Habitual Yogurt Consumption and Health-Related Quality of Life: A Prospective Cohort Study

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ABSTRACT

Background Health-related quality of life (HRQL) is a global indicator of perceived health status, which includes physical and mental domains. Several biological mechanisms might support an association between consumption of yogurt and better HRQL.

Objective Our aim was to assess the association between habitual yogurt consumption and HRQL in the general adult population.

Design We conducted a prospective study with 4,445 individuals aged 18 years and older who were recruited in 2008 to 2010 and were followed up to 2012. Habitual yogurt consumption was assessed at baseline with a validated diet history. HRQL was measured with the Physical Composite Summary and the Mental Composite Summary of the Spanish version of the SF-12 Health Survey. The analysis of the association between baseline yogurt consumption and HRQL at 2012 was performed with linear regression and adjusted for the main confounders, including baseline HRQL.

Results Mean follow-up was 3.5 years (standard deviation=0.6 years). Compared with nonconsumers of yogurt, the Physical Composite Summary scores were similar in habitual consumers of ≤6 servings/week (β=.40; P=0.20) and in consumers of ≥1 serving/day (β=.25; P=0.45). A suggestion of tendency toward a lower Mental Composite Summary score was found among daily yogurt consumers (β=−.65; P=0.09; P for trend across categories=0.07). Results were similar among individuals without morbidity, never smokers, and individuals with higher adherence to the Mediterranean diet.

Conclusions Habitual yogurt consumption did not show an association with improved HRQL.

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HEALTH-RELATED QUALITY OF LIFE (HRQL) IS A global indicator of perceived health status, which includes physical and mental domains. Poor HRQL has been associated with greater use of health care services[1,2] and with higher short- and long-term mortality, particularly among older adults.[3]

The main dietary guidelines in Spain and other countries support the consumption of dairy products as part of a healthy diet.[4,5] Because most studies have focused on the effect of total dairy, it is interesting to assess the independent association between each type of dairy and global indicators of health, such as HRQL. Several biological mechanisms suggest that there is a pathway by which yogurt consumption might influence, directly or indirectly, HRQL. Specifically, yogurt consumption has been associated with lower weight gain,[6,7] which in turn can lead to improved HRQL.[8] In addition, the consumption of dairy products has been linked to lower blood pressure,[9,10] and hypertension awareness and treatment are related to impaired HRQL.[11] Also, yogurt is rich in calcium, which is bone protective, and it is known that osteomuscular disease is one of the health disorders with the greatest negative impact on HRQL.[12] In addition, it has been suggested that probiotics found in yogurt can improve gastrointestinal disorders[13] and also affect activity of brain regions that control central processing of emotion and sensation.[14] Lastly, in specific patient samples, there is some evidence that administration of probiotics reduced lower gastrointestinal symptoms and led to improvement in quality of life.[15,16]

Assessing the association between individual foods and HRQL is important because both the food industry and the population as a whole are interested in knowing whether general well-being could be improved by consuming specific foods. To our knowledge, however, the effect of yogurt on HRQL has not yet been studied in epidemiological investigations in the general population. The objective of this article was to examine the prospective association between habitual yogurt consumption and the physical and mental components of HRQL among the general adult population.

METHODS

Study Design and Participants

Data were taken from a cohort of 6,207 white individuals aged 18 years and older. Cohort members were selected

through random sampling of participants in the ENRICA (Nutrition and Cardiovascular Risk in Spain) study,[17] with over-representation of older adults. Baseline information was obtained in 2008 to 2010 in the following stages: a phone interview to collect information on health status, lifestyle, morbidity and health services use; a first home visit to obtain samples of blood and urine; and a second home visit to perform a physical examination and to record habitual diet. In 2012, a phone interview was conducted to update information on lifestyles other than diet, HRQL, and morbidity in a subsample of 4,887 (78.7%) participants. All interviewers at baseline and at follow-up received specific training in the study procedures.

Study participants gave informed written consent. The Clinical Research Ethics Committee of the "La Paz" University Hospital in Madrid approved both the baseline and follow-up studies.

