ORIGINAL ARTICLE

Protein consumptions in stroke patients

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Background: Stroke is one of the most common causes of disabilities and death all over the world. The mortality rate of stroke is predicted to be doubled by 2030 in the Middle East countries. Nutrition is an effective strategy in prevention and management of stroke. This study assessed the relationship between various protein types and stroke risk. **Materials and Methods:** This hospital-based case-control study was performed in a University hospital. The data regarding consumption of usual food intake of 69 cases (46 men and 23 women) and 60 controls (30 men and 30 women) was collected with a food frequency questionnaire (FFQ). The mean consumption of red and white meat and vegetable and processed proteins consumption were compared between two groups. **Results:** The percent of total of daily protein intake were lower in patients with stroke in both sexes (25.92% vs 30.55% in men and 30.7% vs 31.14% in women). **Conclusion:** Lower protein consumption may be observed in patients with stroke patients in both sex.

Keywords: Meat, protein, stroke, vegetable protein

INTRODUCTION

Stroke is one of the most common causes of serious disabilities and death all over the world.[1-3] The world health organization (WHO) announced that cerebrovascular diseases were the major causes of 46.6 million Disability Adjusted Life Years (DALYs) in 2004[4] and the basic cause of nearly 5.5 million death yearly.[5] Stroke is going to become the main health problem and statistics shows that its mortality rate will double by 2030 in the Middle East countries.[6] The potential impact fractions (PIF) for hemorrhagic stroke mortality are 66% and 49% in males and females, respectively and the attributable burden of risk factors are 44% and 45% for ischemic stroke mortality in South-east Asian and Western Pacific regions.[7] Recent studies show that hypertension and ove rweight should be considered as the major factors of stroke risk in Iran.[8] High blood pressure is the basic cause of approximately 50% of stroke in both sexes.[9]

It seems that we should concentrate on the urgent strategies to prevent the dramatic growth of stroke burden is inevitable. Nutrition as a main environmental factor can play useful roles in prevention and managing stroke and its high health-care system costs. Some of the previous studies mentioned that protein consumption can affect the basic causes of stroke.[10-13] The roles of animal protein intake in intra-parenchymal hemorrhage[14,15] and hypertension[16] were observed in various western countries. Nutrition transition and urbanization increase the rate of the epidemic of main chronic diseases in eastern regions during the recent decades.[17,18] So, we assessed the relation between various protein sources and stroke in our population.

MATERIALS AND METHODS

Participants

This hospital-based case-control survey was conducted in Alzahra Hospital, Iran, between May 2010 and March 2010. The study was approved by Isfahan University of Medical Science ethic committee. The samples were selected by a multistage cluster random-sampling method. A total of 129 patients (76 men, 53 women) agreed to participate in the current study. The informed written consent was obtained from them. Patients with stroke were collected in neurology wards and patients without history of stroke from other wards were selected as the control subjects. We also excluded the participants who calculated an energy intake less than 800 and more than 3500 kcal and those who had left more than 70 items black on their food frequency questionnaire (FFQ).

Assessments of dietary intake

A 168-item semi-quantitative FFQ was used to assess the usual dietary intake. The validity of the questionnaire was revealed in the correlation of the multiple days of 24-h dietary recalls, previously.[19] The questionnaires were administered in an interview with the first relatives of the patients by a trained dietitian. The questionnaires consisted of the most common food items in regard to

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the between and within person variations and the standard serving size which is usually consumed by Iranians. The last year frequency of food consumption was reported based on daily use. The daily intakes for food items were converted to grams by implying the common measures of portion sizes.[20] We defined various food groups based on the nutrients similarity of food items. It should be mentioned that we assigned some of the food items as a unique food group based on the nutrient profiles.

Assessment of anthropometric measures

Body weight was assessed by Seca scale (Seca Model 770, Humburg, Germany) to the nearest 0.1 kg in light dress and not wearing shoes. Height was measured by Seca meter in barefoot and standing position. Waist circumference and hip circumference of the participants were measured at the minimum and maximum levels below the lowest rib, respectively. Measurement was done without any pressure and over light dress by an un-stretchable tape. BMI was calculated as dividing weight (in kg) by height (in square of height).[21] SPSS 17.0 Was used for statistical analysis. *T*-test and Chi-square test was performed for analysis.

RESULTS

Mean ages of men and women with stroke were 56 ± 18 and 52 ± 7 years old and mean ages of men and women with stroke were 55 ± 15 and 53 ± 6 years old respectively. Anthropometric characteristics of the subjects were shown in Table 1. The comparison of total protein intake of patients with stroke reflects a lower level than the control group in both sexes. This comparison about vegetable protein like legumes group showed the same results. However, total of animal protein consumption which included all of the white and red meats plus processed meats was lower in men with stroke incidence. A total of animal protein intake in women with stroke was higher than the controls. In comparison of the groups, we observed that the mean of white and red meats consumption was greater in men with orthopedic problems. But processed meats as sausages and hamburger intake showed no significant difference between groups of men. A similar comparison reflected a higher mean intake in women who had suffered from stroke. A total of white meats intake consists of "ω3" and "non-ω3" rich sources had lower levels in men who experienced the stroke than the control group. The similar results were seen in each subgroup of white meats, too. But, subgroups of white meats consumption were not different in women groups. The red meats consumption (like beef and lamb) was different in two genders. The red meat consumption in men and women with stroke was higher in the control group. Mean daily consumption of various protein-rich foods of men and women are shown in Tables 2 and 3.

