

# Investigating the Prevalence of Non-Communicable Diseases in Veterans with Musculoskeletal Disorders

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## Abstract

**Background:** Non-communicable diseases (NCDs) are responsible for over 53% of the disease burden worldwide. The present study was conducted to examine the prevalence of NCDs among disabled veterans to define treatment approaches for them.

**Methods:** The study population included all individuals participating in cross-sectional studies from provinces across the country between 2014 and 2017. Veterans with ankle-foot disorders (AFD), below-knee amputations (BKA), short trans-femoral/hip disarticulations (STFA/HD) and hemipelvectomies (HP) were assessed for physical health.

**Results:** 1785 veterans with lower-limb musculoskeletal disorder were included in the study. Their medical history reported general physical problems including urinary diseases 39.9%, digestive diseases 54.7%, cardiovascular diseases 29.9%, neuropsychiatric disorders 45.4%, respiratory diseases 36.7%, inflectional diseases 13.2%, dermatology 27.9%, endocrine diseases 18.4%, hearing problems 52.8% and sexual disorders 39.9%.

**Conclusions:** The prevalence of NCDs in these veterans was more than the previously reported prevalence of these diseases in general populations.

**Keywords:** Non-communicable diseases, Musculoskeletal disorders, Veterans

## Background

Non-communicable diseases (NCDs) were responsible for over 53% of the disease burden worldwide and were the cause of 73% of all deaths by 2020.<sup>1,2</sup> In Iran, NCDs account for more than 76% of the total disease burden.<sup>1-4</sup> Among them, cardiovascular diseases, cancer, diabetes and chronic respiratory diseases are severe threats to the health of people around the world and require large state and private budgets. Thus, these four diseases have been part of the World Health Organization's (WHO) action plan for years.<sup>1-4</sup>

Strokes and ischaemic heart disease were among the diseases with the greatest burden in 2010, followed by disabilities (including deafness and blindness), as well as renal, endocrine, neurological, haematological, gastroenterological, hepatic, musculoskeletal and skin diseases.<sup>1</sup> According to a study, an analysis of Years of Potential Life Lost (YPLL) revealed acute myocardial infarction as one of the top 10 causes of

YPLL, and acute cerebrovascular disease as one of the top 5 causes of YPLL in all Americans<sup>5</sup>

The prevalence of NCDs in communities can lead to negative consequences. Approximately one-third of patients with severe physical disease experience symptoms of depression.<sup>6</sup> Pain resulting from physical disease affects welfare, lifestyle, independent living and social relations.<sup>7, 8</sup> There are significant relationships between mental stress, health status and disease-related limitations on the one hand and the level of pain reported by patients on the other.<sup>9</sup> The National Health Survey (NHS) in Iran was conducted for a second time in 1999. It combines home interviews and health examinations, which are performed by trained personnel. Sixty-one thousand one hundred and forty persons were studied. NHS data has indicated that four major diseases (cardiovascular diseases, cancers, chronic obstructive pulmonary disease and diabetes) are directly associated with three preventable risk factors: smoking, malnutrition and lack of physical

activity. Health-related studies have revealed that 11.1% of men have high blood pressure. Moreover, the prevalence of obesity and smoking among men is reported to be 5.6% and about 9.23%, respectively.<sup>10</sup> Based on the first study on disease burden in Iran, high blood pressure, with 14.9% of the total burden attributed to risk factors for health, is the second risk factor after obesity and overweight.<sup>11</sup>

The health status of disabled veterans needs to be considered differently from that of people without disabilities due to underlying war-related physical and social factors. Their medical health status is poorer, and they have to visit doctors more frequently during the year. They also use more medical resources and experience more prolonged periods of hospital stays.<sup>12</sup> Thus, it is wrong to plan their healthcare and allocate resources to them based on the evaluations of people without combat-related disabilities.<sup>12</sup> In order to prevent disease development, it is essential to scientifically identify the prevalence of diseases and risk factors in the target population and decrease them with intervention programs, thereby taking effective measures to promote health in this population. To this end, the present study was conducted to examine the prevalence of NCDs among disabled veterans to define treatment approaches for them. Moreover, the results can be used to develop NCD prevention policies and offer interventions for those at risk of these diseases.