Yogurt Consumption

Habitual food consumption in the previous year was assessed at baseline with a validated computerized diet history developed from the one used in the EPIC (European Prospective Investigation into Cancer and Nutrition)-Spain cohort study.[18,19] Yogurt consumption (including fermented milk) was recorded in detail by asking the participants whether they consumed whole milk or reduced-fat type. We considered that the average serving of yogurt was 125 g and defined the following categories of consumption: no consumption, 1 to 3 servings/month up to 6 servings/week, and ≥1 serving/day. In addition, calcium, sugar, and saturated fat (important nutrients in yogurt) and total energy intake were estimated using standard food-composition tables.[20,21]

HRQL

HRQL represents the individual perception of the impact of a disease or a risk factor (eg, yogurt consumption) on different spheres of life, including physical, mental and social aspects. HRQL was measured at baseline and at the end of follow-up using the SF-12 Health Survey version 2, which has been validated in Spain.[22] This is a shortened version of the SF-36 Health Survey, one of the most widely used instruments to evaluate HRQL. This shorter version was obtained by selecting 12 items whose responses are coded and analyzed to reproduce the Physical Composite Summary (PCS) and the Mental Composite Summary (MCS) from the longer version. The PCS and MCS scores are standardized to a national norm with a mean of 50.0 and a standard deviation of 10.0. A zero score in PCS or MCS indicates the lowest level of health and a score of 100 indicates the highest level.

Despite being a short version of the SF-36 Health Survey, the SF-12 has excellent criterion validity because it explained >90% of the variability in the PCS and MCS scores on the SF-36. The SF-12 Health Survey has also shown good reliability for group comparisons.[22]

Potential Confounders of the Study Association

Study participants reported their age, educational level, smoking habit, and the total amount of hours of sleep per day. Information on physical activity during leisure time was obtained with the questionnaire developed for the EPIC-Spain cohort, and was expressed in metabolic equivalent

hours per week.[23] This information was obtained at baseline and updated at the end of the follow-up.

Accordance with the Mediterranean diet was evaluated at baseline with the Mediterranean Diet Adherence Screener,[24] which consists of 12 items with targets for food consumption and another 2 items with targets for food-intake habits characteristic of the Mediterranean diet in Spain. One point is given for each target achieved. The scale ranges from 0 to 13 (without including alcohol consumption, which was considered an independent potential confounder). We considered that a Mediterranean Diet Adherence Screener score ≥6 represented moderate accordance.

Baseline weight and height were measured in each subject under standardized conditions. Body mass index was calculated as weight (kg) divided by height (m^2). Blood pressure was determined with a validated sphygmomanometer and glucose and cholesterol levels were measured in serum samples using standard protocols at baseline.[25-27] Hypertension was defined as systolic blood pressure ≥140 mm Hg, diastolic blood pressure ≥90 mm Hg, or treatment with an antihypertensive drug. Type 2 diabetes was defined as fasting serum glucose ≥126 mg/dL (6.99 mmol/L) or being treated with oral drugs or insulin, and hypercholesterolemia as serum total cholesterol ≥200 mg/dL (5.18 mmol/L) or receiving lipid-lowering drugs. Finally, participants also reported whether in the year before the baseline and follow-up interviews they had suffered any of the following physician-diagnosed diseases: asthma or chronic bronchitis, cardiovascular disease, sleep apnea, osteoarthritis, rheumatoid arthritis, hip fracture, gallstones, intestinal polyps, cirrhosis of the liver, peptic ulcer, cataracts, cancer at any site, Parkinson disease, and Alzheimer disease.

Statistical Analysis

Of the individuals followed up to 2012, there were 4,780 alive at the time of the interview. Of these, 4,445 provided complete information on the study variables and formed the analytical sample. Individuals excluded from the analyses were less educated, performed less leisure-time physical activity, and had higher body mass indexes; they also showed a higher prevalence of hypertension, diabetes, hypercholesterolemia, and other chronic diseases.

Differences in baseline characteristics and changes from baseline to the end of follow-up across yogurt-consumption categories were examined with the use of analysis of variance and χ^2 test. We used linear regression to examine the association between baseline yogurt consumption and the SF-12 summaries in 2012; the main results were expressed as β coefficients for the SF-12 summaries across categories of yogurt consumption. The analyses were adjusted for baseline HRQL, age, sex, education, change in smoking status, baseline, and change in physical activity and sleep duration, the baseline Mediterranean Diet Adherence Screener score and alcohol intake, and for body mass index, hypertension, diabetes, hypercholesterolemia, and reported prevalent and incident chronic diseases. We also studied whether adjustment for important nutrients (in tertiles) in yogurt could modify the results. All variables were modeled as categorical by using dummy terms, except baseline HRQL, which was modeled as a continuous variable. To test for linear trends across categories, we modeled yogurt consumption as a