DOI: 10.4274/jarem.galenos.2024.02418
J Acad Res Med 2024;14(1):6-13

Adherence to Prophylaxis in Patients with Chronic Headaches and Effect of Internet/Social Media Use

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Cite this article as: Erbaş B, Kesim Şahin Ö. Adherence to Prophylaxis in Patients with Chronic Headaches and Effect of Internet/Social Media Use. J Acad Res Med 2024;14(1):6-13

ABSTRACT

Objective: To determine the medication adherence rates of patients with chronic headaches to prophylaxis and the factors affecting this rate, including internet and social media use.

Methods: This study was conducted in two hospitals between May and September 2021. Adult patients with chronic headaches requiring prophylaxis were recruited for this study. Demographic data, headache types/features, prophylactic drugs, Hospital Anxiety and Depression scale scores, and duration of internet/social media use (hours/day) were recorded. Medication Adherence Report scale scores, changes in headache characteristics, and drug-related adverse effects were assessed during the first month.

Results: In total, 113 patients were recruited. Most patients had migraines (69%). The medication adherence rate in the first month was 72.6%. Patients with a longer duration of internet/social media use and adverse drug effects were more likely to show poor adherence (p=0.005). Decreasing baseline maximum headache severity increased the likelihood of medication non-adherence (p=0.005). Public hospital patients (p=0.036) and married patients (p=0.048) were more prone to non-adherence.

Conclusion: Internet/social media use, headache severity, and medication-related side effects are the most important factors associated with medication adherence. Non-profit healthcare professionals/organizations should use the internet and social media as communication channels to increase medication adherence. Health policies need to be adjusted to allow more time for the healthcare worker-patient communication.

Keywords: Medication adherence, chronic headache, internet/social media

INTRODUCTION

Medication adherence is a crucial factor in treating chronic diseases, and non-adherence to treatment is an important problem affecting treatment success. Non-adherence is observed in 25-65% of patients with headaches requiring prophylaxis (1,2). Similar to many studies conducted in different fields of headache, migraine is the most investigated type in terms of adherence to prophylaxis (3-5).

Factors influencing adherence to treatment in headache prophylaxis are unclear and remain controversial. Poor efficacy or adverse effects of drugs are among the most cited reasons (2,6-9). In this context, the impact of the internet/social media (I/SM), which has become an important source of health information in the last few decades and can affect patients' medication adherence, has not been sufficiently investigated (10-14). This study was conducted when the coronavirus disease-2019 pandemic had largely lost momentum but had not yet been fully controlled. During the pandemic, the use of I/SM as a source of information has increased worldwide, especially among people staying at home, in isolation, or quarantined (14,15). Media/SM misinformation regarding health issues and medical treatments has significantly increased, and the pandemic has highlighted the key role of SM misinformation (14,16). To the best of our knowledge, there are limited studies in the literature investigating the effect of I/SM use on medication adherence.

This study aimed to determine the level of adherence to prophylaxis in patients with chronic headaches and the factors that may influence adherence, including I/SM use.

METHODS

Study Population and Data

This study included adult patients with chronic headaches (aged ≥18 years) requiring prophylaxis who consented to participate. The study was conducted in two different hospitals (one private

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Received Date: 06.09.2023 **Accepted Date:** 23.02.2024

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and one public) between May and September 2021. Demographic data of the patients (age, sex, marital status, education, and economic level), duration of I/SM use (hours/day), headache type (according to the third edition of the International Classification of Headache Disorders-3), features of the headache (frequency, duration, severity), number of emergency room visits due to headache (per year), analgesic type and number per month taken by patients, comorbidities, number of other drugs taken by patients chronically, status of previous headache prophylaxis drug use, and newly prescribed headache prophylaxis drugs were recorded (17).

