



## Original Article

# Symptom and Disability One Year After Traumatic Brain Injury

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### Abstract

TBI is a leading cause of death and disability worldwide. The effects of TBI can significantly disrupt the lives of those who are injured and survive. TBI can affect patients in the physical, cognitive, behavioral and emotional domains which appear from the acute phase and can remain long-term. This cross sectional survey aimed to examine the disability after TBI by the components of ICF and also to describe the symptom present in one year after TBI. TBI patients were recruited from the medical record data of patients admitted to the neurosurgery unit who at least 12 month after discharge from hospital and able to be followed up. The DRS was used for measured disability. Total 56 TBI patients were recruited in this study, 58.9% of the subjects were classified as mild TBI, while 37.5% and 3.6% of them were classified as moderate and severe TBI respectively. More than half of subjects (62.5%) reported of current symptoms with headache as a most common reported. Based on DRS was found that 83.9% of the subjects have no disability, whereas 3.6% had a mild disability, 5.45 had a partial disability, and 7.2% had a moderate disability. The results demonstrated that a TBI survivors face substantial disability and symptom 1 year after injury. To optimise health and well-being outcomes, clinicians need to identified the needs of patients with less severe TBI and treated during the post-acute period.

## INTRODUCTION

TBI is a leading cause of death and disability worldwide. The majority of TBI cases are due to road traffic injuries, which account for nearly 60% of all cases of TBI<sup>1</sup> The increase in road traffic injuries is also projected to become the third leading cause of global disease and the second leading cause of disease for low- and middle-income countries by 2020. The burden of TBI is manifested in all regions of the world, and is especially prominent in

low-and middle-income countries.<sup>1</sup> In Indonesia, based on the Indonesia Health Profile by the Ministry of health Republic of Indonesia, TBI is currently included in the top ten diseases in hospitalized patients. The number of TBI patients in 2010 was 25,281.<sup>2</sup>

The effects of TBI can significantly disrupt the lives of those who are injured and survive. TBI can affect patients in the physical, cognitive, behavioral and

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emotional domains which appear from the acute phase and can remain long-term.<sup>3-6</sup>

The WHO developed the International Classification of Functioning, Disability, and Health (ICF) framework for describing health and health-related states. The ICF development went through multiple revisions, including the original International Classification of Impairments, Disabilities, and handicaps (ICIDH) and the intermediate working draft, International Classification of Functioning and Disability (ICIDH-2) before reaching its current form.<sup>7</sup> In the ICF, "disability" was replaced with the simpler and more general term "activity". Handicap has been replaced with "participation restriction". Handicap and participation are different words for similar constructs, the latter designed to have a more positive slant.<sup>8</sup> In the ICF framework, a person's functioning is conceived as a dynamic interaction between health condition (disease, disorder, injuries, and trauma) and contextual factor using bio-psycho-social approach. The ICF consists of two parts including (1) functioning and disability and (2) contextual factor. Functioning and disability has two components; (1) body structure and (2) activity and participation. It can be used to indicate problems with a three components outcome; (1) impairment, (2) activity limitation, and (3) participation restriction.

The purpose of this study was to examine the disability after TBI by the components of ICF and also describe the symptom present in one year after TBI.

## METHODS

Patients fulfilling the following criteria were enrolled in this study: (1) diagnosed with mild to severe TBI, but oriented with respect to time, place and person at the time approached, (2) age 18-65 years, (3) at least 12 month after discharge from hospital and able to be followed up, (4) have no spinal cord injury, history or

current psychiatric disease, terminal illness, or comorbidity such as MI, COPD, and gout. Subjects were recruited from the medical record data of patients admitted to the neurosurgery unit at Kariadi Hospital. Total of 56 subjects were used in this study.

Disability was measured by Disability Rating Scale (DRS).<sup>9</sup> It consists of 8 items with a 29-point measure. The DRS was designed to measure changes in recovery levels of adults with TBI, where the total scores are meant to reflect the level of disability. The various items of DRS address all three WHO categories: impairment, activity limitation, and participation restriction. The first three items of the DRS ("Eye Opening", "Communication ability", and "Motor Response") are a slight modification of the GCS and reflect impairment ratings. Cognitive ability for "Feeding", "Toileting", and "Grooming" reflect the level of activity limitation. The "Level of Functioning" and "Employability" reflects participation restriction.<sup>10</sup> A score of zero meant the person had no disabling impairments detected by the scale, while the maximum score of 29 indicated vegetative death.<sup>11</sup> Total scores have been used to describe different clinical levels of disability as follows: none (0), mild (1), partial (2-3), moderate (4-6), moderately severe (7-11), severe (12-16), extremely severe (17-21), vegetative state (22-24), and extreme vegetative state (25-29) (Bellon et al.). The inter-rater reliability of in-person assessments with the DRS has been established ( $r = .97-.98$ ) and the test-retest reliability of the DRS has also been established (Spearman  $\rho = .95$ ).<sup>11</sup>

Demographic and health status data were collected and reviewed from each patient's medical record. This included age, gender, religion, marital status, educational level, occupation, average income, family status, time after injury, access to rehabilitation, and current symptom. In addition, the GCS was assessed on admission for classifying

the severity of TBI using the criteria (1) mild TBI with GCS 13-15, (2) moderate TBI with GCS 9-12, and severe TBI with GCS  $\leq$ 8.