Table 1: Anthropometric characteristics of patients with stroke

Sex/index	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

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

DISCUSSION

We observed that mean protein intake of men with stroke was lower than the control group and this finding was seen in various subgroups of protein (as red, white, vegetable, and ω3 sources). The mean of red and animal meats as well as processed meat consumption showed higher level in stroke groups. The relation between protein consumption and risk of stroke was comparable with previous surveys. In a 18-year follow-up cohort study in middle-aged men, there were no statistically significant association between the consumption of total, vegetable and animal protein sources, and stroke incidence.[22] The findings of Japanese cohort reflected an inverse association between total and animal protein intake and various types of stroke.[6,8] The same inverse non-significant relation was seen in some of the epidemiologic and longitudinal studies, too.[23-27]

Table 2: Mean daily intake of different protein sources in men

Protein sources	Patient with stroke		Control	
	g/day	%Cal/d	g/day	%Cal/d
Red meat				
Beef and Lamb	96*±16	9.03±2	85±13	9.57±7
White meats				
White meats (except ω3 sources)				
Poultry (chicken with or without skin)	97±12	5.97±2	92±17	6.77±13
White meats intake (ω3 sources)				
Fishes	13±5	0.63±0.7	21±12	1.18±0.6
Shrimps	13±5	0.42±0.3	26±11	1.01±0.7
Total of white meats intake	123±16	7.02±0.4	139±15	8.96±2
Processed meats				
Sausages and hamburger	52±15	5.2±0.3	42±17	5.08±1.6
Total of red and white meats intake	271±23	21.25±4	266±24	23.61±13
Egg	44±22	2.49±1.6	46±13	3.17±4
Total of animal protein intake	315±26	23.74±6	312±27	26.78±16
Vegetable protein				
Legumes (Bean, Peas, Lima bean, broad beans, Lentils)	52±21	2.18±0.3	74±24	3.77±0.7
Total of protein intake	367±26	25.92±22	386±28	30.55±10

*Mean±SD

Table 3: Mean daily intake of different protein sources in women

Protein sources	Patient with stroke		Control	
	g/day	%Cal/d	g/day	%Cal/d
Red meat				
Beef and Lamb	62*±17	7.42±3	52±21	6.36±0.8
White meats				
White meats (except ω3 sources)				
Poultry (chicken with or without skin)	75±22	5.81±0.5	66±16	5.26±2.1
White meats intake (ω3 sources)				
Fishes	21±12	1.65±0.5	31.5±17	1.92±0.8
Shrimps	26±13	1.07±0.6	32±13	1.32±0.6
Total of white meats intake	122±17	8.53±1.1	129.5±26	8.5±1.2
Processed meats				
Sausages and hamburger	49±13	6.26±0.4	385±22	5.03±0.6
Total of red and white meats intake	233±23	22.21±0.8	566.5±24	19.89±5.8
Egg	56±13	4.02±0.6	25±12	4.80±0.9
Total of animal protein intake	289±23	26.23±13	591.5±21	24.69±14
Vegetable protein				
Legumes (Bean, Peas, Lima bean, broad beans, Lentils)	83±11	4.47±2	117±15	6.45±2
Total of protein intake	372±21	30.7±13	708.5±26	31.14±12

*Mean±SD

However, the findings of Hiroshima/Nagasaki Life Span Study showed non-significant effects.[6] It is worth to mention that the differences may be arisen from the quality and quantity of proteins and substitution of the mean percentage of dietary protein for total energy intake by the other diet macronutrients.

Protein intake has favorable roles in blood pressure control as a main risk factor of stroke[12,28-30] and these beneficial effects are based on anti-inflammatory, antithrombotic, antiatherogenic, hypolipidemic, and hypotensive protein roles.[31,32] The ω3 sources of sea-foods and amino acids of vegetable proteins can improve endothelial function.[33] High levels of non-essential amino acid contents of vegetable proteins such as arginine, glycine, alanine, and serine stimulate protein synthesis by increasing the insulin release.[34] While lower amounts of essential amino acids like methionine, lysine, and tryptophan can decrease the insulin release and its anabolic roles. The useful effects of plant protein sources in lowering the risk of stroke can be referred to the high amounts of fiber, magnesium, potassium, calcium and polyphenols on insulin resistance, blood pressure, and BMI. Insulin level associated with a high-risk features of metabolic syndrome and stroke.[35,36] Moreover, arginine contents of herbal protein can stimulate nitric oxide synthesis.[37,38]

The limitations of this study need to be considered. First, we assessed daily protein intake by semi-quantitative FFQ and its methodological limitations also applied to our data. Second, it seems that health habits, eating behaviors, and food preparation methods can be effective in the relation between protein intake and risk of stroke and paying attention to the confounding factors to assess the mentioned relation is necessary. Third, the limitations of a case-control study are inevitable and our findings need to be verified in prospective studies. Fourth, our hospital-based sampling can reduce the generality of our results and our participants may not be representative of the Iranian population. Furthermore, the effects of protein intake on risk of stroke may be dependent on the subtypes of stroke and their definitions.

CONCLUSION

Our findings indicate that higher protein consumption may be effective in lowering the risk of stroke and the dose–response relationship between protein source consumption and risk of various subtypes of stroke merit confirmation in large prospective studies.

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