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Do Stroke Survivors Experience Posttraumatic Stress Symptoms? A Systematic Review

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ABSTRACT

In the past decade, numerous studies on mood problems following stroke have emerged with an emphasis on posttraumatic stress symptoms (PTSS) and posttraumatic stress disorder (PTSD). This systematic review is intended to investigate the relationship between stroke and PTSS. We searched the following databases: SCOPUS, ISI Web of Knowledge, EMBASE, MEDLINE, CIHANL, AMED and PsyhINFO and retrieved the relevant titles and abstracts. Cross-sectional, longitudinal and predictive studies were included. These studies included patients of any age and of either gender with a diagnosis of stroke who were screened for PTSD or PTSS and must be written in English. A total of 108 articles were retrieved from the search. After reviewing the titles and abstracts, 104 were excluded for not meeting the predetermined inclusion criteria. A total of four studies were considered for this review. The results showed that 21%-31% of stroke patients experienced PTSS and 9.8% met the criteria for PTSD. Therefore, it is important to study PTSS in stroke patients since its would be interesting to define its role in the prediction of recovery from stroke.

INTRODUCTION

Stroke has a major impact on physical and psychological wellbeing among survivors. Most studies of stroke outcome have focused on the physical consequences such as chronic motor impairment (1), and limitation of activities of daily living (2). There is also an increasing indication that patients are also prone to emotional problems such as depression (3, 4, 5) and, anxiety (5). During the past decades numerous studies on mood problems following stroke have emerged with an emphasis on posttraumatic stress symptoms (PTSS) and posttraumatic stress disorder (PTSD).

PTSD is an anxiety disorder that can develop after an individual has been through a traumatic event. The individual may develop PTSD after experiencing or witnessing a terrifying, tragic or life-threatening events or situations which can causes intense fear, helplessness or horror. PTSD is typically diagnosed when symptoms last for more than one month. PTSD (6) is characterised by a set of symptoms that arise after the traumatic event and is composed of a constellation of symptoms including re-experiencing (e.g. recurrent and intrusive recollection of the event including images, thoughts or perception, acting or feelings as the traumatic event is recurring); avoidance and numbness (e.g. efforts to avoid thoughts, feelings or conversation related to stress; restricted range of affect); hyperarousal states (e.g. outburst of anger; hypervigilance); and impaired self-function, and effects on interpersonal relations (e.g. family, friends). A person that has undergone a traumatic event might not possess the whole range of symptoms in order to be diagnosed with PTSD, but may nonetheless experience PTSS (see Appendix 1 for the definition of PTSD based on DSM IV-TR (6).

Stroke is a traumatic life threatening event. A few studies suggest similarities or parallels between stroke reactions and the reaction of individuals suffering from PTSD as a result of assault, combat or road traffic accident (7, 8). According to Anderson (3) and Castillo et al. (9) some individuals may be negatively affected by the consequential significant psychological, social and environmental trauma and as a result develop symptomatology indicative of PTSS. There has been no systematic review of this important subject. In this systematic review, the authors aimed to investigate the prevalence of PTSS stroke and discuss whether stoke survivors experience posttraumatic stress symptoms in their lives.

METHOD

Three types of studies were included in this systematic review, which consists of cross-sectional, longitudinal and predictive studies. These studies also included patients of any age and of either gender with a diagnosis of stroke who was screened for PTSD or PTSS and must be written in English.

SEARCH METHODS FOR IDENTIFICATION OF STUDIES

We searched seven databases: SCOPUS (to November 2007), ISI Web of Knowledge (to November 2007), EMBASE (1980 to 2007 Week 50), MEDLINE ((1950 to November Week 2, 2007), AMED (Allied and Complementary Medicine Database; 1985 to November 2007), CINAHL (Cumulated Index to Nursing and Allied Health Literature; to November 2007), and PsycINFO (to November 2007).

