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Food safety knowledge and training participation are associated with lower stress and anxiety levels of Brazilian food handlers

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ABSTRACT

The objectives of this study were: 1) identify the state anxiety, trait anxiety levels and perceived stress levels of food handlers and; 2) Verify the association of these scores with food safety variables like: food safety knowledge, attitudes, practices and with job characteristics. This study involved 183 randomly selected food handlers from different food businesses in Santos city, Brazil, as follows: street food kiosks, beach kiosks, restaurants, hospitals and school meal services. To evaluate knowledge, attitudes and self-reported practices, a structured questionnaire was used. Observed practices were evaluated using a checklist. The State Trait Anxiety Inventory – STAI was applied to assess the levels of state and trait anxiety with a score range from 10 to 80. To evaluate stress the Perceived Stress Questionnaire – PSQ was used with a score range from zero to one. Food handlers presented 39.22; 10.1 (mean; standard deviation) of state anxiety score, 39.58; 9.6 of trait anxiety score and a perceived stress score of 0.36; 0.09. Observed practices presented a weak negative correlation with state anxiety ($r = -0.26$; $p = 0.014$) but not with trait anxiety ($r = -0.18$; $p = 0.09$) and stress ($r = 0.03$; $p = 0.78$). Using generalized linear models were observed that a higher stress level, trait anxiety and state anxiety were found in food handlers who do not participated in food safety training and with lower knowledge scores of food safety. These findings show that training can not only improve knowledge but possibly empower food handlers, increase their self-efficacy and reduce anxiety and stress levels.

1. Introduction

Studies report that inadequate handling of food is the main causal mechanism of foodborne disease (FBD), and it is directly related to several outbreak cases (Howes, McEwan, Griffiths, & Harris, 1996; Todd, Greig, Bartleson, & Michaels, 2007). Considering the magnitude and number of cases of FBD worldwide (WHO – World Health Organization, 2008), researchers seek to identify factors associated with food handling practices. Accordingly, the study of variables related to human behavior, as stress and anxiety, can illustrate phenomenon not yet observed, since both of them affect the job performance (Pflanz & Ogle, 2006; Waghorn, Chant, White, & Whiteford, 2004, 2005).

Anxiety is defined as a state of anticipatory apprehension over possible deleterious happenings (Bandura, 1988). Individuals with high anxiety levels must invest greater task of effort in work, with a resulting reduction of efficiency (Mughal, Walsh, & Wilding, 1996). Stress is the body's multi-system response to any challenge that overwhelms, or it is judged likely to overwhelm, selective homeostatic response mechanisms (Day, 2005).

Stress conditions activate the pituitary adrenal axis increasing the liberation of adrenal steroids. The corticotropin releasing factor (CRF), present in hypothalamus, is released in response to various stressors and it regulates the adrenocorticotropic hormone (ACTH) and consequently, the release of adrenal steroids (Bonfiglio et al., 2011). The increase of CRF can produce psychological disorders such depression, anxiety and even organs damage in chronic stress (Koob, 1999).

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In this sense, stress and anxiety have different concepts in this work. Stress is a tension related to specific stressors and anxiety a tension that lacks of an immediate identifiable stimulus (Storch & Panzarella, 1996).

Many studies have been conducted with professionals in order to investigate their anxiety and stress levels like: nurses, firefighters and police officers (Storch & Panzarella, 1996). The presence of stress and anxiety at work, and their increase, can lead to job burn-out. Burn-out is defined as a prolonged response to chronic stressors on the job with three dimensions: exhaustions, cynicism and inefficacy (Maslach, Schaufeli, & Leiter, 2001).

These aspects reinforce the importance of studying the relationship between stress, anxiety and job performance. Knowing the potential stressors for food handlers and factors associated with these stressors brings a new vision of the associated food handling factors and promotes knowledge to better plan interventions.

The objectives of this study were: 1) identify the state anxiety, trait anxiety levels and perceived stress levels of food handlers and; 2) Verify the association of these scores with food safety variables like: food safety knowledge, attitudes, practices and with job characteristics.

2. Methods

This study was cross-sectional and involved 183 food handlers from 119 food businesses in the city of Santos, Brazil, as follows: 29 street food kiosks, 23 beach kiosks, 28 restaurants, two hospitals and 37 school meal services. Dichotomously, school meal services and hospitals involve an environment with greater control, a high frequency of sanitary inspections and the presence of a specialist in food hygiene, directly influencing the organizational performance of the food service and the behavior of food handlers. They formed the group 1 “institutional food services”. Street food kiosk, beach kiosks and restaurants were considered as “commercial food services” group 2.

