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NEUROPSYCHIATRIC SEQUELAE OF TRAUMATIC BRAIN INJURY

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ABSTRACT:

The present research was conducted to assess neuropsychiatric effects of traumatic brain injury. Another objective of present research was to describe the existing literature on epidemiology, classification, risk factors and mechanisms of TBI. The sample of this study was consisted of 155 patients (both male and female) taken from Nishter Hospital Multan. Purposive sampling was used to collect the sample. The Depression, Anxiety and Stress Scale was employed to collect the data. The age range of sample was 18 to 60 years (Mean= 28.3 ± SD = 6.0). Findings of this study showed that depression, anxiety and stress were significantly correlated with traumatic brain injury. Female patients suffered more in psychological problems. Furthermore psychological issues rised as age increased.

INTRODUCTION

According to world health organization (WHO), Traumatic brain injury will surpass several diseases as the major cause of mortality and disability by the year 2020 (Hyder et al., 2007). More burden (90%) is on emergent countries where higher risk factors for TBI are present and insufficiently prepared health system are working (Hofman et al., 2005). To overcome and control this matter need is to convene the gap in data on prevalence, sequelae, risk factors, treatment modalities, and daily life impacts of TBI. In Pakistan a total of 260,000 patients were admitted with head injury from 1995-1999 (Ashman et al, 2009). According to the studies there is a significant sex variation in TBI

patients. Men are nearly twice (75%) as susceptible to suffering TBI as women (25%) (Hyder et al., 2007). In Pakistan and all over the world the prevalence of TBI increased among adolescents and young adults. According to Mass, Stocchetti, & Bollock (2008) peak age is similar for men and women. Traffic accidents are the major cause of head injury mostly in young patients 50% . Falls (21%) is the second most prevalent source of injury. Violence and injuries from sports or recreational activities (10%) are the next most occurring cause (McAllister,1992). According to the number of studies conducted in developed and developing countries the vast majority of TBIs are mild in severity accounting for 52%, moderate30%, and severe 18% (Sosin et al., 1996).

Neuropsychiatric disorders of TBI: Neuropsychiatric disorders following traumatic brain injury are numerous. Most commonly observed disorders are depression, stress, apathy, mood disorders, cognitive deficits, anxiety disorders and behavioral problems (McAllister, 1992).

Cognitive deficit is the most occurring chronic impairment after traumatic brain injury (Sosin, Sniezek, & Thurman, 1996). One of the possible reasons is that the most effected part of brain due to traumatic injury is the frontal lobe. Cognitive deficits are linked with frontal lobe injury and are worst in the acute post injury period. These deficits include impaired attention and concentration, memory loss, language problems and disturbances of executive functioning (perception, planning and organizing). Prevalence of cognitive deficits following TBI is 25%-70%. There is large amount of quality evidence for the treatment of cognitive deficits in the context of traumatic brain injury. There is strong evidence that the use of donepezil at 5mg-10mg/day5. results cognitive improvement and may be used effectively in the treatment of cognitive deficits following TBI (McAllister, 1992).

According to Diagnostic statistical manual IV (DSMIV) major depression(MD) is characterized by loss of interest in daily activities, significant weight less, insomnia, fatigue, feelings of worthlessness & recurrent thoughts of death (Washington, 2000). Left dorsolateral frontal and left basal ganglia regions are associated with major depression Anxiety, aggression, sleep problems, alcohol use, lower income levels, poor social functioning, and negative thinking are most important risk factors for the development of major depression after TBI (Kaelin et al. 2010). Mania is very rare after TBI. According to DSMIV most common features of mania are, decreased need of sleep, distractibility, excessive involvement in Pleasurable activities & inflated self esteem (Washington, 2000). prevalence of mania in TBI patents is 9% (Ruedrich et al.,1983). which is less common than depression.

Anxiety disorders are also observed in sustained TBI patients. Prevalence of anxiety disorder in TBI patents is 11% to 70% (Hiott and Labbate, 2002). According to the studies lesions to the right hemisphere are more often associated with anxiety disorder than left sided lesions. There is level ii evidence for the use of cognitive therapy in the treatment of anxiety disorder following TBI. Antipsychotics and benzodiazepine should not recommend

because these drugs may cause memory problems and delayed neural recovery. Although there is level v evidence that carbamazepines reduce anxiety after TBI (Medd & Tate, 2000). Overall, there is lack of evidence to refute or support the recommendation of commonly used medications including SSRIs, benzodiazepines and TCAs in the treatment of anxiety after TBI and need further research.

Behavioral problems are also commonly observed in both acute and chronic phases after TBI but poorly understood. Its prevalence in TBI patients is about 50%. Behavior problems with cognitive (e.g. attention difficulties loss of memory conceptual disorganization) mood (e.g. depression, irritability) & behavioral manifestations (e.g. aggressive impulsive, socially inappropriate) are observed in TBI patients. According to the studies methylphenidate (Mooney & Haas, 1993). Antipsychotic are the best option for the treatment of aggression following TBI. However there is no medication that is permitted by the FDA particularly for the treatment of aggression.

