Dairy Consumption and Stroke Risk

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Date of Submission: Feb 20, 2013

Date of Acceptance: Feb 23, 2013

How to cite this article: Maghsoudi Z, Askari G, Ghiasvand R, Khorvash F, Iraj B, Shokri N, *et al*. Dairy Consumption and Stroke Risk. Int J Prev Med 2013;Suppl 2: S294-9.

Original Article

ABSTRACT

Background: Stroke is one of the most common causes of life-threatening disabilities and death around the world. Mortality rate is going to be doubled by 2030 in the Middle East countries. Prevention is a cost-effective approach to decrease risk of stroke. The present study assessed the relationship between dairy intake and stroke risk.

Methods: This hospital-based case-control study was directed in a University hospital. The common food consumption of 129 men and women was assessed with food frequency questionnaire (FFQ). The relationship between fermented and non-fermented dairy intake and stroke were assessed between two patient groups.

Results: Total of dairy intake were lower in patients with stroke than control group (13.36 vs 19.61% in men and 11.14 vs 15.02% in women). Similar relationships were observed betweenfermented and non-fermented dairy intake and stroke in both genders.

Conclusions: Lower dairyconsumption can increase stroke risk in men and women.

Keywords: Dairy, milk, stroke

INTRODUCTION

Stroke is one of the most frequent reasons of death and life-long disabilities. It is responsible for nearly 17% of cardiovascular disorders (CVD) and it plays an enormous contributionin increasing the healthcare system costs and lowering patients' quality of life (QoL).[1] It is the main cause of 2.5 million deaths per year in women and the statistic shows that this rate is approximately 3 million deaths per year in men.[2] The incidence rate of stroke is going to be doubled by 2030 in the Middle East regions.[3] Iran as a developing country in Middle East is faced to a rapid nutrition transition and westernization life style.[4,5] Cardiovascular disorders comprising stroke are the major basis of death in Iran.[6]

The best strategy in lowering stroke occurrence is prevention[7,8] and proper dietary choiceis a major factor that can play beneficialeffects in reducing stroke risk and its effects. Based on findings of recent surveys, hypertension and overweight

are the mainbasic factors of stroke risk in Iran.[9] Hypertension is attributed in nearly 50% of stroke incidence in both genders.[10] Higher systolic blood pressure with or without elevated diastolic blood pressure is accompanied with greater stroke incidence rate. So, it seems that blood pressure management can be in stroke prevention.[11,12]

Dairies as rich source of crucial minerals like calcium, phosphorus, potassium, and magnesium can reflect effective roles in stroke incidence. Findings of several Western and Japanese studies which were concerned on dairy consumption effect and stroke occurrence showed diverse relationship. In regard to the prevalence of lactose intolerance in some races of humans, lowering or lacking milk in the diet is common and probably has beneficial effects on related chronic disorders as stroke. In this survey, we assess Iranian milk and milk products intake in relationship to stroke risk.[5,13]

METHODS

Participants

The present study is a hospital-based case-control survey. The ethic committee of Isfahan University of Medical Science agreed us to direct this study in a University Hospital, Iran. The multistage cluster randomsampling approachwasused. A written consent was obtained from all subjects who participated in the study. Patients who experienced stroke were sampled in hospital's neurology wards and control subjects were orthopedic patients. Not fulfilling of 70 items on dietary questionnaire or reporting total daily energy intake of lower than 800 kcal or higher than 3,500 kcal were excluded from the study. A total of 69 subjects who experienced stroke and 60 non-stroke patients (46 vs 30 men and 23 vs 30 women, respectively) participated in this study.

Dietary intake assessment

The subjects' regular dietary intake was assessed by using avalid and reliable semi-quantitative food frequency questionnaire (FFQ).[14] The food questionnaires contained 168 Iranian food items which were estimated by the typical food portion size. The questionnaires were completed in person by aneducated dietitian. The first relatives of the participants were asked to perform our food assessment.

The frequency of dietary intake during the previous year was reported on a daily, weekly or monthly basis. Then daily food consumption for items was converted to grams by usingthe usual measures of portion sizes.[15] Total daily dietary intake was obtained by summing up the all food consumption contents. In order to reduce the imbalance of the number of fooditems and study participants, different food groups were classified according to the nutrient contents of food items and standardfood pyramid. It is important to mention that we considered some of the items as an individual food group according to the nutrient profiles and in some cases, food items were assigned individuallyto show a distinct combined group (e.g., doogh (as an Iranian yogurt and water preparation with a consistency as the same as milk)). Theprevious validation survey of the mentioned FFQ showed suitable correlationsbetween food intakes which was assessed by the same semi-quantitative questionnaire and the results of multiple days of 24-h dietary recalls.[14]

Anthropometric assessment

Subjects' body weight was measured by a Seca scale (Seca Model 770, Hamburg, Germany), to the closest 0.1 kg in minimal dress and without shoes. Height was assessed by Seca meter in standing position and not wearing shoes, while shoulders are in normal position.

The circumference of their waist and hip were evaluated at below the lowest rib with light clothes. The narrowest levelaround the waist was determined after overnight fast and hip circumference was measured at the maximum level and without any external pressure. Body mass index (BMI) was calculated by dividing body weight (kg) by height (m^2).[16] Waist to hip ratio (WHR) was computed by the circumference of waist to hip in centimeter.

RESULT

The study participants' mean age was 52 ± 7 and 56 ± 18 years old for womenand men with stroke, respectively. Characteristics of the subjects with and without stroke are presented in Table 1.

Total dairy consumption of patients with stroke was lower than the control subjects in both sexes. The comparison of the subtypesof fermented and non-fermented dairies reflected similar results.

