Z*: Mann-Whitney U test, p: Significance, KWχ^2**: Kruskal Wallis test, p<0.05

In this study, a post hoc power analysis was performed using G*Power 3.1 for the multivariate regression model to assess the adequacy of the sample size with 198 participants (Faul, Erdfelder, Buchner, & Lang, 2009). With an R^2 of 0.14, six predictors, and a total sample size of 198, the effect size (f^2) was calculated as 0.163. Given an alpha level of 0.05, the achieved statistical power (1 - β) was approximately 0.99, indicating that the model had sufficient statistical power to detect the observed relationship.

Table 5. Relationship between Participants' Sociodemographic and Other Characteristics and CDRAPS Total Score (n=198)

Independent Variables	Dependent variable	B	Std. E.	(β)	t*	*p*	Adjusted R^2	F**	*p*
Sex	CDRAPS total score	-3.582	2.345	-.101	-1.528	0.128	0.146	6.622	**0.000** **
Status of Receiving Hygiene Training		7.657	2.776	.189	2.759	**0.006** *			
Age group		-1.869	1.606	-.109	-1.163	0.246			
Educational Status		6.854	1.575	.319	4.352	**0.000** *			
Income Status		-.456	1.868	-.018	-.249	0.804			
Working time in the field		2.672	2.063	.122	1.295	0.197			

B: Regression loadings, Std. E.: Standard error, Beta: Standardized coefficients, t*: Independent Sample T-Test, p: Significance, Adjusted R^2: Adjusted regression square, F: One way ANOVA test, $p<0.05$

DISCUSSION

In this study, the mean total score of CDRAPS was 129.23, which is slightly above the midpoint of the scale. In other studies conducted using CDRAPS, the scale total score average of the participants was found to be 137.31 in the Erdoğan & Duru (2024) study with university students, 155.7 in the Oruç, Yildirim, Kocatepe, & Demirkıran (2023) study with healthcare personnel, and 150.76 in the Murat (2023) study with adults. The first hypothesis, "Food service workers have high levels of communicable disease risk awareness and protective behaviors." was rejected because the average total CDRAPS scale score obtained by the food service workers participating in this study was found to be lower than that of other studies conducted on adult individuals using the same scale. It is thought that the reason why the scale total score average of the participants in this study was lower than the individuals in other studies using the same scale is due to the difference in the level of education and the place of residence of our participants. Compared to previous studies conducted with university students, adult individuals, and healthcare professionals, the lower total scale score among food service workers in the current study highlights a need for increased training and education within this occupational group.

In this study, a statistically significant difference was found between the CDRAPS total scores of the participants according to sex, age group, education level, income level, length of time working in the field, and whether they received hygiene training ($p<0.05$). Multivariate regression analysis was performed to determine which participant characteristics these significant differences were associated with, and it was determined that the factors causing the differences were education level and status of receiving hygiene training ($p<0.05$). As the education level of food service workers participating in this study increases, the average total CDRAPS score also increases. Therefore, the second hypothesis of the study, "There is a significant difference between the sociodemographic characteristics of food service workers and their communicable disease risk awareness and protective behaviors." was accepted. Among the food service workers who participated in this study, those who received hygiene training had higher average total CDRAPS scores. Therefore, the third hypothesis of the study, "There is a significant difference between the communicable disease risk awareness and protective behaviors of food service workers according to their hygiene training status." was accepted. Similarly, in other studies conducted with food handlers, a statistically significant difference was found between the hygiene knowledge levels of the participants according to their education level (Jianu & Chiş, 2012; Martins, Hogg, & Otero, 2012; Yıldırım, 2014; Köksal et al., 2016; Gün & Kendirci, 2021) and hygiene training status (Demirel, 2009; Ayaz & Aydın, 2017; Onurlar, 2020; Gün & Kendirci, 2021). Similarly, in other studies conducted with food handlers, a statistically significant difference was determined between the hygiene behaviors of the participants according to their educational level (Yıldırım, 2014; Dalyan, Canpolat, Öztürk, & Pişkin, 2023) and hygiene training status (Yıldırım, 2014; Aydoğan & Erol, 2023; Dalyan et al., 2023). In studies conducted by providing hygiene training to food handlers, it was determined that the hygiene knowledge levels of the participants increased after the training compared to before the training (Sormaz &

