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Food safety knowledge, attitude and awareness among veterinary college students in India

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Abstract

According to World Health Organization (WHO), Food hygiene are the conditions and measures necessary to ensure the safety of food from production to consumption. India along with China accounts for 49.00 per cent of total economic burden due to food borne diseases in low and middle income countries. Food borne diseases cost India \$28 billion (INR 178100 crore) equivalent to 0.5 per cent of country's GDP every year. Veterinarians play a significant role in food safety. In this study, an attempt was made to evaluate the knowledge, attitude and practices of students studying veterinary medicine and the effects of age, gender and education level, food safety knowledge, Attitude on Food safety practices followed. The study was designed and conducted during January 2020 using structured questionnaires and the study involved 100 both under graduated, post graduates and PhD students of Madras Veterinary College currently enrolled in veterinary medicine education at TANUVAS. Analysis carried out include descriptive statistics and Multiple linear regression analysis is advocated to find out the relationship between Food Safety Practice and factors like age, gender, schooling, nativity, level of education, knowledge, and attitude. The results indicated that majority of (74 per cent) of the sample respondents knew that cooked and raw meat had to be separately placed in the refrigerator, whereas 11 per cent did not know it and 12 per cent have had stated that they don't know it. Majority (79 per cent) of sample respondents know that milk and dairy products should be chilled within 2 hours. 62 per cent of the sample respondents concurred that they always check the best before date of food, majority (73 per cent) claimed that they never taste expired food, 34 per cent of the sample respondents intends to clean the refrigerator monthly. Majority of the sample respondents covered their (67 per cent) mouth while coughing or sneezing always which is a recommended practice, whereas 15 per cent covered their mouth only some times and 4 per cent never covered their mouth. The variable, knowledge was having positive relationship with food safety practices and the people with better food safety knowledge said to have better food safety practices.

Keywords: Attitude, awareness, food safety, knowledge

Introduction

Food safety/ food hygiene refers to those circumstances and practices that aid in preserving food quality and also in prevention from infections and food borne illnesses. According to World Health Organization (WHO) ^[1, 2], Food hygiene are the conditions and measures necessary to ensure the safety of food from production to consumption. India along with China accounts for 49.00 per cent of total economic burden due to food borne diseases in low and middle income countries. Food borne diseases cost India \$28 billion (INR 178100 crore) equivalent to 0.5 per cent of country's GDP every year, indicated a study by 'Food for all' partnership of the world Bank group and the Netherland government. Unsafe food creates a vicious cycle of diarrhoea and malnutrition, threatening the nutritional status of the most vulnerable. Where food supplies are insecure, people tend to shift to less healthy diets and consume more "unsafe foods" – in which chemical, microbiological and other hazards pose health risks. Food borne diseases still continue to be a major public health concern all over the world even in developed countries ^[3]. Each year, it is reported that millions of people suffer from food-borne diseases because of consumption contaminated food ^[3, 4, 5].

Food handlers and consumers are important factors in food- borne disease outbreaks due to mishandling of food during preparation, processing or storage. Similarly, in a meta analytical study by ^[6], it was stated that knowledge, attitude, and practice of food safety among food handlers contribute to food poisoning. Food handlers are individuals such as students, workers, parents who prepare and/or serve prepared food. Understanding the perception of food handlers is of significant importance in food safety education.

In India Food safety of food products produced internally and imported are being ensured through enforcement by Food Safety and Standards Authority of India (FSSAI) which is functioning as an independent authority under the administrative control of Ministry of Health and family.

Veterinarians play a significant role in food safety. Among the several subjects taught to students in veterinary medicine at Madras Veterinary College, Tamil nadu Veterinary and Animal Sciences University is Public health and food safety. Various studies [7, 8, 9] indicated contrasting results that food safety knowledge, awareness and attitude among the students were ranging from low to high. In this connection, an attempt was made to evaluate the knowledge, attitude and practices of students studying veterinary medicine and the effects of age, gender and education level, food safety knowledge, Attitude on Food safety practices followed.

