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Outcome and acceptability of an educational intervention programme on food-borne diseases and food safety behaviour for food handlers and related sectors in Sri Lanka

Ergebnis und Akzeptanz eines pädagogischen Interventionsprogramms zu durch Lebensmittel übertragenen Krankheiten und Lebensmittelsicherheitsverhalten für Lebensmittelhändler und verwandte Sektoren in Sri Lanka

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Summary

This study evaluated the effectiveness of an educational intervention carried out to improve the awareness of food-borne diseases (FBDs) and food safety behaviour among selected target groups in Southern Sri Lanka and found out the perceptions of the participants on the usefulness of the programme. The intervention was an interactive teaching-learning programme for 60 participants. Their awareness on FBDs and food safety was evaluated before and after the intervention using a 25-item questionnaire. The feedback on the programme was obtained in an unstructured format. Pre- and post-intervention scores for the questionnaire were compared in 49 participants who completed both, using paired t-test. Mean score of knowledge had significantly increased after the intervention {17.6(SD±3.3) Vs. 20.9(SD±1.6); p=0.001}. Participants indicated the importance of continuation of the programme and expanding the coverage. Intervention was effective in improving the overall awareness on FBDs and food safety and acceptability of the intervention was satisfactory.

Keywords: food-borne diseases, food safety behaviour, educational intervention, perception, Sri Lanka

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Introduction

Food-borne diseases (FBDs) and food safety are important public health concerns. They result in significant morbidity and mortality and economic loss globally (WHO, 2015). World Health Organization (WHO) has recently suggested 31 causative agents for FBDs including bacteria, viruses, parasites, toxins and chemicals (WHO, 2011; WHO, 2015). An estimated 600 million in the world fall ill after eating contaminated food and 420 000 die every year, resulting in the loss of 33 million healthy life years. Among the FBDs, diarrhoeal diseases are the most common illnesses resulting from the consumption of contaminated food (WHO, 2015).

Though there are outbreaks of FBDs, there is no significant rise in the incidence of FBDs both locally (Ministry of Health, Sri Lanka, 2016) and the internationally (Nyachuba, 2010). Despite intensified educational programmes FBD remains a persistent problem in USA. Further, several food safety-related trends such as large-scale production and wide distribution of food, globalization of the food supply, eating outside of the home, and emergence of new pathogens have been identified (Nyachuba, 2010). However, in the local context, there is a serious lack of research publications which explore food safety related issues.

Contamination of food occurs at different levels from farm to plate (WHO, 2011). Food-borne infections are an influx causing considerable morbidity and mortality (Tauxe et al., 2010). Improper food handling practices due to poor knowledge is a significant contributing factors for food-borne infections (Patel et al., 2010; Sharif et al., 2013; Young & Waddell, 2016). However, a discrepancy between knowledge and practice has been observed in many studies (Park et al., 2010; Tegegne & Phyo, 2017).

According to the food hygiene regulations in Sri Lanka (Ministry of Health, Sri Lanka, 2011) every food handler should be qualified with a training on food safety or food hygiene when they start the employment. However, the availability of training programmes in the country is limited. Therefore, improvement in the knowledge on FBDs and food safety behavior among food handlers and related sectors is viewed as an important step in reducing the FBDs. Hence, conducting awareness programmes on the above theme will be of importance to improve the public health.

Our aim was to evaluate the improvement of the knowledge on FBDs and food safety behavior and related areas among the participants after an initial awareness programme and to find out the perceptions of the participants on the usefulness of the programme. These findings will be utilized to identify the existing knowledge deficits and to design and implement better food safety education programmes in the future.

Material and methods

This study was a part of new awareness programme on FBDs and food safety conducted first time for Galle food handlers and other interested participants September 2017. It was designed and implemented by the Nutrition Society of Sri Lanka in collaboration with Faculty of Medicine, University of Ruhuna, Sri Lanka. The participating institutions were identified from a list of eligible food handling establishments in Galle Municipality and Bope-Poddala health divisions and were invited through emails, telepho-

ne calls and letters. Institutions were also identified by a Google search and by physically visiting to the places in Galle and Suburb areas.

