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KVALITET ŽIVOTA OSOBA SA POSLEDICAMA TRAUMATSKE POVREDE MOZGA[1]

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APSTRAKT

Pregled savremene literature pokazuje da sa porastom učestalosti traumatskih povreda glave u novije vreme, raste broj empirijskih studija koje se bave ispitivanjem kvaliteta života i psihosocijalnih posledica koje ostavljaju traumatska oštećenja mozga u detinjstvu i odraslom dobu. Rezultati ovih studija pokazuju da moždana trauma može da ostavi dugotrajne posledice na celokupno funkcionisanje osobe u različitim domenima – kognitivnom, jezičkom, socijalnom i emocionalnom. Uvreženo je mišljenje da ispoljavanje deficita u ovim domenima korelira sa težinom povrede, odnosno da teže povrede uslovljavaju teže i dugotrajnije posledice kod ove populacije. Međutim, noviji empirijski podaci ukazuju da u dečjoj populaciji čak i blage povrede mogu trajno da poremete razvoj nekih psihičkih funkcija. Kao rezultat tih nalaza polako se napušta tradicionalno shvatanje da kod dece dolazi do potpunog oporavka zbog plastičnosti nezrelog mozga. Dodatna analiza empirijskih nalaza pokazuje da dugoročno ispoljavanje poremećaja različitih aspekata kognicije i ponašanja značajno narušava kvalitet života osoba koje su pretrpele traumatsku povredu mozga. Ovakvi nalazi ukazuju na neophodnost kontinuiranog praćenja i pružanja podrške ovoj populaciji u cilju obezbeđivanja uslova i otklanjanja potencijalnih barijera u njihovom funkcionisanju u svakodnevnom životu.

Ključne reči: *traumatsko oštećenje mozga, kvalitet života, psihosocijalne posledice, deca, odrasli*

ABSTRACT

A study of recent literature reveals that, with the recent increase in the occurrence of traumatic head injuries, the number of empirical studies investigating the quality of life and psychosocial implications of traumatic brain injury in childhood and adulthood is

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increasing. The findings of these studies indicate that brain trauma can have long-term effects on a person's overall functioning in a variety of domains, including cognitive, linguistic, social, and emotional functioning. It is widely held that the manifestation of deficits in these domains correlates with the severity of the injuries, implying that more severe injuries result in more severe and long-term consequences in this population. Recent empirical data, however, show that even mild injuries in the pediatric population can irreversibly affect the development of some mental functions. As a result of these findings, the long-held notion that children recover completely due to the plasticity of the immature brain is gradually being abandoned. Additional empirical findings analysis reveals that long-term manifestations of impairments in numerous domains of cognition and behavior significantly reduce the quality of life of people who have suffered a traumatic brain injury. Such findings highlight the importance of continuous monitoring and support for this population to provide conditions and remove any potential barriers to their functioning in daily life.

Keywords: *traumatic brain injury, quality of life, psychosocial consequences, children, adults*

UVOD

Trauma glave (moždana trauma, traumatsko oštećenje mozga – TOM) predstavlja vodeći uzrok smrtnosti kod mlađih osoba i invalidnosti u svim zemljama i svim starosnim grupama. Procenjuje se da oko 50 miliona ljudi godišnje zadobije povredu glave. U visoko razvijenim zemljama incidenca traumatske povrede raste usled povećanog broja padova kod starijih osoba, dok se u manje razvijenim zemljama rast incidence pripisuje povećanoj učestalosti saobraćajnih nezgoda (Maas et al., 2017). Drugi uzroci uključuju sportske povrede, povrede na radu, kao i posledice fizičkog zlostavljanja. Postoji više načina za klasifikaciju povreda glave. Najrasprostranjenija klasifikacija povreda bazira se na težini moždane traume, koja se određuje na osnovu skora Glazgovske koma skale (eng. Glasgow Coma Scale – GCS), prema kojoj se povrede glave klasifikuju kao blage, umerene i teške (Vuković, 2019).

CILJ RADA

Osnovni cilj ovog rada je analiza i prezentacija savremenih empirijskih podataka o psihosocijalnim posledicama i kvalitetu života kod osoba koje su pretrpele moždanu traumu.

METOD RADA

Za pretragu relevantne literature korišćene su specijalizovane elektronske baze i pretraživači: KoBSON (Konzorcijum biblioteka Srbije za objedinjenu

nabavku), Google Scholar, PubMed i Research Gate. Kao ključne reči u pretrazi, na srpskom i engleskom jeziku, korišćene su: *traumatsko oštećenje mozga*, *moždana trauma*, *kvalitet života kod dece sa traumatskim oštećenjem mozga*, *kvalitet života kod odraslih sa traumatskim oštećenjem mozga*, *posledice moždane traume*.

