Fatigue symptoms in Sri Lanka Navy personnel deployed in combat areas

R Hanwella[1], **N E L W Jayasekera**[2], **V A de Silva**[1]

(Index words: fatigue, military personnel, Special Forces, combat, Sri Lanka)

Abstract

Objectives The objective was to study the prevalence of fatigue symptoms among Special Forces and regular forces military personnel deployed in combat areas and to explore factors associated with fatigue symptoms.

Methods This is a cross sectional study of representative samples of Sri Lanka Navy Special Forces and regular forces deployed in combat areas continuously for at least one year. Fatigue was measured using a 12 item fatigue scale. Symptoms of common mental disorder were identified using the General Health questionnaire 12 (GHQ-12). Multiple physical symptoms were elicited using a checklist of symptoms. PTSD was diagnosed using the 17-item National Centre for PTSD checklist civilian version (PCL-C).

Results Sample consisted of 259 Special Forces and 412 regular navy personnel. Prevalence of fatigue over the last month was 13.41% (95% CI 10.83-16.00). Prevalence was significantly less in the Special Forces (5.4%) than in the regular forces (18.4%) [OR 0.38 (95% CI 0.17-0.82)]. Only two types of combat exposure "thought I might be killed" and "coming under mortar, missile and artillery fire" were significantly associated with fatigue symptoms. Fatigue was strongly associated with symptoms of common mental illness [adjusted OR 12.82 (95% CI 7.10-23.12)], PTSD [adjusted OR 9.08 (95% CI 2.84-29.0)] and multiple somatic symptoms [adjusted OR 9.85 (95% CI 5.42-17.9)]. Fatigue was significantly associated with functional impairment.

Conclusions Prevalence of fatigue was significantly lower in the Special Forces despite high combat exposure. Fatigue was associated only with indicators of intense combat exposure. Fatigue caused significant functional impairment even after adjusting for psychological morbidity.

Ceylon Medical Journal 2014; **59**: 39-44

Introduction

Fatigue is a symptom which refers to weariness and exhaustion [1]. Fatigue can be a symptom of physical or psychiatric disorder. There is no evidence that infections are the cause of chronic fatigue and chronic fatigue syndrome (CFS) [2]. It is not clear if psychological vulnerability predisposes to fatigue although a strong association has been found between fatigue and depression as well as other psychiatric illness [3-5]. A large study of a nationally representative sample in the United Kingdom, showed that chronic fatigue was associated with physical illness, depressive symptoms, anxiety symptoms and sleep complaints [6]. There is evidence to support fatigue as a separate diagnosis and this is reflected in the ICD-10 classification system which includes neurasthenia as a separate diagnostic category [7, 8].

Prevalence of fatigue varies across different cultures. An international study examining psychological health in 14 countries found that people from developed countries were more likely to report unexplained fatigue [3]. In this study, the prevalence of substantial unexplained fatigue varied between Manchester 15.05%, Berlin 12.53%, Bangalore 3.83% and Shanghai 3.63%.

Chronic fatigue syndrome (CFS) is a debilitating and complex disorder, characterized by profound fatigue that is not improved by bed rest and may be worsened by physical or mental activity for which no adequate medical explanations can be found [9, 10]. CFS affects between 0.006% and 3% of the population depending on the definition used [11-13].

There is much evidence regarding adverse mental health consequences such as post traumatic stress disorder (PTSD), depression, substance use and behavioural problems among military personnel deployed in Iraq and Afghanistan [14-17]. In addition, Gulf War 1 veterans reported higher rates of somatic symptoms and functional impairment. This led to the speculation of a Gulf War Syndrome. Some of the Gulf War 1 veterans with somatic symptoms were diagnosed with CFS [18]. Prevalence of CFS among Gulf War veterans is higher than that in the general population [19].