## Methods

The study population included all individuals participating in cross-sectional studies between 2014 and 2017. Over three years, health needs assessment studies were performed among Iranian veterans with musculoskeletal disorders across the country. The Human Ethics Committee of Janbazan Medical Engineer Research Center (JMERC) approved the health needs assessment studies (No: IR.ISAAR.REC.1397.002).

In this study, JMERC's database was used to create a new data file for veterans with lower-extremity musculoskeletal disorders. The causes included shrapnel shell, landmine and bullet damage. Most of the participants had more than one cause for their injuries). The veteran populations targeted in the study consisted of veterans with short trans-femoral/hip disarticulation and hemipelvectomy (STFA/HD/HP), below-knee amputation (BKA), ankle-foot disorders (AFD).

Data from the medical history questionnaires were used for the whole study population. In addition, different groups of participants were visited and interviewed face-to-face by internal medicine

physicians, answering a questionnaire based on their opinions in the form of a checklist for clinical information considerations. The content validity of the checklist was reviewed and verified by the physicians.

The inclusion criteria were a war survivor with lower-limb injuries and willingness to participate. The informed consent forms were also filled and signed by all the subjects participating in the health needs assessment studies.

The obtained demographic data included age, gender, education, previous year occupational status and marital status. In the current study, we used recommendations to define health risk factors, as outlined below.

1. Obesity with a body mass index (BMI) of over 30 and overweight, which refers to a BMI between 25 and 29.9.<sup>13</sup> BMI was calculated using the following equation:<sup>14</sup>

$$\text{Estimated body weight below-knee amputee} = \text{Body weight} + (\text{Body weight} \times 0.059)$$

$$\text{Estimated body weight HD/HP} = \text{Body weight} + (\text{Body weight} \times 0.16)$$

2. Hypertension (systolic blood pressure  $\geq 140$  mm Hg or diastolic blood pressure  $\geq 90$  mm Hg or history of hypertension).<sup>15</sup>
3. History of diabetes.
4. Current cigarette use.

Statistical analysis was performed using SPSS 16 (The Statistical Package for the Social Sciences 16.0). Prevalence of problems /diseases or disorders was presented as frequency, percentage and confidence interval. The difference between the prevalence of NCDs in different levels of lower-limb disabilities was examined by chi-square test. Multivariate logistic regression with enter-selection method was employed to find the relation between age and lower level limb disabilities and the type of NCDs. The method used for the evaluation of the appropriateness of the models is Hosmer and Lemeshow Test and classification table. The statistical significance selected was  $P < 0.05$ . The results of common NCDs were considered as the dependent variable and age and lower level limb disability factors were included in the analysis as independent variables.

## Results

One thousand seven hundred and eighty-five veterans with lower-limb musculoskeletal disorder were included in the study. There were 1748 men

(97.9%) and 37 women (2.1%) (see Table1). Lower-limb disabilities were 79.7 % ankle-foot disorders (AFD), 14.6% below-knee amputation (BKA) and 5.6 % short trans-femoral/hip disarticulation and hemipelvectomy (STFA/HD/HP). Their medical history reported general physical problems including urinary diseases 39.9%, digestive diseases 54.7%, cardiovascular diseases 29.9%, neuropsychiatric disorders 45.4%, respiratory diseases 36.7%, inflectional diseases 13.2%, dermatology 27.9%, endocrine diseases 18.4%, hearing problems 52.8% and sexual disorders 39.9% (see Table 2). According to the chi-square test results, the prevalence of all problems except the eyes, endocrine system and sexual function differed in three lower-limb disabilities. The problems reported by participants were chronic joint pain (39 %), hypolibido (37%), reflux disorder (32%) and headache (30.7%). More details are presented in Table 3.

The prevalence of obesity and overweight were 45.3% (42.9-47.5%) and 24.4% (22.5-26.5%), respectively.

