



Family-centered education vs telephone follow-up on nutrition pattern and Body Mass Index of opioid-dependent patients: A quasi-experimental study

Mohsen Hezbollahi¹ , Habib Shareinia², Ali Akbary³, Tahereh Baloochi Beydokhti^{2*}

¹Department of Medical-Surgical Nursing, School of Nursing, Gonabad University of Medical Sciences, Gonabad, Iran

²Department of Medical-Surgical Nursing, School of Nursing, Nursing Research Center, Gonabad University of Medical Sciences, Gonabad, Iran

³Department of Psychiatry, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

*Corresponding Author: Tahereh Baloochi Beydokhti, Email: tbaloochi@gmail.com

Abstract

Background: Proper nutrition is important for treatment adherence and preventing adverse metabolic indices in Methadone Maintenance Treatment (MMT) in opioid-dependent patients. The present study aimed to assess the effectiveness of a nutrition education program designed based on the family-centered method and telephone follow-up on nutrition patterns and Body Mass Index (BMI) of opioid-dependent patients undergoing MMT.

Methods: In this quasi-experimental study, 60 patients, who had been undergoing MMT for at least one year, at Ibn-e-Sina Psychiatric Hospital of Mashhad, Iran, were selected using the convenience sampling method and assigned to two equal groups (family-centered group and telephone follow-up group) randomly. The participants fulfilled the demographic questionnaire and Food Frequency Questionnaire (FFQ) in pre- and post-test (2 months later), and also the Checklist for recording BMI. Data were analyzed using SPSS version 16, with a significance level of less than 0.05.

Findings: The results showed that the two groups had no statistically significant differences in terms of demographic variables. Protein consumption in the family-centered group significantly increased compared to the telephone follow-up group ($P < 0.001$). Fat and carbohydrate consumption decreased in both groups, but it was not significant ($P > 0.05$). Also, BMI increased in both groups, but it was not statistically significant ($P > 0.05$).

Conclusion: Based on the results, it seems that family-centered nutrition education is more effective than telephone follow-up, especially to improve protein intake.

Keywords: Nutrition status, Body mass index, Family, Education, Telephone, Opioid-related disorders

Citation: Hezbollahi M, Shareinia H, Akbary A, Baloochi Beydokhti T. Family-centered education vs telephone follow-up on nutrition pattern and body mass index of opioid-dependent patients: a quasi-experimental study. *Addict Health* 2026;18:1690. doi:10.34172/ahj.1690

Received: 3 May, 2025, **Revised:** 21 June, 2025, **Accepted:** 28 January, 2026, **ePublished:** February 2, 2026

Introduction

The opioid use epidemic is a critical health issue worldwide, and it continues despite great efforts in different countries,¹ while patterns of use have changed from classic to novel opioids.² Opioid Use Disorder (OUD) affects many lives and families.³⁻⁵

Opioid Use Disorder has many socioeconomic, physical, and psychiatric consequences and decreases the quality of life in addicted individuals.⁶

The majority of individuals with chronic addiction to opioids suffer from inappropriate food habits, disrupted metabolic parameters, and different nutritional deficiencies, even with a normal BMI.⁷ They usually prefer sweet foods rather than foods with high protein or fat. Also, this food preference will remain in the first months after detoxification.^{8,9}

Although oral methadone (as a strong μ -opioid agonist) is suggested as a first line to reduce harm consequences of OUD,^{10,11} it is associated with negative metabolic indices such as increased BMI¹²⁻¹⁴ compared to the period of opioid use in patients.¹⁵

These adverse effects may increase the risk of discontinuation of MMT and relapse of opioid use, especially in women.¹⁶

On the other hand, there is evidence that some diet regimen, such as the ketogenic diet (decreased carbohydrates and increased proportion of fat), has a therapeutic effect in OUD.¹⁷ So, it is important that patients with OUD adhere to special nutritional regimens and correct their food habits.

