

Post-traumatic Stress Disorder Following Trauma Injuries in Military Personnel

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Received 2022-12-25; Accepted 2023-04-10; Online Published 2023-04-27

Abstract

Introduction: War-zone injuries are creating PTSD. This study aimed to assess Posttraumatic stress disorder (PTSD) Following Traumatic injuries among the Military Populations.

Methods: PubMed, Scopus, Web of Science, and Google Scholar sites were searched from 2013 to 2023. Two authors separately screened, assessed, and included the studies and any disagreement resolved by senior reviewers.

Results: Fifteen studies were included. Mental disorders among the forces showed that diseases, such as PTSD, were the highest among the military forces. The PTSD proportion in TBI cases was more significant than those without TBI. The cause of injuries and PTSD outcomes was due to blast injuries.

Conclusion: PTSD is among military force personnel's most common mental health disorders. Therefore, measures must be taken to prevent and control these diseases, especially among military combat forces. Classifying mental health disorders based on gender, age, the type of military service, the location of troops, the military rank of individuals, and the relationship with PTSD require further studies.

Keywords: PTSD; Military; Trauma.

Introduction

Mental disorders are among the most critical problems that may threaten military forces' health. Military staff uncovered war-zone injuries are a chance for creating PTSD¹⁻³. Those at the most prominent opportunity are those discovered to the most noteworthy levels of war-zone stretch, those injured in activity, those imprisoned as war detainees, and those who show intense war-zone response^{4,5}.

Recent studies and studies have shown that civilian and military patients with varying degrees of traumatic brain injury can develop PTSD⁶. Several processes have been proposed to explain onset, even in severe cases, such as the increased emotional significance of the event due to structural and functional changes in the brain, fear conditioning, PTA resolution, or memory restructuring. For example, a patient with a severe traumatic brain injury who has no memory of a car

accident may experience PTSD after viewing a magazine article about the accident⁷⁻⁸.

PTSD is characterized by the onset of symptoms following exposure to one or more traumatic events. Events such as war, terrorism, aggression, catastrophes, and motor vehicle accidents can be physically and psychologically traumatic and expose individuals to co-occurring risks: craniocerebral trauma and post-traumatic stress disorder. In the context of traumatic brain injury, "trauma" or "traumatic" are terms commonly used for sudden and severe physical damage, which excludes the possibility of psychological trauma. From a PTSD perspective, these terms refer to psychologically intense experiences⁹.

The mental health of military forces directly affects their job effectiveness, and research shows that mental health is one of the most critical factors in the job survival and productivity of military forces¹⁰. Many

factors, such as long-term deployment in military environments, being ready for operations, and being away from home and family, can increase the risk of psychological stress and mental health damage in military forces¹⁰⁻¹². Military service can be considered a stressful job like other emergency services. However, unlike other occupations in which the risk of stressful events can be compared with everyday stressful circumstances, it is not possible to compare the frequency and severity of stressful events experienced by the military forces with regular stressful events because it has conditions and many influential factors cannot be searched and assimilated in typical environments¹³⁻¹⁵. In truth, life in the military forces requires spending a lot of time away from family, friends, and relatives, which does not make it possible to receive support and help from them during the period of distance¹⁴⁻¹⁵.

Evaluating the probability of the occurrence of any disease has inherent importance in the category of prevention because any type of disease that can be predicted before the event of symptoms and signs can significantly help control the spread of that disease in the target group and population. Therefore, knowing the common conditions among the military forces and checking the possibility of their occurrence through the review of existing documents and reports can somehow play the role of screening for these types of diseases and help to plan correctly while knowing the current situation of the actual incidence of those disorders should be prevented in the future.

This study aimed to assess Posttraumatic stress disorder Following Traumatic injuries among Military Populations.

Methods

The preferred reporting methods for systematic reviews and meta-analyses guidelines were followed. We searched the PUBMED, SCOPUS, Web of Science, and Google Scholar databases for relevant studies (2013- 2023).

