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Understanding the Misconceptions about Traumatic Brain Injury among Indian Young Adults

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Abstract

Background Traumatic brain injuries (TBIs) pose significant challenges globally. The implementation of TBI prevention programs is highly reliant on the prevalent misconceptions. There is a paucity of research exploring the misconceptions regarding TBIs among young adults in India. Therefore, the present study explores the prevalence and nature of misconceptions regarding TBIs among young adults.

Materials and Methods This prospective survey study, with 150 participants aged 18 to 25 years, utilized the Common Misconceptions about Traumatic Brain Injury questionnaire comprising 40 items across 7 domains. The data was analyzed using Jamovi (2.3.28 solid).

Results The results revealed that the participants have high rates of misconception regarding brain injury sequelae, brain damage, and seatbelt prevention and low rates regarding the posttraumatic amnesia. Overall, females exhibited a higher rate of misconceptions compared with males. Higher years of education were associated with lesser misconceptions. Prior exposure to TBI had no significant impact on overall awareness of TBI.

Conclusion This study highlights important misconceptions about TBIs among young adults. Education and gender might play a vital role in these misconceptions. These findings might inform the development of preventive modules for TBIs and to enhance their effectiveness.

Keywords
- traumatic brain injury
- misconceptions
- prior exposure
- brain damage
- prevalence

Introduction

The "silent epidemic," also known as traumatic brain injury (TBI), is a significant public health concern and the leading cause of mortality and disability worldwide among all trauma-related injuries. TBI has been defined as "an alteration in brain function or other evidence of brain pathology by an external force caused by an object that penetrates the skull and enters the brain, a powerful bump, blow, or jolt to the head or body."[1] Certain wounds are regarded as primary, since the harm occurs right away. Some TBI effects may be secondary, which means they may develop gradually over several hours, days, or even weeks. Depending on the type of TBI, there may be temporary or short-term issues with a person's ability to think, understand, move, communicate, and act. Permanent and serious impairments, as well as death, can result from more severe TBI. The response mechanisms that take place following the initial head trauma are also what cause these subsequent brain damages. TBI presents in various forms ranging from mild alterations of consciousness to an unrelenting comatose state and death. In the most severe form of TBI, the entirety of the brain is affected by a diffuse type of injury and swelling.[2]

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Patients who survive moderate-to-severe TBI frequently suffer from a wide range of cognitive deficits and behavioral changes due to diffuse axonal injury. These deficits include slowed information-processing and impaired long-term memory, attention, working memory, executive function, social cognition, and self-awareness. Mental fatigue is frequently also associated and can exacerbate the consequences of neuropsychological deficits. Personality and behavioral changes can include combinations of impulsivity and apathy. Even mild TBI raises specific problems: while most patients recover within a few weeks or months, a minority of patients may suffer from long-lasting symptoms.[3] According to the World Health Organization (WHO), TBI was anticipated to be one of the primary causes of mortality and disability by the year 2020. It is a major public health issue because: it is one of the largest causes of brain damage, resulting in high rate of morbidity and mortality worldwide and is estimated to surpass many diseases as a major cause of death and disability by 2020.[3,4] India being one of the developing nations in the world with a high population density, has become an unenviable destination of having the highest rate of TBIs in the world. Prevalence studies have established that approximately 100,000 lives are lost every year with over 1 million suffering from serious TBIs in India.[5] Extensive research has shown that TBI has become a major cause of morbidity, mortality, disability, and economic losses in developing countries like India, where 1.5 to 2 million people are injured and 1 million succumb to death each year due to TBI. Road traffic accidents (RTAs) are the primary cause of TBI, followed by falls and violence, with alcohol involvement present in 15 to 20% of cases. Individuals aged between 14 and 35 years report the most cases and the male members of the society are at major risk for head injuries.[5,6]

An accurate estimate of the incidence and prevalence of TBIs for individuals between 0 and 35 years of age was calculated.[7,8] The lowest incidence rates occurred between 5 and 10 years of age, and the highest rates between 18 to 35 years of age. Several Indian studies have highlighted that around 10% of worldwide RTA fatalities were accounted for in India.[9,10] Despite enough efforts on the part of governmental and nongovernmental organizations to reduce the rates of RTAs and thereby reducing the rates of consequent fatalities and disabilities, the number of RTAs is on the rise. One of the possibilities why people continue to engage in rash driving or assault is possibly due to the lack of awareness or misconceptions people hold regarding TBIs which can possibly result from such accidents. Moreover, the myths and misconceptions about TBIs among the survivors of TBIs and their families can affect the recovery process and overall functional outcomes.

