İzmir Tıp Fakültesi Dergisi
Journal of Izmir Faculty of Medicine

Klinik Araştırma
DOI: 10.57221/izmirtip.1308037

İzmir Tıp Fak Derg. 2024;3(2):70-76.

Detection of Possible Trigger Nutrition Factors in Migraine Patients with Alternating Diet Model

Migren Hastalarında Olası Tetikleyici Beslenme Faktörlerinin Değişimli Diyet Modeliyle Saptanması

Mustafa Emrecan Uludağ[1], Nihat Şengeze[1], Özge Türk[1], Adnan Karaibrahimoğlu[2]

[1]Süleyman Demirel University, Faculty of Medicine, Department of Neurology. Isparta, Turkey

[2]Süleyman Demirel University, Faculty of Medicine, Department of Biostatistics and Medical Informatics. Isparta, Turkey

Abstract

Aim: The aim of this study is to determine the effects of diet programs on the severity and duration of migraines and the number of attacks by administering cheese, caffeine, and chocolate-restricted diet programs to patients.

Materials and Methods: The migraine patients included in the study (92,6% is female, average age: 36,66±12,32, while no comorbid disease was detected in 57.7% of the patients, the two most common chronic diseases were iron deficiency anemia and rheumatoid arthritis with a rate of 7.7%.) were given three different (chocolate-free, cheese-free, caffeine-free) dietary recommendations and were given a chart in which they could record their migraine attacks. The dietary recommendations were administered separately every two weeks. The chart filled out by the patients was collected through face-to-face interviews at the end of the total six weeks.

Results: The study determined a decrease in the duration, severity, and number of migraine attacks in the period of a diet free from cheese, caffeine, and chocolate. Except for the decrease in the number of attacks on the caffeine-free diet ($p=0.069$), all the decreases are statistically significant ($p<0,05$).

Conclusion: This study shows that using a cheese-free, chocolate-free, or caffeine-free diet in managing migraine patients may improve the quality of life, and the need for drug treatment may decrease. Dietary modification is as important as medical treatment in migraine management. However, further studies with larger sample sizes and longer follow-up periods are needed to confirm these results.

Keywords: Migraine; alternating diet model; nutrition factors

Öz

Amaç: Bu çalışmanın amacı, hastalara peynir, kafein ve çikolatadan kısıtlı diyet programları uygulayarak, diyet programlarının migrenin şiddeti, süresi ve atak sayısı üzerine etkisini belirlemektir.

Gereç ve Yöntemler: Çalışmaya alınan migren hastalarına (%92.6'sı kadın, ortalama yaş: 36.66±12.32, %57.7'sinde herhangi bir komorbid hastalık saptanmamışken en çok saptanan iki kronik hastalık %7.7 oranlarıyla demir eksikliği anemisi ve romatoid artrittir) üç farklı (çikolatasız, peynirsiz, kafeinsiz) beslenme önerisiyle beraber migren ataklarını kaydedebilecekleri bir çizelge verildi. Bu üç diyet önerisi her biri ikişer hafta olmak üzere toplamda altı hafta ayrı ayrı uygulandı. Hastaların diyet programları esnasında doldurduğu çizelge, toplam altı hafta sonunda yüz yüze görüşmeyle toplandı.

Bulgular: Çalışma, peynir, kafein ve çikolatadan kısıtlı diyet döneminde migren ataklarının süresi, şiddeti ve sayısında azalma tespit etti. Kafeinsiz diyet esnasında oluşan atak sayısındaki azalma ($p=0.069$) dışında tüm düşüşler istatistiksel olarak anlamlıdır ($p<0,05$).

Sonuç: Bu çalışma, migren hastalarının yönetiminde peynirsiz, çikolatasız veya kafeinsiz bir diyet kullanmanın yaşam kalitesini artırabileceğini ve ilaç tedavisine olan ihtiyacı azaltabileceğini göstermektedir. Bu türden bir diyet düzenlemesi, migren yönetiminde medikal tedavi kadar önemlidir. Ancak, bu sonuçları doğrulamak için daha büyük örnekleme ve daha uzun takip sürelerine sahip daha fazla çalışma yapılması gerekmektedir.

