

Relationship Between Medication Adherence and Prospective Memory in Individuals with Epilepsy

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Cite this article as: Hilal E, Uluhan Y, Aksu S, Bek S, Kutlu G. Relationship Between Medication Adherence and Prospective Memory in Individuals with Epilepsy. *Arch Epilepsy*. 2024;30(1):27-30



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Received: 28.11.2023 **Accepted:** 06.02.2024 **Publication Date:** 13.03.2024

DOI: 10.4274/ArchEpilepsy.2024.23106



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Abstract

Objective: Epilepsy is a condition characterized by sudden, recurrent epileptic seizures that occur as a result of abnormal and excessive electrical discharge in cortical neurons and are not triggered by an identifiable event. To date, no study has examined prospective memory and medication adherence in patients with focal and generalized epilepsy. This study aimed to examine medication adherence and prospective memory functions in individuals diagnosed with focal and generalized epilepsy.

Methods: In this study, 51 patients diagnosed with focal and 51 with generalized epilepsy at Muğla Sıtkı Koçman University Faculty of Medicine Epilepsy and Sleep Center were included. In addition to the sociodemographic and clinical data forms, participants were administered the Modified Morisky Scale to evaluate medication adherence and the Prospective and Retrospective Memory Questionnaire to evaluate prospective memory function.

Results: No difference was found between patients diagnosed with focal epilepsy and those with generalized epilepsy in prospective memory functions and medication adherence. Near-significant correlations were found between medication adherence and memory function.

Conclusion: More comprehensive studies evaluating cognitive functions and other parameters related to medication adherence simultaneously are required to clarify the relationship between memory and medication adherence in epilepsy.

Keywords: Cognition, epilepsy, medication adherence, memory, neurophysiology

INTRODUCTION

Epilepsy is a condition characterized by sudden, repetitive, epileptic seizures not triggered by an identifiable event and result from abnormal and excessive electrical discharges in cortical neurons.¹ In addition to seizures, many patients experience seizures or treatment-related cognitive and psychiatric problems. Response to treatment is highly variable. Although numerous treatment modalities are available to control recurrent seizures, including medications, diet, immunotherapy, surgery, and neuromodulation, a large proportion of patients continue to suffer the consequences of uncontrolled seizures, including psychosocial stigma and death.² Seizure control can be achieved with antiepileptic treatment in only 60-70% of epileptic patients.³

Few studies have directly examined medication adherence in individuals diagnosed with epilepsy. In a study, 27.3% of patients said that they used medication irregularly. The most frequently reported reason for irregular medication use was forgetfulness (48.2%). The cause of forgetfulness is thought to be impairment in at least one cognitive domain. One is prospective memory. Because using the appropriate dose of medication at certain times of the day is an intention formation and implementation activity, it is thought that medication adherence may be related to prospective memory.⁴

Prospective memory is the ability to remember to perform an action intended to be performed in the future and is a complex process that includes various phases and cognitive domains.⁵ The relationship between prospective memory and medication adherence has been observed in various neurological diseases such as Huntington's disease (HD).⁶ To our knowledge, no study has examined prospective memory and medication adherence in individuals diagnosed with focal and generalized epilepsy. This study aimed to evaluate medication adherence and prospective memory functions in individuals diagnosed with focal and generalized epilepsy.

METHODS

Participants

Fifty-one focal epilepsy and 51 generalized epilepsy patients who were followed at Muğla Sıtkı Koçman University Faculty of Medicine Epilepsy and Sleep Center were recruited in the study. Muğla Sıtkı Koçman University Local Ethics Committee approval was obtained (decision number: 90, dated: 12/25/2022). Written informed consent was obtained from all participants. In addition to the sociodemographic and clinical data forms, participants were administered the Modified Morisky Scale to evaluate medication adherence and the Prospective and Retrospective Memory Questionnaire to evaluate prospective memory function.