Interventions focused on nutritional education programs are effective in improving individuals' knowledge about



dietary habits and consumption of healthy foods.¹⁸

The role of the family in patients' adaptation to lifestyle changes for proper control of blood sugar, nutritional patterns, and prevention of complications is important, and the family, as the most fundamental element of society, is responsible for providing proper and appropriate health care to the patient and those around them.¹⁹ Therefore, by educating and involving family members, given the strong connection between their health status, patients' attitudes are also affected.²⁰ The results of the studies suggest that families are fed up with the behaviors of opiate-dependent patients,²¹ so family-centered education may have a different effect. Another approach is education combined with telephone follow-up or telenursing. Many studies have shown telenursing to be an effective and economical way to follow up on chronic diseases, which promotes self-care at home and increases the quality of life of patients.²²

Despite various studies focused on nutritional training intervention on patients with chronic diseases or special groups²³⁻²⁷, there are very few studies conducted about nutritional education programs in patients with OUD who have undergone MMT. Therefore, the present study aimed to assess the effectiveness of a nutrition education program designed based on the family-centered method and telephone follow-up on nutrition patterns and body mass index of opioid-dependent patients undergoing methadone maintenance treatment.

Materials and Methods

Study Design and Setting

This quasi-experimental study was conducted at Ibn-e-Sina Psychiatric Hospital of Mashhad, Iran, in 2020-2021.

Study Participants and Sampling

The study population comprised all adult patients who had been undergoing MMT for at least one year, referred to Ibn-e-Sina Psychiatric Hospital. Inclusion criteria consisted of willingness and consent to participate in the study, aged 18 to 50 years, no history of significant disease affecting the nutritional pattern such as obstructive gastrointestinal diseases, or inflammatory gastrointestinal diseases, mentally alert and able to answer questions according to the physician's approval, not using laxatives, malnourished according to the FFQ criteria, living with family, and consumption of a maximum of 5-6 cc of methadone daily. Exclusion criteria encompassed having a disease that changes the dietary pattern, comorbid psychiatric conditions, withdrawing from the study at any time, creating conditions that make it impossible to continue the intervention, such as the patient dying or being discharged during the training.

Eligible participants meeting the inclusion criteria were enrolled in the study, using the convenience sampling method. Subsequently, participants were randomly assigned to two groups: the family-centered and the

telephone follow-up groups. Random allocation was performed using a permuted block randomization method with six possible sequences (AABB, ABAB, ABBA, BBAA, BAAB, BABA).

The sample size was estimated by analyzing the mean and standard deviation from the study by Cowan et al with a confidence level of 95% and a statistical power of 80%, following the formula for comparing means.⁹ Considering a 10% allowance for potential sample dropout, a final total of 30 participants were included in each of the two study groups. Thus, the study included 60 participants, and the final analysis was conducted with the same number, with no instances of sample dropout observed throughout the study (Figure 1).

Data Collection Tool and Intervention

The demographic and substance use questionnaire, which included questions on age, gender, place of residence, level of education, income, comorbidities affecting the patients' weight, including hepatitis, indigestion, and physical activity and sports activities, as well as the type of substance used, daily consumption, and frequency of daily consumption, was completed by the researcher.

Another tool was the Food Frequency Questionnaire (FFQ) developed by Esfahani et al which is a 147-item questionnaire based on the usual intake of Iranians. The relative validity of the FFQ ranged from 0.1 (solid fat) to 0.77 (simple sugars) in men, with a mean of 0.44, and from 0.12 (snacks) to 0.79 (refined sugars) in women, with a mean of 0.42. The reliability of the FFQ was 0.51 in men (the highest value in tea was 0.91) and 0.59 in women (the highest value in refined sugars was 0.74). The data are reported in terms of consumption type and amount (percentage of consumption per day, week, month).²⁸ The third tool used in this study was a checklist for recording BMI, through which information related to the patient's weight, height, and BMI is recorded. The weight was measured using a UCL 125 digital scale, and to verify its reliability, its operation was checked every day with a 2 kg weight, while the subjects were wearing minimal clothing and without shoes, and recorded to the nearest 100 grams. We measured height in a standard, shoeless position using a tape measure while subjects were in a normal position, and BMI was defined as weight divided by the squared height in kilograms per square meter, which was measured and recorded before (pre-test) and after two months (post-test).

