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Evaluation of post-traumatic stress disorder in ischemic stroke patients

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ABSTRACT

Aims: Post-traumatic stress disorder (PTSD) is most commonly seen in cases such as actual death or threat of death, a severe injury, or experiencing a threat to the physical integrity of oneself or others. Stroke was defined to be related to PTSD as well. For this purpose, we aimed to evaluate acute and chronic PTSD after stroke with this test in our hospital, which is also a stroke center and has many different stroke patient profiles.

Methods: 25 patients hospitalized for stroke in the neurology clinics of our hospital and 25 patients in outpatient follow-up were included in the study. Inpatients were in the first 1-month period after stroke. These patients were accepted as acute PTSD. Patients who took the test from the outpatient clinic were in the follow-up period of at least 6 months after stroke.

Results: Patients were included in the study as 1-month post-stroke group and 6 months or more post-stroke group. In group 1, the test score was significantly higher ($p<0.001$). No significant difference was found in the comparison of these parameters.

Conclusion: In our study, a significant difference was found especially in terms of acute and chronic PTSD. The scores in the acute PTSD group were significantly higher than the chronic PTSD group ($p<0.001$). This suggests that this effect of stroke, especially in the acute period, may affect the course of treatment of the disease. However, multicenter studies including randomized controlled and long-term follow-up are needed.

Keywords: Stroke, post-traumatic stress disorder, life quality

INTRODUCTION

Stroke is one of the most important causes of mortality and morbidity worldwide. In the post-stroke period, return to social life may become difficult in relation to the remaining sequelae.[1] Many different problems may be encountered in adaptation to daily life in post-stroke patients. Psychiatric complaints may also accompany the patient's adaptation process. Clinicians should be especially vigilant in terms of conditions such as post-traumatic stress disorder, depression and anxiety.[2] Post-traumatic stress disorder (PTSD) is a psychiatric disorder that develops after a life-threatening event.[3] Although it has been associated with traumatic brain injury for a long time, in the last 30 years studies have proven that it has also been observed after stroke.[4] In the post-stroke period due to PTSD, symptoms such as problems in compliance with medications, decreased participation in activities of daily living and slowdown in mental capacity may be observed.[5] These may undermine the patient's recovery process and worsen his/her current condition.[6] Therefore, it is important to recognize PTSD after stroke.

PTSD is most commonly seen in cases such as actual death or threat of death, a severe injury, or experiencing a threat to the physical integrity of oneself or others.[3] It is classified as acute PTSD if the symptoms last less than 3 months and chronic PTSD if they last longer than 3 months.[3,7] The PTSD Checklist (PCL) is a self-report questionnaire that measures symptoms of PTSD according to the diagnostic and statistical manual of mental disorders (DSM). The PCL was first developed in 1993 by Weathers and colleagues[8] at the National Center for PTSD. The current version (PCL-5; Blevins et al.[10]; Weathers et al.[7]) is a 20-item questionnaire that includes items corresponding to the 20 PTSD symptoms (Criteria B-E) in the DSM-5 (American Psychiatric Association 2013). Items 1-5 reflect involuntary re-experiencing symptoms (Criterion B), items 6-7 reflect avoidance symptoms (Criterion C), items 8-14 reflect negative

mood and cognition symptoms (Criterion D), and items 15-20 reflect hyperarousal symptoms (Criterion E).[10] It has also been emphasized that the PCL-5 is a powerful test in the assessment of PTSD.[9,10]

Many different tests have been used in previous studies: post-traumatic stress disorder checklist-5 (PCL-5), patient health questionnaire-9 (PHQ-9), stroke specific quality of life scale (SS-QOL-12) are the most commonly used ones.[11,12] The post-traumatic stress disorder questionnaire (Civilian Version (PCL-C)) was validated in Turkish in 2005 and it was observed that there were very few studies on its use after stroke in the literature.[13] For this purpose, we aimed to evaluate acute and chronic PTSD after stroke with this test in our hospital, which is also a stroke center and has many different stroke patient profiles.

METHODS

The study was carried out with the permission of the Antalya Training and Research Hospital Scientific Researches Evaluation and Ethics Committee (Date: 26.02.2025, Decision No: 4/8). All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki.