Anahtar sözcükler: Migren; değişimli diyet modeli; beslenme faktörleri

Corresponding Author: Mustafa Emrecan Uludağ
Suleyman Demirel University, Faculty of Medicine, Department of Neurology. Isparta, Turkey
E-mail: dremrecanuludag@gmail.com
Geliş ve Kabul Tarihi: 31.05.2023/22.05.2024

INTRODUCTION

A migraine is a severe headache with recurrent attacks, typically unilateral and throbbing, lasting between 4-72 hours with photophobia and nausea (1). A migraine is a disease that impacts one's personal and social life (1). Although the prevalence of migraines varies with age, studies show that it peaks between 20 and 50 (2). Lifelong prevalence is 10% in men and 25% in women (3). It is estimated that three billion people worldwide suffer from headaches, and 1.04 billion of them are migraine sufferers (4).

Individuals with migraines state that their headaches are triggered by some factors (5,6). Trigger factors are either exogenous or endogenous that are likely to increase the number of attacks for a short period of time as a result of these exposures (7). Some classic and most cited trigger factors of migraines are chocolate, cheese, citrus fruits, nuts, processed meats, monosodium glutamate, aspartame, red wine, and coffee (6,8-11).

In this study we aimed to determine the effects of these factors and diet on the severity and duration of migraines by applying cheese, caffeine, and chocolate-restricted diet programs to patients.

MATERIALS and METHODS

Ethical approval for the study was obtained from the local Clinical Research Ethics Committee (Date: 23.12.2021 and decision no:370). The study was conducted in accordance with the Declaration of Helsinki and a signed informed consent form was obtained from all patients. Following one-on-one interviews with patients diagnosed with migraines, their current attack frequency, eating habits, and demographic information was obtained. Exclusion criteria (advanced age >70, patients with limited cooperation due to dementia, cerebrovascular disease, aphasia, severe dysarthria, patients who are not suitable for diet due to diabetes diagnosis, headache types other than migraines). These patient groups were not included in the study. The patients included in the study were given three different dietary recommendations, which included a caffeine-free, cheese-free, and chocolate-free diet, in cooperation with the dietitians at the hospital. The diet recommendations were presented in a brochure. The patients were given a chart in which they could record their migraine attacks, their visual analog scale (VAS) score during the attack, the onset and ending time of the attack, the drugs they used during the attack, and the potential triggering factors accompanying the attack. Dietary recommendations were applied for two weeks and each attack was recorded by the patient on the chart given to them during the diet, and collected through face-to-face interviews with the patients at the end of the six weeks.

The statistical analysis of the study was performed by SPSS 20.0 (IBM Inc, Chicago, IL, USA). The descriptive statistics were presented as mean +/-SD or median; min-max where needed for numerical variables; frequency (percentage) for categorical variables. The normality was checked by the Kolmogorov-Smirnov test for continuous variables. However, the distributions were not normal ($p<0.05$), therefore nonparametric methods were performed for comparisons. The Wilcoxon signed-rank test was used for pre and post-measurements. The $p<0.05$ value was considered as statistically significant result for 5% type-I error.

The power analysis of the study was performed by GPower 3.1.9.2 (Universiataet Kiel, Germany). The VAS score values, found in a pilot study, were used to determine the effect size for paired measurements. The test family was chosen as "t test" and the analysis was "Means: paired sample means". The effect size was calculated as d=0.984, with the power as 95% and the type-I error as 0.05. The sample size was calculated as n=27. Therefore, the total of 27 patients were enrolled in the study.

