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Research report

Factors associated with low adherence to a Mediterranean diet in healthy children in northern Spain ☆

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ABSTRACT

There is a tendency in Mediterranean countries to abandon the characteristic Mediterranean diet. This is especially apparent within younger populations. This could have negative consequences for health such as, cardiovascular diseases, obesity or metabolic syndrome. The aim of this study was to describe adherence to the Mediterranean diet within a population of school children and to examine the influence of different socio-demographic factors and lifestyle habits. The study was conducted on a representative sample of 321 school children aged 11–12 years from 31 schools in the city of Logroño (La Rioja). Socio-demographic variables, anthropometric variables, blood pressure, level of development, aerobic fitness, lifestyle, physical activity habits and adherence to the Mediterranean diet were recorded. High adherence to the Mediterranean diet was reported by 46.7% of school children, with low adherence being reported by 4.7% of them. Children attending state schools, immigrants and families from low-to-medium socio-economic strata reported significantly lower adherence to the Mediterranean diet ($p = .039$), but the results did not reveal any significant differences in terms of body composition. Correlations were found between adherence to the Mediterranean diet and other lifestyle habits, especially level of physical activity ($r = .38$) and screen time ($r = -.18$). Adherence to a Mediterranean diet differs according to the type of school attended by children, and the child's nationality and socio-economic status. Children who attended state schools, immigrants and those from families with a medium-to-low socio-economic status were less likely to follow healthy diets.

Introduction

The dietary habits of children have been studied in recent years and relationships have been found between unhealthy diets and different cardiovascular risk factors, such as, obesity (Santos et al., 2011), blood pressure (Niinikoski et al., 2009), cholesterol (Royo-Bordonada et al., 2006) and type-2 diabetes (Pereira et al., 2005). Moreover, the dietary habits of children may influence other habits such as the time spent engaged in sedentary or physically active pursuits.

The Mediterranean diet (MD) is of special interest as it has been shown to have a positive impact on health-related quality of life (Costarelli, Koretsi, & Georgitsogianni, 2013), cardiovascular disease (Domínguez et al., 2013) and metabolic syndrome (Kastorini et al., 2011) and also shows some associations with obesity, albeit these findings are more equivocal (Buckland, Bach, & Serra-Majem, 2008).

Unfortunately, it seems that Mediterranean countries are replacing the traditional MD with other less healthy eating habits (Hebestreit & Ahrens, 2010). This is especially apparent within younger populations (Serra-Majem et al., 2004). The progressive globalisation of food products has contributed to decreased consumption of traditional healthy foods (Royo-Bordonada et al., 2006). Promoting the MD could contribute to a resurgence in the consumption of healthy foods (Lazarou, Panagiotakos, & Matalas, 2009) making it a critical tool for combatting the current detrimental eating habits of young people, which are characterised by a high intake of sugars and saturated fats, and insufficient consumption of fruits and vegetables.

There is therefore a need to promote traditional Mediterranean dietary habits during school age since this is a critical stage in the acquisition of habits. However, the habits of young people can be determined by individual (e.g. age, gender, food preferences, nutritional knowledge, attitudes), collective (e.g. food pricing, education, family employment) and social factors (e.g. cultural factors, familial factors, peers and product marketing/mass media) (Taylor, Evers, & McKenna, 2005). Thus, it is important to identify the primary factors that influence diet in order to develop effective interventions.

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The aim of this study was to describe adherence to the MD within a representative population of sixth-grade primary school children (11–12 years) in Logroño, a city in northern Spain. The relationship of the MD with body composition, blood pressure, physical fitness, night-time sleep, screen time, and various socio-demographic factors were also analysed.

Materials and methods

Subjects

This was a cross-sectional study using a representative sample of sixth-grade primary school children (11.7 ± .4 years) from the city of Logroño. Research was conducted during the spring of 2012. Data were collected on 1595 school children during the 2011–2012 academic year. We estimated that the present study required a minimum sample of 310 school children (95% confidence interval). Three hundred seventy-two school children were randomly selected from all state and state-subsidised private schools in the city, of which 329 accepted to take part in the study. The sample was stratified across the different state and private schools. Eight subjects were excluded from analysis for failing to complete the questionnaire. This left a final sample of 321 school children.