In this retrospective study, 25 patients hospitalized due to stroke in the neurology service of our hospital and 25 patients in outpatient clinic follow-up were included. The study was conducted with patients admitted with stroke between August 2024 and January 2025. Inpatients were planned as an acute group and patients in the first 1-month period after stroke were included in the study. Patients who were in outpatient follow-up after stroke and in the follow-up period of at least 6 months after stroke were included in the study as the chronic patient group. Informed consent was prepared for the study and patients who agreed to participate were tested. Aphasic patients, patients with advanced hearing loss, patients with multiple medication use due to diseases such as dementia, bipolar disorder, psychotic disorder before stroke, and patients with traumatic brain injury or brain surgery were excluded.

Statistical Analysis

The study data were analyzed with SPSS (Statistical Package fort he Social Sciences) 16.0 (SPSS Inc., Chicago, IL). Study data were expressed as mean±standard deviation for continuous variables and percentage (%) for categorical variables. Interquartile range (IQR) was used. Kolmogorov-Smirnov test was used for normality analysis of the data. Since the data did not fit the normal distribution, Independent simple t-test and Chi-square test were used to compare the two groups and $p<0.05$ was considered statistically significant.

RESULTS

Demographic data and stroke-related information of the patients are as follows. The mean age for group–1 was calculated as 71.28±12.98 and group–2 was 64.56±10.72 years. Thirteen patients were female (26%) and 37 were male (74%). Forty patients were married (80%) and 10 were single or divorced (20%). 40 (80%) patients had a history of first stroke, 6 (12%) patients had 2 strokes, 3 (6%) patients had 3 strokes and 1 (2%) patient had 4 strokes. 5 patients had a history of monopharmacy drug use for depression. 4 patients had mild motor aphasia that did not interfere with communication and had no comprehension disorder. 1 patient was receiving treatment for epilepsy.

23 patients (46%) had a history of left-sided stroke, 21 (42%) had a history of right-sided stroke and 6 (12%) had a history of bilateral stroke. 36 patients (72%) had anterior system stroke and 14 patients (28%) had posterior system stroke. In 41 patients (82%) modifed Rankle score(mRs) was 0-1, while in 9 patients (18%) it was 2 or more.

According to demographic data between the groups, the acute group was significantly higher than the chronic group according to age ($p=0.024$) and number of previous strokes ($p=0.041$). Again, in terms of mRS results ($p=0.010$), this time the chronic group had statistically more significant results than the acute group. Patients were included in the study as the first 1-month post-stroke group and the group with 6 months or more after stroke. Group 1 had a significantly higher test score ($p<0.001$) [acute 25 IQR (21.5-30.5), chronic 17 IQR (17-24)] (Table).

Table. Demographic data and (PCL-C) test results

	Group–1 (acute)	Group–2 (chronic)	p*
Age	71.28±12.98	64.56±10.72	0.052[1]
Sex			0.024[2]
Male	15	22	
Female	10	3	
Marital status			0.111[2]
Married	18	22	
Single	3	3	
Divorced	4	-	
Stroke number			0.041[2]
First time	17	23	
Second time	6	-	
Third time	1	2	
Fourth time	1	-	
Chronic disease (n=10)			0.700[2]
Depression	3	2	
Aphasia	3	1	
Epilepsy	1	0	
Laterlization			0.149[2]
Left	14	9	
Right	10	11	
Bilateral	1	5	
Localization			0.208[2]
Front	16	20	
Back	9	5	
mRS			0.010[2]
Good (0-1)	17	24	
Bad (>1)	8	1	
PCL-C*	25	17	<0.005

* PCL-C: Post-traumatic stress disorder checklist: civilian scale, [1] Independent simple t-test, [2] Chi-square test

DISCUSSION

Stroke is a disease with a heavy social burden and is still one of the diseases causing the highest mortality and morbidity in

the world. In general, problems related to physical capacity are more prominent after stroke. However, psychosomatic complaints similar to those in patients with head trauma may occur after stroke.[1-2] Since stroke is a serious life-threatening condition, these patients should also be questioned in terms of posttraumatic stress disorder.[5-6] This condition, which remains in the background in the clinic, actually affects patients' compliance with treatment and quality of life in the long term.[6,11,12] There is no test to evaluate posttraumatic stress disorder especially in stroke patients. Tests used for similar conditions have been used for this patient group in various studies and meta-analyses.[11-14] There may not always be enough time to administer these tests to patients by physicians or healthcare personnel in neurology outpatient clinic conditions. For this reason, the PTSD Checklist-Civilian Version" (PCL-C) is particularly important as it provides information to the physician about the patient's condition by answering the questionnaire in a short time. There is no data on the use of this test especially in Turkish stroke patients. Our study is important as it is one of the first in this respect.

