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Correlation between Body Composition and Body Mass Index with Mental Health and Sleepiness in Chemically Injured Veterans: A Cross-sectional Study

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ABSTRACT

Aims Chemically injured veterans are very vulnerable because of their special situation, and they may confront numerous difficulties. Body composition is one of the effective factors in mental health in adults. So, this study aimed to survey the correlation between body composition and body mass index with mental health and sleepiness in chemically injured veterans.

Instruments & Methods This cross-sectional study was conducted on chemical veterans referred to the rheumatology ward in Karaj province. 131 patients were selected through the available sampling method. The body composition and body mass index of veterans were determined, and General Health Questionnaire and Epworth Sleepiness Scale were answered. Data were analyzed using the Pearson correlation coefficient by SPSS 19 software.

Findings There was a significant correlation between body fat percent and fat mass with total general health (p=0.004). The correlation between body composition and sleepiness was not significant (p>0.05). There was no significant correlation between body mass index with mental health and sleepiness (p>0.05).

Conclusion Body composition, particularly fat percent and fat mass, is associated with general health in chemically injured veterans.

Keywords Body Composition; Mental Health; Sleepiness; Veterans

CITATION LINKS

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Introduction

Chemically injured veterans are very vulnerable, and because of their special situation, they may confront enormous health difficulties. They are also affected by many biological, mental, and environmental factors [1]. Most chemical veterans are suffering from psychological and physical disorders [2]. Common mental disorders include a range of problems anxiety and depression are among its manifestations [3]. Mental disorders are among the major burden of disease [4]. A study has shown that 29.2% of people experience common mental illness during their lifetime [5]. Several risk factors have been identified for common mental disorders [6-9]. Some of the risk factors for mental disorders are the Body Mass Index (BMI) and body composition [10-12].

Worldwide studies show an increase in the prevalence of obesity and overweight over the past years. Overweight and obesity have increased in children and adolescents in developed countries and developing countries [13]. Body composition indexes, such as waist circumference (WC), BMI, waist-to-hip ratio, and waist-to-height ratio [14], are used for assessing fat distribution, weight gain, and obesity. In men with obesity or android obesity, the fat often is over the waist, and in women with obesity or ganoid obesity, the fat is under the waist, hip, and thigh area. Abdominal obesity, which is assessed by increasing waist-to-hip ratio and waist-to-height ratio, is recognized as one of the risk factors for cardiovascular [15] and diabetes type 2 disease [16].

Body composition, especially fat and muscle mass, is one of the factors affecting common health, diseases [17-19], and also the mental health of people. In obese people, fat distribution in the body has a main role in obesity disorders' incidence [20].

Ghoddousi *et al*. research showed that the prevalence of obesity among chemical veterans is more than the normal population [21]. Also, recent research revealed the importance of body composition in general and mental health [17, 18]. Walter *et al*. found that more depression symptoms and low emotional support were accompanied by worse body composition [17]. Hong's study showed that sarcopenic obesity was more in women than men, and it was related to high blood pressure and arthritis. These people also had mobility and self-care problems [18]. Body composition is associated with various aspects of health, including mortality [22], musculoskeletal pain [23], and ischemic stroke [24].

On the other hand, sleepiness and sleep disorders are the results of body composition and obesity, and it is increasingly harmful to health [25-27]. Much research shows that body composition affects sleep quality [26, 27]. For example, St-Onge and Shechter [27] reported that short sleep duration was related to weight increase, and also obesity was one of the risk factors for obstructive sleep apnea, which affected the quality of sleep. Hayley *et al*.'s survey on the excessive daytime sleepiness and body composition in an adult population showed that excessive sleepiness was related to several anthropometric adiposity profiles, which were independent life style and health factors. Among women, symptoms of sleepiness were higher in overweight and obese subjects than in the normal population [28].

A lot of studies have been done about the relationship between body composition and obesity with medical diseases [21]. But research about the relationship between body composition and psychological health and sleep condition is limited. So this study aimed to determine the correlation between body composition and BMI with mental health and sleepiness in chemically injured veterans.

