Self-reported Liver Disorders in Australian Vietnam War Veterans

H Wang, X Liang, K Bridle, D Crawford

Abstract

Background: Self-reported physical comorbidities are common among combat veterans. Until now, it has been unclear what underlying risk factors were associated with these self-reported health disorders.

Purpose: This study aimed to compare self-reporting and objective clinical investigations of liver disorders in a large group of Australian Vietnam War veterans and identify potential risk factors for the discordance.

Material and methods: Australian veterans who had served in the armed services in Vietnam during the Vietnam War were recruited between February 2014 and July 2015. The univariate and multivariate logistic regression models were constructed to examine the risk factors of false positive self-reported liver disorders.

Results: Of 299 enrolled participants, 80 participants (26.8%) self-reported liver disorders and 110 (36.8%) were clinically confirmed. Self-reporting gave high specificities (83.5% to 98.8%) but low sensitivities (2.70% to 66.7%) for liver disorders. Abdominal symptoms were associated with a 2.2-fold increase in the risk of false positive self-reported liver disorders (P = 0.04).

Conclusion: Abdominal symptoms are an independent risk factor for false positive self-reported liver disorders in Australian Vietnam War veterans.

Introduction

Self-reported physical comorbidities are common among combat veterans. A large portion of these comorbidities could not be diagnosed or confirmed even with intensive clinical examinations and investigations.[1, 2] Many previous studies attributed the over reporting of physical comorbidities to psychological conditions, such as post-traumatic stress disorder (PTSD).[3, 4] However, our recent study revealed that the rate of self-reported physical comorbidities among Australian Vietnam War veterans without PTSD is still as high as 46–56%.[5] Until now, it is unclear what underlying risk factors were associated with these self-reported health disorders. To address this knowledge gap, we compared self-reporting and objective clinical investigations of liver disorders in a large group of Australian Vietnam War veterans with and without PTSD and identified potential risk factors for the discordance.

Methods

Clinical data collection and laboratory tests

The study was conducted at the Gallipoli Medical Research Institute, Greenslopes Private Hospital in Brisbane, QLD. Australian veterans who had served in the armed services in Vietnam during the Vietnam War were recruited between February 2014 and July 2015. Written informed consent from all participants was obtained. A structured, comprehensive medical history was obtained, and a clinical examination was conducted by a medical officer in Greenslopes Private Hospital, Brisbane, Australia. Participants were assessed by a psychiatrist experienced in diagnosing and treating veterans with psychiatric disorders. Participants also underwent assessment by a psychologist using the Clinician Administered PTSD Scale for DSM-5 (CAPS-5), the Alcohol Use Disorders Identification Test (AUDIT) and the DASS21 scores for depression, anxiety and stress. Blood from all participants was collected for liver function test and hemochromatosis genotyping. TaqMan® SNP Genotyping Assays for haemochromatosis (C282Y and H63D mutations) were used as per manufacturer's instructions (ThermoFisher Scientific, Waltham, MA, USA). The ultrasound examinations of the hepatobiliary system were performed by sonologists with more than four years of experience. Images were analysed by investigators experienced in diagnosing and treating patients with liver disorders.

Diagnostic criteria for liver disorders

Abnormal liver function was defined when subjects with abnormal baseline alanine aminotransaminase (ALT > 40 U/L). The hepatitis B surface antigen and

hepatitis C IgG antibody were also tested to diagnose hepatitis B and C. Fatty liver disease, liver fibrosis, cancer and biliary stones were diagnosed with abdominal ultrasound and elastography (FibroScan) results.

Statistical analysis

Data on continuous variables were expressed as mean ± standard deviation (SD), the categorical variables are summarised as frequencies and percentages. T-tests were conducted for continuous variables and c^2 tests or Fisher's exact test were conducted for categorical variables. Odds ratios (OR), 95% confidence interval (CI) and P values were calculated for each variable. The univariate and multivariate logistic regression models were constructed to examine the risk factors of false positive self-report. The results were considered statistically significant when P values were ≤ 0.05. The ORs and 95% CIs were calculated for each parameter estimate. All statistical analyses were performed by SPSS version 25 (IBM Co., Armonk, NY, USA).

Ethics approval

Ethics approval was obtained from the Department of Veterans' Affairs (E016/014), the University of Queensland (2016000220) and Greenslopes Private Hospital (16/03).