Measures and Procedures

At the beginning of the study, all patients were asked to complete the Hospital Anxiety and Depression scale (HADS), a self-assessment test including 14 items and divided into an anxiety subscale (HADS-A) and a depression subscale (HADS-D) (18,19). The answer format offers four response options, which are scored with values ranging from 0 to 3. This resulted in scale values between 0 and 21 for each scale. The authors of the original test defined three ranges for both scales: 0-7 (non-cases), 8-10 (doubtful cases), and 11-21 (cases). The HADS total score was calculated by summing the anxiety and depression items.

After initiating prophylactic drug treatment, a face-to-face visit was planned in the first month. Adherence rate was measured in the first month using the Medication Adherence Report scale (MARS-5). In addition, changes in headache frequency and severity [based on a visual analog scale (VAS) score between 0 and 10], percentage of improvement in headache according to the patient, and adverse effects of prophylactic drugs were recorded by asking the patients.

MARS-5 is a self-report medication adherence scale used to assess medication adherence in many chronic diseases (20). Translation of MARS-5 into Turkish and Turkish validation studies has been conducted previously (21). MARS-5 consists of five general statements about non-adherent behavior (I forget to take my medicines, I alter the dose of my medicines, I stop taking my medicines for a while, I decide to miss out on a dose, I take less than instructed) answered on a 5-point Likert scale (1= always, 2= often, 3= sometimes, 4= rarely, 5= never). The outcome variable was calculated as the total score on the MARS-5 (maximum, 25), and a score <23 was considered non-adherent (6).

Ethics Approval and Consent to Participate

This study was approved by the Clinical Research Ethics Committee of Demiroğlu Bilim University (decision no: 22.12.2020/2020-24-03). The study was conducted in accordance with the Good Clinical Practice and the Declaration of Helsinki ethical standards. Written informed consent was obtained from all participants.

Statistical Analysis

The normality of the distribution was examined using the Kolmogorov-Smirnov test. Normally distributed data are presented as mean ± standard deviation, whereas skewed data are presented as median (25-75%). Univariate and multivariate binary logistic regression analyses were performed to investigate the possible predictors of medication adherence. In the multivariate model, the backward Wald method was used to include independent variables. Pearson's chi-square test with Yates correction was used to compare categorical data between the adherent and non-adherent groups, and the Z test with Bonferroni correction was performed for multiple comparisons. Statistical calculations were performed using the IBM SPSS V.23 software. Statistical significance was defined as $p<0.05$.

RESULTS

A total of 113 patients were included in this study. The demographic characteristics, comorbidities, total number of medications (per day), HADS scores, duration of I/SM use (hours/day), and the type of hospital in which the patients were recruited (private-public) are presented in Table 1.

Headache characteristics, previous prophylaxis status, number of annual admissions to the emergency room due to headache, number of analgesics taken per month, type of headache prophylaxis drug initiated, and first-month MARS scores are shown in Table 2. Most patients had migraine without aura (64.6%), followed by tension-type headaches (41.6%) and cervicogenic headaches (23%). Approximately 60.2% of the patients had more than one type of headache. The medication adherence rate in the first month was 72.6%. The most common statement was, "I forget to take it" (38.9%). The statements "I'm quitting for a while," "I've decided to skip the dose" and "I'm changing the dose" were reported by the patients at the rates of 22.1%, 10.6%, and 2.7%, respectively.

The independent variables predicting adherence in the first month were analyzed by binary logistic regression analysis, and the backward Wald method was used to include the independent variables in the model. When the model was analyzed univariately, increasing the daily I/SM usage time of the participants increased the probability of non-adherence by 1.37 times ($p=0.016$). Decreasing the maximum initial VAS score increased the probability of non-adherence (1/0.66) by 1.51 times ($p=0.024$). The probability of non-adherence was 3.82 times higher in patients with prophylaxis side effects than in those without side effects ($p=0.005$). Multivariate analysis found that the probability of medication non-adherence of those treated in public hospitals was 3.71 times higher than that of those treated in private hospitals ($p=0.036$). The probability of non-adherence of married patients was 4.28 times higher than that of unmarried patients ($p=0.048$). Increasing the duration of daily SM use increased the probability of non-adherence by 1.68 times ($p=0.005$). A decrease in the initial maximum VAS score increased the probability of non-adherence (1/0.5) 2-fold ($p=0.005$). The probability of non-adherence was 4.68 times higher in patients with prophylaxis side effects than in those without side effects ($p=0.005$). Other variables did not have a statistically significant effect on the risk of treatment non-adherence ($p>0.05$) (Table 3).