General terms that represented the key terms of the research questions were used. The key terms chosen were based on the MESh terms of the following domains :

1 Domain of Posttraumatic Stress Symptoms
   - i. Posttraumatic Stress Disorder
   - ii. PTSD
   - iii. Posttraumatic Stress Symptoms
   - iv. PTSS

2 Stroke
   - i. Stroke
   - ii. Cerebrovascular Accidents
   - iii. CVA

SEARCH STRATEGY

The following search strategies were adapted as appropriate to the specifications of each databases:

Embase	***Medline***
1. Posttraumatic Stress Disorder.tw.	1. Posttraumatic Stress Disorder.tw.
2 Posttraumatic Stress Disorder.mp. or Posttraumatic Stress Disorder/	2. Posttraumatic Stress Disorder.mp. or Stress Disorders, Post-Traumatic/
3. PTSD.tw.	3. PTSD.tw.
4. Posttraumatic Stress Symptom$.tw.	4. Posttraumatic Stress Symptom$.tw.
5. PTSS.tw.	5. PTSS.tw.
6. 1 or 2 or 3 or 4 or 5	6. 1 or 2 or 3 or 4 or 5
7. STROKE/	7. Stroke.mp.
8. stroke.tw.	8. stroke.tw.
9. Cerebrovascular accident$.mp. or Cerebrovascular Accident/	9. cerebrovascular accident$.mp. or Cerebrovascular Accident/
10.Cerebrovascular accident$.tw.	10. cerebrovascular accident$.tw.
11. CVA.tw.	11. CVA.tw.
12. 7 or 8 or 9 or 10 or 11	12. 7 or 8 or 9 or 10 or 11
13. 6 and 12	13. 6 and 12

CINAHL	***AMED***
1. Stress Disorders, Post-Traumatic/di, pf, ss [Diagnosis, Psychosocial Factors, Symptoms	1. Stress disorders post traumatic/
2. Posttraumatic Stress Disorder.mp	2. Posttraumatic Stress Disorder.mp.
3. PTSD.mp.	3. PTSD.mp.
4. Posttraumatic Stress Symptom$.mp.	4. Posttraumatic Stress Symptom$.mp.
5. PTSS.mp.	5. PTSS.mp.
6. 1 or 2 or 3 or 4 or 5	6. 1 or 2 or 3 or 4 or 5
7. Stroke.mp.	7. Cerebrovascular disorders/ or Stroke.mp.
8. Cerebral Vascular Accident/di, pf [Diagnosis, Psychosocial Factors]	8. stroke.tw.
9. Cerebrovascular Accident.mp.	9. cerebrovascular accident$.mp. or Cerebrovascular accident/
10. Cerebrovascular Accident$.mp.	10. Cerebrovascular accident$.tw.
11. CVA.mp.	11. CVA.tw.
12. 7 or 8 or 9 or 10 or 11	12. 7 or 8 or 9 or 10 or 11
13. 6 and 12	13. 6 and 12

PsycINFO

1. TX Posttraumatic Stress Disorder
2. TX PTSD
3. TX Posttraumatic Stress Symptoms
4. TX PTSS
5. S4 or S3 or S2 or S1
6. TX Stroke
7. TX Cerebrovascular Accidents
8. TX CVA
9. S8 or S7 or S6
10. (S5) and (S9)

SCOPUS

1. Posttraumatic stress disorder OR PTSD
2. Posttraumatic stress symptoms OR PTSS
3. Posttraumatic Stress Disorder OR PTSD OR Posttraumatic stress symptoms OR PTSS
4. Stroke OR Cerebrovascular Accidents OR CVA
5. Posttraumatic stress disorder OR PTSD OR Posttraumatic Stress Symptoms OR PTSS AND Stroke OR Cerebrovascular Accidents OR CVA

ISI Web of Knowledge

1. Posttraumatic Stress Disorder
2. PTSD
3. Posttraumatic Stress Symptoms
4. PTSS
5. #1 OR #2 OR #3 OR #4
6. Stroke
7. Cerebrovascular Accidents
8. CVA
9. #6 OR #7 OR #8
10. #5 AND #9

METHODS OF THE REVIEW

STUDY IDENTIFICATION AND SELECTION

One reviewer (SEG) conducted the electronic searches and retrieved the searches with the names of the authors, titles of the articles and the abstracts. The articles were then selected independently by the reviewers (SEG and YM). Both reviewers then checked the retrieved titles and abstracts independently. Titles and abstracts were selected independently by the reviewers and an agreement was sought. When it was clear that a particular study was neither predictive, cross-sectional or longitudinal, or did not screen for PTSS following stroke, it was excluded. Where these were unclear, the first reviewer searched for the full articles, which were then independently assessed for inclusion by the two reviewers. Disagreements were resolved by consensus between the reviewers. The final list of the full articles was then obtained for the systematic review.

ASSESSMENT OF METHODOLOGICAL QUALITY OF INCLUDED STUDIES

The two reviewers independently assessed the quality of the included studies. Agreement was reached by reanalysing the articles and the two reviewers managed to reach an agreement in all instances.

