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**RESEARCH ARTICLE**

# Effectiveness of an Information booklet on knowledge and practice on food safety among food handlers in restaurants

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## *Abstract*

**Background:** According to World Health Assembly resolution in 2000, food safety has increasingly become a global issue. The knowledge and practice of food handlers on food safety plays an important role here. The proper training of the food handlers helps to prevent food borne illnesses to a great extent. But the training provided for the food handlers are very less and the reviews shown that even though many restaurants are emerging day by day, the training for proper practice of safe handling of food is inadequate.
**Objective:** The study was conducted to assess the knowledge and practice of food handlers on food safety and to determine the effectiveness of an information booklet on food safety among food handlers.
**Materials and methods:** Two phase study - descriptive survey design in phase I and one group pre-test post-test design in phase II was used. Data were collected from 234 restaurant employees by using structured questionnaire on food safety for assessing the knowledge and practice.
**Results:** Majority (59%) of the subjects had poor knowledge, 41% had average knowledge and there were no subjects with good knowledge on food safety. Also 52% of the subjects had average knowledge, 40% had poor knowledge and 8% had good knowledge on practice on food safety.
**Conclusion:** The study concluded that the information booklet was effective to improve the knowledge and knowledge of practice on food safety among the food handlers.



## Introduction

Consuming good food prepared in hygienic conditions on time in the right quantity is the best way to maintain health. But now the situation has come up to check whether the food consumed are reaching to the table through safe hands. It has become an issue to be studied to identify whether the community is in risk or not. The statistics given by World Health Organization in 2000 explains that about 70% of the 2 million deaths of the world per year due to diarrhoea in developing countries are related to contaminated food. Each day, thousands of people die from preventable food borne diseases. In developing countries, 1.8 million children under the age of five die from diarrheal illness each year, and up to 70% of these cases are linked to infections associated with food borne pathogens. More than 200 diseases were spreading through contaminated food and 76 million cases, 350,000 hospitalizations and 5000 deaths in each year are due to food borne illnesses. Also in various industrialized countries, the statistics shows that about 60% of food borne illnesses is caused by poor food handling technique and by contaminated food served in food service establishments[1]. In Indian scenario, approximately 3 million children

below the age of five die of diarrhoea every year and about 70% of these deaths in the country are said to be of food-borne origin[2] .

An outbreak of Salmonellosis, affected 19 people who consumed food from one restaurant in The United Kingdom had symptoms of diarrhoea (in 100% of cases), abdominal cramps (in 100% cases), fever and vomiting (98% of cases) and the illness lasted from an average of 1 to 17 days. Another outbreak was a Staphylococcal illness among 7 people who consumed contaminated corned beef sandwiches due to improper handling of corned beef by two employees who had positive nasal cultures[3]. Another incident that happened in Kerala was the death of a youth who consumed food contaminated with toxins produced by Staphylococcus aureus bacteria[5]. One of the major reasons for these was the cross-contamination that occurred from improper handling due to lack of training given to the food handlers.

An important problem related to this is the lack of interest in documenting the food borne illnesses and also the misconception that the food borne diseases are mild and self limiting kind and it was often difficult to tribute the food borne illnesses and related deaths to a specific foodstuff[4] .

The health teachings given to the restaurant and hotel employees are very less and there is a need for rethinking to protect our public from these food-borne illnesses. Food safety training programs and teachings through printed media would increase the knowledge and practice of food handlers which in turn would help to increase the food safety practices. Researcher's own experiences along with the experiences of colleagues suggested need for such a study. This study is expected to add information to the requirements of food safety in the present situation which would help for the needs of the community to a great extent to have safe food from public places.

**Problem Statement**

An evaluative study to assess the effectiveness of an Information booklet on knowledge and practice on food safety among food handlers in selected restaurants of Udupi District.