Included criteria were the English language, which counted on military/veteran, and diagnostics were obtained through documented and validated diagnostic tools for PTSD. To search for articles from the keywords in the MeSH database such as "Military," "Mental," "Police," "Posttraumatic stress disorder," "PTSD," "Mental Health," "Army," and "Trauma"

"injuries*" and "Disorders" were used. The mentioned words were searched in the search fields related to keywords, article title and article abstract using Boolean operators "And" and "Or".

Two reviewers independently filtered the documents' titles, abstracts, and methodological validity utilizing a data extraction format before their inclusion in the final review. Discussions with the senior faculty associate were employed to fix reviewer disagreements during the examination stage.

Results

Fifteen articles were included and were used in analysis (Table 1).

Pre-PTSD risk factors included female gender, minority status, lower educational attainment, noncommissioned rank, military service, combat expertise, multiple deployments, longer cumulative deployment duration, and more adverse life events. , exposure to previous trauma, etc., problem. Various aspects of the trauma stage also show risk factors such as increased combat stress, weapon firing, witnessing someone being injured or killed, severe trauma, and work-related stressors. Finally, the lack of post-deployment support in the post-traumatic period also increased the risk of PTSD.

Cognitive, anger, and physicality subscales were significantly higher in veterans with PTSD, but there was no interaction between PTSD and TBI or outburst history.

Daytime sleepiness may be a mediating factor by which both mTBI and PTSD can impair future memory. Regardless of subjective sleep quality, clinical care of individuals with a self-reported history of mTBI and/or PTSD should pay more attention to complaints of daytime sleepiness.

Barriers to self-care include disease severity, involvement in other chronic physical illnesses, aggressive personality types, propensity for risky behavior, and delays in starting treatment, drug-treatment interactions, and psychotropic medications. Side effects and inappropriate access to certain medicines. Fatigue from long-term drug use, forgetting to take some drugs, inadequate dependence on pure drug therapy, lack of social worker activity, and inadequate organization.

Comorbid mental health problems (Cognitive, anger, fatigue, stress, sleepiness, anxiety etc.) and subsequent life events were not positively associated with PTSD,

but post-deployment support was a protective factor (Table 1).

Table 1: Studies' characteristics

Studies	samples	Setting	Type of the study	causes	Effects
Carolyn et al (2020) ¹⁶	70,864 women Veterans aged 65.8± 10.4 years	USA	cohort	military sexual trauma	Anxiety, alcohol use disorder, substance use disorder, and opioid use disorder
Girija et al. (2018) ¹⁷	370 cases with a history of TBI	USA	Cross-sectional	TBI	Cases who depicted psychological injury had higher scores for post-traumatic stress and depression.
Christine et al. (2021) ¹⁸	575 military personnel in Afghanistan	Afghanistan or Germany	cohort	Blast TBI	Non blast controls but to a lesser extent, meeting criteria for moderate to severe PTSD symptoms was found to noticeably increase during this time frame
Bilal et al. (2021) ¹⁹	346 participants with mTBI	USA	Cross-sectional	mTBI	Cases with high pain interference were more likely to have history of ≥ 3 TBIs and to have clinical levels of post-traumatic stress disorder, depression, anxiety, and sleep disturbances versus those with insignificant pain interference.
Kelley et al (2019) ²⁰	283 military personnel (181 males; mean age 32.61 who had deployed in support of recent wars in Iraq or Afghanistan	USA	Cohort	Killing during Combat	These findings provide preliminary support for associations between killing in combat and negative mental health (PTSD) outcomes and hazardous alcohol use.
Macera et al. (2014) ²¹	31,534 Military personnel of Iraq, Afghanistan, or Kuwait	USA	Cohort	deployed to combat zones	Women in this sample had a similar probability of screening positive for PTSD. These PTSD symptoms were not associated with deployment-related variables, suggesting that deployment to a combat zone does not affect women differently from men. This finding could have meaningful implications for policies surrounding women in the military.
Harbertson et al. (2013) ²²	1,238 Rwanda Defense Forces	USA	Cross-sectional	Defense Forces	Nearly one-fourth of RDF participants screened positive for PTSD or depression, which impacts sexual risk behaviour, HIV acquisition risk and military readiness.
Kline et al. (2013) ²³	922 (91 female) military personnel in Iraq	USA	Cohort	National Guard soldiers	In the fully controlled model, gender remained a significant predictor of PTSS but the effect size was small. Modifiable military institutional factors may account for much of the increased vulnerability of women soldiers to PTSD.
O'Neil et al. (2017) ²⁴	67 military with blast injuries and 23 without blast injuries	USA	Cohort	blast injuries	Cognitive, anger, and physicality subscales were significantly higher in veterans with PTSD, but there was no interaction between PTSD and mTBI or outburst history.
Glenn et al. (2017) ²⁵	852 active-duty Marines and Navy Corpsmen	USA	Cohort	blast injuries	Deployment TBI, and multiple-hit TBI in particular, are associated with increases in conditioned fear learning and expression that may contribute to risk for developing PTSD symptoms.
Rau et al. (2017) ²⁶	82 Veterans with and without personal history of repeated blast-related mTBI	USA	Cohort	blast injuries	Daytime sleepiness may be a mediating factor by which both mTBI and PTSD can impair future memory. Regardless of subjective sleep quality, clinical care of individuals with a self-reported history of