The most common misconceptions reinforced in the popular media, for example, cinema and television, are that a second head injury might reverse the memory function, and seatbelt use results in as many brain injuries as it does avoid. Other common myths relate to the inability of brain injured individuals to remember who they are or recognize others, as well as the notion that serious brain injuries can be completely recovered from. These myths may have a variety of detrimental consequences on TBI patients and their rehabilitation process. Studies have shown that these misunderstandings and misconceptions among people with TBI and their families can result in feelings of frustration and inadequacy, which can negatively affect the course of therapy. These misconceptions about TBIs are rampant. Over 20 years ago, Gouvier et al[11] administered a survey to the lay public and found numerous false beliefs regarding TBIs and TBI survivors.[11] Since that time, several researchers have confirmed that misperceptions about TBI persist and are widely endorsed across Britain, Australia, the United States, and Canada. TBI is responsible for nearly 30% of all injury deaths in India, according to the WHO, making it a prominent cause of death and disability.[12–15]

Despite the devastating consequences of TBIs, TBI misconceptions are common among health care professionals[15] and family members.[16] In India, perhaps such TBI misconceptions among young adults in India were not yet documented. With over 1 million survivors in India requiring TBI care, poor awareness and misconceptions among this age group must be assessed to strengthen the rules and the curriculum in the Indian context.[17] Therefore, in the light of this the present study aims to understand these misconceptions among young adults in the Indian context. This information will further aid in creating modules and formulating curriculum for schools and colleges to strengthen the knowledge in the field of head trauma, specifically TBIs, and clarify the misconceptions which might be fatal to one's life or lead to lifelong disabilities.

Materials and Methods

Study Design and Sample

This prospective study followed a survey research design with a sample of 150 participants, in the age range of 18 to 25 years of age, residents of India, with functional knowledge of English language. Convenience sampling was adopted and the readily available pool of participants was chosen for the data. Individuals with any mental or neurological disorder or lack of fluency in English were excluded from the study.

Procedure

The prospective study was approved by the Institutional Review Board of the parent institution. The study survey was created using Google Forms and was circulated on various social media platforms, for reaching out to potential participants. Informed consent was sought from all the participants who met the inclusion criteria. Sociodemographic details were obtained.

Study Instrument

The present study used the Common Misconceptions about Traumatic Brain Injury (CM-TBI) questionnaire. CM-TBI is a 40-item self-report questionnaire with 7 key domains, namely, prevention, brain damage, brain injury sequelae, unconsciousness, amnesia, recovery process, and rehabilitation. For each item under CM-TBI, the participants must respond on a 4-point Likert scale (true,

probably true, false, and probably false) to indicate their agreement or disagreement. The CM-TBI questionnaire has been widely used in the study exploring the myths and misconceptions surrounding TBI in various contexts.[18,19]

Data Analysis

Data from the questionnaire responses was coded and entered in the database and analyzed using Jamovi (2.3.28 solid), an open-source software. All demographic data was analyzed using frequencies and percentages that described the sample. The demographic data collected here included participant's age and gender, area of residence, and prior exposure to brain injury. Thus, descriptive statistics was used as the data analysis method for the proposed study.

Results

Sample Characteristics

►**Table 1** shows the sociodemographic characteristics of the sample. The age of participants ranged from 18 to 25 years (mean ± standard deviation [SD] = 21.5 ± 1.80) where 51.7% were younger (18–21 years) and 48.3% were older (22–25 years). The years of education ranged from 12 to 17 (mean ± SD = 15.2 ± 1.11), where majority of the population had studied up till graduation. The sample had 56% females and 44% males. Majority of the population were Hindu (69.3%) and the rest of the population were from other religious backgrounds (30.7%). Among the overall population, 17.3% of the participants had a prior exposure to TBI whereas 82.7% did not have any prior exposure to TBI.