**Purpose:**

The purpose of the study is to improve the knowledge and practice on food safety among food handlers by assessing their knowledge and knowledge of practice and determining the effectiveness of an information booklet on food safety in selected restaurants of Udupi district. This in turn will contribute to the reduction of food borne diseases for those who have food from public places.

**Objective:**

Objectives of the study were to:

1. assess the knowledge among food handlers on food safety
2. find out the knowledge of practice on food safety among food handlers
3. explore the relationship between knowledge and knowledge of practice on food safety
4. determine the effectiveness of an information booklet on food safety among food handlers

**Assumptioms:**

The study assumed that:

1. Food handlers will have some knowledge about food safety measures while preparing and storing food.
2. Food handlers may give free and frank responses on preparation and storage of food.
3. Proper knowledge on food safety may improve the practice of food handlers which in turn will help in reducing food borne diseases.

**Variables:**

**Independent variable:** Information booklet on food safety.

**Dependent variable:** Food handler's knowledge and knowledge of practice on food safety.

**Extraneous variables:** Age, education, monthly income and prior exposure to any source of information.

**Delimitation:**

The study was delimited to the employees of the restaurants of Udupi and Manipal and those who were able to read, write and communicate in Kannada.

**Hypotheses:**

The hypotheses of this study are:

- There will be a significant relationship between knowledge and knowledge of practice scores on food safety among food handlers.
- There will be a significant difference between the mean pre-test and mean post-test knowledge scores on food safety among food handlers.
- There will be a significant difference between the mean pre-test and mean post-test knowledge of practice scores on food safety among food handlers

**Sampling Criteria**

The sampling criteria were those who are:

- working as permanent staff in the restaurant
- working as chefs or waiters in the restaurant
- willing to participate in the pre-test, intervention and the post-test
- available during the data collection period

## Materials and Methods

Research approach for phase 1: Survey and for phase II**:** Evaluative approach

**Research design for phase 1**: Descriptive survey and **for phase II**: One group pre test and post test design. Survey was done to identify those restaurants with seating capacity more than fifty having employees more than fifteen. It was conducted among 234 employees (chefs and waiters) who fulfilled the inclusion criteria from 16 selected restaurants of Udupi and Manipal after obtaining the permissions from owners of each selected restaurant and consent from each sample. Sixteen restaurants, eight each from Udupi and Manipal were selected by simple random sampling method. The employees working in the restaurants were considered as a cohort sample. All those employees with poor knowledge score in phase I of the study were included (138) in phase II of the study.

**Data collection instruments and measurements**

For the development of the tools, a Focus Group Discussion was conducted among the food handlers to identify the subareas to be included in the knowledge questionnaire and knowledge of practice questionnaire and information booklet on food safety. Validity and reliability of all the tools were tested and translated into local language.

***Demographic data***

The demographic proforma consisted of 9 items seeking information related to background data such as age, gender, education, place of living, number of years of experience in food handling, whether having any physical defects, previous exposure to studies related to food safety, monthly income in rupees and whether they have undergone any training programme related to food safety or not.

***Questionnaire on knowledge on food safety***

Questionnaire on knowledge on food safety consisted of twenty questions where it included the subareas like food poisoning, personal hygiene, food preparation, food service, food storage, food delivery and pest control. The knowledge score was arbitrarily categorized as good, average and poor.

***Questionnaire on knowledge of practice on food safety***

Questionnaire on knowledge of practice on food safety consisted of fifteen questions where it included the subareas like food poisoning, personal hygiene, food preparation, food service, food storage, food delivery and pest control and food holding. The knowledge of practice score was arbitrarily categorized as good, average and poor.

***Booklet on food Safety***

The booklet on food safety was titled as "What you need to know on food safety?" which mainly comprised of subareas of food safety like personal hygiene, food preparation, food service, food storage, food delivery and pest control. The introduction on food safety was followed by the discussion of each of the above subareas. Each subarea also emphasized on the guidelines that were to be followed while practicing food safety.

