

Analysis of good hygiene practices' knowledge in Slovenian food establishments

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Abstract

The aim of this study was to determine the level of knowledge in field of Good Hygiene Practices (GHPs) among employees (58) in selected food establishments. Training sessions were conducted for employees in the area of GHPs. Knowledge was determined using a pre- and post-training survey. The results showed that the percentage of correct answers was significantly higher after training ($P \leq 0.001$). The knowledge level prior training was $62.3 \pm 25.9\%$ of correct answers, and after training, the percentage of correct answers was $91.0 \pm 6.6\%$. It was found that respondents who had participated in GHPs training in the past (86.2 %) had a significantly better ($P \leq 0.001$) result (68.4 % correct answers prior training and 92.2 % correct answers after this training) than respondents who had never participated in training (13.8 %) (45.9 % correct answers prior and 82.3 % correct answers after this training). Work experience showed a significant effect ($P \leq 0.001$), as employees with more than 15 years of work experience in the food industry had the most knowledge in the area of GHPs. Respondents' acquired education also had a significant effect ($P \leq 0.001$) on knowledge of GHPs, as those who had completed education in food industry had the best knowledge. The positive effect of the training was also reflected in the change of respondents' opinions after the training, as the training-participation burden decreased, while the percentage of people who found the training useful in their work increased. Regardless of some limitations of the research, the results of the study show the necessity of GHPs principles knowledge among employees in food establishments and adequate education that are important elements of a food safety culture.

Keywords: food hygiene, food safety culture, good hygiene practices, education in food industry

Introduction

Ensuring safe, quality, and healthy food, reducing foodborne infectious diseases, and managing the burden of chronic disease in society are effective actions defined in the Resolution on the National Program on Nutrition and Physical Activity for Health 2015–2025 (2015). The basic areas of the resolution are ensuring the availability of food and promoting healthy food and products

in cooperation with trained and qualified food industry stakeholders. Good hygiene practices (GHPs) mean good experience and habits related to work hygiene (e.g., hygiene of premises and workflow, personal hygiene) in a given industry. Application of the GHPs and good manufacturing practice (GMPs) principles is the basis for establishing the Hazard Analysis Critical Control Point (HACCP) system in

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the enterprise and thus the basis for ensuring safe food. The basic hygiene principles that condition the work in terms of GHPs are defined in the Regulation of the European Parliament and of the Council on the hygiene of foodstuffs (Regulation (EC) No. 852/2004, No. 1019/2008), which sets the objectives such as that food handlers are supervised and instructed and/or trained in food hygiene matters in accordance with their work activity, that those responsible for developing and maintaining the procedure or operating relevant guides receive adequate training in the application of HACCP principles, and that compliance with any requirements of national law concerning training programmes for persons working in certain food sectors is ensured. In 2021, the European Commission adopted Commission Regulation (EU) 2021/382, which amends an existing food safety regulation ((EC) No 852/2004) requiring food business operators to establish an appropriate food safety culture. Food safety culture concept is a general principle that improve food safety by increasing the awareness and improving the behaviour of employees in food establishments. Among others requirements employers shall ensure the appropriate training for employees. Training equips food handlers with the necessary knowledge and awareness of food safety principles, practices, and regulations. It helps them understand the potential risks associated with improper food handling and the consequences of foodborne illnesses. When food handlers are well-trained, they become more conscious of their actions and are motivated to follow proper food safety procedures consistently (Yiannas, 2023). The problem is that there are no minimum requirements for the providers and content of training and education. Research in the Slovenian area shows that fewer food business operators care about the training of their employees with the aim of reducing costs (Čebular et al., 2014). In practice, the abolition of vocational training requirements often leads to a situation where people come into contact with food without adequate formal training.

It should be emphasized that performing work according to the HACCP system and the principles of GHPs and GMPs are essential for the prevention of foodborne illness. To achieve this, adequate hygienic and technical conditions are required, as well as motivated, satisfied and qualified personnel. A person working with food must be treated in the same way as other risk factors (Jevš-

nik et al., 2008). One of the key elements in ensuring safe food is proper employee training. Effective training programs cover more than just the basics of microbiology and food hygiene. Programs are tailored to include various risk factors that employees encounter in their workplace. Training should have a positive impact on employee behaviour, reduce the risk of infection and/or food poisoning, improve product quality, and reduce complaints (De Sequeira et al., 2015). Numerous studies have been described in the literature in which employees' food hygiene knowledge was assessed using questionnaires (Pichler et al., 2014; Barjaktarović-Labović et al., 2018; Al-Kandari et al., 2019; Gruenfeldova, 2019; Taha et al., 2021). Studies have shown that employees with on-the-job training perform significantly better on GHPs knowledge than employees without training (Barjaktarović-Labović et al., 2018; Taha et al., 2020). Therefore, it is important to raise awareness and provide adequate training to employees, as this is the only way to achieve the necessary knowledge, skills, and appropriate attitudes (Seaman and Eves, 2010; Shinbaum et al., 2016; Ovca, 2020).

The aim of the study was to determine the knowledge of employees in the selected Slovenian food establishments about hygiene practices prior and after the conducted training. Thus, we aimed to determine the knowledge of selected content of GHPs, train employees in the area of selected content of GHPs and analyse the acquired knowledge of employees in selected food establishments. We hypothesized that the knowledge level of employees would increase after training and that employees who had previously attended one or more training sessions on GHPs would have more knowledge than employees without prior training.

