The occurrence and severity of musculoskeletal disorders in Swedish military personnel during peacekeeping operations in Afghanistan

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Abstract

Background Not much is known about musculoskeletal disorders (MSD) in peacekeeping missions and to what extent such conditions are disabling. The objective of this study was to assess the occurrence and severity of MSD in Swedish military personnel on 6 months duty in Afghanistan.

Methods When returning from Afghanistan 440 individuals received a questionnaire including questions about pain conditions during their mission abroad. A manikin was used to mark the area(s) in pain and which body area had bothered them the most. A modified version of chronic pain questionnaire was used to assess pain and disability.

Results The response rate was 78% ($n = 344$). Any MSD during the 6 months was reported by 70% (95% CI 65–75). The three most bothersome areas were lumbar spine [17% (95% CI 13–20)], shoulders [17% (95% CI 13–21)] and lower extremities [14% (95% CI 11–18)]. 57% (95% CI 49–65) had grade I pain (low pain/low disability), 36% (95% CI 28–45) had grade II pain (high pain/low disability) and 5% (95% CI 3–10) had grade III pain (any pain/high disability). Of all MSD, more than half were new episodes since arrival and gradual onset was common.

Conclusion Musculoskeletal pain was common during peacekeeping mission and gradual onset was dominating. Most often, it did not affect the daily activities. Nevertheless, it may be of important to consider broadening the medical disciplines onsite to provide preventive measures and treatment at an early stage, and thereby reducing the risk of chronicity.

Keywords Military · Musculoskeletal · Pain · Lumbar spine · Disability · Peacekeeping

Introduction

There is a widespread misconception that battle-related injuries are the major source of unit declension in the military. Although, since statistics have been kept, the main cause of soldier attrition in modern war has never been injuries sustained in combat [1]. In World War I, respiratory illness and infectious diseases were the leading causes of hospital admission, with non-battle-related injuries (NBI) ranking fourth [2]. By the time of the Vietnam War, NBIs had become the leading basis for soldier attrition, where they have remained ever since [2].

An American study of injury-related musculoskeletal conditions among soldiers in the Air Force, Army, Marines and Navy concluded that of the 743,547 injuries, 82% were classified as inflammation/pain/over-use. Injuries involving the vertebral column and lower extremity accounted for nearly equal proportions of all injuries (40 and 39%, respectively) while upper extremity injuries comprised 14% of the total [3]. In another American study, 145 soldiers with musculoskeletal disorders (MSD) identified the two most commonly affected areas to be knees and lumbar spine. Almost one-third of the soldiers with pain from

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knees and lumbar spine also reported that they were unable to run, march, jump down from a vehicle or carry a backpack because of the disorders [4]. MSD is also prevalent among conscripts. A Finnish study of 955 conscripts showed that during a 6-month period, the most common type of MSD was lumbar spinal pain (20%) and so-called overuse-related disorders were nearly two times (66%) more common than traumatic disorders (33%). The most common reason for dropping out of military service on medical grounds was lumbar spinal pain [5]. Knee and lumbar spine were also the two most common problem areas in a study with Swedish conscripts [6].

As of today, around 950 Swedish military personnel are located around the globe in peacekeeping missions with the largest concentration of troops, approximately 700 soldiers, located in Afghanistan, with the majority located in Camp Northern Light in Mazar-e-Sharif [7]. To the best of our knowledge, no Swedish study where the occurrence and severity of MSD and related disability in such population has been published and such knowledge would be of importance when planning medical resources on military locations, but also for specialized clinicians seeing patients with spinal disorders and other MSD.

The objective of this study was to assess the occurrence and severity of MSD in Swedish military personnel on 6 months duty in Afghanistan. The specific research questions were

- How common are musculoskeletal disorders among Swedish military personnel on duty in Afghanistan and what body parts are perceived to be the most bothersome?
- How much pain and disability have they experienced from such disorders and does severity differ between different pain areas?
- Are such episodes of pain new since arrival to Afghanistan?
- What type of onset of MSD is most common; gradual or sudden?