Instruments and Methods

Study design and population

This cross-sectional study was conducted on chemical veterans referred to the rheumatology ward in Karaj province in 2017-2018. 131 patients were selected through the available sampling method. Recalling 1100 chemical veterans of Karaj province, 131 veterans were visited, and their monitoring plan was carried out. After eating breakfast and a group meeting, they became familiar with the process and objectives of the project. Two hours after breakfast with a BC device, the body composition was detected using a Bio impedance analyzer. After the presence of the researchers in the studied population, descriptive and demographic indexes were surveyed, and then the research questionnaires were given to them to answer.

Body composition

For body composition analysis, chemical veterans went to the laboratory on specific days, and by a bioelectric impedance body analyzer, model PlusAvis 333 (Jawon company; South Korea) the weight, Percent of Body Fat (PBF), Mass of Body Fat (MBF), and Soft Lean Mass (SLM) were measured.

Body Mass Index (BMI)

Height and weight were measured, and then BMI was calculated. On the basis of World Health Organization instructions, people with 25≤BMI<30 were considered overweight, and BMI≥30 were considered as obese [29]. In the present research, body mass index was used as a continuous variable.

General Health Questionnaire (GHQ-28)

General Health Questionnaire-28 (GHQ-28) is a standard tool that consists of 28 questions. GHQ assesses somatic symptoms, anxiety, insomnia, social dysfunction, and depression. We used likert scoring. For each question, the score was between 0-3, so the total score was between 0-84. The high scores show the bad condition of common health [30, 31].

Epworth Sleepiness Scale

Epworth Sleepiness Scale measures the likelihood of a person's napping in everyday activities such as watching TV, sitting inactive on a place, and sitting as a passenger in a bus or taxi. The total score between 0-6 shows adequate sleeping, 7-10 low to moderate sleepiness, 11-15 severe sleepiness and 16-24 dangerous sleepiness [32]. The results of other researches showed that the total score

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more than 10 in this test was a sign of extensive daily sleepiness [33].

Statistical analysis

Data were analyzed using descriptive indexes and Pearson correlation coefficient. SPSS 19 software was used to analyze the results.

Findings

The mean age, height, weight, and BMI were 55.34±4.01 years, 172.09±5.79 cm, 79.03±11.03 kg, and 26.67±3.48 Kg/m^2, respectively. In the General Health Questionnaire, the sub-scales of somatic symptoms, anxiety-insomnia, social dysfunction, and depression were 48.9%, 57.2%, 44.3%, and 28.2%, respectively, in the moderate to severe range. The mean score of components of health and sleep are presented in Table 1.

The total mean score for general health was 42.5±16.4, and the mean score for sleepiness was 11.4±5.6.

Table1) Mean anthropometric variables and GHQ scores and its subscales and sleepiness

Variable	Mean±SD	Min-Max
Age, y	55.34±4.01	48-67
Height, cm	172.09±5.79	155-189
Weight, Kg	79.03±11.03	52-105
BMI, Kg/m^2	26.67±3.48	19.25-39.04
somatic symptoms	11.5±4.4	3-21
Anxiety-insomnia	12.7±4.9	2-21
Social withdrawal	10.7±3.9	0-20
Depression	7.5±5.8	0-21
GHQ-28	42.5±16.4	13-79
Epworth Sleepiness Scale	11.4±5.6	1-24

The body composition index, including fat percent (r=0.251; p=0.004) and fat mass (r=0.251; p=0.004), had a significant correlation with the general health score but had no significant correlation with the Epworth sleepiness score. Also, free fat mass, body water percent, and muscle mass had no significant correlation with the general health and Epworth sleepiness scores (Table 2).

Table 2) Correlation between body composition with GHQ and Epworth sleepiness scores