REZULTATI

Psihosocijalne posledice moždane traume

Simptomi nakon TOM mogu se podeliti na rane i kasne. Neposredno nakon traume mogu se ispoljiti bolovi u različitim delovima tela (glavobolja, kao i bolovi u vratu, leđima i u ekstremitetima), zamor, senzorne smetnje, gubitak snage, spasticitet, smetnje koordinacije, gubitak interesovanja i koncentracije, smetnje planiranja i rešavanja problema, gubitak inicijative, nedostatak uvida u sopstvene smetnje, promene raspoloženja, agitacija, motorna i verbalna agresija i emocionalne smetnje. Kasniji simptomi ometaju svakodnevno funkcionisanje i prevashodno podrazumevaju kognitivne smetnje i poremećaje raspoloženja, koji utiču na održavanje socijalnih kontakata, te se neretko ovi pacijenti izoluju iz zajednice i imaju nisko samopouzdanje (Hofhuis & Spronk, 2014).

Psihosocijalne posledice traume glave mogu se manifestovati u nekoliko oblasti života: u domenu svakodnevnih životnih aktivnosti, socijalnog funkcionisanja, radnog i materijalnog statusa, kao i u oblastima kognicije i emocija (Humphreys et al., 2013). Na primer, deficiti se mogu ispoljiti u oblasti pamćenja, pažnje i drugim aspektima kognicije, kao i u vidu bola i fizičkih ograničenja. Sve ove promene direktno mogu uticati na samopouzdanje osobe i svakodnevnu participaciju u porodičnoj i socijalnoj sredini (Krenz et al., 2021). Zamor je česta posledica TOM i utiče na socijalne, emocionalne, fizičke i kognitivne sposobnosti pogođenih osoba. Prema nekim empirijskim podacima zamor je učestaliji i izraženiji kod žena koje su pretrpele povredu nego kod muškaraca, a istovremeno se navodi da je učestaliji kod osoba sa TOM u poređenju sa zdravom populacijom (Cantor et al., 2008). Moguća je i pojava neuropsihijatrijskih poremećaja, poput anksioznosti, afektivnih poremećaja, posttraumatskog stresnog sindroma i poremećaja spavanja (Rauen et al., 2020). Problemi sa spavanjem često se javljaju i kod dece sa TOM i smatra se da je njihova pojava nezavisna od težine povrede (Botchway et al., 2019).

U dečjoj populaciji najčešće su blage povrede mozga, koje mogu, ali i ne moraju ostaviti značajnije posledice (Beauchamp et al., 2010). Međutim, pokazano je da čak i blage povrede mogu da dovedu do pojave smetnji u oblasti jezičkog, kognitivnog i socioemocionalnog razvoja, naročito ako je došlo do difuzne lezije mozga (Vuković, 2019). S druge strane, teške

povrede mogu da ostave dugoročne posledice u domenu kognitivnih funkcija i ponašanja (kao što su izmenjena sposobnost obrade informacija, poremećaji pažnje, pamćenja, učenja, socijalnih veština, egzekutivnih funkcija i bihevioralnih poremećaja) (Beauchamp et al., 2010; Vuković, 2019). Kod dece i adolescenata sa povredom glave moguća je pojava deficita u oblasti socijalne kognicije. Iako bazične veštine, kao što su percepcija i prepoznavanje emocija ostaju relativno pošteđene, ipak deficiti se ispoljavaju u složenijim aspektima kao što su teorija uma i pragmatske sposobnosti (On et al., 2021).

Prema nekim empirijskim podacima uzrast u vreme povrede nije značajan prediktor funkcionalnog ishoda kod dece nakon povrede glave, već se najznačajnijim faktorom za oporavak smatra težina povrede (Andruszkow et al., 2014). Pojedini nalazi retrospektivnih studija pokazuju da deca nakon traume glave imaju veće šanse za funkcionalni oporavak i preživljavanje u odnosu na odrasle osobe (Purcell et al., 2020). Međutim, neki podaci iz literature pokazuju da oporavak kod dece nakon TOM nije uvek potpun, kao i da funkcionalne smetnje koje prate teže povrede mozga perzistiraju i u odraslom dobu, pre svega u oblasti psihosocijalnog funkcionisanja. Drugim rečima, u poređenju sa tipičnom populacijom deca sa TOM imaju manje šanse za završetak viših nivoa obrazovanja, za obavljanje poslova koji zahtevaju kompleksne veštine i važne pozicije na poslu. Takođe, navodi se da deca imaju veći rizik za nastanak poremećaja u domenu mentalnog zdravlja (Anderson et al., 2009).

