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Contents lists available at ScienceDirect

Asian Pacific Journal of Tropical Medicine

journal homepage: <http://ees.elsevier.com/apjtm>Original research <http://dx.doi.org/10.1016/j.apjtm.2016.07.011>

Post-traumatic stress disorder after typhoon disaster and its correlation with platelet 5-HT concentrations

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ARTICLE INFO

Article history:

Received 17 May 2016

Received in revised form 16 Jun 2016

Accepted 1 Jul 2016

Available online 26 Jul 2016

Keywords:

Post-traumatic stress disorder

Influential factors

5-HT

Typhoon

ABSTRACT

Objective: To investigate residents' psychological stress factors and research the correlation between post-traumatic stress disorder (PTSD) and platelet 5-HT concentrations so as to provide scientific bases for diagnosis and treatment of PTSD and psychological intervention for people in the disaster area.

Methods: A questionnaire survey of 5500 residents who have accepted psychological help was conducted by the emphatic investigation method. While high performance liquid chromatography was used to detect the platelet serotonin concentration of 100 PTSD patients and 100 healthy people.

Results: (1) Of the 5114 cases, 3167 (61.93%) showed positive results in screening for psychological stress symptoms, and 399 (7.8%) were tested having apparent PTSD symptoms. Male and female prevalence showed no significant difference ($\chi^2 = -0.380$, $P = 0.704$). The differences of prevalence between different age groups were statistically significant ($\chi^2 = 381.89$, $P = 0.000$). (2) The differences in the level of platelet 5-HT between PTSD patients and normal control group were statistically significant.

Conclusions: The typhoon of Hainan Province caused relatively large psychological problems to the disaster victims. Compared with normal control group, the platelet 5-HT levels of PTSD patients in the disaster areas are lower. It may be related to incidents exposure levels, cultural background, religious ideas, social concerns and psychological rescue of the residents who live in the disaster areas of Hainan.

1. Introduction

Recent ten years, irresistible natural disasters and occasionally unconventional emergencies lead to the constant increase of the PTSD (post-traumatic stress disorder, PTSD) incidence. PTSD refers to exposed individuals' mental disorders that delay

happened and persistent for long term after unconventional contingencies or catastrophic life events. The clinical manifestations is characterized by re-experience of the trauma, and accompanied by emotional irritability and avoidance behavior. PTSD has serious social value harm, and its incidence has a significant increase in unconventional emergencies, natural disasters and other trauma. It is a hot and difficult problem in psychiatry and psychology. However, our attention and research in this area are relatively few. This paper summarizes the research status of epidemiology, basic neurobiology, etiology diagnosis, treatment and other aspects of PTSD.

PTSD refers to persistent mental disorders of individuals appearing after affected by abrupt, threatening or disastrous life affairs. Its clinical manifestations are characterized by experiencing the trauma again and combined with unstable emotion and

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Peer review under responsibility of Hainan Medical College.

Foundation project: This study was supported by the National Science Foundation (Grant No. 81260209), the Special International Technology Cooperation of Hainan Province (Grant No. KJHZ2014-09), the Provincial University Students' Innovation and Pioneering Training Program of Hainan Province (Grant No. 20140119).

avoidance behaviors, which showed severe social and family perniciousness. PTSD performs high incidence rate in traumatic incidents such as war, social violence, fatal traffic accidents and natural disasters, which has become a new hot spot for the psychiatry department and psychological studies in recent years. However, there are few understandings and researches on this aspect in our country by far. This study aimed to sum up the status of researches of epidemiology, neurobiological basis, etiology and diagnosis and treatment associated with PTSD.

2. Materials and methods

2.1. Investigation objects

A questionnaire survey of 5500 residents in the disaster area of typhoon Rammasun of Hainan Province who have accepted psychological help was conducted by the emphatic investigation method, and 5114 copies of effective questionnaire were taken back with a recovery rate of 93%.

2.2. Investigation methods

After typhoon Rammasun, staff of the Hainan Psychological Crisis Intervention Laboratory rushed to the disaster area to offer psychological help to the afflicted people. A questionnaire survey of 5114 afflicted people was carried out by a one-to-one investigation method.

2.3. Questionnaire

2.3.1. General condition questionnaire

The general condition questionnaire included gender, age, personality, marriage, education and so on.

2.3.2. PTSD CheckList – Civilian Version (PCL-C)

PCL-C scale includes four factors, namely awareness of symptoms, avoidance response, traumatic experiences repeatedly produce reproducible and feeling numb feeling, a total of 17 entries. Rating scale using five criteria was applied: none (1 score), a little (2 scores), moderate (3 scores), a considerable degree (4 scores), extreme (5 scores). 38 is a critical value, ≥ 38 scores is defined as positive for PTSD (50–85 scores is considered to have more obvious symptoms of post-traumatic stress disorder, 38–50 scores is considered to have some degree of post-traumatic stress disorder symptoms); ≤ 37 points is defined as negative for PTSD.

