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Chronic Pain, Metacognition and Suicidality in Traumatic Brain Injured Patients Following a Road Traffic Accident

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ABSTRACT

Chronic pain (CP) can contribute to excessive negative emotional states and pain behaviour that can exacerbate its clinical profiles, perception of disability and its treatment. Metacognitions can affect the experience of pain intensity. The concept embodies, amongst others, thoughts and beliefs regarding regulating internal cognitive processes. Traumatic brain injury (TBI) is a crucial cause of disability and socio-economic problems worldwide and is a frequent clinical presentation that can, inter alia, result in deficits in metacognition and in suicidality. Road traffic accidents (RTAs) often account for TBIs, although the incidence varies across countries. Despite a plethora of research regarding the above, to the best of my knowledge no studies have addressed issues specifically related to the association between CP, metacognitive abilities, suicidality and TBIs following a RTA. In view of this and its clinical significance, the present study aimed to investigate whether CP mediates the relationship between metacognition and suicidality in a sample of patients who suffered a TBI in a RTA. Methods for gathering data included post-interview analyses, a structured questionnaire, a comprehensive mental status examination, a set of standardised psychometric measures, information extracted from their medical files and interviews with relatives. The sample (N = 86) constituted a random number of adult volunteers who suffered a TBI after being involved in a RTA. Age was a significant risk factor as was gender. The results endorsed an implicit connection between CP combined with metacognitive deficits, and potential suicidality in younger male patients who sustained a TBI in a RTA. Imperatives of prevention of suicidality in these patients should include improved access to healthcare facilities and early recognition of the associated symptomatology where focused intervention strategies must be integrated into efficient service delivery programmes, guided by the necessary socio-cultural sensitivity.

Keywords: chronic pain, metacognition, suicidality, traumatic brain injury, road traffic accidents

1. INTRODUCTION

Chronic pain (CP) can contribute to excessive negative emotional states and pain behaviour that can exacerbate its clinical profiles, perception of disability and its treatment. Defining CP can be difficult. It has been referred to by various names including chronic pain syndrome, but it generally includes the experience of the persistiveness of pain over time. It is characterized by the presence of, and focus on pain sufficiently intense enough to require clinical attention as well as by psychological and cultural factors that are involved in its genesis, severity, and/or maintenance which can cause notable anguish and/or impairment outcomes for patients, progressing into a complex array of symptomatology [1-10]. It has also been classified as a somatic symptom disorder [1] related to significant discomfort in daily life and impairment which can be a multidimensional and complex experience with distressing symptoms, abnormal thoughts, feelings and behaviours, where a distinctive feature can be the way it presents and how patients interpret the symptoms. Additionally, it represents a prominent symptom in many psychiatric disorders, including anxiety-related ones and depression as well as in suicidal behaviour [1, 8, 10]. While the role of metacognition can form an important substructure of the development of memory regardless of age, developmental differences in memory strategies and capacities [11], some patients who suffer from CP can be inclined to be preoccupied with their pain and gauge their symptoms in terms of the worst considerations and outcome about their health and recovery where cognitive/perceptual processes play an important role in pain modulation, which is pointed out by models of pain that emphasize a comprehensive evaluation of CP [3, 7, 8, 12].

Metacognitions associated with anger, negative beliefs and cognitive self-consciousness can affect the experience of pain intensity [9]. Metacognition, which can be both positive and negative, covers a complicated area, described in different terms [3, 9, 13-15]. The concept embodies, amongst others: thoughts and beliefs regarding regulating internal cognitive processes; insight; functioning of attention; understanding and reflecting on one's own thoughts as well as those of others; interpersonal relationships; behaviours; executive functioning; physical symptoms and sensations; irrational thought-processes; self-awareness; and sometimes thinking about thinking. A positive relationship has been noted between metacognition, increased physical dysfunction, somatic complaints, the pain matrix, pain intensity and emotional distress, where negative metacognitive processes (including irrational ones and thought intrusions) can result in decreased coping behaviours and worsening of the pain experience and the cognitive-behavioural pain cycle thereby ending up in various adverse psychological and functional factors [13, 15-18].