RESULTS

In this study; 25 of the 27 patients examined were female, who had previously been diagnosed with migraines and emitted to the neurology outpatient clinic. The mean age of the examined patient population was 36.7 ± 12.3 years, while the mean time elapsed since the patients were diagnosed with migraine was 11.6 ± 8.4 years. Majority of the patients were university graduates (%74.1) while 18.5% were primary school graduates, and 7.4% were high school graduates. The most frequently performed occupations in the patient population were nurses (23.8%) and housewives (18.5%). 46.2% of the patients were married. The history of the patients included hypertension in three patients, hyperlipidemia in one patient, asthma-COPD in three patients, iron deficiency anemia in two patients, sarcoidosis in one patient, brucellosis in one patient, depression in one patient, and rheumatoid arthritis in two patients.

When the regular dietary habits of the patients included in the study were examined, 24 patients were consuming cheese, 21 patients were consuming chocolate, and 27 patients were consuming caffeine regularly. In our entire patient population, average cheese consumption was 4.2±3.2 servings (One serving of approximately 30 g) per week, caffeine consumption was 2172.2±1153.0 mg per week, and chocolate consumption (One serving of approximately 70 g) was 2.66±2.75 servings per week. These patients had an average of 3.8±3.0 migraine attacks per month, and

their VAS score during their attacks was found to be 7.8±1.4 on average.

Among all the patients, 55.6% of them were not receiving any prophylactic treatment for migraine. The incidence of photophobia or phonophobia during migraine attacks was 92.6%. In our patients, the frequency of attacks for two weeks before the diet was 1.8±1.5, and the average duration of attacks was 20.8±8.0 hours (Table 1).

Table 1. Identifiable information of patients

Specifications	Mean ± SD*	Median	Min-Max
Age	36.66 ± 12.32	35	21-69
Cheese Consumption per week (1 serving of approximately 30 g)	4.18 ± 3.29	3.50	0-14
Caffeine Consumption per week (mg)	2172.22 ± 1153.04	1800	300-5080
Chocolate Consumption per week (1 serving of approximately 70 g)	2.66 ± 2.75	1.50	0-10
Years Passed After Patient Recieved Migraine Diagnosis	11.60 ± 8.42	10	2-35
Average Duration for a Migraine Attack (hours)	20.8 ± 8.0	24	2.50-72.00
Average VAS Score for a Migraine Attack	7.79 ± 1.40	7	5-10
Average Number of Attacks Along 2 Weeks	3.75 ± 3.00	2.75	0.50-12.00

*SD = Standard Deviation

When the patients were asked about some possible migraine triggers, the rate of those who saw caffeine as a trigger was 14.8%, those who saw chocolate as a trigger 11.1%, and then those who saw cheese as a trigger 7.4% (Table 2).

Table 2. Subjective examination of potential triggers from the patients perspective

Potential Triggers	Yes (%)	No (%)	Do not know (%)
Stress	96.3	3.7	0
Hunger	85.2	14.8	0
Bright Light	81.5	11.1	7.4
Weather Change	63.0	37.0	0
Fruit And Vegetable Consumption	18.5	29.6	51.9
Caffeinated Beverage Consumption	14.8	59.3	25.9
Chocolate Consumption	11.1	77.8	11.1
Cheese Consumption	7.4	48.1	44.4
Alcohol Consumption	7.4	18.5	74.1
Nicotine Intake	7.4	81.5	11.1

Three different diets were applied to all patients, lasting two weeks each, totaling six weeks. These diets were labeled as cheese-free, chocolate-free, and caffeine-free. The mean VAS score of migraine attacks decreased and was statistically significant in all three diet programs (p=0.001) (Table 3). According to the results of the analysis, the pre-diet VAS score was 7.79 ± 1.40; It was determined as 5.41 ± 2.71 after the cheese-free diet period, 4.47 ± 3.31 in the chocolate-free diet period (p=0.001), and 5.05 ± 3.23 in the caffeine-free diet period (p=0.001, p=0.001) (Table 3).

