

The Effectiveness of Exercise Interventions in Physical and Psychological Conditions in Iranian Veterans: A Systematic Review

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Abstract

Purpose: The purpose of this review was to investigate the effects of exercise interventions on physical and psychological health in Iranian war veterans. **Method:** The search strategy for this review consisted of an electronic database search of full text papers in Google Scholar and SID.ir databases. 10 studies met the eligibility criteria, all of them interventional in nature. The studies were analyzed separately according to the specific areas of study. **Results:** The studies demonstrate that exercise interventions have a significant impact on physical health, psychological health, and quality of life in Iranian war veterans. However, inconsistencies were generally apparent between some of the results. **Conclusions:** Exercise interventions have positive effects on physical and psychological health in Iranian war veterans. More investigation is needed to identify optimal exercise protocols for different groups of veterans.

Keywords: Veterans, Exercise, Health, Psychology

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INTRODUCTION

War can cause many physical and psychological consequences and injuries among the soldiers and people of a country. During the 8-year Iran-Iraq war, more than 200 thousand people were killed, and more than 400 thousand people have been suffering from injuries and disabilities. Among these, it can be noted that the war caused more than 50 thousand people to become contaminated with chemical agents. Regarding physical injury, damage to joints, bone structures in the pelvic area and lower limbs, upper limbs, head, neck, and other injuries in the abdominal viscera have the highest prevalence of war injuries (Mohebbi, Nejad Sangsari, Saghafi nia, Khavanin, & Moharamzadeh, 2007). The incidence of such injuries could impose a large financial burden on the veterans and the community and could have various psychological and social consequences for the veterans and their families.

Based on the results of studies, injured veterans in Iran have lower levels of quality of life (Talavari & Nisi, 2015; Tavallaie et al., 2006), mental health (Khani, Zamani, Ghorbani, Jahangir, & Jenaabadi, 2016), sleep disorders (Tavallaie, Assari, Najafi, Habibi, & Ghanei, 2005), lower levels of physical abilities (Toulabi, Saki, & Ghanbari, 2003), lower levels of life satisfaction (Hashemian & Khademi, 2015; Roohi, Asayesh, Abbasi, & Ghorbani, 2011) and psychological disorders (Fathiashtiani, Tavallaee, Azizabadi Farahani, & Moghani Lankarani, 2008) personally and in the family. Therefore, providing proper strategies for improving these effects shall always be considered by health policy makers and other relevant organizations; so that they can have proper planning with the least cost and the most effectiveness for maintaining the health of veterans.

For a long time, exercise and physical activity have been considered as a way to maintain physical well-being and improve physical fitness and mental health. Exercise makes it easier for the body to push and pull in daily activities, delaying the onset of disability due to aging and chronic illness, increasing the expectancy of active life, and life expectancy itself. Sport maintains physical functioning and improves the independent life of the elderly, as well as improving the quality of life. Many people believe that exercising regularly helps having a relaxing sleep. Athletes generally feel less distressed, anxious, and depressed than non-athletes do. Exercise can also be associated with increasing self-

esteem (Shahrjerdi, Shavandi, Sheikhhoseini, & Shahrjerd, 2010). In addition, exercise has psychosocial aspects as follows: First, research has shown that intense and regular exercise is associated with a reduction in nervous stress and anxiety. Secondly, people who participate in fitness and sports programs say their performance at work and attitudes becomes better-for example, they make fewer mistakes. Third, regular participation in physical activities make people, especially children, more self-confident. All this makes people see themselves in a better position (Shahrjerdi, Shavandi, Golpaygani, & Sheikhhoseini, 2009). On the other hand, various studies show that veterans and disabled people who exercise are better than their non-exercising counterparts in terms of physical health (Aghdasi, Samadi, & Ghari, 2015), self-confidence, mental health, and quality of life (Bakhshayesh, Bahmani, & Kamali, 2012), and exercise can improve physical function and disability in people (Babakhani, Sheikhhoseini, & Amjad, 2017; Mahdavi, Golpaigani, Shavandi, Farzaneh Hessari, & Sheikh Hoseini, 2010). Therefore, due to the importance of sport in the field of health, many efforts have been made to study the role of sport in maintaining and improving physical and mental health of war veterans in Iran through various research. Therefore, in this systematic review, the researcher intends to collect and analyze the studies conducted in this field.