Suicidality occurs frequently in a variety of neuropathological and medical conditions, including in the abuse of analgesics because of CP and has been reported as a risk factor in TBI patients and their family carers [2, 5, 8, 10, 19, 20]. There are geographic variations between and within certain regions and countries, but overall suicide rates have increased globally and suicidal behaviour has been acknowledged as a significant public health concern across different socio-demographic groups [8, 10, 21-26]. Similarly, traumatic brain injury (TBI) is a crucial cause of disability and socio-economic problems worldwide and is a frequent clinical presentation that can result in various long-term pathological, mental sequelae and suicidal behaviour [5, 20, 23, 27-32]. Marked difficulties in functional outcomes often result from TBI partly because of deficits in metacognition, which tend to be a common outcome following TBI, contributing to psychosocial dysfunctioning, loss of employment and a reduced quality of

life of family members who care for TBI patients [33-35]. Blunt trauma causing TBI tends to be more common than penetrating TBI-related trauma and road traffic accidents (RTAs) often account for most of TBI blunt trauma, also in young adults which constitutes a markedly high percentage of TBIs following RTAs where the latter has been shown in some studies to be greater in low and middle income group countries [5, 7, 30, 36, 37]. Although TBI incidence varies across countries in general, averages of about 150 per 100,000 have been reported with higher rates for South Africa (about 316 per 100,000) with males sustaining TBI more frequently than females [5, 27, 37]. Notwithstanding the fact that RTAs are a major cause of TBIs, the relationship between RTA dynamics and TBI risks concerning different road users is not always that clear [32].

According to the best of my knowledge, and despite a plethora of research regarding the above, no studies have addressed issues specifically related to the association between CP, metacognitive abilities, suicidality and TBIs following a RTA, giving rise to a lack of a satisfactory explanatory paradigm. In view of this and its clinical significance, the present study aimed to investigate whether CP mediates the relationship between metacognition and suicidality in a sample of patients who suffered a TBI in a RTA. As such, it forms part of an extended research project [38]. The first part of the study essentially dealt with family carers of TBI patients, whereas the present one specifically deals with patients who suffered a TBI in order to provide a synthesis of potential practical implications, endeavouring to highlight appropriate targets for intervention in these patients.

2. MATERIALS AND METHODS

This is a descriptive and analytical study in which the theoretical framework is based on an integrated biopsychosocial model, rooted in systems theory wherein health and suicide prevention are intertwined within multiple interconnected factors that are perceived holistically [8, 10, 12, 39, 40]. Methods for gathering data included a phenomenological approach and post-interview analyses [41], in addition to incorporating a structured questionnaire, a comprehensive mental status examination, and a set of standardised psychometric measures, viz.: The Pain Disability Questionnaire (PDQ) [6, 42], the Neurobehavioral Rating Scale (NRS) [43], the Beck Depression Inventory (BDI) [44] with a specific focus on Item 9, and Item 4 of the expanded Brief Psychiatric Rating Scale (BPRS) [6, 45].

All the instruments were individually administered. Since the entire sample of patients had been hospitalised for different periods, confirmation of their TBI status was extracted from their medical files, CT brain scans, reduced Glasgow Coma Scale (GCS) indices, recorded levels and duration of post-traumatic amnesia (PTA) and loss of consciousness (LOC) following the RTA as well as any other relevant information. LOC, GCS scores and duration of PTA are important indicators of TBI [5], but problems can arise regarding PTA especially in view of the presence of metacognitive deficits.

Patients may sometimes have islands of accessible memory or lucid intervals followed by a further period of PTA which may make a difference that could give rise to uncertainty about the exact chronology of the RTA itself, subsequent events, a mnemonic quality to remembrances of what or how the RTA occurred and the duration of PTA [5, 28, 29, 46]. Thus, patients' retrospective accounts related to the RTA may tend to inadvertently rely on information provided by relatives or nursing staff.

Consequently, in addition to scrutinizing medical records, interviews and careful questioning of relatives who accompanied the patients to the assessments were necessary to support the required information.

