Food Policy 61 (2016) 156–162

Contents lists available at ScienceDirect

Food Policy

journal homepage: www.elsevier.com/locate/foodpol

Effect of educational intervention on young people, targeting microbiological hazards in domestic kitchens

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ARTICLE INFO

Article history:
Received 11 December 2015
Received in revised form 26 February 2016
Accepted 31 March 2016
Available online 6 April 2016

Keywords:
Food safety
Microbiological hazard
Domestic kitchen
Education
Intervention
Primary school children

ABSTRACT

Education and training about basic food safety principles are emphasized as important factors contributing to the reduction of foodborne illnesses. However, it is of crucial importance that the message is specifically tailored and task-specific with regards to the needs of the target group. The main purpose of this study was to investigate the effectiveness of focused workshop-based educational intervention targeting barriers to control microbiological hazards in domestic kitchens by primary school children. A cross-sectional pre-test/post-test survey with a control group was administered. The results show considerable change of respondents' susceptibility towards food-related risk and demonstrate that activities during the workshop were recognised by respondents as feasible in the domestic environment. There are several significant improvements of a long-term nature regarding the results assessed as direct measures related to knowledge and self-reported behaviour. Improvement becomes more significant if substantiated with practical activity in comparison to those addressed only orally.

1. Introduction

The mishandling of food plays a significant role in the occurrence of foodborne illness, which have, in spite of often mild clinical symptoms and a relatively low number of proven deaths (EFSA & ECDC, 2015), emerged as an important growing public health and economic problem in many countries over the previous two decades (Scharff, 2012), also taking into account unreported cases. Education and training about basic food safety principles are, therefore, generally emphasized as important factors contributing to the reduction of foodborne illnesses in the food industry (Egan et al., 2007) and among consumers (Medeiros et al., 2001). Of course, it is of crucial importance that the message is specifically tailored and task-specific with regards to the needs of the target group. Previous studies revealed that consumers feel themselves to be less responsible for the safety of the food they consume than other links in the food supply chain (Jevšnik et al., 2008; Redmond and Griffith, 2004). They also often demonstrate an optimistic bias and the illusion of control related to the perceptions of risk in the context of microbial food safety from the foods they prepare (Redmond and Griffith, 2004).

Once habits are established, they tend to be long lasting and difficult to alter at later life stages (Eves et al., 2010; Wills et al., 2005). Childhood is, therefore, recognised as a crucial time for developing food safety knowledge and skills (Faccio et al., 2013; Mullan et al., 2013). However, as reported by others (Byrd-Bredbenner et al., 2007b; Griffith and Redmond, 2001; Mullan, 2009), these topics are declining in national curricula, meaning that they are reduced or moved from compulsory to elective courses. There is evidence that children prepare food at home by themselves or together with their parents, although their experiences are limited considering the dishes they prepare (Byrd-Bredbenner et al., 2010; Haapala and Probart, 2004; Ovca et al., 2014). Consumers report learning their cooking practices primarily from their parents (Jevšnik et al., 2008). Parents, in particular mothers, have an important but also selective impact on the knowledge and risk perception of young children (Kang et al., 2010; Ovca et al., 2014), representing an increased probability that deficiencies in food handling may be passed on to children especially if a certain behaviour is performed repeatedly (Ouellette and Wood, 1998). Nevertheless, the possibility that children educated in an effective way during their regular schooling can act as facilitators at home through messages conveyed to family members should not be rejected (Egan et al., 2008).

A systematic review of consumer food safety education for the domestic environment shows that interventions were successful in increasing knowledge, and specific behaviours (Milton and

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http://dx.doi.org/10.1016/j.foodpol.2016.03.004
0306-9192/

Mullan, 2010). There are also studies including middle school children that demonstrate discrepancies between knowledge and behaviour during the baseline study (Haapala and Probart, 2004). Health promotion campaigns are usually targeted to teenagers or adults, and only a few studies include primary school children in focused educational programmes (Faccio et al., 2013; Kang et al., 2010; Richards et al., 2008). If new habits are introduced in childhood, using not only theoretical (based on the addition of new information) but also practical (experiments and observations) lessons, the impact on behaviours could increase (Faccio et al., 2013). There is evidence that children find practical work relatively useful and enjoyable in comparison with other teaching activities (Abrahams and Millar, 2008).

The purpose of this study was to evaluate a focused workshop-based educational intervention, targeting barriers to the control of microbiological hazards in domestic kitchens by primary school children enrolled in the sixth grade of primary school. During the workshop, the main microbiological hazard control measures were addressed (Taché and Carpentier, 2014; WHO, 2013). The major objective was to measure the effectiveness of the didactic style applied through participants' comprehension of food-related risks, their food safety knowledge and self-reported practices in the domestic environment in comparison to the control group not exposed to the educational intervention.

