

ORIGINAL ARTICLE

The Association of Dietary Acid Load with Fatigue, Quality of Life, and Nutrient Adequacy Ratio in Multiple Sclerosis Patients

Zahra Mousavi-Shirazi-Fard^{1*}, Zohreh Mazloom¹, Sadegh Izadi², Mohammad Fararouei³

1. Nutrition Research Center, School of Nutrition and Food Sciences, Shiraz University of Medical Sciences, Shiraz, Iran

2. Clinical Neurology Research Center, Department of Neurology, Medical School, Shiraz University of Medical Sciences, Shiraz, Iran

3. HIV/AIDS Research Center, Shiraz University of Medical Sciences, Shiraz, Iran

ARTICLE INFO

Keywords:

Multiple sclerosis
Nutrients
Fatigue
Quality of life
Dietary acid load

ABSTRACT

Background: Multiple sclerosis (MS) is associated with many health-related problems and changes in diet were shown to help the patients reduce some symptoms. This cross-sectional study investigated the relationship between dietary acid load with fatigue, quality of life, and nutrient adequacy ratio in MS patients.

Methods: Totally, 283 MS patients were enrolled in Shiraz, Iran between June 2018 and February 2019. Dietary acid load indices including potential renal acid load (PRAL) and net endogenous acid production (NEAP) were determined for the patients. The level of fatigue and quality of life of the individuals were evaluated by the modified fatigue impact scale (MFIS) and the multiple sclerosis quality of life-54 questionnaires (MSQoL-54), respectively. Nutrient intake was determined to calculate the mean adequacy ratio (MAR) using a food frequency questionnaire (FFQ).

Results: The mean score of MAR, NEAP, and PRAL was 0.9 ± 0.18 , 87.71 ± 44.86 , and 36.27 ± 33.81 , respectively. After adjusting for confounders, a significant, negative and very weak association was observed between physical health composite (PHC) of the quality of life and NEAP ($p=0.003$) and PRAL ($p=0.007$). Also, a significant, negative, and very weak correlation was found between MAR and NEAP ($p=0.006$) and PRAL ($p=0.028$) in a crude model. Furthermore, after adjusting for confounders, the association between MAR and NEAP remained significant ($p=0.003$).

Conclusion: Our findings revealed that there might be an association between dietary acid load indices, physical dimension of MSQoL-54 and MAR.

*Corresponding author:

Zahra Mousavi-Shirazi-Fard, PhD;
Nutrition Research Center,
School of Nutrition and Food
Sciences, Shiraz University of
Medical Sciences,
Shiraz, Iran.

Tel: +98-71-37251001

Email: z_mousavi@sums.ac.ir

Received: March 20, 2024

Revised: May 22, 2024

Accepted: June 1, 2024

Please cite this article as: Mousavi-Shirazi-Fard Z, Mazloom Z, Izadi S, Fararouei M. The Association of Dietary Acid Load with Fatigue, Quality of Life, and Nutrient Adequacy Ratio in Multiple Sclerosis Patients. Int J Nutr Sci. 2024;9(3):2-8. doi:

Introduction

Multiple sclerosis (MS) is a chronic inflammatory autoimmune disease characterized by demyelination and destruction of neurons in the central nervous

system (1). The global prevalence of MS was estimated 2.8 million in 2020 showing a rise when compared to the prevalence in 2013 (2). Although the etiology of the disease is not clearly known, it

PRAL and NEAP that was positively correlated with fat mass, after adjusting for confounders (36). Recently, it has been reported that patients with MS had higher fat mass which was related to a higher disability and a lower HRQOL (37). This issue may be due to the effects of excess fat mass on biological mechanisms such as inflammation and psychological functions (37). Some studies have reported that increasing body fat can be associated with pain intensity, and this association has been shown in MS patients (38, 39). Another cross-sectional study conducted on diabetic patients also revealed a positive significant relationship between PRAL and fat mass (40).