Material and methods

Respondents in the selected food establishment: A total of 58 employees from the 11 food companies participated in the interview prior and after the training.

Survey: The survey included nine questions on general and sociodemographic characteristics of respondent (gender, age, educational level and direction, work experience) and twenty-eight questions divided into four sections: food contamination, personal hygiene and general hygiene.

ne principles, cleaning and disinfection, and the importance of training (Appendix A). Employees completed the survey an average of three days prior training, followed by training in GHPs, and then a re-survey after training. Training was conducted in small groups with an average of 4-6 respondents. Selected content of GHPs was presented using interactive materials (Power Point presentation, videos, animated films). Survey responses were scored and collected according to above mentioned four areas. A correct answer was scored one point, and an incorrect answer was scored zero point. A five-point Likert scale was used to measure attitudes toward the importance of employee training. The sum of the points achieved was the criterion for evaluating the respondents' knowledge.

Methods

Survey implementation: the purpose of the survey was to assess participants' knowledge of GHPs and to obtain their opinions on the impact of the training on their work. Knowledge level was determined as a percentage of correct responses by dividing the sum of points for correct responses by the number of points for all correct responses. Respondents were informed in advance that the survey was not intended to provide a general assessment of their knowledge, but to assess the impact of the training on their level of knowledge of GHPs.

Statistical analysis: the results obtained were processed and the basic statistical parameters (average and standard deviation) were calculated using the Microsoft Excel program (Microsoft Office Professional Plus 2019). To compare the

results prior and after the training a paired t-test was used and to compare differences in demographic characteristics of respondents (educational level, work experience, previous participation of the respondents in the training) analysis of variance (ANOVA) was used (SPSS Statistics, version 23). Means of experimental groups were compared using Duncan's test and paired t-test with 5% risk.

Results and discussion

Demographic characteristics of respondents

Overall, 25.9 % of men and 74.1 % of women participated in the survey (Appendix A). Of the respondents, 22.4 % had incomplete or completed elementary school, and 51.7 % completed lower or secondary vocational education (most frequently cooks, confectioners and waiters). This was followed by respondents with secondary professional or short-cycle higher vocational education (17.3 %) and respondents with university programs or master's study programmes (8.6 %). A total of 25.8 % of respondents held the position of catering manager or kitchen manager, and 34.5 % of respondents were employed as cooks. The remaining participants (37 %) were employed as assistant cooks or assistants. Of the respondents, 86.3 % had at least 15 years of experience in the food industry. The results of our survey show that 86 % of respondents have attended training on GHPs in the past, while the rest of respondents (14 %) have never attended training (Figure 1). In comparison, 28 % of respondents in Ireland (Gruenfeldova et al., 2019) and 23 % in Austria (Pichler et al., 2014) have never attended GHPs training.

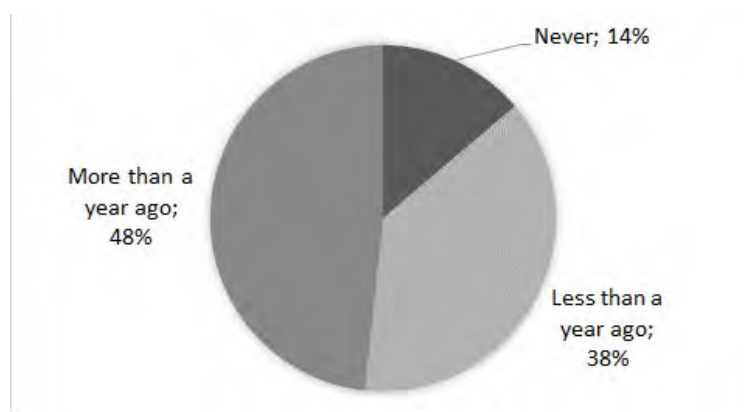


Figure 1 Share of respondents according to participation in education in the field of good hygiene practices

Respondents' knowledge of GHPs prior our training had a significant effect on the results; those who had already attended food hygiene training had a significantly better ($P \leq 0.001$) survey result (68.4 %)

than respondents who had never attended training (45.9 %). Knowledge acquired at the last training also improved significantly for both groups of respondents ($P \leq 0.001$; 92 % vs. 82 %) (Figure 2).

