

Original Research



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Salty-Snack Eating, Television or Video-Game Viewing, and Asthma Symptoms among 10- to 12-Year-Old Children: The PANACEA Study

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ABSTRACT

Background Salty-snack consumption, as well as the amount of time children spend watching television or playing video games, have been implicated in the development of asthma; however, results are still conflicting.

Objective The aim of this work was to evaluate the association of salty-snack eating and television/video-game viewing with childhood asthma symptoms.

Design Cross-sectional study.

Settings Seven hundred children (323 male), 10 to 12 years old, from 18 schools located in the greater area of Athens were enrolled. Children and their parents completed questionnaires, which evaluated, among other things, dietary habits. Adherence to the Mediterranean diet was

evaluated using the KIDMED (Mediterranean Diet Quality Index for Children and Adolescents) score.

Statistical analysis The association of children's characteristics with asthma symptoms was performed by calculating the odds ratios and corresponding 95% confidence intervals.

Results Overall lifetime prevalence of asthma symptoms was 23.7% (27.6% boys, 20.4% girls; $P=0.03$). Forty-eight percent of children reported salty-snack consumption (≥ 1 times/week). Salty-snack consumption was positively associated with the hours of television/video-game viewing ($P=0.04$) and inversely with the KIDMED score ($P=0.02$). Consumption of salty snacks (>3 times/week vs never/rare) was associated with a 4.8-times higher likelihood of having asthma symptoms (95% confidence interval: 1.50 to 15.8), irrespective of potential confounders. The associations of salty-snack eating and asthma symptoms were more prominent in children who watched television or played video games >2 hours/day. In addition, adherence to the Mediterranean diet was inversely associated with the likelihood of asthma symptoms.

Conclusions Unhealthy lifestyle behaviors, such as salty-snack eating and television/video-game viewing were strongly associated with the presence of asthma symptoms. Future interventions and public health messages should be focused on changing these behaviors from the early stages of life.

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Asthma is a chronic inflammatory disease of the airways characterized by increased airway responsiveness and variable airflow obstruction (1). Worldwide, it is clear that more affluent Westernized countries and countries making the transition to a Westernized lifestyle have a higher prevalence of asthma compared with less-developed countries, and that the link between atopic sensitization and asthma symptoms in children increases with economic development (2,3).

The dramatic increase in asthma prevalence, especially in Westernized countries, suggests that environmental

factors such as dietary intake may play a key role in the onset and the development of the disease. Another important factor that has been changing in recent decades is the amount of time that children spend watching television (TV) or playing video games. TV viewing has several deleterious effects on children's health because it promotes sedentary behavior (4). Moreover, consumption of fruit and vegetables is strongly reduced during TV viewing and consumption of salty snacks is increased (5). In addition, the consumption of fast food in children has increased from 2% of total energy in the late 1970s to 10% in the 1990s (6). Fast food has been associated with wheezing symptoms in children, particularly boys, but the relationship between fast-food consumption and asthma is not yet confirmed (7,8). Salty snacks (eg, hamburgers, pizzas, hot dogs, toasts, cheese pies, all kinds of crisps, popcorn) contain high levels of fat and salt, which might play a role in the pathogenesis of asthma (9-21). However, a recent randomized clinical trial failed to show beneficial effects of a low-sodium diet (22). A Cochrane Review concluded that current studies of the effect of a low-sodium diet on individuals with asthma suggest a possible improvement in pulmonary function, but larger studies are also needed (23).

Despite some promising hypotheses and findings mentioned in the literature, there has been no conclusive evidence about the role of salt, fat, and sedentary lifestyle past early childhood in asthma prevalence. The aim of this work was to evaluate the associations of salty-snack consumption and TV viewing, as well as their synergistic role, with the presence of asthma symptoms in children.