Pojedini autori ističu da su šanse za oporavak intelektualnih sposobnosti veće kod dece u odnosu na odrasle samo u slučaju blagih povreda, dok je šansa za bolji oporavak intelektualnih sposobnosti veća kod odraslih sa teškim povredama glave (Königs et al., 2016).

Kod odraslih pretrpljena povreda u detinjstvu može da uzrokuje smetnje u oblasti kognitivnih sposobnosti (poremećaji pažnje, brzine obrade informacija, deficiti egzekutivnih funkcija), psihijatrijske poremećaje (ADHD, depresija, poremećaje prilagođavanja), adaptivne poremećaje (školski neuspeh, nezaposlenost) i socijalne probleme (izolacija, smanjen nivo participacije) (Beauchamp et al., 2010). U studiji Rauen i saradnika (2020) ispitivan je kvalitet života osoba sa blagom, umerenom i teškom povredom glave 10 godina nakon povrede. Prema dobijenim podacima, oko dve trećine ispitanika navelo je da deceniju nakon povrede ima dobar kvalitet života. Međutim, trećina ispitanika navela je da ima loš kvalitet života usled nedovoljne samostalnosti, kognitivnih smetnji i psihijatrijskih poremećaja, odnosno smetnji koje je povreda izazvala u domenu psihičkog zdravlja. Zbog toga autori preporučuju da procena neuropsihijatrijskih posledica traume treba da bude integralni deo rehabilitacije pacijenata sa traumatskom povredom mozga (Rauen et al., 2020).

U slučaju pojave posttraumatskih poremećaja procesiranja jezika (ranije označavano terminom traumatska afazija) karakteristično je da su deficiti formalne jezičke strukture uglavnom tranzitornog karaktera, dok se neretko zadržavaju smetnje na višim nivoima jezičke strukture, odnosno na nivou diskursa (Vuković, 2019). Pojedini nalazi iz literature ukazuju da stepen oštećenja jezika korelira sa težinom povrede kod dece. Drugim rečima, pokazano je da je veće oštećenje jezika prisutno kod dece koja su pretpela tešku povredu glave, u poređenju sa decom sa umerenom povredom. Kod ove dece jezički poremećaji su hronične prirode i moguće je njihovo udruženo ispoljavanje sa dizartrijom i poremećajima egzekutivnih funkcija (Vuković, 2017). Takođe, smetnje se ispoljavaju na nivou diskursa i pragmatike, kao i u sticanju školskih veština, odnosno čitanja i pisanja (Vuković, 2019). Iako su u nekim studijama dokumentovani deficiti u produkciji i razumevanju jezika kod dece sa TOM, priroda jezičkih deficita u ovoj populaciji još uvek nije sasvim razjašnjena. Kognitivno-komunikacijski poremećaj nakon moždane traume utiče na funkcionisanje ove dece u porodičnoj, školskoj i socijalnoj sredini (Vuković, 2022). Stoga je procena kvaliteta života kod osoba sa stečenim jezičkim poremećajima krucijalna u svim fazama oporavka (Vuković & Jerkić, 2021), s obzirom na potencijalne rezidualne jezičke deficite kod dece i odraslih sa TOM.

Uticaj moždane traume na kvalitet života

Raniji empirijski podaci ukazuju da stepen smetnji u psihosocijalnom funkcionisanju korelira sa težinom povrede. Drugim rečima, smatra se da su smetnje izraženije kod osoba sa težom povredom mozga (Anderson et al., 2009; Catroppa et al., 2008). Smatra se da teška povreda glave u ranom detinjstvu može uticati na razvoj opštih kognitivnih sposobnosti, ali i uzrokovati smetnje u specifičnim oblastima kognitivnog razvoja (Catroppa et al., 2008). I drugi nalazi ukazuju da teška povreda glave ostavlja dugoročne posledice, prvenstveno u domenu psihičkog zdravlja, funkcionisanju u socijalnom okruženju i porodičnim odnosima. Pored toga, evidentno je i sagorevanje kod negovatelja (Hoofien et al., 2001).
Prema rezultatima nekih empirijskih studija posledice u domenu psihičkog zdravlja kod blage traume imaju važnu ulogu u određivanju kvaliteta života. Pojava anksioznosti, depresije, zamora i stresa negativno utiče na psihosocijalno funkcionisanje ovih osoba, što implicira neophodnost inkorporiranja psihološkog tretmana kao integralnog dela rehabilitacije nakon izlaska iz bolnice (Shirvani et al., 2020). Pojedini autori ispitivali su uticaj godina na zadovoljstvo kvalitetom života u ovoj populaciji i pokazano je da su starije osobe zadovoljnije od mlađih. Potencijalno objašnjenje za nalaze da mlađe osobe sa blagom traumom glave percipiraju manje kvalitetno u odnosu na starije objašnjava se (ne)mogućnošću

