Post-traumatic stress disorder and ischaemic stroke severity

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Abstract:

Introduction: Although most often considered a consequence of a traumatic event, post-traumatic stress disorder (PTSD) occurs after illness as well. The aim of this study was to establish incidence of PTSD in patients with ischaemic stroke (IS) and its correlation to the degree of disability.
Participants and Methods: The study included 161 patients with ischaemic stroke. PTSD was diagnosed using a modified version of the PTSD Checklist specific for a stressor (PCL-S). Stroke severity was measured using the modified Rankin Scale (mRS). Demographic information including age and gender were collected from medical histories.
Results: Of the 161 patients with IS, 21 (13.04%) fulfilled PCL-S criteria for PTSD. We found a positive correlation between PTSD and higher degree of disability (Mann Whitney U test, P<0.001).
Conclusion: Our results show that a significant number of IS patients develop PTSD after the incident. Determining correlates of post-stroke PTSD can help to identify those at higher risk for its development. If proven by additional large sample studies, early detection and treatment of PTSD symptoms may improve outcomes in stroke patients.

Keywords: ischaemic stroke; posttraumatic stress disorder; disability

Sažetak:

Povezanost posttraumatskog stresnog poremećaja i težine posljedica ishemičkog moždanog udara
Uvod: Iako se najčešće smatra posljedicom traumatskih događaja, PTSP se može pojaviti i nakon bolesti. Cilj ovog istraživanja je bio utvrditi incidenciju PTSP-a kod bolesnika s ishemičkim moždanim udarom (MU) te njegovu povezanost s stupnjem onesposobljenosti.
Ispitanici i metode: U istraživanje je uključen 161 ispitanik s ishemičkim MU-om. PTSP je dijagnosticiran primjenom modificirane verzije PTSP liste specifične za stresor (PTSD Checklist Specific for a stressor (PCL-S)). Stupanj onesposobljenosti procjenjivan je korištenjem modificirane Rankin skale (mRS). Demografski podatci o dobi i spolu bolesnika prikupljeni su u razgovoru s pacijentima.
Rezultati: Od 161 pacijenta s ishemičkim MU-om, njih 21 (13.04 %) je ispunilo PCL-S kriterije za PTSP. Našli smo pozitivnu povezanost između PTSP-a i većeg stupnja onesposobljenosti (Mann-Whitneyjev U-test, P <0,001).
Zaključak: Naši rezultati pokazaju da se PTSP pojavljuje u značajnog broja bolesnika s ishemičkim MU-om. Određivanje korelata PTSP-a nakon MU-a može pomoći identificirati bolesnike s većim rizikom za razvoj PTSP-a. Kada bi se ovi rezultati dokazali u studijama s većim brojem ispitanika, rana detekcija i liječenje simptoma PTSP-a mogli bi poboljšati ishode pacijenata s MU-om.

Ključne riječi: ishemički moždani udar; posttraumatski stresni poremećaj; onesposobljenost

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Introduction

Stroke is the leading cause of disability among adults in the Republic of Croatia and the second leading cause of death[1]. Stroke causes various degrees of neurological dysfunction. In patients over the age of 65, 6 months after stroke, 26% of them are dependent in activities of daily living, and 46% have cognitive impairment[2]. Post-traumatic PTSD is a set of mental disorders that can develop after a person is exposed to an unexpected traumatic stressor. Well-known traumatic events that can cause PTSD are wars, captivity, natural disasters, violent attacks, or severe traffic accidents. In the last few decades, there is growing evidence that PTSD occurs even after life-threatening medical conditions. PTSD has been proven in patients with acute coronary syndrome, HIV (human immunodeficiency virus), breast cancer, multiple sclerosis[3-6] and after cerebrovascular events such as stroke and transient ischemic attack (TIA)[7].

According to Diagnostic Statistical Manual (DSM-5) criteria PTSD is defined as a disorder associated with trauma or stressor, which consists of four basic groups of symptoms: intrusions, avoidance of reminders of trauma, negative changes in cognition and mood and hyperarousal. To be diagnosed with PTSD, these symptoms must be present for more than one month, lead to significant distress or functional impairment, and must not be the result of medication, drug abuse, or medical condition[8].