The PDQ yields a total score ranging from 0 to 150. The primary focus is on functional disability in which psychosocial variables portray a fundamental role in the development and continuity of CP. The psychometric properties of the PDQ demonstrate strong reliability, responsiveness, and validity. The scores can be divided into 5 distinct categories, i.e.: No disability = of 0; Mild disability = 1 to 70; Moderate disability = 71 to 100; Severe disability = 101 to 130; and Extreme disability = 131 to 150 [6, 42, 47]. The NRS [43] was developed from the BPRS [45] to, rather than on general psychiatric disorders, focus on behavioural sequelae of brain damage.

Items are scored on a seven-point scale on 27 items, i.e. not present to extremely severe with a total score calculated ($\Sigma = 189$). It is a multidimensional clinician based instrument designed to assess behavioural items more specific to patients with neuropsychiatric symptoms resulting from closed head injury. The items are in random order, but they can be meaningfully grouped by factor scores as: Factor 1 = Cognition/Energy; Factor 2 = Metacognition; Factor 3 = Somatic/Anxiety; and Factor 4 = Language [5, 48]. For behavioural outcome assessment the clinician can interpret results via elevations on individual items or on the factor scores. The latter was done in the present study.

There are many psychometric scales to assess suicidal behaviour, but short scales with high clinical validity have been found to be important [10] as was utilised in the current study to cover the relevant domain of the dimension under investigation, i.e. the presence of suicidality in the patients studied. The BDI [44] has been translated into many languages and is an established and well-researched scale that is routinely included in psychological test batteries. It is a 21-item multiple choice inventory on which a high score implies a clinical depression. Its structure includes graded levels of intensity and scores on Item 9 of the BDI indicates suicidal behaviour or not where patients endorse one of the following: 0 ("I don't have any thoughts of killing myself"); 1 ("I have thoughts of killing myself, but I would not carry them out"); 2 ("I would like to kill myself"); or 3 ("I would kill myself if I had the chance"). For the purpose of the present study, suicidality was defined as a score of 1 to 3 on Item 9 of the BDI, which was followed up by analysing the patients' responses to Item 4 of the expanded version of the BPRS [6, 45, 49], i.e. the BPRS-E that covers an expressed desire, intent, or action to harm or kill oneself where symptom severity is indicated as: 1. Not present; 2. Very mild; 3. Mild; 4. Moderate; 5. Moderately Severe; 6. Severe; 7. Extremely Severe.

3. SAMPLE AND RESULTS

The sample recruited (N = 86) constituted a random number of adult volunteers who suffered a mild to moderate TBI after being involved in a RTA and who were referred for an assessment to a hospital-based facility in Durban, South Africa. Informed consent for inclusion in the study was obtained from both the patients and accompanying family members. Patients with a pre-morbid history of TBI, psychiatric disorders, substance abuse or neurological deficits were excluded. Scores on the various instruments used were non-normally distributed and data is reported, inter alia, in numbers and percentages for categorised variables that are rounded off to the nearest whole.

In 95% of instances that the RTA patients were caught up in occurred between the years 2018 – 2025, i.e. on average around 4 years prior to being assessed. The rest (5%) sustained their RTAs up to 6 years before. Age was a significant risk factor for being involved in a RTA as was gender. At base of the total sample 72% were males and 28% were females. Their ages ranged from 19 to 67 ($\bar{x} = 36$), with the male $\bar{x} = 34$ years, as opposed to the female $\bar{x} = 41$ years. However, 85% was under the age of 50 years when the RTA occurred (70% males and 15% females). Overall 31% were pedestrians, 29% were back seat passengers in cars, minibus taxis or vans, 19% were front seat passengers in cars, trucks or vans of whom only 25% were restrained (i.e. they wore seat belts), and 2% were motorcyclists.

The rest (19%) were drivers of various vehicles of whom only 69% were seat belt restrained while driving, i.e. (31%) ignored a pivotal protective factor. In all, 37% were employed pre-and post their RTA, 58% became unemployable post their RTA, while 5% had never worked on the open labour market either pre- or post their RTA. Most (73%) of the sample suffered from some form of post-RTA reduced physical capacity (i.e. they had difficulty to walk, stand, run, etc. or to pick up heavy items without pain or discomfort), and 7% were either crutch-dependent or reported a curtailed ability to balance at times. Other than a TBI, all the patients suffered polytrauma caused by their RTAs that included a wide range of injuries to varying degrees, especially orthopaedic injuries, 6% had subsequent seizures and 13% suffered from occasional dizzy spells. Most of the patients (79%) were reported to have suffered LOC of uncertain duration immediately following their RTA and 21% had LOC of six hours or longer. In general, 73% of patients reported a degree of PTA (duration <24 hours) and 23% reportedly had PTA of at least one or more days. None suffered from retrograde amnesia.

