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Food Safety Knowledge, Attitude, and Hygiene Practices among Veterinary Medicine Students in Shiraz University, Iran

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ABSTRACT

Background: Global occurrence of foodborne illnesses is of public health importance in both developed and developing countries. This study aimed to assess the food safety knowledge, attitude, and hygiene practices (KAP) among veterinary medicine students in Shiraz University. **Methods:** This cross-sectional study was conducted from April to June 2017 using structured questionnaires on food safety KAP. Data were collected from 210 undergraduate veterinary medicine students from the Shiraz University, Iran. Data analysis was conducted using descriptive statistics, *t*-test, and ANOVA at the significant level of 0.05 by SPSS version 24. **Results:** The mean scores of KAP of students were 12.05 ± 1.46 , 58.67 ± 15.09 , and 49.32 ± 18.19 , respectively. Results revealed that various age categories and years of education were significantly different from the mean score of knowledge. **Conclusion:** Regarding the food safety, the levels of knowledge, attitudes, and practice of students were moderate. So, it is necessary to raise the knowledge, change the attitudes, and promote the food safety practices of students.

Keyword: Knowledge; Attitude; Practices; Food safety; Veterinary students.

Introduction

Food borne diseases have a profound effect on public health both in the developing and developed countries. According to a recent report by the United Nations, one per ten people in the world are involved with food borne diseases.

Despite extensive research and intervention programs conducted in the field of food safety, more than 91 million people are suffering from foodborne diseases in developing countries (World Health Organization, 2015). Annually, 2.2 million

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children die of diarrhea in the developing countries (World Health Organization, 2008). Food borne diseases are more prevalent in the developing countries due to poor health, unsafe drinking water, lack of food safety education, and inadequate food storage facilities (Rezaee *et al.*, 2018). According to the European Food Safety Authority's report, more than 5,000 outbreaks of foodborne diseases affected more than 69,000 people. The number of outbreaks related to the waterborne and foodborne diseases is about 3,000 per a year in Iran. In each outbreak, usually 6 to 7 individuals become sick (Rezaee *et al.*, 2018). The burden of foodborne diseases is global; therefore, it needs global efforts in forms of international collaboration, financing, information, commitment from different governments, especially developing nations, and food policy makers. In this regard, food safety knowledge should be emphasized, because most outbreaks of foodborne diseases occur at home, in restaurants, or in other public places (Sani NA, 2014). The World Health Organization (WHO) established the Foodborne Disease Burden Epidemiology Reference Group in 2007, due to the continuous increase and the emergence of foodborne disease. Since then, various studies have been carried out by this group, which included different consultations on the ways to deal with these diseases in the developed and developing countries (Odeyemi and Sani, 2016). In less developed countries, a large number of people have been poisoned due to the lack of health knowledge and food storage under unsafe conditions. Three main factors in food poisoning are awareness, attitude, and practice of consumers and food producers. The poor knowledge and attitude of consumers and food manufacturers can decrease the food safety standards (Tran *et al.*, 2018). Several factors affect the foodborne diseases in developing countries. Initially, houses play a key role in the outbreak of foodborne diseases; for example contamination of raw food with baked foods, lack of food safety knowledge, poor personal health, and inappropriate food carriage. Food can be infected in a variety of ways, in the farm, during transportation, and even by

consumers. In the consumers' homes, factors such as storing raw food with the baked food in the refrigerator can cause infection. Contaminated cutting boards can also lead to food contamination. In order to reduce food-borne diseases, food consumers and managers are advised to observe and educate personal hygiene. For example, appropriate washing of hands after going to the bathroom is effective in preventing the transmission of microorganisms into food (Stratev D, 2017). A meta-analysis by Patil *et al.* confirmed the role of knowledge, attitude, and practice (KAP) of food managers in food poisoning (Patil SR, 2005). Food managers and consumers play the major role in the spread of foodborne diseases caused by the defects in food preparation, processing, or storage (Odeyemi and Sani, 2016). Veterinary students and food producers are important effective groups in food industry. Veterinarians play an essential role in food supply from the farm to the table (Cacaci and Lelli, 2017). Most reported outbreaks of food-borne diseases are due to contamination of foods with zoonotic agents (Marabelli and Caporale, 2003). Veterinarians can protect the health and welfare of animals that produce eggs, milk, meat, wool, and other protein and fiber products (Bousfied and Brown, 2011). So, veterinary plays an important role in food safety. In this regard, food safety courses should be conducted for veterinary students. However, no studies have ever assessed the KAP of veterinary students with regard to food safety in Iran. The purpose of this study was to evaluate the KAP of veterinary students in Shiraz University concerning food safety.

Materials and Methods

Study participants: This study was designed and implemented from May to July 2014 using structured questionnaires of food safety KAP. Participants included 210 veterinary students at Shiraz University. A completely randomized sampling was conducted at the Faculty of Veterinary Medicine in Shiraz. The sample size was calculated as 210 students by taking into account the type 1 error ($\alpha = 0.05$) and the test

error of 60 percent as well as the $SD=3$ according to the formula.