					mTBI and/or PTSD should pay more attention to complaints of daytime sleepiness.
Reijnen et al. (2015) ²⁷	994 Dutch military personnel	Nederland	Cohort	deployment	The prevalence of symptoms of fatigue, PTSD, hostility, depression and anxiety was found to significantly increase after deployment compared with pre-deployment rates. As opposed to depressive symptoms and fatigue, the prevalence of PTSD was found to decrease after the 6-month assessment.
Trautmann et al. (2017) ²⁸	1439 deployed soldiers	Germany	Cohort	deployment	PTSD were observed in deployed soldiers with high combat exposure compared with civilians
Harbertson et al. (2018) ²⁹	2078 deploying shipboard US military personnel	USA	Cohort	deployment	In total, 7.3% screened positive for PTSD
Khalili et al. (2018) ³⁰	25 veteran in Iran	Iran	Qualitative research	Trauma injuries	Barriers to self-care include disease severity, involvement in other chronic physical illnesses, aggressive personality types, propensity for risky behavior, and delays in starting treatment, drug-treatment interactions, and psychotropic medications. Side effects and inappropriate access to certain medicines. Fatigue from long-term drug use, forgetting to take some drugs, inadequate dependence on pure drug therapy, lack of social worker activity, and inadequate organization. management, dissatisfaction with the organization and unexpected expectations of the organization

Discussion

The results showed that one of the most common disorders generally includes PTSD in military/veteran personnel⁶⁻¹⁰. Among the investigated diseases, post-traumatic stress disorder had a lower prevalence. Most of the military forces studied were men¹⁶⁻¹⁸.

The few studies that have been conducted, mainly on veterans and retired forces, indicate the high prevalence of this type of disorder in the military forces. For example, in a study conducted in 2018 by Williamson et al. on military retirees, the results showed that about 13.4% of the participants had depression, about 9% had anxiety disorders, and 8.4% had PTSD³¹. Another review study was conducted by Stevelink et al. in 2015 to investigate the prevalence of mental health disorders in military personnel with physical disabilities³². In this study, which evaluated the available resources from establishing databases such as Medline and the Institute of Scientific Information until 2014, finally, 17 studies entered the final evaluation stage. The results showed that disorders such as anxiety, with a range of 16 to 35%, stress, with a field of 13 to 36%, and depression, with a range of 10 to 46%, are among the most critical problems related to mental health in military forces with amputation

or physical injury.

