Multiple symptom illness in New Zealand contemporary veterans

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ABSTRACT

AIMS: To describe patterns of multiple symptom illness (MSI) in New Zealand military veterans, defined as clusters of "medically unexplained" symptoms not fitting within a specific medical diagnosis, and to investigate the relationship with exposure to traumatic events.

METHODS: We designed an online cross-sectional survey. The participants of interest were the 3,874 currently serving veterans who had been deployed to a conflict zone, but all veterans were eligible to participate. A modified Centers for Disease Control (CDC) 54-item symptom checklist identified MSI, the post-traumatic checklist—military version (PCL-M) identified symptoms of post-traumatic stress disorder (PTSD) and the brief trauma scale assessed "war zone" service. Factor analysis was used to identify unobserved "latent factors" in the data, factor severity scores and the number of symptoms being calculated for each respondent.

RESULTS: The CDC questionnaire was completed by 1,819 veterans, with 1,672 completing the PCL-M. The factor analysis revealed three factors, explaining 86% of the variation in the data. Factor 1 symptoms were of an arthro-neuromuscular nature, Factor 2 cognitive and Factor 3 psycho-physiological. Discriminant function analysis showed that the factors could discriminate between those with and without PTSD but could not discriminate between those who did and did not serve in a war zone.

CONCLUSIONS: In veterans, multiple symptoms including pain, sleep disorders, cognitive problems and avoidance, especially when severe, may be worthy of further investigation by health professionals because of the possible association with PTSD.

In New Zealand, military veterans can only access assistance from New Zealand Veterans' Affairs (NZVA) if they have undertaken "qualifying operational service" as defined by the *Veteran Support Act 2014*,[1] thus being veterans in a legal sense. NZVA support some 12,000 veterans, with an average age of 80 years, 5,000 being actively case managed.[2] The majority will have seen operational service in Korea, Borneo, Malaya and Vietnam. Post-Vietnam, smaller numbers were deployed with the United Nations and on other missions, but the tempo of operations rose with the deployment to Bosnia in 1992, and some 9,000–10,000 "legal" veterans were deployed between then and the withdrawal of New Zealand troops from Afghanistan in 2021. The ministerial Veterans' Health Advisory Panel—established under the *Veteran Support Act*—are specifically charged with funding research on this "contemporary veteran" group, NZVA acknowledging that they "*have had different experiences, and have different needs, compared to the older veterans. They are likely to have served in a number of deployments during their career, and come to us with more complex health issues.*"[2] Multiple symptom illness (MSI) in veterans is a cluster of "medically unexplained" chronic symptoms that do not fit within a specific medical diagnosis, first described in veterans of the 1991 Persian Gulf war, occurring in both military personnel and civilians as "Gulf War Syndrome". This conflict was one of the first in which there were multiple chemical, physical and biological stressors, the association between putative exposures and symptoms being generally weak;[3,4] however, psychological stressors were not considered at the time.[5]

Although the symptoms originate from multiple body systems, data on self-reported health conditions have been structured using factor analysis to extract one or more "unobserved" or "latent" variables from the symptom data. Forbes et al.[6] identified 1,871 Gulf War veterans, largely Navy, and a matched stratified random sample of 2,924 participants from operational units. Of these, 2,781 subjects (1,322 Gulf War, 1,459 comparison group) completed a 63-item questionnaire derived from previous studies, analysing 62 items. Three factors labelled psychophysiological distress, cognitive distress and arthro-neuromuscular distress were found to explain most of the variability in symptoms in the veterans, but a similar factor structure existed in the comparison group.

The changes were then observed longitudinally

at a 10-year follow-up,[7] with no change in the pattern of symptoms being reported over time and the underlying symptom pattern remaining similar to that in the comparison group. The levels of somatic distress and arthro-neuromuscular distress increased comparably for the veteran and comparison group, but the levels of psycho-physiological distress increased only for the veteran group, possibly explained by the delayed onset of post-traumatic stress disorder (PTSD).

Gwini et al.[8] used a latent class model to identify groups, the best fit based on symptom counts in three groups, low (average 5 symptoms), medium (16 symptoms) and high (34 symptoms). Concerningly, a small proportion of veterans with high symptom counts had developed chronic conditions including sleep apnoea, psychological disorders and cardiovascular conditions. In keeping with this pattern, they also had risk factors: high prevalence of obesity, diabetes, asthma, high waist circumference and harmful alcohol use.

As military cohorts age, the initial "healthy soldier effect", engendered by the selection process, wears off. Chronic conditions become more common, with increases in health service utilisation and disability claims, a possible explanation for the complex health problems seen by NZVA. The Australian researchers also investigated this wear-and-tear effect, defining three groups: military personnel with MSI (but no chronic diseases), those with chronic diseases, and those without MSI or chronic diseases. Health service use by those with MSI was higher than the non-MSI group and similar to those with chronic diseases. Furthermore, the general health of the MSI group was poorer.[9]

In summary, MSI, rather than being an inexplicable pattern of health effects, remains stable across time and is linked to both chronic illness and poorer quality of life. Because of the pattern of symptom reporting and the veteran group reporting it, there is a plausible association between MSI and PTSD. The aim of this study was to describe the pattern of reporting of MSI among New Zealand veterans and to investigate the relationship with PTSD as a risk factor. The intention was to highlight the symptom profile and any relationship with PTSD. Ethics approval was received from the Northern B Health and Disability Ethics Committee, ref. 17/NTB/118.