Measurements: The questionnaire was extracted from a similar study (Cacaci and Lelli, 2017) in English. After translation, the validity of this questionnaire was approved by six professors in food health and health education. To confirm its reliability, 30 students completed the questionnaire and its internal consistency was tested using Cronbach's alpha coefficient. The result showed that the Cronbach's alpha was more than 0.7 (knowledge = 0.73, attitude = 0.85, and performance = 0.71).

The questionnaire consisted of 64 questions, which included 4 items about demographic information (age, gender, marital status, and education level), 20 multi-choice questions were about knowledge, 20 questions dealt with attitude, which should be answered on a 5-point Likert scale, and 20 items were about hygiene practice, which should be answered on a 5-point Likert scale.

In the area of knowledge, each correct question got 1 score and wrong answers received zero. Therefore, the range of the scores was 0-20. Scores less than 7 showed poor level of knowledge, scores from 7 to 13 indicated moderate level of knowledge, and scores higher than 13 were considered as good level of knowledge. The attitude and performance questions were answered on a 5-point Likert scale and ranged from 20-100; scores less than 40 were considered poor, 40 to 80 were moderate, and higher than 80 were good.

Ethical considerations: participants were orally explained about the research. Then, they were asked to complete the consent forms and answered the questioner for about 20-30 minutes.

Data analysis: The collected data were analyzed by SPSS 24. The Kolmogorov-Smirnov test was used to determine the normality of the data. Due to the normal nature of data, the results were reported by mean, standard deviation, and percentage. Independent t-test was conducted to compare the mean of knowledge, attitude, and hygiene practice in two independent groups. Furthermore, ANOVA was run to compare the mean of dependent variables. The significance level was considered at 0.05.

Results

The findings showed that 86 men and 114 women participated in the study. Among the participants, 127 were single and 53 were married. Most participants had less than 22 years of age (27.8%) and were in their first or second year of study (27.8%). Among the students, 36.1 percent had an experience of food poisoning and 74 percent were residents of the dormitory. However, these two variables did not have a statistically significant correlation with the mean scores of KAP ($P > 0.05$). Among students with a history of food poisoning, the highest level of poisoning was due to the canned food.

The mean and standard deviation of KAP in students are shown in **Table 1**. According to the results, KAP was at a moderate level for the majority of students with regard to food safety.

According to **Table 2**, knowledge score had a significant relationship with age and Years of study ($P < 0.05$). The findings proved that scores of attitude and hygiene practice did not have any significant association with demographic characteristics ($P > 0.05$).

Table 1. The mean scores of knowledge, attitude, and hygiene practice of students

Variables	N	Score range	Mean \pm SD	Score status (%)		
				Good	Moderate	Weak
knowledge	200	0-20	12.50 \pm 1.46	19.4	78.3	2.2
Attitude	200	20-100	58.67 \pm 15.09	5.6	81.7	12.8
Practice	200	20-100	49.32 \pm 18.19	0.6	56.1	43.3

Table 2. The mean \pm SD scores of knowledge, attitude, and hygiene practice of students according to their demographic characteristics

Variables	N (%)	Knowledge	Attitude	Practice
Gender				
Male	86(47.8)	11.90 \pm 1.80	58.70 \pm 14.89	50.54 \pm 17.72
Female	94 (52.2)	12.18 \pm 18.5	58.64 \pm 15.36	52.77 \pm 18.01
P-value		0.22	0.97	0.1
Age (year)				
Below 22	50 (27.8)	11.58 \pm 2.14	61.04 \pm 14.77	49.52 \pm 16.60
22-26	48 (26.7)	12.20 \pm 1.12	56.95 \pm 13.47	50.87 \pm 18.45
26-30	41 (22.8)	12.38 \pm 1.09	61.63 \pm 14.17	48.68 \pm 20.34
Above 30	41 (22.8)	13.05 \pm 0.86	54.85 \pm 17.42	51.43 \pm 14.07
P-value		0.02	0.1	0.2
Years of study				
Below 2	50 (27.8)	11.58 \pm 2.14	61.04 \pm 14.77	50.52 \pm 16.60
2 to 4	48 (26.7)	12.20 \pm 1.12	56.95 \pm 13.47	50.87 \pm 18.45
4 to 6	43 (23.9)	13.04 \pm 1.11	60.30 \pm 15.11	47.51 \pm 19.93
Above 6	39 (21.7)	14.46 \pm 0.85	55.97 \pm 17.12	51.12 \pm 13.99
P-value		0.03	0.31	0.07
Marital status				
Single	127 (70.6)	12.88 \pm 1.63	60.53 \pm 13.89	53.51 \pm 18.68
Married	53 (29.4)	12.45 \pm 0.84	59.22 \pm 16.97	53.66 \pm 16.30
P-value		0.4	0.07	0.9

Discussion

In spite of the scientific advances in various fields, the issue of food is socially and economically important and is considered as a strategic issue. The socio-economic situation and health status of a country are identified by the level and type of food consumed by its people. Therefore, veterinary has an important and indisputable role in health and food safety. The aim of this study was to assess the knowledge and attitude of veterinary students of Shiraz University with regard to food safety.