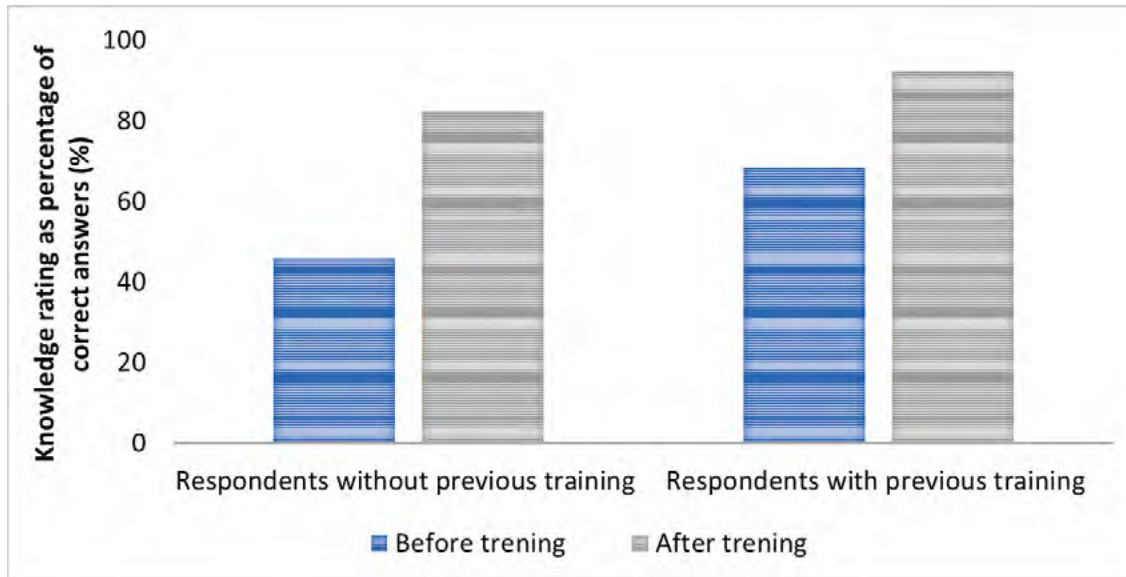


Figure 2 Assessment of respondents' knowledge of GHPs based on their participation in training in the past

In the study by Sanlier et al. (2020), participants were divided into three groups: a group with long-term training (184 hours of training), a group with short-term training (eight hours of training), and a control group with no food hygiene training. The knowledge test was administered prior training, after training, and 12 months after the training. The knowledge test after one year showed an exceptional effect of the long-term training, which affected not only the increase in knowledge, but also the positive attitude and implementation of GHPs among the food handlers. Their knowledge became permanent.

The gender of the participants did not affect the level of knowledge, which is to be expected since men and women work in the same work environment, while a significant relationship between work experience and knowledge of GHPs was demonstrated (Barjaktarović-Labović et al., 2018). In our study, there was a significant difference in the level of knowledge after the last training, as men had a mean score of 70.4 % and women 63.4 % (t value = -2.075, $P = 0.044$). In this context, it should be noted that the percentage of male respondents was significantly lower than that of female respondents. The higher knowledge level of males was also related to their educational level, as 86.7 % of respondents had at least a secondary vocational education, while this percentage was

lower for female respondents (74.4 %). Comparable studies show the same, as respondents with at least a high school degree performed better than respondents with an elementary school degree (Al-Kandari et al., 2019; Taha et al., 2021).

Respondents' age had a significant effect on their knowledge ($P \leq 0.001$) as well as other factors (e.g., education or experience), independent on food hygiene training. Respondents under 40 years of age achieved a knowledge level of 57 %. Among them, 21 % of respondents had at least a secondary vocational degree. Among respondents aged 41 years and older, 27 % had at least a secondary vocational degree, and they achieved a knowledge level of 68 %. Secondly, work experience had a significant effect on knowledge scores ($P \leq 0.001$). Respondents with nine years of professional experience in the food industry scored the lowest (35 %), while respondents with more than 15 years of professional experience in the food industry scored the highest (65-69 %) (not presented in tables and figures). As mentioned earlier, the respondents' level of knowledge was also significantly ($P \leq 0.001$) influenced by their level of education (Figure 3). The lowest level of knowledge prior the implementation of the training was achieved by respondents with no or completed elementary school and participants with completed lower/secondary vocational

education (40-65 %). A better result was achieved by participants with completed higher vocational education (82 %), and the highest level of knowledge was achieved by participants with at least completed higher secondary education (95 %).

In the study by Ambrožič et al. (2016), it was found that employees with completed vocational

education had a higher level of knowledge in food hygiene than employees without formal education. This was also confirmed by the study of Darko et al. (2015), participants with acquired formal education had more knowledge and were better trained. Thus, there is a strong correlation between food hygiene knowledge and employee hygiene habits.



Figure 3 Assessment of respondents' knowledge of GHPs according to their level of formal education

Survey responses

The correct answers of 58 respondents are given as a percentage of the correct answers. Prior training, the number of correct answers ranged from a minimum of 6.9 % to a maximum of 100 %. In the first phase of this study, the mean knowledge level was 65.3 %; after training, the knowledge level was significantly higher ($P \leq 0.001$) and was 91.0 % (Table 1). The percentage of correct answers increased from a minimum of 72.4 % to a maximum of 100 % after training. In general, the results showed that workers have poor knowledge about GHPs. Regular training of food workers on GHPs could have a significant impact on improving food hygiene and, together with other

activities and measures, could lead to improved food safety (Barjaktarović-Labović et al., 2018) and food safety culture (Yiannas, 2023).