Measures

Prospective and Retrospective Memory Questionnaire

It was developed by Smith et al.⁷ and Turkish validity and reliability studies were conducted by Cinan and Doğan.⁸ The scale, which consists of eight questions for each part, evaluates prospective and retrospective memory functions separately in daily life.⁸ Among the activities evaluated are activities planned to be done, words spoken, places visited, things watched on television, people to call and appointments.

Modified Morisky Scale

The scale was initially developed as four questions and modified by adding two new items: collecting “yes” or “no” responses.⁹ In the second and fifth questions, “yes” is added as one point, and in the others, “no” is added as one point. If the total score from Questions 1, 2, and 6 is 0 or 1, it indicates a low motivation level; >1 indicates a high motivation level. If the total score obtained from questions 3, 4 and 5 is 0 or 1, it indicates a low level of knowledge, and if >1, it indicates a high level of knowledge. A validity and reliability study of the scale recommended for use in evaluating adherence to long-term medication use in chronic diseases in primary care was conducted.⁸ The content of the scale includes situations such as whether the drug is taken or not, timing, motivation for use, expected benefits, and tracking of the time of supply of the drug.

Statistical Analysis

Statistical analyses were performed using Statistical Package for the Social Sciences (SPSS) 25.0 (IBM SPSS Statistics, Armonk, New York State, USA). The suitability of the data for normal distribution was evaluated using Shapiro-Wilk tests. It was observed that the variables did not comply with the normal distribution. Therefore, differences between groups were examined using the Mann-Whitney U test. Spearman correlation analyses were performed between the parameters.

MAIN POINTS

- Cognitive disorders, including memory deficits, are common in epilepsy.
- Focal and generalized epilepsy did not differ in prospective memory.
- No significant relationship between medication adherence and prospective memory was observed.

RESULTS

The sociodemographic data of the participants are shown in Table 1. The sample consisted of 43 male and 59 female participants. Half of the participants were in the generalized epilepsy group and the other half were in the focal epilepsy group. The mean age was 32.03 (\pm 10.79) years and the mean disease duration was 14.06 (\pm 10.31) years. There was no difference between the groups regarding gender and disease duration. Age was slightly higher in the focal epilepsy group ($p=0.048$).

The memory functions and medication adherence levels of the participants are shown in Table 2. In Mann-Whitney U tests, no differences were observed between the focal and generalized epilepsy groups in terms of Prospective Memory Questionnaire scores ($p=0.928$), Retrospective Memory Questionnaire scores ($p=0.765$), and Modified Morisky Scale scores ($p=0.564$). Spearman correlation tests revealed near-significant correlations between medication adherence and prospective ($r=0.178$; $p=0.073$) and retrospective ($r=0.186$; $p=0.061$) memory functions.

DISCUSSION

Prospective memory is the part of episodic memory that involves the formation, maintenance, and execution of intentions about the future.¹⁰ It has been defined as the cognitive ability that allows remembering to perform an activity in the future¹¹ or fulfilling postponed intentions¹² without a direct and explicit cue. It is a memory for actions to be performed in the future.¹³ It means remembering to something we plan to do when the correct time comes and putting it into action. In prospective memory, the decision to perform the intended action is activated by the person himself; that is, he remembers it and performs the relevant behavior, without a clear external reminder, when the targeted event occurs or the specified time ends. For example, a person receives a phone call during an important task; then, he says he is not available at all at that time and he will call back when he is done. It is through prospective memory that a person remembers and fulfills his or her plan or intention when he or she is available to call.¹⁴

Although memory is a frequently examined subject of study in the field of psychology, studies mostly focus on retrospective memory, whereas prospective memory, that is, the ability to remember what a person will do, is scantily studied. However, memory complaints in people's daily lives largely arise from situations caused by prospective memory difficulties, and a good prospective memory skill is an important condition for living an effective life. Individuals who are admitted to neurology clinics with memory complaints complain of difficulties related to prospective memory deficits, such as forgetting to turn off the stove, forgetting to take the keys from the door after opening the door of their house, and forgetting an appointment they had made.¹⁵