Results

Of the 311 enrolled participants, 299 underwent all clinical and laboratory assessments. In total, 80 participants (26.8%) self-reported liver disorders and 110 (36.8%) were clinically confirmed. The clinically confirmed liver disorders in this study include abnormal liver function, fatty liver disease, hemochromatosis, liver fibrosis and biliary stones. All participants were hepatitis B surface antigen negative and hepatitis C IgG antibody negative. The baseline characteristics of participants with and without self-reported liver disorders are summarised in Table 1. More participants with self-reported liver disorders had abdominal symptoms, such as heartburn, dyspepsia, abdominal pain, diarrhoea and constipation, than those without (81.3% vs 58.0%, P = 0.00). Participants with self-reported liver disorders had significantly less daily tea consumption (1.50 ± 1.39 vs 2.11 ± 2.15, P = 0.00) but higher AUDIT score (9.46 ± 6.99 vs 6.57 ± 5.10, P = 0.01), suggesting they infer having liver diseases because of higher alcohol consumption. There were no differences in PTSD between the two groups, and only one participant had substance abuse. More participants with self-reported liver disorders had non-PTSD psychiatric disorders (43.8% vs 30.1%, P = 0.03).

The diagnostic performance of self-reporting is shown in Supplementary Table S1. Self-reporting gave high specificities (83.5% to 98.8%) but low sensitivities (2.70% to 66.7%) for liver disorders. The self-reporting of hemochromatosis had the highest positive likelihood ratio of 28.2 in all liver disorders. Only six of 53 subjects with confirmed fatty liver disease self-reported this condition, reflecting a general lack of awareness of this common condition in the veteran population. Participants who are unaware of clinically confirmed liver disorders had significantly less abdominal symptoms (56.6% vs 85.3%, P = 0.00) but lower AUDIT score (6.78 ± 5.68 vs 9.65 ± 7.16, P = 0.03) and less non-PTSD psychiatric disorders (25% vs 47.1%, P = 0.02, Supplementary Table S2). Univariate and multivariate analyses were performed to identify independent risk factors for self-reported liver disorders, which could not be diagnosed with clinical investigations (Table 2) and unawareness of clinically confirmed liver disorders (Table 3). We found that abdominal symptoms were associated with a 2.2-fold increase in the risk of false positive self-reporting liver disorders (P = 0.04). This association suggests that a high portion of participants ascribing these non-specific symptoms to liver disorders.

Short Communication

Table 1: Baseline characteristics of Australian Vietnam War veterans

Variable	Veterans with self-reported liver disorders (n = 80)	Veterans without self-reported liver disorders (n = 219)	*P* value
Age	68.54 ± 3.55	68.93 ± 4.36	0.47
BMI	30.13 ± 4.45	29.68 ± 4.50	0.44
Education			0.27
University	21 (26.3%)	72 (32.9%)	
Less than Year 12	59 (73.7%)	147 (67.1%)	
Marital status			0.51
Married	72 (90%)	191 (87.2%)	
Single / divorced / widowed	8 (10%)	28 (12.8%)	
Employment status			0.17
Working	9 (11.3%)	39 (17.8%)	
Not working	71 (88.7%)	180 (82.2%)	
Abdominal symptoms			**0.00**
With	65 (81.3%)	127 (58.0%)	
Without	15 (18.7%)	92 (42.0%)	
Smoking status			0.42
Current smoker	9 (11.3%)	18 (8%)	
Current non-smoker	71 (88.7%)	201 (92%)	
Coffee (cups/day)	1.98 ± 1.68	2.15 ± 1.93	0.47
Tea (cups/day)	1.50 ± 1.39	2.11 ± 2.15	**0.00**
Drinking patterns			
Risky drinking	49 (61.3%)	116 (52.9%)	0.20
Safe drinking	31 (38.7%)	103 (47.1%)	
AUDIT score	9.46 ± 6.99	6.57 ± 5.10	**0.01**
Family history of liver diseases			0.92
With	8 (10%)	21 (9.6%)	
Without	72 (90%)	198 (90.4%)	
PTSD			0.57
With	31 (38.7%)	77 (35.2%)	
Without	49 (61.3%)	142 (64.8%)	
PTSD severity score	10.71 ± 11.14	8.75 ± 9.56	0.13
Non-PTSD psychiatric disorders*			**0.03**
With	35 (43.8%)	66 (30.1%)	
Without	45 (56.2%)	153 (66.9%)	

Risk drinking: Drink no more than 10 standard drinks per week and no more than 4 standard drinks on any one day

AUDIT: Alcohol Use Disorders Identification Test.

