

A case-control study on food insecurity among patients with kidney stones

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Abstract

Background: Kidney stone is a multifactorial disease with a worldwide distribution. Dietary factors can affect urine composition and have a role in modulating the risk of kidney stones. Food insecurity is defined as lack of access to sufficient, safe and nutritious food for a healthy life. Due to the lack of research about relationship between food insecurity and kidney stones in Iran, this study aimed to compare food insecurity among kidney stone patients and control subjects without kidney stones.

Methods: This case-control study was conducted on 35 patients with kidney stones and 35 patients as controls from Kish Hospital in 2015. A general questionnaire and United States Department of Agriculture (USDA) food security questionnaire were used to assess demographics and food security level of study participants

Results: Mean age of cases and control group was 39.28 ± 10.88 , and 37.37 ± 11.89 , years respectively. 65.7% from cases and 40% from control group were male. In relation to the ethnicity, there was significant difference between two group ($p = 0.001$). There were no significantly different between cases and controls group in education, marital status and BMI ($p < 0.05$). Final score of USDA questionnaire, in case significantly higher compared with the control group 5.71 ± 6.7 and 2.85 ± 3.30 , respectively, ($p < 0.05$).

Conclusion: In summary, food insecurity have become more prevalent among patients patients with kidney stones. More prospective studies in this field are needed.

Key Words: food insecurity, kidney stones, Kish

Introduction

Kidney stone disease (nephrolithiasis) is a multifactorial disease and its prevalence is increasing. Despite significant advances in understanding the causes of kidney stones in recent years, there are many questions about its pathogenesis that remained unanswered (1). Kidney stone composition consist of crystals and proteins. Many solutes in urine can play a role in lithogenesis and making different types of kidney stones including calcareous an uric acid stones

(2). Dietary factors can affect composition of urine and have a role in modulating the risk of kidney stones. With the increasing prevalence of kidney stones in most industrial societies the effects o improving diet to improve the risk and prevention of kidney stones has found a new importance (3). Food insecurity definition is lack of trusty access to enough, safe and nutritious food necessities for having a healthy living (4). According related studies in this field, learning about risk factors such as demographic factors, consumption of fruits and vegetables and other related factors is important(5).

Our review have shown that there is no studies about kidney stone and food insecurity in Iran. The present study, therefore, was performed to determine the association between food insecurity and kidney stones in a hospital-based case-control study.

Materials and Methods

This case-control study has been carried out in 2015 on patients admitted to the Kish hospital with kidney stones. Totally, 35 cases and 35 controls aged 19-60 years were included in the study. Patients with kidney stones have been picked as the case group and 35 patients, referred to the center, have been selected randomly as controls. To be enrolled in the study, controls had to be without a prior history of cerebrovascular accident or any endocrine diseases, cancer, regular consumption of drugs and inability to cooperate and respond for any reasons. These patients should not have had a specific diet. Written informed consent was obtained from each participant. The study protocol was approved by the Ethics Committee at Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran.

First, to ensure that healthy controls had no kidney stones, ultrasonography of their kidney was performed. In the following, the sociodemographic questionnaire and the family food security United States Department of Agriculture (USDA), was completed by asking the participants. Sociodemographic questionnaire included age (in years), gender (male and female), marital status (married and unmarried include single, divorced spouse died), education level (illiterate, elementary

and high school diploma or higher), ethnicity (Persians, Arabs and other ethnic groups), also weight (in kilograms) and height (in centimeter). Body mass index (BMI) was calculated by dividing weight in kg by height in m². BMI categories was classified; underweight: BMI ≤ 18.5 kg/m², normal weight: BMI = 18.5-24.9 kg/m², overweight: BMI 25-29.9 kg/m² and obese: BMI ≥ 30 kg/m²

Family food security during the previous year was assessed using a validated, interviewer questionnaire of USDA family food. The questionnaire has been validated and used during previous studies in Iran (6, 7).

Statistical methods: Statistical Package for Social Science (SPSS Inc., Chicago IL. Version 19.0) was used for all statistical analyses. Independent samples Student's t test was used for comparing means of continuous variables among cases and controls. To compare categorical variables between cases and controls, we applied chi-square test. The significance level was set at 0.05.

Results

General characteristics of study participants are presented in Table 1. Mean aged of case and control group was 39.28±10.88 and 37.37±11.89 years respectively (p=0.485). Control group was included 40% male and 60% female, and in cases group 65.7% of participants were male and 34.3% were female. Mean weight and height was 168.77±7.89 cm in the case against 167.34 ± 9.42 cm in the control group. The weight of the case and control groups, respectively were measured 72.77 ± 14.48 and 73.02 ± 13.74 kg. It seems that most of participants were married (88.6% in the case group and 80% in the control group) and more than 75 % of participants had normal weight (BMI 18.5-24.9 kg/m²). No significant statistical differences were found in mean weight (p=0.939), BMI category (p=0.767) as well as marital status (p=0.513) across case and control group. 62.9% of case group and 80 % of control had diploma or higher levels of education. No significantly different in education levels was seen between two groups (p = 0.165). The majority of cases were Fars by 48.6%. In contrast, the majority of the control group were of other ethnicities by 74.3%. Between two groups was a significant correlation in ethnicity (p = 0.001).

Most participants in both groups are in the state of food security which is 51.4% in the case group, lower than the control group (54.3%). Also in the category of food insecure without hunger, abundance in the control group (23.6%) compared to the control group (14.3%) is higher.

On the other hand, the frequency of food insecurity with moderate and severe hunger in the case group is more than the control group. The food security

situation in the two groups showed significant correlation (p = 0.025).

