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Research report

Associations between food consumption habits with meal intake behaviour in Spanish adults ☆

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ABSTRACT

The aim of the present study is to explore the contribution of different types of meal intake behaviour on a healthy diet and seeks to find associations with food consumption habits. A cross-sectional survey with data from 1332 Spanish adults aged between 20 and 79 years was conducted. The survey was carried out during the cardiovascular health event 'Semanas del Corazon 2008' in four Spanish cities. Several food consumption habits such as the recommended intake of fruits, vegetables, milk and dairy products, as well as the regular consumption of fatty and salty food and ready-made meals, were used as dependent variables in logistic regression. We evaluated different meal intake behaviour such as the type of meals, snacking, and drinks taken with a meal. Our survey revealed that snacking is positively associated with the regular consumption of salty and fatty food, and having sugary drinks with meals was positively associated with the regular consumption of ready-made meals. Having a forenoon meal is positively associated with the consumption of two or more portions of milk and dairy products and vegetables, and taking an afternoon meal with the recommended intake of milk and dairy products and fruits. Drinking water during a meal increases the probability of consuming two or more portions of fruits and vegetables. Our results enhance the understanding of the contribution that meal intake behaviour makes to a healthy diet based on food consumption habits. This work provides an insight into eating behaviour and would make a useful contribution to interventions aimed at promoting healthier eating habits.

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Introduction

During the twentieth century, advanced technology increased food production output (through the industrialisation of agriculture and food preparation) and food durability (through conservation and transport) in developed countries. These changes resulted in an excessive supply of food as well as a decrease in food prices which led to a change (Golzarand et al., 2012; Popkin, 2001) in traditional healthy food consumption habits (FCHs). The resulting increase in the consumption of meat, dairy products, and industrially prepared meals has caused an energy-dense alimentation rich in protein, sugar and fat (Golzarand et al., 2012; World Health Organization, 2000) that has promoted the incidence of cardiovascular diseases, as well as diet dependent risk factors such as obesity (World Health Organization, 2000), hypercholesterolaemia, and diabetes (Popkin, 2001).

The traditional food and nutritional habits of the Spanish population are based on the Mediterranean diet, rich in carbohydrates, fibre and unsaturated fat, and lacking in protein and saturated fat. People who adhere to this diet show a lower risk of developing diabetes (Martínez-González et al., 2008), cancer (Trichopoulou, Costacou, Bamia, & Trichopoulos, 2003), coronary heart disease (Martínez-González et al., 2011; Trichopoulou et al., 2003) and obesity (Beunza et al., 2010). Therefore, in Spain healthy eating is associated with FCHs which are a part of the Mediterranean diet such as the regular and adequate consumption of fruit, vegetables, cheese, fish, legumes, and olive oil (Márquez-Sandoval, Bulló, Vizmanos, Casa-Agustench, & Salas-Salvadó, 2008). Since the early 1980s however, new FCHs such as the consumption of pre-prepared, fatty, and salty food, which are considered to be unhealthy due to their association with the Anglo-Saxon diet (or Western diet), have been introduced into Spain (Da Silva et al., 2009; Márquez-Sandoval et al., 2008). A critical review carried out by Boeing et al. (2012) has shown that a high consumption of fruit and vegetables is likely to reduce hypertension, coronary heart disease and cancer, which confirms the observations made by Alwan (2011). Furthermore a high consumption of milk and dairy products when compared with a low intake of milk and dairy products, is negatively associated with

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all-cause deaths, ischaemic heart disease, stroke and the incidence of diabetes (Aune, Norat, Romundstad, & Vatten, 2013; Elwood, Pickering, Givens, & Gallacher, 2010). Whereas, the increased consumption of pre-prepared, fatty, and salty food is known to promote cardiovascular risk factors (Perk et al., 2012; Sayon-Orea et al., 2013; Van der Horst, Brunner, & Siegrist, 2011) and should therefore be avoided.

Diet is considered to be one of the most important determinants in cardiovascular disease and its risk factors, such as obesity, hypertension and hypercholesterolaemia (Alwan, 2011). Therefore, achieving a healthy diet is important; however, the effectiveness of intervention programmes promoting healthy FCHs is disputed (Brambila-Macias et al., 2011; Rees, Dyakova, Ward, Thorogood, & Brunner, 2013). Studies have shown that public information companies are able to raise awareness but the implementation of these recommendations is rare (Brambila-Macias et al., 2011). To broaden the scope of exploration into what constitutes a healthy diet, meal intake behaviour (MIB) such as daily eating frequency, snacking between meals, or at night, and the drinks taken with a meal, are brought into the focus of scientific investigation. As MIB accompanies food intake it might have an effect on FCHs and food choices. Previous studies have demonstrated that although a higher daily eating frequency is associated with an increased calorie intake, the energy provided comes from carbohydrates rather than from fat or proteins. They also showed a positive relationship between a higher daily eating frequency and the intake of micronutrients such as folic acid, vitamin C, calcium, magnesium, iron, and dietary fibre (Kerver, Yang, Obayashi, Bianchi, & Song, 2006). Furthermore, skipping breakfast and to a lesser degree skipping lunch, result in a decrease in the intake of micronutrients (Berg et al., 2009; Kerver et al., 2006), whereas meals taken in addition to the usual three main meals, breakfast, lunch, and dinner, increase their intake (Kerver et al., 2006). Snacking defined as eating a smaller amount of food, eating between meals (Bes-Rastrollo et al., 2010) and eating 'snack food' (Halkjaer, Tjønneland, Overvad, & Sørensen, 2009) has been shown to be associated with obesity (Marín-Guerrero, Gutiérrez-Fisac, Guallar-Castillón, Banegas, & Rodríguez-Artalejo, 2008). The individual perception of an eating experience either as a meal or a snack depends on schemas or constructs such as the type of food being eaten and the time of the day (Wadhera & Capaldi, 2012). In addition is the accompanying situational and environmental circumstances such as the duration, whether the food is taken sitting or standing or whether one is eating alone or with company (Wansink, Payne, & Shimizu, 2010).