povratka na radno mesto, nastavka školovanja ili efikasnog učestvovanja u aktivnostima svakodnevnog života, zbog čega mogu biti opterećeniji negativnim mentalnim i emocionalnim posledicama TOM (Yousefzadeh-Chabok et al., 2021).
S druge strane, studija koja se bavila istom problematikom kod osoba sa umerenom i teškom povredom glave takođe je pokazala da su mlađe osobe manje zadovoljne kvalitetom života u odnosu na starije, kao i osobe koje su se duže vreme oporavljale u bolničkim uslovima (usled drugih komorbiditeta koje su posledica traume) (Weber et al., 2016). Kod starijih ispitanika sa umerenom povredom glave može doći do promena u životnim ulogama i lošijeg kvaliteta života u odnosu na osobe istog životnog doba koji nisu pretrpele moždanu traumu (Dainter et al., 2019).
Neki podaci govore u prilog razlike u percepciji kvaliteta života adolescenata i njihovih roditelja. S obzirom na to da se izmenjena samosvesnost ili posledice koje trauma ostavlja mogu javiti kao posledica teške povrede, pojedini autori navode da je moguće da adolescenti sa TOM precenjuju kvalitet života usled bihevioralnih i kognitivnih posledica, naročito u emocionalnom i socijalnom domenu (Stancin et al., 2002). Drugi autori nisu pronašli ovakve razlike u percepciji ograničenja svakodnevnog života kod dece sa TOM i njihovih roditelja (Krenz et al., 2021).
Takođe, izvršena je komparacija zadovoljstva kvalitetom života kod osoba pre i za vreme epidemije virusom kovid 19 kod osoba koje su pretrpele povredu glave ili moždani udar. Osobe sa TOM često su prijavljivale redukovano osećanje povezanosti sa drugim osobama, lošiji kvalitet prijateljskih odnosa, kao i ukupno lošiji kvalitet života nego što su imali pre pandemije (Fama et al., 2021).
Empirijski podaci, kao i kliničko iskustvo, pokazuju da je percepcija kvaliteta života pacijenata koji su pretrpeli stečenu povredu mozga važan pokazatelj ishoda rehabilitacije. Obično je oporavak dugotrajan, te se smatra da su poboljšanja uočljivija u pogledu fizičkog oporavka nego u oblastima emocionalnog i socijalnog funkcionisanja (Aza et al., 2021). Ovakvi nalazi ukazuju na neophodnost procene kvaliteta života kod osoba sa moždanom povredom i u redovnim, i u vanrednim okolnostima. Prilikom razmatranja kvaliteta života kod mlađe dece i adolescenata preporučuje se prikupljanje informacija i od njihovih roditelja, kako bi se dobila što jasnija slika o svakodnevnim životnim izazovima.

Procena kvaliteta života nakon TOM

S obzirom na to da TOM može ostaviti posledice u različitim oblastima, veoma je važna kontinuirana procena kognitivnih, govorno-jezičkih, emocionalnih i socijalnih sposobnosti. Neuropsihološka procena naročito je važna kod osoba sa teškim povredama, zbog toga što teže povrede

