

**KNOWLEDGE, ATTITUDE AND PRACTICE OF PERSONAL HYGIENE, CLEANING
AND SANITATION DURING FOOD PROCESSING**Prabhusaran N.^{1*}, Manivannan L.², Pramila M.³ and Prabhakar Y. K.⁴¹Department of Microbiology, Trichy SRM Medical College Hospital and Research Centre (Affiliated to the Tamilnadu Dr. M.G.R. Medical University, Chennai) Tiruchirapalli, India.²Department of Physical Education and Yoga, Trichy SRM Medical College Hospital and Research Centre (Affiliated to the Tamilnadu Dr. M.G.R. Medical University, Chennai) Tiruchirapalli, India.³Department of Biotechnology, Nehru Memorial College (Affiliated to Bharathidasan University), Tiruchirapalli, India.⁴Department of Biochemistry, National Institute of Nutrition (Indian Council of Medical Research), Hyderabad, India.***Corresponding Author: Prabhusaran N.**

Department of Microbiology, Trichy SRM Medical College Hospital and Research Centre (Affiliated to the Tamilnadu Dr. M.G.R. Medical University, Chennai) Tiruchirapalli, India.

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ABSTRACT

This is a descriptive cross sectional study that evaluates the knowledge, attitude and practices of personal hygiene, sanitation and cleaning of the food handlers in their food processing units or places in Tiruchirapalli, Pudukkottai and Karur districts of Tamilnadu, India. The detailed data was collected in 2018 by recruiting 236 food handlers, The recruiters were asked with 50 questions related with three major parts including knowledge on food safety, attitude towards food safety and food hygiene practices. Majority of the respondents were between the age group of 35 – 50 years and male population are higher than female. Most of the food handlers are not having good knowledge in the food safety including personal hygiene, sanitation and cleaning procedures. The attitude towards the food safety also observed lesser due to their lethargy in handling food substrates. In most of the places the practice towards the microbial control are less practiced thus need more training and guidelines towards it. All the three aspects were included in this study thereby based on the observation and interpretation; an appropriate recommendation will be made to overcome the problems revealed from this study.

KEYWORDS: Food processing unit, Food handlers, hygiene, sanitation, cleaning.**INTRODUCTION**

The report of World Health Organization (WHO) highlighted that nearly two million fatal cases of food poisoning occurred every year globally. The increased incidence of such type of scenario was largely reported in developing countries, mainly due to poor hygiene and improper food safety measures.^[1] In the large scale processing of raw food substrates to prepare edible food, it will be handled by different types of people thus the chance of getting contamination is high. These outbreaks are mainly due to unintentional contamination, which pose very dangerous situation to the health of the consumers and also create economical issues to the nation.^[2,3]

Food related infections and related illnesses are increased now a days are mainly due to increase in number of competitive restaurants including street vending foods, quality less packed local foods, laziness to prepare quality foods in home and bulk order food processing and preparations. The ingestion of such contaminated food and drinking water are the prime source for food borne infections and intoxications. Food poisoning is mainly due to the usage of inappropriate chemicals in the

food processing including food colors and toxins produced by the microorganisms (Eg. *Staphylococcus aureus*, *Shigella dysenteriae*, *Vibrio cholerae* etc).^[3,4]

Food borne infections and intoxications may occur due to any of the following reasons in combined also: food contaminated with microbial toxins, contamination due to inadequate preservation, unhygienic handling procedures, cross contamination from other sources and individual harboring microbes in their nasal and cutaneous system. Many reports were notices that food borne bacterial and viral diseases has been attributed to infected food handlers involved in catering services.^[5,6] In previous days, the food preparations was directly correlated to prayers, thereby the quality, contamination free and freshly prepared foods are available even in hotels, parties and family functions. But now all are observed as business point of view, thus the quality related queries are becoming exclamatory.^[7]

Buying and consuming readymade foods are also the prone area where more infections and discomfort occur. There is triangular description training for the food handlers including knowledge about the cause of food

borne diseases, agent of transmission; attitude and practice towards importance of personal hygiene and appropriate food handling procedures.^[1,8,9] Food handlers are also responsible for the spreading of infectious gastrointestinal pathogens while they infected even after treatment also. If they are not having excellence hygienic practice to ensure cross contamination, then the entire food processing unit gets contaminated leads to mass infection. Thus the knowledge, attitude ad practice of food handlers play dominant role in food safety with regards to food production industry.^[10]

To ensure such hygienic food handling practices, this study was planned towards the determination of knowledge and attitude towards food hygiene, sanitation, cleaning and type of food borne infections and intoxications among the food handlers in food processing unit. It is also to determine the relationship between the sociodemographic data of the food handlers and their KAP level.