In our study, a significant difference was found especially in terms of acute and chronic PTSD. The scores in the acute PTSD group were significantly higher than the chronic PTSD group ($p<0.001$). This suggests that this effect of stroke, especially in the acute period, may affect the course of treatment of the disease. However, multicenter studies including randomized controlled and long-term follow-up are needed.

Since there are very few studies in which this test was applied in stroke, our study is important in this respect. Fear of progression (FoP) is closely related to PTSD, perceived social support and coping styles in stroke patients. PTSD may directly or indirectly affect FoP through perceived social support, confrontation and submissive coping styles.[15] Therefore, it is important to encourage patients to reasonably use social support and coping styles to enhance their well-being and strive to alleviate the ongoing impact of PTSD symptoms and reduce the risk of FoP. In terms of PTSD risk factors, no significant difference was found in terms of gender, mRS, anterior or posterior system stroke. However, different results may be obtained by increasing the number of patients and increasing the sample size. Because there were not enough patients in our study to perform subgroup analysis. There were 5 patients who were previously taking medication for depression. No significant difference was found in the scores of these patients compared to other patients. Although the number of patients was very small, this result is still important in terms of showing that stroke can be a cause of PTSD in itself. In another study, delirium, previous psychiatric history, younger age, female gender and unemployment status were found to be more highly associated with PTSD symptoms after hemorrhagic stroke in patients evaluated with the PCL-C test.[16] More prominent PTSD symptoms were also associated with greater functional impairment. However, unlike our study, it was applied in patients with non-traumatic hemorrhage, not ischemic stroke, and 205 patients were included in the study. In another study, a significant relationship was found between younger age, female gender and previous PTSD history and post-stroke PTSD.[17] Similarly, in another study, PTSD caused by stroke was associated with younger age, recurrent strokes, more disability and comorbidities.[18] PTSD was associated with significantly increased physical, mental and quality of life burden in this already vulnerable population. Having social support was protective and indicated a potential target for intervention. A review shows that PTSD is common after stroke and even more common after subarachnoid hemorrhage. This underlines the importance of awareness and screening for PTSD after stroke, even after the first year post-stroke.[19] Feely et al.[29] evaluated both acute stress disorder and PTSD as a prospective cohort in their study and emphasized the importance of early assessment and identification of acute stress symptoms in stroke survivors as a risk factor for subsequent PTSD.

Different findings were obtained in studies comparing National institutes of health stroke scale (NIHSS) with PTSD. Müller et al.[20] found no relationship between anxiety and depression developing after stroke and NIHSS, whereas Pedowitz et al.[21] found that both acute stress disorder and PTSD increased as stroke disability increased. Rutovic et al.[22] showed that mRS was associated with PTSD. In our study, such a relationship with mRS was not detected. However, different results may be obtained in more patients and multicenter studies.

Although PTSD is generally thought to be triggered by external events such as war or sexual assault, studies have shown that PTSD symptoms develop in one out of every 4 patients after transient ischemic attack (TIA) and stroke.[23] PTSD is also frequently observed after myocard infarctus (MI).[24] In other words, experiencing MI, TIA or stroke means facing a life-threatening event. Therefore, early screening, diagnosis and treatment of PTSD in patients with somatic diseases is important. Because PTSD may both mislead the clinician about the underlying disease and challenge the clinician with problems such as compliance with treatment.[6]

PTSD after stroke is a clinical entity that needs to be examined more. There are a considerable number of studies on migraine in the literature.[25-27] However, self-assessment tests have been applied in stroke patients in a limited way. One reason for this may be that patients do not have the capacity to perform self-assessment after stroke. The use of these tests in neurological diseases both prevents confusion with stroke or stroke worsening by recognizing functional neurological symptoms and helps to understand the prevalence of PTSD.[28,29]

Limitations

Our study has some limitations. We think that the small number of patients is an important limitation especially in determining the factors predisposing to PTSD. Although the tests were administered prospectively, it was not possible to perform subgroup analyses. It can be predicted that the effectiveness of the study will increase if we can reach a sample size where subgroup analysis can be performed. The fact that it was a single-center study is another limiting factor. For future studies, a study design that includes a larger pre-sample and subgroups is planned.