ostavljaju značajnije posledice na celokupno funkcionisanje osobe. Važna je, takođe, i za identifikaciju smetnji i planiranje dugoročnih ciljeva rehabilitacije (Beauchamp et al., 2010).
Prema dostupnim podacima iz literature u proceni kvaliteta života nakon TOM koriste se različiti instrumenti, kao što su Kvalitet života nakon moždane traume (The Quality of Life after Brain Injury – QOLIBRI), EuroQol-5D (EQ-5D), Health Utilities Index Mark 3 (HUI3), Kratka anketa o zdravlju (Short form Health Survey – SF-36/ SF-12), Upitnik o kvalitetu života Svetske zdravstvene organizacije (The World Health Organization Quality of Life Questionnaire – WHOQOL-100) i drugi. Međutim, za ispitivanje kvaliteta života u ovoj populaciji preporučuje se primena EQ-5D, HUI3 i SF-36, s obzirom na to da se njima procenjuju različiti aspekti uticaja povrede i moguće ih je primenjivati u svih starosnim grupama (Hofhuis & Spronk, 2014).
Pojedini autori ističu važnost vremena primene instrumenata kojima se procenjuje kvalitet života kod osoba sa TOM. Ukoliko je procena izvršena isuviše rano, odnosno u prvih šest meseci nakon povrede, moguće je da se ne dobije realna slika o zadovoljstvu kvalitetom života pacijenta. Ove osobe su u akutnom i subakutnom periodu od povrede obično uključeni u usmerene programe rehabilitacije, pri čemu neke od njih obično ne mogu da se vrate u potpunosti svojim svakodnevnim aktivnostima i reintegrišu u socijalnu sredinu (Di Battista et al., 2012). Pojedini nalazi iz literature pokazuju da čak i deca od pet godina mogu diskutovati o kvalitetu života, što nameće potrebu za kreiranjem specijalno dizajniranog upitnika samoprocene i za dečju populaciju (Krenz et al., 2021).
Rezultati novijih studija pokazuju da su glavni prediktori zadovoljstva kvalitetom života nakon godinu dana od povrede podrška socijalnog okruženja, tačnije podrška i integracija u društvenu sredinu, ali rezilijentnost i depresija (Aza et al., 2021). Pošto TOM često uzorkuje dugoročnu nesposobnost, neke osobe koje su pretrpele povredu zahtevaju dugotrajnu rehabilitaciju, prvenstveno u domenu emocionalnog blagostanja. Rehabilitacija ima doprinos i za pacijente, i za njihove negovatelje. Na taj način osobe mogu da postanu ponovo radno funkcionalne. Neke od njih stiču mogućnost ponovnog zaposlenja, te rešavanja finansijskih problema. Najzad, dugotrajna rehabilitacija može da doprinese sprečavanju socijalne izolacije pogođene osobe (Hoofien et al., 2001).

ZAKLJUČAK

Pregledom dostupne literature može se zaključiti da se sve veći broj istraživača interesuje za kvalitet života kod osoba sa traumom mozga, o čemu svedoči veći broj studija objavljenih u poslednjih nekoliko godina. Iako je fokus istraživača prevashodno usmeren na ispitivanje posledica

moždane traume kod dece ili kod odraslih, u novije vreme pažnja se sve više usmerava na praćenje dugoročnih posledica koje trauma stečena u detinjstvu može da ostavi na kasniji razvoj. Takođe, u fokusu istraživanja su i posledice koje perzistiraju kod odraslih koji su pretrpeli povredu mozga u detinjstvu. S obzirom na to, sve više se napušta ranije stanovište prema kojem se potpun oporavak kod dece pripisivao plastičnosti nezrelog mozga, te se sa većom pažnjom ispituju posledice traume na razvoj dece, naročito na razvoj veština čija se pojava očekuje kada dete dostigne odgovarajući kalendarski uzrast. Empirijski podaci pokazuju da čak i blage traume kod dece mogu izazvati smetnje u kognitivnom, jezičkom, socijalnom ili emocionalnom razvoju, što nije slučaj i kod odraslih, gde težina povrede uglavnom korelira sa pojavom deficita u navedenim oblastima.

Naročito je značajan podatak da su mlađe osobe manje zadovoljne kvalitetom života usled različitih izazova koji se pred njih postavljaju nakon povratka „normalnom" životu – nastavak školovanja, mogućnosti zapošljavanja, sticanje visokokvalifikovanih poslova, socijalni kontakti itd. Ova činjenica nameće potrebu za visoko fokusiranim ciljevima rehabilitacije usmerenim ka boljem biopsihosocijalnom funkcionisanju osobe.

Empirijski podaci svedoče u prilog postojanja brojnih psihosocijalnih posledica koje utiču na kvalitet života osoba sa traumatskom povredom mozga. Te posledice proporcionalno rastu sa težinom povrede (naročito kod odraslih) i afektiraju svakodnevno funkcionisanje, zbog čega su kontinuirana procena i podrška ne samo važne već i neophodne. U ovom procesu treba nastojati da sve intervencije budu usmerene ka pojedinačnim potrebama dece i odraslih sa TOM, pri čemu je veoma značajno da se obuhvate potrebe porodice i negovatelja. Krajnji cilj rehabilitacije nije samo integracija osoba sa TOM u socijalnu sredinu već i inkluzija, što im omogućava da, prilagođavanjem sredine njihovim potrebama, žive što je moguće kvalitetnije.