Şanlıer, 2017; Labovic, Joksimović, Galić, Knežević, & Mimović, 2023). The increase in the participants' hygiene knowledge level after the training program shows that the training was successful in transferring information and that the participants gained more knowledge about hygiene. The increase in the knowledge level shows that the participants learned the correct practices regarding hygiene and could better understand how to integrate this knowledge into their work. This shows that the training not only provides information but can also be effective in improving the hygiene behaviors of the participants in their daily work processes. The work of food workers in accordance with the hygiene rules helps to prevent foodborne diseases by reducing potential health risks. This shows that hygiene training has a great impact not only on theory but also in practice and can make significant contributions to the improvement of hygiene standards.

In this study, it was found that 75.3% of the participants received hygiene training. In the research conducted with food handlers before the publication of the regulation, it was determined that 73.9% of the participants in Eksen et al.'s (2004) research, 47.8% of the participants in Baş et al.'s (2006) study, and 90.38% of the participants in Akbulut's (2010) study did not receive hygiene training. In other studies conducted with food handlers after the publication of the regulation 30.8% of the participants in Yıldırım's (2014) study, 93.2% of the participants in Köksal et al.'s (2016) study, 67.6% of the participants in Ayaz and Aydın's (2017) study, 85.9% of the participants in Onurlar's (2020) study, 69.3% of the participants in Gün & Kendirci's (2021) study, and 97.6% of the participants in Aydoğan and Erol's (2023) study received hygiene training. Most studies conducted with food handlers reveal that individuals have received higher rates of hygiene training after the publication of the regulation. As a result of this situation, it is expected that workers will become aware of hygiene, learn personal hygiene, cleaning and correct food processing techniques and contribute to increasing the general hygiene level in the workplace.

Following the entry into force of the Hygiene Training Regulation in 2013, the obligation for employees working in food businesses to undergo porter examinations was abolished. Instead, these workers were mandated to complete certified hygiene training programs. However, the Hygiene Training Regulation (2013) abolished the obligation for food sector workers to undergo a porter examination; instead, it was made mandatory for them to complete hygiene training programs provided by the Ministry of National Education or authorized institutions and obtain a certificate. This change aims to make hygiene a systematic and documentable process rather than an individual responsibility. However, hygiene training certificates are often issued because of short-term programs lasting 3 to 4 hours. This calls into question the effectiveness of such training in terms of providing employees with lasting behavioral changes and sustaining hygiene awareness in the long term. In the event of an infectious disease in food services, the employer is held directly responsible and may face severe penal sanctions if it fails to take the necessary measures (Hygiene Training Regulation, 2013). In addition, the abolition of porter examinations has made it more difficult to identify individuals who are carriers, making it even more important for employers to establish regular monitoring and evaluation processes for employee health. As a result, hygiene training should not only be seen as a legal obligation; it should be supported by continuous training and control processes to improve employees' knowledge, attitudes and behaviors on health and hygiene.

In this study, it was found that 53.5% of the participants cut their nails every week. Similarly, in other studies conducted with food handlers, it was determined that 65.3% of the participants in the study of Allam, Al-Batanony, Seif, & Awad (2016), 76% of the participants in the study of Hadir (2018), 69% of the participants in the study of Sharma, Gangopadhyay, Agarwal, Kumar, & Ingole (2021) had cut nails. Mudey et al. (2010) found that 31.8% of the participants cut their nails twice a week, 41.8% once a week, and Aksoy and Ersoy (2011) found that 47.5% of the participants cut their nails every week. Similarly, it was found that most participants in this study cut their nails regularly. Regular nail care plays an important role in maintaining hygiene standards, reducing contamination risks and creating healthy working environments (Lin, 2003).