A significant number of patients' (97%) had scores that fell into the moderate to severe disability categories of the PDQ (Figure 1), supporting their CP symptoms. None scored in the no disability or extreme disability categories.

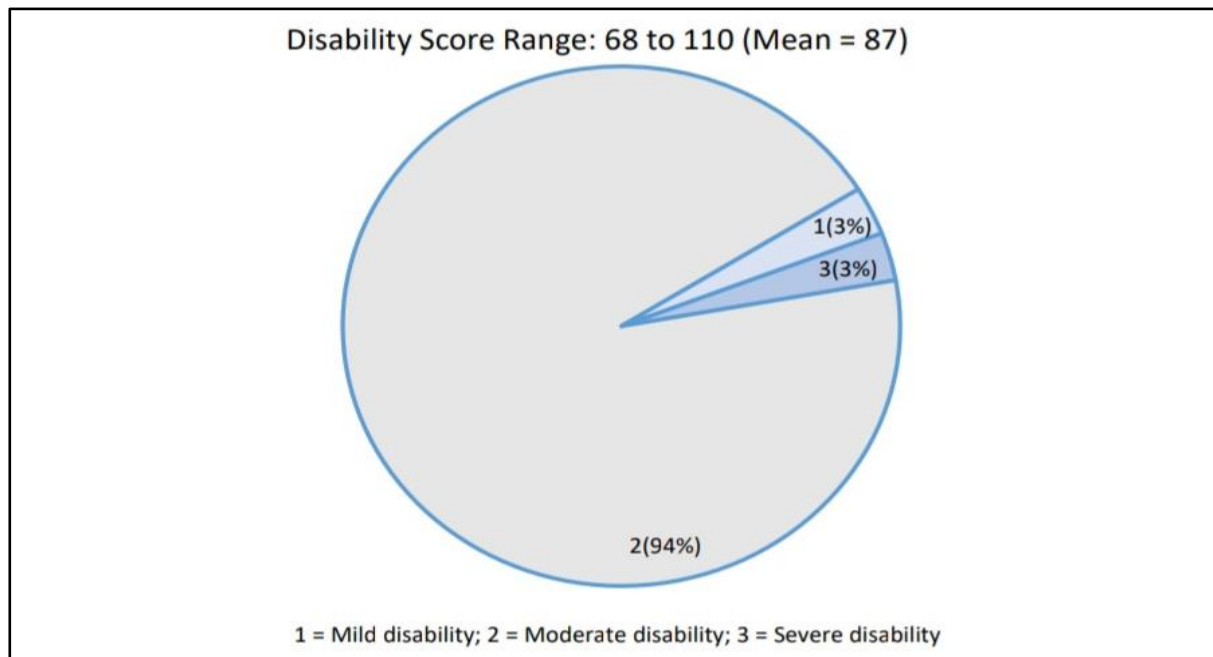


Figure 1. PDQ Average Scores (N = 86).

Scores on the NRS varied, but tended to be high for the entire patient sample. However, utilising the upper range of the highest scores, comparatively the most significantly elevated score in terms of factor scores was in respect of Factor 2 that indicated notably impaired metacognition in 25% of the patients (Figure 2). Of these, males predominated (82%) as opposed to females (18%). Factors 1-3 were scored for this purpose.

