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Dairy food intake is positively associated with cardiovascular health: findings from Observation of Cardiovascular Risk Factors in Luxembourg study☆

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ABSTRACT

Conflicting findings have been reported about dairy food consumption and risk for cardiovascular disease. Furthermore, few studies have examined dairy food intake in relation to cardiovascular health and the incorporation of lifestyle factors such as diet and physical activity. This study examined whether dairy food consumption was associated with cardiovascular health, recently defined by the American Heart Association. Data were analyzed from 1352 participants from the Observation of Cardiovascular Risk Factors in Luxembourg survey. A validated food frequency questionnaire was used to measure intakes of milk, yogurt, cheese, dairy desserts, ice cream, and butter. Seven cardiovascular health metrics were assessed: smoking, body mass index, physical activity, diet, total cholesterol, blood pressure, and fasting plasma glucose. A total cardiovascular health score (CHS) was determined by summing the total number of health metrics at ideal levels. It was hypothesized that greater dairy food consumption (both low fat and whole fat) would be associated with better global cardiovascular health, as indicated by a higher CHS. Total dairy food intake was positively associated with the CHS. Higher intakes of whole fat milk, yogurt, and cheese were associated with better cardiovascular health. Even when controlling for demographic and dietary variables, those who consumed at least 5 servings per week of these dairy products had a significantly higher CHS than those who consumed these products less frequently. Higher total whole fat dairy food intake was also associated with other positive health behaviors, including being a nonsmoker, consuming the suggested dietary intakes of recommended foods, and having a normal body mass index. Increased dairy food consumption was associated with better cardiovascular health.

Abbreviations: AHA, American Heart Association; BMI, body mass index; BP, blood pressure; CHS, cardiovascular health score; CVD, cardiovascular disease; Non-RFS, non-Recommended Food Score; ORISCAV-LUX, Observation of Cardiovascular Risk Factors in Luxembourg; RFS, Recommended Food Score.

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1. Introduction

Cardiovascular disease (CVD) causes more than 4 million deaths in Europe and is estimated to cost almost €196 billion per year [1]. The American Heart Association (AHA) recently defined a construct of "ideal cardiovascular health" comprising 7 health metrics: not smoking, engaging in sufficient physical activity, consuming a healthy diet, maintaining a normal body mass index (BMI), and having optimal levels of total cholesterol, blood pressure (BP), and fasting blood glucose [2].

Diet is an integral part of CVD prevention. However, the evidence regarding the intake of dairy products, particularly with regard to the fat content of dairy and CVD risk is inconsistent. Some studies have failed to find an increased risk of CVD [3] or CVD mortality [4] associated with the intake of dairy products, regardless of fat content. Other studies suggest that the consumption of 3 or more servings per day is associated with a reduced risk of CVD [5-7]. However, high fat dairy intake has also been associated with an increased risk of CVD mortality [8]. A recent meta-analysis of randomized controlled trials concluded that increasing dairy food intakes did not significantly impact cardiometabolic risk factors [9].

Few epidemiological studies have examined dairy food intake (including both low and high fat products) in relation to a constellation of health factors and behaviors, such as the AHA construct of cardiovascular health. Most studies and reviews have focused on risk for "disease" and/or cardiovascular "mortality" risk [3-8,10]. As the treatment for and survival from acute cardiovascular conditions improves, the number of patients living with chronic disease will continue to increase [11]. Simple lifestyle changes that may impact the individual risk factors for CVD will become increasingly important for cost-benefit prevention strategies.

Encompassing 7 health factors and behaviors, the present study aimed to explore the relationship between dairy food consumption and cardiovascular health among adults in the Observation of Cardiovascular Risk Factors in Luxembourg (ORISCAV-LUX) survey. First, it was hypothesized that greater total dairy food consumption would be associated with better global cardiovascular health, as indicated by a higher cardiovascular health score (CHS). Second, it was hypothesized that ideal levels of individual health metrics, particularly the health behaviors, would be associated with greater total dairy food intakes. To test these hypotheses, the research objectives were as follows: (1) to assess the relationship between the CHS (as a continuous variable) across increasing intakes of total low fat, total whole fat, and all dairy foods; (2) to compare the CHS across increasing intakes of individual dairy foods; and (3) to explore relationships between the individual health metrics and total dairy food intakes (low fat, whole fat, and all dairy foods).

2. Methods and materials

2.1. Study population

The present study used data from the ORISCAV-LUX survey. This was a nationwide, cross-sectional study conducted between 2007 and 2009 that was designed to gather information on the prevalence of cardiovascular risk factors among the general adult population of Luxembourg. A random sample of 1432 individuals, stratified by sex, age (18-69 years), and district of residence completed the recruitment procedure [12,13]. After the elimination of those subjects with incomplete information on components of cardiovascular health or diet, data were available for 1352 subjects for the current study. Detailed information about the study design and sampling methods has been published elsewhere [13]. All participants provided informed written consent. The ORISCAV-LUX was approved by the National Research Ethics Committee and the National Commission for Private Data Protection.

2.2. Dietary assessment

2.2.1. Dairy food intakes

Dietary intake was assessed using a semiquantified food frequency questionnaire, which assessed the frequency of consumption of 134 items over the previous 3 months [14]. Participants were asked how often they consumed one standardized portion of each food (eg, one medium cup [125 mL] of milk). The 6 response categories ranged from "never or rarely" to "2 or more times per day." Dairy products included in the questionnaire were milk (skim, semi-skim, and whole), cheese (low fat and regular), yogurt (low fat and regular), dairy desserts, ice cream, and butter. To facilitate comparison between the different dairy products, the responses were recalculated into servings per day that were based on standard serving sizes (250 mL of milk; 125 g of yogurt, ice cream, and dairy desserts; 50 g of cheese; and 30 g of butter) [15,16]. For research objectives, dairy food intakes were classified into 3 groups: (1) total low fat dairy foods (total consumption of low-fat milk, yogurt, and cheese); (2) total whole fat dairy foods (total consumption of whole fat milk, yogurt, and cheese); and (3) total dairy foods (total consumption of both low and whole fat milk, yogurt, and cheese as well as dairy desserts, ice cream, and butter).

2.2.2. Calculation of healthy diet metric

Two food scores were calculated for the diet metric, a Recommended Food Score (RFS) [17] and a non-Recommended Food Score (non-RFS) [18]. These scores were used to capture a more detailed measure of dietary intakes and variety. Based on the recommendations of the 2010 Dietary Guidelines for Americans, the RFS comprised 17 food items [19]. Foods included fruit, vegetables, legumes, whole grain cereal products, fish and nuts—items similar to those used previously [17,20]. One point was assigned for consumption of any of the recommended foods at least once per week; otherwise, 0 points were given [17]. A total RFS out of 17 was calculated, with a higher score indicating a higher consumption of recommended food items.

The non-RFS [18], the second component of the diet metric, included 11 items of which reduced consumption is recommended [19], such as processed meats, refined grains, solid fats and added sugars, and alcohol. Consumption of non-recommended foods at least 2 to 4 times per week was assigned a score of 1; otherwise, 0 points were assigned [20,21]. A total non-RFS out of 11 was calculated, with a higher value indicating a higher consumption of