METHOD

For this study, the titles and abstracts of scientific sources available in electronic databases including Google Scholar, SID.ir, related magazines such as *Iranian Journal of War and Public Health* and *Journal of Military Medicine* were searched without a time limit. The search terms included: Veteran, disabled, exercise, public exercise, practice, exercise therapy, well-being, and physical activity. The only sources that were published in journals with peer review process and In Persian were selected. First, the titles and abstracts of the sources searched by two researchers were examined. In cases of disagreement among the researchers on the criteria for entering the research, the researchers, in consultation with each other, decided on entering or not entering the source for the systematic review process. Only those resources were selected that examined the effects of exercise on the physical and mental factors of veterans.

RESULTS

At first, a total of 106 paper titles were found on Google Scholar. Of these, based on the review of abstracts and titles, 30 papers were selected. After a closer study of the articles, 10 papers fully met the conditions to enter the study, the summary of the methodology and the results of which are presented in Table 1.

Table 1: The main characteristics of eligible studies were selected for review

Author	Subjects	Intervention	Exercise duration	Comparison with	Variables	Main results
Ghehri et al. (16)	68 veterans contaminated with mustard gas in experimental (n=31) and control (n=37) groups	Respiratory exercises	10 days and 15 minutes for everyday	Control	-FVC -FEV1 -FEF 25-75% -PEF	Respiratory volumes were significantly improved
Fallahmohamadi et al. (17)	14 veterans contaminated with mustard gas in experimental (n=8) and control (n=6) groups	Ergometer exercise, 20-30 minutes per session, at intensity of $\dot{V}_{O_2} \cdot V \cdot \% HR_{max}$	4 weeks, 3 times per week	Control	-FEV1 -MVV -VC -TV	NO significant improvements were observed

Tari et al. (18)	14 veterans contaminated with mustard gas in experimental (n=8) and control (n=6) groups	Ergometer exercise, 20-30 minutes per session, at intensity of Δ , Δ , Δ , Δ , Δ % HR _{max}	4 weeks, 3 times per week	Control	-FVC -FEV1 -Exercise tolerance -Dyspnea	Exercise tolerance and dyspnea were significantly improved
Yazdampajoo et al. (19)	31 female chemical agent victims in experimental (n=16) and control (n=15) groups	Walking and jogging at intensity of 45-65% of HR _{max}	8 weeks, 3 session per week	Control	-FVC -FEV1 -MVV -FEF (25-75%) -Red cell, white cell and platelets counts and blood hematocrit	Respiratory volumes were improved significantly
Tofighti et al. (23)	40 veterans with 25-75% injured veterans in experimental (n=20) and control (n=20) groups	Running at intensity of 50-65% of VO _{2max}	12 weeks, 3 sessions per week	Control	General health- Psychosomatic- Anxiety and - insomnia Impaired social - functioning Depression- Blood serotonin-	All variables significantly were improved
Gatani et al. (20)	20 veterans with minimum 70% of spinal cord injury	Aerobic resistance exercise by means of wheelchair	8 weeks, 3 session per week	Control	-VC -FEV1 -HDL-C -LDL-C -Systolic blood pressure -Diastolic blood pressure Fasting blood - glucose	VC, FEV1, HDLs and Systolic blood pressure were improved significantly

Moradi et al. (24)	19 single leg amputee veterans in experimental (n=9) and control (n=10) groups	Aquatic balance training	8 weeks, 3 session per week	Control	Static balance-	Improved static balance
Mandani et al. (22)	19 veterans with post-traumatic stress disorder	Group exercise program	12 weeks, 2 session per week	Control	Quality of life-	Improved quality of life
Mohamadtaghi et al. (25)	14 single leg amputee veterans in experimental (n=7) and control (n=7) groups	Balance training	4 weeks, 5 session per week	Control	Sensory - organization test	Balance indexes were improved significantly
Ahmadi et al. (21)	23 veterans contaminated with mustard gas in experimental (n=13) and control (n=10) groups	Respiratory exercises	8 weeks, 3 session per week	Control	-FEV1 -FVC -FEV1/FVC -Fatigue score	Respiratory volumes and fatigue score were significantly improved