CONCLUSION

Recognizing and treating PTSD after stroke affects the patient's acceptance of the disease, compliance with treatment and suitability for rehabilitation. In addition, it should be kept in mind that some symptoms perceived as worsening of stroke symptoms may be due to PTSD. Thus, unnecessary further examinations can be prevented each time. Therefore, multicenter randomized controlled studies with long-term follow-up are needed.

ETHICAL DECLARATIONS

Ethics Committee Approval

The study was carried out with the permission of the Antalya Training and Research Hospital Scientific Researches Evaluation and Ethics Committee (Date: 26.02.2025, Decision No: 4/8).

Informed Consent

Because the study was designed retrospectively, no written informed consent form was obtained from patients.

Referee Evaluation Process

Externally peer-reviewed.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

Financial Disclosure

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Author Contributions

All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

REFERENCES

1. Tang WK, Wang L, F Tsoi Kelvin KF, Rutovic Stela, Kim Jong S. Post-traumatic stress disorder after stroke: a systematic review. *Neurol India*. 2022;70(5):p1887-1895, doi:10.4103/0028-3886.359285
2. Kutlubaev MA, Akhmetova AI, Ozerova AI. Emotsional'nye rasstroistva posle insul'ta [Emotional disorders after stroke]. *Zh Nevrol Psikhiatr Im S S Korsakova*. 2023;123(12. Vyp. 2):30-35. doi:10.17116/jnevro202312312230
3. Amerikan Psikiyatri Birliği, (2014). Ruhsal bozuklukların tanısal ve sayımsal el kitabı (DSM-5), Tanı ölçütleri el kitabı. (Çev: Köroğlu,E.) Ankara: Hekimler Yayın Birliği. (Özgün çalışma 2013).
4. Bombardier CH, Fann JR, Temkin N, et al. Posttraumatic stress disorder symptoms during the first six months after traumatic brain injury. *J Neuropsychiatry Clin Neurosci*. 2006;18(4):501-508. doi:10.1176/jnp.2006.18.4.501
5. Sembi S, Tarrier N, O'Neill P, Burns A, Faragher B. Does post-traumatic stress disorder occur after stroke: a preliminary study. *Int J Geriatr Psychiatry*. 1998;13(5):315-322. doi:10.1002/(sici)1099-1166(199805)13:5<315::aid-gps766>3.0.co;2-p
6. Kronish IM, Edmondson D, Goldfinger JZ, Fei K, Horowitz CR. Posttraumatic stress disorder and adherence to medications in survivors of strokes and transient ischemic attacks. *Stroke*. 2012;43(8):2192-2197. doi:10.1161/STROKEAHA.112.655209
7. Weathers FW, Litz BT, Keane TM, Palmieri PA, Marx BP, Schnurr PP. The PTSD checklist for DSM-5 (PCL-5). In National center for PTSD. 2013.
8. Weathers FW, Litz BT, Herman DS, Huska JA, Keane TM. The PTSD Checklist (PCL): Reliability, validity, and diagnostic utility. Paper presented at the annual meeting of the International Society for Traumatic Stress Studies, San Antonio. 1993.
9. American Psychiatric Association. Diagnostic and statistical manual of mental health disorders (5th ed.). Washington DC: Author. 2013.
10. Blevins CA, Weathers FW, Davis MT, Witte TK, Domino JL. The posttraumatic stress disorder checklist for DSM-5 (PCL-5): development and initial psychometric evaluation. *J Trauma Stress*. 2015;28(6):489-498. doi:10.1002/jts.22059
11. Palmisano C, O'Neal M, Bautista MA, O'Neil CA, Fitzpatrick S. Assessing adherence to posttraumatic stress disorder screening in young stroke survivors. *J Neurosci Nurs*. 2025;57(1):31-36. doi:10.1097/JNN.0000000000000808
12. Renati S, Raju S, Makarova A, et al. Impact of post-stroke post-traumatic stress disorder. *Neurohospitalist*. 2025:19418744251315201. doi:10.1177/19418744251315201
13. Kocabaşoğlu N, Çorapçıoğlu Özdemir A, Yargıç İ, Geyran, P. Türkçe "PTSD Checklist - Civilian Version" (PCL-C) geçerliği ve güvenilirliği. Yeni Symposium. 2005.