Table 1. Patient demographics, medical history, and Hospital Anxiety and Depression scale (HADS) scores at baseline

Type of hospital - n (%)	
Private hospital	60 (53.1)
Public hospital	53 (46.9)
Age - mean ± SD	42.35±10.9
Sex - n (%)	
Male	89 (78.8)
Female	24 (21.2)
Marital status - n (%)	
Single	26 (23.0)
Married	81 (71.7)
Divorced/widowed	6 (5.3)
Educational status - n (%)	
Unable to read and write	5 (4.4)
Primary school and below	39 (34.5)
Secondary and high school	30 (26.5)
College/university completed	39 (34.5)
Economic status - n (%)	
Low	20 (17.7)
Middle	84 (74.3)
High	9 (8.0)
Duration of internet/social media use (hour/day) - median (Q1-Q3)*	2 (1-4)
Total number of diseases other than headache - n (%)	
0	19 (16.8)
1	29 (25.7)
2	41 (36.3)
3	11 (9.7)
≥4	13 (11.5)
Types of diseases other than headache - n (%)	
Fibromiyalgia/myofascial pain	27 (23.9)
Cervical hernia	17 (15.0)
Hypertension	20 (17.7)
Bruxism	11 (9.7)
Psychiatric diseases	11 (9.7)
OSAS - insomnia	12 (10.6)
Other diseases	71 (62.8)
Total number of medication types (per day) - n (%)	
0	45 (39.8)
1	37 (32.7)
2	11 (9.7)
3	11 (9.7)
4	3 (2.7)
≥5	6 (5.4)
HADS scores	
Anxiety score - median (Q1-Q3)	9 (6-10)
0-10 - n (%)	87 (77)
≥11 - n (%)	26 (23)
Depression score - median (Q1-Q3)	6 (3-8)
0-10 - n (%)	97 (85.8)
≥11 - n (%)	16 (14.2)

*Median (25-75%)
SD: standard deviation, OSAS: obstructive sleep apnea syndrome, HADS: Hospital Anxiety and Depression scale

There was no significant difference in the distribution of the type of prophylaxis drug (p=0.342) or type of headache according to medication adherence (p=0.173) (Supplementary Table 1).

DISCUSSION

This study, in which most participants had migraines, showed that 27.4% of patients with headaches were non-adherent to prophylaxis in the first month. This rate was not substantially different from the rates reported in previous studies (4,6,7,22,23). It was determined that the probability of adherence was negatively affected by an increase in the duration of I/SM use, a decrease in the maximum headache VAS score at baseline, and the presence of drug side effects. In addition, this probability was lower in patients from public hospitals and in married patients.

Previous studies have shown different medication adherence rates in patients with headaches (1). These differences may have resulted from the study methods, patient populations, or other factors (1). In an early prospective study assessing self-reported adherence to prophylaxis of patients with different types of headaches, 48% were reported to be adherent to their medication, and adherence rates decreased to 34% in the third month (24). In another 1-year observational study that included patients with migraine and tension headaches, it was determined that 9% of patients showed an adherence problem from the beginning, 16% changed their medication, and only 35% fully complied with the instructions until the next visit (2).

It should be noted that most drug adherence studies in patients with headaches have been conducted on migraineurs (1). A prospective study on adults with chronic migraine found that 78.4% of patients reported adherence to preventive medication (25). A different longitudinal study on children and adolescents (age 8-17 years) with migraine found that self-report and pill number adherence rates were high (over 90%); however, the adherence rates of serum drug levels were lower and showed a decrease (from 84% to 76%) during the study period (26). A retrospective study by Dozza and Krymchantowski (4) also showed similar results (overall adherence of 79.6%). However, other studies found much lower adherence rates of patients with migraine to prophylaxis drugs (26.2-37%) (3,22,23,27,28).