N4 software was used to determine nutritional patterns, analyze food intake, and calculate the eating index score before and after the intervention. Then, based on the body size and clinical information of the individual, as well as the data given to N4 from the FFQ questionnaire, the nutritional pattern was determined and the type of diet was adjusted and taught to the patients based on the nutritional pattern by a nutrition expert. This diet

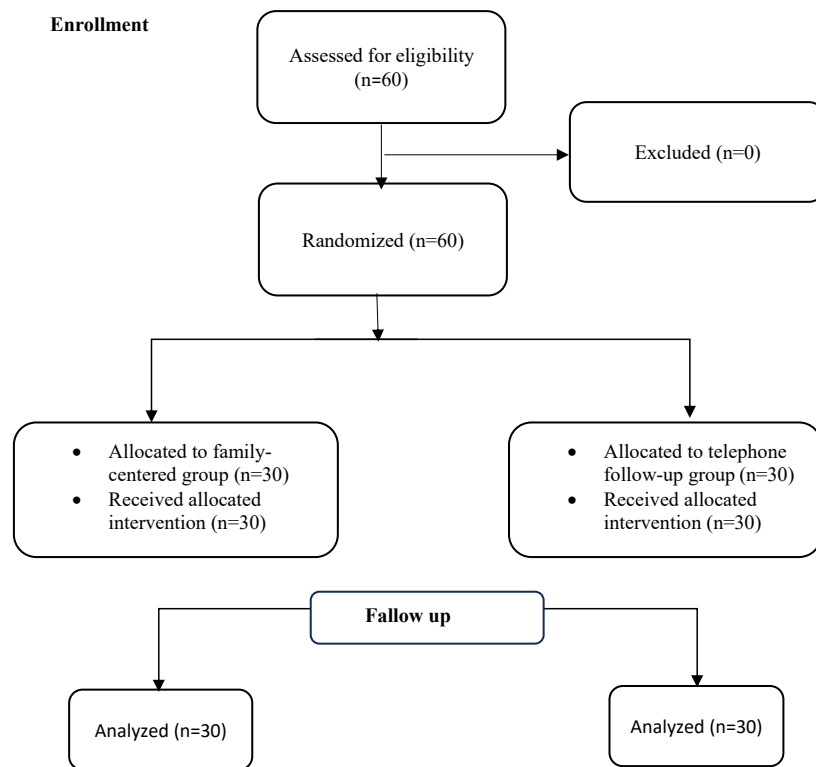


Figure 1. CONSORT flow diagram

usually included high-fiber, moderate-carbohydrate, and high-protein foods in the first two weeks; the second two weeks of this diet included low-fiber, low-fat, moderate-carbohydrate, and moderate-protein foods; and after that, the person entered a diet period that consumed high protein, low fiber, moderate-carbohydrate, and moderate-fat, and the person was kept on this dietary treatment. In the family-centered method, a close family member was selected, and the nutrition education program was taught to him/her and the patient in three sessions of 30–45 minutes (over two months). In the telephone follow-up method, the nutrition education program was taught to the patient only during a one-hour session, and a copy of the program was provided to him/her. Then, the nutrition education program was followed up by telephone calls three times a week for two months. Immediately after the completion of the training in the two groups, the questionnaires were completed again.

Ethical approval was granted by the Ethics Committee of Gonabad University of Medical Sciences (Ethical code: IR.GUM.REC.1400.087). After identifying the intervention, the researcher explained the study's objectives, procedural steps, and methods for assessing nutritional patterns and BMI to the patient. A written informed consent form was obtained from each patient.