The Sri Lanka Defence Forces were engaged in combat operations for 30 years. In 2006, the level of combat operations intensified as reflected in the casualty figures

[1]*Department of Psychological Medicine, Faculty of Medicine, University of Colombo and* [2]*Directorate of Health Services, Sri Lanka Navy, Sri Lanka.*

Correspondence: VAdeS, *e-mail: <varunidesilva2@yahoo.co.uk>.* *Received 10 August 2013 and revised version accepted 25 November 2013. Competing interests: none declared.*

[20]. During the period 2006-2009, 190 officers and 5,700 other ranks of the Sri Lanka Army were killed and 27,000 injured [21]. In the Sri Lanka Navy (SLN), 485 personnel were killed and 245 permanently disabled [22]. We conducted a study to compare the mental health of regular forces and Special Forces personnel of the Sri Lanka Navy who were deployed in combat areas. This paper presents data on fatigue symptoms and associated factors which were obtained from that study.

Methods

A cross sectional study was carried out among Sri Lanka Navy (SLN) Special Forces and regular forces deployed in combat areas. The study methods are described in detail in a previous publication [20]. Representative samples of Special Forces and regular forces were selected using simple random sampling. The sampling frames used were the lists of personnel from the SLN central data base. Samples were selected using computer generated random numbers. Only personnel who had served continuously in combat areas during the one year period prior to end of combat operations were included in the study. Since there were no females in the Special Forces, females were excluded from the regular forces group. A total of 259 Special Forces and 412 regular navy personnel were recruited to the study. The response rate was 93.8%. The rate of missing values for individual items in the survey was about 10%. The study was conducted six months after the end of combat operations in 2009.

The 28 page questionnaire used in the study "Health of UK military personnel deployed in the 2003 Iraq war" was used as the data collection instrument [17]. Permission was obtained from the authors for the use of the questionnaire. Fatigue was measured using a 12 item fatigue scale which assessed symptoms over the past month. Cases were defined as individuals scoring 4 or more. Symptoms of common mental disorder were identified using the General Health Questionnaire 12 (GHQ-12) and cases were defined as individuals scoring 4 or more. Duration of fatigue symptoms and common mental disorders were assessed for a period of one month. Multiple physical symptoms were elicited using a checklist of symptoms and cases were defined as individuals with 10 or more symptoms. PTSD was diagnosed using the 17-item National Centre for PTSD checklist civilian version (PCL-C) and cases were defined as individuals scoring 50 or more.

Functional impairment was assessed with five questions from the SF-36. These included one item of physical or emotional problems interfering with normal social activities with family, friends, neighbours, or groups, and four items of problems with work or other regular activities as a result of physical health [23].

Approval was obtained from the Ethics Review Committee of the Faculty of Medicine, University of Colombo. Participation was voluntary and written informed consent was obtained from all participants. The questionnaire did not identify the participants by name.

Analyses were done using SPSS version 13.0. Pearsons χ^2 test was used to assess the difference between groups for categorical variables. Logistic regression analysis was used to calculate unadjusted and adjusted odds ratios (OR) with 95% confidence limits (95% CI). Model adequacy was tested using goodness of fit with the Hosmer-Lemeshow test.

Results

Study sample

The sample consisted of 259 Special Forces and 412 regular navy personnel (Table 1). The mean age of the sample was 27.6 years (SD 5.02). There were 33 (4.9%) commissioned officers, 104 (15.5%) non commissioned officers and 534 (79.6%) other ranks. Two hundred and thirty six (35.2%) were engaged in combat duty, 195 (29.1%) served on board naval vessels and 237 (35.3%) were engaged in noncombat duties which included medical, logistic, engineering, communication and administrative roles [20].