In this study, one of the most influential factors affecting adherence was the duration of I/SM use. The decrease in the probability of drug adherence as the duration of I/SM use increases may be explained by the fact that patients who have used I/SM for a long time are affected by misinformation. The Internet and SM are among the most popular and accessible sources of information for every subject. However, misinformation and conspiracy theories creating panic/anxiety about various diseases and drug use on I/SM have increased during the pandemic (14,29-31). Arguably, the uncertainty arising from science-based decision-making processes during the pandemic has significantly increased pre-existing public suspicion and mistrust of scientific communities, experts, and public institutions (32,33). Studies suggest that frequent and conflicting information

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Table 2. Headache characteristics, previous prophylaxis status, initiated prophylaxis drugs, number of annual admissions to the emergency and Medication Adherence Report scale-5 (first-month) scores	
Duration of headache (years) - median (Q1-Q3)*	9 (2-18)
Total number of headache types - n (%)	
1	45 (39.8)
2	48 (42.5)
≥3	20 (17.7)
Type of headache - n (%)	
Primary headache	
Migraine without aura	73 (64.6)
Migraine with aura	5 (4.4)
Tension headache	47 (41.6)
Trigeminal autonomic cephalgias	4 (3.5)
Secondary headache	
Cervicogenic headache	26 (23.0)
Headache attributed to hypertension	14 (12.39)
Headache attributed to sinusitis	2 (1.77)
Headache attributed to TMD* (e.g. bruxism)	13 (11.5)
Medication-overuse headache	19 (16.8)
Number of emergency room visits for headache acute attack (per year) - n (%)	
0-5	98 (86.7)
6-10	5 (4.4)
≥10	10 (8.8)
Type of analgesic used by patients (on admission) - n (%)	
No analgesic use	3 (2.7)
Triptans	14 (12.4)
NSAID	59 (52.2)
Paracetamol ± caffeine	35 (31)
Ergots	2 (1.8)
Previous prophylaxis status - n (%)	
Never been on prophylaxis	74 (65.5)
Stopped prophylaxis	33 (29.2)
On regular prophylaxis	6 (5.3)
Headache frequency (per month) - median (Q1-Q3)	
On admission	10 (8-15)
1 month	5 (3-9)
Average VAS score - median (Q1-Q3)	
On admission	6 (5-7)
1 month	5 (4-5)
Maximum VAS score - median (Q1-Q3)	
On admission	9 (8-10)
1 month	7 (6-8)
Type of headache prophylaxis drug initiated - n (%)	
Beta blocker	
Propranolol/metoprolol	21 (18.6)
Antidepressant	
TCA	14 (12.4)
SSRI/SNRI	44 (38.9)

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Table 2. Continued

Antiepileptic	
Topiramate	14 (12.4)
Gabapentinoid	23 (20.4)
Others (valproic acid, lamotrigine)	10 (8.9)
Percent benefit of prophylaxis in the first-month - median (Q1-Q3)	0.6 (0.5-0.8)
Number of analgesics taken per month - median (Q1-Q3)	
On admission	8 (6-13)
1 month	4 (3-7)

*Median (25-75%)
NSAID: non-steroidal anti-inflammatory drug, SNRI: serotonin-norepinephrine reuptake inhibitor, SSRI: selective serotonin reuptake inhibitor, TCA: tricyclic antidepressant, TMD: temporomandibular disorder, VAS: visual analog scale

Table 3. Univariate and multivariate binary logistic regression analyses for predictors for first-month adherence