## RESULTS

The characteristics of 56 subjects are shown in Table 1. The mean age of subjects was 33.84 (SD 12.56) years old with range from 18-59 years old. The majority of subjects were male (75%) with an average time after injury of 19.24 (SD 2.98) months, range from 13-24 months. About half (60.7%) of subjects was married and 17.9% had educational levels lower than junior high school. Although more than half

of the subjects worked as labors (73.2% before injury and 64.3% after injury), the number of jobless was increasing after injury from 5.4% to 10.8%. Majority of the subjects were Moslem who most (93%) of them living with the family with the number of family range from 0 to 9. Majority of the subjects diagnosed with TBI were caused by traffic accident.

Based on GCS, it was found that 58.9% of the subjects were classified as mild TBI, while 37.5% and 3.6% of them were classified as moderate and severe TBI respectively.

Table 1  
*Characteristic of Subjects (N=53)*

Variables	f	%	Mean (SD)
Age (year) (Minimum-Maximum=18-59)			33.84 (12.57)
Gender			
Male	42	75	
Female	14	25	
Religion			
Muslim	56	100	
Marital status			
Single	20	35.7	
Married	34	60.7	
Widow/Widower	2	3.6	
Level of education			
No schooling	1	1.8	
Elementary school	9	16.1	
Junior high school	12	21.4	
Senior high school	28	50	
Diploma	3	5.4	
Bachelor	3	5.4	
Occupation before injury			
Student	9	16.1	
Government employee	3	5.4	
Labors	41	73.1	
No occupation	3	5.4	
Occupation after injury			
Student	8	14.2	
Government employee	3	5.4	
Labors	39	69.6	
No occupation	6	10.8	
Time after injury (months) (Minimum-Maximum= 13-24)			19.27 (2.98)

Variables	f	%	Mean (SD)
Living together with family			
Yes	52	92.9	
No	4	7.2	
Number of families living together (Minimum-Maximum=0-8 persons)			3.7 (1.7)
Access to rehabilitation			
No	47	83.9	
Yes	9	16.1	
Use complementary therapy			
No	48	85.7	
Yes	8	14.3	
GCS on admission			12.83 (2.21)
Mild TBI (13-15)	33	58.9	
Moderate TBI (9-12)	21	37.5	
Severe TBI (< or equal to 8)	2	3.6	
Cause of injury			
Motorcycle accident	38	67.9	
Traffic accident	14	25	
Falling	3	5.4	
Violence	1	1.8	

Table 2  
The number and percentage of symptom of the subjects)

Variables	f	%
Current symptom present		
No	21	37.5
Yes	35	62.5
Headache*	30	53.5
Memory problem*	6	10.7
Fatigue*	3	5.3
Emotional problem*	2	3.5
Vision problem*	1	1.8
Cognitive problem*	1	1.8
Pain*	1	1.8
Stiff face*	1	1.8
Nose problem*	1	1.8

\*= each patient can have more than one symptom

The number and percentage of symptom of the subjects are shown in table 2. More than half of subjects (62.5%) reported of current symptoms as follows: headache (53.5%), problems with memory (10.7%), fatigue (5.3%), emotional problem (3.5%), visual problems (1.8%), cognitive problem

(1.8%) , pain (1.8%), stiff face (1.8%), and nose problem (1.8%).

Table 3  
The number and percentage of DRS of the subjects categorized by level of disability

Level of Disability	f	%
None (0)	47	83.9
Mild (1)	2	3.6
Partial (2-3)	3	5.4
Moderate (4-6)	4	7.2

The disability of the subjects based on DRS was found that 83.9% of the subjects have no disability, whereas 3.6% had a mild disability, 5.45 had a partial disability, and 7.2% had a moderate disability (Table 3).

## DISCUSSION

The majority of the TBI subjects in this study were male, which was similar to previous studies.<sup>12-18</sup> The WHO report (2004) on road traffic injury prevention reported that males account for 73% of deaths and 70% of all disability-adjusted life years (DALYs) lost because of road traffic injuries.

According to the cause of TBI, it was found that the majority of the subjects diagnosed with TBI sustained their injuries in road traffic accidents. This result was consistent with the second global status report on road safety by the WHO (2012) in that 90% of road traffic injuries occur in low- and middle-income countries, such as Indonesia. Similarly, it was also reported that in low- and middle-income countries, motorcycle riders account for a large portions of road traffic injuries.