Abbreviations: HR_{max}: Maximum Heart Rate, FVC: Forced Volume Vital Capacity, FEV1: Forced Expiratory Volume in 1 Second, FEF: Forced expiratory flow, PEF: Peak Expiratory Flow, MVV: Maximum voluntary ventilation, VC: Vital Volume, TV: Tidal Volume, HDL: High-density lipoproteins, LDL-C: Low-density lipoproteins.

Due to the heterogeneity observed in the texts, these sources were classified according to the dependent variables presented below.

The effects of exercise interventions on the pulmonary function

The 6 papers in this study investigated the effect of training interventions on pulmonary function (Ahmadi, Moradi, & Abedi, 2016; Fallahmohamadi & Tari, 2009; Gaeini, Sattari-Fard, & Haj-Amini, 2013; Ghehri-Sarabi, Heydarizadeh, Ebrahimi, Alavimajd, & Yaghmayi, 2007; Tari, Fallah Mohamadi, Dabidi Roushan, & Aliaei, 2009; Yazdanpajoo Khosravi, & Nazarali, 2012), all of which except two (Fallahmohamadi & Tari, 2009; Tari et al., 2009) have shown that training interventions have been able to improve the pulmonary function of veterans. Five of these researches have been conducted on chemical warfare victims (Ahmadi et al., 2016; Fallahmohamadi & Tari, 2009; Ghehri-Sarabi et al., 2007; Tari et al., 2009; Yazdanpajoo et al., 2012) and one case on spinal cord injured veterans (Gaeini et al., 2013).

The results of study by Ghehri et al. showed that providing 10 days of respiratory training to veterans contaminated with mustard gas has been able to significantly improve lung volumes FVC, FEV1, FEF 25-75% and PEF (Ghehri-Sarabi et al., 2007). The results of the study by Yazdanpajoo et al. showed that endurance training of walking and running for 8 weeks has been able to improve pulmonary volume of FVC, FEV1, MVV and FEF (25-75%) in female chemical agent victims (Yazdanpajoo et al., 2012). These results are consistent with the results of the study by Ahmadi et al., which showed that 8 weeks of respiratory training has been able to improve FEV1, FVC and FEV1/FVC values (Ahmadi et al., 2016). Only two papers from a collaborative work published by a group show that 4-weeks of training using exercise bikes has not been able to significantly improve the FEV1, MVV, VC, TV and FVC factors in chemical veterans contaminated by mustard gas (Fallahmohamadi & Tari, 2009; Tari et al., 2009). Perhaps this finding can be attributed to the fact that in other studies that have shown exercise training has improved pulmonary function, the training period has been for 8 weeks (Yazdanpajoo et al., 2012) and continuing the exercise up to 8 weeks might have improved the pulmonary function of the veterans. One paper examined the effect of a special endurance training on over 70% spinal cord injured veterans, and the results showed that 8 weeks of

training can significantly improve the VC and FEV1 values (Gaeini et al., 2013). In general, it can be concluded that to have a meaningful effect, the administration of respiratory and endurance exercises (walking, running, and exercise bike) can improve the pulmonary function of chemical warfare victims. However, it seems necessary that endurance training using exercise bike shall continue regularly for more than 4 weeks. To further clarify the duration and intensity of exercises for the best efficacy of the exercises on the pulmonary function of chemical warfare victims more research is needed. Endurance exercises seem to improve the pulmonary function of veteran's with spinal cord injury.