Materials and methods

The personnel returned to Livgardet Kungsängen in Sweden during a 1-week period in May 2010. All personnel spent 3 days at the camp, primarily for health examination and debriefing. The first day of arrival consisted of a welcome-home meeting, a lecture on stress and information about the week in smaller groups, consisting of 30–130 persons. A total of 440 persons were present at the information sessions. All were asked to participate in the study by responding to the questionnaire anonymously and return it before leaving the session room.

The questionnaire and written information about the study were handed out during four different information sessions at Livgardet Kungsängen. The study was presented with a short oral introduction by the author and stressed the fact that it was voluntary and anonymous. However, everyone was urged to answer the questionnaire prior to leaving the session room, because there was no possibility to return it later. Those who had been in Afghanistan <6 months were excluded, as were those who reported pain as a result of fracture.

The questionnaire, included questions about age, weight, military rank, occupational position and hours of exercise per week. Military rank was divided into NATO standards which means that all non-officers is called OR (Other rank) and all officers, OF (Officer). Further, current mental health and average mental health during service was measured with a numerical rating scale (NRS) 0–10, zero denotes “very poor” and ten denotes “excellent”. For assessment of MSD, a drawn manikin was used, where the respondent marked the area(s) in pain and which area (if more than 1) that had bothered them the most during their mission. We used the already divided template manikin from Margolis to categorize the MSDs to a certain body area and to define the seven most commonly affected anatomical areas [8]. We also questioned the subjects if they had any musculoskeletal disorders prior leaving for Afghanistan.

We assessed general health prior to the injury using the question “How was your general health prior to your musculoskeletal disorder?” which is a modification of an SF-36 general health subscale question [9]. Pain intensity and disability during their mission abroad were measured with a modified version of the Chronic Pain Questionnaire (CPQ) [10] and the time frame was changed from “during six months” to “during your service” and “daily activity” was replaced with “your ordinary assignment”. They were asked to respond to the CPQ according to the body area that had bothered them the most. The method of grading CPQ works as following; characteristic pain intensity is a 0–100 score derived from the mean of the values on three numerical rating scales (NRS 0–10) of pain right now, average pain and worst pain multiplied by ten. The disability score is a 0–100 score derived from the mean of the questions of daily activities, social activities and work activities multiplied by ten. Disability points are added for indicated points for disability days and for disability score. The greater the number of days on disability, the higher disability score. For instance, 31+ disability days are equal to three disability points, while a 70 or higher disability score adds another three points to the disability score. Grade 0 means pain free (no pain problem), grade I denote low disability-low pain intensity (characteristic pain intensity <50, and <3 disability points), grade II low disability, high pain intensity (characteristic pain intensity of

50 or greater and <3 disability points), grade III high disability-moderately limiting (3–4 disability points, regardless of characteristic pain intensity) and finally grade IV high disability-severely limiting (5–6 disability points regardless of characteristic pain intensity) [10].

The type of pain onset (sudden or gradual) was assessed by marking the body area on the manikin with a cross or circle depending on the sudden or gradual onset. An area that was marked with a circle with a cross was considered as onset of both sudden and gradual character.

Statistical analysis

The results are presented as frequencies and proportions together with 95% confidence intervals (CI) and for data on scale level, means and standard deviations were calculated. All statistical analyses were performed using SPSS version 17.0 (SPSS Inc., Chicago, IL, USA) and appear in χ^2 test form for nominal and ordinal data and in one-way ANOVA analysis of variance for scale level data. A $p < 0.05$ was set for statistical significance between groups.

Ethic consideration

Permission to conduct this study was granted by Medical Command Livgardet.

The study protocol was reviewed by the Regional Committee on Ethics at Karolinska Institutet, Stockholm. The decision was, since it was an anonymous questionnaire, no ethical approval was necessary (DNR 2010/651-31/5).

Results

Of the 440 subjects, a total of 344 (78%) complete questionnaires were returned. Seventy percent of all military personnel reported MSD at some point during their 6-month service. Eight subjects were excluded for not being abroad for 6 months or for suffering pain because of fractures. The demographic characteristics are presented in Table 1. The mean age was 30 (SD 9) years, 90% were male. Ninety-nine percent of all subjects stated “Excellent”, “Very good” or “Good” general health. The three most bothersome areas of MSD were the lumbar spine (26%), shoulders (26%) and lower extremities (22%) (Table 2) and 17% (95% CI 13–20), 17% (95% CI 13–21) and 14% (95% CI 11–18), respectively had had such MSD (Table 3).