Table 3. Pre and after-diet pain intensity (VAS Score) information

	Mean VAS Score ± SD*	Median	Min-Max	*P*
Before Any Diet Program Period	7.79 ± 1.40	7.00	5-10	
After Cheese-Free Diet Period	5.41 ± 2.71	5.50	0-10	*p=0,001***
After Chocolate-Free Diet Period	4.47 ± 3.31	5.00	0-10	*p=0,001***
After Caffeine-Free Diet Period	5.05 ± 3.23	5.75	0-10	*p=0,001***

VAS: Visual Analog Scale
*SD = Standard Deviation
** Significant at the level of 0.05 according to Wilcoxon analysis

The mean duration of migraine attacks decreased and was statistically significantly after all three diet programs (p=0.001) (Table 4).

Table 4. Pre and after-diet pain duration ınformation

	Attack Duration Mean ± SD*	Median	Min-Max	*P*
Before Any Diet Program Period (hours)	20.8 ± 8.0	24.00	2.50-72.00	
After Cheese-Free Diet Period (hours)	7.27 ± 5.72	6.60	0-19	*p=0,001***
After Chocolate-Free Diet Period (hours)	5.89 ± 5.82	4.50	0-17.66	*p=0,001***
After Caffeine-Free Diet Period (hours)	5.15 ± 4.78	3.50	0-13.75	*p=0,001***

*SD = Standard Deviation
** Significant at the level of 0.05 according to Wilcoxon analysis

According to the results of the analysis, the mean attack duration before the research was 20.8 ± 8.0 hours; It was found to be 7.27 ± 5.72 hours when a cheese-free diet was applied, 5.89 ± 5.82 hours when a chocolate-free diet was applied, and 5.15 ± 4.78 hours when a caffeine-free diet was applied (p=0.001, p=0.001, p=0.001).
Before our study, the frequency of migraine attacks was 3.75 ± 3.00 on average within the two weeks, but when we applied cheese-free and chocolate-free diets, the number of attacks within the two weeks decreased (p=0.008, p=0.003). However, there was no statistically significant change in the number of attacks following a caffeine-free diet (p=0.069) (Table 5).

Table 5. Pre and after diet attack frequency information

	Attack Numbers Mean ± SD*	Median	Min-Max	*P*
Before Any Diet Program Period	3.75 ± 3.00	2.75	0.50-12.00	
After Cheese-Free Diet Period	2.44 ± 1.67	3.00	0-6	*p=0,008* **
After Chocolate-Free Diet Period	2.00 ± 1.90	2.00	0-8	*p=0,003* **
After Caffeine-Free Diet Period	2.59 ± 2.85	2.00	0-14	*0.069*

*SD = Standard Deviation

** Significant at the level of 0.05 according to Wilcoxon analysis

DISCUSSION

Migraine is a prevalent and debilitating neurological disorder affecting millions of people worldwide (4). The preventive effects of elimination diets on headaches have been previously examined in various studies, and they have been found to be effective in some patient groups (12-14). Our study is important in demonstrating the improvement of life quality in migraine patients of the three elimination diets in the clinical setting. To our knowledge, no study has tested these three elimination diets in clinical settings.

Before starting the elimination diets, during the interviews conducted with the patients participating in our study, 7.4% of them defined cheese, 11.1% chocolate, and 14.8% caffeine consumption as triggering factors. These percentages are consistent with previous studies on migraine trigger factors (5,13,15).

Patients experienced a decrease in the VAS score (representing the severity), duration, and number of migraine attacks in all three elimination diet periods. These reductions indicate that elimination diets can be used as adjunctive therapy in the treatment of migraines. Furthermore, the varying degrees of impact of the applied diet programs on patients emphasize the importance of personalizing elimination diets for migraine patients.