Prevalence of fatigue

Association between fatigue and demographic variables are shown in Table 2. Prevalence of fatigue was 13.41% (95% CI 10.83-16.00). Prevalence was 5.41% (95% CI 2.63-8.18) in the Special Forces and 18.45% (95% CI 14.69-22.21) in the regular forces. Special Forces personnel were significantly less likely to have experienced fatigue compared to regular forces [OR 0.38 (95% CI 0.17-0.82)]. Of those having more than four symptoms, 26 (3.87%) reported symptom duration of three months or more. Fatigue was not significantly association with age or marital status. Adjusted odds ratios showed that risk of fatigue was significantly higher among personnel with education level of GCE A'Level or higher [OR 2.35 (95% CI 1.12-4.95). Although unadjusted odds ratios showed that personnel engaged in noncombat duty had significantly higher risk of fatigue, this disappeared when we adjusted for demographic variables and service type.

Fatigue and combat exposure

Combat exposure was assessed using ten questions (Table 3). Only two types of combat exposure were significantly associated with fatigue symptoms. These were "thought I might be killed" [OR 2.05 (95% CI 1.27-3.33)] and "coming under mortar, missile and artillery fire" [OR 2.27 (95% CI 1.38-3.71). Adjusting for service type, education and role within the unit did not alter the outcomes.

Table 1. Description of study sample

	Special Forces n=259 (%)	*Regulars n =412 (%)*	*Significance*
Age (years)			
0-24	102 (39.4)	96 (23.3)	χ^2=24.8 df=4
25-34	146 (56.4)	277 (67.2)	p<0.001
>35 years	11 (4.2)	39 (9.5)	
Marital status			
Married/divorced	101 (39.6)	234 (57.2)	χ^2=19.8 df=2
Never married	154 (60.4)	175 (42.8)	p<0.001
Educational status			
Less than GCE O'Level	137 (53.5)	104 (25.4)	χ^2=59.2 df=3
GCE O Level	91 (35.5)	195 (47.7)	p<0.001
GCE A Level or higher	28 (10.9)	110 (26.9)	
Rank (Current)			
Commissioned Officer	14 (5.4)	19 (4.6)	χ^2=38.4 df=2
Non-commissioned Officer	68 (26.3)	36 (8.7)	p<0.001
Other ranks	177 (68.3)	357 (86.7)	
Role within unit			
Land combat	183 (70.7)	53 (13.0)	χ^2=257.0 df=2
On board naval vessels	60 (23.2)	135 (33.0)	p<0.001
Non combat duties	16 (6.2)	221 (54.0)	

Table 2. Association between fatigue and demographic variables and mental health outcomes

	Unadjusted OR (95% CI)	**Adjusted OR (95% CI)*
Service type		
Special Forces	0.25 (0.14-0.46)	0.38 (0.17-0.82)
Regular Forces	1.0	1.0
Age (years)		
0-24 years	1.0	1.0
25-34 years	1.01 (0.61-1.68)	0.72 (0.41-1.25)
> 35 years	1.95 (0.89-4.30)	0.75 (0.27-2.08)
Marital Status		
Never married	1.0	1.0
Married/divorced	1.21 (0.77-1.89)	0.97 (0.55-1.71)
Educational Status		
Less than GCE O'Level	1.0	1.0
GCE O Level	2.45 (1.32-4.56)	1.65 (0.86-3.19)
GCE A Level or higher	5.19 (2.71-9.92)	2.35 (1.12-4.95)
Rank (Current)		
Commissioned Officer	2.16 (0.94-4.98)	2.52 (0.96-6.22)
Non-commissioned Officer	0.95 (0.51-1.81)	1.22 (0.53-2.85)
Other ranks	1.0	1.0
Role within unit		
Land combat	1.0	1.0
On board naval vessels	0.97 (0.48-2.08)	0.58 (0.25-1.34)
Others	4.18 (2.35-7.42)	1.90 (0.89-4.03)
Mental health outcomes		
GHQ case yes	13.85 (8.12-23.62)	12.82 (7.10-23.12)
PTSD case yes	6.99 (2.55-19.13)	9.08 (2.84-29.0)
Multiple somatic symptoms	10.73 (6.21-18.5)	9.85 (5.42-17.9)