Methods

There is no comprehensive New Zealand veteran registry; however, the New Zealand Defence Force (NZDF) identified serving veterans holding the New Zealand Operational Service Medal at the time of the survey, numbering 3,874 personnel. Our steering group advised us to include retired "legal" veterans in the community, also veterans who had served but not been deployed to a conflict. Data were collected via an online survey, a postal version being available on request. In July 2018, a link to the online questionnaire was sent by email to the 3,874 currently serving (NZDF) members. An introductory message and link to the questionnaire were also presented on the NZDF "intranet landing page", a secure internal webpage from which all regular force personnel can access relevant work-related content, tools and resources. Retired military personnel were invited to participate through posters distributed to reserve units and the 43 local social clubs identified by the RSA national office to be "veteran active". Paper questionnaires with return postage envelopes were made available at these sites. Announcements were also made on military social media pages, and both retired and currently serving personnel were invited to participate through announcements on social media and veteran support websites. The questionnaire was available for completion from June to December 2018.

We used a 54-item questionnaire derived from the Centers for Disease Control (CDC) consensus case definition[5] as "*the presence of one or more chronic symptoms (for at least six months) from at least two of three categories namely fatigue, mood-cognition (symptoms of feeling depressed, difficulty remembering or concentrating, feeling moody, feeling anxious, trouble finding the right words or difficulty sleeping) and musculoskeletal (symptoms of joint pain, joint stiffness or muscle pain)*". Participants indicated whether they had experienced one or more of the listed symptoms in the preceding month, each symptom classified in terms of severity (mild, moderate, severe) and duration, lasting shorter or longer than 6 months.

The post-traumatic checklist—military version (PCL-M)[10] is a 17-item instrument asking about DSM-IV symptoms of PTS related to stressful military experiences, with response options ranging from 1 = not at all to 5 = extremely. A total symptom severity score is calculated by summing responses to each option (range = 17–85); scores of 30–45 indicate the presence of significant PTS symptoms, or probable cases of PTSD, and scores of greater than 45 indicate a presumptive PTSD diagnosis.

Trauma exposure was assessed with the brief trauma scale (BTS),[11] which captures past exposure to situations that were life threatening or capable of

producing serious injury. This included the question "*Have you ever served in a war zone, or have you ever served in a non-combat job that exposed you to war-related casualties (for example, as a medic or on graves registration duty)?*"

Factor analysis (using an orthogonal varimax rotation) was used to group the 54 symptoms based on their severity score. As the data were on an ordinal scale, the analysis was based on a polychoric correlation matrix rather than using the raw scores. Variables were removed if the communality, or proportion of variation explained, was less than 0.4, which resulted in 20 symptoms (variables) being excluded. A further 8 did not load clearly onto a particular factor. Therefore, the three final factors were based on 26 symptoms. Those three factors were also selected (rather than 4) as they had eigenvalues greater than 1.

A discriminant function analysis[12] was used to see if the factor scores could be used to discriminate firstly between the groups who had served in a war zone or had not, and secondly people who had PTSD (according to our scale) or did not have PTSD. All analyses were undertaken using Stata version 15.[13]

Results

Of the 2,024 people who clicked on the online survey link, 1,056 (24%) were currently serving. Of these, 79 did not provide any data or only personal data, 1,945 partially completed the survey, 1,819 completed the CDC questionnaire (967 currently serving, 831 ex-serving and 21 with missing data on service) and 1,672 completed the PCL-M. Factor analysis of the 1,819 completed CDC questionnaires revealed three factors having eigenvalues of 1 or more, which explained 86% of the variation in the data (Table 1). Ten variables loaded onto Factors 1 and 2; six loaded onto Factor 3.

On inspection, Factor 1 has a largely arthro-neuromuscular profile including joint pains, joint stiffness and muscle aches and pains; Factor 2 has psychological characteristics, with cognitive symptoms, sleep problems (unrefreshing sleep, sleeping difficulties, distressing dreams) and avoidance, and Factor 3 has psycho-physiological characteristics with gastro-intestinal/inflammatory symptoms.

No particular factor was indicated for loss of interest in sex; shaking; dizziness or blackouts; increased sensitivity to light; itchy or painful eyes; double vision; dry mouth; and chest pain.