In this study, it was found that 37.4% of the participants did not work when they had a communicable disease. Similarly, in studies conducted with food handlers, it was determined that %20.6 of the participants in the Sargın's (2005) study, 40% of the participants in the Green et al.'s (2006) studies, 59.3% of the participants in

the Aksoy and Ersoy's (2011) studies, 31.5% of the participants in the Ifeadike, Ironkwe, Adogu, & Nnebue's (2014) studies did not work when they had an communicable disease. In the study of Sormaz and Şanlıer (2017), in the evaluation made after the training given to food handlers, it was determined that 15.8% of individuals did not come to the workplace when they had an communicable disease. The fact that 62.6% of the participants in our study were actively working at work while having a communicable disease could have a major impact on the spread of the infection. The implementation of infection control measures in workplaces and the removal of individuals with the disease from work are critical both in terms of protecting the health of workers and public health. When an individual with a communicable disease continues to work, it can negatively affect workers' health, leading to decreased productivity and larger outbreaks. Therefore, the responsibilities of both employers and workers are of great importance.

In this study, 46.5% of the participants reported that they did not wear jewelry on their hands or wrists while working at work. In other research conducted with food handlers, Ababio and Adi (2012) found that 49.1% of the participants, Özgel and Yıldız (2020) found that 50% of the participants, Sharma et al. (2021) found that 64.5% of the participants, Labović et al. (2023) found that 71.4% of the participants did not wear jewelry while working at work. In the Acikel et al.'s (2008) studies, it was determined that 80% of the individuals did not wear jewelry while working at work, according to the evaluation made after the participants were given hygiene training. Wearing jewelry on the hand or wrist while working can prevent hands from being cleaned properly, increase the likelihood of hands carrying pathogens and cause problems during the rinsing process (Koçak, 2015). During food preparation and service, jewelry can come into direct contact with food or fall into food, increasing the risk of foodborne illness. Not wearing jewelry while working can contribute to improving hygiene conditions in the workplace by reducing potential contamination risks, but the fact that most individuals in this study wore jewelry while working indicates that they need to be made aware of this issue.

In this study, 50% of individuals reported that they changed their work clothes every day, and 37.4% stayed that they changed every other day. Similarly, in other studies conducted with food handlers, it was determined that 55% of the participants in the Sargın's (2005) study and 31.9% of the participants in the Ünlüönen and Cömert's (2013) studies changed their work clothes every day. In the study of Sormaz and Şanlıer (2017), it was stated that 47.4% of the participants reported changing their work clothes daily, and 22.1% reported doing so every other day. Regular change of work clothes can reduce infection risks and contribute to the increase of general hygiene standards. In this study, the frequency of changing work clothes of the participants was relatively high, consistent with the results of other studies.

In this study, 99% of the participants reported washing their hands after going to the restroom, 98% before touching ready-to-eat foods, and 97% after touching raw foods, 95.5% after sneezing, 86.9% after using wipes, 67.7% after coughing and 53.5% before going to the restroom. Similarly, in other studies conducted with food sector workers, it was determined that 80.4% of the participants in Sargın's (2005) study, 95.5% of the participants in Mukhopadhyay et al.'s (2012) study, 89.3% of the participants in Ifeadike et al.'s (2014) study, and 99.1% of the participants in Aung et al.'s (2019) study washed their hands after going to the restroom. In the Hadir (2018) research, it was determined that 52% of the participants washed their hands only with water after going to the restroom. Aung et al. (2019) found that 85.6% of the participants washed their hands after contact with raw foods, 62.2% after touching their skin or hair, and 53.1% after coughing or sneezing. Labović et al. (2023) found that 77.4% of the participants always washed their hands after contact with raw food, and 66.5% always washed their hands after touching their face or body. The findings of this study, like other studies, show that the participants' hand hygiene habits are generally high. In this study, hand washing rates are below expectations in some cases. The low rates of handwashing before handling ready-to-eat foods, after handling raw foods, and after sneezing or coughing reveal that these behaviors still need to be improved. In addition, the presence of workers who do not wash their hands after using the restroom reveals deficiencies in hygiene habits. As a result, although the general hygiene behaviors of the participants are high, strengthening hand washing habits in certain situations and increasing awareness-raising activities on this issue are of great importance for public health in terms of both

