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Nutritional Status and Gastrointestinal Manifestations in Patients with Systemic Sclerosis in Ilam, Iran

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ABSTRACT

Background: Systemic sclerosis is an incurable autoimmune fibrotic skin disease. Many factors were described as aetiology of SS, but the impact of nutritional factor is unknown. The aim of this study was to determine the nutritional status and gastrointestinal manifestations in patients with systemic sclerosis in Ilam, Iran.

Methods: In a case-control study, 47 people confirmed with systemic sclerosis disorders were enrolled as case group and 47 subjects as control group; while they were matched for age and BMI and compared statistically. Food frequency questionnaire (FFQ) and demographic variables were collected for all participants.

Results: Meat and dairy consumption was higher among case group (Adjusted OR=5.1, $p<0.01$, CI=1.08-24.64; Adjusted OR=4.2, $p<0.01$, CI=1.23-14.29, respectively); while there was a reduction for vegetables intake (Adjusted OR=0.09, $p<0.05$, CI=0.01-0.876).

Conclusion: An increase in meat and dairy consumption and reduction in intake of vegetables seems to be the causes for systemic sclerosis in patients in the area. Further evaluations in a large sample size with a longer follow-up duration are needed to verify these findings. The results can help health authorities when planning for patients with systemic sclerosis.

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Introduction

Scleroderma is a chronic disease with an unclear pathogenesis that can affect multiple organ systems. In Iran, the prevalence has been estimated 10-20/100,000, while a significant percentage of patients believe that nutritional status and the type of food consumed can play an important role in the severity of symptoms. Therefore, they tend to make changes in their diet in order to reduce the pain and suffering due to systemic sclerosis (1, 2). Genetic and environmental factors were also defined as unavoidable risk factors. The role of foods with animal origin such as meat and dairy products were demonstrated to have correlation with the activity and the development of systemic sclerosis (3-5), and even the overall health of people (6-10).

Reviews of cohort studies showed no associations between the development of inflammatory polyarthritis and consumption of meat or dairy products (6, 11). The results of another study revealed that receiving higher protein and meat levels, as well as less fruit, vegetables and vitamin C intake can increase the risk of inflammatory polyarthritis (12-16). Overall, the association between diet and inflammatory polyarthritis is still limited and often contradictory. Many researchers have investigated on dietary patterns and nutritional behaviors and demonstrated the relationship and the interactions between systemic sclerosis and diet (17, 18). Therefore, the present study was undertaken to determine the nutritional status and gastrointestinal manifestations in patients with systemic sclerosis in Ilam, Iran.

Materials and Methods

This case-control study was performed on 47 patients with systemic sclerosis referred to Rheumatology Clinic of Shahid Mostafa Khomeini Hospital affiliated to Ilam University of Medical Sciences in Ilam, Iran. All patients who were diagnosed with systemic sclerosis on the basis of clinical symptoms, physical examination, laboratory tests according to 2010 American College of Rheumatology/European League against Rheumatism Classification Criteria (ACR/EULAR) (19) were evaluated by just a rheumatologist for disease activity. The included patients were categorized as case group and were compared with equal number of participants as control group. A written informed consent was provided from both case and control groups.

In order to carry out this research, the necessary permission was obtained from the Office of Vice Chancellor for Research of Ilam University of Medical Sciences (Code: IR.MEDILAM.REC.1398.012). All ethical principles were enrolled in this study based on Helsinki declaration. The purpose of study and ensuring the confidentiality of the people's information were explained for all participants. Matching was done individually based on, age, weight, body mass index (BMI) and geographic region. Among cases and controls, over 18 years old persons were matched for socioeconomic status too. A questionnaire was used to collect demographic information of the participants, including age, gender, marital status, educational level, occupation, annual family income, living status, and geographic origin. Food Frequency Questionnaires (FFQ) listed all foods, including foods containing antioxidants and others in three daily, weekly, and rarely classified categories. The validity of FFQ used in this study was previously tested and was based on responses to the questionnaire twice within one-year period (20). A 125-item semiquantitative food frequency questionnaire was utilized to check dietary intake of subjects based on Willet method (20).

Statistical analyses were performed using SPSS software (Version 22, SPSS Inc., Chicago, IL, USA) at a significance level of 0.05. Descriptive statistics of mean and standard deviation were used for quantitative variables. Univariate and multivariate logistic regression were performed to evaluate the relationship between systemic sclerosis and nutritional factors. The "MatchIt" package was conducted for the matching in R (Version 3.5.1; R Foundation for Statistical Computing, Vienna, Austria).

Results

The total participation rate for both case and control groups was more than 85%. Patients with systemic sclerosis were younger (46.06±7.69 years) than the control group (47.05±9.00 years) and had a comparable level of education. The distribution according to area of residence was similar among both groups, since 80% of cases and 77% of controls were residents in Malekshahi village. There was no significant difference (p>0.05) between the two groups in terms of age, weight (69.2±14.4 kg, 66±13.3 kg, respectively) and BMI (28.3±5.7 kg/m^2, 27.1±5.0 kg/m^2, respectively) for the case and control groups (Table 1). Meat and fat consumption in case group was higher than the control group (p<0.05). As Table 2 shows, protein, polyunsaturated fatty acid (PUFA), total cholesterol and fat in case group was higher than the control group (p<0.05). Table 3 reveals that selenium (Se), iron (Fe), calcium (Ca), Zinc (Zn), manganese (Mn) and cupper (Cu) levels were higher in case group when compared to the control group (p<0.05).