Misconceptions about TBIs: Items of the CM-TBI Questionnaire

Misconceptions varied across the seven domains, namely, seatbelt prevention, brain damage, brain injury sequelae, unconscious, amnesia, recovery, and rehabilitation. ►**Table 2** indicates that domains related to brain damage (mean ± SD = 3.07 ± 1.20) were identified as the categories about which the participants had the highest rate of misconception followed by brain injury sequelae (mean ± SD = 6.59 ± 1.93). This finding closely aligns with the results obtained in a previous epidemiological study conducted among nursing students in India in 2019. Domains on brain damage (81.1%) had the highest rate, while amnesia domain (42.0%) had the lowest rate of misconception. While the seatbelt prevention domain (mean ± SD = 2.39 ± 1.19) had a modest rate of misconception, the lowest rate of misconception was observed for the amnesia domain (mean ± SD = 1.97 ± 0.983).

Table 1 Sociodemographic variables ($N = 150$)

Variable	Mean ± SD or *N* (%)
Age (y)	
Younger	77 (51.7)
Older	72 (48.3)
Religion	
Hindu	104 (69.3)
Others	46 (30.7)
Gender	
Male	66 (44)
Female	84 (56)
Years of education	15.2 ± 1.11
Prior exposure	
Yes	26 (17.3)
No	124 (82.7)

Abbreviation: SD, standard deviation.

Table 2 Descriptive statistics of study variables

Domain	Mean ± SD	Shapiro–Wilk	
		w	*p*
Seatbelt prevention	2.39 ± 1.19	0.863	< 0.001
Brain damage	3.07 ± 1.20	0.753	< 0.001
Brain injury sequelae	6.59 ± 1.93	0.881	< 0.001
Unconsciousness	1.68 ± 0.854	0.871	< 0.001
Amnesia	1.97 ± 0.983	0.901	< 0.001
Recovery	6.34 ± 1.71	0.966	< 0.001
Rehabilitation	1.83 ± 0.865	0.863	< 0.001
CM-TBI total	23.9 ± 4.73	0.949	< 0.001

Abbreviations: CM-TBI, Common Misconceptions about Traumatic Brain Injury; SD, standard deviation.

As mapped out in ►**Table 3**, items 5, 11, 15, 16, 17, and 38 showed the highest percentages of misconceptions. Of the participants, 86.7% believed that problems with speech, coordination, and walking can be caused by brain damage; 86.7% believed that head injury can cause brain damage even if the person is not knocked out; 82.7% believed brain injuries may cause one to feel depressed, sad, and hopeless; 85.3% believed it is common for people to experience changes in behavior after a brain injury; and 82% believed that drinking alcohol may affect a person differently after a brain injury. Majority of the population reported relatively low but significant misconceptions in the brain damage domain. Of the participants, 66.7% believed that it is obvious that someone has brain damage because they look different from people who do not have brain damage, 76.7% believed that whiplash injuries to the neck can cause brain damage even if there is no direct blow to the head, and 77.3% believed that a little brain damage does not matter much, since people only use a part of their brains anyway. Furthermore, participants reported fewer misconceptions in the items slow recovery may continue even 1 year after injury in the recovery domain (18.7%) and item people with brain injury can forget who they are and not recognize others, but be normal in every other way in the amnesia domain (28%).

Association of Misconceptions with sociodemographic Characteristics

The overall mean score for our sample was 23.9 with SD of 4.73. The research found no significant variations in the

Table 3 Number of participants with misconceptions about TBIs: Items of the CM-TBI questionnaire