Food contamination

Seven survey questions addressed knowledge of food contamination (Appendix A, Section 2). The results show that the average respondent's level of knowledge about contamination possibilities was 49.5 %. Many respondents (77.6 %) knew that food can be contaminated with microorganisms by other food. On the other hand, only 15.5 % of respondents correctly believed that normal appearance, smell

Table 1 The average rating of respondents' knowledge in each group of GHPs questions

Education	Knowledge rating (%)	
	Prior training	After training
Food contamination	49.5 ± 19.2b	87.9 ± 5.6a
Personal hygiene and general hygiene rules	76.4 ± 22.0b	93.0 ± 5.5a
Cleaning and disinfection	56.1 ± 25.8b	89.4 ± 7.2a
Total	65.3 ± 25.9b	91.0 ± 6.6a

Scores with a different superscript letter (a-b) are statistically significantly different ($P \leq 0.05$)

and taste do not mean that the food is safe, which is comparable to the survey in Montenegro, where only 18 % of respondents correctly answered the same question (Barjaktarović-Labović et al., 2018). Even 65.5 % of respondents answered incorrectly to the question that they can wear jewellery when working with food, but must be careful to do so consistently when washing their hands, while the percentage of correct answers is even lower when claiming that wearing jewellery has no effect on food contamination (43.1 %). Hand sweat, dirt, food debris and microorganisms collect under jewellery and watches. Bracelets with jewellery and watches can never be washed properly, so they should not be worn when handling food (NIJZ, 2014). More than half of the respondents (53.4 %) did not know that kitchen towels can be a source of cross-contamination, while the percentage of incorrect answers in the survey in Montenegro was significantly higher (78.1 %) (Barjaktarović-Labović et al., 2018).

Education on personal hygiene and general hygiene rules

Respondents scored highest on questions about personal hygiene and general hygiene rules. The average knowledge level prior training was 76.4 % and after training 93.0 %. 92.5 % of respondents correctly answered the question about basic hand washing resources (Appendix A, Question 20). Similarly, 83.7 % of respondents correctly answered the question about what we use to dry our hands (Appendix A, Question 21). Respondents knew that they should not handle raw foods if they have indigestion, even if they are later thermally treated (84.5 %). The worst result was obtained when asked about wearing and storing work and personal clothing (39.7 %) (Appendix A, Question 17). In addition, only 53.4 % of respondents answered correctly that chewing is not allowed in the workplace in the food industry. The percentage of correct responses increased significantly after training (93.1 %).

A higher assessment of knowledge level was expected after the training. The percentage of correct answers ranged from 84.5 % to 100 %, and the average knowledge level after training was 93.0 %.

People who are carriers of infectious disease agents are not allowed to work in the production and distribution of food because they could directly or indirectly endanger the health of consumers through food (Article 5 of Act on the health suitability of food and products and substances that come into contact

with food (ZZUZIS), 2000). Therefore, food workers have a great moral and legal obligation to know and consistently follow and implement the basics of hygienic procedures in food preparation. One of the factors in ensuring safe food is also the respect to personal hygiene, which prevents the outbreak of food- and waterborne diseases (NIJZ, 2014). Food hygiene studies (Djekic et al., 2020) have shown that personal hygiene is a prerequisite for preventing the transmission of foodborne illness. Consumers rated food hygiene as a key factor in ensuring safe food.

Education about cleaning and disinfection

Seven questions were related to knowledge about cleaning and disinfection (Appendix A, Section 4). The results show that the average knowledge level of the respondents was 56.1 % prior the training and 89.4 % after the training. Respondents scored the highest score (64.8 %) on statements about the cleaning schedule. Most respondents knew that the cleaning schedule included information about what to clean (91.4 %), when to clean (86.2 %), and who does the cleaning (87.9 %). A much smaller percentage of respondents correctly answered that the cleaning plan does not include guidance on the most common cleaning errors (27.6 %) and applicable GHPs legislation (31.0 %).

After the training, the percentage of correct answers for the cleaning plan questions increased to 89.7 %. On the other hand, only 24.1 % of the respondents believed that a surface without visible food debris and aesthetically sound did not mean that it was clean. The percentage of correct answers increased to 82.8 % after the training. A relatively small percentage of respondents knew the difference between cleaning and disinfection (55.2 %). Compared to other surveys, they achieved the lowest result, as, for example, 71.1 % of participants in Montenegro knew that cleaning and disinfection are not the same procedure (Barjaktarović-Labović et al., 2018), while this percentage was significantly higher in the Austrian survey (94 %) (Pichler et al., 2014). When asked about the storage of cleaning products and food (Appendix A, question 25), respondents showed less knowledge, as only 51.7 % of respondents knew that properly labelled cleaning products may only be stored in the same room where food is prepared if they have a special place and are only used for intermediate cleaning. Only 6.9 % of respondents answered correctly to the statement that we use cleaning concentrates for on-site cleaning, making

this statement the worst result of the questionnaire. After the training, the percentage of correct answers increased significantly (79.3%). When diluting cleaning agents, we must always follow the instructions for use, because even a minimal deviation in the ratio can damage surfaces or the user (Confidenti et al., 2020). Due to lack of personnel, insufficient knowledge in the field of cleaning, unsuitable cleaning agents and cleaning accessories, errors in the cleaning process can also occur (e.g. mixing of agents with each other, use of too high or too low concentration of cleaning agents, use of soiled cloths) (Confidenti et al., 2020).

Respondents' opinions on the need for education on good hygiene practices

After the training, respondents' opinions about the need for ongoing training in GHPs changed, as the sense of burden from repeated participation in the training decreased, while the percentage of people who found the training useful in their work increased.

People who come into contact with food in their work have long been recognized as an important risk factor in providing safe food (Ovca, 2020).

Conclusions

The study has some limitations. Because of the small sample - 58 respondents - we cannot generalize the results. The study did not include the same number of participants by gender, which could affect the results obtained.