After inputting the data into the statistical software SPSS version 16, the normality of the quantitative data was assessed using the Kolmogorov-Smirnov test. BMI, Fat, Protein, and Carbohydrate intake scores were reported using the mean and standard deviation. Given the non-

normal distribution of the data, the Mann-Whitney U test was employed to compare the scores across the two groups under investigation. The Chi-square test was utilized for analyzing nominal and categorical demographic variables, while the independent t-test was used for analyzing continuous variables assuming normal distribution (age, weight, and height).

Results

In the present study, 30 patients in the family-centered group (19 men and 11 women) and 30 patients in the telephone follow-up group (20 men and 10 women) were studied. Table 1 presents demographic variables in the two groups.

The results of Table 1 showed no significant differences in demographic variables between the two groups. So, the two groups were homogeneous in these variables.

Table 2 compares the nutritional variables included: BMI, carbohydrate intake, protein intake, and fat intake in the family-centered group and the telephone follow-up group in the pre- and post-test stages.

The results of the Mann-Whitney U test comparing the scores of the nutritional variables in the pre-test stage between the two family-centered groups and the telephone follow-up group showed no significant differences ($P > 0.05$), while the results in the post-test stage indicated only a significant difference in protein intake score between the two groups ($P = 0.001$). In other words, the family-centered group had a greater effect in increasing protein intake in the diet regimen in patients

Table 1. Demographic variables in the family-centered group and the telephone follow-up group

Variable		Family-centered group Number (%)	Telephone follow-up group Number (%)	Statistical test
Marital status	Married	17 (56.7)	18 (60.0)	$\chi^2=0.171$ df=2 $P=0.918$
	Single	9 (30.0)	9 (30.0)	
	Divorced	4 (13.3)	3 (10.0)	
Age (Years)		39.4 ± 12.41	37.7 ± 11.41	t=0.529 df=58 $P=0.599$
Income level	Appropriate and higher than needed	18 (60.0)	16 (53.3)	$\chi^2=0.271$ df=2 $P=0.602$
	Lower than needed	12 (40.0)	14 (46.7)	
Place of residence	Urban	20 (66.7)	19 (63.3)	$\chi^2=0.073$ df=1 $P=0.787$
	Rural	10 (33.3)	11 (36.7)	
Weight (kg)		75.26 ± 11.24	76.70 ± 10.92	t=0.933 df=58 $P=0.354$
Height (cm)		174.33 ± 5.76	176.73 ± 10.93	t=0.512 df=58 $P=0.611$

Table 2. Comparing the nutritional variables in the family-centered group and telephone follow-up group in the pre-test and post-test stages

Variable	Stage	Family-centered group (Mean ± SD)	Telephone follow-up group (Mean ± SD)	Mann–Whitney U test
Fat intake score	Pre-test	21.56 ± 5.53	22.03 ± 6.40	Z=-1.048 $P=0.295$
	Post-test	16.10 ± 8.64	17.43 ± 8.43	Z=-0.256 $P=0.798$
Carbohydrate intake score	Pre-test	68.23 ± 8.81	68.77 ± 8.19	Z=-0.067 $P=0.946$
	Post-test	63.23 ± 6.47	64.20 ± 6.42	Z=-0.521 $P=0.602$
Protein intake score	Pre-test	14.10 ± 2.13	13.63 ± 1.23	Z=-1.790 $P=0.073$
	Post-test	17.10 ± 2.15	14.43 ± 8.43	Z=-4.020 $P=0.001$
BMI	Pre-test	21.56 ± 2.93	22.22 ± 2.83	Z=-1.460 $P=0.143$
	Post-test	23.55 ± 2.45	22.66 ± 2.53	Z=-0.962 $P=0.336$

who underwent MMT. While the intake of carbohydrate and fat decreased and BMI increased in two groups after intervention, the differences between the two groups were not significant ($P > 0.05$).