Materials and methods

The study was designed and conducted during December 2019 and January 2020 using structured questionnaires on food safety knowledge, attitudes and practices. The study involved 100 both under graduated, post graduates and PhD students of Madras Veterinary College currently enrolled in veterinary medicine education at TANUVAS. The questionnaire used in the study comprised 52 items developed based on previous methods. Each questionnaire was made up of four sections. Section 1: Demo- graphic section to collect information about age, gender, marital status, employment, years of study, education level of parents, place of schooling,

native place. Section 2 was on food safety knowledge statements of participants and comprised 14 questions. Section 3 examined 11 questions on food safety attitudes among participants while section 4 assessed food safety practices which consisted of 19 questions. The questionnaire took approximately 20 min to complete. Collected data were analyzed using IBM Social Package for Social Scientist (SPSS) version 20.0. Analysis carried out include descriptive statistics and Multiple linear regression analysis is advocated to find out the relationship between Food Safety Practice and factors like age, gender, schooling, nativity, level of education, knowledge, and attitude.

Multiple linear regression

Multiple linear regression function of the following form was fitted separately to study the factors influencing Food safety practices of respondents due to age, gender, schooling, nativity, level of education, knowledge and attitude.

$$Y_{fp} = \alpha + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6 + \beta_7X_7 + \mu$$

Where,

Y_{fp} = Aggregated scores of Food safety practice of the respondents

α = Constant term

β_i 's = Regression coefficients

x_i = Demographic and food safety knowledge and attitude

μ = Random disturbance term; ($\mu_i \sim 0, \sigma_i^2$)

The explanatory variables (X_i) used in this analysis include:

X_i	Variables
α	(Constant)
X_1	Age in years (as such, actual age of respondents)
X_2	Gender (Male-Score of 1 and Others-0)
X_3	Schooling (Urban Score of -1 and Others-0)
X_4	Nativity (Urban Score of -1 and Others-0)
X_5	Level of Education (Under graduate Score of -1 and Others-0)
X_6	Food safety knowledge(aggregated score of statement food safety knowledge of respondents)
X_7	Attitude(aggregated score of food safety attitude of respondents)

Results and discussion

Demographic responses

Results of Socio economic characteristics of respondents are presented in Table-1.

The results indicated that male and female respondents were equal in the sample proportion. Among the respondents, major (54.00 per cent) respondents belonged to the age group of 21–30 years followed by 17–20 years (46.00 per cent). Among the sample respondents (77 per cent) studied B.V.Sc programme and (23 per cent) had completed B.V.Sc. 46 per cent of the sample respondents were from urban background and majority (54 per cent) were from rural areas.

As for as school education in concerned, 59 per cent were studied in urban schools and remaining 41per cent had the school education in rural areas.

It is interesting to know that 24 per cent of the sample respondents parents had no formal education, and 9 per cent of the parents had primary level education, 19 per cent of the had secondary level education, 29 per cent of the parents had college level education and 19 per cent of the parents had professional education.

Food safety knowledge of the respondents

Results of food safety knowledge of respondents are presented in Table-2. From the results it could be seen that

majority of (74 per cent) of the sample respondents knew that cooked and raw meat had to be separately placed in the refrigerator, whereas 11 per cent did not know it and 12 per cent have had stated that they don't know it. Majority (79 per cent) of sample respondents know that milk and dairy products should be chilled within 2 hours. 14 per cent of the sample respondents stated that milk and dairy products need not be chilled, whereas 5 per cent did not know the fact. Almost all the sample respondents knew the basic facts that one should wash hands with soap before eating and improperly cooked meal contain dangerous microbes. 65 per cent of the students know that meals made with raw eggs might cause illness. Whereas 23 per cent of the students said that meals made with raw eggs might with cause illness and 9 per cent stated that they did not know. 84 per cent of the students stated that insufficiently cooked meat causes illness, whereas, 11 per cent stated that did not cause illness, and 5 per cent did not know about it. 31 per cent of the sample respondents believed that same cutting board can be for raw chicken, raw vegetables after using which is wrong. The cutting boards has to be thoroughly cleaned and disinfected before using for vegetable cutting or preferably separate cutting boards for each purpose to prevent the cross contamination of the harmful microbes form meat to vegetable or vice versa. 87 per cent of the sample respondents