DATA ANALYSIS

Data was analyzed descriptively.

RESULTS

SEARCH RESULTS

The articles were sorted according to the year of publication and their databases. Listed below is the table describing the year and database where the article was retrieved from.

TABLE 1 : Year and databases of the article retrieved

Year	Data Base								
	Scopus	Embase	Medline	Psych INFO	CINAHL	AMED	ISI	TOTAL	
	n	n	n	N	n	n	n	n	%
1989	0	0	0	2	0	0	0	2	1.85
1992	0	0	1	2	0	0	0	3	2.78
1995	1	0	1	0	0	0	0	2	0.93
1996	0	0	0	1	0	0	0	1	0.93
1997	1	1	1	0	0	0	0	3	0.93
1998	3	3	3	3	0	0	0	12	3.70
1999	4	1	2	0	0	0	0	7	3.70
2000	3	1	2	0	0	0	1	7	2.78
2001	2	2	0	0	0	0	1	5	2.78
2002	6	5	1	2	0	0	4	18	8.33
2003	9	7	3	2	0	0	2	23	9.26
2004	5	11	4	1	0	1	4	26	13.89
2005	8	6	0	3	0	0	1	18	12.04
2006	10	15	6	7	3	0	10	51	21.30
2007	2	11	3	3	0	0	3	22	14.81
Total	54	63	27	26	3	1	26	200	100.00

A total of 200 articles were retrieved from the databases. The articles were sorted and organized according to the databases retrieved. Some articles were retrieved from more than one database, resulting in 108 different articles. Below is a table illustrating the process used to determine the exact number of articles from the databases. The author used the SPSS 15 software to sort the articles.

TABLE 2: Process of sorting the articles from the databases

	Author	Data Base							
		Scopus	Embase	Med Line	Psych INFO	CINAHL	AMED	ISI	
		n	n	N	n	n	n	n	Total
1	Aladin, 2003	1	1	0	0	0	0	0	2
2	Amiel J.M et al.,2007	0	1	0	0	0	0	0	1
3	Amson Y et al, 2007	0	1	0	0	0	0	0	1
4	Antonio V et al., 2004	0	0	1	0	0	0	0	1
5	Barinov, E.F. et al., 1995	1	0	1	0	0	0	0	2
6	Becker, R., 2005	0	0	0	1	0	0	0	1
7	Berzon B. et al.. 2002	1	1	0	0	0	0	0	2
8	Bessetti C.L. et al., 2005	0	1	0	0	0	0	0	1
9	Boss, J., 2000	1	1	1	0	0	0	1	4
10	Brown K.E. et al., 2006	1	1	0	0	0	0	0	2
11	Bruggimann et al., 2006	1	1	1	1	1	0	1	6
12	Van Zomeren A.H. et al.,1998	1	1	1	1	0	0	0	4
13	Walder B et al., 2007	0	1	0	0	0	0	0	1
14	Weiderhold B, et al., 2005	0	0	0	1	0	0	0	1
15	Wiederhold B.K., 1999	1	1	0	0	0	0	0	2
		54	63	27	26	3	1	26	200

A total of 108 studies were identified from seven databases (SCOPUS, ISI Web of Knowledge, EMBASE, MEDLINE, CIHANL, AMED, and PsyhINFO). After reviewing the titles and abstracts, 104 studies were excluded because they did not meet the predetermined inclusion criteria. A total of four (10, 11, 12, 13) studies were considered for this systematic review.

DESCRIPTION OF STUDIES

The four studies that were selected are described in Table 3.

TABLE 3: Characteristics of selected studies

Study	Aims of study	Participants	Sample Size	Location/Setting
Sembi et al. (10)	To determine whether PTSD or PTSD-like syndrome occurred after stroke.	Stroke and TIA patients.	61 patients	3 different hospital populations: a) Outpatients from the stroke prevention clinic; b) Inpatients in the general hospital stroke rehabilitation ward; c) Outpatients who attended a local elderly day care hospital.
Sampson et al. (11)	To determine levels of depression, symptoms of PTSD and autobiographical memory processes in an older cohort of patients (hospitalized stroke and non stroke).	Stroke and non stroke patients.	103 patients	6 general hospitals in large cities in England.
Bruggimann et al. (12)	To determine whether PTSD-related symptoms were present 1 year after non severe stroke.	Stroke and non severe.	49 patients	Clinic and at home/ clinic (Patients were approached during follow-up).
Merrimann et al. (13)	To assess the number of demographic, medical and psychological risk factors associated with presence and severity of PTSD among stroke patients.	Stroke patients.	102 patients	Stroke Units of a UK university teaching hospital, in the ward and home.