Previous studies on the emotional consequences after stroke have mainly focused on depression. Despite the discrepancy in diagnostic criteria, PTSD is significantly different from depression. While both disorders contain elements of negative changes in cognition and mood, PTSD differs in features of intrusive thoughts and avoidance of reminders of trauma, in addition to increased irritability and increased fear[9].

Patients with PTSD have higher mortality and a higher number of causes of mortality compared to the rest of the population[10]. This difference is particularly noticeable in the case of cardiovascular disease[11]. Studies of cardiovascular events have shown that PTSD after coronary incidents is associated with worse cardiovascular prognosis. The factors linking PTSD to poor outcomes are not yet fully known, but may include increased sympathetic activity, adverse effects of inflammation and medication non-adherence[12].

Varying incidence rates of PTSD after stroke have been reported, and there is conflicting evidence about predictive factors for PTSD development, probably due to different research methodologies[9]. The aim of this study was to determine the PTSD incidence in patients with ischemic stroke and its association with the severity of neurological deficit.

Patients and methods

This prospective study was conducted at the Department of Neurology of the General Hospital Dr Josip Bencevic in Slavonski Brod in the period from March 2016 to August 2017. The study was approved by the Ethic Committee of General Hospital Slavonski Brod and performed in accordance with the ethical standards as laid down in the 1964 Declaration of Helsinki and its later amendments. All patients signed an informed consent form. 161 subjects over the age of 18 which were hospitalized at the Department of Neurology for acute IS were included. Symptoms of PTSD were assessed three months after discharge from the hospital. Patients under the age of 18, those with a previous stroke, aphasia or severe cognitive impairment, and pregnant were excluded from the study.

PTSD symptoms were detected using a modified version of the PTSD Checklist Specific (PCL-S) with the stressor "stroke". The PCL-S is a validated 17-item scale that corresponds to DSM-IV of Mental Disorders criteria for PTSD. Participants rated the extent of their symptoms on a five-point scale. PCL-S score of 50 or more was used as a cut-off value, indicating the presence of PTSD[13]. Stroke severity was measured by the modified Rankin scale (mRS), which is a simple six-point assessment, and a score of 3 or higher on this scale signifies at least moderate disability[14]. Demographic information from including age and gender were collected from medical history.

Statistical analysis was conducted using statistical software tool (version 14.12.0, MedCalc Software bvba). Numerical data are presented with median and interquartile range and Box-and-Whisker plots. Numerical data comparison was tested with nonparametric Mann–Whitney U test. Categorical data are presented with absolute frequencies and proportions and were tested with Chi-square test. Statistical significance was set at 0.05, while all P values were two tailed.

Results

161 participants were included in the study. Median age of all participants was 65 years with interquartile range from 57 to 70 (Figure 1). There were 85 (52.8%) male and 76 (47.2%) female patients (Chi-square test, P=0,09), with no statistical difference among groups. Of the 161 patients, 21 (13.04%) of them had symptoms of PTSD according to the PCL-S scale (Chi-square test, $P < 0.001$). The median of the score was 30, with interquartile range from 20 to 39 (Figure 2). We found significant relationship between PTSD and the degree of disability (Mann–Whitney test, $P < 0.001$) where patients with PTSD had statistically higher mRS (Figure 3).