Domain	Items	Misconceptions
Prevention	1. You do not need seatbelts as long as you can brace yourself before a crash	112 (74.7%)*
	2. It is more important to use seatbelts on long trips than in driving around town	86 (57.3%)
	3. It is safer to be trapped inside a wreck than to be thrown clear	55 (36.7%)
	4. Wearing seatbelts causes as many injuries as it prevents	105 (70%)*
Brain damage	5. A head injury can cause brain damage even if the person is not knocked out	130 (86.7%)*
	6. A little brain damage doesn't matter much, since people only use a part of their brains anyway	116 (77.3%)*
	7. It is obvious that someone has brain damage because they look different from people who don't have brain damage	100 (66.7%)*
	8. Whiplash injuries to the neck can cause brain damage even if there is no direct blow to the head	115 (76.7%)*
Brain injury sequelae	9. It is common for people with brain injuries to be easily angered	85 (56%)
	10. It is possible that a person's personality will change after a brain injury	115 (76.7%)*
	11. Problems with speech, coordination, and walking can be caused by brain damage	130 (86.7)*
	12. Problems with irritability and difficulties controlling anger are common in people who have had a brain injury	113 (75.3%)*
	13. Most people with brain damage are not fully aware of its effect on their behavior	107 (71.3%)*
	14. Brain injury patients usually show a good understanding of their problems because they experience them every day	64 (42.7%)
	15. Brain injuries may cause one to feel depressed, sad, and hopeless	124 (82.7%)*
	16. Drinking alcohol may affect a person differently after a brain injury	123 (82%)*
	17. It is common for people to experience changes in behavior after a brain injury	128 (85.3%)*
Unconscious	18. When people are knocked unconscious, most wake up quickly with no lasting effects	80 (53.3%)
	19. People in a coma are usually not aware of what is happening around them	97 (64.7%)
	20. Even after several weeks in a coma, when people wake up, most recognize and speak to others right away	75 (50%)
Amnesia	21. People usually have more trouble remembering things that happen after an injury than remembering things from before	103 (68.7%)*
	22. Sometimes a second blow to the head can help a person remember things that were forgotten	89 (59. %)
	23. A person with a brain injury may have trouble remembering events that happened before the injury, but usually does not have trouble learning new things	62 (41.3%)
	24. People with brain injury can forget who they are and not recognize others, but be normal in every other way	42 (28%)
Recovery	25. Recovery from a brain injury usually is complete in ~5 months	87 (58%)
	26. Complete recovery from a severe brain injury is not possible, no matter how badly the person wants to recover	85 (56.7%)
	27. Once a person is able to walk again, his/her brain is almost fully recovered	77 (51.3%)
	28. Slow recovery may continue even 1 year after injury	28 (18.7%)
	29. People who have had one brain injury are more likely to have a second one	87 (58%)
	30. It is necessary for a person to go through a lot of physical pain to recover from a brain injury	70 (51.3%)
	31. Once a person with a brain injury realizes where they are, they will always be aware of this	77 (51.3%)
	32. A person who has recovered from a head injury is less able to withstand a second blow to the head	58 (38.7%)
	33. A person who has a brain injury will be "just like new" in several months	46 (30.7%)
	34. Asking persons who have had a brain injury about their progress is the most accurate, informative way to find out how they have progressed	82 (54.7%)

Table 3 (*Continued*)

Domain	Items	Misconceptions
	35. It is good advice to remain completely inactive during recovery from a brain injury	108 (72%)*
	36. Once a person recovering from a brain injury feels 'back to normal' the recovery process is complete	92 (61.3%)
	37. How quickly a person recovers depends mainly on how hard he or she works at recovering	54 (36%)
Rehabilitation	38. "Cognitive" refers to thinking processes such as memory, attention, and learning	123 (82%)*
	39. "Cognitive" refers to the ability to move your body	86 (57.3%)
	40. The primary goal of brain injury rehabilitation is to increase physical abilities such as walking	65 (43%)

Note: *denotes the items where the rates of misconceptions were found to be high or 66% and above.
Abbreviations: CM-TBI, Common Misconceptions about Traumatic Brain Injury; TBI, traumatic brain injury.

Table 4 Comparison of CM-TBI scores between various groups

Groups	*N*	Median	IQR	Mann–Whitney *U*	*p*-Value	Effect size
Gender						
Male	66	22	8.00	1449	< 0.001[a]	0.477
Female	84	26	4.00			
Prior exposure						
Yes	26	24.50	5.00	1500	0.577	0.0698
No	124	25	6.00			

Abbreviations: CM-TBI, Common Misconceptions about Traumatic Brain Injury; IQR, interquartile range.
[a]*p*-value significant at 0.05 level.

overall misconceptions regarding TBI when considering factors such as age, religion, years of education, or prior exposure among the participants. However, ►**Table 4** shows the comparison of total CM-TBI scores between various groups based on gender (male and female) and prior exposure (yes and no). The table shows that participants showed significant misconceptions indicating that females (median = 26) had higher misconceptions than males (median = 22). It is important to know that prior exposure had no significant impact on the overall misconceptions of the population.