MATERIALS AND METHODS

This is a descriptive, cross sectional study. The interview was conducted among 236 food handlers from various food preparation premises in Pudukkottai, Thanajvur and Tiruchirapalli districts of Tamilnadu (India). The study was conducted after obtaining institutional ethical clearance and written informed consent from the participants. The study premises included 10 restaurants, 15 street food stalls, 3 sweet preparation units and 2 home based snacks preparation unit (Figure 1).

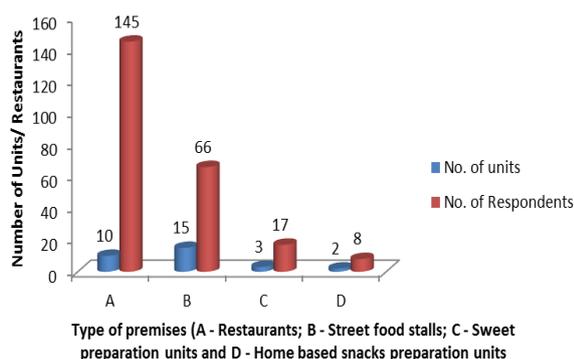


Figure 1: Details of study premises and Respondents.

Self administered questionnaire was prepared and were used in this study. The questionnaire was also modified based on the cross reference by the experts in the identified field and previous research papers. Reliability of the questions has been tested among the selected house wives and staff of college canteen. The questionnaire was structured into five distinct sections including sociodemographic details with eight questions; knowledge of food safety with eight questions; attitude towards food safety with twenty six questions; practice to food hygiene and with sixteen questions and self experiences in the food borne infections and

intoxications with five questions and the details were depicted in figure 2.

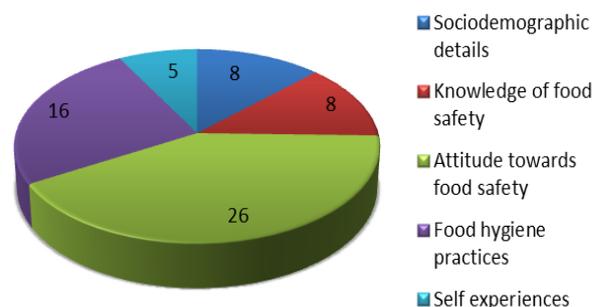


Figure 2: Detailed description of the questionnaires included in this study.

The questions related to analysis of knowledge of the respondents to food safety comprised with eight close ended questions with three options including “Correct/ Incorrect/ Donot know), this section mainly dealt with knowledge about personal hygiene, cross contamination, food borne diseases/ infections/ intoxications, microbes responsible, environmental conditions like temperature, humidity, aeration etc and hygienic practices.

The twenty six questions of attitude section were required to choose “Agree/ Disagree/ Not sure” and this section was aimed to analyze the complex mental state of the respondents including beliefs, feelings, values and disposition to act towards food safety. For evaluation, food handlers who answered correctly to 15 and above were measured as good/ sufficient understanding and below 15 as poor or insufficient.

The fourth section with analyzing the practices dealt with food hygiene. These were analyzed, assessed and evaluated based on self reporting of personal hygiene and safe food handling practices. This section had sixteen questions/ statements with possible two responses including “Yes/ No” and each correct practice is calculated with one point. For evaluation, a scale of $\geq 70\%$ was considered as having good food hygienic practices and others referred as poor.

Finally, all the respondents are asked to share their self experiences towards food borne infections/ diseases / intoxications. The severity of the disease was also analyzed by their answers. The complaints regarding the food borne diseases in their food processing unit were also asked and recorded. The availability of the license for food preparation unit and certificate for training of handling raw and processed foods among food handlers were also interviewed and analyzed.