	Univariate		Multivariate¶	
	OR (95% CI)	**p-value**	**OR (95% CI)**	**p-value**
Type of hospital*	0.76 (0.33-1.75)	0.516	3.71 (1.09-12.64)	**0.036**
Sex**	1.83 (0.7-4.76)	0.217	-	-
Age	1.01 (0.97-1.05)	0.775	-	-
Marital status***	1.59 (0.61-4.17)	0.343	4.28 (1.02-18.01)	**0.048**
Education†	0.71 (0.29-1.74)	0.452	-	-
Economic status††	0.61 (0.19-2)	0.415	-	-
Daily duration of internet/social media use	1.37 (1.06-1.76)	**0.016**	1.68 (1.17-2.42)	**0.005**
Total number of other diseases	0.93 (0.67-1.3)	0.667	-	-
Total number of medication types (per day)	0.93 (0.71-1.22)	0.610	-	-
Total number of headache types	0.58 (0.32-1.05)	0.074	-	-
Duration of headache (years)	0.99 (0.94-1.03)	0.504	-	-
Previous use of prophylaxis†††	0.71 (0.29-1.74)	0.452	-	-
0 month/headache frequency (per month)	0.95 (0.87-1.03)	0.197	-	-
0 month/average VAS score	0.89 (0.68-1.17)	0.403	-	-
0 month/maximum VAS score	0.66 (0.47-0.95)	**0.024**	0.5 (0.31-0.81)	**0.005**
Number of ER visits due to headache (per year)	0.92 (0.82-1.04)	0.166	-	-
HADS-A	0.94 (0.85-1.05)	0.266	-	-
HADS-D	0.99 (0.89-1.11)	0.920	-	-
Total HADS score	0.98 (0.92-1.04)	0.481	-	-
Number of headache prophylaxis drug initiated	0.56 (0.11-2.75)	0.474	-	-
Side effects of prophylaxis††††	3.82 (1.5-9.75)	**0.005**	4.68 (1.52-14.41)	**0.005**
1 month/percent benefit from prophylaxis	0.38 (0.03-4.44)	0.440	-	-
1 month/headache frequency (per month)	1.03 (0.92-1.15)	0.571	-	-
1 month/average VAS score	1.32 (0.95-1.84)	0.101	-	-
1 month/maximum VAS score	1.04 (0.84-1.29)	0.733	-	-

ER: emergency room, HADS-A: Hospital Anxiety and Depression scale-anxiety sub-score, HADS-D: Hospital Anxiety and Depression scale-depression sub-score, OR: odds ratio, CI: confidence interval, VAS: visual analog scale. Reference groups: *private hospital; **female; ***not married); †0-8 years of education; ††middle and high income; †††no previous prophylaxis; ††††no side effect; (¶Backward Wald method)

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provided by the mass media can negatively affect patients' beliefs about the benefits of drugs and lead to negative health behaviors (12). A study evaluating the accuracy of some claims on SM, where drug-related information was also shared, revealed that the most frequently shared messages were "possibly misleading" (34). Another example of the influence of mass media is the discontinuation of statin therapy by thousands of patients in Australia following a misinformative media program (35).

The Internet and SM provide opportunities to disseminate information about diseases and their treatments to benefit patients. International headache associations, such as the European Headache Federation, American Headache Society, and International Headache Society, strive to promote their organizations' expertise and disseminate research findings (32). However, recent studies have shown that the most popular online content on migraine management is not evidence-based and is driven by for-profit organizations (32). The content about headache management in popular sources, such as Google, YouTube, Instagram, and Facebook, reaches millions of people, and the potential impact cannot be ignored (32,36,37). Non-pharmacological approaches and complementary alternative medicine attract more attention from healthcare consumers (36-39). Additionally, only a small fraction of the popular videos on the I/SM are provided by non-profit health professionals in this field (for example, less than one-tenth of the most popular migraine-related videos on YouTube) (36). I/SM users of health community members with the same diagnosis and health status tend to trust each other more than professionals (40). Patients' treatment decisions may be affected by anecdotal information rather than evidence-based statistical information from experts in the field (32,41). Although different social networking sites show some differences, established health communities are more likely to reach a large audience regardless of their socioeconomic background and health status (16,40,42).

Patients' concerns about possible side effects of medications, refusal to take daily medication, no further need for improvement, preference for non-pharmacologic approaches, and recommendations from other people are among the reasons that may cause or contribute to non-adherence to prophylaxis (2,6).