The food services were randomly selected. Only those services that manipulated foods with a high risk of contamination (Xue & Zhang, 2013), such as meat products and raw salads were eligible for inclusion.

A pilot study was first performed with 50 food handlers, being 10 from each business, to calculate the necessary sample size and to test comprehension of the questionnaires. Minor adjustments were necessary to improve understanding of the questionnaires. The sample size was calculated considering at least one point of difference on knowledge score and a 95% of global confidence interval. Based on the data, 42 randomly selected food handlers for each group (trained and untrained) were necessary to have a sample with 0.80 of power.

To characterize the food handlers, they were questioned about their education level, age, gender, participation in food safety training and experience (months working as a food handler).

2.1. Anxiety assessment

The State Trait Anxiety Inventory – STAI (Spielberger, 1983), validated for use in Brazil (Gorenstein & Andrade, 1996), was applied to assess the levels of state and trait anxiety. STAI consists of two scales: the first scale measures the degree of state anxiety – describes how the individual feels in a specific moment. It refers to a transitory emotional state characterized by subjective feelings of tension; and the second scale measures the degree of trait anxiety – how they feel in general. It is a stable disposition to respond stress with anxiety (Andrade, Gorenstein, Vieira Filho, Tung, & Artes, 2001).

Each STAI has 20 affirmatives in which the individuals express their degree of concordance with a 4-point Likert scale from 1- almost never to 4- almost ever.

The STAI score range from 20 to 80, where 20 represent low anxiety.

2.2. Stress assessment

To evaluate stress the Perceived Stress Questionnaire – PSQ was used (Levenstein et al., 1993). This questionnaire was translated to Portuguese (Petrelluzzi, Garcia, Petta, Grassi-Kassisse, & Spadari-Bratfisch, 2008) and used in other researches in Brazil (Bella, Garcia, & Spadari-Bratfisch, 2011; Garcia et al., 2008).

The PSQ has 30 affirmatives in which the individuals express their degree of concordance with a 4-point Likert scale from 1- almost never to 4- almost ever. The sum of the ranking of the 30 individual items, gives a raw score. This raw score minus 30 is divided by 90 and gives the perceived stress index, which varies from zero to one (Bella et al., 2011; Levenstein et al., 1993).

2.3. Knowledge, attitudes and self-reported practices assessment

To evaluate knowledge, attitudes and self-reported practices (KAP), a structured printed questionnaire was administered to the food handlers. This questionnaire was fully described in a previous research (da Cunha, Stedefeldt, & de Rosso, 2014).

The KAP questionnaire is divided in three parts: 1) ten questions related to food handling to assess food handlers' knowledge. A response was given as one of three possible answers: “yes”, “no” and “I don't know”. The knowledge score range was between 0 and 10 where 10 represent the highest knowledge score and 0 the lowest. 2). Ten affirmatives to assess food handlers' attitudes toward food safety. Food handlers indicated their level of agreement using three-point rating scale: “1 = agree”, “0 = not sure” and “0 = disagree”. The attitude score range was between 0 and 10 where 0 is the most negative attitude and 10 the most positive one. 3) Self-reported practices were evaluated through ten questions about daily practices. A five-point rating scale, ranging from 1 = never to 5 = always, was used to evaluate each practice. The self-reported practices score range was between 10 and 50 where 10 represents poor food safety practices and 50 good food safety practices.

2.4. Evaluation of observed practices of food handlers

To evaluate the food handlers' practices, a checklist was developed in accordance with the Brazilian food safety law (Brazil - Health Ministry, 2004). This questionnaire was fully described in a previous research (da Cunha et al., 2014).

The checklist was composed of 42 evaluated items covering different aspects of food handling. The items were divided into seven categories: 1 – environmental hygiene (i.e. frequency of sanitization of the facilities, furniture and utensils; type and dilution of hygiene products used); 2 – water supply (i.e. use of ice made of potable water); 3 – waste management (i.e. sanitization and use of waste collectors); 4 – food handlers (i.e. use of clean uniforms; hygienic behavior; hand hygiene); 5 – raw materials, ingredients and packaging (i.e. receipt of the raw materials; use of raw materials before their expiration dates; storage); 6 – food preparation (i.e. temperature of cooking; thawing technique; preservation of food under refrigeration; sanitization of raw food; avoidance of cross-contamination); and 7 – storage and transportation of prepared food (i.e. temperature and waiting time of ready-to-eat foods that are transported and stored). It is noteworthy that all of the evaluated items covered food handlers