The main study data collection was conducted in two phases, from selected restaurants of Udupi and Manipal. The phase I was the survey in which, the pre-test was conducted among the food handlers of the 16 selected restaurants. Data was collected from 234 restaurant employees by using structured questionnaire on food safety for assessing the knowledge and practice. Analysis of Phase I was done and after that those who had poor knowledge were included into phase II of the study. The phase II began with the administration of the booklet, on the eighth day of the administration of booklet, a post-test was conducted for each sample.

## Results

The data were analyzed using both descriptive and inferential statistics using Statistical Package for Social Science Version 16 (SPSS 16).

***Sample Characteristics:***

The final sample for analysis constituted 234 food handlers in phase I and 138 food handlers in phase II of the study. Frequency and percentage were computed for describing the sample characteristics .Table 1 indicates that majority of the samples were in the age group of 21-40 years (73.1%) and most of them (95.3%) were males. Thirty nine percent of them had an education of primary school and the postgraduates were only 0.9%. Most of them (92.7%) were residing in rural areas and there were no samples with any physical defects. Forty two percent of them had experience of less than five years in food handling and most of them had a monthly income of more than six

thousand rupees. Only 0.4% samples had prior exposure to a training programme on contamination and preservation of food and 0.8% among them had gone for a training programme on food safety previously.

Table 1: Frequency and percentage distribution of food handlers in their demographic characteristics.

n=234

| **Sample characteristics** | **f** | **%** |
|---|---|---|
| Age in years | | |
| <20 | 25 | 10.7 |
| 21-40 | 171 | 73.1 |
| 41-60 | 38 | 16.2 |
| >60 | 0 | 0.00 |
| Gender | | |
| Male | 223 | 95.3 |
| Female | 11 | 4.7 |
| Education | | |
| Primary school | 93 | 39.7 |
| Secondary school | 36 | 15.4 |
| PUC | 73 | 31.2 |
| Diploma | 9 | 3.8 |
| Graduate | 21 | 9.0 |
| Postgraduate | 2 | 0.9 |
| Place of living | | |
| Rural | 217 | 92.7 |
| Urban | 17 | 7.3 |
| Number of years of experience in food handling | | |
| ≤5 | 100 | 42.7 |
| 6-10 | 89 | 38.0 |
| 11-15 | 36 | 15.4 |
| ≥16 | 9 | 3.8 |
| Any physical defects | | |
| No | 234 | 100 |
| Yes | 0 | 0 |
| Any previous exposure to related studies | | |
| No | 232 | 99.1 |
| Yes | 2 | 0.9 |
| | | |
| Monthly income in rupees | | |
| ≤1500 | 6 | 2.6 |
| 1501-3000 | 33 | 14.1 |
| 3001-6000 | 83 | 35.5 |
| ≥6001 | 112 | 47.9 |
| | | |
| Sample characteristics | | |
| | f | % |
| No | 231 | 98.7 |
| Yes | 3 | 1.3 |
| Attended training programmes | | |
| Contamination and preservation of food | 1 | 0.4 |
| food safety | 2 | 0.8 |
| No training | 232 | 98.8 |

Figures in parenthesis are percentages

**Knowledge on food safety among food handlers:**

Figure 1 shows that majority of the samples i.e., 59% of them had poor knowledge on food safety and 41% had average knowledge on food safety and there were no subjects with good knowledge on food safety.

**n = 234**

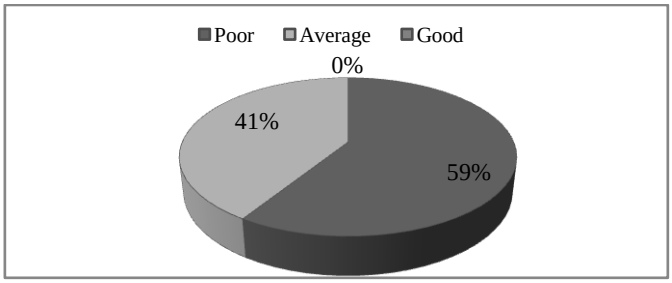


**Figure 1:** Frequency and percentage distribution of knowledge on food safety

**Knowledge on practice of food safety among food handlers**

Figure 2 indicates that majority of the samples (52%) had average knowledge of practice on food safety, 40% had poor knowledge of practice on food safety and 8% had good knowledge of practice on food safety. n=234