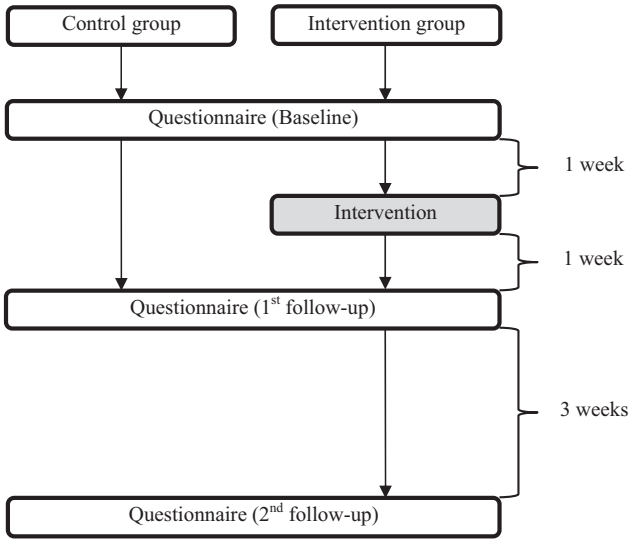

Fig. 1. Study design.

2. Material and methods

2.1. Study design

A cross-sectional pre-test/post-test survey with a control group was administered (Dimitrov and Rumrill, 2003). The participants (enrolled in the 6th grade of primary school) were recruited via an e-mail invitation sent to 52 primary schools in the municipality of Ljubljana, the capital of Slovenia, and its surroundings, addressed to home economics teachers. Overall, half the schools (26) responded to the invitation, representing 5.8% of all primary schools in Slovenia (450). After official permission by the school principal was granted for the proposed study, the home economics teacher acquired parental permissions when general permissions for these kind of activities had not already been collected at the beginning of school year. All respondents were anonymised and participated voluntarily during their regular school hours of home economics course. The National Medical Ethics Committee approved the study design.

With the purpose of reducing the reactive effects of the experimental procedure (Fig. 1), participants were divided into two groups (intervention and control). Students in both groups were first asked to complete the questionnaire. One week later, the participants in the intervention group took part in the focused workshop. After the workshop was concluded, participants in the intervention group answered the questionnaire once again, approximately one week (1st follow-up) and approximately one month (2nd follow-up) later. Participants in the control group did not take part in the workshop and answered only one post-test questionnaire (1st follow-up). The home economic teachers in the control group were advised to delay teaching food hygiene and food safety topics during their teaching hours until the follow-up step was over. The purpose of the 2nd follow-up in the intervention group was to observe whether the possible changes caused by the workshop were of a long-term nature.

The questionnaires and survey instructions were sent by post to the home economics teachers. The teachers were expected and advised to be present when the respondents were answering the questionnaire. They were instructed with written guidelines to explain the questions/content to the students if necessary. The teachers were also instructed to emphasise to the respondents the importance of honesty in the responses, particularly when reporting their practices.

2.2. Workshop design

A focused 45-min workshop was divided into four sections: (i) the impact of temperature on microorganisms, (ii) the cleaning of kitchen gear, (iii) the removal of bacteria with hand washing, and (iv) the prevention of cross-contamination. All the activities (briefly described further) were prepared according to the Partnership for Food Safety Education's instructions and work sheets respectively developed especially for the target population, which took part in this study (FightBac, 2012). *The impact of temperature on microorganisms* was demonstrated with "The yeast balloon blow-up" experiment and additionally explained with an adapted schematic diagram in which the temperature scale combined with cartoon-like illustrations of microorganism status was presented. The experiment was carried out as a demonstration in which two flasks containing the same amount of water, sugar and a yeast mixture, with a balloon over the opening were placed into two separate beakers with water at temperatures of ca. 45 °C and 4 °C. The experiment was prepared at the beginning of the workshop and discussed at the end. The result of the *inappropriate cleaning of kitchen gear* was demonstrated with the experiment "There's more than meets the eye", which was prepared in advance and explained during the workshop with two sterile jars containing peeled and cut apples (the first with unclean hands and a dirty knife, the second with properly washed hands and a clean knife). *Removing bacteria by hand washing* was directly addressed during the workshop activity called "Soapy solutions", involving volunteers from the class. They were instructed to use different hand-washing approaches (cold water without soap, warm water without soap, warm water with soap) to remove mixture of cooking oil and cinnamon, which thoroughly coated their hands. *Cross-contamination* was demonstrated with the "Safely separate" experiment through the use of a chopping board and knife for the handling of fresh meat (represented by a coloured sponge) and meat after heat treatment (represented by an ordinary sponge) without intermediate cleaning and hand washing. Food dye was used to represent the presence of harmful bacteria *Salmonella*, which is mostly known among the target group. Furthermore,