Over the past two decades, the number of women serving in the military has increased and is expected to grow. This may put women at an increased risk of developing mental disorders. Gender was also a predictor in the meta-analysis¹⁶⁻²⁵. Post-traumatic stress disorder is more common in women than men after a fight. The findings corroborate a study conducted with army soldiers deployed to combat areas, where PTSD symptoms were more common in women than in studies comparing men and women. There are several possible factors for such results. But the main reasons appear to be that women report lower military readiness, lower unit cohesion, and higher rates of depression. Socio-demographic factors such as age have been noted. However, the results were mixed. In particular, it has been difficult to predict the impact of being young at the time of the trauma on the risk of developing PTSD, as age has opposing effects on different processes underlying the traumatic stress response²⁵⁻³⁰.

When military characteristics were studied, military rank, military service, occupation, total duration of deployment, and number of deployments were the major contributors to combat-related post-traumatic stress disorder development.

NCOs and support staff were more likely to be diagnosed with PTSD. This may have been due to increased exposure to combat. Other studies have also shown post-traumatic stress disorder is higher in NCO males than in officers¹⁰.

Military samples with traumatic brain injury were more likely to suffer from post-traumatic stress disorder than those without traumatic brain injury. Although most studies were conducted in the year following the accident, the total rate of PTSD after traumatic brain injury in both civilian and military samples was higher than the lifetime prevalence of PTSD in the general population⁶.

Ramchand et al. (2015) evaluated the prevalence of mental disorders, especially post-traumatic stress disorder, in international military forces stationed in Iraq and Afghanistan and reviewed all available documents from 2009 to 2014 through databases⁷. They gave. Their study showed that depending on the type of mission and duties of the military forces, the amount of mental disorders in them varies. For example, the prevalence of post-traumatic stress disorder ranged from zero in a group of Dutch military doctors stationed in Afghanistan to 48% in a sample of American National Guard soldiers. In the same way, the rate of depression was different from about 4 to 45 percent among other military groups.

A study showed that associated pathways and related genes be considered intelligent targets for managing pain in traumatic injuries patients³³. In the new research in managing PTSD cases especially with trauma injuries this issue should be regarded.

Conclusion

PTSD is among the most common mental health disorders in military forces. Therefore, measures must be taken to prevent and control these types of diseases, especially among military combat forces. Future studies can be conducted to classify mental health disorders based on factors such as the type of military service, the location of troops, and the military rank of individuals.

Acknowledgments

None.

Conflict of Interest Disclosures

The authors declare that they have no conflict of interests.

Funding Sources

None.

Authors' Contributions

Concept and design: Mehrdad Faraji, Sadrollah Mahmoodi; Data gathering and search: Mehrdad Faraji, Mohammad Reza Ghane, Hamid Reza Javadzadeh, Fahime Shahjooie, Ali Azadpour, Hasan Goodarzi, Sadrollah Mahmoodi; Writing and editing: Mehrdad Faraji, Mohammad Reza Ghane, Hamid Reza Javadzadeh, Fahime Shahjooie, Ali Azadpour, Hasan Goodarzi, Sadrollah Mahmoodi.

Ethical Statement

The board of emergency department, Baqiyatallah University of Medical Sciences confirmed the protocol of study.