►**Table 5** shows the correlation between CM-TBI scores, age, and years of education. The table reported that years of education correlated negatively with the overall CM-TBI scores and were statistically significant indicating that individuals with more years of education tend to have fewer misconceptions about TBI. As participants' age increases, their total score on misconceptions about TBI tends to decrease. In simpler terms, older participants are more likely to have fewer misconceptions about TBI compared with younger participants. The magnitude of –0.412 suggests a moderate negative correlation, however, it was found not to be statistically significant. The table provides valuable insights into the relationships between these variables, suggesting that both years of education and age may be associated with differences in misconceptions about TBI, with education having a smaller effect (–0.200) compared with age (–0.412).

Table 5 Intercorrelation matrix

	CM-TBI total
Years of education	–0.200[a]
Age	–0.412

Abbreviation: CM-TBI, Common Misconceptions about Traumatic Brain Injury.
[a]*p*-value significant at 0.05 level.

Discussion

To improve the rules and curriculum in the Indian context for the more than 1 million TBI care-requiring survivors, it is essential to evaluate the limited awareness and prevalent misconceptions. Reiterating this, the current study found significant misconceptions regarding TBIs among individuals aged between 18 and 25 years. The overall mean misconception score was found to be 23.9 for the present sample. Nearly 61.3% of our sample had an overall misconception score higher than the mean score (> 24).

The highest rate of misconceptions was seen in the domains of brain damage. Eighty-six percent of people believe that one will not suffer from brain injury if they are not knocked out (►**Table 3**, item 5). Similarly, a large chunk of our study participants had misconception in the domains of brain damage. Note that 86.7% of people believed that brain damage cannot cause problems with speech, coordination, and walking (►**Table 3**, item 11). Note that

85.3% of people believed that it is not common for people to experience change in behavior after a brain injury (►**Table 3**, item 17). These findings contradict earlier studies which did not observe such high prevalence of misconceptions in the domains of brain damage and brain injury sequelae.[20,21] The discrepancy may stem from various factors. Differences in sample demographics, educational backgrounds, and cultural contexts could lead to varying levels of awareness and understanding of TBIs. Additionally, variations in survey methodologies, including question wording and response options, may influence participants' interpretations and contribute to discrepancies in observed prevalence rates of misconceptions.

On the other hand, the study found relatively lower rates of misconceptions in the domains of amnesia (►**Table 3**, item 24) and unconsciousness (►**Table 3**, item 20). Again, these findings are in contrast with another study which explored these misconceptions among South African university students where the two domains reported the highest misconceptions.[21] The discrepancy in rates of misconceptions regarding amnesia and unconsciousness between the current study and the study conducted among South African university students[21] may stem from cultural and educational differences, variations in study populations, methodological variances, and temporal factors. These factors can influence individuals' understanding and awareness of TBIs and associated misconceptions, leading to contrasting findings in different contexts.[22]

The study further attempted to examine the misconceptions in relation to various sociodemographic factors. The findings showed the overall misconception score did not have any significant relationship with age of the participants. Interestingly, the years of education were found to be negatively correlated with the overall misconception score. This can be well explained by the fact that individuals with higher years of education will have more access to material and information regarding TBI.[23]

Interesting finding of the present study was that female participants have higher overall misconceptions about TBI than their male counterparts, which contrasts with various studies which did not identify significant differences in sociodemographic variables. One possible explanation for this would be that in India, most people who suffer from TBI are mostly males[24] with RTAs being the most common cause. Thus, indicating a lesser need for women to seek out information regarding TBI. This study did not uncover notable distinctions in sociodemographic factors such as age and place of residence regarding misconceptions. However, our findings did reveal significance in the case of gender and years of education. Specifically, females exhibited higher misconceptions compared with males, and a higher level of education corresponded to a lower prevalence of misconceptions.

We hypothesized that having a prior exposure to TBI would help people reduce their misconceptions. However, our findings did not support our hypothesis which is in alignment to another study conducted among the nursing students in India.[16] This could be explained partly by the fact that only 17% of our participants had a prior exposure to TBI and the rest did not have any prior exposure.

For our study on the general population, potential limitations include the absence of representation from diverse age groups, occupations, and socioeconomic statuses. The self-report nature of the survey may introduce response biases, and a more extensive sample size would enhance the study's generalizability. Moreover, the study results hold significant bearings for policy making in institutions and development of educational modules. Focusing specifically on the items which reported higher misconceptions, various psychoeducation modules can be developed for schools and colleges.

Conflict of Interest
None declared.

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