*Adjusted for age, marital status, education, rank, service type and role

Table 3. Association between fatigue and combat exposure

Combat exposure	*Unadjusted OR (95% CI)*	*Adjusted OR[a] (95% CI)*
Discharged weapon in direct combat	0.54 (0.34-0.85)	1.60 (0.89-2.88)
Thought I might be killed	1.48 (0.95-2.30)	2.05 (1.27-3.33)
Seeing dead or wounded	0.98 (0.61-1.58)	1.31 (0.78-2.18)
Handled bodies	1.02 (0.65-1.59)	1.23 (0.75-2.0)
Aided wounded	0.98 (0.62-1.55)	1.11 (0.67-1.83)
Came under small arm fire	0.87 (0.55-1.39)	1.36 (.081-2.28)
Came under mortar, missile, artillery fire	1.66 (1.06-2.60)	2.27 (1.38-3.71)
Experienced landmine strikes	1.24 (0.42-3.7)	1.37 (0.43-4.37)
Experienced hostility from civilians	1.88 (0.61-5.86)	2.77 (0.82-9.41)
Involved in combat with enemy vessels	0.58 (0.37-0.91)	1.22 (0.71-2.10)

[a] Adjusted for service type, education, and role within the unit

Table 4. Association between fatigue and functional impairment

	Unadjusted OR (95% CI)	*Adjusted OR[a] (95% CI)*
Health interfered with social life	3.75 (2.36-5.95)	1.88 (1.09-3.27)
Cut down time on work/other activities	5.86 (3.49-9.86)	4.22 (2.26-7.86)
Accomplished less than would like	4.13 (2.46-6.92)	3.41 (1.85-6.30)
Limited in type of work	4.30 (2.61-7.06)	3.76 (2.08-6.82)
Difficulty performing work	3.84 (2.42-6.09)	2.69 (1.54-4.71)

[a] Adjusted for age, marital status, education, rank, service type, GHQ and PTSD

Association with mental health outcomes

Fatigue was strongly associated with symptoms of common mental illness [adjusted OR 12.82 (95% CI 7.10-23.12)], PTSD [adjusted OR 9.08 (95% CI 2.84-29.0)] and multiple somatic symptoms [adjusted OR 9.85 (95% CI 5.42-17.9)]. This association remained even after adjusting for demographic variables.

To explore if the association between fatigue and combat experiences, GHQ caseness and somatic symptoms could be explained by PTSD we adjusted for PTSD caseness. We found that the significant association for combat exposure "thought I might be killed" [adjusted OR 1.87 (95% CI 1.14-3.06)] and "coming under mortar, missile and artillery fire" [adjusted OR 2.30 (95% CI 1.39-3.79)] remained even after adjusting for PTSD. Similarly the association between fatigue and GHQ caseness [adjusted OR 11.06 (95% CI 6.14-19.93)] and multiple physical symptoms [adjusted OR 8.92 (95% CI 4.88-16.30)] remained after adjusting for PTSD.

Association between fatigue and functional impairment is shown in Table 4. Fatigue was significantly associated with all five items measuring functional impairment. The effect size reduced when we adjusted for psychological morbidity but the association still remained significant.

The mean number of days of sick leave was significantly higher among personnel with fatigue (0.93 days) than those without fatigue (0.32 days) ($t=-5.11$, $p<0.001$). Among those with fatigue 43.3% had reported sick at least once during the last 6 months compared to 17.2% without fatigue symptoms.

Discussion

This is one of the few studies which examined fatigue among military personnel in an Asian population. We looked at the association between fatigue and combat exposure, mental health problems and functional impairment among deployed military personnel. We found that the presence of at least four fatigue symptoms over a period of one month was associated with GHQ caseness and PTSD. Regular forces had a higher risk of developing fatigue compared to Special Forces. Fatigue caused

significant functional impairment even after adjusting for psychological morbidity.