**Table 1: Demographic information of veterans**

Variable	NO	(%)
<b>Sex</b>		
Male	1748	97.9
Female	37	2.1
<b>Education</b>		
Primary/secondary/high school	843	47.2
Diploma	529	29.6
Academic education	413	23.2
<b>Occupational status in one past year</b>		
Yes	557	31.2
No	1228	68.8
<b>Marital status</b>		
Married	1743	97.6
Widowed/divorced/single	42	2.4

**Table 2: The participants' history of physical health problems**

Variable	Foot and ankle disorder (n=1424)		Below knee amputee (n=261)		Short trans-femoral, hip disarticulation and hemipelvectomy (n=100)		P-value
	N%	CI (95%)	N%	CI (95%)	N%	CI (95%)	
Urinary diseases (N= 1785)	597 (41.9%)	39.544.5	78 (29.9%)	24.535.6	36 (37.1%)	27.847.4	<0.001
Digestive diseases (N= 1785)	806 (56.6%)	54.059.2	120 (46%)	39.852.1	49 (50.5%)	40.260.8	0.004
Cardiovascular diseases (N= 1785)	391 (27.5%)	25.129.8	99 (37.9%)	32.243.3	42 (43.3%)	34.053.6	<0.001
Hearing problems (N= 1785)	755 (53%)	50.555.7	121 (46.4%)	40.252.5	64 (66%)	56.775.3	0.003
Eyes problems (N=884)	75 (14.3%)	11.517.6	32 (12.3%)	8.416.1	9 (9.3%)	4.115.5	0.431
Neuropsychiatric disorders (N= 1641)	643 (50.2%)	47.652.9	66 (25.3%)	19.930.7	36 (37.1%)	27.847.4	<0.001
Respiratory and lung diseases (N= 884)	228 (43.6%)	39.448.0	78 (29.9%)	24.136.0	18 (18.6%)	11.326.8	<0.001
Infectious diseases (N= 668)	71 (23.1%)	18.927.7	19 (7.3%)	4.210.7	11 (11.3%)	6.218.6	<0.001
Dermatological problems (N=522)	168 (32.2%)	28.236.6	66 (25.3%)	20.331.0	12 (12.4%)	6.219.6	<0.001
Endocrine diseases (N= 884)	90 (17.2%)	14.120.5	56 (21.5%)	16.526.8	17 (17.5%)	10.325.8	0.326
Sexual disorders (N= 1758)	571 (40.1%)	37.342.6	96 (36.8%)	30.742.9	46 (47.4%)	37.157.7	0.268
Orthopaedic problems (N= 1568)	1062 (87.9%)	85.989.8	188 (72%)	66.777.4	84 (86.6%)	79.492.8	<0.001

Regardless of the position of the injures, about one-third (32%) of all veterans (29.9-34.4%) had a history of hypertension (systolic tension  $\geq 140$  mmHg or diastolic tension  $\geq 90$  mmHg). Diabetic persons were 15.9 % ( 14.3-17.7%) of all veterans. The prevalence of cigarette smoking was 22.9% (19.7-25.8%).

The results from multiple logistic regressions, shown in Table 4, indicated that relevant neuropsychiatric disorders and digestive diseases were less common among younger participants. It was noted that the chance of having orthopaedic problems is lower in veterans with STFA/HD/HP and BKA compared with FAD. The value of the appropriateness of the model for all models was up to 0.91.

## Discussion

The findings of this study showed three common physical problems, including digestive diseases (54.7%), hearing problems (52.8%) and neuropsychiatric disorders (45.4%). In 2009, Nejati and Khodabakhsh evaluated the prevalence of chronic diseases in psychiatric veterans. The most common problems were respiratory diseases (18.2%), cardiovascular diseases (14.7%), urinary system diseases (8.9%) and diabetes (7.5%).<sup>16</sup> It seems that the difference in mean age and the type of war-related disorders are the main factors behind these differences.