The educational programme

The programme covered areas such as FBDs and their transmission, food contamination and spoilage, food safety behavior, screening of food handlers and the food safety practices based on food hygiene regulations in the country. The programme content was determined based on the evidence of best practices available in the literature and guidelines issued by the Ministry of Health, Sri Lanka and relevant professional bodies such as College of Microbiologists of Sri Lanka. The resource persons for the programme included a food scientist, a nutritionist, a community physician, a microbiologist and a Public Health Inspector experienced in legislations related to food safety and hygiene. A series of lectures and printed materials were used to deliver the content. In addition, there were interactive discussions and group work that were followed by a panel discussion at the end of the programme.

The target audience for the programme was food handlers, owners of food establishments, public health inspectors, kitchen staff of hospitals of the area and agricultural officers/workers involved in food production. Public health inspectors were invited for the programme since they are in the investigator teams of FBD outbreaks (Ho et al., 2018).

Assessment of knowledge on FBDs and Food safety behaviour

The knowledge of the participants regarding FBDs and food safety behavior was evaluated before and after the educational programme using an anonymous questionnaire. The questionnaire consisted of 25-items, designed specifically to test the important aspects of food safety education delivered during the programme. Content validity (content relevance and coverage) and consensual validity of the questionnaire was confirmed through opinions of a panel of experts a microbiologist, a nutritionist and a community physician including. Each correct response was given a mark of +1, with a total score marked out of 25. The correct answers to the questions were discussed after the post-programme evaluation in order to emphasize the key messages.

Comparison of pre- and post-intervention knowledge scores was done using paired sample t-test. Improvements in the number of correct responses for each item of the questionnaire were analysed separately using the z-test for difference between two proportions (Tab. 1). Level of significance was set at 0.05.

Evaluation of the programme

At the end of the session, written feedback was obtained from the participants to assess their perceptions regarding the programme. Unstructured feedback forms were used to facilitate a free response which would be useful in improving the quality and the content of the programme in future. Participants' feedback responses were categorized broadly into basic themes using content analysis. Four themes emerged from the responses; namely, 1. Usefulness of the programme, 2. Need for further knowledge, 3. Expectations of change of practices in future and 4. Demand for expansion of the programme. In addition, participants' questions and concerns were addressed by the resource persons during the final panel discussion.

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Results

There were 60 participants in the programme which included food handlers (n=48), owners of food establishments (n=02), public health inspectors (n=03), kitchen supervisors from two private hospitals (n=04), a cook from a state hospital kitchen (n=01) and agriculture instructors from a state farm (n=02). Fifty four (90%) completed the pre-intervention assessment of knowledge on FBDs and food safety, 50 (83.3%) completed the post-intervention evaluation and 49 (81.6%) had completed both pre- and post-intervention evaluations. The pre-intervention knowledge score ranged from 7 to 23 with a mean \pm SD of 17.6 ± 3.3 . Post-intervention knowledge score ranged from 17 to 25 with a mean \pm SD of 20.9 ± 1.6 . The increase in the mean knowledge score on FBDs and food safety behavior after the intervention had been statistically significant ($p=0.001$).

Table 1 shows the percentage of participants who provided correct responses to each question at pre- and post-evaluation. The findings indicate that although there are statistically significant improvements in knowledge in certain areas, there are other aspects which are not improved, reflecting the requirement of further emphasis.

Table 2 indicates the summary of the comments/feedbacks which have been expressed under four main themes.

Discussion

This study revealed the current status and post-intervention improvement of knowledge on FBDs and food safety behaviour in a sample of food producers/handlers and other related stakeholders in Galle district, Sri Lanka. There was a significant improvement of the overall knowledge after the educational intervention. In keeping with our findings, a study done in Korea has shown improvement of knowledge in food safety among food handlers after a food sanitation training programme (Park et al., 2010). A similar study done in India reported a significant improvement in the knowledge and attitude on food safety among hospital food handlers after a training programme (Dudeja et al., 2017).

TABLE 2: Summary of the perceptions of the participants (n=60).

Theme of the comment	n (%)
1. Workshop was useful	60(100%)
2. Need further knowledge	15 (25%)
3. Expected to change future practices	42 (70%)
4. Demand for expansion of the programme	27 (45%)

TABLE 1: Distribution of pre- and post-evaluation scores of knowledge on FBDs (n=49).