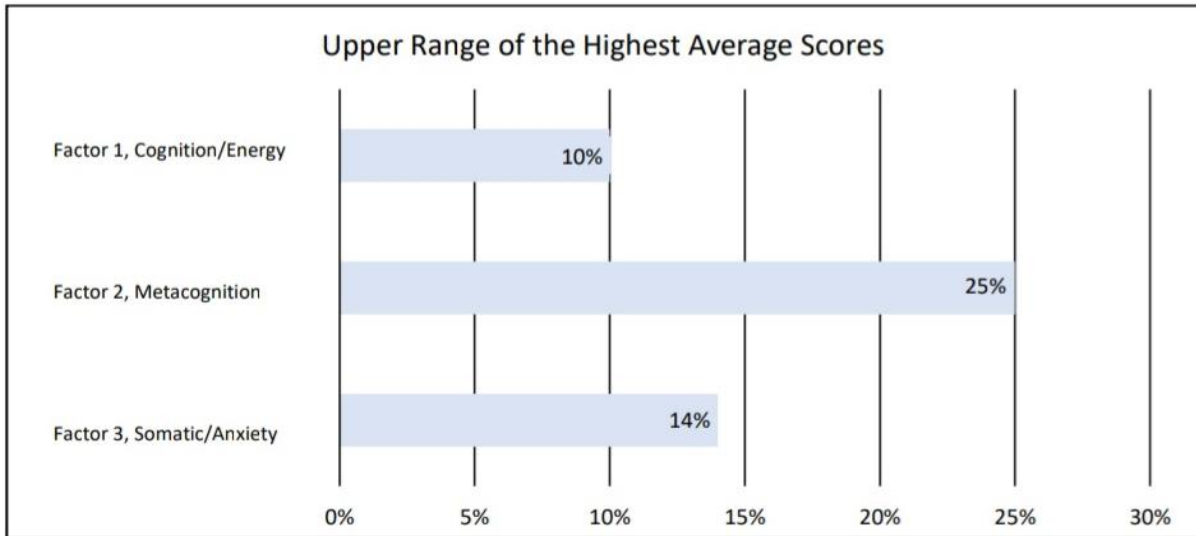


Figure 2. Range of NRS Factor Scores (N = 86).

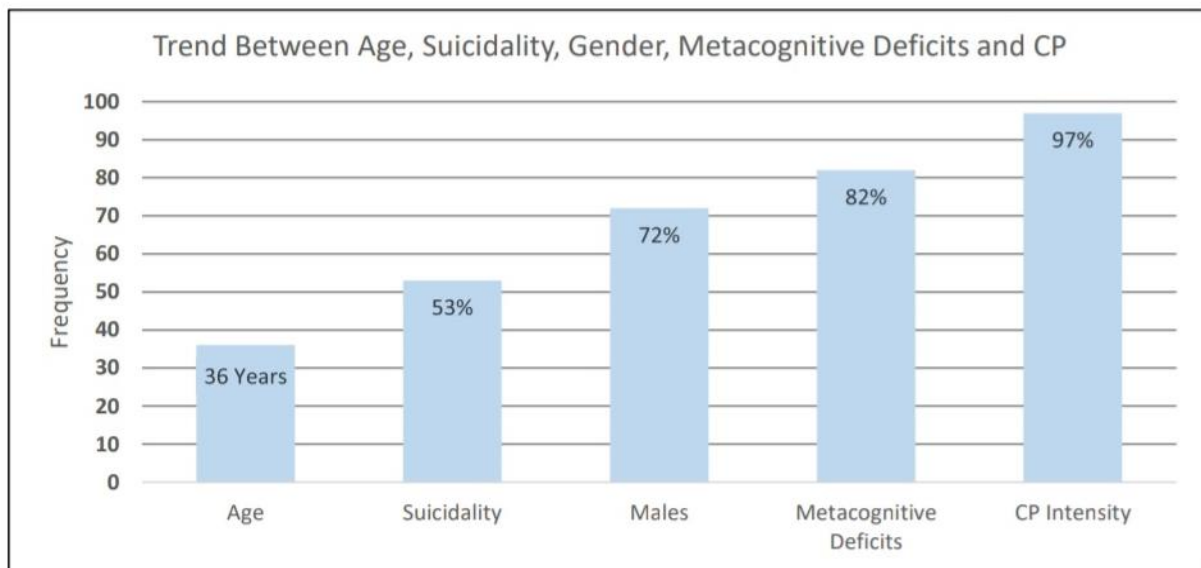


Figure 3. Sample Averages (N = 86).