Table 1. The qualitative variables status in the case and control groups

variables		Cases		controls		P
		n	%	n	%	
Education	illiterate	2	5.7	0	0	0.165
	Primary school	11	31.4	7	20	
	Diploma or higher	22	62.9	28	80	
Ethnicity	Fars	17	48.6	7	20	0.001
	Arab	7	20	2	5.7	
	Other	11	31.4	26	74.3	
Marital status	Married	31	88.6	28	80	0.513
	Unmarried	4	11.4	7	20	
BMI	Underweight	1	2.9	1	2.9	0.767
	Normal weight	15	42.9	17	48.6	
	Overweight	15	42.9	11	31.4	
	Obese	4	11.4	6	17.1	
Total		35	100	35	100	

Based on the average of The final score of the food security questionnaire USDA, it has been found that the average in the case group was 5.71 ± 6.7 and in the control group was 2.85 ± 3.30. The mean scores in the case group is significantly higher than the control group (p = 0.027).

Table 2. State of Food Insecurity in the case and control groups based on the USDA food security questionnaire

food security status		cases		controls		p
		n	%	n	%	
food secure		1	51.	1	54.	0.02
		8	4	9	3	
food insecure	Without hunger	5	14.	1	34.	
			4	2	3	
	With moderate hunger	6	17.	4	11.	
			1	4	4	
	With severe hunger	6	17.	0	0	
			1	0	0	

Table 3. Mean and standard deviation of final score of the USDA food security questionnaire in case and control groups

Final score	Cases	Controls	P
	Mean±SD	Mean±SD	
	5.71±6.7	2.85±3.30	0.027

Discussion

Based on the average of the final score of food security questionnaire USDA, it has been found that this average in the case and control groups, respectively, consists of 5.71 ± 6.7 and was 2.85 ± 3.30 , which significantly indicates food insecurity is higher in the case group. Based on the rating of the questionnaire and the average final score of cases, it is clear that this group on average is in the state of the average food hunger. While the average of the control group was in the state of food insecurity without hunger.

In a review study, Friedlander et al, In 2014, stated that nutritional factors can affect urine composition and thereby contribute to the risk of kidney stones. With the increasing incidence of kidney stones in many industrialized countries, dietary modification as a safe and inexpensive treatment to improve the risk factors associated with kidney stones and also reducing the likelihood of its recurrence, is considered. Previously, some nutritional variables such as excessive intake of fluids, long clinical trials have been conducted and have shown their effectiveness. But for other dietary factors, these kind of researches are not available. In Friedlander's study is suggested that some dietary factors such as omega-three, fatty acid, citrate can

lead to reduction of kidney stones(3). Another study that was conducted by Siener and Hesse, concluded that changing usual dietary habits to an adjusted compound diet can significantly reduce the risk of calcium oxalate (8).

According to the World Bank, food security is defined as accessibility for all people at any time to adequate food in terms of quality, quantity and variety for an healthy living without risk of the loss of this food access(9).The higher final score of the food security questionnaire in the case group, indicates the food insecurity is higher in this group and Can affect on accessibility to adequate food according to the World Bank definition(9) and it's aligned with the studies as well as Siener an Friedlander's studies (3, 8) and our study (More food insecurity in group who had kidney stones).

Based on the review in the study of Najib and colleagues, stated the overall prevalence of food insecurity in various cities of Iran was different from 30.5 percent in Yazd, to 86 percent in Bushehr. In the present study, the overall prevalence of food insecurity was 48.6 percent among who had kidney stones and 45.7% in the control group which does match to the state of food insecurity in some cities such as Shiraz (44%), District 16 of Tehran Municipality (42.5 %) and the city of Ray (50.2%)(10).

The study also indicated that in terms of ethnicity, the majority of cases, were Fars (48.6%). In contrast, the majority of the control group (74.3%) were from other ethnical groups and the differences between the two groups were significant and meaningful. In two studies that were aimed to evaluate the relationship between ethnicity and race, with the nutritional status of US citizens was published in 2012 and 2013, stated that ethnicity and race, in American society, has a significant impact on the nutritional status of individuals(11, 12). Hence, significant ethnic minorities in the two study groups, can be effective on the severity of food insecurity and are aligned with the results of present study (difference between food insecurity in the two groups).

As stated, in this study the relationship between level of education among the two groups was not significant. A study of Bruce and colleagues in 2010 was conducted to determine the relationship between socioeconomic status and chronic kidney disease among African Americans, it was found that the relationship between education and CKD patients, wasn't statistically significant (13). This finding is consistent with the present study about education. Similarly, results of Hirvonen and co-workers study to check the risk of kidney stones associated with the consumption of nutrients, Showed that the level of education between the two groups was not significant correlation (14). And this finding is also consistent with the results of our study, but on the other hand in the study of Eisner

and colleagues, which was published in 2012, Low levels of education contributed to a significant increase in urinary calcium oxalate and calcium phosphate supersaturation but education showed no significant correlation with other compounds in urine(15) While education can have an indirect effect on food security by a healthy nutrition, but the results of that study are not consistent with the results of our study and may indicate lack of impact of education on the process of stone formation in this population.

Our study also showed that marital status and BMI, between the two groups showed no significant correlation. Similarly, in a study of Hirvonen and co-workers on a community of smokers with the concentration on the differences among people with kidney stones with others stated that There were no significant differences among the groups in terms of BMI, while there was a significant relationship between marital status(14). The findings of this study are consistent with ours in terms of BMI but in terms of marital status, beside the similarity of married In the present study and Hirvonen study(14), but in our study a significant relationship was not found.

Conclusion

According to this study, it was found that patients with kidney stones, significantly were in the state of more severe food insecurity than the control group. This was also a significant relationship to ethnicity while the other study's variables such as level of education, marital status, height, weight and BMI, it was not found such a relationship .

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HELIX TEMPLATE