Psychotic symptoms are rarely found in patients with TBI. Loss of touch with reality, hallucination and delusion are the most common features of psychotic symptoms. According to the researches both right and left hemispheres have been implicated in the beginning of psychotic symptoms. Its prevalence is 3% to 8% in TBIs .There is level v evidence about the effectiveness of olanzapine for the treatment of psychotic disorders in TBI patients (Levine and Finkelstein, 1982).

Symptoms e.g. headaches, insomnia may also be present in the patients with TBI but careful examination should be done to diagnose whether these symptoms are isolated or the part of any other syndrome. Daily Life of Traumatic Brain Injured Patients: Traumatic brain injury can lead to numerous difficulties in areas that include activities of daily living e.g. physical (including pain) psychological (e.g. affective disorders, personality changes) social (especially vocational status and relationship with family friends) and cognitive. Fatigue after traumatic brain injury is common. Sleep disturbances and daytime somnolence are also reported in sustained TBI patients.

Conflict in social relationships is also observed in TBI patients. Traumatic brain injury often results loss of friendships. Studies describe that forming new relations also often become difficult because such people have restricted interaction with others and constraints on mobility further reduces opportunities to meet potential new friends (Morton & wehman, 1995).

TBI patients are higher at risk to lose their jobs. Loss of job is a major determinant of lower quality of life. According to studies TBI patients also have minimum number of leisure activities after injury. They are poor in their Personal Care and Social Relations. Somatic Complaints (e.g. Pain, Fatigue) are also frequently observed in TBI patients. On the basis of above mentioned studies it can be concluded that there is a strong relationship between traumatic brain injury and quality of life of sustained TBI patients.

Psychosocial risk factors for neuropsychiatric disorders: With an increasing age, premorbid personality and use of substance some other psychosocial factors e.g. financial problems, family conflicts, poor interpersonal skills, and problems at work are also important contributors in the development of neuropsychiatric sequelae in sustained TBI patients (Hitlock, Stoll, & Rekh Dahl, 1977).

Table 1 Neuropsychiatric Sequelae, percentage according to age, common features and Evidence based multidisciplinary treatments.

Neuropsychiatric Sequelae	% age	Common Features	Evidence based multidisciplinary treatments
1. Anxiety Disorder	11-70%	Feelings of Apprehension, avoidant behavior, emotional numbing	Carbamazepine (Anticonvulsant) iv Cognitive behavior therapy ii
2. Psychosis	3%-8%	Loss of touch with reality, disorganized thought process, presence of hallucination and delusions.	Olanzapine v
3. Behavioral Problems	50%	Poor interpersonal skills, poor self-care habits, aggressive behavior etc.	Carbamazepine (Anticonvulsant) i Methylphenidate (psychostimulant) ii Anger management training ii
4. Major Depression	15% - 29%	Loss of pleasure, suicidal thoughts, negativism, with or without psychosis	Citalopram(SSRI) ii Desipramine(tricyclic) ii Teaching coping skills ii Sertraline(antidepressant) conflicting
5. Mania	9%	Distractibility, inflated self-esteem, with or without psychosis	Lithium iii Valproate iii
6. Cognitive Deficits	25% - 70%	Poor attention & concentration, memory loss, disturbance of executive functions, language problems	Amantadine conflicting Methylphenidate (psychostimulant) conflicting Donepezil (cholinesterase inhibitor) i

The present study has following objectives.

- (1) One of the most important aims of this study is to reveal the link between Neuropsychiatric effects and TBI.
- (2) To differentiate Neuropsychiatric effects of TBI according to gender and age of patients.
- (3) Understanding the prevalence of neuropsychiatric impairments of TBI. This will help to develop the strategic plans to meet the unique needs of patients in the local context.
- 4) A brief discussion of preventing measures in various culture and evidence based multidisciplinary treatments in TBI will be outlined. This aim was designed to meet two objectives(i) Those treatments will be identified for which strong evidence for effectiveness is missing and therefore need further research. Those treatments will be identified for which research evidence is strong and should be used effectively.
- (5) Last but not least the present study seeks to add the authentic literature on the prevalence, deficits and treatment of TBI.

METHODS

Sample

The Sample of this study was comprised of 155 TBI patients (male =105, female =50). Mild and moderate injury patients were included in the sample. TBI sample was taken from Nishtar Hospital Multan. The age range of patients was 18 to 46 years (Mean= 28.3 \pm SD = 6.0). Purposive sampling technique was employed to collect the sample. The sample with any prior clinical or psychiatric illness was not included in the study.

Instruments

Following instruments were used to collect the data.

Demographic Information Sheet:

To collect the demographic informations age, gender, and time of injury were included.