References

1. Baumeister, A.A., et al., Prevalence and incidence of severe mental illness in the United States: an historical overview. *Harv Rev Psychiatry*, 2012. 20(5): p. 247-58.
2. Murray, C.J. and A.D. Lopez, Alternative projections of mortality and disability by cause 1990-2020: Global Burden of Disease Study. *Lancet*, 1997. 349(9064): p. 1498-504.
3. Patten, S.B., The Global Burden of Disease 2010 update: keeping mental health in the spotlight. *Epidemiol Psychiatr Sci*, 2014. 23(3): p. 255-7.
4. Rose-Clarke, K., et al., Rethinking research on the social determinants of global mental health. *Lancet Psychiatry*, 2020. 7(8): p. 659- 662.
5. Heron, E.A., et al., Military mental health: the role of daily hassles while deployed. *J Nerv Ment Dis*, 2013. 201(12): p. 1035-9.
6. Loignon A, Ouellet MC, Belleville G. A systematic review and meta-analysis on PTSD following TBI among military/veteran and civilian populations. *The Journal of Head Trauma Rehabilitation*. 2020 Jan 1;35(1): E21-35.
7. Ramchand, R., et al., Prevalence of, risk factors for, and consequences of posttraumatic stress disorder and other mental health problems in military populations deployed to Iraq and Afghanistan. *Curr Psychiatry Rep*, 2015. 17(5): p. 37.
8. Martins, L.C. and C.S. Lopes, Rank, job stress, psychological distress and physical activity among military personnel. *BMC Public Health*, 2013. 13: p. 716.
9. Xue C, Ge Y, Tang B, Liu Y, Kang P, Wang M, Zhang L. A meta-analysis of risk factors for combat-related PTSD among military personnel and veterans. *PloS one*. 2015 Mar 20;10(3): e0120270.
10. Saffari M, Sanaeinasab H, Rashidi-jahan H, Pakpour AH. Common Mental Health Disorders in Military Forces: A Systematic. *Journal of Military Health Promotion*. 2021;1(4):172-81.
11. Iversen, A.C., et al., The prevalence of common mental disorders and PTSD in the UK military: using data from a clinical interviewbased study. *BMC Psychiatry*, 2009. 9: p. 68.