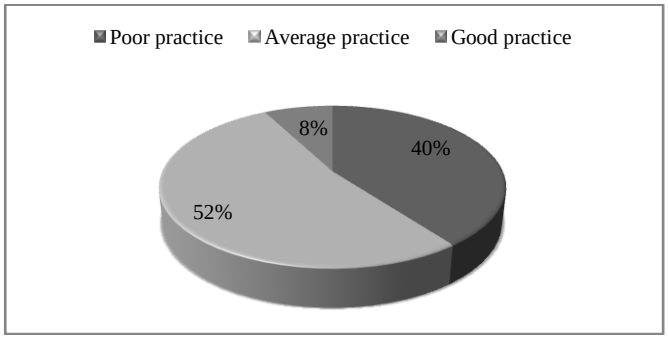


**Figure 2:** Frequency and percentage distribution of knowledge of practice on food safety

***Relationship between knowledge and knowledge on practice of food safety:***

Table 2 shows the relationship between the knowledge and knowledge on practice of food safety. The data obtained were analyzed and computed using Karl Pearson Correlation Coefficient. The **r** value showed a weak positive relationship between knowledge and knowledge of practice on food safety (r= 0.39, P=0.001).

**Table 2: Correlation between mean score of knowledge and knowledge of practice on food safety**

| Variables | Mean | SD | r value | P value |
|---|---|---|---|---|
| Knowledge on food safety | 7.25 | 2.43 | | |
| | | | 0.390 | 0.001** |
| Knowledge on practice of food safety | 6.33 | 3.09 | | |

**Correlation is significant at 0.01 level

***Effectiveness of Information booklet on knowledge:***

The paired't' test was used to compute the effectiveness of an information booklet on improving knowledge on food safety. Result shows that the information booklet was very effective to improve the knowledge of food handlers in the areas of personal hygiene (t=12.69, p=0.001), food preparation (t=4.66, p=0.001) and food storage (t=17.07, p=0.001) and it was not effective to improve the knowledge of food handlers in the areas of food poisoning (t=1.67, p=0.097), food delivery (t=1.96, p=0.052) and pest control (t= 0.25, p=0.801).

**Table 3: Mean pre-test, mean post-test and 't' value on knowledge on food safety among food handlers**

| Knowledge on food safety | Mean | SD | Standard error | t value* | df | P value |
|---|---|---|---|---|---|---|
| **Pre-test** | 5.57 | 1.455 | | | | |
| **Post-test** | 10.65 | 1.72 | 0.187 | 27.248 | 137 | 0.001* |

*Paired 't' test, Significance at 0.05 level

The sub areas included in the knowledge questionnaire on food safety were food poisoning, personal hygiene, food preparation, food storage, food delivery and pest control and these areas were statistically analyzed for interpreting the mean pre-test, post-test and **t** value on knowledge on food safety among food handlers before and after administration of booklet. Table 4 shows that the information booklet was effective to improve the knowledge of food handlers in the areas of personal hygiene, food preparation, food delivery and food storage and it was not effective to improve the knowledge of food handlers in the areas of food poisoning and pest control.