know that one has to wash his hands with soap after touching raw meat before preparing other meal which is correct. 83 per cent of the sample respondents felt that it is not safe to leave the leftover cooked meat on the table from lunch to dinner whereas 12 per cent felt it is safe. 68 per cent of the sample respondents felt that dairy products with bulgy over foil are not usable which is correct. Whereas 14 per cent said that they can be used safely and 13 per cent stated that they do not know. Almost all sample respondents stated that milk from a farm has to be boiled before drinking. Majority (78 per cent) have stated that they are verifying FSSAI logo on food labels while buying which is an encouraging aspect. Whereas 17 per cent had stated that they are not looking for FSSAI logo in the food package, hence steps may be taken to create awareness among the students about the importance of the FSSAI licensing which is mandatory for all food business operators (FBOs) for manufacture, sell and distribute food articles in India. Almost all the students know that expansion of FSSAI. The results revealed that majority of the students have fair knowledge about the food safety. Whereas [10], concluded that overall knowledge related to food safety among all participants was about 60-70 per cent, but there was no considerable difference regarding gender and lower status [11]. Suggested that the students had good knowledge about food safety.

Food safety attitude of the respondents

Results of food safety attitude among the sample respondents are presented in the table 3. The results indicated that 66 per cent of the respondents stated that they wash their hands in before eating, 25 per cent stated that they wash their hands often and 9 per cent wash their hands seldom. Though 94 per cent have stated that one should wash hands with soap before eating whereas only 66 per cent expressed positive attitude towards it. 74 per cent stated that they would wash their hands before eating in the college canteen, 66 per cent of the sample respondents intend to wash their hands after stoking a pet whereas, 25 per cent often intend to wash their hands after stoking a pet. Regarding washing of fruits of vegetables before eating them 62 per cent affirmed that fruits and vegetables have to be washed always. Only 25 per cent of the sample respondents agreed to put remaining food in to the refrigerator within 2 hours. 62 per cent of the sample respondents concurred that they always check the best before date of food, majority (73 per cent) claimed that they never taste expired food, 34 per cent of the sample respondents intend to clean the refrigerator monthly. 45 per cent of the respondents seldom had indigestion whereas 34 per cent had indigestion often; 40 per cent of the sample respondents confirmed that, they buy food articles without checking FSSAI license number 53 per cent of the sample respondents agreed that they never lodge a complainant with designate after on FSSAI. As they believe that the complex procedural formalities also not confident of getting the complaints redressed.

Food safety practices of the respondents

The results of food safety practice being followed by sample respondents is presented in table 3. 33 per cent of the sample respondents had stated that they always wash hands before and after cooking, while 20 per cent wash their hands frequently and 11 per cent said that they wash their hands some time only; 35 per cent of the respondents said that they don't cook, 59 per cent of the sample respondents said that they consume food which is kept at room temperature for long time, some times, 8 and 9 per cent of the respondents said that they always and frequently consume the food which kept at

room temperature for long time and only 25 per cent said that they never consume that for which is correct. Majority of the sample respondents covered their (67 per cent) mouth while coughing or sneezing always which is a recommended practice, whereas 15 per cent covered their mouth only some times and 4 per cent never covered their mouth, which indicates their food safety practice needs to be improved to prevent the spread of microbes through aerosol route. Half of the participants never tasted the food unit with unprotected hands, whereas remaining 15 per cent is not following this food safety practice. Majority (59 per cent) read the labels for expiry/best before date which is a good sign and only 6 per cent said that they are not bothered to read the labels. 54 per cent of the respondents read the condition of uses of storage of packaged food only sometimes, 14 per cent read it frequently, 21 per cent always read the condition and only 11 per cent never read the condition. Hence the participants must be made aware of the importance reading the food labels as different foods have to be stored at appropriate temperature (especially frozen food) for prevent microbial growth and spoilage. Majority of the (52 per cent) respondents informed that they always wash and use the cutting boards and knives for raw meat before using them for other food. Only 19 per cent of the sample respondents always deep freeze the frozen food outside the refrigerator and 12 per cent stated that they never defreeze their food outside the refrigerator.

Majority of the sample respondents stated that they never use an apron while cooking and 47 per cent stated that they store raw chicken (or) meat separately from other food. 47 per cent stated that they always wash the dishes with detergent and water while preparing food, while 17 per cent said they don't cook. Majority (57 per cent) always washed their hands before handling raw food, 12 per cent washed their hands frequently, 28 per cent wash their hands some times and 3 per cent never bother to wash their hands. 44 per cent wash the dishes with detergent water after preparing food, 12 per cent washed their dishes frequently and 12 per cent seldom. Only 13 per cent of the sample respondents always covered their cuts/bruises with bandage and use gloves which indicate that the practice of using gloves while preparing food is not practice in our condition. Only 7 per cent of the respondents said that they keep food unrefrigerated for more than 2 hours which indicates that most of the respondents are following prepare food safety practice. Majority of the participants protected the raw food of cooked from insects aware which is a healthy practice. Overall it is observed that the food safety practice are not followed strictly by the majority of the respondents hence, awareness about food safety and its importance of practicing it needs to be propagated among the students so as to reduce the food borne illness.