12. Perez Ade, M. and I.M. Bensenor, Tobacco and alcohol use, sexual behavior and common mental disorders among military students at the Police Academy, Sao Paulo, Brazil. A crosssectional study. *Sao Paulo Med J*, 2015. 133(3): p. 235-44.
13. Castillo, R.C., et al., Pain, Depression, and PTSD Following Major Extremity Trauma Among United States Military Serving in Iraq and Afghanistan: Results from the METALS Study. *J Orthop Trauma*, 2020.
14. Rowan, A.B., et al., Military Mental Health Personnel Deployment Survey: A Secondary Analysis. *Mil Med*, 2020. 185(3-4): p. e340-e346.
15. Waitzkin, H., et al., Military Personnel Who Seek Health and Mental Health Services Outside the Military. *Mil Med*, 2018. 183(5-6): p. e232-e240.
16. Gibson CJ, Maguen S, Xia F, Barnes DE, Peltz CB, Yaffe K. Military sexual trauma in older women veterans: prevalence and comorbidities. *Journal of general internal medicine*. 2020 Jan; 35:207-13.
17. Gibson CJ, Maguen S, Xia F, Barnes DE, Peltz CB, Yaffe K. Military sexual trauma in older women veterans: prevalence and comorbidities. *Journal of general internal medicine*. 2020 Jan; 35:207-13.
18. Mac Donald CL, Barber J, Patterson J, Johnson AM, Parsey C, Scott B, Fann JR, Temkin NR. Comparison of clinical outcomes 1 and 5 years' post-injury following combat concussion. *Neurology*. 2021 Jan 19;96(3): e387-98.
19. Khokhar BR, Lindberg MA, Walker WC. Post-mTBI pain interference in a US military population: A chronic effect of neurotrauma consortium study. *Military medicine*. 2021 Mar;186(3-4): e293-9.
20. Kelley ML, Bravo AJ, Hamrick HC, Braitman AL, Judah MR. Killing during combat and negative mental health and substance use outcomes among recent-era veterans: The mediating effects of rumination. *Psychological trauma: theory, research, practice, and policy*. 2019 May;11(4):379.
21. Macera CA, Aralis HJ, Highfill-McRoy R, Rauh MJ. Posttraumatic stress disorder after combat zone deployment among Navy and Marine Corps men and women. *Journal of women's health*. 2014 Jun 1;23(6):499-505.
22. Harbertson J, Grillo M, Zimulinda E, Murego C, Cronan T, May S, Brodine S, Sebagabo M, Araneta MR, Shaffer R. Prevalence of PTSD and depression, and associated sexual risk factors, among male R wanda D efense F orces military personnel. *Tropical Medicine & International Health*. 2013 Aug;18(8):925-33.
23. Kline A, Ciccone DS, Weiner M, Interian A, St. Hill L, Falca-Dodson M, Black CM, Losonczy M. Gender differences in the risk and protective factors associated with PTSD: a prospective study of National Guard troops deployed to Iraq. *Psychiatry*. 2013 Sep 1;76(3):256-72.
24. O'Neil ME, Callahan M, Carlson KF, Roost M, Laman-Maharg B, Twamley EW, Iverson GL, Storzbach D. Postconcussion symptoms reported by Operation Enduring Freedom/Operation Iraqi Freedom veterans with and without blast exposure, mild traumatic brain injury, and posttraumatic stress disorder. *Journal of clinical and experimental neuropsychology*. 2017 May 28;39(5):449-58.
25. Glenn DE, Acheson DT, Geyer MA, Nievergelt CM, Baker DG, Risbrough VB, MRS-II Team. Fear learning alterations after traumatic brain injury and their role in development of posttraumatic stress symptoms. *Depression and anxiety*. 2017 Aug;34(8):723-33.
26. Rau HK, Hendrickson RC, Roggenkamp HC, Peterson S, Parmenter B, Cook DG, Peskind E, Pagulayan KF. Fatigue—but not mTBI history, PTSD, or sleep quality—directly contributes to reduced prospective memory performance in Iraq and Afghanistan era Veterans. *The Clinical Neuropsychologist*. 2018 Oct 3;32(7):1319-36.
27. Reijnen A, Rademaker AR, Vermetten E, Geuze E. Prevalence of mental health symptoms in Dutch military personnel returning from deployment to Afghanistan: a 2-year longitudinal analysis. *European Psychiatry*. 2015 Feb;30(2):341-6.
28. Trautmann S, Goodwin L, Hufler M, Jacobi F, Strehle J, Zimmermann P, Wittchen HU. Prevalence and severity of mental disorders in military personnel: a standardised comparison with civilians. *Epidemiology and psychiatric sciences*. 2017 Apr;26(2):199-208.
29. Harbertson J, Hale BR, Michael NL, Scott PT. Missed opportunity to screen and diagnose PTSD and depression among deploying shipboard US military personnel. *BJPsych open*. 2016 Sep;2(5):314-7.
30. Khalili R, Sirati Nir M, Mahmoudi H, Ebadi A. Explanation of the self-care barrier factors in veterans with chronic post-traumatic stress disorder caused by war: A qualitative study. *Journal Mil Med*. 2018 Dec 19;20(5):527-37.
31. Williamson, V., et al., Prevalence of Mental Health Disorders in Elderly U.S. Military Veterans: A Meta-Analysis and Systematic Review. *Am J Geriatr Psychiatry*, 2018. 26(5): p. 534-545.
32. Stevelink SA, Malcolm EM, Mason C, Jenkins S, Sundin J, Fear NT. The prevalence of mental health disorders in (ex-) military personnel with a physical impairment: a systematic review. *Occupational and environmental medicine*. 2015 Apr 1;72(4):243-51.
33. Rasouli HR, Talebi S, Ahmadpour F. Evaluation of Associated Genes with Traumatic Pain: A Systematic Review. *CNS & Neurological Disorders-Drug Targets (Formerly Current Drug Targets- CNS & Neurological Disorders)*. 2022 Nov 1;21(9):830-40.