2.4. Statistical analysis

Epidata 3.1 was employed for a double entry of data. Then, SPSS 19.0 was used to establish a database and analyze the data.

Chi-square tests and *t* tests were used for data analysis and the test level is 0.05.

3. Results

3.1. The determination of symptoms of PTSD

Among the 5114 cases, 2944 were males and 2170 were females with a sexual proportion of 1.36:1. The average age was (41.3 ± 11.1) years. There are 3167 cases (61.93%) who were classified as PTSD symptoms positive group, and there are 399 cases (7.8%) who were considered to have more obvious post-traumatic stress disorder symptoms. The positive rate in females and males were 69.58% and 69.84%, respectively. The difference of incidence rates in males and females had no statistical significance ($\chi^2 = -0.380$, $P = 0.704$) (Table 1). There were 2194 young people, 2778 middle-aged people and 142 old people in the 5114 cases. The positive rates of them were 59.62%, 80.45% and 14.79%, respectively. The positive rates of the three groups showed statistical significance ($\chi^2 = 381.89$, $P = 0.000$) (Table 1).

3.2. The comparison of platelet 5-HT levels between the two groups ($\text{ng}/10^9$)

After typhoon, 100 cases that were randomly selected from 399 PTSD patients of the disaster areas and 100 healthy volunteers who were randomly selected from Hainan Provincial People's Hospital Medical Center in the same period (control group) were analyzed by *t*-test. The platelet 5-HT levels of the PTSD patients and normal control group were (271.43 ± 181.66) $\text{ng}/10^9$ and (350.50 ± 169.19) $\text{ng}/10^9$, respectively, showing significant difference between the two groups.

4. Discussion

The results of this study showed that after typhoon Rammasun the incidence rate of PTSD was 61.93% and 7.8% of them presented obvious symptoms of PTSD, which indicated that the disaster caused severe psychological trauma to people there [2]. It may be related to the lagging overall level of socio-economic development of Hainan Province and the failing to carry out rescue and psychological intervention timely after disaster. At the same time, the lower level in socio-economic status, income, education and possession of various social resources of the affected people who mostly are coastal residents contribute to the increase of the incidence and symptoms of PTSD and the severe of the residents' stress response [3]. The survey also found that the young and middle-aged have a high prevalence and a low mental capacity who are more susceptible to

Table 1

The determination of symptoms of PTSD [*n* (%)].

Factors		Non-positive (37 scores)	Positive (38–49 scores)	Severe degree (50 scores)
Gender	Male	888 (30.16)	1840 (62.50)	216 (7.34)
	Female	660 (30.42)	1327 (61.15)	183 (8.43)
Age	Young (<40)	886 (40.38)	1157 (52.74)	151 (6.88)
	Middle-aged (40–)	543 (19.55)	1991 (71.67)	244 (8.78)
	Old (65–)	119 (83.80)	19 (13.38)	4 (2.82)
	Total	1548 (30.27)	3165 (61.93)	399 (7.80)

psychological symptoms. Therefore, the young and middle-aged people should be given more attention and concern when mental health workers carrying out mental health relief in the affected areas [4]. 5-HT dysfunction make the body cannot maintain a stable stress neurotransmitter during stress, which may be an important etiologic basis of stress or related disorders [5]. 5-HT dysfunction of PTSD patients may be related to individual exposure and trauma-related differences. There is a threshold relationship between the differences, unpredictability and controlling of stressors disaster itself and stress responses of individuals. Individual psychological defense mechanism obeys passively to the disasters that are sudden and strong stimulus, thus losing its own willingness to control events adverse consequences, which appear PTSD [6]. Meanwhile, the low level of platelet 5-HT in affected people with PTSD may be associated with individual exposure levels, acculturation, religious and cultural and so on factors of Hainan typhoon disaster area residents [7].

Currently, varieties of unconventional unexpected events occur more and more frequently. Hainan has a high incidence of typhoons, tsunamis and other natural disasters, and almost every region will experience this or that unconventional emergency. Sudden traumatic event sometimes cause non-objective harm to body and mind, which in addition to the harm on the body, it brings significant mentally and psychologically damage to affected people, as well as the resulting pluralism changes in thinking, emotional expression, values, philosophy of life, and understanding of life value and many other aspects of personality. This study shows that psychological symptoms (somatization, hostility, interpersonal sensitivity, paranoia, depression, obsessive-compulsive symptoms, anxiety, terror, psychotic) and low level in platelet 5-HT are the risk factors of PTSD. To

help the government establish mechanisms for post-disaster psychological crisis intervention, develop psychological rescue plan and provide a scientific basis for clinical diagnosis of PTSD, psychological crisis intervention service agencies that can cover all areas of Hainan Province should be built and post-disaster psychological crisis intervention should be carry out. It also embodies the humane care to affected populations, the building of harmonious society and the stabilizing of social situation.

Conflict of interest statement

We declare that we have no conflict of interests.

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