Our results showed 30.7 % of veterans suffered from headaches and 4.9% migraines. A study indicated the prevalence of headache disorders as 8% (6-11%) and migraine as 14% (12-17%) in Iran.<sup>17</sup> Also, annual stroke incidence was reported from 23 to 103 cases per a population of 100 000 people.<sup>18</sup> Of the veterans with lower-limb injures, 27.3% suffered from tinnitus. According to available studies, the prevalence of tinnitus in the adult population is 10.1 to 14.5 per thousand, which is estimated to be 22 to 32 per thousand in terms of temporal tinnitus due to noise or cold.<sup>19</sup> Assessment of the pulmonary system showed that 4.8% of the participants had a history of asthma and 18% had chronic bronchitis. In 2007, Heidari et al. stated that the prevalence of asthma symptoms in Iran was 13.4 %.<sup>20</sup> Another study indicated an overall prevalence of 4.56% among men and 4.17% among women, and pooled prevalence of asthma was 7.95% for men and 5.83% for women. The pooled prevalence of chronic bronchitis was 5.57%.<sup>21</sup> Gastroesophageal reflux was a common disease of the digestive system. (20)In Iran, the prevalence of gastroesophageal reflux was estimated at 21.2%.<sup>22</sup> Twenty-five per cent of the veterans had a history of kidney stone disease in the present study. In the general population, chronic kidney disease

**Table 3: The type of physical health problems in veterans with musculoskeletal disorders**

Problem/ disease	Total N	Frequency	(%)
Head trauma	1651	182	11.0
Stroke	1651	23	1.4
Migraine	1651	81	4.9
Headache	1703	523	30.7
Hearing trauma	1651	114	6.9
Tinnitus	1785	487	27.3
Hearing loss	1785	804	45
Chemistry pulmonary injury	750	136	18.1
Asthma	884	42	4.8
Bronchitis	750	46	6.1
Dyspnoea	702	197	28.1
Myocardial infarction (MI)	1785	120	6.7
Coronary artery bypass grafting (CABG)	1569	84	5.4
Congestive heart failure	1569	64	4.1
Stent	455	72	15.8
Orchitis	1651	12	.7
Pyelonephritis	1569	16	1.0
Kidney stone disease	1651	415	25.1
Recurrent urinary tract infection	1651	178	10.8
Reflux	1785	571	32
Gastritis	1785	343	19.2
Dyspepsia	1703	429	25.2
Abdominal surgery	1651	412	25
Low back pain	1162	611	34.2
Spine surgery	1162	37	3.2
Chronic joint pain	1162	461	39.7
Osteoporosis	1162	10	.9
Fracture	1162	5	.4
Hypolibido	1702	632	37.1
Orgasm disorder	1785	535	30

Table 4: Relation between demographic factor and general physical health using logistic regression

Problems/disease	Variable	OR	CI	P
<b>Hearing problems</b>	Age (years)			
	<39	.35	.19.62	<.001
	4049	.69	.50.94	.02
	5059	.81	.601.09	.17
	60< Reference			
	Level of disability			
	STFA/HD/HP*	1.74	.1.132.68	.01
	Below knee amputation	.77	.591.01	.06
<b>Neuropsychiatric problems</b>	Age (years)			
	<39	1.05	.59.1.85	.85
	4049	.96	.69 1.33	.80
	5059	1.04	.761.42	.77
	60< Reference			
	Level of disability			
	STFA/HD/HP	.56	.36.85	.008
	Below knee amputation	.33	.24.45	<.001
<b>Orthopaedic problems</b>	Age(years)			
	<39	1.18	.502.77	.70
	4049	.97	.601.58	.92
	5059	.90	.571.42	.66
	60< Reference			
	Level of disability			
	STFA/HD/HP	.90	.491.66	.75
	Below knee amputation	.35	.25.49	<.001
<b>Digestive diseases</b>	Age(years)			
	<39	.45	.25.79	.006
	4049	1.01	.741.38	.92
	5059	.81	.611.09	.18
	60< Reference			
	Level of disability			
	STFA/HD/HP	.76	.501.14	.19
	Below knee amputation	.66	.50.86	.003
	Food and ankle disorders Reference			

\*Short trans-femoral/hip disarticulation and hemipelvectomy (STFA/HD/HP)

was reported as 23.7% for both men and women, 26.6% in women and 20.6% in men.<sup>23</sup> Another study indicated the overall prevalence of chronic kidney disease was 18.9%;<sup>24</sup> however, according to our findings, the prevalence of urinary diseases was 39.8%.