Discussion

The present study aimed to assess the effectiveness of a nutrition education program designed based on the family-centered method and telephone follow-up on nutrition patterns and BMI of opioid-dependent patients undergoing MMT. In this study, 30 patients in the family-centered group and 30 patients in the telephone follow-up group were evaluated through the Food Frequency Questionnaire and BMI. The results revealed that both interventions decreased the proportion of fat and carbohydrate intake and increased protein intake in the diet regimen, while the family-centered group had

a greater effect than the telephone follow-up group in increasing the protein intake. The BMI increased in both groups, although this index was in a normal range.

We did not find any research like our study, which focused on an educational training program through the family-centered method or telephone follow-up on patients who underwent MMT. So, our findings have novelty in this field.

Regarding the effect of nutrition education, some studies on patients with chronic conditions indicated that nutrition education programs with a modified diet improve nutritional status in these patients.²³⁻²⁷

A study by Peiris et al on 996 pregnant and nursing mothers in Sri Lanka showed that a mobile phone-based nutrition educational intervention (19 messages in 4 weeks about pregnancy care, infant feeding, diet, and family care) had a positive effect on the knowledge and

attitudes of mothers about child feeding and nutritional diet, and improved breastfeeding and mothers' dietary diversity.²⁹ These results are consistent with our findings about the effectiveness of a telephone follow-up nutrition education program on food preference and protein intake in patients who underwent MMT, although the statistical community of the two studies was different, and Peiris et al did not assess the effectiveness of the family-centered nutrition education program in pregnant and nursing mothers.

Also, the findings of a study conducted by Crisan et al on 218 patients with prediabetic conditions indicated that 6-month nutritional education decreased glycosylated hemoglobin significantly in these patients, and this effectiveness remained 12 months later. This finding showed the effectiveness of nutritional education on controlling the prediabetic condition and preventing to development of diabetes in these individuals.²³ This finding is in line with our results about the effectiveness of educational programs to modify the diet regimen in at-risk individuals.

The present study also has some limitations, such as a sampling limited to one geographical region (Mashhad City) and a lack of assessment of the demographic variables, such as duration of opioid addiction and type of opioid agent. Future research is needed to investigate the effectiveness of a nutrition education program designed with the family-centered approach and telephone follow-up on the quality of life of opioid-dependent patients undergoing MMT. Also, similar research in a larger community is needed to examine influential factors such as the level of awareness about nutritional habits.

Conclusion

In the present study, the results indicated that the family-centered method had a greater impact on improving the nutritional pattern and BMI. Family-centered education method was more effective in patient adherence to the treatment regimen. Considering the dependence of family members on each other in Iranian society, interventions related to modifying the dietary habits of these patients with the participation of the family are prior over other methods.

Acknowledgements

The authors thank all patients and their families who participated in the present study.

Authors' Contribution

Conceptualization: Mohsen Hezballahi, Tahereh Baloochi Beydokhti.

Data curation: Mohsen Hezballahi.

Formal analysis: Habib Shareinia, Mohsen Hezballahi.

Funding acquisition: Mohsen Hezballahi.

Investigation: Mohsen Hezballahi, Tahereh Baloochi Beydokhti.

Methodology: Mohsen Hezballahi, Tahereh Baloochi Beydokhti, Habib Shareinia.

Software: Mohsen Hezballahi, Ali Akbary.

Supervision: Tahereh Baloochi Beydokhti, Ali Akbary.

Writing—original draft: Mohsen Hezballahi, Tahereh Baloochi Beydokhti.

Competing Interests

The author(s) declared no conflict of interest.

Ethical Approval

This study is approved with the ethical code IR.GUM.REC.1400.087.

Funding

This study was self-funded by the authors and received no external financial support from any funding organization.