**Table 4: Area wise mean pre-test, mean post-test and 't' value on knowledge on food safety among food handlers**

| Area | Knowledge range of scores | Pre-test n=234 | | | Post-test n=138 | | | t value | p |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | Mean % | SD | Mean | Mean % | SD | | |
| Food poisoning | 0-4 | 1.29 | 30.25 | 0.95 | 1.12 | 28 | 0.59 | 1.67 | 0.097 *NS |
| Personal hygiene | 0-5 | 0.96 | 19.2 | 0.60 | 2.12 | 42.4 | 0.93 | 12.69 | 0.001 Sig |
| Food preparation | 0-3 | 2.04 | 68 | 0.96 | 2.51 | 83.7 | 0.66 | 4.66 | 0.001 Sig |
| Food storage | 0-6 | 1.96 | 32.5 | 1.12 | 4.10 | 68.33 | 1.08 | 17.07 | 0.001 Sig |
| Food delivery | 0-1 | 0.41 | 41 | 0.49 | 0.33 | 33 | 0.47 | 1.96 | 0.052 Sig |
| Pest control | 0-1 | 0.56 | 56 | 0.50 | 0.59 | 59 | 0.49 | 0.25 | 0.801 *NS |

**NS= Not Significant*

**Effectiveness of Information booklet on knowledge of practice**

Table 5 shows the effectiveness of an information booklet on improving knowledge of practice on food safety. The test used to compute the findings was Paired 't' test. The p value obtained was less than the table value ($p<0.05$). The information booklet was effective to improve the knowledge of practice of food handlers in the areas of food storage (t=9.98, p=0.001), food delivery (t=3.93, p=0.001) and food holding (t=10.16, p=0.001) and it was not effective to improve the knowledge of practice of food handlers in the areas of food poisoning (t=0.17, p=0.863), personal hygiene (t=0.75, p= 0.455), food preparation (t=1.96, p= 0.052)and pest control (t=0.40, p= 0.693).

**Table 5: Mean pre-test, mean post-test and 't' value on knowledge of practice on food safety among food handlers**

| Knowledge of practice on food safety | Mean | SD | Standard error | 't' value | df | p |
|---|---|---|---|---|---|---|
| **Pre-test** | 5.72 | 3.48 | | | | |
| **Post-test** | 8.88 | 2.08 | 0.30 | 10.51 | 137 | 0.001* |

*Paired 't' test, Significance at 0.05 level

The sub areas included in the questionnaire on knowledge of practice on food safety were food poisoning, personal hygiene, food preparation, food storage, food delivery, pest control and food holding and these areas were statistically analyzed for interpreting the mean pre-test, post-test and t value on knowledge of practice on food safety among food handlers before and after administration of booklet. Table 6 shows that, the information booklet was effective to improve the knowledge of practice of food handlers in the areas of food storage, food delivery, food preparation and food holding. For areas of food poisoning, personal hygiene and pest control and it was not effective to improve the knowledge of practice of food handlers.

**Table 6: Area wise mean pre-test, mean post-test and 't' value on knowledge of practice on food safety among food handlers**

| Area | Knowledge of practice range of scores | Pre-test | | | Post-test | | | t value | p |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | Mean % | SD | Mean | Mean % | SD | | |
| Food poisoning | 0-2 | 0.73 | 36.5 | 0.69 | 0.80 | 40 | 0.63 | 0.17 | 0.863 *NS |
| Personal hygiene | 0-3 | 1.47 | 49 | 0.87 | 1.60 | 53.33 | 0.81 | 0.75 | 0.455 *NS |
| Food preparation | 0-4 | 1.88 | 47 | 1.07 | 2.26 | 56.5 | 0.92 | 1.96 | 0.052 Sig |
| Food storage | 0-3 | 1.15 | 38.33 | 0.87 | 2.11 | 70.33 | 0.66 | 9.98 | 0.001 Sig |
| Food delivery | 0-1 | 0.51 | 51 | 0.50 | 0.80 | 80 | 0.40 | 3.93 | 0.001 Sig |
| Pest control | 0-1 | 0.29 | 29 | 0.45 | 0.28 | 28 | 0.45 | 0.40 | 0.693 *NS |
| Food holding | 0-1 | 0.33 | 33 | 0.47 | 0.86 | 86 | 0.35 | 10.16 | 0.001 Sig |

**NS= Not Significant*

*Other findings*

- There is significant association between knowledge on food safety and the selected sample characteristics like age in years ($\chi^2_{(2)}$= 7.86, p=0.02), education ($\chi^2_{(5)}$=32.01, p=0.001), number of years of experience in food handling ($\chi^2$ =8.45, p=0.04) and monthly income in rupees ($\chi^2_{(3)}$=12.12, p=0.007).