Of those who reported the most bothersome area to be the lumbar spine, shoulders or lower extremities, the majority 57% (95% CI 49–65) had grade I pain (low pain/low disability), 36% (95% CI 28–45) had grade II pain

Table 1 Description of the study population ($n = 336$)

Factors	Number (%)
Age, years, mean (SD)	30 (9)
Length, cm, mean (SD)	181 (8)
Weight, kg, mean (SD)	83 (12)
Gender	
Males	301 (90)
Females	34 (10)
Rank	
Other rank (OR)	209 (64)
Officer (OF)	118 (36)
Hour of physical exercise/week (h)	
0–1	36 (11)
2–3	71 (21)
4–5	80 (24)
6–7	73 (22)
More than 7 h	74 (22)
General Health (SF 36)	
Excellent	104 (31)
Very good	165 (49)
Good	63 (19)
Fair or poor	3 (1)
Mental health right now—NRS 0–10, mean (range)	8 (4–10)
Average mental health during service—NRS 0–10, mean (range)	8 (1–10)

0 denotes “very poor” and 10 denotes “excellent”; numbers varies due to internal missing

SD standard deviations, *h* hours, SF 36 short form 36 [9], NRS numerical rating scale

Table 2 Distribution of type of pain onset in the most bothersome areas of MSD

Body area	Gradual onset (<i>n</i>)	Sudden onset (<i>n</i>)	Both (<i>n</i>)	Total (<i>n</i>)	% (95% CI)
Neck/head	12	3	2	17	8 (5–13)
Shoulder	40	11	5	56	26 (21–33)
Upper extremities	11	3	2	16	8 (5–12)
Thoracic spine	13	4	0	17	8 (5–13)
Lumbar spine	41	12	3	56	26 (21–33)
Lower extremities	27	17	3	47	22 (17–28)
Trunk	2	1	0	3	1 (1–4)
Total	146 (69%)	51 (24%)	15 (7%)	212	

Internal missing $n = 17$

MSD musculoskeletal disorder, *n* number, CI confidence interval

Table 3 Distribution of the most bothersome areas of MSD during 6 months

Body area	<i>n</i> /336	%	95% CI
Neck/head	17/336	5	3–8
Shoulder	56/336	17	13–20
Upper extremities	16/336	5	3–8
Thoracic spine	17/336	5	3–8
Lumbar spine	56/336	17	13–21
Lower extremities	47/336	14	11–18
Trunk	3/336	1	0–3

MSD musculoskeletal disorder, *n* number, *CI* confidence interval

Table 4 Distribution of pain grades in three most common bothersome areas of MSD

Pain grade	Shoulder (<i>n</i>)	Lumbar spine (<i>n</i>)	Lower extr. (<i>n</i>)	Total (<i>n</i>)	% (95% CI)
Grade 0 pain	1	0	0	1	1 (0–4)
Grade I pain	29	29	18	76	57 (49–65)
Grade II pain	17	17	14	48	36 (28–45)
Grade III pain	3	2	2	7	5 (3–10)
Grade IV pain	0	0	1	1	1 (0–4)
Total	50	48	35	133	

MSD musculoskeletal disorder, *n* number, *CI* confidence interval

(high pain/low disability) and 5% (95% CI 3–10) had grade III pain (any pain/high disability) (Table 4). No difference in pain grade ($p = 0.742$) or mean pain ($p = 0.323$) was found between the areas of MSD (Table 4). There was an indication of a difference in mean disability between the areas of MSD where subjects reporting lower extremity disorders reported a higher disability than those with shoulder or lumbar spine disorders ($p = 0.059$) (Table 5). Sixty-nine percent of all MSD were of gradual onset and 24% were of sudden onset. Seventy percent could not be categorized into either onset and were instead labeled as both gradual and sudden.

One hundred and twenty-nine subjects (82%) still experienced pain (≥ 1 , NRS) in the lumbar spine, shoulders or lower extremities when completing the questionnaire. Of all subjects with MSD from the areas mentioned above, 50% experienced pain ranging from 1 to 4 (NRS) and 33% experienced pain ranging from 5 to 8 (NRS). Fifty-five percent of the subjects reported having had pain for more than 31 days (Table 6).