Question	Distribution of correct responses		p value
	Pre-intervention evaluation n (%)	Post-intervention evaluation n (%)	
Q 1. Food-borne diseases (FBDs) due to unsafe/ contaminated food are a common occurrence.	49(100.0%)	49(100.0%)	–
Q 2. Consumption of unsafe/contaminated food may even cause death.	48 (97.9%)	49(100.0%)	0.312
Q 3. Most of the FBDs occur due to the contamination of food by toxic chemicals.	23 (46.9%)	19 (38.8%)	0.413
Q 4. In FBDs, symptoms occur within a short period of time.	4 (8.1%)	5 (10.2%)	0.726
Q 5. Risk of getting FBDs is high during pregnancy.	40 (81.6%)	49(100.0%)	0.001
Q 6. FBDs that occur during the pregnancy may cause defects in the baby.	38 (77.6%)	48 (97.9%)	0.002
Q 7. Food with a high protein content are easily perishable.	45 (91.8%)	48 (97.9%)	0.164
Q 8. Nutritional value of the food changes with its spoilage.	49(100.0%)	49(100.0%)	–
Q 9. Contaminated food can be often identified by its appearance, smell and the taste.	5 (10.2%)	4 (8.1%)	0.726
Q10. Pathogens causing FBDs grow optimally in the temperatures between 4–60°C.	33 (67.3%)	46 (93.9%)	0.001
Q11. Pathogens causing FBDs are destroyed by deep-freezing.	26 (53.0%)	38 (77.5%)	0.008
Q12. Keeping perishable food in room temperature for more than 2 hours increases the risk of FBDs.	37 (75.5%)	48 (98.0%)	0.001
Q13. It is not necessary to heat the refrigerated food until boiling temperature, before eating.	34 (69.3%)	38 (77.5%)	0.358
Q14. Frozen food should not be thawed/defrosted outside the refrigerator before cooking.	23 (46.9%)	41 (83.7%)	0.001
Q15. The uncooked fish/meat should be stored above the cooked /ready to eat foods.	28 (57.1%)	34 (69.3%)	0.205
Q16. Dish-cloths are preferable to sponges for cleaning the food preparation area.	34 (69.3%)	36 (73.4%)	0.654
Q17. Regular screening of food-handlers reduces the risk of transmission of FBDs.	43 (87.8%)	47 (95.9%)	0.136
Q18. Poor personal hygiene of food-handlers is the leading cause for FBDs.	36 (73.4%)	48 (97.9%)	0.001
Q19. Carriers of FBDs could be asymptomatic.	42 (85.7%)	47 (95.9%)	0.076
Q20. Use of polluted water in cultivation may increase the risk of FBDs.	31 (63.2%)	46 (93.9%)	0.001
Q21. There are no established rules and regulations for the food production, preparation and marketing in Sri Lanka.	32 (65.3%)	39 (79.6%)	0.109
Q22. Fungi can cause FBDs.	41 (83.7%)	47 (95.9%)	0.041
Q23. Unsafe/contaminated food may cause non-communicable diseases such as cancers and neurological disorders.	39 (79.6%)	48 (97.9%)	0.003
Q24. It is necessary to wash the hands properly for at least 20 seconds before the preparation of food.	46 (93.9%)	47 (95.9%)	0.646
Q25. Risk of getting FBDs is high with home-made canned foods.	34 (69.3%)	47 (95.9%)	0.001

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A significant proportion of participants had improved their knowledge on several aspects after the programme. The areas were the knowledge on high susceptibility to FBDs during pregnancy, causal association of FBDs in pregnancy and birth defects, the temperature at which optimal growth of food pathogen occurs, the effect of freezing on food pathogens, effect on perishable food when kept at room temperature, the risk of FBDs due to the use of polluted water in cultivation, the occurrence of non-communicable diseases due to unsafe food and the possibility of getting FBDs by unsafe and homemade canned-food. Poor consumer awareness on food safety related with refrigerator and freezer use and defrosting was a common finding in other settings as well. A study conducted among householders in an urban area in Jamaica revealed that more than one-half of the participants were unfamiliar with the correct procedure for freezing and thawing of foods (Knight et al., 2003). Refrigerator storing practices were poor among consumers according to the findings of a study on food safety-related refrigeration and freezer practices of consumers in Peoria (Towns et al., 2006). An Australian study on pregnant women demonstrated that awareness on the importance of consumption of safe food during the pregnancy was poor (Bryant et al., 2017), though we were unable to find similar studies done among food handlers. During the post-programme discussion, participants expressed their concerns on adherence to the correct procedure on defrosting meat and fish at large scale. It appeared that the unavailability of defrosting machines with adequate capacity to handle larger loads is a limitation for adherence to the recommended defrosting practices.