Three studies indicated the percentage of patients with PTSS and only one study indicated the percentage of patients with PTSD. This ranged from 21% to 31% of the patients presenting with PTSS (12, 13, 10) and 9.8%

met criteria for PTSD (10). The study by Sampson et al. (11) aimed to analyse the impact of PTSD-like symptoms and did not indicate the percentage of patients suffering from PTSS. In addition all the four studies also reported the severity of stroke disability using the Barthel Index (14) - two studies indicated the percentage of patients suffering from any degree of disability and two reported the means and standard deviations. One important omission in all but one of the studies was the time since the stroke. Merrimann et al. (13) found a strong relationship between time since stroke and the PTSS severity. They concluded that the more recent the stroke the more severe the PTSS symptoms experienced by the individual. Importantly, the study by Burggimann et al. (12) found that people with minor stoke also developed PTSS.

DISCUSSION

The objective of this review was to understand the relationship between stroke and PTSS. This review found only four related articles, which is relatively a small number, reflecting the earlier lack of awareness of PTSS and PTSD. Based on this systematic review we can conclude that there has been a 93% increment of published research in this area over the past 10 years (see table 1). Two factors could have contributed to this recent increase: 1) the official introduction of PTSD as a diagnostic category in the Diagnostic and Statistical and Manual of Mental Disorders 3rd Edition (15); during the same period according to Norris and Hamblen (16), the DSM-III narrowed the events and excluded more common events such as marital conflict, chronic illness, simple bereavement and business loss, 2) a revised and refined definition of PTSD in the 4th edition of the same manual (17) and later in the DSM-IV-TR (6) which included a wide range of events, including personal illnesses, but required a subjective response of fear, helpleness, and horror. Some seminal studies contributed to this change. Green et al. (18) concluded that illness can be considered as a stressor capable of causing traumatic stress symptoms. Their research focused on breast cancer patients. Another study conducted later included acute myocardial infarction patients (19). The DSM IV (17) explicitly allows for a medical diagnosis to serve as a basis for a PTSD assessment and subsequent diagnosis (17). The changes in the definition of stressor within the PTSD contributed to the important development of the study of PTSD or PTSS as a consequence of an acute/chronic illness event.

When we look at the historical roots of PTSD, the definition was originally confined to "individual responses to discrete events of a horrific nature that are no longer threatening in the present time". According to Buckley (20), before the diagnosis of PTSD was formally introduced in DSM-III (15) terms such as 'shell shock' described psychiatric disturbances that were linked to the exposure of life threatening events that occurred in the past especially during war. In the first edition of the DSM, published in 1952, there was no diagnostic category known as PTSD or PTSS. Diagnostic criteria which most closely resembled of those of PTSD then were listed under the heading of "gross stress reaction". In the second edition of the DSM in 1968, trauma related disorder was listed under the heading of situational disorder. In DSM-III (15), trauma was defined as a "recognizable stressor that would evoke significant symptoms of distress in almost anyone" (15). In DSM III-R published in 1987, the definition was revised once again to mean an event that is "outside the range of human experience and what would markedly distress almost anyone" (21). According to Norris and Hamblen (22) , these two definitions were introduced to narrow down the events and exclude more common events such as marital conflict, chronic illness, simple bereavement and business loss. The DSM-IV (17) defines a traumatic event as one in which both of the following are present: "(1) the person experienced, witnessed, or was confronted with an event or events that involved actual or threatened death or serious injury, or a threat to the physical integrity of self or others (criterion A1), and (2) the person's reaction involved intense fear, helplessness, or horror" (criterion A2) (see appendix 1). The current definition has been expanded to include events that would not have been considered in the earlier versions such as personal illness (16). At the same time, the definition is also focused and narrowed by requiring a subjective response of fear, helpleness, and horror. The evolution of this definition was stimulated by the growth of research in this area in a wide range of populations presenting with different events considered as triggers for this disorder.

There were three studies that showed a relationship between PTSS and stroke. The Studies by Bruggimann et al. (12) and Merrimann et al. (13) found almost the same percentage of participants who had PTSS, nearly about 31%, and Sembi et al. (10) found that 21% developed PTSS. The present results are in keeping with the growing number of studies that have shown the presence of PTSS following life threatening illnesses such as myocardial infarction (22) and cancer (23). Besides that, the similarity of results of PTSS that were found among patients with physical illnesses in the above study may be due to the contribution of the self report measurement which measure PTSS.