When interpreting the results, it should be considered that in the survey we measured the level of knowledge (percentage of correct answers in the questionnaire) of respondents who handle food in their work and are employed in catering or commercial food establishments, but not their actual handling of food, since we did not observe and evaluate respon-

dents at work. Worker performance is largely determined by knowledge, but the work environment also has a significant impact on individual behaviour. This includes both the physical environment (e.g., room layout, availability of work equipment) and the influence of organizational culture on individual work organization (e.g., available time and personnel, supervisor attitudes, compliance with GHPs regulations).

If one would like to examine the acquired knowledge in more detail, it would also be necessary to examine it after a longer period of time (e.g., six months) and measure the long-term effects on knowledge and possible changes in employee attitudes and behaviour. It would also be possible to monitor the effects of employees' participation in short-term and long-term training, and the knowledge acquired would be reviewed over a longer period of time.

The study could be expanded to include an additional research model, such as interviewing respondents and observing employees at work. Similar studies (Pichler et al., 2014; Barjaktarović-Labović et al., 2018; Al-Kandari et al., 2019; Taha et al., 2020, Rifat et al., 2022) examined different approaches in education and training to improve knowledge, attitudes, and food handling. Most studies used a group and measured changes prior and after training. Some studies measured also attitudes and beliefs, knowledge, behaviour, inspection results, or results of microbiological analysis. Studies addressed multiple domains, usually food safety and food hygiene and the subdomains of food cross-contamination and personal hygiene.

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Appendix A: A survey on knowledge of good hygiene practice with response rates of 58 respondents before and after the training

Section 1: General questions		Answer (%)
		Prior training
1. Gender		
a) woman		74.1
b) man		25.9
2. Age		
a) under 20 years		1.7
b) 20-30 years		6.9
c) 31-40 years		15.6
d) 41-50 years		43.1
e) 51-60 years		31.0
f) over 61 years		1.7
3. Type of education acquired		
a) unfinished elementary school		3.4
b) completed elementary school		19.0
c) completed lower vocational education (2-year)		10.3
d) completed secondary vocational education (3 years)		41.4
e) completed secondary professional education		15.6
f) completed short-cycle higher vocational education		1.7
g) completed higher education or first cycle study programmes are academic and professional study programmes		0
h) completed university programs or master's study programmes		8.6
i) Master of science		0
j) Doctor of science – 3rd Bologna level		0
4. The direction of the acquired education:		
5. Name of the current position:		
6. Work experience		
a) less than one year		0
b) from 1-4 years		1.7
c) from 5-9 years		10.3
d) from 10-14 years		36.2
e) from 15-24 years		51.7
f) more than 25 years		
7. Time worked in the food industry (profit or non-profit, public or private activity engaged in the manufacture, processing or distribution of any type of food):		
a) less than 1 year		0
b) from 1-4 years		5.2
c) from 5-9 years		5.2
d) from 10-14 years		6.9
e) from 15-24 years		36.2
f) more than 25 years		41.4
8. Have you ever attended any training in good hygiene practice?		
a) Yes		86.2
b) no		13.8

If you answered YES, please complete the following question.

9. When was the last time you attended good hygiene practise training?

- a) less than one year ago 44.0
- b) more than one year ago 56.0

	Correct answer (%)	
	Prior training	Prior training
Section 2: Food contamination		
10. Most people are occasional carriers of infectious agents and food poisoning (choose one answer). Correct Incorrect	67.2	93.1
11. Wearing jewellery does not affect food contamination (choose one answer). Correct Incorrect	43.1	89.7
12. Many infections are transmitted through the hands, but only if the hands are visibly damaged (cuts, burns, wounds...) (choose one answer). Correct Incorrect	55.2	86.2
13. I can wear jewellery when I work with food, but I have to be careful about washing my hands so I do it consistently (choose one answer). Correct Incorrect	34.5	86.2
14. The kitchen towel used at work cannot be a source of food contamination (choose one answer). Correct Incorrect	53.5	93.1
15. Food can be contaminated with microorganisms by other food. This type of cross-contamination is especially dangerous when finished food come in contact with raw foods (choose one answer). Correct Incorrect	77.6	91.4
16. Does a normal appearance, odour and taste mean the food is safe (choose one answer)? Correct Incorrect	15.5	75.9
Section 3: Personal hygiene and general hygiene rules		
17. Workers who work with food must wear appropriate work clothes and shoes, which must always be clean and when stored in a closet with personal items when not in use (choose one answer). Correct Incorrect	39.7	84.5
18. Individuals not employed in a food establishment (service workers, maintenance personnel, inspectors, etc.) are not required to follow personal hygiene instructions when working as employees in a food establishment. Correct Incorrect	69.0	91.4
19. Chewing is not allowed in the workplace in the food industry (choose one answer). Correct Incorrect	53.5	93.1
20. The basic resources needed for effective hand washing in food manufacturing and food service establishments are (choose one answer for each item). Correct Incorrect	92.5	96.6
a) healthy water (cold and warm) Correct Incorrect	100	100
b) liquid soap Correct Incorrect	100	100
c) hard soap Correct Incorrect	91.4	94.8
d) paper towels Correct Incorrect	98.3	98.3
e) a clean cloth towel Correct Incorrect	67.2	87.9
f) waste container Correct Incorrect	98.3	98.3
21. What do we use to dry our hands after washing (choose one answer for each item)?	83.7	93.8
a) an apron Correct Incorrect	91.4	91.4