In the current study, 15.9 % of veterans were diabetic. Esteghamati et al. found that 7.7% of adults had diabetes and 16.8% of Iranian adults had impaired fasting glucose.<sup>25</sup> In addition, Haghdoost et al. reported the prevalence of type 2 diabetes was 24% in people older than 40 years.<sup>26</sup> The prevalence of diabetes mellitus was reported at 5.5 %, and the health effects were most prevalent in people older than 60 (10.9 %).<sup>27</sup> In our study, the prevalence of the history of hypertension was 26.9%. The overall pooled prevalence of hypertension was 22% (23.6% in men and 23.5% in women).<sup>28</sup> The prevalence of hypertension in Ahvaz was 17.58%.<sup>29</sup> In a cohort study, the incidence of hypertension was 42.7%.<sup>30</sup>

Of the veterans, 34.7 % had a history of cigarette smoking; however, 22.9% smoked cigarettes at the time of the study. Smoking prevalence in all subjects was estimated 13.9%, 21.7% and 19.8% in men and 3.6% and 0.94% in women in the meta-analysis of non-communicable disease studies.<sup>31</sup> Another study showed that the prevalence was 22.9-26.5%, in men and 0.3-0.8% in women.<sup>32</sup> In the present study, the ranges of overweight and obesity were 42.8-47.6% and 22.3-26.5%, respectively. The range of overweight prevalence was reported as 27.0-38.5%.<sup>33</sup> One study reported an overall prevalence of overweight was 34.1% (39.5% in men and 36.9% in women).<sup>34</sup> In another study, the range of overweight was 4.4%-42.3%,<sup>35</sup> the range of obesity prevalence was 12.6-25.9%<sup>33</sup> and the overall prevalence of obesity was 15.4%. The overall prevalence of obesity was 11.7% in men 20.6% in women.<sup>34</sup> The rate of obesity was in the range of 1-16.1% in a separate study.<sup>35</sup> Obesity was estimated 21.7% in populations above the age of 18.<sup>36</sup> The combined prevalence of both overweight and obesity was 51.2% in males and 57.5% in females.<sup>34</sup> Qodousi and colleagues also found that 48.2% of chemical warfare victims with chronic bronchitis were overweight and 17.5% of them had obesity.<sup>37</sup>

The results of this study showed that the odds of incidence of hearing problems in veterans with HD/HP were higher than participants with AFD. This indicates that the magnitude of the cause of the war-related injuries can have an influential role in hearing problems such as tinnitus. Nevertheless, the incidence of hearing problems in people with AFD are more than BKA. The odds of having central

nervous system problems in veterans with AFDs are more with amputation. This shows that although the level of war injures is lower, problems such as headaches and migraines are more prevalent in this group. This requires more examination considering other factors such as psychological dimensions. While it is expected that orthopaedic problems increase with age and higher levels of injury, the results of the present study showed that orthopaedic problems are not related to age. There are fewer problems with orthopaedic problems in participants with BKA than veterans with AFDs. Assessments of biomechanical aspects are needed in this group. The odds of getting digestive diseases are lower in people under 40 and BKA. This suggests the high likelihood of having physical illnesses in veterans with AFDs compared to those with BKAs. This group demand more attention, and it is necessary to evaluate their physical activities and mental dimensions.

### Key messages

The health status of disabled veterans needs to be considered differently from that of people without disabilities due to underlying war-related physical and social factors.

The findings of this study showed three common physical problems, including digestive diseases, hearing problems and neuropsychiatric disorders.

In the present study, the ranges of overweight and obesity were 42.8-47.6% and 22.3-26.5%, respectively.

This study suggests that veterans with ankle and foot disorders demand more attention, and it is necessary to evaluate their physical activities and mental dimensions.

### Conclusion

The prevalence of NCDs in the studied population of veterans with lower-limb disability was more than the previously reported prevalence of these diseases in general populations. It was also shown that different levels of lower-limb disability and different age groups had different chances of having common health problems.

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