personal hygiene and preventing the spread of communicable diseases. When people provide information about their hygiene habits in surveys or research, they may often tend to present their actual behaviors in a more responsible and hygienic manner than they are. Strategies such as ensuring anonymity or monitoring behavior through direct observation to encourage participants to express themselves more honestly can positively affect the accuracy and validity of research.

Limitations of the Research

The limitations of this study include the cross-sectional nature of the study, collection of hygiene practices by self-reporting, focus on food service workers only among food handlers, and overemphasis on training, which is one of the structural requirements for optimum hygiene practices in the workplace.

CONCLUSION

Foodborne diseases cause deaths and permanent disabilities in hundreds of thousands of people worldwide each year. Such diseases are often caused by inadequate hygiene conditions and errors in preparing food for consumption. The knowledge, attitudes and behaviors of food handlers should be closely monitored as they have a major impact on the transmission of foodborne diseases. In this study, it was found that the average total score of the CDRAPS scale, which measures the risk awareness and protective behaviors of the participants against communicable diseases, was lower than other studies conducted with adults using the same scale. This situation shows that the food service workers participating in our study have lower communicable disease risk awareness and protective behaviors compared to other adult populations. The results of this study indicate that food service workers exhibit certain gaps in hygiene practices and awareness of communicable disease risks. Lack of hand hygiene in critical situations such as before using the restroom, after touching the body and personal items, and after coughing shows that these workers do not fully understand the importance of hand hygiene. Additionally, many workers report working while infected with communicable diseases and wearing jewelry on their hands or wrists at the workplace; this not only jeopardizes the health of the workers but also poses a serious risk to public health. The study also highlighted the positive relationship between education and outcomes, noting that participants who received hygiene training had higher awareness of infectious diseases and higher hygiene scores. It is believed that strategies such as training programs and seminars to be implemented to eliminate deficiencies in this area will be a critical step in protecting and improving both the individual health of workers and public health. In addition, in order to prevent foodborne diseases and improve the quality of food hygiene, governing bodies should conduct more frequent inspections, encourage compliance with the rules by imposing punitive sanctions, support the improvement of hygiene by providing adequate hand washing stations, disinfectants and appropriate cleaning materials in enterprises, and in the event of the spread of a foodborne disease, it must intervene quickly to prevent the problem. Given the widespread impact of foodborne illnesses and the pivotal role of food service workers in mitigating these risks, future studies with larger, more diverse populations are necessary to comprehensively assess the gaps in knowledge, attitudes, and behaviors regarding communicable diseases. These studies should also involve food handlers from various sectors, as this could provide a more representative understanding of hygiene practices across the industry. These studies should aim to increase workers' awareness of the general risks posed by communicable diseases, improve personal protection practices, and provide guidance on how to protect themselves and their customers from the spread of these diseases.

Ethics Committe Approval

Ethics committee approval was received for this study from the Marmara University Institute of Health Sciences Ethics Committee (Date: 19.04.2023, and Approval Number: 26).

Author Contributions

Idea/Concept: T.P., H.K.; Design T.P., H.K.; Supervision/Consulting: T.P., H.K.; Analysis and/or Interpretation: T.P., H.K.; Literature Search: T.P., H.K.; Writing the Article: T.P., H.K.; Critical Review: T.P., H.K.

Peer-review

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Conflict of Interest

The authors have no conflict of interest to declare.

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