Prevalence of fatigue in our sample of 13.41% was lower than 33% reported in a study of UK military personnel deployed to Iraq which used the same diagnostic criteria. There is cross cultural variation in the prevalence of fatigue with prevalence of fatigue ranging from 2.26-15.05% with a lower prevalence of fatigue in Asian countries [3]. This could explain the low prevalence of fatigue in our study. Another reason is that more than one third of the sample consisted of Special Forces who had very low prevalence of fatigue. The prevalence of fatigue (18.4%) among regular forces is similar to prevalence of "abnormal fatigue" of 21.4% (95% CI 19.5-23.3) reported among males in a community sample in Sri Lanka [24].

We found that the prevalence of fatigue was significantly lower in the Special Forces than in the regular forces. This is in keeping with the previous findings in this sample of better mental health outcomes among Special Forces indicated by lower rates of hazardous drinking, smoking, GHQ caseness and multiple physical symptoms, despite higher rates of combat exposure [20, 25-27]. UK military reservists and US National Guard also experienced more mental health problems than regular personnel [14, 28, 29]. Differences in intensity of training and in physical and mental health status of the groups prior to deployment were thought to contribute to the poorer mental health outcomes among reservists [14]. This could explain the lower rates of fatigue among Special Forces in our study too. The SLN Special Forces are recruited from regular personnel who volunteer to join the Special Forces and only about 50% finally complete the intensive training. Thus, the Special Forces are a highly select group who are physically healthier and probably more resilient than regular personnel [20]. Fatigue was also associated with significant functional impairment and personnel with functional impairment are likely to be excluded from combat roles. This has been described as the "healthy warrior" effect which suggests that psychologically unfit personnel drop out during training and therefore those deployed are healthier [30].

We could not find any previous studies of association between combat exposure and fatigue symptoms although the association between PTSD and physical symptoms is well known [31, 32]. In our sample overall exposure to combat was high and Special Forces were exposed to significantly more combat than regular forces [20]. For example more than 80% of the Special Forces experienced discharge of weapons in direct combat compared to 26.7% of the regular forces. Despite the high level of combat exposure, only two of the ten items measuring combat exposure were associated with fatigue. "Thought might be killed and "coming under mortar, missile, artillery fire" can be classified as risk to self events [33, 34]. Some of these "risk to self events" were also associated with increased risk of smoking [25]. It appears that fatigue is not a common consequence of combat exposure. However vulnerable individuals who experience intense combat may be at risk of developing fatigue and other somatic symptoms. There is evidence of association between somatic symptoms and PTSD [32]. However in our sample PTSD could not explain the association between fatigue, and other mental health outcomes.

Chronic fatigue is associated with considerable functional impairment [35]. Although the fatigue symptoms are associated with psychological morbidity, this alone cannot explain the functional impairment because the association between fatigue and functional impairment remained even after adjustment for psychological morbidity. Those with fatigue were also more likely to report sick. However the mean number of days reported as sick over the last six months was less than one.

Our study had several limitations. We did not identify chronic fatigue syndrome but only symptoms of fatigue. Similar to other community surveys we did not review medical records and therefore could not rule out physical illness. Because the sample consisted of deployed military personnel, it is unlikely that many of them would have physical illness which could account for the fatigue symptoms. The data is based on the self reporting of symptoms. While this can influence results, most studies of fatigue have relied on self reports.

Conclusions

Prevalence of fatigue symptoms was lower in Sri Lanka Navy personnel deployed in combat areas compared to rates from Western countries. Special Forces had significantly lower rates of fatigue compared to regular forces. There was significant association between fatigue and psychological morbidity. Fatigue was significantly associated with impaired functioning level, even in the absence of psychological morbidity. Fatigue was not associated with most types of combat exposure.

Acknowledgements

We thank Prof. Matthew Hotopf for granting permission to use the questionnaire.