RESULTS AND DISCUSSION

Demographic details

Among the 236 food handlers, 102 (43.2%) were males and 134 (56.8%) were females. In this study the male :

female ratio is not having much differences compared to the other works where 23:77 were recorded.^[9,11-13] The maximum participants were belonging to the age group of 41 to 50 and the same was supported by other studies

too.^[9,14,15] Further the other detailed description about the complete sociodemographic data were impregnated in table 1.

Table 1: Distribution of sociodemographic details of Food handlers (n=236).

Characters	No. of respondents	Remarks
Gender		
Male	102 (43.2)	Females are more than males
Female	134 (56.8)	
Age in age groups		
Below 20	16 (6.8)	The maximum respondents observed in the age group of 41-50 followed by 31-40
21 - 30	45 (19.1)	
31 - 40	62 (26.3)	
41 - 50	69 (29.2)	
51 - 60	42 (17.8)	
Above 60	2 (0.8)	
Marital status		
Single	16 (6.7)	The maximum participants are married
Married	159 (67.4)	
Divorced	3 (1.3)	
Widow/ Widower	58 (24.6)	
Education		
Primary	184 (77.9)	Most of respondents are completed their primary school level only
Secondary	12 (5.1)	
Collegiate	4 (1.7)	
Illiterate	36 (15.3)	
Duration of Experiences		
< 5 years	23 (9.7)	The participants are maximum having 5 – 10 years of food handling experiences
5 – 10 years	169 (71.6)	
11 – 20 years	38 (16.1)	
21 – 30 years	6 (2.6)	
Undergone Food safety training		
Yes	9 (3.8)	All the food handlers have to undergo training
No	227 (96.2)	
Employment status		
Full time	95 (40.2)	Most of them are part time workers; thus much importance given
Part time	141 (59.8)	
Food premise grade		
High	112 (47.5)	Maximum of moderate level of food premises were noticed followed by high
Moderate	103 (43.6)	
low	21 (8.9)	

[Figure in parenthesis denoted percentages]

In this study, the knowledge about the food hygiene, safety, sanitation and cleanliness are very less and most of them are unaware about the issues related to infections that spread through contaminated foods. Even the awareness about the usage of protective equipments like gloves, face and hair mask in the working environment is very less thereby more stepwise training should be given before they enter into the mass production, package and providing the foods to the public. The detailed information related to the knowledge about the food hygiene and safety was described in table 2. The awareness of such important hygienic procedures by majority of the institutional food-handlers in this study is very appropriate. This is because the hands of food-

handlers can serve as vectors in the spread of food borne diseases due to poor personal hygiene or cross contamination.^[8,9,10]

Table 2: Knowledge on food hygiene and safety.

Question/ Statement	Response rate (%)		
	Correct	Incorrect	Donot know
Using of food protective equipments like gloves, masks etc	31 (13.1)	201 (85.2)	4 (1.7)
Provision of food protective equipments in working place	31 (13.1)	201 (85.2)	4 (1.7)
Using germ free water for food processing	59 (25.0)	33 (14.0)	144 (61.0)
Closing the food substrates when not in use	193 (81.8)	40 (16.9)	3 (1.3)
Aware about food borne infections			
Typhoid	111 (47.1)	110 (46.6)	15 (6.3)
Cholera	146 (61.9)	71 (30.1)	19 (8.0)
Diarrhoea	95 (40.2)	110 (46.6)	31 (13.2)
Botulism	14 (5.9)	79 (33.5)	143 (60.6)
<i>E. coli</i> infections	19 (8.1)	123 (52.1)	94 (39.8)
Hepatitis A	26 (11.0)	51 (21.6)	159 (67.4)
Salmonellosis	12 (5.1)	33 (14.0)	191 (80.9)
AIDS	4 (1.7)	220 (93.2)	12 (5.1)
Aware of pathogenic germs in nail gaps	63 (26.7)	159 (67.4)	14 (5.9)
Training for handling foods is required	149 (63.1)	71 (30.1)	16 (6.8)
Reheating cooked foods can contributing food contamination	19 (8.1)	181 (76.7)	36 (15.2)

The incidence of food-borne illnesses is reduced mainly influenced by the attitudes of food-handlers towards the implementation of food safety guidelines and regulations. Thus, there is a strong linkage between positive behavior, attitudes and education of food-handlers in maintaining safe food handling practices.^[9,16] Table 3 shows the attitudes of the food-handlers toward

the prevention and control of food-borne diseases/ infections/ intoxications. Based on the observations of the attitude towards food safety, it is advised and recommended to have regular health camps and proper training to be given to them for active and result oriented product delivery.