There is no consensus on the effect of food triggers on headaches (12). In a study by Marcos et al., involving 63 individuals with chronic headaches, chocolate was used as a vasoactive amine and carob as a placebo, yielding similar results (16). Half of the patients included in the study had migraine-type headaches, while the remaining group had tension-type and mixed. After implementing a restricted diet of vasoactive amine-containing foods, participants were given two samples of chocolate and two of carob in a double-blind fashion. Throughout the study, patients kept headache diaries. It was demonstrated that chocolate did not trigger headaches more than carob did (16).

Studies by Wöber et al. found no negative effects of dietary factors on migraines (17). Out of 14 studies conducted, chocolate was implicated as a trigger for migraines. Four of these studies were population-based (18-21) even were retrospective, one was both retrospective and prospective, one was prospective, and one was a randomized controlled trial (11). In our study, a statistically significant decrease in the VAS Score was observed in the chocolate elimination diet compared to before the diet. The VAS score before the diet was 7.79, while it was 4.47 after the chocolate elimination diet.

Regarding the effects of cheese on migraines, studies by Takeshima et al. and Yadav et al. did not find cheese to be a migraine trigger (18,22). However, there are literature suggesting that cheese could trigger migraines (23). In our study, both the VAS score and migraine attack duration and frequency were statistically different compared to before the diet in the cheese-free diet group.

Population-based studies have reported higher migraine frequency in adolescents and adults who consume caffeine (24,25). However, Rasmussen did not show this relationship (21). In our study, the VAS score and migraine attack duration were statistically different with the caffeine-free diet compared to before the diet.

It is known that diet triggers affect migraines. Elimination diets are popular; however, completely eliminating certain substances from the diet can lead to inadequate nutrition. Therefore, it is recommended to choose an appropriate diet and seek guidance from physicians and dietitians. This is to ensure the biopsychosocial well-being of migraine patients, as strictly avoiding foods can lead to stress and decreased quality of life (26).

Although our study yielded similar findings to the literature, it is one of the rare studies where elimination was applied under the supervision of a dietitian. We wanted to emphasize that diet modification is as effective as medical treatment in our study.

The biggest limitation of our study is that the elimination diets were limited to two weeks for patients. We believe that elimination diet implementations conducted over a longer period in a clinical setting will be more successful in helping individuals identify migraine triggers and reduce disability due to migraine attacks. Further research is warranted to explore the mechanisms underlying these dietary effects and to develop tailored dietary recommendations for migraine patients.

CONCLUSION

Our study has shown that caffeine, chocolate and cheese elimination diets are clinically effective in preventing migraine attacks and improving patients' life quality. The use of these elimination diets, in addition their medical therapy, by choosing them according to their personal characteristics and their dietary habits is one of the options that can improve their life quality. However, further studies with larger sample sizes and longer follow-up periods are needed to confirm these results.

Author's Contribution

The authors declare no conflict of interest.

All authors declared their contribution to the study at all stages and approved the final version of the manuscript.

All authors declared that this manuscript has not been published before and is not currently being considered for publication elsewhere.

This research was carried out with the support of Süleyman Demirel University Scientific Research Projects Coordination Unit - Undergraduate Degree Support (Project Number: TLP-2022-8589). All stationery expenses covered by this support.

This research was orally presented in "Uludag Nöroloji Günleri" congress in Uludag/Bursa/Turkey in March 11, 2023.