Regarding VAS scores, Acikgoz et al. (43) found that VAS scores were negatively correlated with understanding the disease in patients with headaches but not with treatment control. There are also other studies showing that there is no difference between the pain intensity of patients who are adherent and non-adherent (6).

The higher medication adherence among patients attending private hospitals may be related to the higher health literacy of the patients in these hospitals, the longer time allocated per patient in the hospital, and the easier access of the patient to their physicians (44,45). In public hospitals in Türkiye, the examination time physicians can allocate to a patient is 2.5-10 min, and it is difficult for patients to reach their physicians (45-47).

It has been suggested that the most preferred prophylactic drug groups, such as beta-blockers, antidepressants, and antiepileptics, may cause low adherence because they are not specific to migraine and have frequent side effects (22). Social prejudices and beliefs about these medicines, especially against antidepressants and antiepileptics, may affect drug adherence (6,48-50). However, we found no effect of prophylactic drug groups on medication adherence, as shown in some previous studies. Other studies have reported that beta-blockers (followed by topiramate) are advantageous for drug adherence (1,27).

Study Limitations

One of the main limitations of this study is the use of a patient-reported scale to measure adherence. In addition, the amount of time patients spent on health news compared with the total time they spent on I/SM and the content of these health news items were not questioned. However, an advantage of this study is that it was conducted in two different hospitals, reflecting different patient populations.

CONCLUSION

This study emphasizes that the duration of I/SM use, headache severity, and drug-related side effects are among the factors that most affect medication adherence in patients with chronic headaches. In addition, the probability of adherence decreased among patients who visited public hospitals. Therefore, preventing the spread of misinformation on SM and improving health literacy and conditions in public hospitals should be among the goals of clinicians and researchers to improve medication adherence.

Ethics Committee Approval: This study was approved by the Clinical Research Ethics Committee of Demiroğlu Bilim University (decision no: 22.12.2020/2020-24-03). The study was conducted in accordance with the Good Clinical Practice and the Declaration of Helsinki ethical standards.

Informed Consent: Written informed consent was obtained from all participants.

Author Contributions: Surgical and Medical Practices - B.E., Ö.K.Ş.; Concept - B.E.; Design - B.E.; Data Collection and/or Processing - B.E., Ö.K.Ş.; Analysis and/or Interpretation - B.E.; Literature Search - B.E.; Writing - B.E., Ö.K.Ş.

Conflict of Interest: The authors have no conflict of interest to declare.

Financial Disclosure: The authors declared that this study has received no financial support.

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Supplementary Table 1. Chi-square tests of association between type of prophylaxis drug, type of headache and medication adherence

	Medication adherence		Test stat.	p-value*
	Non-adherent	Adherent		
Type of prophylaxis drug				
Duloxetine	4 (12.9)	9 (11)	8,999	0.342
Gabapentin	2 (6.5)	8 (9.8)		
Beta blockers	5 (16.1)	15 (18.3)		
Topiramate	4 (12.9)	10 (12.2)		
Pregabalin	5 (16.1)	4 (4.9)		
Valproic acid	2 (6.5)	2 (2.4)		
Lamotrigine	0 (0)	2 (2.4)		
SSRIs	4 (12.9)	24 (29.3)		
Amitriptyline	5 (16.1)	8 (9.8)		
Type of headache				
Common migraine	20 (64.5)	53 (64.6)	14,002	0.173
Migraine with aura	2 (6.5)	3 (3.7)		
Cervicogenic headache	4 (12.9)	21 (25.6)		
Tension type headache	9 (29)	38 (46.3)		
Headache attributed to HT	3 (9.7)	11 (13.4)		
Medication-overuse headache	4 (12.9)	15 (18.3)		
Headache attributed to TMD	4 (12.9)	9 (11)		
Others	3 (9.7)	3 (3.6)		

HT: hypertension, TMD: temporomandibular disorder
*Pearson's chi-square test
Pearson's chi-square test with Yates correction was used to compare categorical data between the adherent and non-adherent groups, and the Z test with Bonferroni correction was performed for multiple comparisons