The finding of near-significant correlations between medication adherence and memory functions in our study is partially compatible with other disease studies in the literature showing this relationship. HD is one of these diseases. Individuals with HD received much lower scores on performance-based prospective memory tests than those in the control group. Prospective memory dysfunction negatively affects the daily lives of individuals diagnosed with HD.⁶ In line with the results shown in the HD study,

Table 1. Comparison of the demographic and clinical data of focal and generalized epilepsy groups

	Focal epilepsy (n=51)	Generalized epilepsy (n=51)	Total (n=102)	p values
Age (years)	30.00 (16.00)	27.00 (15.00)	28.00 (16.25)	0.048
Gender (male rate)	47.10	37.30	42.30	0.211*
Disease duration (years)	9.00 (15.00)	12.00 (12.00)	11.00 (12.50)	0.604

Medians (interquartile ranges) and p values of the Mann-Whitney U tests are shown. Significant p values are in bold. *Chi-square test

Table 2. Comparison of memory functions and medication adherence between the focal and generalized epilepsy groups

	Focal epilepsy (n=51)	Generalized epilepsy (n=51)	Total (n=102)	p values
Prospective memory (score)	17.00 (9.00)	17.00 (12.00)	17.00 (10.00)	0.928
Retrospective memory (score)	16.00 (8.00)	17.00 (9.00)	16.50 (8.25)	0.765
Medication adherence (score)	2.00 (0.00)	2.00 (2.00)	2.00 (2.00)	0.564

Medians (interquartile ranges) and p values of the Mann-Whitney U tests are shown

it was considered that the deficits of prospective memory caused the weakening of daily living activities. One of these activities is medication adherence.

Persistent cognitive deficits are observed in individuals diagnosed with epilepsy for many reasons, such as seizures and drug adverse effects. Many studies have shown that the most frequently and severely affected cognitive domain is memory¹⁶ almost all types of memory are affected in epilepsy, such as semantic and autobiographical episodic memory, verbal and spatial working memory, and object location memory.¹⁶ Moreover, executive function disorders are frequently observed in individuals diagnosed with epilepsy. Executive function and working memory deficits are closely related to prospective memory impairment.¹⁷ However, prospective memory has not been examined in individuals previously diagnosed with epilepsy. Contrary to the hypothesis put forward in the current study, no difference was found between individuals diagnosed with focal and generalized epilepsy in terms of prospective memory functions and medication adherence. Similarly, in a study with a small sample, no difference was found in cognitive functions between focal and generalized epilepsies.¹⁸ In addition, no significant relationship was found between prospective memory functions and medication adherence. This situation may depend on many factors such as epilepsy type, disease duration, and severity. In addition, although the assessment tool evaluated the effect of prospective memory on daily functionality, it did not examine sensitive changes related to prospective memory function. It was considered that these situations also contributed to the obtained results.

Study Limitations

Limitations of the study include the fact that it was conducted on a relatively small sample, that a measurement tool that evaluates prospective memory more precisely was not used, and that tests examining other cognitive functions related to prospective memory, such as executive functions and working memory, were not evaluated.

CONCLUSION

Focal and generalized epilepsy groups may not differ in terms of memory function and medication adherence. It was considered that this difference may be detected in examinations performed

with more sensitive evaluation tools. To clarify the relationship between memory and medication adherence in epilepsy, more comprehensive studies are needed in which other cognitive functions and other parameters related to medication adherence are evaluated simultaneously.

Ethics

Ethics Committee Approval: The Ethics Committee of Muğla Sıtkı Koçman University approved this cross-sectional study (decision no: 90, dated: 12/25/2022).

Informed Consent: Written informed consent forms were obtained from all patients.

Authorship Contributions

Surgical and Medical Practices: E.H., Concept: G.K., Design: S.B., G.K., Data Collection or Processing: E.H., Y.U., S.B., G.K., Analysis or Interpretation: E.H., S.A., Literature Search: E.H., Y.U., S.A., Writing: E.H., S.B., G.K.

Conflict of Interest: No conflicts of interest were declared by the authors.