REFERENCES

1. Headache Classification Committee of the International Headache Society (IHS). The İnternational classification of headache disorders. Cephalalgia. 2018;38:1-211.
2. Rossi MF, Tumminello A, Marconi M, Gualano MR, Santoro PE, Malorni W, et al. Sex and gender differences in migraines: A narrative review. Neurol Sci.2022;43:5729-34.
3. Lipton RB, Bigal ME, Diamond M, Freitag F, Reed ML, Stewart WF, et al. Migraine prevalence, disease burden, and the need for preventive therapy. Neurology.2007;68:343-49.
4. GBD 2016 Headache Collaborators. Global, regional, and national burden of migraine and tension-type headache, 1990-2016: A systematic analysis for the Global Burden of Disease Study 2016. Lancet Neurol. 2018;17:954-76.
5. Fukui PT, Gonçalves TRT, Strabelli CG, Lucchino NMFL, Matos FCi, Santos JPM et al. Trigger factors in migraine patients. Arq Neuro-Psiquiatr. 2008;66:494-9.
6. Mollaoğlu M. Trigger factors in migraine patients. J Health Psychol. 2013;18:984-94.
7. Lipton RB, Pavlovic JM, Haut SR, Grosberg BM, Buse DC. Methodological issues in studying trigger factors and premonitory features of migraine. Headache. 2014;54:1661-9.
8. Marmura MJ. Triggers, protectors, and predictors in episodic migraine. Curr Pain Headache Rep. 2018;22:81.
9. Pavlovic JM, Buse DC, Sollars CM, Haut S, Lipton RB. Trigger factors and premonitory features of migraine attacks: summary of studies. Headache. 2014;54:1670-9.
10. Blau JN. Migraine triggers: practice and theory. Pathol Biol. 1992;40:367-72.
11. Rockett FC, de Oliveira VR, Castro K, Chaves MLF, Perla A da S, Perry IDS. Dietary aspects of migraine trigger factors. Nutr Rev. 2012;70:337-56.
12. Razeghi JS, Ghorbani Z, Martelletti P, Lampl C, Togha M. School of Advanced Studies of the European Headache Federation (EHF-SAS). Association of diet and headache. J Headache Pain. 2019;20:106.
13. Martin VT, Vij B. Diet and headache: Part 1. Headache. 2016;56:1543-52.
14. Martin VT, Vij B. Diet and headache: Part 2. Headache. 2016;56:1553-62.
15. Zaeem Z, Zhou L, Dilli E. Headaches: A review of the role of dietary factors. Curr Neurol Neurosci Rep. 2016;16:101.
16. Marcus DA, Scharff L, Turk D, Gourley LM. A double-blind provocative study of chocolate as a trigger of headache. Cephalalgia. 1997;17:855-62.
17. Wöber C, Brannath W, Schmidt K, Kapitan M, Rudel E, Wessely P, et al. Prospective analysis of factors related to migraine attacks: the PAMINA study. Cephalalgia. 2007;27:304-14.
18. Takeshima T, Ishizaki K, Fukuhara Y, Ijiri T, Kusumi M, Wakutani Y et al. Population-based door-to-door survey of migraine in Japan: The Daisen study. Headache. 2004;44:8-19.
19. Bánk J, Márton S. Hungarian migraine epidemiology. Headache. 2000;40:164-9.
20. Ulrich V, Russell MB, Jensen R, Olesen J. A comparison of tension-type headache in migraineurs and in non-migraineurs: a population-based study. Pain. 1996;67:501-6.

21. Russell MB, Rasmussen BK, Fenger K, Olesen J. Migraine without aura and migraine with aura are distinct clinical entities: a study of four hundred and eighty-four male and female migraineurs from the general population. Cephalalgia. 1996;16:239-45.
22. Yadav RK, Kalita J, Misra UK. A study of triggers of migraine in India. Pain Med. 2010;11:44-7.
23. Xie YJ, Lin M, Wong YT, Yan L, Zhang D, Gao Y. Migraine attacks and relevant trigger factors in undergraduate nursing students in Hong Kong: A Cross-Sectional Study. J Pain Res. 2022;15:701-13.
24. Milde-Busch A, Blaschek A, Borggräfe I, Heinen F, Straube A, von Kries R. Associations of diet and lifestyle with headache in high-school students: results from a cross-sectional study. Headache. 2010;50:1104-14.
25. Hagen K, Thoresen K, Stovner LJ, Zwart J-A. High dietary caffeine consumption is associated with a modest increase in headache prevalence: Results from the Head-HUNT Study. J Headache Pain. 2009;10:153-9.
26. Gazerani P. Migraine and Diet. Nutrients. 2020;12:1658