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Review

QUALITY OF LIFE IN PERSONS WITH CONSEQUENCES OF TRAUMATIC BRAIN INJURY

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Abstract

A study of recent literature reveals that, with the recent increase in the occurrence of traumatic head injuries, the number of empirical studies investigating the quality of life and psychosocial implications of traumatic brain injury in childhood and adulthood is increasing. The findings of these studies indicate that brain trauma can have long-term effects on a person's overall functioning in a variety of domains, including cognitive, linguistic, social, and emotional functioning. It is widely held that the manifestation of deficits in these domains correlates with the severity of the injuries, implying that more severe injuries result in more severe and long-term consequences in this population. Recent empirical data, however, show that even mild injuries in the pediatric population can irreversibly affect the development of some mental functions. As a result of these findings, the long-held notion that children recover completely due to the plasticity of the immature brain is gradually being abandoned. Additional empirical findings analysis reveals that long-term manifestations of impairments in numerous domains of cognition and behaviour significantly reduce the quality of life of people who have suffered a traumatic brain injury. Such findings highlight the importance of continuous monitoring and support for this population to provide conditions and remove any potential barriers to their functioning in daily life.

***Keywords**: traumatic brain injury, quality of life, psychosocial consequences, children, adults*

INTRODUCTION

Head trauma (brain trauma, traumatic brain injury - TBI) is the major cause of death and disability among young people in all countries and age categories. Each year, an estimated 50 million people suffer a head injury. In highly developed countries, the incidence of traumatic injury is rising due to an increase in the number of falls among the elderly, but in less developed countries, the increase is related to an increase in the frequency of road traffic accidents (Maas et al., 2017). Sports injuries, work injuries, and the consequences of physical abuse are some of the other causes. There are various classifications for head injuries. The most common classification of injuries is based on the severity of brain trauma, which is measured by the Glasgow Coma Scale (GCS), which classifies head injuries as mild, moderate, or severe (Vuković, 2019).

AIM OF PAPER

The main aim of this paper is to analyze and present current scientific data on the psychosocial consequences and quality of life of people who have experienced brain trauma.

METHOD

To search relevant literature, the following specialized electronic databases and search engines were used: KoBSON (Serbian Library Consortium for Coordinated Acquisition), Google Scholar, PubMed, and Research Gate. In both Serbian and English, the following keywords were used in the search: traumatic brain injury, brain trauma, quality of life in children with traumatic brain injury, quality of life in adults with traumatic brain injury, and sequelae of brain trauma.

RESULTS

Psychosocial consequences of brain trauma

Symptoms after TBI can be divided into early and late. Immediately after the trauma, pain in various parts of the body (headache, as well as neck, back, and limb pain), fatigue, sensory disturbances, loss of strength, spasticity, coordination disturbances, loss of interest and concentration, disturbances in planning and problem-solving, and loss initiatives, lack of insight into one's disturbances, mood swings, agitation, motor, and verbal aggression and emotional disturbances. Later symptoms interfere with everyday functioning and mostly include cognitive disturbances and mood disorders, which affect the maintenance of social contacts, and these individuals are frequently isolated from the community and have low self-esteem (Hofhuis & Spronk, 2014).

Head trauma can have psychosocial consequences in many areas of life, including everyday activities, social functioning, work, and material status, as well as cognition and emotions (Humphreys et al., 2013). Deficits in memory, attention, and other areas of cognition, as well as pain and physical restrictions. All of these changes might have a direct impact on a person's self-esteem and everyday participation in the family and social environment (Krenz et al., 2021). Fatigue is a frequent consequence of TBI, affecting people's social, emotional, physical, and cognitive capacities. According to certain empirical data, fatigue is more common and prominent in women who have sustained an accident than in men, and it is also reported to be more common in people with TBI than in the healthy population (Cantor et al., 2008). Sleeping problems are also common in children with TBI, and their occurrence is assumed to be unrelated to the severity of the injury (Botchway et al., 2019).

Mild brain injuries are the most prevalent in children, and they may or may not have major consequences (Beauchamp et al., 2010). However, it has been demonstrated that even minor injuries can cause problems with language, cognitive, and socio-emotional development, particularly if there is diffuse brain damage (Vuković, 2019). Severe injuries, on the other hand, can have long-term effects on cognitive functions and behaviour (such as the decreased ability to process information, attention, memory, learning, social skills, executive functions, and behavioural problems) (Beauchamp et al., 2010; Vuković, 2019). A deficit in social cognition is possible in children and adolescents who have suffered a head injury. Although basic skills like perception and emotion detection are mostly unaffected, deficits are evident in their more complex aspects such as the theory of mind and pragmatic abilities (On et al., 2021).

According to certain empirical evidence, age at the time of injury is not a significant predictor of functional outcomes in children after a head injury, but the severity of the injury is the most important factor for recovery (Andruszkow et al., 2014). Certain findings from retrospective studies show that children have a better chance of functional recovery and survival following brain trauma than adults (Purcell et al., 2020). However, studies from the literature reveal that recovery in children following TBI is not always complete and that functional impairments associated with serious brain injuries persist throughout adulthood, primarily in the domain of psychosocial functioning. In other words, when compared to the general population, children with TBI are less likely to complete higher levels of education, work in jobs requiring sophisticated abilities, or achieve important positions at work. It is also stated that children are at increased risk of developing mental health problems (Anderson et al., 2009).