Table 3: Attitudes about food safety among food handlers.

Question/ Statement	Response rate		
	Agree	Disagree	Donot know
Taking bath before enter into food processing unit reduces contamination	73 (30.9)	158 (66.9)	5 (2.2)
Required leave during fever	200 (84.7)	27 (11.5)	9 (3.8)
Required leave during diarrhea	209 (88.5)	24 (10.2)	3 (1.3)
Habit of nail biting increase contamination	112 (47.4)	82 (34.8)	42 (17.8)
Arrangement of regular health check ups	192 (81.3)	37 (15.7)	7 (3.0)
Frequent cleaning of floors with disinfectants	198 (83.8)	19 (8.1)	19 (8.1)
Spillage of food materials should be discarded	59 (25.0)	160 (67.8)	17 (7.2)
Unused/ remaining foods should not be used again	136 (57.7)	61 (25.8)	39 (16.5)
Usage of processed and filtered water reduce contamination	210 (89.0)	17 (7.2)	9 (3.8)
Scrubbing the hairs increases contamination	39 (16.5)	141 (59.8)	56 (23.7)
Taking bath after food processing increases individual hygiene	121 (51.3)	72 (30.5)	43 (18.2)
Cleaning of the used vessels immediately	74 (31.3)	150 (63.6)	12 (5.1)
Standard concentration of antiseptics and disinfectants reduces infections	163 (69.1)	54 (22.8)	19 (8.1)
Visit of health inspectors to the unit enhance environmental and food hygiene	54 (22.9)	143 (60.6)	39 (16.5)
Available of ditches and garbages nearby unit increase contamination	130 (55.1)	94 (39.8)	12 (5.1)
Need of pest control equipments	186 (78.8)	48 (20.3)	2 (0.9)
Regular reptile and rodent control measures	162 (68.6)	62 (26.3)	12 (5.1)
Dead animals in the unit should be cleaned immediately	78 (33.1)	116 (49.1)	42 (17.8)
Train the differences between infections and intoxications	94 (39.8)	129 (54.7)	13 (5.5)
Provision of providing regular biosafety training	146 (61.9)	39 (16.5)	51 (21.6)
Availability of risk management facilities in unit	111 (47.0)	116 (49.1)	9 (3.8)
Availability of first Aid kit in the unit	176 (74.6)	42 (17.8)	18 (7.6)
Periodic checking of refrigerator and instruments	212 (89.8)	18 (7.6)	6 (2.6)
Defrosted foods should not be refrosted	32 (13.6)	192 (81.3)	12 (5.1)
Dish towels should be source of contamination	43 (18.2)	182 (77.1)	11 (4.7)
Knives and cutting boards should be properly cleaned	96 (40.7)	131 (55.5)	9 (3.8)

[Figure in parenthesis denoted percentages]

This module defined with the practices about food safety among food handlers. Among the 236 participants, 194 (82.2%) do not use face masks while they sneeze or cough out. While they certify themselves about the food hygiene and safety, most of them told that they are good but 34.7% asked the requirement of training programmes

frequently. From this study, it was noted that other factors including employee motivation and continuous education and training on the job should be provided to inspire food-handlers, which will affect attitudes and subsequently food-safety practices.^[9,17]

Table 4: Food safety practices among food handlers.