*: Depression, dysthymia, anxiety, mania, hypomania, panic disorder, social phobia, generalised anxiety disorder

Table 2: Features associated with self-reporting of liver disorders in Australian Vietnam War veterans for whom clinically confirmed without any liver disorders

Features	Univariate analysis		Multivariate analysis	
	Odds ratio (95% CI)	*P* value	Odds ratio (95% CI)	*P* value
Age	0.99 (0.92-1.07)	0.81		
BMI	1.01 (0.94-1.08)	0.82		
Education	0.81 (0.56-1.16)	0.26		
Married	0.89 (0.35-2.29)	0.82		
Work	0.75 (0.30-1.89)	0.55		
Abdominal symptoms	2.24 (1.06-4.72)	**0.03**	2.20 (1.03-4.69)	**0.04**
Smoking	2.59 (1.06-6.34)	**0.04**	2.20 (0.86-5.67)	**0.09**
Coffee (cups/day)	0.95 (0.81-1.12)	0.54		
Tea (cups/day)	1.21 (0.99-1.48)	0.06		
Alcohol				
Hazardous drinking	0.84 (0.45-1.60)	0.60		
AUDIT score	0.94 (0.89-0.99)	**0.01**	0.95 (0.90-1.00)	0.05
Family history of liver diseases	1.89 (0.75-4.71)	0.18		
Psychiatric disorders				
PTSD	1.29 (0.68-2.46)	0.43		
PTSD severity score	0.98 (0.95-1.01)	0.17		
Non-PTSD psychiatric disorders	0.68 (0.36-1.30)	0.24		
DASS21 depression score	1.01 (0.94-1.08)	0.84		
DASS21 anxiety score	0.98 (0.90-1.05)	0.52		
DASS21 stress score	1.00 (0.94-1.06)	0.98		

Table 3: Features associated with unawareness of clinically confirmed liver disorders in Australian Vietnam War veterans

Features	Univariate analysis	
	Odds ratio (95% CI)	*P* value
Age	0.99 (0.94-1.06)	0.94
BMI	1.04 (0.98-1.10)	0.19
Education	0.65 (0.38-1.13)	0.13
Married	1.56 (0.74-3.29)	0.25
Work	0.90 (0.45-1.81)	0.77
Abdominal symptoms	1.55 (0.91-2.63)	0.11
Smoking	0.97 (0.39-2.40)	0.95
Coffee (cups/day)	0.99 (0.86-1.14)	0.84
Tea (cups/day)	0.96 (0.83-1.09)	0.51
Alcohol		
Hazardous drinking	1.00 (0.60-1.70)	0.99
AUDIT score	0.98 (0.93-1.02)	0.32
Family history of liver diseases	0.88 (0.37-2.09)	0.78
Psychiatric disorders		
PTSD	0.89 (0.52-1.52)	0.67
PTSD severity score	0.99 (0.97-1.02)	0.60
Non-PTSD psychiatric disorders	0.57 (0.32-1.03)	0.06
DASS21 depression score	0.99 (0.94-1.05)	0.77
DASS21 anxiety score	1.02 (0.96-1.08)	0.63
DASS21 stress score	1.00 (0.95-1.05)	0.93

Supplementary Table S1: Diagnostic characteristics of self-reported liver disorders in Australian Vietnam War veterans

Variable	Clinically confirmed		Sensitivity (%)	Specificity (%)	Predictive values (%)	Positive likelihood ratio
	With	Without				
Overall						
Self-report:						
With	34	46	30.9	75.7	Positive: 42.5, negative: 65.3	1.27
Without	76	143				
Abnormal liver function						
Self-report:						
With	12	43	31.6	83.5	Positive: 21.8, negative: 89.3	1.92
Without	26	218				
Fatty liver disease*						
Self-report:						
With	6	23	11.3	90.6	Positive: 20.7, negative: 82.5	1.20
Without	47	221				
Hemochromatosis						
Self-report:						
With	2	7	66.7	97.6	Positive: 22.2, negative: 99.7	28.2
Without	1	289				
Other conditions [$,*]						
Self-report:						
With	1	3	2.70	98.8	Positive: 25.0, negative: 87.7	2.34
Without	36	257				

[*]: Two refused ultrasound examination.