The results of this study suggested that the majority of students had moderate level of knowledge about food safety. The studies of Eslami (Eslami H, 2015) and Patil (Patil SR, 2005) also reported the same results. However, in the studies by Jahed (Jahed G, 2012), Ko (W-H, 2011), and Ferk (Ferk CC, 2016), participants had higher level of knowledge in this regard. Stratev (Stratev D, 2017) conducted a study among the Turkish veterinary medicine students and reported higher degrees of knowledge and attitude in compare with the participants of the

present study. On the contrary, in Hasan's study (Hassan HF, 2014) students were at lower levels considering their knowledge.

According to Baş (Baş M, 2006), who studied food transfer in Turkey, 47.8 percent of the participants did not receive proper education about food safety. As a result, their knowledge was low. Baş concluded that related training and interventions were necessary to raise the knowledge of people about food management and safety. The study by Walker (Walker E, 2003) on people working in small food distribution systems showed that the employees' low level of knowledge was a major barrier to implementation of Hazard Analysis and Critical Control Points (HACCP). Sanlier (Sanlier, 2009) conducted a study in Turkey on young and adult consumers and reported that young consumers had poor knowledge and hygiene practice in terms of food safety.

The (Teh NS, 2016) studied the impact of parents on increasing the knowledge of urban and rural youth in Malaysia and concluded that application of mass media, such as television was

similarly effective in increasing the knowledge of both urban and rural parents. All these studies confirm the great role of knowledge on food safety. Veterinary students are expected to have a high level of knowledge about food safety because they will be a major part of the food supply industry in the country in near future. Even though students take many courses on food safety, they are still far behind the desired knowledge level. The theory-based educational system should be transformed into a system that engages students in practical food industry and business.

According to the results, Iranian student's attitude was at moderate level. In comparison with the Stratev study (Stratev D, 2017), Turkish veterinary students had a higher attitude level. Eslami (Eslami H, 2015) studied students of Yazd University of medical sciences and reported that 63.4 percent of them had a good attitude towards food safety. Many experts indicated that attitude was more important than knowledge and skills. They believe that attitudes guide the behavior, affect social adaptation, and derive people to construction or diversion. Attitudes have a strong impact on behavior-shaping, motivating, and satisfying needs. Despite numerous studies carried out over the food safety, it seems that no important measures were taken to establish an appropriate attitude in students in order to avoid the annual occurrence of foodborne diseases and food poisoning in dormitories. Food has always been a great concern for student environments and students play an important role in developing this crisis by ignoring the principles of food safety. In addition to knowledge that has a direct relation to one's attitude, other dimensions such as culture, religion, family, food habits, society, and media affect food safety. Therefore, it is necessary to make comprehensive and cross-cutting efforts to increase the food knowledge and create healthy food culture on a large scale to develop a proper attitude in the society.

According to the results, students' practice score was at a moderate level; whereas, in the Stratev's study (Stratev D, 2017), the Turkish veterinary

students had higher scores. Hassan (Hassan HF, 2014) studied the adolescents in Malaysia and showed that 61.7 percent of participants' practice score was good. The attitude towards the food safety plays an important role in the quality of food. In addition, living in the dormitory and using the university's food will greatly affect the students' practice. Therefore, the health conditions of the kitchens, dishes, refrigerator, dormitories, and campus should be improved. In this study, students' practice was assessed by self-report method, which may have some disadvantages.

The results of this study indicated a direct linear relationship among KAP. The moderate levels of KAP were consistent with the results of the study by Bas (Baş M, 2006). However, the results of a review by Walker (Walker E, 2003) over 253 articles did not confirm the linear and direct relationship among KAP in the field of food safety. This discrepancy can be due to the participants' cultural differences.

According to the results, with increase of age, the level of knowledge increased in the field of food safety, which is consistent with the findings reported by Eslami and Sanlier (Eslami H, 2015, Sanlier, 2009).

Students who were at higher levels of education and studied for more academic years had a higher level of knowledge, which is consistent with the results of the studies conducted by Eslami (Eslami H, 2015) and Walker (Walker E, 2003). This similarity among the findings can be attributed to the fact that students of higher educational levels collected more information and became more aware about food safety principles.

Conclusion

According to the results of this study, in order to achieve enough knowledge, change the attitude, and improve the performance of students about food safety and health, more practical training is needed. These training services can be rendered in the form of workshops, educational tools, or other facilities during the student's education period.

Authors' contributions

Marzban A participated to the conception and designing the study. Rahmanian V Participated to analysis and interpretation of data. Ayasi M and Ghaneian MT participated to drafting of manuscript: Mehran Barzegaran M and Karimi-Nazari E participated to data gathering and case selection. All authors read the manuscript and verified the final version of manuscript.

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Conflict of interest

There was no conflict of interest in this study.

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