Depression Anxiety And Stress Scale (DASS):

The Depression, Anxiety and Stress Scale developed by Lovibond and Lovibond (1995) consisted of 21 items. This is a set of three scales and used to measure states of depression anxiety and stress. Each of the scale comprised of seven items. This scale is suitable from age 12 and clinical and non-clinical settings for diagnosis and screening of mental health issues. Alpha reliability of this scale is .82.

Procedure

Written permission from the head of department of medical institutes was obtained. Patients consent was also obtained. They were briefed about the nature, purpose of study. Data was collected after two weeks of injury. It was ensured that patients were quite comfortable and able to respond. Study meets the ethical standards. Patients were also ensured that data collected from them will be kept confidential. For analysis of the data, SPSS version 23 was employed. Descriptive statistics, Pearson correlation and t-test statistical technique was used to analyze the findings.

RESULTS

Table 2

Correlation between psychological problems (depression, anxiety and stress) and TBI (N= 155)

Variables	1	2	3	4	Alpha
TBI	-	.64**	.68**	.66**	-
Depression	-	.-	.49**	.48**	.79
Anxiety	-	-	-	.62**	.91
Stress	-	-	-	-	.89

Table 2 shows significant positive correlation of Psychological problems with TBI. The alpha coefficient reveals that scales of this study are highly reliable.

Table 3: Comparison between male and female TBI patients according to psychological problems (N= 155).

Psycholo. Problems	Male (n=95)		Female (n=60)		t	df	P	95% CI		Cohen's d
	M	SD	M	SD				LL	UL	
Depression	21.79	4.07	25.77	4.41	-3.51	153	.001	-4.16	-2.21	0.46
Anxiety	22.06	4.01	25.78	3.31	-2.21	153	.001	-5.13	-2.28	1.22
Stress	24.06	3.15	26.78	5.12	-3.21	153	.001	-3.13	-2.28	1.48

Note. Psycholo. = psychological problems

Above table shows more psychological problems in female TBI patients as compared to male patients.

Table 4: Comparison of psychological problems among TBI patients according to their age (N= 155).

Psycholo. Problems	Age group1 (18 to 40)		Age group2 (41 to 60)		<i>t</i>	<i>df</i>	<i>P</i>	95% CI		Cohen's <i>d</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>				<i>LL</i>	<i>UL</i>	
Depression	22.21	4.17	26.24	5.32	- 4.41	153	.001	-3.14	-4.22	1.46
Anxiety	24.23	4.11	27.24	3.32	- 3.22	153	.001	-3.14	-4.21	.45
Stress	26.23	4.25	28.25	4.31	- 2.11	153	.001	-2.14	-4.18	1.45

Note. Psycholo. = psychological problems

Above table shows more psychological problems among patients with more age.

DISCUSSION

The aim of this study was to assess neuropsychiatric sequelae following traumatic brain injury (TBI). The authors accentuate the close link between psychiatry and TBI. Another objective of present research was to review the existing literature on epidemiology, classification, risk factors and mechanisms of TBI. The present research also provides the evidence-based guideline to direct the psychotherapeutic, pharmacological and other biological and rehabilitation interventions for neuropsychiatric disorders following TBI.

Results of this study showed that TBI patients suffer in depressive disorders. Findings of previous researches are also in line with our results. Major depression occurs approximately 14% to 29% of patients with TBI (Rapoport et al. 2005). Findings of this study also showed significant positive correlation between depression, anxiety and stress and TBI patients. Previous studies have also reported anxiety disorders (phobias, panic attacks, generalized anxiety disorder, posttraumatic stress and obsessive compulsive disorder) following traumatic brain injury. Anxiety is commonly observed in TBI patients. Our findings also prove previous researches. Furthermore psychological disorders were more prevalent among female TBI patients. Age is also important in these patients. TBI patients with more age suffer more in psychological issues. Literature and findings describe that there is need of randomized controlled studies and more research is required to provide evidence based treatment recommendations for neuropsychiatric disturbances that occur in the result of TBI.

Limitations And Suggestions Of The Study:

Sample size was small and collected only from one city. In order to generalize sample should be large and taken from diverse cities and cultures.

CONCLUSION

It is difficult to make the strategic plans for TBI prevention unless the reliable data of incidence, risk factors and mortality rate is not available. Although differences in traumatic brain injury study methods result in diverse estimates of numbers and make comparison of inter study difficult but when exclusion and inclusion criteria are specified, the relative incidence and trends are parallel. Even variation in numbers exists, some general trends are universal e.g. mild TBI is most common, males are higher at risk, the incidence of TBI increases to peak in young adults and adolescents and low income countries are higher at risk. Psychological problems are very much prevalent among such patients and females suffer more in these psychological problems.

Although for TBI patients psychotherapy is highly effective, pharmacological treatment is also needed, but there is lack of randomized control studies in this population. The present study not only emphasizes on the use of multidisciplinary therapies but also enables the clinicians to understand treatment preferences and barriers for the better treatment of neuropsychiatric conditions.

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