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

REFERENCES

- Akdağ G, Algın D, Erdiç O. Epilepsy. *Osmangazi Journal of Medicine*. 2016;38(Suppl 1):35-41. [\[Crossref\]](#)
- Sirven JI. Epilepsy: A Spectrum Disorder. *Cold Spring Harb Perspect Med*. 2015;5(9):a022848. [\[Crossref\]](#)
- Kwan P, Brodie MJ. Early Identification of Refractory Epilepsy. *N Engl J Med*. 2000;342(5):314-319. [\[Crossref\]](#)
- Woods SP, Weinborn M, Maxwell BR, et al. Event-based prospective memory is independently associated with self-report of medication management in older adults. *Ageing Ment Health*. 2014;18(6):745-753. [\[Crossref\]](#)
- Mills GN, Raskin SA, DiMario FJ. Remembering to remember: prospective memory in children with epilepsy. *Child Neuropsychol*. 2021;28(1):14-29. [\[Crossref\]](#)
- Nicoll DR, Pirogovsky E, Steven Paul Woods, et al. "Forgetting to Remember" in Huntington's Disease: A Study of Laboratory, Semi-Naturalistic, and Self-Perceptions of Prospective Memory. *J Int Neuropsychol Soc*. 2013;20(2):192-199. [\[Crossref\]](#)
- Smith G, Della Sala S, Logie RH, et al. Prospective and retrospective memory in normal ageing and dementia: a questionnaire study. *Memory*. 2000;8(5):311-321. [\[Crossref\]](#)

8. Cinan S, Doğan A. Working Memory, Mental Proseption, Time Orientation, and Cognitive Insight. *Journal of Individual Differences*. 2013;34(3):159-169. [\[Crossref\]](#)
9. Vural B, Teberru Acar Ö, Topsever P, Filiz TM. Reliability and Validity of Turkish Version of Modified Morisky Scale. *Jour Turk Fam Phy*. 2012;3(4):17-20. [\[Crossref\]](#)
10. Karantzoulis S, Troyer AK, Rich JB. Prospective memory in amnesic mild cognitive impairment. *J Int Neuropsychol Soc*. 2009;15(3):407-415. [\[Crossref\]](#)
11. Kazui H, Matsuda A, Hirono N, et al. Everyday Memory Impairment of Patients with Mild Cognitive Impairment. *Dement Geriatr Cogn Disord*. 2005;19(5-6):331-337. [\[Crossref\]](#)
12. Costa A, Caltagirone C, Carlesimo GA. Prospective Memory Impairment in Mild Cognitive Impairment: An Analytical Review. *Neuropsychol Rev*. 2011;21(4):390-404. [\[Crossref\]](#)
13. Einstein GO, McDaniel MA. Normal aging and prospective memory. *J Exp Psychol Learn Mem Cogn*. 1990;16(4):717-726. [\[Crossref\]](#)
14. Öztürk G. Hafif Kognitif Bozuklukta ve Subjektif Kognitif Bozuklukta Prospektif Bellek. Doktora Tezi. *İstanbul Üniversitesi Sağlık Bilimleri Enstitüsü*; 2013. [\[Crossref\]](#)
15. Bozdemir M. Prospektif bellek ve geleceğe yönelik niyetleri unutmaya niyetlenme. Doktora Tezi. *İstanbul Üniversitesi, Edebiyat Fakültesi, Psikoloji Bölümü*; 2017. [\[Crossref\]](#)
16. Khalife MR, Scott RC, Hernan AE. Mechanisms for Cognitive Impairment in Epilepsy: Moving Beyond Seizures. *Front Neurol*. 2022;13:878991. [\[Crossref\]](#)
17. Palermo L, Cinelli MC, Piccardi L, et al. Cognitive functions underlying prospective memory deficits: A study on traumatic brain injury. *Appl Neuropsychol Adult*. 2018;27(2):158-172. [\[Crossref\]](#)
18. Gauffin H, Landtblom AM, Vigren P, et al. Similar Profile and Magnitude of Cognitive Impairments in Focal and Generalized Epilepsy: A Pilot Study. *Front Neurol*. 2022;12:746381. [\[Crossref\]](#)