More than half of the patients ($\bar{x} = 53\%$) indicated associated suicidality as determined by their responses to Item 9 of the BDI and Item 4 of the BPRS where their suicidal intentions ranged from mild to moderately severe. All of these patients met the clinical criteria for

depression [1] and had elevated BDI scores. CP and suicidality were associated with metacognitive deficits regarding both age and gender, and the latter two variables were also factors in respect of being in a RTA. There was an upward trend in relation to age, suicidality, gender, metacognitive deficits and pain intensity. That is, compounded by their elevated metacognitive deficits, as their CP pain levels increased in the younger male age group, so did the presence of suicidality in them (Figure 3).

4. DISCUSSION

The presentation, recognition, and management of somatic manifestations of CP are affected by differences in medical care across multiple factors within a sociocultural context [5, 9, 10, 13, 15-18]. Bearing this in mind, the efficacy can hardly be overstated of replacing the traditional biomedical nociceptive and/or reductionist approach to the understanding, assessment and treatment of CP with the biopsychosocial viewpoint that CP can form a complex and dynamic interaction between variables which might perpetuate or worsen its clinical presentation in patients because of each one's unique expression of their pain intensity. This can help to explain individual differences in how CP is divergently manifested, and that it can be divided into pain behaviour and pain experience. The former is usually evaluated through behavioural observation in a structured environment and the latter, *inter alia*, through self-monitoring by patients, family monitoring and the use of multi-dimensional questionnaires [3, 6, 15, 42] as was the case in the current study. Moreover, a distinction can be made between acute and CP, where different aetiologies and individualised pain responses have implications for clinical management. Patients often confuse such issues and give CP as a major reason for analgesic abuse accompanied by suicidality [8]. Additionally, there is a growing acceptance that CP in itself may constitute a complex illness in some patients with a myriad of subjective and other variables that can be affected by perceived pain intensity, emotional states, personality and behaviour which can be complicated by deficits in metacognition [1, 8, 9, 12, 15], equally observed in the present research.

Regardless of the severity of TBI, changes in emotion and personality are common after TBI [5, 20, 37, 50] with depression being one of the most frequent followed by pervasive anxiety often displayed by emotional lability, extreme affective fluctuations and ineffective functioning which can be further compromised by CP. Awareness of deficits in TBI patients with right hemisphere damage can be muted or possibly absent, whereas in right hemisphere TBI disturbances appear to arise more from the secondary effects of the reduced self-awareness and social insensitivity of the TBI patient failing to realize their expectations [5, 29, 50]. Despite increasing research interest in CP, metacognition and TBI especially as related to experiencing pain intensity, inconsistent findings have complicated clarity on the impact of metacognitive knowledge on functional outcomes after TBI since some sequelae of TBI typically occurs in stages with a complex range of pathological, biochemical, physiological, family, secondary psychopathological and socio-economic effects [5, 14, 20, 50].

The results of the present investigation, consistent with other findings [31], showed that the number of patients varied across the NRS subscales, although the findings indicated that metacognitive deficits were the most common. These deficits in TBI patients can result, amongst others, in a reduction in the monitoring of their cognitive processes and adaptive strategies that can have a lastingly deleterious effect where the interplay between somatic,

cognitive, and emotional symptoms can become chronic in a substantial number of patients. The results are also concordant with research about gender differences in that younger males compared to females are more likely to acquire a TBI [5, 19, 31], especially in RTAs.

To counterbalance possible non-specificity and to improve relevance, in line with other reports [3, 15], different assessment approaches were used in this study which showed that impaired metacognition can have an adverse effect on CP and escalate suicidality in patients with TBIs resulting from a RTA. Outcomes are congruent with accounts of an increased risk of suicidality in patients living with CP and a TBI [2, 5, 19]. When and how intervention strategies could be employed depends on higher executive functioning and the patients' different awareness levels of their metacognitive and corresponding deficits. Retraining programmes based on both executive and compensatory strategies can lead to improvement, playing an important role in cognitive rehabilitation [28].