Response of the participants was considerably low in certain areas both before and after the educational programme; the modes of transmission of FBDs, time duration of symptom occurrence of FBDs, identification of spoiled food and the procedure of thawing. However, there was significant improvement of knowledge related to the procedure on thawing after the intervention. The areas of knowledge which was not significantly improved after the programme need special attention in next training programmes. It would also be worthwhile to further examine whether there is improvement in the practices – especially the sanitation performances or personal hygiene practices – after training programme as recommended by Park and co-researchers (2010).

There is an observed discrepancy between the knowledge and the practice of food safety behaviour worldwide according to the existing literature. Although there is adequate knowledge and skills among the food handlers, the practice is not up to the standard, probably due to the practical barriers. A study done on food service staff of Iran hospitals revealed that knowledge on food safety was very little and most had positive attitudes. However, there was a disparity between attitudes and practices. It was observed that the practices were better in hospital with lesser number of beds (Askarian et al., 2004). A Korean study conducted on restaurant employees revealed that there was a significant improvement of the knowledge after a training programme, but not the practices and sanitation performances (Park et al., 2010). An Ethiopian survey revealed that most food establishments had poor sanitary conditions and poor food hygiene practices of handlers. Introduction of more job-specific hand-on training material, implementation of continuous training programmes to maintain the upgrading, employee appraisal programmes, educational programmes targeted at improving the attitude of food handlers and li-

ensing and regular inspections (Park et al., 2010; Kibret & Abera, 2012) have been recommended to overcome this discrepancy. Further, programme assessment and field/site inspections have been identified as important in the progress evaluation (Campos, et al., 2009; Henderson et al., 2017) However, site inspections seem unlikely to detect or predict the food-borne illness outbreak, because most of the time outbreaks are resulted from consumption of a contaminated fresh produce item (Lee & Hedberg, 2016).

Evaluation of food hygiene practices in food vendors in Paris has found a significant positive correlation between the general hygiene status, the hygiene conditions of the production and distribution processes and the hygiene practices of workers (Czarniecka-Skubina et al., 2018). A study which examined hand washing compliance among retail food establishment workers in Minnesota, USA has revealed a strong positive association between the person in charge being a certified food manager and the ability to describe the proper hand washing procedure. And also the study revealed significant associations among correct hand washing demonstration, physical infrastructure for hand washing, and the hand washing training methods used by the establishment (Allwood et al., 2004). Therefore regular site-visits are necessary not only to inspect the practices, but also to check to ensure the improvement or the presence of adequate facilities to maintain the food safety practice.

The educational programme was appreciated by the participants who emphasized the need for its expansion to other sectors in the food industry and to the other locations of the country. The intervention will be modified in the light of the feedback received for this initial programme. Improvement of deficiencies and incorporation of new areas to the programme as suggested by the participants will be done by the resource persons in collaboration with a group of experts in nutrition, microbiology and food safety legislations. Further, it is expected to design an expanded evaluation form to obtain feedback from the participants in a defined format. This will enable the acquisition of more focused, specific information on the content, resource persons, way the training was delivered and suggestions for future programmes etc. Future programmes will be reformed with more practical sessions and hands-on experience.

Conclusions

There was an overall improvement of knowledge with the educational intervention except in certain areas such as modes of transmission of FBDs and recognition of food spoilage. These findings raise the concerns about knowledge on FBDs and food safety practices among food handlers and other related sectors and highlight the demand for the knowledge and hands-on training on FBDs and food safety.

Recommendations

We recommend a national survey to find out the awareness or training on FBDs and food safety behaviour among the workers at food establishments. Further, we recommend the initiation of comprehensive and affordable food safety education programmes at national level to enhance this awareness, which, in the long run, will be able to minimize the incidence of FBDs minimizing the burden on health care system and families.

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Limitations

The participants in this study were mainly from the star-class hotels and representation from medium and small scale restaurants was not adequate. Moreover, the sample size was small increasing the sampling error.

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Conflict of interest

Authors do not have any conflict of interest.

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