The effect of training interventions on the quality of life and psychological factors

One study examined the effect of group exercise on the quality of life of the veterans (Mandani, Hosseini, Saadat Abadi, & Farahbod, 2015) and another study examined the effect of aerobic exercise on psychological factors in veterans with 25-75% of injury (Tofighi, Nozad, Babae, & Dastah, 2013). The results of the study by Mandani et al. showed that participation in a group exercise program for 12 weeks can improve the psychological scales and social performance, and the total score of the quality of life questionnaire in veterans diagnosed with of post-traumatic stress disorder (Mandani et al., 2015). The results of the study by Tofighi et al. showed that 12 weeks of running aerobic exercises with an intensity of 50-65% of maximum oxygen consumption can improve general health, mental health, anxiety, insomnia, social dysfunction and depression (Tofighi et al., 2013). In general, it can be concluded that participation in sports exercises can improve the physical and mental health of the veteran, and this effect can be achieved by participating in individual or group exercises. Of course, due to the small number of studies done in this area and considering the fact that the veterans are suffering from a wide range of injuries, further research in this regard is recommended.

The effect of exercise interventions on blood and cardiovascular factors

Three studies have been conducted to investigate the effect of exercise training on cardiovascular factors (Gaeini et al., 2013; Tofighi et al.,

2013; Yazdanpajooch et al., 2012). The results of the study by Yazdanpajooch et al. showed that 8 weeks of walking and jogging with the intensity of 45-65% of maximum heart rate cannot significantly alter the amount of red blood cells, white blood cells, platelets, and hematocrit in female victims of chemical weapons (Yazdanpajooch et al., 2012). Tofighi et al. showed that 12 weeks of aerobic exercise training can increase the serotonin levels significantly in 25-70% injured veterans (Tofighi et al., 2013). Gaeini et al. showed that 8 weeks of a special resistance aerobic exercise can significantly improve systolic blood pressure, diastolic blood pressure, fasting blood glucose, HDL-C and LDL-C (Gaeini et al., 2013). Although the population, the type of interventions, and the subjects in these studies have a lot of differences, it can be said that, in general, training exercises can improve cardiovascular risk factors in veterans. It should be kept in mind that, given the wide range of injuries and specific physiological needs of each group of veterans, further research is needed to determine effective protocols in this regard.

The effect of exercise interventions on balance

Two studies have examined the effect of exercise training on veterans' balance (Mohamadtaghi, Hejazi Dinan, & Shamsipour Dehkordi, 2016; Moradi, Behpoor, Ghaeni, & Shamsakohan, 2014). Moradi et al. showed that 8 weeks of balancing exercises in the pool could significantly improve the static balance of unilateral amputations (Moradi et al., 2014). In addition, Mohamadtaghi et al. showed that participating in a 4-week exercise program can significantly improve postural control, sustainability, and balance strategies in veterans and those with under-knee amputation (Mohamadtaghi et al., 2016). In general, it can be concluded that balance exercises have a positive effect on balance in amputated veterans. Given the importance of balance in preventing falls and subsequent damage, it seems that participating in balance exercises in water or in the outdoors can improve the dynamic and static balance in veterans and, therefore, participation in these programs can be offered to the veteran.

The effect of training exercises on fatigue

Two studies have been conducted to determine the level of fatigue (Ahmadi et al., 2016) or exercise tolerance (Tari et al., 2009) in veterans

after participating in sports programs. The results of the study of Ahmadi et al. showed that the 8 weeks of respiratory training in chemical victims with mustard gas agent could significantly reduce the fatigue score in these individuals (Ahmadi et al., 2016). Tari et al. also showed that participating in a 4-week exercise program with an exercise bike for the same veterans could significantly increase the level of exercise tolerance (Tari et al., 2009). In general, it can be concluded that participation in sports programs can increase the ability of veterans to withstand fatigue and be more physically active. Since inactivity is one of the problems that can cause many complications for veterans, it is possible to increase their fatigue threshold by prescribing sports exercises, and by encouraging them to participate in sports programs, inactivity complications could be cured or prevented.

The effect of training interventions on dyspnea

One study examined the effect of exercise with a training bike on the dyspnea level of chemical warfare victims contaminated with mustard gas. In this study, Tari et al. showed that 4 weeks of participation in the exercise program could improve the amount of dyspnea in these veterans (Tari et al., 2009). Since dyspnea is one of the major and annoying problems of chemical warfare veterans, this finding, that exercise can reduce the dyspnea in these people, is good news for them and the medical staff. However, it should be noted that adjusting the intensity of exercises to prevent exertional dyspnea during exercise in veterans is of great importance, and, thus determining an optimized sport protocol for this purpose needs wider research in different groups of veterans (contaminated with different gases).