To be eligible for inclusion, children had to be free of any major physical or behavioural disorder that could seriously impact participation. All children met these criteria; they were healthy and none were undergoing any medical treatment. Ethical principles of the Declaration of Helsinki for medical research were adhered to. Informed consents were obtained from the parents or guardians of the school children. Ethical approval was granted by the Ethics Committee for Clinical Research of La Rioja.

Level of adherence to the MD

The Mediterranean Diet Quality Index (KIDMED) questionnaire (Serra-Majem et al., 2004) was used to determine level of adherence to the MD. This questionnaire consists of 16 items that relate to Mediterranean dietary patterns; items that denoted negative connotations with respect to the MD (e.g. do you eat candies daily?) were scored as a –1, while those with positive connotations (e.g. do you use olive oil for cooking at home?) were scored as a +1. The 16 items were then summed to produce a total score. Based on this score, participants' adherence to the MD was classified as high (≥8), medium (4–7) or low (≤3). The school children were also asked whether they visited the school canteen on three or more days a week. All questionnaires were administered systematically by a trained researcher and supervised by three collaborators to ensure that all participants understood the questionnaires.

Socio-demographic data

Participants reported their gender, date of birth and country of origin. Schools were classified as state or state-subsidised private according to the Regional Ministry of Education of the Regional Government of La Rioja. The socio-economic and sociocultural level of the school children was categorised as: medium-low, medium and medium-high determined based on information contained in the Educational Project of the centre or school in which they were enrolled.

Anthropometric measurements

Protocols established by the International Society for the Advancement of Kinanthropometry (Stewart, Marfell-Jones, Olds, & de Ridder, 2011) were followed when taking all anthropometric measurements. Measurements were taken by a single experienced Level II (accredited by ISAK) assessor.

Weight was determined using a SECA scale (model 713, Hamburg, Germany) to an accuracy of .1 kg. Height was determined using a Holtain height rod (Holtain Ltd., Dyfed, UK), to an accuracy of 1 mm. Overweight and obesity were defined according to international criteria (Cole, Bellizzi, Flegal, & Dietz, 2000). Waist and hip circumferences were measured using a Lufkin flexible steel tape measure (Lufkin W606 PM, Michigan, USA) to .1 cm accuracy. Skinfolds were measured at the triceps and subscapular using a Holtain skinfold caliper (Holtain Ltd., Crosswell, UK) to an accuracy of .2 mm and a constant pressure of 10 g/mm^2. Percentage fat mass was also estimated (Slaughter et al., 1988).

Sexual maturity

Sexual maturity of each child was determined by a trained researcher, of the same gender. The two following procedures were used.

Firstly, all school children assessed their own stage of sexual maturity or development (Tanner & Whitehouse, 1976). Secondly, peak height velocity was estimated from equations using chronological age, sex and a series of anthropometric measurements as references (Mirwald, Baxter-Jones, Bailey, & Beunen, 2002).

Blood pressure

Systolic and diastolic blood pressures were determined using a calibrated Riester aneroid sphygmomanometer (Minimus III, Jungingen, Germany) and stethoscope. Measurements were taken with the participant in a seated position, and followed a period of rest which lasted for at least five minutes. The cuff was adapted to the size of the child's arm, as advised in internationally accepted recommendations for assessing children (National High Blood Pressure Education Program Working Group on High Blood Pressure in Children and Adolescents, 2004). Qualified and experienced staff measured blood pressure from the right arm of each participant.

Aerobic capacity

The maximum volume of oxygen consumed was estimated by performing a maximum incremental field test (20-m Shuttle Run Test). The number of minutes (whole or half) completed by each participant was recorded. From these data, the maximum volume of oxygen relative to body mass (ml/kg/min) was calculated using established formulas (Léger, Mercier, Gadoury, & Lambert, 1988).

Physical exercise level and habits

The Physical Activity Questionnaire for Older Children (PAQ-C), validated and adapted to Spanish (Martínez-Gómez et al., 2009), was completed by participants. The questionnaire assesses moderate-to-vigorous exercise engaged in during the seven days prior to completion of the questionnaire. It consists of nine questions which probe the frequency and type of physical activity performed at different times of the day during the week prior to completion of the questionnaire. A score 1–5 was obtained using the answers to the nine questions. A higher score indicated a more active child. Based on these scores, participants were classified into physical activity tertiles (low, medium and high). Participants were also asked on the number of hours of sleep they achieved at night, their engagement in extracurricular school sports activities, daily screen time each day and how they travelled to school.