- There is significant association between knowledge of practice on food safety and the selected sample characteristics like age in years ($\chi^2_{(2)}$ =11.85, p= 0.001), education ($\chi^2_{(5)}$ =84.36, p=0.001), number of years of experience in food handling ($\chi^2_{(3)}$= 16.61, p=0.001) and place of living ($\chi^2_{(4)}$=4.75, p=0.03).

## Discussion

The present study revealed that there were no samples with good knowledge on food safety and all the samples belonged to either average or poor knowledge. Also 52% of the subjects had average knowledge of practice on food safety, 40% had poor knowledge of practice on food safety and 8% had good knowledge of practice on food safety. This was supported by the study conducted by Isara and Isah,who found that more than half (52.6%) of the employees had poor knowledge in food hygiene and safety and it also reported that the prevalence of food contamination in fast food restaurants was 37.5% [6]. The findings are similar to that of Declan Bolton, who reported that most of the food poisoning in restaurants was due to lack of knowledge of food handlers in safety and hygiene aspects[7.]

Also the findings revealed a significant relationship between the knowledge and the knowledge of practices on food safety among the food handlers. A similar study supporting the same finding was conducted by Wen-Hwa Ko among the food handlers in Taiwan where the results showed that 84.7% having average knowledge in food safety knowledge and practice based on Hazard Analysis and Critical Control Point practices and it also found a positive correlation among knowledge, attitude, and HACCP practices (Ko W H. 2013).

It also revealed that information booklet was effective in improving knowledge on food safety. This finding was supported by the study conducted by Sung, Tong-Kyung and Chang among the food handlers of Korea in 2010 whose results showed an increase in knowledge for the food handlers from 49.3% to 66.6% two weeks after a training programme on food safety [9.] Another study conducted by Rahul, et al. in New Delhi in 2008 among the food handlers of Moulana Azad Medical College, revealed that after a three month intervention programme using posters and flip charts, there was an improvement in the knowledge of the food handlers in the food handling practices evidenced by increased hand hygiene practices from 23.5% to 65.4%[10.]

## Conclusions

Even though many factors influence the knowledge and knowledge on practice of food safety, the present study helps to conclude that a printed media; information bookletis an effective method to improve the knowledge and knowledge of practice on food safety among the restaurant employees. It also reveals that if the knowledge on food safety is improved, then the practice of food handlers will also be improved and this in turn will help in the reduction of food borne diseases from restaurants and other public food service establishments.

### Ethical consideration

Ethical approvals from the District Health Officer, Designated officer of Food Safety Department; Udupi Surveillance Office, Dean of Manipal College of Nursing; Manipal and Ethical Committee; Manipal University were obtained before proceeding with the study.

### Limitations of the study

The following limitations were recognized in the study:

1. Due to the practical difficulties, cohort sample was taken for selecting the employees from the selected restaurants, which limits the generalization of the study findings.
2. The study was conducted with single group which reduces the generalizability of the results.
3. Along with the administration of booklet, individual teaching for each client was not performed due to practical difficulties and time constraints of the employees.

### Recommendations

- The study recommends to replicate the same study on a larger sample with probability sampling method which may help to draw conclusions that can be generalized.
- A similar study with an experimental and control group can be conducted which gives more generalizability for the results.
- A training programme on food safety can be conducted for the food handlers in the restaurants to increase the effectiveness of the interventions.

- A survey on all the food service establishments with an intervention can be conducted to increase the effectiveness of teaching to the grass root level. Also observation on practices of food handlers can be taken as a variable rather than knowledge on practice which will provide more reliable information.

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