DISCUSSION

The purpose of this study was to find studies that focused on sport interventions on the physical and mental health of injured veterans. Thus, the existing studies are classified based on the dependent variables of the research. In general, we can say that the results show that sport interventions can be effective in improving overall physical health, mental health, and veterans' quality of life. A few contradictions were found in the results of studies that could be due to: a) the duration of the training period. It seems that there may be less statistically significant effects in exercises for the duration of less than 8 weeks

(Fallahmohamadi & Tari, 2009; Tari et al., 2009); b) type of injuries may also affect the results; and (c) the small number of subjects undergoing research (Fallahmohamadi & Tari, 2009; Tari et al., 2009). The severity and type of exercises prescribed in this research are reported very different so that the type of exercises include respiratory exercises (Ahmadi et al., 2016; Ghehri-Sarabi et al., 2007), exercises with exercise bike (Fallahmohamadi & Tari, 2009; Tari et al., 2009), walking and jogging (Tofighi et al., 2013; Yazdanpajooch et al., 2012), specific aerobic resistance exercise, especially with the wheelchair (Gaeini et al., 2013), balance exercises in (Moradi et al., 2014) and out (Mohamadtaghi et al., 2016) of water, and group exercise programs (Mandani et al., 2015).

This study has gathered evidence that may be helpful in designing special training for veterans. In order to design such a special training, in addition to taking into account individual characteristics, one can use the following findings:

- Respiratory and endurance exercises (walking, running, and exercise biking) can improve the pulmonary function of chemical agent victims. Although it seems that endurance training with the exercise bike can have a meaningful effect, it is necessary that these exercises continue regularly for more than 4 weeks.
- Participating in sports exercises can improve the physical and mental health of veterans, and this effect can be achieved by participating in individual or group exercises. Of course, due to the small number of studies done in this area and considering that the victims are suffering from a wide range of injuries, further research is recommended in this regard.
- Exercise can improve cardiovascular factors in veterans. It should be kept in mind that, given the wide range of injuries and physiological needs of each group of veterans, further research is needed to determine effective protocols in this regard.
- Balance exercises have a positive effect on balance in amputated veterans. Given the importance of balance in preventing falls and subsequent damage, it seems that participating in balance exercises in or out of water can improve the dynamic and static balance in veterans, and, therefore, participation in these programs can be offered to the veterans.

- Participating in sports programs can increase the ability of veterans to withstand fatigue, and will allow them to spend more time on physical activity.

In general, the results of these studies indicated that sport interventions can be effective in maintaining and improving physical and mental health of veterans. Considering that present studies have examined the effect of a wide range of sport interventions in different and heterogeneous groups of veterans, it seems that more research is needed to determine the optimal protocols in different veteran groups. About three decades have passed since the end of the Iran-Iraq War, and most veterans have entered the age of adulthood and higher. Thus, exercise training needs and training protocols may require more general reviews for these people, and the data in all the studies may not be suitable for the design of exercise programs at the present. Therefore, further research in these areas is recommended.

In future studies, it is best to try to apply longer interventions with follow-up courses. It is better to conduct studies to determine the optimal intensity of exercise and optimal training time in these individuals. The limitation of this study was to review the works published in Farsi. It is suggested that another study reviews the results of studies conducted in the Iranian veterans' community and veterans in other countries. More studies may have been conducted in this field in Iran, the results of which are not published yet, so these sources have been outside the reach of the researcher.

CONCLUSIONS

In general, it can be said that the results of various studies have shown that participation in exercise programs can improve pulmonary function, quality of life, mental health, balance, and increased exercise tolerance of veterans. About three decades have passed since the end of the Iran-Iraq war, and given the possible effects of physiological and functional needs related to the age of the veterans, more research is strongly recommended to determine the optimal protocols in terms of intensity and duration of exercise and in different groups of veterans.

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