Twenty symptoms were dropped from the factor analysis (as their communality was less than 0.4): irritability/outbursts of anger; difficulty finding the right word; increased sensitivity to noise; alcohol intolerance; night sweats; increased sensitivity to smell; loss of or decrease in appetite; headaches; ringing ears; flatulence or burping; constipation; persistent cough; unintended weight gain >4 kilograms; rapid or pounding heartbeat; rash or skin irritation; low back pain; skin infections;

Table 1: Factor grouping of symptoms.

Factor 1	Factor 2	Factor 3
Problems with sexual functioning	Loss of concentration	Diarrhoea
Passing urine more often	Feeling distant from others	Stomach cramps
Loss of balance or coordination	Unrefreshing sleep	Nausea
Loss of sensation hands/feet	Forgetfulness	Feverish
Tingling or burning hands/feet	Sleeping difficulties	Sore throat
Joint pain	Avoid doing things or situations	Tender/painful swelling of lymph glands
Joint stiffness	Fatigue	
Muscle aches/pains	Distressing dreams	
Wheezing	Feeling jumpy/easily startled	
Shortness of breath	Difficulty speaking	

mouth ulcers; toothache; and indigestion—all 54 symptoms being accounted for.

The groups for the discriminant function were the 1,672 respondents who completed the MSI and PCL-M, 59% having served in a war zone, and 29% having PTSD.

Using the "war zone" discriminant function (with factor scores as predictors) did not have much utility (Table 2).

Thus, 64% of people who were not in a war zone were predicted to be in that group, and only 45% of the people who were in a war zone were predicted to be in that group.

Using the PTSD function in a similar manner gives results as in Table 3.

That is to say, 82% of people who do not have PTSD were predicted to be in that group, while 72% of the people who do have PTSD were predicted to be in that group.

Discussion

The factor analysis reveals Factor 1 to have an arthro-neuromuscular profile, Factor 2 cognitive and Factor 3 psycho-physiological; the factor scores discriminating only those who had PTSD, and not those who had been to a war zone. This tends to confirm that PTSD is associated with MSI, as did the finding that those with PTSD had more severe symptoms.

The strengths of the study are the relatively large sample size and the inclusion of all veterans, both those who had deployed and those who had not.

A weakness is the response rate—24% from serving veterans—and we know neither the total number of veterans in New Zealand, nor whether those with PTSD were more or less likely to respond, so any direction of bias is difficult to assess, but a higher or lower prevalence may affect the symptom profile. We asked only about present symptoms, so recall bias will not be present, but this limits our conclusions to this particular sample. The cross-sectional design does not allow the direction of any effect to be investigated, so we cannot conclude that PTSD contributes to, or causes, multiple symptoms.

In previous cross-sectional analyses of this sample,[14,15] we found, in comparison with the general population, a higher self-reported prevalence of problems with pain or discomfort, mobility, self-care and carrying out usual activities. Age, length of service, deployment, psychological flexibility and better sleep quality were associated with better self-reported health and distress with poorer health. With post-traumatic stress disorder as the outcome, factors associated with higher PCL-M scores were trauma exposure, older age, male sex and Māori ethnicity; asso-

Table 2: Discriminant analysis for having served in a war zone.

		Classified war zone		
		No N(%)	**Yes N(%)**	**Total**
In a war zone	No	441 (64)	243 (35)	684
	Yes	539 (55)	449 (45)	988
	Total	980 (58)	692 (41)	1,672

Table 3: Discriminant analysis for having PTSD.

		Classified PTSD		
		No N(%)	**Yes N(%)**	**Total**
True PTSD	No	995 (82)	224 (18)	1,219
	Yes	143 (28)	365 (72)	508
	Total	1,138 (66)	589 (34)	1,727

ciated with lower PCL-M scores were greater length of service, psychological flexibility and better-quality sleep.

The Australian Defence Force provides the closest comparisons. The Forbes et al.[6] factor analysis in Royal Australian Navy Gulf War veterans also found three factors, labelled psycho-physiological distress, cognitive distress and arthro-neuromuscular distress. There is almost certainly no "unique" MSI signature: it is the number of symptoms and their severity that is important, as these have associations with chronic ill health and high health service use.[8,9]

Although Gulf War veterans "*were exposed to an impressive array of biologic and chemical agents*,"[5] the association with psychological factors were not pursued. The cognitive distress factor is, however, the most reproducible across studies, and the discriminant analysis for PTSD showed that symptom scores are predictive of PTSD, tending to confirm that PTSD is a signature disorder in this population.

Health practitioners might find that a patient presenting with multiple symptoms including muscle and joint aches and pains, cognitive problems, disorders of sleep and avoidance is worthy of further investigation, including whether or not they have military service, and enquiry about PTSD symptoms. More precise definition around, and refinement of, a parsimonious set of questions should give guidance as to when intervention is necessary, the likely direction of future research efforts.

Further follow-up should be possible, as we asked permission to contact participants again. In this case we would be able to assess any changes in the number and severity of symptoms. We are hopeful that a behavioural intervention will have become available in the interim, in which case we can assess the effects.

COMPETING INTERESTS

Nil.

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