Table 1: Comparison of weekly intake of various nutritional ingredients among the two study groups.

Variable	Control	Case	*P* value
Meat (g/day)	2.30±1.44	2.93±1.22	0.16
Dairy (g/day)	1.522±0.94	3.80±2.66	0.001
Fruits (g/day)	2.06±1.93	1.78±1.15	0.59
Vegetables (g/day)	1.57±1.52	1.23±0.70	0.408
Oil and fats (g/day)	7.35±4.92	8.83±5.98	0.417
Sweet (g/day)	0.99±1.42	1.25±1.45	0.584
Calorie (g/day)	2804.20±768.124	2053.08±834.45	0.008

Table 2: Protein and fat intake among the two groups.

Variable	Group	Mean	SD	*P* value
Protein (g)	Control	74.42	35.09	0.01
	Case	102.32	29.44	
Cholesterol (g)	Control	270.52	134.02	0.01
	Case	373.22	103.61	
Total fat (g)	Control	76.57	29.06	0.04
	Case	100.72	42.66	
Saturated fat (g)	Control	28.65	13.65	0.09
	Case	36.16	13.20	
PUFA (g)	Control	14.38	6.61	0.04
	Case	19.18	7.44	

PUFA: Polyunsaturated fatty acid, SD: Standard deviation.

Table 3: Macronutrients and micronutrients consumption among the two groups.

Variable	Group	Mean	SD	*P* value
Fe (mg)	Control	15.33	9.26	0.01
	Case	22.65	7.29	
Ca (mg)	Control	1323.15	779.23	0.005
	Case	2118.46	835.14	
Zn (mg)	Control	9.26	4.13	0.05
	Case	11.74	3.39	
Cu (mg)	Control	1.28	.70	0.005
	Case	1.93	.59	
Mn (mg)	Control	5.34	2.97	0.65
	Case	5.76	2.54	
Se (mg)	Control	104.52	63.76	0.01
	Case	151.80	43.64	
Cr (mcg)	Control	0.04	0.10	0.15
	Case	0.01	0.03	

Calcium, Cr: Chromium, Cu: Copper, Fe: Iron, Mn: Manganese, SD: Standard deviation, Se: Selenium, Zn: Zinc.

Table 4: Logistic regression model for various food groups.

Predictors	Crude odds ratio (95%CI)	Adjusted odds ratio (95%CI)	*P* value
Meat	5.43 (1.33-24.93)	5.16 (1.08-24.64)	0.040
Dairy	4.52 (1.54-14.72)	4.20 (1.23-14.29)	0.021
Vegetables	0.25 (0.15-0.98)	0.09 (0.01-0.87)	0.038
Cholesterol (g)	1.03 (0.02-1.22)	1.02 (0.00-1.07)	0.054

95%CI: 95%confidence interval.

Table 4 demonstrates that case group had higher rates of dairy (Adjusted odds ratio (OR=4.20, 95%CI: 1.23-14.29), meat (adjusted OR =5.16, 95% CI 1.08-24.64), and vegetables (Adjusted odds ratio (OR=0.09, 95%CI: 0.011-0.876) consumption and a higher level of total cholesterol (Adjusted odds ratio (OR=1.02, 95%CI: 1.00-1.04). There was no significant difference between the 2 groups regarding the consumption of fat.

Discussion

The role of nutritional status has been illustrated in systemic inflammations and many diseases that can reduce the burden of the disease (21). Scientific evidences regarding the role of nutritional status and systemic sclerosis is scarce, and among available sources, the recruited groups are often small in size, and the research protocols are variable. Our case–control study findings revealed that an increase in meat consumption and decrease in vegetable intake can be associated with a rise in systemic sclerosis occurrence. The inhabitants of participants in the area were more likely susceptible to the disease that may be due to the high consumption of meat in their food. Therefore, reducing the consumption of meat in the diet can decline the progression of systemic sclerosis. Other researchers have also shown that eating more meat and protein, as well as intake of less fruits and vegetables, is associated with an increased risk of developing polyarthritis (22).

Several studies revealed that Mediterranean diet or its main components may have protective effects on development or severity of inflammatory diseases (23-28). Furthermore, a reduction in consumption of fruits and vegetables (OR=0.09) can increase inflammatory factors and thereby increase the incidence of scleroderma. The other factor that can affect scleroderma is dairy consumption. Our results revealed that with an increase in dairy consumption, the incidence of scleroderma increases. Several patients lived in Malekshahi village which is one of the coldest areas of Ilam province that could impact their nutritional behavior. It is necessary to mention that the strength of our study was high prevalence of systemic sclerosis in the area of the study.

Conclusion

An increase in meat and dairy consumption and reduction in intake of vegetables seems to be the causes for systemic sclerosis in patients in the area. Further evaluations in a large sample size with a longer follow-up duration are needed to verify these findings. The results can help health authorities when planning for patients with systemic sclerosis.

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Authors' Contribution

ESh: Sample size determination, consulting for Data analyses and interpretation, Reviewed and approved the manuscript. NB: Data collection, Dietary scores consumption, Data analyses and interpretation, writing the original draft, Reviewed and approved the manuscript. AKR: Conceptualization, Methodology, Review and editing the manuscript. DV: Advice on dietary scores consumption, Investigation, Reviewed and approved the manuscript. STGh: Conceptualization, Methodology, Review and editing the manuscript. RJ: Sample size determination, consulting for Data analyses and interpretation, Reviewed and approved the manuscript. MB: Methodology, Investigation, Reviewed and approved the manuscript.

Conflict of Interest

None declared.

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