References

1. Cook JL. The opioid epidemic. *Best Practice & Research Clinical Obstetrics & Gynaecology*. 2022;85:53–8. doi:10.1016/j.bpobgyn.2022.07.003
2. Preveze E, Mason NL, Kuypers KPC, Theunissen EL, Mallaroni P, Pasquini M, et al. Use patterns of classic, novel, and herbal opioids. *Emerging Trends in Drugs, Addictions, and Health*. 2025;5:100166. doi:10.1016/j.etedah.2024.100166
3. Ma L, Tran L, White D. A Statistical Analysis of Drug Seizures and Opioid Overdose Deaths in Ohio from 2014 to 2018. *Arxiv Preprint Arxiv:240519199*. 2024. doi: https://doi.org/10.48550/arXiv.2405.19199
4. Rosenfeld R, Wallman J, Roth R. The Opioid Epidemic and Homicide in the United States. *Journal of Research in Crime and Delinquency*. 2021;58(5):545–90. doi:10.1177/0022427820986848
5. Rosenfeld R, Roth R, Wallman J. Homicide and the Opioid Epidemic: A Longitudinal Analysis. *Homicide Studies*. 2023;27(3):321–37. doi:10.1177/10887679211054418
6. Rhee TG, Rosenheck RA. Association of current and past opioid use disorders with health-related quality of life and employment among US adults. *Drug Alcohol Depend*. 2019;199:122–8. doi:10.1016/j.drugalcdep.2019.03.004
7. Nabipour S, Ayu Said M, Hussain Habil M. Burden and nutritional deficiencies in opiate addiction- systematic review article. *Iran J Public Health*. 2014;43(8):1022–32.
8. Neale J, Nettleton S, Pickering L, Fischer J. Eating patterns among heroin users: a qualitative study with implications for nutritional interventions. *Addiction*. 2012;107(3):635–41. doi:10.1111/j.1360-0443.2011.03660.x
9. Cowan J, Devine C. Food, eating, and weight concerns of men in recovery from substance addiction. *Appetite*. 2008;50(1):33–42. doi:10.1016/j.appet.2007.05.006
10. Álvaro-Alonso EA, Gómez-Álvarez MDC, Segovia-Tapiador B, Del-Pino-Illaconza MI, Valencia J, Ryan P, et al. Persistence in the Methadone Maintenance Program and Its Relationship with the Medication Regimen Complexity Index in Opioid-Dependent Patients. *Pharmaceuticals (Basel)*. 2024;17(5). doi:10.3390/ph17050567
11. Makvand M, Mirtorabi SD, Campbell A, Ahangari G. Predictive Factors for Methadone Maintenance Treatment Compliance: Exploring Resistance and Tolerance in Heroin Addiction. *Iranian Journal of Psychiatry and Behavioral Sciences*. 2024;18(1). doi:10.1111/10.5812/ijpbs-143305
12. Sweeney MM, Antoine DG, Nanda L, Géniaux H, Lofwall MR, Bigelow GE, et al. Increases in body mass index and cardiovascular risk factors during methadone maintenance treatment. *J Opioid Manag*. 2019;15(5):367–74. doi:10.5055/jom.2018.0526
13. Byanyima JJ, Li X, Vesslee SA, Kranzler HR, Shi Z, Wiers CE. Metabolic profiles associated with opioid use and opioid use disorder: a narrative review of the literature. *Curr Addict Rep*.