Body composition	Somatic symptoms	Anxiety	Social dysfunction	Depression	GHQ total	Sleepiness
Total body						
Fat percent	**r=0.228 p=0.009**	**r=0.293 p=0.001**	**r=0.176 p=0.044**	r=0.168 p=0.055	**r=0.251 p=0.004**	r=0.064 p=0.471
Fat mass	**r=0.216 p=0.013**	**r=0.255 p=0.003**	**r=0.206 p=0.018**	**r=0.190 p=0.030**	**r=0.251 p=0.004**	r=0.079 p=0.367
Free fat mass	r=0.023 p=0.790	r=-0.051 p=0.565	r=0.102 p=0.247	r=0.096 p=0.276	r=0.050 p=0.572	r=0.170 p=0.052
Total body water	r=0.023 p=0.797	r=-0.051 p=0.562	r=0.102 p=0.247	r=0.096 p=0.277	r=0.049 p=0.575	r=0.169 p=0.053
Muscle mass	r=0.023 p=0.793	r=-0.053 p=0.550	r=0.100 p=0.256	r=0.095 p=0.283	r=0.048 p=0.585	r=0.167 p=0.057
Right leg						
Fat percent	r=0.158 p=0.072	**r=0.211 p=0.016**	**r=0.196 p=0.025**	r=0.100 p=0.254	**r=0.188 p=0.031**	r=0.112 p=0.203
Fat mass	r=0.151 p=0.085	**r=0.190 p=0.029**	**r=0.225 p=0.010**	r=0.127 p=0.148	**r=0.197 p=0.024**	r=0.125 p=0.156
Free fat mass	r=0.084 p=0.340	r=0.056 p=0.523	r=0.137 p=0.118	r=0.169 p=0.054	r=0.132 p=0.132	r=0.080 p=0.366
Muscle mass	r=0.086 p=0.329	r=0.057 p=0.519	r=0.142 p=0.107	**r=0.172 p=0.050**	r=0.135 p=0.123	r=0.078 p=0.376
Left leg						
Fat percent	r=0.139 p=0.114	**r=0.264 p=0.002**	r=0.152 p=0.083	r=0.103 p=0.241	**r=0.189 p=0.030**	r=-0.055 p=0.535
Fat mass	r=0.053 p=0.550	**r=0.195 p=0.026**	r=0.109 p=0.217	r=0.051 p=0.565	r=0.116 p=0.185	r=-0.072 p=0.414
Free fat mass	r=0.071 p=0.421	r=0.031 p=0.723	r=0.149 p=0.090	r=0.142 p=0.107	r=0.115 p=0.193	r=0.152 p=0.083
Muscle mass	r=0.078 p=0.376	r=0.036 p=0.683	r=0.154 p=0.078	r=0.145 p=0.098	r=0.121 p=0.170	r=0.153 p=0.080
Right arm						
Fat percent	**r=0.209 p=0.017**	**r=0.249 p=0.004**	**r=0.195 p=0.026**	**r=0.194 p=0.026**	**r=0.247 p=0.005**	r=0.088 p=0.317
Fat mass	**r=0.201 p=0.022**	**r=0.211 p=0.016**	**r=0.209 p=0.016**	**r=0.205 p=0.019**	**r=0.241 p=0.006**	r=0.096 p=0.273
Free fat mass	r=0.024 p=0.788	r=-0.043 p=0.624	r=0.087 p=0.321	r=0.074 p=0.399	r=0.041 p=0.642	r=0.111 p=0.206
Muscle mass	r=0.019 p=0.826	r=-0.050 p=0.573	r=0.079 p=0.371	r=0.064 p=0.471	r=0.032 p=0.717	r=0.113 p=0.197
Left arm						
Fat percent	**r=0.214 p=0.014**	**r=0.242 p=0.005**	**r=0.193 p=0.027**	**r=0.187 p=0.033**	**r=0.243 p=0.005**	r=0.048 p=0.587
Fat mass	**r=0.218 p=0.012**	**r=0.227 p=0.009**	**r=0.227 p=0.009**	**r=0.215 p=0.013**	**r=0.258 p=0.003**	r=0.081 p=0.358
Free fat mass	r=0.001 p=0.994	r=-0.051 p=0.566	r=0.070 p=0.428	r=0.065 p=0.459	r=0.025 p=0.776	r=0.146 p=0.096
Muscle mass	r=0.003 p=0.976	r=-0.050 p=0.571	r=0.083 p=0.346	r=0.071 p=0.420	r=0.031 p=0.725	r=0.153 p=0.082
Trunk						
Fat percent	**r=0.254 p=0.003**	**r=0.267 p=0.002**	r=0.157 p=0.074	**r=0.190 p=0.029**	**r=0.254 p=0.003**	r=0.094 p=0.287
Fat mass	**r=0.187 p=0.032**	**r=0.181 p=0.039**	r=0.154 p=0.079	r=0.152 p=0.082	**r=0.196 p=0.025**	r=0.157 p=0.074
Free fat mass	r=-0.019 p=0.828	r=-0.115 p=0.189	r=0.062 p=0.481	r=0.048 p=0.584	r=-0.008 p=0.932	**r=0.196 p=0.025**
Muscle mass	r=-0.017 p=0.846	r=-0.115 p=0.193	r=0.063 p=0.474	r=0.049 p=0.582	r=-0.006 p=0.943	**r=0.196 p=0.025**
BMI	r=-0.006 p=0.945	r=0.006 p=0.942	r=0.011 p=0.904	r=0.091 p=0.303	r=0.035 p=0.691	r=0.122 p=0.164