Factors influencing food safety practices of respondents

A Multiple linear regression analysis was employed to find out the relationship between food safety practice and factors like age, gender, schooling, nativity, level of education, knowledge and attitude. The result of analysis is presented in Table 3. The F value of the function is 5.346 indicating that the regression equation is statistically significant at 1 per cent level ($P < 0.01$). Among the independent variables, the nativity was found to have a positive influence ($P < 0.01$) over the food safety practices i.e. people with urban nativity seem to have better Food safety practices than the rural background. Independent variable knowledge was having positive relationship with food safety practices ($P < 0.05$) the people with better food safety knowledge said to have better food safety practices.

Table 1: Demographic information of respondents.

Demographic variables	Classification	Number	Percent
Gender	Male	50	50.00
	Female	50	50.00
Employment	Student	100	100.00
Age	17 – 20 years	46	46.00
	21 – 30 years	54	54.00
Present status of graduation	UG	77	77.00
	PG	23	23.00
Native place	Urban	46	46.00
	Rural	54	54.00
School education	Urban	59	59.00
	Rural	41	41.00
Education level of parents	No formal education	24	24.00
	Primary	9	9.00
	Secondary	19	19.00
	College	29	29.00
	Professional	19	19.00

Table 2: Food safety knowledge of the respondents

Statements	Yes		No		I cannot remember		I do not know	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
B1 In the refrigerator we have to separate cooked and raw Meats	74	74.00	11	11.00	3	3.00	12	12.00
B2 Milk and dairy products should be chilled (refrigerated) within 2 hours to keep them safe	79	79.00	14	14.00	2	2.00	5	5.00
B3 One should wash hands with soap before eating	94	94.00	6	6.00	0	0.00	0	0.00
B4 In improperly cooked meal dangerous microbes may be Found	92	92.00	7	7.00	0	0.00	1	1.00
B5 Meals made with raw eggs might cause illnesses	65	65.00	23	23.00	3	3.00	9	9.00
B6 Insufficiently cooked meat causes illnesses	84	84.00	11	11.00	0	0.00	5	5.00
B7 One can use the same cutting board for raw chicken and raw vegetables if it is wiped off between uses	31	31.00	56	56.00	5	5.00	8	8.00
B8 After touching raw meat, one has to wash our hands with soap before preparing other meal	87	87.00	6	6.00	1	1.00	6	6.00
B9 It is safe to leave leftover cooked meat on the table from lunch to dinner	12	12.00	83	83.00	2	2.00	3	3.00
B10 Dairy products with bulging cover foil are not useable	68	68.00	14	14.00	5	5.00	13	13.00
B11 Milk directly from a farm has to be boiled before drinking	97	97.00	2	2.00	0	0.00	1	1.00
B12 Have observed/noticed FSSAI logo on food labels while buying	78	78.00	17	17.00	2	2.00	3	3.00
B13 FSSAI stands for Food safety and standards Authority of India	94	94.00	1	1.00	4	4.00	1	1.00
B14 Food safety and standards Authority of India enforces the Food safety rules for domestic as well as imported food and food products manufactured in India	88	88.00	4	4.00	2	2.00	6	6.00

Table 3: Food safety attitude of respondents

Parameters/statements	Always		Often		Seldom		Never	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
C1 I wash my hands before eating at home	66	66.00	25	25.00	9	9.00	0	0.00
C2 I wash my hands before eating in the college canteen	74	74.00	16	16.00	7	7.00	3	3.00
C3 I wash my hands after stroking a pet	66	66.00	25	25.00	6	6.00	3	3.00
C4 I wash fruits and vegetables before eating them	62	62.00	29	29.00	6	6.00	3	3.00
C5 I put remaining food into the refrigerator within 2 hours	25	25.00	38	38.00	17	17.00	20	20.00
C6 I check the best before date of foods	62	62.00	29	29.00	7	7.00	2	2.00
C7 I taste expired food if it is good for consumption	4	4.00	10	10.00	13	13.00	73	73.00
C8 I clean the refrigerator at least monthly	34	34.00	31	31.00	28	28.00	7	7.00
C9 I have already had indigestion	9	9.00	34	34.00	45	45.00	12	12.00
C10 I buy food articles after checking FSSAI Licence no	16	16.00	21	21.00	23	23.00	40	40.00
C11 In case of unsafe food I will lodge a complaint with Designated officer of FSSAI	12	12.00	11	11.00	24	24.00	53	53.00