Most of the subjects in this study were young adults ( $M = 33.84$ ,  $SD = 12.5$ ) with the median age of 32 years old. This finding was consistent with a previous study which reported that young adults accounted for the majority of TBI subjects.<sup>19,20</sup> Moreover, a report on the incidence of TBI showed that there was bimodal age distribution in adult populations.<sup>21,22</sup> The first peak occurs in young adults with motor vehicle crashes being the major cause of TBI. The second peak occurs within the elderly population with falls being the predominant cause of TBI.<sup>21,22</sup>

Regarding the employment status of TBI patients, it was found that the number of unemployed subjects increased from 5.4% before injury to 10.8% after injury. This finding may reflect that some TBI patients could not return to normal life after their injury. The TBI results in physical and functioning limitations which need long-term care. As reported in previous studies, more than a half of TBI patients had changed their vocational status after they encountered problems with employment.<sup>23</sup>

Consistent with those results, role limitations at work and school was confronted by TBI patients.<sup>20</sup>

More than a half of the subjects in this study reported having current symptoms such as headaches, memory problems, fatigue, the vision problems, emotional problem, cognitive problem, pain, stiff face, and nose problem. Some of patient reported having more than one symptom. This finding was consistent with previous studies which reported the physical impact of TBI on patients.<sup>3,5</sup> After three months, approximately half of the mild TBI subjects reported at least one persistent symptom, and the persistence of symptoms continued at one year after injury even though they received early active rehabilitation.<sup>5</sup> Among those symptoms reported in this study, headaches were the most common among the TBI subjects, which was consistent with a previous study.<sup>24</sup>

In this study only a lesser amount required access to rehabilitation. It was noted that only a small number of subjects joined a rehabilitation program in this study ( $n=9$ ). This reflects the situation of Indonesia, where access to rehabilitation units is limited. It is estimated that although over 80% of the world's people with disabilities live in low and middle income countries only 2% have access to rehabilitation services.<sup>11</sup> The TBI person who is admitted in a post acute rehabilitation program may have a better outcome. The outcome of TBI persons admitted to a post rehabilitation program at early admission (less than 1 year post injury) versus late admission.<sup>25</sup> It was found that all groups showed improvements between admission and discharge on measures of overall disability, independence, home competency, and productivity, and these gains were maintained at follow-up. In addition, the greatest gains were obtained in persons entering a post rehabilitation program within 6 months post injury.<sup>25</sup> Post acute neuropsychological rehabilitation can have long-term beneficial effects.<sup>26</sup> The

rehabilitation group showed significantly lower levels of brain injury symptoms and higher levels of competency. They also rated internal locus of control and general self-efficacy as significantly higher, anxiety and depression levels significantly lower, and QoL significantly higher in the rehabilitation group.<sup>26</sup> Moreover, a systematic review of the effectiveness of multidisciplinary rehabilitation following acquired brain injury in adults of working age showed strong evidence that more intensive programs were associated with more rapid functional gains.<sup>27</sup> The impact of multifaceted rehabilitation services on functional outcomes after TBI for individuals with significant physical and cognitive difficulties, as well as those with added behavioral complications. The result showed that the rehabilitation treatment model achieved significant functional gains for neuropsychologically-impaired adults with and without associated behavioral and substance problems.<sup>28</sup>

Moreover, In Indonesia, besides modern medicine, there are traditional treatments that have been lasted a long time and are entered in the community. TBI patients after discharge from hospital are less likely to follow up in a hospital. More commonly they prefer traditional treatments such as herbs or massages or visiting spiritual healer. Even though in the community, TBI patients can access services from community health center. However, community health center only provide primary care for simple disease or symptom. Caring for TBI patients after the acute phase, like other disabled groups, is mostly done at home with family. Because traditional medicine has become part of Indonesian culture and is also more available, it is more likely to be used for curing patients. As reported in WHO-South East Asia regional (Chaudhury & Rafei, 2001), traditional medicine and traditional practitioners in Indonesia, who have developed in line with community needs, are to provide the alternative health services. These practitioners are very

popular and familiar in the community, because they are easily accessible and valuable, and have been proved empirically safe.<sup>29</sup>

Those symptom and disability which persist 1 year after injury would be affecting the Quality of Life (QoL) of patients with TBI. It is evidence that a lesser degree of disability was related to higher QoL.<sup>30</sup> Cognitive dysfunction, the activity of daily living (ADL) dysfunction, and GOS at the time of hospital discharge for TBI patients related significantly to QoL.<sup>31</sup> Congruent with previous studies, patients with lower functional independence have significantly more decreased rates of life satisfaction than patients with greater functional independence.<sup>32</sup>

## CONCLUSION

TBI survivors after 1 year post injury demonstrated face substantial disability and symptom. To optimize health and well-being outcomes, clinicians need to identify the needs of patients with less severe TBI and treated during the post-acute period.

## CONFLICTS OF INTEREST

The author declares that none of her had any conflict of interests.

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