References

1. Wessely S. The epidemiology of chronic fatigue syndrome. *Epidemiologic Reviews* 1995; **17**: 139-51.
2. Wessely S, Chalder T, Hirsch S, Pawlikowska T, Wallace P, Wright DJ. Postinfectious fatigue: prospective cohort study in primary care. *Lancet* 1995; **345**: 1333-8.
3. Skapinakis P, Lewis G, Mavreas V. Cross-cultural differences in the epidemiology of unexplained fatigue syndromes in primary care. *British Journal of Psychiatry* 2003; **182**: 205-9.
4. Pawlikowska T, Chalder T, Hirsch SR, Wallace P, Wright DJ, Wessely SC. Population based study of fatigue and psychological distress. *BMJ* 1994; **308**: 763-6.
5. Henningsen P, Zimmermann T, Sattel H. Medically

unexplained physical symptoms, anxiety, and depression: a meta-analytic review. *Psychosomatic Medicine* 2003; **65**: 528-33.

6. Watanabe N, Stewart R, Jenkins R, Bhugra DK, Furukawa TA. The epidemiology of chronic fatigue, physical illness, and symptoms of common mental disorders: a cross-sectional survey from the second British National Survey of Psychiatric Morbidity. *Journal of Psychosomatic Research* 2008; **64**: 357-62.
7. Harvey SB, Wessely S, Kuh D, Hotopf M. The relationship between fatigue and psychiatric disorders: evidence for the concept of neurasthenia. *Journal of Psychosomatic Research* 2009; **66**: 445-54.
8. World Health Organization. The ICD-10 Classification of Mental and Behavioural Disorders: Clinical descriptions and diagnostic guidelines. Geneva: World Health Organization; 1996.
9. Royal Colleges of Physicians, Psychiatrists, and General Practitioners. Chronic Fatigue Syndrome. Report of a joint working group of the Royal Colleges of Physicians, Psychiatrists, and General Practitioners. London: Royal Colleges of Physicians; 1996.
10. Chronic fatigue syndrome [http://www.cdc.gov/cfs/]
11. Reid S, Chalder T, Cleare A, Hotopf M, Wessely S. Chronic fatigue syndrome. *Clinical Evidence* (Online) 2011; **26**: 2011.
12. Bates DW, Schmitt W, Buchwald D, Ware NC, Lee J, Thoyer E, Kornish RJ, *et al*. Prevalence of fatigue and chronic fatigue syndrome in a primary care practice. *Archives of Internal Medicine* 1993; **153**: 2759-65.
13. Darbishire L, Ridsdale L, Seed PT. Distinguishing patients with chronic fatigue from those with chronic fatigue syndrome: a diagnostic study in UK primary care. *British Journal of General Practice* 2003; **53**: 441-5.
14. Thomas JL, Wilk JE, Riviere LA, McGurk D, Castro CA, Hoge CW. Prevalence of mental health problems and functional impairment among active component and National Guard soldiers 3 and 12 months following combat in Iraq. *Archives of General Psychiatry* 2010; **67**: 614-23.
15. Hoge CW, Castro CA, Messer SC, McGurk D, Cotting DI, Koffman RL. Combat duty in Iraq and Afghanistan, mental health problems, and barriers to care. *New England Journal of Medicine* 2004; **351**: 13-22.
16. Hoge CW, Terhakopian A, Castro CA, Messer SC, Engel CC. Association of posttraumatic stress disorder with somatic symptoms, health care visits, and absenteeism among Iraq war veterans. *American Journal of Psychiatry* 2007; **164**: 150-3.
17. Hotopf M, Hull L, Fear NT, Browne T, Horn O, Iversen A, *et al*. The health of UK military personnel who deployed to the 2003 Iraq war: a cohort study. *Lancet* 2006; **367**: 1731-41.
18. Thomas HV, Stimpson NJ, Weightman AL, Dunstan F, Lewis G. Systematic review of multi-symptom conditions in Gulf War veterans. *Psychological Medicine* 2006; **36**: 735-47.