Discussion

The results of our study show an incidence of PTSD of 13.04% in patients with IS, which is significantly higher than reported rates in the general population ranging from 1.7% in South Korea to 9.2% in Canada[15]. Several other authors have also published studies showing increased prevalence rates of PTSD after cerebrovascular incidents. Sembi et al. detected PTSD in 9.8% of patients with stroke or TIA[16]. The study had a small

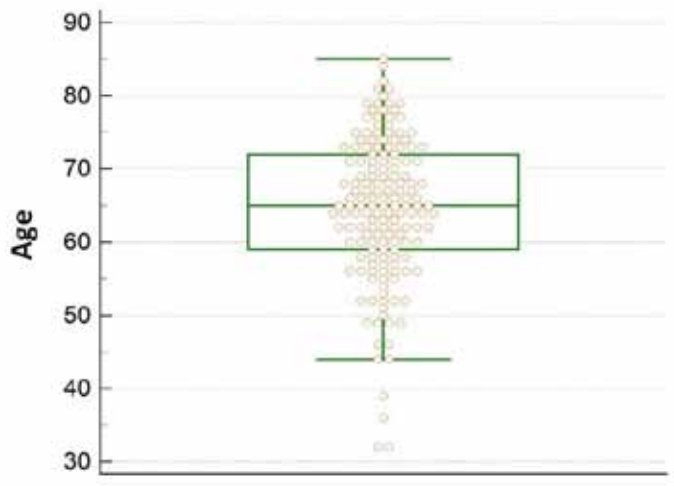

Figure 1. *Box-plot chart presenting age distribution in stroke patients*

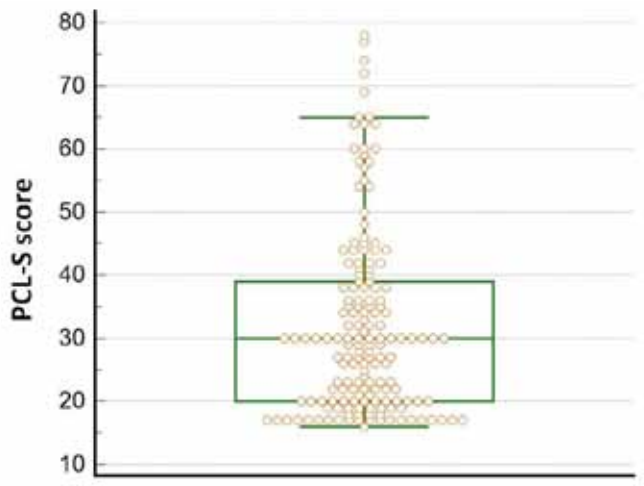

Figure 2. *Box-plot chart presenting distribution of PCL-S scores among stroke patients*

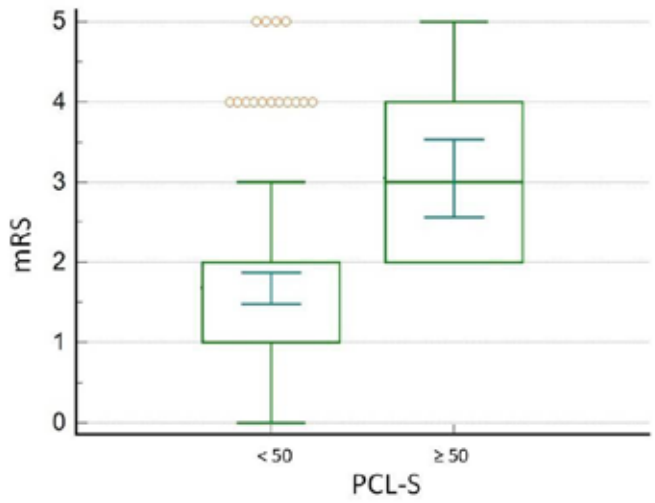

Figure 3. *Box- Plot chart presenting distribution of mRS scores in patients without PTSD (PCL-S<50) and with PTSD (PCL-S≥50)*

and heterogeneous sample of only 61 patients with two different outcomes, one of which (TIA) does not leave permanent neurological deficit. Comparison of the incidence rate of PTSD in a group that maintains a handicap and a group that develops it only for a short time, lasting from a few seconds to a few hours, could reveal how much initial fear of life- threatening event and how much permanent disability contributes to PTSD development. Kronish et al. found PTSD symptoms in 18% of patients with stroke and TIA[7]. Their study included patients who had at least one stroke or TIA in the previous 5 years, meaning that some of the patients also had more than one episode of the inclusion criterion. The authors state that patients with PTSD were 3 times more likely to have reduced adherence to drugs prescribed in secondary prevention of stroke than patients with stroke or TIA who did not develop PTSD.