Another finding of the current study was a significant, negative, and very weak correlation between MAR and NEAP and PRAL in a crude model. An investigation on obese women displayed that greater dietary acid load indices were associated with a decrease in MAR (13). As previously mentioned, MAR was calculated based on 14 micronutrients. Some components of MAR, including phosphorus, calcium, magnesium and potassium can directly affect acid load indices; however, other components might indirectly determine acid load indices, which indicate the amount of protein, vegetable, and fruit consumption (13).

No significant association was observed between fatigue score and dietary acid load indices. In line with our study, a recent research that investigated long-term dietary acid load correlation with fatigue in MS patients found no relationship (14). The main strength of this study was the large sample size. However, the present study had some limitations, such as not investigating the relationship between food groups and the dietary acid load, as well as the cross-sectional design of the study, which does not express the causal relationship between the indicators. Additionally, the calculation of acid load indices based on FFQ can overestimate or underestimate the levels.

Conclusion

The result of the current study indicated that an increase in the dietary acid load could reduce the quality of life in a physical dimension. In addition, a significant relationship was found between the nutrient adequacy ratio and dietary acid load indices. Nevertheless, prospective studies are necessary to clarify these findings.

Acknowledgment

We would like to thank Shiraz University of Medical Sciences for approving and funding this study (project No. 96-16241). The authors would

like to thank Shiraz University of Medical Sciences, Shiraz, Iran and also Center for Development of Clinical Research of Nemazee Hospital, Dr. Nasrin Shokrpour for editorial assistance, and Mr. A. Keshtvarz for his statistical assistance.

Authors' Contribution

ZMSF: data collection, research idea, writing and drafting the manuscript. ZM: supervised the study, study design, research idea, critical revision of the manuscript and editing. SI: data collection, revision of the manuscript. MF: study design, data analysis and interpretation. All authors read and approved final manuscript.

Conflict of Interest

None declared.

References

- 1 Mazloun Z, Razmjouei N, Hejazi N, et al. Food Insecurity in Patients with Multiple Sclerosis and Its Association with Anthropometric Measurements. *Int J Nutr Sci*. 2017;2:80-84.
- 2 Walton C, King R, Rechtman L, et al. Rising prevalence of multiple sclerosis worldwide: Insights from the Atlas of MS, third edition. *Mult Scler*. 2020;26:1816-21. DOI: 10.1177/1352458520970841. PMID: 33174475.
- 3 Mehrabani G, Gross DP, Aminian S, et al. Comparison of fitbit one and activPAL3TM in adults with multiple sclerosis in a free-living environment. *J Meas Phys Behav*. 2021;4:257-65. doi: 10.1123/jmpb.2020-0066.
- 4 Mehrabani G, Aminian S, Norton S, et al. Preliminary efficacy of the "SitLess with MS" intervention for changing sedentary behaviour, symptoms, and physical performance in multiple sclerosis. *Disabil Rehabil*. 2022;44:6374-6381. doi: 10.1080/09638288.2021.1966520. PMID: 34433359.
- 5 Manns PJ, Mehrabani G, Norton S, et al. The SitLess With MS Program: Intervention Feasibility and Change in Sedentary Behavior. *Arch Rehabil Res Clin Transl*. 2020;2:100083. doi: 10.1016/j.arrct.2020.100083. PMID: 33543106.
- 6 Mehrabani G, Aminian S, Mehrabani G, et al. Dietetic Plans within the Multiple Sclerosis Community: A Review. *Int J Nutr Sci*. 2019;4:14-22. doi: 10.30476/IJNS.2019.81531.1007.
- 7 Hadgkiss EJ, Jelinek GA, Weiland TJ, et al. The association of diet with quality of life, disability, and relapse rate in an international sample of people with multiple sclerosis. *Nutr Neurosci*. 2015;18:125-36. DOI: 10.1179/1476830514Y.0000000117. PMID: 24628020.