Question/ Statement	Response rate (%)	
	Yes	No
Do you cover your face with masks or handkerchief while sneezing or coughing in the food production unit?	42 (17.8)	194 (82.2)
Do you clean your hands if you sneeze or cough out in your hands?	104 (44.1)	132 (55.9)
Do you clean your hands with antiseptics after defecation?	49 (20.8)	187 (79.2)
Do you cut your nails frequently?	80 (33.9)	156 (66.1)
Do you scrub your hair?	197 (83.5)	39 (16.5)
Do you or your colleagues(s) serve water by dipping fingers in the glass?	174 (73.7)	62 (26.3)
Do you attend any training programmes related to food safety?	12 (5.1)	224 (94.9)
Can you assess yourself for hygiene, sanitation and cleanliness in your food production unit		
Matrix A (Excellent)	36 (15.3)	-
Matrix B (Good)	112 (47.5)	-
Matrix C (Need improvement)	82 (34.7)	-
Matrix D (Poor)	6 (2.5)	-
Do you wear hand jewels during food processing?	94 (39.8)	142 (60.2)
Do you wear watch during food processing?	146 (61.9)	90 (38.1)
Do you smoke during food processing?	61 (25.9)	175 (74.1)
Do you use same cloth for cleaning in all places?	92 (39.0)	144 (61.0)
Do you use separate utensils for preparing raw and processed foods?	25 (10.6)	211 (89.4)
Do you refroze the defrost foods?	182 (77.1)	54 (22.9)
Do you touch the foods while you have wounds in your hands?	29 (12.3)	207 (87.7)
Do you train for refrigerating the unused foods?	74 (31.4)	162 (68.6)

The last descriptive questionnaire included with 5 close ended questions related to self experiences in food borne infections, intoxications and poisoning dealt with the observation of dilemmatic response among participants. Sometimes, we felt that the participants are giving wrong answers. The owners have to notify the workers if they suffer certain symptoms relating to gastro-intestinal

illness. If observed, they are permitted to take leave for avoiding the spread of infections to the consumers. Conducting the study during summer season might not reflect the diarrhea prevalence.^[6,9] Thus an extensive study that will be done during rainy season may support and provide some effective informations.

Table 5: Self experiences in food borne infections and food poisoning.

Question/ Statement	Response rate		
	Yes	No	Donot know
Are you experience with acute food borne infection (vomiting/ diarrhea of 3 episodes per day)?	15 (6.4)	204 (86.4)	17 (7.2)
Are you experience with chronic food borne infection (low BP, giddiness, unconsciousness, diarrhea of 10 episodes per day, with or without vomiting)?	9 (3.8)	216 (91.5)	11 (4.7)
Is there any mass food poisoning take place in your working area?	8 (3.5)	161 (68.2)	67 (28.3)
Is there any complaints reported related to food poisoning in your working place?	15 (6.4)	109 (46.1)	112 (47.5)
Whether family members affect with food poisoning?	165 (70)	39 (16.5)	32 (13.5)

[Figure in parenthesis denoted percentages]

From this study, we are suggesting that all the restaurants and road side food stalls must have pest and rodent controller because they feed on animal and human waste and collect these microorganisms on their feet, mouth, gut and wings and transmit a variety of organisms to the processed foods and raw food substrates. It is already

reported that contamination from house fly is a risk factor in the transmission of diarrhoeal pathogens.^[18,19] The bacterial pathogens including *Salmonella typhimurium* and *Shigella dysenteriae* have been found in the gut of the house fly that transmit more food borne infections.^[20]

In some situations, environmental sanitation, insufficient safe water supply and unhygienic food handling practices are also some of the factors that cause foodborne diseases outbreak.^[21] During short period of time to prepare dishes from raw foods, food handlers may have not following good food handling practices such as uncovered dish for excessively long time or not cleaning hands before handling raw or cooked foods.^[7]

The recent other investigations reported that availability of the knowledge of food safety and hygiene is not translated into safe food behavior or practice.^[22-25] At the same time, the current study indicated the moderate performance about knowledge on food safety. Our observation did not suggest that the food handlers often wore gloves and the scenario could eventually increase the risk of microbial contamination in foods. The behavioral change in safe food handling can be attained when the knowledge and skills learned are being rehearsed and used.^[26] Thus continual education, training and management are the important elements in the transfer of knowledge into behavior.^[27] In this case, further studies are required to understand the factors that have limited the transfer of knowledge into practice among food handlers.

By this study, it was suggested to do lot of improvements need to be made in order to improve the awareness of food handlers towards food safety, hygiene, sanitation and cleanliness. Also arrangement of regular health check-up or periodic health related training provide better and much healthier environment for food preparation, processing and services. Continuous education and training should strengthen the knowledge of food handlers for minimizing food borne hazards.

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