Therefore, the aim of this study is to evaluate the associations between FCHs, namely the recommended intake of fruit, vegetables, milk and dairy products and the regular consumption of ready-made meals, salty and fatty foods, with several kinds of MIB such as the type of meals consumed, snacking between meals and the drinks taken with a meal in order to identify possible associations of healthy diet.

Material and methods

Participants

The study included 1332 individuals, 844 women and 488 men, with a mean age of 57.9 years and an age range of 20–79 years. The individuals were interviewed in 2008 during a cardiovascular health event called 'Semanas del Corazon' (The Weeks of the Heart) which were organised by the 'Fundación Española del Corazón' and the 'Sociedad Española de Cardiología'. The events took place in four Spanish cities: Las Palmas, Madrid, Seville, and Valencia. These events were focused on the prevention of cardiovascular risk factors, by assessing the prevalence and the health status of the participants. Therefore, a previous random selection of the individuals was not conducted. This might have attracted groups of the population who had a higher degree of sensitivity towards cardiovascular diseases, which could consequently have led to an elevated proportion of women and older individuals in the sample. The inclusion criterion was the completion of a questionnaire that provided information about age, sex, FCHs, MIB, individual risk factors, weight and height measurements. Individuals were excluded if they could not participate without assistance, for example if they needed to be supported by another person or if they used a wheelchair. Participants were asked to sign a consent form before completing the guided-questionnaire. The study complied with the ethical standards of the 1964 Declaration of Helsinki and was approved by the Ethical Commission of the 'Fundación Española del Corazón'.

Food consumption habits

Our dependent variables were based on several FCHs. The three FCHs that were considered to be the parameters of unhealthy habits were: the regular consumption of salty food (1 = yes; 0 = no), fatty food (1 = yes; 0 = no) and ready-made meals (1 = yes; 0 = no). Therefore, we asked the participants if they regularly consumed these kinds of foods. We also assessed three healthy FCHs by obtaining information about the daily intake frequency of: a) milk and dairy products (0 = none, 1 = one, 2 = two, 3 = three portions); b) fruit (0 = none, 1 = one, 2 = two, 3 = three, 4 = four, 5 = five or more portions); c) vegetables (0 = none, 1 = one, 2 = two, 3 = three portions). These variables were recoded based on previous recommended intake habits (Salvador Castell, Mataix Verdú, & Serra-Majem, 2006), two or more portions of milk and dairy products, fruit and vegetables, and used as dichotomous (1 = yes; 0 = no) in the regression analysis.

Meal intake behaviour

Our key independent variables were several kinds of MIB, such as the types of meals consumed per day, snacking between meals, and the types of drinks consumed with the meals. The meals were assessed using five questions asking whether participants regularly had breakfast, a forenoon meal, lunch, an afternoon meal and dinner (1 = yes/0 = no). The participants were also asked if they snacked between these five main meals (1 = yes/0 = no). Finally, two different variables were created: a) 'Drinking water with the meals' (DWM) pertaining to those individuals who consumed water as one of the drinks taken during the meals and b) 'Drinking sugary drinks with the meals' (DSM) which indicated the consumption of soft drinks. The possible responses to the type of drinks consumed with the meals included: no drinking during meals, juice, water, wine, soft drinks, beer, and other, where selecting more than one answer was possible.

Individual risk factors

In order to determine the nutritional status of the participants, we estimated body mass index (BMI) from objective measurements of weight and height. We used the cut off points proposed by the World Health Organization (2000) to classify the participants as underweight (<18.5 kg/m^2), normal weight (18.5–24.9 kg/m^2), overweight (25–29.9 kg/m^2) and obese (≥30 kg/m^2). Individual risk factors were determined through self-reporting of physical activity during leisure time (coded 1 = sedentary lifestyle; 2 = light exercise and 3 = moderate and/or intensive exercise), alcohol consumption (1 = yes/0 = no), and smoking (1 = yes/0 = no). These factors were considered to be possible confounders in further analysis.

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