According to some authors, the chances of intellectual ability recovery are higher in children compared to adults only in cases of moderate injuries, but the chances of improved intellectual ability recovery are higher in adults with severe head injuries (Königs et al., 2016).

Childhood trauma can result in cognitive impairments (attention deficits, information processing speed deficits, executive function deficits) in adulthood, as well as mental diseases (ADHD, depression, adjustment disorders), adaptive disorders (poor school performance, unemployment), and social issues (isolation, reduced participation) (Beauchamp et al., 2010). Rauen et al. (2020) investigated the quality of life of patients with mild, moderate, and severe brain injuries 10 years after the injury. According to the data obtained, over two-thirds of the respondents reported having a decent quality of life a decade following the injury. However, one-third of respondents reported that they still had a low quality of life due to insufficient independence, cognitive impairments, and psychiatric diseases, disorders caused by injury in the domain of mental health. As a result, the authors suggest that assessing the neuropsychiatric repercussions of trauma be an integral part of the rehabilitation of patients with traumatic brain damage (Rauen et al., 2020).

When post-traumatic language processing disorders (previously known as traumatic aphasia) appear, it is typical that deficits in formal language structure are mostly transitory, whereas disturbances frequently persist at higher levels of language structure, i.e. at the discourse level (Vuković, 2019). According to the literature, the degree of language loss in children correlates with the severity of the injury. In other words, children who have sustained a serious head injury show more linguistic impairments than children who have sustained a mild injury. Language difficulties are chronic in these children, and they may coexist with dysarthria and executive function abnormalities (Vuković, 2017). Deficits express themselves not only at the level of conversation and pragmatics but as well as in the acquisition of school skills, such as reading and writing (Vuković, 2019). Although some studies have shown that children with TBI exhibit difficulties in language production and comprehension, the nature of these deficits in this population is not fully understood. Cognitive communication disorder following brain trauma affects these children's functioning in the family, school, and social environment (Vuković, 2022). As a result, assessing the quality of life in people with acquired language disorders is essential at all stages of recovery (Vuković & Jerkić, 2021), considering potential residual language deficits in children and adults with TBI.

Brain trauma impact on quality of life

Previous empirical data indicate that the degree of impairment in psychosocial functioning correlates with the severity of the injury. In other words, individuals with more severe brain injuries are thought to have more severe impairments (Anderson et al., 2009; Catroppa et al., 2008). A severe brain injury in early childhood is thought to affect not only the development of general cognitive abilities but also cause disturbances in specific areas of cognitive development (Catroppa et al., 2008). Other findings indicate that a serious head injury has long-term consequences, primarily in the areas of psychological health, social functioning, and family relationships. Furthermore, caregiver burnout is evident (Hoofien et al., 2001).

Some empirical studies have discovered that the psychological health implications of mild trauma play an important role in determining the quality of life. The emergence of anxiety, depression, exhaustion, and stress harms these individuals' psychosocial functioning, implying the importance of implementing psychological care as an integral part of rehabilitation after they leave the hospital (Shirvani et al., 2020). Some researchers examined the effect of age on satisfaction with the quality of life in this population and discovered that older people are more satisfied than younger ones. A potential explanation for the findings that younger people with mild head trauma perceive less quality than older people is the (in)ability to return to work, continue education, or participate effectively in daily life activities, which may make them more burdened by the negative mental and emotional consequences of TBI (Yousefzadeh-Chabok et al., 2021).

A study on the same topic in people with moderate and severe head injuries, on the other hand, found that younger people are less satisfied with their quality of life than older people, as well as people who have been recovering in hospital conditions for a long time (due to other comorbidities caused by trauma) (Weber et al., 2016). When compared to adults of the same age who did not suffer brain trauma, elderly subjects with moderate head injuries might well have changes in life roles and a lower quality of life (Dainter et al., 2019).

Some studies point to discrepancies in adolescents' and parents' perceptions of the quality of life. Given that altered self-awareness or trauma-related outcomes can emerge as a result of severe injury, some authors speculate that adolescents with TBI may overestimate their quality of life due to behavioural and cognitive consequences, specifically in the emotional and social domains (Stancin et al., 2002). Other researchers did

not detect significant disparities in the perception of daily life limitations in children with TBI and their parents (Krenz et al., 2021).