METHODS

Study Design

The PANACEA study (Physical Activity, Nutrition and Allergies in Children Examined in Athens) is a cross-sectional, health and nutrition, observational survey that took place in Athens during the period 2005-2006. The study's sample included 700 students (323 male, 377 female) aged 10 to 12 years old (4th to 6th school grade) who were selected from 18 schools located in various areas of Athens; the participation rate was 83.5%. Only premenstrual girls were included. Children with chronic diseases that prohibited free running (ie, cyanotic heart disease or severe motor handicaps) were also excluded. The schools were randomly selected from a list provided by the regional education offices. In order to achieve a representative sample, the enrolled schools were selected from various regions of Athens (24). Participation of children was on a voluntary basis; before acceptance, children's guardians were fully informed of the objectives and methods of the study and signed an informed consent.

Evaluation of Asthma Symptoms

In order to evaluate asthma symptoms, children's parents completed the International Study of Asthma and Allergies in Childhood questionnaire (25). In particular, the duration and the evaluation of the presence of asthma symptoms was assessed by four questions on whether the child had ever had 1) wheezing; 2) disturbed sleep due to wheezing; 3) asthma; and 4) dry cough at night, except in cases of cold or chest infection.

Measurements

A questionnaire developed for the purposes of the PANACEA Study that retrieved information about age, sex, school class, dietary habits, and physical activity status was completed by all the enrolled children. The questionnaire also included information about social and economic status of the family assessed on the basis of the educational level of the parents (classified in the following categories: none, basic education, high school, academic), the number of cars in the family, the availability of child's own room (yes or no), and the number of siblings, as well as information on possible hospitalizations of the children (ie, number of hospitalizations). All questionnaires were completed at the time of enrollment.

Dietary Assessment. A Food Frequency Questionnaire (FFQ) was administered to all children who participated in the study and was completed by their parents during face-to-face interviews. The FFQ gathered information on a daily or weekly basis on 63 foods and beverages usually consumed in Greece and on the habits pertaining to meal-time behaviors. In particular, the daily consumption of various meals, frequency of consumption of foods outside the home (including school canteens and non-homemade meals), cooking method usually used, type of oils/fat consumed, frequency of consumption of snacks, and frequency of consumption of various foods (eg, fish, poultry, meat and meat products, eggs, various types of bread, potatoes, rice, fruits, fruit juices, vegetables), soft drinks and beverages, and intake of traditional Greek cooked meals. Especially for the assessment of the diet pattern of breakfast, was included a question about the frequency of breakfast consumption in a week (in times per week) as well as another question assessing the food that children consume most frequently at breakfast (closed-type question with one of eight possible answers: "milk, yogurt, cereals, fruit juice, honey/marmalade, bread/toast, butter/margarine, cake"). Regarding the other foods and beverages that were assessed by the FFQ questionnaire, they were included in the following categories: 1) dairy products, which included all kinds of milk, yogurt, and cheese; 2) snacks, which were categorized into two main types: salty snacks (eg, hamburger, pizza, hot dog, toast, cheese pie, all kind of crisps, popcorn) and sweet snacks (eg, ice cream, milkshake, all kinds of chocolate, croissant, cakes, biscuits); 3) any type of soda drink; 4) fruit juices (fresh or ready-made); 5) other beverages (such as tea, chamomile, etc); and 6) traditional Greek cooked foods. Typical serving sizes of these foods and beverages were used as units of measurement and were clearly described in the FFQ (eg, a can of soft drink, one hamburger, one portion of chicken approximately 150 g, a bag of crisps, etc). The FFQ questionnaire has been found repeatable and valid in previous internal analyses. For the evaluation of the overall dietary habits and quality of diet, the children's adherence to the Mediterranean-type diet was also assessed with the use of the KIDMED index (Mediterranean Diet Quality Index for children and adolescents). The index is derived from 16 components that summarize the inherent characteristics of the Mediterranean diet. The theoretical score ranges from 0 to 12 (scores of 0 to 3 reflect poor adherence to the Mediterranean diet, scores between 4 and 7 and 8 and 12 indicate average and good adherence to the Mediterranean diet) (26).

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