Fifty-eight percent of the MSD were new episodes of pain since arrival to Afghanistan, but still more than half

Table 5 Mean disability score and mean pain score in three most common bothersome areas of MSD ($n = 159$)

Body area	Mean disability score (95% CI)	Mean pain score (95% CI)
Shoulder	15 (11–21)	44 (40–48)
Lumbar spine	12 (8–16)	42 (38–46)
Lower extremity	21 (15–27)	47 (41–52)
<i>p</i> value	0.059 (ns)	0.321 (ns)

Disability score (0–100) is derived from the mean of the questions of daily activities, social activities and work activities multiplied by 10. Pain score is a 0–100 score derived from the mean of “pain right now”, “average pain” and “worst pain” and multiplied by 10

MSD musculoskeletal disorder, *CI* confidence interval, *ns* not significant

Table 6 Distribution of pain duration, in the three most common bothersome body areas

Body area	Days of pain 0–6	Days of pain 7–14	Days of pain 15–30	Days of pain 31+	Total
Shoulder	11	6	6	32	55
Lumbar spine	13	7	8	27	55
Lower extremities	4	7	9	27	47
Total	28 (18%)	20 (13%)	23 (14%)	86 (55%)	157 (100%)

(59%) of the most bothersome MSD were untreated during service. When treated, 42% were prescribed NSAID, and the most common other treatment was massage, given by a colleague.

Discussion

Musculoskeletal disorders were common among the Swedish troops that served in peacekeeping operations in Afghanistan. The most common and bothersome MSD were new episodes of pain since arrival to Afghanistan and most often, located in the lumbar spine, shoulders or lower extremities; however, the majority had grade I pain (low pain/low disability). We found no difference between these MSD with respect to pain intensity.

The findings may be of importance for clinicians examining and treating patients with spinal disorders and other MSD, and should pay attention to the occurrence of the problem and possible risk factors, when treating current or former soldiers.

Gradual onset of MSD was more common than sudden onset. Several other studies on military personnel have found that gradual and so-called over-use onset is more

common than traumatic onset, such as falling or lifting [3, 5, 11]. Rhon et al. [12] found that approximately one in every five injuries was of a chronic nature, not related to any specific attributable cause, and primarily having to do with the spine.

This study's findings of location of MSD are similar to results from other countries. An American study conducted in a combat support hospital in Iraq during 2006, reported that out of 224 patients, the most common body region of symptoms leading to medical care was the lumbar spine, followed by shoulders, knees and ankles [12]. Findings in a prospective cohort study among 34,006 American soldiers medically evacuated from Iraq and Afghanistan during January 2004 to December 2007 indicate, that the most common reason for medical evacuation was musculoskeletal and connective tissue disorders (8,104 subjects, 24%) and spinal pain (2,445 subjects, 7%) being the fifth most common [13]. Hauret et al. found in 2006, 743,547 injury-related musculoskeletal conditions among non-deployed military services members. Lumbar spine (19%), knee/lower leg (23%) ankle/foot (15%) was the most common body areas. Eighty-two percent of all conditions were classified as over-use or inflammation/pain [3]. Out of 995 Finnish conscripts, lumbar spine (20%), knee (18%) and the ankle (12%) was the leading anatomical area suffering from MSD during a 6-month military service. Belmont et al. [14] showed similar numbers, lumbar spine (14%), shoulder (12%), knee and ankle (14%) for a 15-month period during a mission in Iraq. Thus, the prevalence of MSD seems to be similar to deployed and non-deployed service members.

Our findings that grade II pain was common (36%) but only 5% reported grade III pain, indicating significant disability because of MSD is supported by a study by Carragee et al. They found a high frequency of lumbar spinal pain episodes among soldiers, but only a mere 5% reported severe disability on the Oswestry Disability Index scale [15]. More than 80% with no documented history of lumbar spine problems reported at least one episode of lumbar spinal pain and 25% reported functional impairment over an 18-month period, although, the majority of the soldiers denied having lumbar spine problems. When asking the soldiers about their lumbar spinal pain they did not consider it as being a medical problem, but rather a common fact of life or just a result of a badly packed rucksack [15].