The fermented dairies intake including various types of cheese and yogurt products was higher in men and women of control groups than patients who experienced stroke. Also, milk and chocolate milk (non-fermented dairy) consumption was lower in subjects with stroke incidence than the other patient group in both genders.

In general comparison, we observed that almost all kinds of milk and milk products intake was greater in patients with non-stroke than the others. Mean daily intake of various fermented and non-fermented dairy foods of men and women in both groups are shown in Tables 2 and 3.

DISCUSSION

As mentioned in results, we found that mean dairy consumption of men and women with stroke were lower than the control group and these findings were seen in different subtypes of dairies as fermented and non-fermented group (except ice cream and cheese).

The observed association between dairy intake and risk of stroke is comparable with previous surveys. In a 22-year follow up prospective investigation in middle-aged men, results showed that the rate of stroke incidence were doubled in subjects who consumed equal to or more than two glasses of milk daily as compared to the lower amount.[17] The findings of large Japanese cohort study showed the same inverse association between dairy and calcium consumption and stroke incidence.[18] Similar negative association between calcium intake and dairy consumption and stroke risk were seen in previous studies too.[17-27] While, the non-significant relationship were reported in some of the preceding reports.[28,29]

The observed stroke incidence because of reduced consumption of milk and its products can be referred to the important roles of their critical minerals. The proper metabolic balance of calcium, potassium, and magnesium content of dairies has potential contribution in minimally 4 of 10 basic risk factors of stroke (such as major atherosclerotic process, vasoconstriction, insulin resistance, enhancing platelet gathering, tissue-type plasminogen activator antigen level, and thrombosis).[30,31] Moreover, the consistent and convincing role for dairy calcium intake in lowering arterial blood pressureis known[32-43] and

Table 1: Anthropometric characteristics of patients with stroke

Indices	Sex	
	Men	Women
BMI (kg/m^2)	29±7.5*	25.5±3.5
WC (cm)	112±15	92±8
HC (cm)	93.3±0.1	102.2±0.1
WHR (cm/cm)	1.2±0.1	0.9±0.1

*Means±SD, BMI=Body mass index, WC=Waist circumference, HC=Hip circumference, WHR=Waist to hip ratio

Table 2: Mean daily intake of dairy in men

Dairies	Patient with stroke		Control	
	g/day	%Cal/d	g/day	%Cal/d
Non-fermented dairies				
Milk	95	3.34	108	4.58
Chocolate milk	7	0.25	13	0.55
Ice cream	10	0.35	4.7	0.2
Total of non-fermented dairies intakec	112	3.94	125.7	5.33
Fermented dairies				
Dried whey (Kashk)	1.5	0.05	35	1.48
Yogurt	188	6.61	176	7.46
Cheese	22	0.77	17	0.72
Yogurt drink (Doogh)	85	2.99	109	4.62
Total of fermented dairies intake	296.5	10.42	337	14.28
Total of dairy intake	408.5	14.36	462.7	19.61

Table 3: Mean daily intake of dairy in women

Dairies	Patient with stroke		Control	
	g/day	%Cal/d	g/day	%Cal/d
Non-fermented dairies				
Milk	125	5.59	171	7.83
Chocolate milk	22	0.98	10	0.46
Ice cream	10	0.45	4.7	0.21
Total of non-fermented dairies intake	157	7.02	185.7	8.5
Fermented dairies				
Dried whey (Kashk)	166	7.43	190	8.70
Yogurt	6.5	2.91	11.5	0.53
Cheese	23	1.03	17	0.78
Yogurt drink (Doogh)	60	2.68	121	5.54
Total of fermented dairies intake	255.5	14.32	339.5	15.55
Total of dairy intake	412.5	21.34	525.2	24.05

calcium could be one of those responsible for aforementioned inverse relationship between dairy consumption and hypertension risk.[44,45]

As we know, approximately 70-75% of daily source of calcium intake is milk and its products[46] and better absorption rate of calcium in dairy products by their casein content can increase their useful roles as hypotensive factor and reducer of platelet aggregation. An optimal balance of phosphorus to calcium contents could improve the amount of calcium absorption.[17,47] Also, dairy food intake is one of the key block of dietary approach to stop hypertension (DASH) diet and its protective roles has been verified previously.[48]

The finding of earlier reports showed that the role of non-dairy calcium in reducing stroke risk is not as much as dairy sources. In the other words, the ratio of the before mentioned minerals probably is the base of favorable effects of dairies in reducing stroke and blood pressure. The protective roles of minerals are even seen independent of their blood pressure control.[30]

In regard to the variety of greatly differing composition of dairy products, we tried to assess nearly all types of Iranian dairy foods. So, it is believable that we were able to evaluate daily dairy intake, adequately.

Several limitations in the present study need to be considered. First, we assessed dairyconsumption by block and semi-quantitative FFQ and its methodological restrictions like recall bias could have an effect on our observed relationships. Second, the influence of limits which is based on case-control nature isunavoidable and our findings need to be verified in some Iranian prospective studies. Third, the hospital-based structure can diminish the generality of our outcomes and thestudy participants probablycould not be representative of Iranian population, comprehensively. Fourth, it seems that health behaviors and eating habits can have impressive roles in evaluating the associations and considering more attention to the effects of confounding factors is necessary. Fifth, lack of questions about taking supplements, we could not assess the role of supplements separately. Moreover, the effects of dietary dairyconsumption may show various results in subtypes of stroke or based on different criteria in diagnosing it.

CONCLUSIONS

Our findings reveal that higher dairy (fermented and non-fermented) consumption is associated with lower stroke risk in both the sexesand the dose-response relation between milk and milk products intake and the risk of stroke subtype deserve large investigation in Iranian prospective studies.

ACKNOWLEDGMENTS

We thank the participants of the study for their enthusiastic support.

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Source of Support: Nil, **Conflict of Interest:** None declared.