b) clothes		98.3	98.3
Correct	Incorrect		
c) disposable paper towel		98.3	98.3
Correct	Incorrect		
d) tea towel		69.0	86.2
Correct	Incorrect		
e) cloth towel		70.7	96.6
Correct	Incorrect		
f) automatic hand dryer		94.8	94.8
Correct	Incorrect		
g) we do not wipe hands		63.8	91.4
Correct	Incorrect		
22. Check off the correct statements regarding the use of disposable gloves (choose one answer for each item):		61.5	89.4
a) hands must always be thoroughly washed and dried before putting on gloves		58.6	82.8
Correct	Incorrect		
b) when working with prepared food, it is not allowed to use utensils, but always use gloves		87.9	96.6
Correct	Incorrect		
c) gloves must be changed during work only if they are dirty or damaged		27.6	86.2
Correct	Incorrect		
d) wash hands properly and thoroughly each time gloves are changed		70.7	94.8
Correct	Incorrect		
e) if gloves have only been worn for a short time, they must be washed thoroughly and reused after the work is completed		91.4	94.8
Correct	Incorrect		
f) if we do not have time to wash our hands thoroughly, put on gloves and be safe		32.8	81.0
Correct	Incorrect		
23. If you have diarrhoea, you cannot process raw food unless it is thermally treated down in the road.		84.5	96.6
Correct	Incorrect		

Section 4: Cleaning and disinfection

24. Tick the correct statements about the use of cleaning agents (choose more than one answer):		55.5	91.4
a) they are kept separate from food and in specially designated places		82.8	96.6
Correct	Incorrect		
b) we use cleaning agents intentionally		53.5	86.2
Correct	Incorrect		
c) a greater effect is achieved by mixing two cleaning agents together		44.8	93.1
Correct	Incorrect		
d) are kept in their original packaging, but when they are transferred to another packaging, the cleaner can be recognized by its colour and odour		48.3	93.1
Correct	Incorrect		
e) use cleaning concentrates primarily for on-site cleaning		6.9	79.3
Correct	Incorrect		
f) follow the instructions for safe use and work (label, instructions, safety data sheet)		96.6	100
Correct	Incorrect		
25. Properly labelled cleaning agents can be stored in areas where food is prepared if they have a designated place and are used only for intermediate cleaning (choose one answer).		51.7	89.7
Correct	Incorrect		
26. A surface is clean if there is no food residue on it and it is aesthetically pleasing (choose one answer).		24.1	82.8
Correct	Incorrect		
27. In proper cleaning, the order of cleaning is not important and is determined by the person (choose one answer).		56.9	82.8
Correct	Incorrect		

28. The cleaning schedule includes the following information (choose more than one answer):	64.8	89.7
a) what will be cleaned (area or equipment to be cleaned)	91.4	93.1
Correct Incorrect		
b) when will be cleaned (frequency of cleaning)	86.2	93.1
Correct Incorrect		
c) warnings (the most common cleaning mistakes)	27.6	72.4
Correct Incorrect		
d) the cleaning company	87.9	96.6
Correct Incorrect		
e) the legislation in force in the field of good hygiene practice	31.0	93.1
Correct Incorrect		
29. The difference between cleaning and disinfection is (choose one answer):	55.2	94.8
a) cleaning means the removal of food residues, microorganisms and other contaminants from surfaces, while disinfection means the reduction of the number of microorganisms on the surface		
b) cleaning means the removal of food residues and other contaminants from surfaces, while disinfection means the drying of the wet work surface		
c) cleaning and disinfection are synonymous		
30. We do not need instructions to preform disinfection (choose one answer).	53.5	84.5
Correct Incorrect		

Section 5: The importance of education

Indicate in the level of agreement with the following statements!

31. Education about good hygiene practices is my responsibility (choose one answer).		
a) I do not agree at all	19.0	22.4
b) I do not agree	19.0	31.0
c) I neither agree nor disagree	13.8	13.8
d) I agree	32.8	22.4
e) I fully agree	15.5	10.3
32. I would like to attend training on good hygiene practices at least once a year (choose one answer).		
a) I do not agree at all	22.4	15.5
b) I do not agree	31.0	19.0
c) I neither agree nor disagree	12.1	15.5
d) I agree	17.2	25.9
e) I fully agree	17.2	24.1
33. I attend education about good hygiene practice only if it is mandatory (choose one answer).		
a) I do not agree at all	25.9	13.8
b) I do not agree	6.9	27.6
c) I neither agree nor disagree	6.9	12.1
d) I agree	13.8	15.5
e) I fully agree	46.6	31.0
34. Education about good hygiene practices is important to my work (choose one answer).		
a) I do not agree at all	13.8	8.6
b) I do not agree	31.0	20.7
c) I neither agree nor disagree	17.2	12.1
d) I agree	19.0	24.1
e) I fully agree	19.0	34.5
35. The knowledge I acquired during the training on good hygiene practices is sufficient for me to apply it in my work (choose one answer).		
a) I do not agree at all	13.8	10.3

b) I do not agree	37.9	15.5
c) I neither agree nor disagree	22.4	19.0
d) I agree	19.0	36.2
e) I fully agree	6.9	19.0
36. If I were educated about good hygiene practices, I would be able to do my job more efficiently and with higher quality (choose one answer).		
a) I do not agree at all	20.7	10.3
b) I do not agree	27.6	24.1
c) I neither agree nor disagree	20.7	19.0
d) I agree	22.4	29.3
e) I fully agree	8.6	17.2
37. I am aware that I play a very important role in ensuring food safety, which is very important to the consumer (choose one answer).		
a) I do not agree at all	24.1	1.7
b) I do not agree	27.6	5.2
c) I neither agree nor disagree	17.2	8.6
d) I agree	22.4	31.0
e) I fully agree	8.6	53.5
Thank you for participating in the survey.		