A comparison of satisfaction with the quality of life in patients who experienced a brain injury or stroke before and during the COVID-19 virus epidemic was also made. People with TBI frequently reported a decreased feeling of attachment with others, lower quality of friendships, and overall lower quality of life than before the pandemic (Fama et al., 2021). Empirical evidence, as well as clinical experience, reveal that patients' perceptions of their quality of life after an acquired brain injury are an important predictor of rehabilitation outcomes. Recovery is usually long-lasting, and improvements in physical recovery are considered to be more visible than in emotional and social functioning (Aza et al., 2021). Such findings highlight the need of evaluating the quality of life in people with brain injuries in both regular and uncommon circumstances. When assessing the quality of life of younger children and adolescents, it is advised that information be gathered from their parents as well, to provide the most accurate view of everyday life challenges.

Assessment of quality of life after TBI

Since TBI can have consequences in a variety of areas, it is essential to conduct ongoing assessments of cognitive, speech-language, emotional, and social capacities. A neuropsychological evaluation is especially important for those who have suffered serious injuries because more serious injuries have a greater impact on the person's overall functioning. It is also crucial for identifying impairments and setting long-term rehabilitation goals (Beauchamp et al., 2010).

Various instruments, such as The Quality of Life after Brain Injury (QOLIBRI), EuroQol-5D (EQ-5D), Health Utilities Index Mark 3 (HUI3), Short-form Health Survey (SF-36/ SF-12), The World Health Organization Quality of Life Questionnaire (WHOQOL-100), and others, are used to assess the quality of life after TBI, according to available literature data. To assess the quality of life in this population, the EQ-5D, HUI3, and SF-36 are recommended, as they assess different aspects of the impact of the injury and can be used in all age categories (Hofhuis & Spronk, 2014).

Some authors emphasize the role of the timing of the use of tools used to assess the quality of life in individuals with TBI. If the assessment is conducted too early, that is, within the first 6 months of the injury, an accurate view of the patient's contentment with the quality of life may not be provided. During the acute and subacute phases of the injury, these individuals are typically enrolled in focused rehabilitation programs,

and some of them are unable to fully return to their normal activities and reintegrate into the social context (Di Battista et al., 2012). Certain research findings indicate that even 5-year-old children may discuss their quality of life, necessitating the development of a specially constructed self-assessment questionnaire for the child population as well (Krenz et al., 2021).

According to recent studies, the strongest predictors of satisfaction with the quality of life one year after an injury are social environment support, namely support and integration into the social environment, but resilience and depression are also important (Aza et al., 2021). Because TBI typically causes long-term disability, some people who have been injured require long-term rehabilitation, especially in the area of emotional well-being. Rehabilitation benefits both patients and caregivers. People can regain their functionality in this manner. Some of them can re-enter the labour market and resolve their financial concerns. Finally, long-term rehabilitation can help to prevent the affected person's social isolation (Hoofien et al., 2001).

CONCLUSION

Based on a review of the current literature, it is possible to conclude that a rising number of researchers are interested in the quality of life of persons who have suffered brain damage, as indicated by the high number of studies published in recent years. Although researchers' primary focus has been on analyzing the implications of brain trauma in children or adults, attention has recently shifted to monitoring the long-term effects that childhood trauma can have on later development. The studies also focus on the long-term effects of juvenile brain injuries in adults. In light of this, the earlier viewpoint, which attributed the complete recovery in children to the plasticity of the immature brain, is increasingly being abandoned, and the effects of trauma on the development of children are being studied more closely, particularly the development of skills whose appearance is expected when the child reaches the appropriate calendar age. Empirical evidence suggests that even mild trauma in children can disrupt cognitive, verbal, social, or emotional development, but in adults, the severity of the injury often correlates with the manifestation of deficits in the aforementioned domains.

Younger individuals are less satisfied with their quality of life because of the various challenges they face when returning to "normal" life - continuing education, career opportunities, obtaining highly qualified occupations, social contacts, and so on. This fact necessitates highly focused rehabilitation goals aimed at improving the person's biopsychosocial functioning.

The existence of a wide range of psychosocial consequences affecting the quality of life of people with traumatic brain injury is supported by empirical data. The mentioned consequences worsen in direct proportion to the severity of the damage (particularly in adults) and also have an impact on daily functioning, which is why continuous assessment and support are not only important but also required. Throughout this process, efforts should be taken to ensure that all interventions are focused on the individual needs of children and adults with TBI, where it is also especially important to include the needs of family and caregivers. The ultimate goal of rehabilitation is not only the integration of individuals with TBI into the social environment but also inclusion, which allows them to live as well as possible by adapting the environment to their needs.

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