19. Reid S, Hotopf M, Hull L, Ismail K, Unwin C, Wessely S. Multiple chemical sensitivity and chronic fatigue syndrome in British Gulf War veterans. *American Journal of Epidemiology* 2001; **153**: 604-9.
20. Hanwella R, de Silva V. Mental health of Special Forces personnel deployed in battle. *Social Psychiatry and Psychiatric Epidemiology* 2012; **47**: 1343-51.
21. Ministry of Defence (2009) Wanni war heroes given military honours & their service appreciated http://www.defence.lk/new.asp?fname=20090529_05 (accessed May 2010).
22. Sri Lanka Navy (2009) Fallen comrades 2001-2005 http://www.navy.lk/index.php?id=66 (accessed May 2010).
23. Ware J, Snow K, Kosinski M, Gandek B. SF-36 Health Survey Manual and Interpretation Guide. Boston: The Health Institute, New England Medical Centre; 1993.
24. Ball HA, Sumathipala A, Siribaddana SH, *et al*. Aetiology of fatigue in Sri Lanka and its overlap with depression. *British Journal of Psychiatry* 2010; **197**: 106-13.
25. de Silva VA, Jayasekera NE, Hanwella R. Smoking among troops deployed in combat areas and its association with combat exposure among navy personnel in Sri Lanka. *Substance Abuse Treatment Prevention and Policy* 2012; **7**: 27.
26. Hanwella R, de Silva VA, Jayasekera NE. Alcohol use in a military population deployed in combat areas: a cross sectional study. *Substance Abuse Treatment Prevention and Policy* 2012; **7**: 24.
27. de Silva VA, Jayasekera NE, Hanwella R. Multiple physical symptoms in a military population: a cross sectional study. *Annals of General Psychiatry* 12: 24.
28. Milliken CS, Auchterlonie JL, Hoge CW. Longitudinal assessment of mental health problems among active and reserve component soldiers returning from the Iraq war. *Journal of the American Medical Association* 2007; **298**: 2141-8.
29. Browne T, Hull L, Horn O, Jones M, Murphy D, Fear NT, *et al*. Explanations for the increase in mental health problems in UK reserve forces who have served in Iraq. *British Journal of Psychiatry* 2007; **190**: 484-9.
30. Larson GE, Highfill-McRoy RM, Booth-Kewley S. Psychiatric diagnoses in historic and contemporary military cohorts: combat deployment and the healthy warrior effect. *American Journal of Epidemiology* 2008; **167**: 1269-76.
31. Osorio C, Carvalho C, Fertout M, Maia A. Prevalence of post-traumatic stress disorder and physical health complaints among Portuguese Army Special Operations Forces deployed in Afghanistan. *Military Medicine* 2012; **177**: 957-62.
32. Engel CC, Jr., Liu X, McCarthy BD, Miller RF, Ursano R. Relationship of physical symptoms to posttraumatic stress disorder among veterans seeking care for gulf war-related health concerns. *Psychosomatic Medicine* 2000; **62**: 739-45.
33. Browne T, Iversen A, Hull L, Workman L, Barker C, Horn O. *et al*. How do experiences in Iraq affect alcohol use among male UK armed forces personnel? *Occupational and Environmental Medicine* 2008; **65**: 628-33.
34. Iversen AC, Fear NT, Ehlers A, Hacker Hughes J, Hull L, Earnshaw M, *et al*. Risk factors for post-traumatic stress disorder among UK Armed Forces personnel. *Psychological Medicine* 2008; **38**: 511-22.
35. Kroenke K, Wood DR, Mangelsdorff AD, Meier NJ, Powell JB. Chronic fatigue in primary care. Prevalence, patient characteristics, and outcome. *Journal of the Americal Medical Association* 1988; **260**: 929-34.