Patrols in Afghanistan are made in vehicles but also by foot. Soldiers in the field are required to carry body-armour, weapon, ammunition, water and other essential gear. The heavy equipment easily exceeds 40 kg, which put high demands on the body, especially shoulders, back and joints. In our study, when choosing the most bothersome area in the questionnaire, there were additional notes pointing out that 'heavy gear' and 'heavy rucksacks' was the reason for shoulder MSD. Because the gear is supposed

to be carried at all times, there might be no opportunity to ease the burden. This might explain the high prevalence of MSD in shoulder, lumbar spine and lower extremities.

The current Swedish battle vest has been the focus of several discussions. Comments have been made about it being unwieldy, not sitting tight enough and cause of backaches.

In addition, equipment hanging in the battle vest put a lot of strain on the shoulders and back. Recently, the Swedish Army decided to replace the old battle vest with a new and improved vest that will address the complaints. The participants in our study still used the old vest, and future studies need to evaluate the health benefits of the new vest. Stressors other than physical workload may include long separation from the support of family and friends, and also high incidents of combat stress [15]. The physical and psychosocial stressors military personnel are deployed to in a combat zone and probably far exceed that of workers in general. There is a reason to believe that all three domains included in the bio-psycho-social model, might explain the relatively high occurrence of MSD in our study, despite the fact that the population is highly selected due to the military requirements of high physical and mental capacity. It is important, however, to emphasize that the aim of our study was not to assess determinants of MSD. Future studies are needed to address risk factors for MSD in military populations working in combat zones.

We used population-based prevalence studies on lumbar spinal pain, shoulder pain, and neck pain to compare our results of MSD to that of a general population. A study of Iranian industrial workers with a similar study population (majority male and mean age of 30); found that the 12-month prevalence of lumbar spinal pain was 21% [16]. According to annual statistics from Statistics Sweden (SCB), of all men aged between 25 and 34 in the Swedish general population, 26% experienced neck pain (4% severe neck pain) and 22% experienced lumbar spinal pain (6% severe lumbar spinal pain) during 2008 [17]. A Swedish study concluded that 30% of all patients who consult their primary care physicians for pain in the musculoskeletal system had pain in the neck/shoulder region and 50% of these reported solely shoulder pain [18]. In a systematic review on neck pain in the general population, it was concluded that the 12-month prevalence typically ranged between 30 and 50%; the 12-month prevalence of activity-limiting neck pain was 2–12% [19]. Since our study had a shorter time span (6-month period), this might be one reason to the lower proportion of lumbar pain, but there might also be other explanations, such as differences in physical fitness and preparation of the work tasks. However, the occurrence of neck pain in our study (5%) was by far not as common as in the general population, and could not fully be explained by different time span. In addition,

all of those who experienced neck pain rated it to be the most bothersome pain area. Prevalence studies on a general population with respect to other types of MSD are lacking.

Strengths and limitations

To the best of our knowledge, this study is the first based on Swedish military peacekeeping forces. An acceptable response rate (78%) and the fact that all the subjects derived from the same unit and stationed at the same location is one of the strengths of this study. Von Korff CPQ is mostly used to measure chronic pain and is a validated and reliable tool. It has been used to assess pain conditions on shorter duration as well [20]. One of the authors (DG), attended four information sessions, and all personnel got a similar oral presentation and written information about the study. Unfortunately, one flight from Afghanistan was delayed, which resulted in approximately 150 subjects only getting written information about the study. This may have decreased the response rate; it is however not likely those who got written information different from those who got oral and written information, with respect to MSD. Although the majority of the subjects that suffered MSD from the lumbar spine, shoulders or lower extremities reported having pain more than 31 days and still experienced pain after returning to Sweden, recall bias is always an issue in retrospective studies.

Conclusions

Musculoskeletal pain was common during peacekeeping mission in Afghanistan and gradual onset was dominating. Most often, it did not affect the daily activities and was left untreated in more than half of the cases. Nevertheless, it may be of important to consider broadening the medical disciplines onsite, in order to provide preventive measures and treatment for such disorder at an early stage, and thereby reducing the risk of chronicity.

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