- 2023;10(3):581–93. doi:10.1007/s40429-023-00493-4
14. Elman I, Howard M, Borodovsky JT, Mysels D, Rott D, Borsook D, et al. Metabolic and Addiction Indices in Patients on Opioid Agonist Medication-Assisted Treatment: A Comparison of Buprenorphine and Methadone. *Sci Rep.* 2020;10(1):5617. doi:10.1038/s41598-020-62556-0
 15. Migdanis A, Migdanis I, Papadopoulou SK, Hadjivasiliou L, Trifonova N, Villioti M, et al. Assessment of Dietary Intake and Nutritional Status of Former Opioid Users Undergoing Detoxification Process. *Cureus.* 2023;15(12):e50068. doi:10.7759/cureus.50068
 16. Mahboub N, Rizk R, Karavetian M, de Vries N. Nutritional status and eating habits of people who use drugs and/or are undergoing treatment for recovery: a narrative review. *Nutr Rev.* 2021;79(6):627–35. doi:10.1093/nutrit/nuaa095
 17. Kong D, Sun JX, Yang JQ, Li YS, Bi K, Zhang ZY, et al. Ketogenic diet: a potential adjunctive treatment for substance use disorders. *Front Nutr.* 2023;10:1191903. doi:10.3389/fnut.2023.1191903
 18. Mogre V, Sefogah PE, Adetunji AW, Olalekan OO, Gaa PK, Ayettey Anie HNG, et al. A school-based food and nutrition education intervention increases nutrition-related knowledge and fruit consumption among primary school children in northern Ghana. *BMC Public Health.* 2024;24(1):1739. doi:10.1186/s12889-024-19200-7
 19. Hoseinpour F, Ghahari S, Motaharinezhad F, Binesh M. Supportive Interventions for Caregivers of Individuals With Multiple Sclerosis: A Systematic Review. *Int J MS Care.* 2023;25(6):266–72. doi:10.7224/1537-2073.2022-083
 20. Shokoohi-Yekta M, Parand A, Dargahi M. Family-based Preventive Interventions: Effects on Parent-child Relationship and Parenting Styles. *Quarterly Journal of Child Mental Health.* 2016;3(2):55–63.
 21. Mardani M, Alipour F, Rafiey H, Fallahi-Khoshknab M, Arshi M. Challenges in addiction-affected families: a systematic review of qualitative studies. *BMC Psychiatry.* 2023;23(1):439. doi:10.1186/s12888-023-04927-1
 22. Osorio-Calle YP, Sebasti n KJ, Meneses-La-Riva MnE. Systematic review: Tele-nursing a Universal Access to Care for Oncology Patients. *Jurnal Ners dan Kebidanan (Journal of Ners and Midwifery).* 2021;8(3):393–400. doi:10.26699/jnk.v8i3.art.p393-400
 23. Allogmanny S, Probst Y. Dietary Modification Combined with Nutrition Education and Counseling for Metabolic Comorbidities in Multiple Sclerosis: Implications for Clinical Practice and Research. *Curr Nutr Rep.* 2024;13(2):106–12. doi:10.1007/s13668-024-00538-8
 24. Russell RD, Black LJ, Begley A. Nutrition Education Programs for Adults with Neurological Diseases Are Lacking: A Scoping Review. *Nutrients.* 2022;14(8). doi:10.3390/nu14081577
 25. Bostancı S, Konar N, Bařkaya G, Aykut  . The Effect of Physical Activity and Nutrition Awareness Education on the Level of Physical Fitness and Nutrition Knowledge in Women Aged 50–60. *Journal of Basic and Clinical Health Sciences.* 2024;8(2):367–79. doi:10.30621/jbachs.1327637
 26. Sneij A, Farkas GJ, Carino Mason MR, Gater DR. Nutrition Education to Reduce Metabolic Dysfunction for Spinal Cord Injury: A Module-Based Nutrition Education Guide for Healthcare Providers and Consumers. *J Pers Med.* 2022;12(12). doi:10.3390/jpm12122029
 27. Criřan A, Guluță E, Minc  A, Minc  D, Rusu A, Costea R, et al. Efficiency of a Nutrition Education Program in the Prediabetic Population: Is it Necessary? *Internal Medicine.* 2023;20(3):7–17. doi:10.2478/inmed-2023-0254
 28. Esfahani FH, Asghari G, Mirmiran P, Azizi F. Reproducibility and relative validity of food group intake in a food frequency questionnaire developed for the Tehran Lipid and Glucose Study. *J Epidemiol.* 2010;20(2):150–8. doi:10.2188/jea.je20090083
 29. Peiris DR, Wijesinghe MSD, Gunawardana BMI, Weerasinghe W, Rajapaksha R, Rathnayake KM, et al. Mobile Phone-Based Nutrition Education Targeting Pregnant and Nursing Mothers in Sri Lanka. *Int J Environ Res Public Health.* 2023;20(3). doi:10.3390/ijerph20032324