Visser-Meily et al. studied the symptoms of PTSD after subarachnoidal hemorrhage (SAH). They found symptoms of PTSD in 26% of patients[17]. As SAH is a type of stroke with the highest mortality rate and severe headaches in the acute phase are clearly associated with a life-threatening feeling, the high incidence of PTSD in this population is expected. On the other hand, abrupt clinical presentation, as well as invasive treatment methods used in patients with SAH (neurosurgical or endovascular) significantly complicate the direct comparison of research results in this group of patients with the results of a group of patients who survived IS.

Another specific aetiology of stroke, carotid artery dissection, according to the results of a study by Speck et al., has a high PTSD prevalence of as much as 46%[18]. It seems that the most likely explanation for such a high rate of PTSD after stroke caused by carotid artery dissection could be the relatively young age of patients, but the results of this study suggest that age is not associated with PTSD as an outcome. Nevertheless, the average age of patients in the study by Speck et al. was slightly lower than the average age of stroke patients. In addition, the design of the study itself was retrospective, which means lower quality of evidence. We conclude that the wide range of prevalence rates can be explained by the heterogeneity of research methods and patient populations.

Different assessment methods are used to assess symptoms and detect PTSD. The most commonly used scales for detecting PTSD after stroke are: Clinician Administered PTSD Scale, Impact of Event Scale, Structured Clinical Interview for DSM-5, Post-traumatic Stress Diagnostic Scale, and PTSD Checklist Specific for Stroke, which we used in our research[9]. The prevalence of PTSD diagnosis varies depending on the assessment method used.

Some of the diagnostic tools are parts of comprehensive diagnostic manuals or instruments such as DSM or ICD. Clinical interview is considered the gold standard for diagnosing PTSD, but in clinical practice and research, self-assessment scales are often used as screening[19].

In the aforementioned study by Sembi et al. the screening of patients was done with a questionnaire that the patients filled out themselves, and then patients with suspected PTSD were additionally examined by a psychologist. Such screening may mean that the sample of subjects was representative, that is, that such a sequence of diagnostic procedures for detecting PTSD in the study reduced sensitivity in favour of specificity and simplification of screening[16]. As a proof of the accuracy of this assumption about the different prevalence rates that depend on the applied diagnostic procedures, we can state that Favrole et al. found the prevalence of PTSD after stroke 25% when measured by the Impact of Events Scale-Revised (IESC-R) and 10% when measured by a clinical interview[20].

It could be argued that incidence rate in our study would probably be lower if it would be measured by a clinical interview, but we believe that easy use of PCL-S is an element that allows neurologists to use it routinely, which is why our research results are more applicable in clinical practice. The same has been recognized by other authors, which is the reason it is frequently used in studies, and the results obtained by its application are a better orientation to clinicians compared to the difficult and time-consuming clinical interview[21].

Our results clearly confirm the association between PTSD and a higher degree of disability of the measured mRS. A similar correlation was found in some other studies[7, 21, 22]. Goldfinger found an association between handicap and PTSD in 535 subjects with stroke and TIA when he included patients with varying degrees of disability, including mRS range of 0 to 4, of whom nearly half of subjects had mRS 3 or 4, which means a significant handicap, ie the inability to independently perform activities of everyday life[21]. In the same studies, PTSD was associated with younger age and female gender.

Some studies have not found a correlation between disability and PTSD[20,23, 24]. However, these were studies with relatively small samples of subjects in which cases with severe, disabling deficits were excluded. It can be assumed that a persistent deficit serves as a recurrent reminder of a traumatic event, contributing to the development of PTSD.

The main limitations of our study include the small sample size and the use of screening questionnaire instead of a clinical interview.

In conclusion we can say that our results confirmed high incidence of PTSD after stroke. Further, larger studies are required in order to determine predictive factors for its development as well its effect on outcomes in patients with stroke.

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