14. Kutlubaev MA, Sabitova ÉR, Voevodin VA, Akhmadeeva LR. Simptomy posttravmaticheskogo stressovogo rasstroĭstva u patsientov s tserebral'nym insul'tom [Posttraumatic stress disorder in patients after stroke]. *Zh Nevrol Psikhiatr Im S S Korsakova*. 2014;114(12 Pt 2):16-18. doi:10.17116/jnevro201411412216-18
15. Guan X, Zhu Q, Qian H. Relationship between post-traumatic stress disorder and fear of progression in stroke patients: the mediating role of perceived social support and coping styles. *Top Stroke Rehabil*. 2024:1-9. doi:10.1080/10749357.2024.2417646
16. Griffin TT, Bhave V, McNulty J, Christophe BR, Garton ALA, Sander Connolly E Jr. Delirium and previous psychiatric history independently predict poststroke posttraumatic stress disorder. *Neurologist*. 2023;28(6):362-366. doi:10.1097/NRL.0000000000000495
17. Kronenberg G, Schöner J, Levitanus M, et al. The importance of previous lifetime trauma in stroke-induced PTSD symptoms and mental health outcomes. *J Psychiatr Res*. 2021;136:589-594. doi:10.1016/j.jpsychires.2020.10.033
18. Calderbank A, Gray C, Morgan-Boon A, Reuber M. Changes in posttraumatic stress disorder symptoms with integrative psychotherapy for functional neurological symptom disorder. *J Neuropsychiatry Clin Neurosci*. 2023;35(4):398-403. doi:10.1176/appi.neuropsych.21070184
19. Janssen EPJ, Spauwen PJJ, Bus BAA, Rijnen SJM, Ponds RWHM. Prevalence of posttraumatic stress disorder after stroke: a systematic literature review. *J Psychosom Res*. 2024;187:111914. doi:10.1016/j.jpsychores.2024.111914
20. Müller HHO, Czwalinna K, Wang R, et al. Occurence of post-traumatic stress symptoms, anxiety and depression in the acute phase of transient ischemic attack and stroke. *Psychiatr Q*. 2021;92(3):905-915. doi:10.1007/s11126-020-09873-9
21. Pedowitz E, Derby L, Cruz GJ, Trainor A, Edmondson D, Cornelius T. Relationship between NIH stroke symptoms and post-traumatic stress disorder in patients evaluated for transient ischemic attack/stroke. *Gen Hosp Psychiatry*. 2021;70:98-102. doi:10.1016/j.genhosppsych.2021.03.004
22. Rutovic S, Kadojic D, Dikanovic M, Solic K, Malojcic B. Prevalence and correlates of post-traumatic stress disorder after ischaemic stroke. *Acta Neurol Belg*. 2021;121(2):437-442. doi:10.1007/s13760-019-01200-9
23. Edmondson D, Richardson S, Fausett JK, Falzon L, Howard VJ, Kronish IM. Prevalence of PTSD in survivors of stroke and transient ischemic attack: a meta-analytic review. *PLoS One*. 2013;8(6):e66435. doi:10.1371/journal.pone.0066435
24. Dollenberg A, Moeller S, Lücke C, et al. Prevalence and influencing factors of chronic post-traumatic stress disorder in patients with myocardial infarction, transient ischemic attack (TIA) and stroke- an exploratory, descriptive study. *BMC Psychiatry*. 2021;21(1):295. doi:10.1186/s12888-021-03303-1
25. Balaban H, Semiz M, Şentürk IA, et al. Migraine prevalence, alexithymia, and post-traumatic stress disorder among medical students in Turkey. *J Headache Pain*. 2012;13(6):459-467. doi:10.1007/s10194-012-0452-7
26. Peterlin BL, Tietjen GE, Brandes JL, et al. Posttraumatic stress disorder in migraine. *Headache*. 2009;49(4):541-551. doi:10.1111/j.1526-4610.2009.01368.x
27. Peterlin BL, Tietjen G, Meng S, Lidicker J, Bigal M. Post-traumatic stress disorder in episodic and chronic migraine. *Headache*. 2008;48(4):517-522. doi:10.1111/j.1526-4610.2008.00917.x
28. Goldfinger JZ, Edmondson D, Kronish IM, et al. Correlates of post-traumatic stress disorder in stroke survivors. *J Stroke Cerebrovasc Dis*. 2014;23(5):1099-1105. doi:10.1016/j.jstrokecerebrovasdis.2013.09.019
29. Feely D, Slattery B, Walsh T, et al. Acute stress symptoms 1-2 weeks after stroke predict the subsequent development of post-traumatic stress symptoms: a prospective cohort study. *PLoS One*. 2023;18(10):e0286220. doi:10.1371/journal.pone.0286220