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Discussion

The purpose of this study was to investigate the relationship between body composition and BMI with mental health and sleepiness. Accordingly, 131 war chemical injured veterans were examined in dimensions of the body composition, including fat percent, fat mass, free fat mass, total body water, and muscle mass. After reviewing the results, the findings showed that fat percent and fat mass were correlated with total GHQ, including somatic symptoms, anxiety, social dysfunction, and depression. This finding is consistent with the findings which have shown that body fat percentage is associated with the severity of symptoms of depression [34, 35]. Also, findings from another study have shown that fat percentage has a significant correlation with both depression and anxiety [36].

The relationship between body fat and depression can include two psychological and biological mechanisms [35]. From a psychological point of view, perceived weight, physical image, and stigmatization can play a role in this regard [37-40]. Biologically, obesity is associated with several endocrine and metabolic disorders, which are related to mental health, particularly depression [41]. Studies have also shown that body fat is associated with foot pain [42], and this pain can increase the risk of depression [43]. Also, in the case of anxiety and anxiety disorders, studies have shown that obesity is correlated with anxiety [44]. In general, body fat is associated with low quality of life, so higher body fat is associated with worse quality of life [45]. Body fat is associated with various physiological problems, which can lead to a decrease in the level of psychological health of the individual. For example, fat mass and body fat are associated with an increased risk of musculoskeletal pain [23, 46].

Another goal of the present study was to evaluate the amount of sleepiness based on the body composition. However, the findings showed that body composition had no significant relationship with sleepiness. Only trunk free fat mass and Muscle mass were associated with sleepiness. Another similar study in the past showed that there was a positive association between fat mass percentage and sleep quality [47].

Another finding of this study showed that there is no significant relationship between BMI with mental health and sleepiness. No significant relationship between BMI and sleep is in contrast to previous studies, which showed a significant relationship between BMI and sleep and insomnia [48-51]. Studies that show a correlation between BMI and sleep are common in the general population, while the current study was conducted on chemically injured veterans. A systematic review study [52] has shown that obesity is a risk factor for depression, but the present study did not find a correlation between BMI and depression. Given that the current study was conducted on men, this finding is consistent with the previous systematic review, which showed no significant association between overweight and obesity with depression in men [52]. In explaining these findings, it should also be taken into account that psychiatric disorders may lead to changes in body composition and body mass index, as studies have shown [53]. But because of the cross-sectional nature of the present study, it is not possible to determine the direction of the association. Studies have also indicated that depression is associated with obesity [54]. In the study of the effects of sleep problems on obesity, studies have shown that there is a relationship between sleep loss and obesity [55].

This study contains limitations that should be considered when interpreting the results. This is a cross-sectional study, and the causality relationship cannot be extracted, and future studies should examine this issue using a longitudinal research. This study was conducted on people with chemical injuries, and because they were exposed to chemical damage, so generalizing the results to the general population should happen cautiously. This study included males and did not include women, so the generalization of the results is restricted.

By these findings, we must essentially notice the body composition, especially fat percent and fat mass, in common health and sleepiness of chemically injured veterans. Starting interventions and effective exercise programs to solve this problem can promote their health.

Conclusion

Body composition, particularly fat percent and fat mass, is associated with general health in chemically injured veterans.

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Conflict of Interests: There is nothing to declare.

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