[$]: Liver fibrosis, cancer and biliary stones.

Supplementary Table S2: Features of Australian Vietnam War veterans who are unaware of clinically confirmed liver disorders

Variable	Veterans unaware of liver disorders (n = 76)	Veterans aware of liver disorders (n = 34)	*P* value
Age	68.79 ± 4.41	67.97 ± 3.59	0.35
BMI	30.39 ± 4.46	30.75 ± 4.23	0.69
Education			0.38
University	29 (38.2%)	10 (29.4%)	
Less than Year 12	47 (61.8%)	24 (70.6%)	
Marital status			0.22
Married	64 (84.2%)	32 (94.1%)	
Single / divorced / widowed	12 (15.8%)	2 (5.9%)	
Employment status			0.38
Working	13 (17.1%)	3 (8.8%)	
Not working	63 (82.9%)	31 (91.2%)	
Abdominal symptoms			**0.00**
With	43 (56.6%)	29 (85.3%)	
Without	33 (43.4%)	5 (14.7%)	
Smoking status			0.43
Current smoker	7 (9.2%)	1 (2.9%)	
Current non-smoker	69 (90.8%)	33 (97.1%)	
Coffee (cups/day)	2.07 ± 1.68	1.59 ± 1.23	0.14
Tea (cups/day)	1.81 ± 1.63	1.59 ± 1.42	0.48
Drinking patterns			
Hazardous drinking	42 (55.3%)	22 (64.7%)	0.35
Safe drinking	34 (44.7%)	12 (35.3%)	
AUDIT score	6.78 ± 5.68	9.65 ± 7.16	**0.03**
Family history of liver diseases			1.00
With	8 (10.5%)	4 (11.8%)	
Without	68 (89.5%)	30 (88.2%)	
PTSD			0.77
With	29 (38.2%)	12 (35.3%)	
Without	47 (61.8%)	22 (64.7%)	
PTSD severity score	8.75 ± 9.92	10.14 ± 10.51	0.50
Non-PTSD psychiatric disorders*			**0.02**
With	19 (25%)	16 (47.1%)	
Without	57 (75%)	18 (52.9%)	

Risk drinking: Drink no more than 10 standard drinks per week and no more than 4 standard drinks on any one day

AUDIT: Alcohol Use Disorders Identification Test.

*: Depression, dysthymia, anxiety, mania, hypomania, panic disorder, social phobia, generalised anxiety disorder

Discussion

This is the first study to investigate the association between psychosocial and physical components of self-reported liver disease. The study demonstrated a high rate of false positive self-reported liver disorders as well as a large number of subjects apparently unaware of their underlying liver disease. We found that self-reporting gave high specificities but low sensitivities for liver disorders. The awareness rate of fatty liver disease in the veteran population is similar to that of Alzheimer's disease, previously reported.[6] Therefore, referring to the experience in veteran communities, education about liver diseases in the general population by medical practitioners should be strengthened to improve the currently poor awareness of chronic disorders.

Among 18 included variables in our study, only abdominal symptoms are an independent risk factor for false positive self-reporting. It is independent of previously reported potential risk factors such as drinking patterns or PTSD.[5] We suggest that many veterans may misinterpret their abdominal symptoms as evidence of liver disorders. This study highlights the need for improved education about one's health status among Australian Vietnam War veterans.

Corresponding author: Darrell H. G. Crawford. email: d.crawford@uq.edu.au T +61 7 3346 0698 Authors: H Wang[1,2,3,4,] X Liang[1,2,3,] K Bridle[1,2,] D Crawford[1,2,] on behalf of the PTSD Study Group, Gallipoli Medical Research Foundation
1 Faculty of Medicine, The University of Queensland, Brisbane, QLD, Australia
2 Gallipoli Medical Research Institute, Brisbane, QLD, Australia
3 The University of Queensland Diamantina Institute, The University of Queensland, Brisbane, QLD, Australia
4 The Prince Charles Hospital, Brisbane, QLD, Australia.

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