However, the ability to benefit from cognitive rehabilitation may depend on TBI patients' extent of impaired metacognition, since correlated deficits may result in diminished motivation to engage in rehabilitation strategies [51, 52]. Hence access to appropriate healthcare needs to be improved where screening for potential depression and suicidality in TBI patients can be efficiently effected in both acute and chronic conditions [8, 10, 22, 53, 54]. Suicide prevention is aimed at reducing the incidence of suicidal behaviour and various preventive procedures have been described [8, 10, 21, 22]. Some key areas include: family, social and buddy support; spirituality; positive personal qualities; coping strategies; education and awareness; screening for at-risk persons; treatment of psychiatric disorders; restricting access to lethal means; media responsibility in reporting of suicide; stigma avoidance; and the effectiveness of brief interventions [8, 10, 19, 26, 55].

Because elevated suicide risk is a recognised feature of several medical conditions and somatic disorders, suicide prevention needs to comprise sound clinical practice where initiatives to prevent suicidal behaviour should involve all the relevant role players in social and health care to assist with an astute diagnosis of accompanying underlying psychopathology and the required appropriate treatment by suitably trained health-care professionals [2, 8, 10]. This is of paramount importance where suicidal patients exposed to CP and metacognitive deficits have limited ways of dealing with their problems, making it difficult for them to seek appropriate treatment for their suicidality. While CP is a complex phenomenon that entails several dimensions, such as personal meaning and course in its relationship with suicidality, there might be some methodological issues about the definition of CP in respect of suicidality, but most authorities agree that there can be a relationship between them [2, 8, 10], as demonstrated in the present study as well.

Several psychological treatment techniques for TBI patients with residual metacognitive deficits have been used including cognitive behavioural interventions and various psychotherapy strategies, albeit patients may respond best to different applications depending on the specifics of each patient [5, 19, 53, 56]. Therefore, it is prudent to remember that change in these patients, when it occurs, may tend to consist of overlapping phases, including in the case of suicidal patients. In light of this, patients' families should be involved because they (especially family carers) may assist in promoting treatment choices and rehabilitation and could exhibit some psychological mobility themselves [20, 38]. The provision of support and pertinent psychoeducation to them constitute constructive cornerstones as a basis to proceed with [28, 38, 50]. Although a combination of relevant strategies in health care and the evaluation of their different benefits are important, adequate provision of mental health-care and mental

health policies could reduce suicidality rates [8, 10, 25, 57, 58]. Additionally, on top of recognizing the need for procedures that encompass a reduction in RTAs such as abiding by road safety rules, wearing seatbelts, maintaining road infrastructure, etc., peer mentoring and fitting community inclusion constitute innovative strategies that can be used in effective intervention and programme development augmented by educational suicide awareness training, especially in young people [8, 10, 26, 55, 59, 60]. Finally, the cardinal interplay between biological, psychological, social, environmental, cultural factors and increased awareness in the medical community of suicidality are important factors that should be recognised by healthcare providers in suicide prevention when rendering services, which is of special relevance where the concept of suicidality may present in diverse ways that require an explanation by what it is meant to designate [8, 10] and when it is complicated by the presence of CP, metacognitive deficits and a TBI.

5. CONCLUSIONS

To conclude, in striving to provide a descriptive, analytical and conative depiction of the sample studied, the results endorsed an implicit connection between CP combined with metacognitive deficits, and potential suicidality in younger male patients who sustained a TBI in a RTA. The indications are that CP, metacognition deficits in TBI patients after a RTA can be an underestimated suicidality risk factor. Imperatives of prevention of suicidality in these patients should include improved access to healthcare facilities and early recognition of the associated symptomatology where focused intervention strategies should be integrated into efficient service delivery programmes, guided by the necessary socio-cultural sensitivity.

Limitations

While this study provided valuable information, some limitations should be considered when interpreting the research findings, including generalisability thereof because the sample size was relatively small and the study should be replicated on a larger one. Data must be interpreted with caution when making cross-cultural and cross-regional comparisons, especially in countries with a multicultural population. The impact of the time lapse between CP, metacognitive deficits, TBI, suicidality and the assessment of patients require further research, including the potential permanence or not of the adverse effects found, the varied roles in treatment considerations along with any possible conflicting extraneous influences.

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