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Analiza poznavanja dobre higijenske prakse u slovenskim prehrabnim objektima

Sažetak

Cilj ovog istraživanja bio je utvrditi razinu znanja u području dobre higijenske prakse (*Good Hygiene Practices* - GHPs) među zaposlenicima (58) u odabranim prehrabnim objektima. Provedene su edukacije djelatnika na području GHP-a. Znanje je utvrđeno anketom prije i nakon edukacija. Rezultati su pokazali da je postotak točnih odgovora bio značajno veći nakon edukacija ($P \leq 0,001$). Razina znanja prije edukacija bila je $62,3 \pm 25$, % točnih odgovora, a nakon treninga postotak točnih odgovora bio je $91,0 \pm 6,6$ %. Utvrđeno je da su ispitanici koji su u prošlosti sudjelovali u obuci za GHP (86,2 %) imali značajno bolji ($P \leq 0,001$) rezultat (68,4 % točnih odgovora prije obuke i 92,2 % točnih odgovora nakon ove obuke) od ispitanika koji nikada nisu sudjelovali na obuci (13,8 %) (45,9 % točnih odgovora prije i 82,3 % točnih odgovora nakon ove obuke). Radno iskustvo pokazalo je značajan učinak ($P \leq 0,001$), jer su zaposlenici s više od 15 godina radnog iskustva u prehrabnoj industriji imali najviše znanja iz područja GHP-a. Stečeno obrazovanje ispitanika također je imalo značajan utjecaj ($P \leq 0,001$) na poznavanje GHP-a, budući da su najbolje znanje imali oni koji su završili obrazovanje u prehrabnoj industriji. Pozitivan učinak edukacije odrazio se i u promjeni mišljenja ispitanika nakon obuke, jer se smanjilo opterećenje sudjelovanja u edukaciji, a povećao se postotak osoba kojima je edukacija bila korisna u radu. Bez obzira na određena ograničenja istraživanja, rezultati studije pokazuju nužnost poznavanja GHP principa među zaposlenicima u prehrabnim objektima i odgovarajuće edukacije, koji su važni elementi kulture sigurnosti hrane.

Ključne riječi: higijena hrane, kultura sigurnosti hrane, dobra higijenska praksa, obrazovanje u prehrabnoj industriji

Analyse des Kenntnisstandes über die Gute Hygienepraxis in Slowenischen Lebensmittelbetrieben

Zusammenfassung

Ziel dieser Studie war es, den Kenntnisstand der Mitarbeiter (58) ausgewählter Lebensmittelbetriebe im Bereich der guten Hygienepraxis (Good Hygiene Practices - GHPs) zu ermitteln. Es wurden Schulungen für die Mitarbeiter im Bereich der guten Hygienepraxis durchgeführt. Die Kenntnisse wurden anhand einer Umfrage vor und nach der Schulung ermittelt. Die Ergebnisse zeigten, dass der Prozentsatz der richtigen Antworten nach der Schulung signifikant höher war ($P \leq 0,001$). Der Wissensstand vor der Schulung betrug $62,3 \pm 25$ % der richtigen Antworten; nach der Schulung lag der Prozentsatz der richtigen Antworten bei $91,0 \pm 6,6$ %. Es wurde festgestellt, dass Befragte, die in der Vergangenheit an einer GHP-Schulung teilgenommen hatten (86,2 %), ein signifikant besseres Ergebnis ($P \leq 0,001$) erzielten (68,4 % richtige Antworten vor der Schulung und 92,2 % richtige Antworten nach dieser Schulung) als Befragte, die nie an einer Schulung teilgenommen hatten (13,8 %) (45,9 % richtige Antworten vor und 82,3 % richtige Antworten nach dieser Schulung). Die Berufserfahrung wirkte sich signifikant aus ($P \leq 0,001$), da Beschäftigte mit mehr als 15 Jahren Berufserfahrung in der Lebensmittelbranche die meisten Kenntnisse im Bereich der GHP hatten. Die erworbene Ausbildung der Befragten hatte ebenfalls einen signifikanten Einfluss ($P \leq 0,001$) auf das Wissen über GHPs, da diejenigen, die eine Ausbildung in der Lebensmittelindustrie absolviert hatten, die besten Kenntnisse hatten. Die positive Wirkung der Schulung spiegelte sich auch in der Meinungsänderung der Befragten nach der Schulung wider, da die Belastung durch die Teilnahme an der Schulung abnahm, während der Prozentsatz der Personen, die die Schulung als nützlich für ihre Arbeit empfanden, zunahm. Ungeachtet einiger Einschränkungen der Untersuchung zeigen die Ergebnisse der Studie, dass das Wissen über die GHP-Grundsätze bei den Beschäftigten in Lebensmittelbetrieben und eine angemessene Ausbildung wichtige Elemente der Kultur der Lebensmittelsicherheit sind.