Future research in this area should be progressive in nature and determine whether PTSS foresee recovery from stroke. Previous studies have addressed the function of social-cognitive variables in predicting recovery from impairments such as perceived control (24, 25), illness representations (26, 27) including perceived cause of illness (28), perceived control over symptoms (28, 29), illness time line and illness consequences (30) social support (31) exercise, the role of self-efficacy and importance of having a goal in predicting reduction in disability (32).

Appendix 1: DSM-IV-TR Diagnostic Criteria for PTSD

A : The person has been exposed to a traumatic event in which both of the following were present;

i. the person experienced, witnessed, or was confronted with the event or events that involved actual or threatened death or serious injury, or a threat to the physical integrity of self or others
ii. the person's response involved intense fear, helpleness or horror. **Note:** In children, this may be expressed instead by disorganized or agitated behaviour.

B : The traumatic event is persistently reexperienced in one (or more) of the following ways:

i. recurrent and intrusive distressing, recollections of the event, including images, thoughts or perception. Note: In young children, repetitive play may occur in which themes or aspects of the trauma are expressed.
ii. recurrent distressing dreams of the event. **Note:** In children, there may be frightening dreams without recognizable content.
iii. acting or feeling as if the traumatic event were recurring (includes a sense of reliving the experience, illusion, hallucinations, and dissociative flashback episodes, including those that occur on awakening or when intoxicated). **Note:** In young children, trauma-specific re-enactment may occur.
iv. intense psychological distress at exposure to internal and external cues that symbolize or resemble an aspect of the traumatic event.
v. physiological reactivity on exposure to internal or external cues that symbolize or resemble an aspect of the traumatic event.

C : Persistent avoidance of stimuli associated with the trauma and numbing of general responsiveness (not present before the trauma), as indicated by three (or more) of the followings :

i. efforts to avoid thoughts, feelings, or conversation associated with the trauma.
ii. efforts to avoid activities, places, or people that arouse recollection of the trauma.
iii. inability to recall an important aspect of the trauma
iv. markedly diminished interest or participation in significant activities
v. feeling of detachment or estrangement from others
vi. restricted range of affect (e.g., unable to have loving feelings)
vii. sense of a foreshortened future (e.g. does not expect to have a career, marriage, children, or a normal life span)

D : Persistent symptoms of increased arousal (not present before the trauma). As indicated by two (or more) of the following:

i. difficulty falling or staying asleep.
ii. irritability or outbursts of anger
iii. difficulty concentrating
iv. hypervigilance
v. exaggerated startle response

E : Duration of the disturbance (symptoms in Criteria B,C, and D) is more than 1 month

F : The disturbance causes clinically significant distress or impairment in social, occupational or other important areas of functioning.

Specify if :

Acute: if duration of symptoms is less than 3 months
Chronic: if duration of symptoms in 3 months or more

Specify if :
With Delayed Onset : If onset of symptoms is at least 6 months after the stressor

Note : From American Psychiatric Association (2000, pp 467- 468) Copyright by the APA.

Appendix 2: Target Assessment and Sample of the Studies

POTENTIAL FOR SELECTION BIAS IN ANALYSIS		**STUDIES**			
		Sembi et al. (10)	**Sampson et al. (11)**	**Bruggimann et al. (12)**	**Merrimann et al (13)**
1	How to define the design? **A=Longitudinal** **B=Predictive** **C=Cross-sectional**	C	C	C	C
2	Was a power calculation conducted? A = Yes B = Possibly, but not clear **C = No**	B	B	B	C
3	Were the instruments used described in accordance to their reliability and validity for the sample used? A = Yes B = Possibly, but not clear **C= No** **D= Non applicable**	C	C	C	C
4	**Was there a description of withdrawals and dropouts?** A = states numbers and reasons for withdrawals B(I) = states numbers of withdrawals only B(II) = states withdrawals but no number given C = Not mentioned D= Non applicable	A	A	A	A

CONCLUSION

This systematic review has shown that, thus far, limited attention has been given to analyse the relationship between stroke and the experience of PTSS. Four studies have shown that stroke patients do experience PTSS following stroke. Further research will need to be conducted in order to understand how PTSS is related to stroke and the impact of PTSS on stroke recovery. This review shows the relevance of the study of PTSS as an additional potential predictor of recovery following stroke, alongside with illness representations, and psychological distress.

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