Table 4: Food safety practices of the respondents

Statements	Always		Frequently		Some times		Never		I don't cook	
	Number	per cent	Number	per cent	Number	per cent	Number	per cent	Number	per cent
D1 Do you wash your hands before and after cooking	33	33.00	20	20.00	11	11.00	1	1.00	35	35.00
D2 Do you consume food kept at room temperature for long	8	8.00	9	9.00	59	59.00	24	24.00	0	0.00

D3	Do you use your hand to cover your mouth while coughing or sneezing	67	67.00	14	14.00	15	15.00	4	4.00	0	0.00
D4	Do you taste and dish out food with unprotected hands?	4	4.00	7	7.00	39	39.00	50	50.00	0	0.00
D5	Do you read labels with the use by and/or expiry date of packaged food before purchasing	59	59.00	13	13.00	22	22.00	6	6.00	0	0.00
D6	Do you read conditions of use and storage of packaged food	21	21.00	14	14.00	54	54.00	11	11.00	0	0.00
D7	Do you wash eggs before cooking or frying them	22	22.00	7	7.00	11	11.00	31	31.00	29	29.00
D8	Do you wash and rinse cutting boards, knives and plates used for raw meat before using them for other food	52	52.00	6	6.00	11	11.00	4	4.00	27	27.00
D9	Do you defreeze frozen food outside the refrigerator	19	19.00	21	21.00	27	27.00	12	12.00	21	21.00
D10	Do you wear accessories like rings, bracelets when cooking food?	9	9.00	13	13.00	22	22.00	31	31.00	25	25.00
D11	Do you use an apron when cooking	1	1.00	3	3.00	17	17.00	55	55.00	24	24.00
D12	Do you store raw chicken or meat separately from food	47	47.00	18	18.00	16	16.00	19	19.00	0	0.00
D13	Do you wash dishes with detergent and water or in a dishwasher preparing food	47	47.00	10	10.00	15	15.00	11	11.00	17	17.00
D14	Do you wash your hands before handling raw food	57	57.00	12	12.00	28	28.00	3	3.00	0	0.00
D15	Do you wash dishes with detergent and water or in a dishwasher after preparing food and before new usage	44	44.00	12	12.00	12	12.00	10	10.00	22	22.00
D16	Do you cover your cut with bandage and use gloves	13	13.00	23	23.00	25	25.00	13	13.00	26	26.00
D17	Do you keep food unrefrigerated for more than 2 h?	7	7.00	17	17.00	43	43.00	33	33.00	0	0.00
D18	Do you protect raw food from insects and rodents	66	66.00	17	17.00	10	10.00	7	7.00	0	0.00
D19	Do you protect cooked food from insects and rodents	71	71.00	14	14.00	7	7.00	8	8.00	0	0.00

Table 5: Factors influencing food safety practices of respondents

Explanatory factor		Coefficient(β_i)
Constant		51.108 **
X ₁	Age in year	0.821 (0.214)
X ₂	Gender	0.053 (0.958)
X ₃	Schooling	1.163 (0.110)
X ₄	Nativity	5.281** (0.000)
X ₅	Level of Education	1.220 (0.123)
X ₆	Food safety knowledge	2.932* (0.044)
X ₇	Attitude	1.673 (0.098)
R ²		0.689
Adjusted R ²		0.665
'F' value		5.346**
Number of observations		100

Conclusion

Although the study is limited with respect to the number of respondents, it provides an insight and direction of further studies on food safety awareness and practice. It is indicated by the results that nativity and food safety knowledge have a direct influence on food safety practices among participants. However, despite the high level of awareness of food safety that of the practice was low. Age, gender, Schooling, level of education, attitude have no bearing on food safety practices. The variable, knowledge was having positive relationship with food safety practices and the people with better food safety knowledge said to have better food safety practices. Therefore, there is need for practical food safety education among the participants. Similarly, there is need to extend this study to other students in other science colleges. Moreover, implementable policies on food safety in by FSSAI are recommended.

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