Schlüsselwörter: Lebensmittelhygiene, Kultur der Lebensmittelsicherheit, gute Hygienepraxis, Ausbildung in der Lebensmittelindustrie

Análisis del conocimiento de las buenas prácticas de higiene en establecimientos alimentarios eslovenos

Resumen

El objetivo de este estudio fue determinar el nivel de conocimiento en el campo de las Buenas Prácticas de Higiene (BPH) entre los empleados (58) en establecimientos alimentarios seleccionados. Se llevaron a cabo sesiones de capacitación para los empleados en el área de las BPH. El conocimiento se determinó mediante una encuesta antes y después de la capacitación. Los resultados mostraron que el porcentaje de respuestas correctas fue significativamente mayor después de la capacitación ($P \leq 0,001$). El nivel de conocimiento antes de la capacitación fue del $62,3 \pm 25,0$ % de respuestas correctas, y después de la capacitación, el porcentaje de respuestas correctas fue del $91,0 \pm 6,6$ %. Se encontró que los encuestados que habían participado en capacitación en BPH en el pasado (86,2 %) obtuvieron un resultado significativamente mejor ($P \leq 0,001$) (68,4 % de respuestas correctas antes de la capacitación y 92,2 % de respuestas correctas después de esta capacitación) que los encuestados que nunca habían participado en capacitación (13,8 %) (45,9 % de respuestas correctas antes y 82,3 % de respuestas correctas después de esta capacitación). La experiencia laboral mostró un efecto significativo ($P \leq 0,001$), ya que los empleados con más de 15 años de experiencia laboral en la industria alimentaria tenían un mayor conocimiento en el área de las BPH. La educación adquirida por los encuestados también tuvo un efecto signifi-

vo ($P \leq 0,001$) en el conocimiento de las BPH, ya que aquellos que habían completado una educación en la industria alimentaria tenían el mejor conocimiento. El efecto positivo de la capacitación también se reflejó en el cambio de opiniones de los encuestados después de la capacitación, ya que la carga de participación en la capacitación disminuyó, mientras que el porcentaje de personas que encontraron útil la capacitación en su trabajo aumentó. A pesar de algunas limitaciones de la investigación, los resultados del estudio muestran la necesidad de conocimiento de los principios de las BPH entre los empleados de establecimientos alimentarios y una educación adecuada, que son elementos importantes de una cultura de seguridad alimentaria.

Palabras claves: : higiene alimentaria, cultura de seguridad alimentaria, buenas prácticas de higiene, educación en la industria alimentaria

Analisi della conoscenza delle buone pratiche igieniche negli stabilimenti dell'industria alimentare in Slovenia

Riassunto

L'obiettivo di questa ricerca consisteva nel determinare il livello di conoscenza nel campo delle buone pratiche igieniche (GHP) tra i dipendenti (58) degli stabilimenti dell'industria alimentare selezionati. Va premesso che i dipendenti sono stati debitamente formati nel campo delle GHP. Il loro livello di conoscenza è stato accertato mediante un sondaggio svolto prima e dopo la formazione. I risultati hanno mostrato che la percentuale di risposte corrette era significativamente più alta dopo aver frequentato il corso di formazione ($P \leq 0,001$). Il livello di conoscenza prima della formazione era del $62,3 \pm 2,5\%$ di risposte corrette, mentre dopo la formazione la percentuale delle risposte corrette era del $91,0 \pm 6,6\%$. È stato riscontrato che gli intervistati che hanno partecipato al corso di formazione GHP in passato (86,2%) hanno ottenuto risultati significativamente migliori ($P \leq 0,001$) (68,4% di risposte corrette prima della formazione e 92,2% di risposte corrette dopo la formazione) rispetto agli intervistati che non hanno mai partecipato al corso di formazione GHP (13,8%) (45,9% di risposte corrette prima e 82,3% di risposte corrette dopo la formazione). È stato dimostrato anche che l'esperienza lavorativa (anzianità di servizio) dei dipendenti ha un effetto significativo ($P \leq 0,001$) sulla conoscenza delle GHP, perché i dipendenti con più di 15 anni di esperienza lavorativa nel settore alimentare hanno dimostrato di avere una maggiore conoscenza delle buone pratiche igieniche. È risultato anche che il grado d'istruzione scolastica vantato dagli intervistati ha un impatto significativo ($P \leq 0,001$) sulla conoscenza delle GHP, poiché coloro che hanno completato la propria formazione scolastica nel settore alimentare hanno dimostrato di avere una migliore conoscenza delle buone pratiche igieniche. L'effetto positivo della formazione si è riflesso anche nel cambiamento di opinione degli intervistati dopo la formazione: al diminuire del peso della partecipazione al corso di formazione, è aumentata la percentuale di persone che hanno trovato il corso utile ai fini dello svolgimento del proprio lavoro. Nonostante alcuni limiti della ricerca, i risultati dello studio mostrano la necessità che i dipendenti dell'industria alimentare conoscano i principi GHP e abbiano una formazione adeguata, entrambi elementi importanti della cultura della sicurezza alimentare.

Parole chiave: igiene alimentare, cultura della sicurezza alimentare, buone pratiche igieniche, educazione nell'industria alimentare