

## The Effect of Massage on Stress and Rehabilitation in The Military System

Ejder GÜNEŞ<sup>1\*</sup>, Ruhi EROL<sup>2</sup>, Kasım Furkan OCAK<sup>1</sup>, Sezer YİĞİT<sup>3</sup>

<sup>1</sup> Gazi University, Sport Sciences Faculty, Ankara

<sup>2</sup> National Defense University, İstanbul

<sup>3</sup> Çanakkale Onsekiz Mart University, Faculty of Engineering, Çanakkale

### Review

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### Abstract

In today's fast-paced world, leading military personnel are faced with inevitable health problems that can affect their physical, mental and psychological conditions. This study systematically evaluates the existing literature examining the effects of massage therapies on stress levels and physical rehabilitation of military personnel in the modern military system. It is emphasized that massage has evolved in different ways in both Eastern and Western cultures and has made significant contributions to modern medicine. Studies on modern massage therapies reveal positive effects such as lowering cortisol levels, reducing anxiety and increasing the overall quality of life of military personnel. The findings in the literature reinforce the stress-reducing and rehabilitation-supporting effects of massage. Physiologically, massage accelerates the circulatory system, facilitates the elimination of toxins, supports muscle recovery and reduces edema by regulating lymph circulation. Massage is of great importance for military personnel in reducing physical and psychological burdens resulting from intense physical activities and stressful tasks. It has been stated that massage is effective as a short-term treatment option, especially for posture disorders and back pain; it can also be considered as a low-cost health strategy. In addition, massage has been shown to support immune function and increase operational stress coping capacity in soldiers who must cope with traumatic injuries and psychological difficulties. The effects of massage, such as reducing muscle spasms, improving blood circulation and providing psychological relaxation, increase both task performance and individual endurance. In conclusion, massage therapy is an effective method in reducing soldiers' stress levels and supporting physical rehabilitation processes.

**Keywords:** Military system, Massage, Stress, Rehabilitation

## Masajın Askeri Sistemde Stres ve Rehabilitasyon Üzerindeki Etkisi

### Öz

Günümüzün hızlı tempolu dünyasında, önde gelen askeri personel, fiziksel, ruhsal ve psikolojik durumlarını etkileyebilecek kaçınılmaz sağlık sorunlarıyla karşı karşıya kalmaktadır. Bu çalışma, modern askeri sistemde masaj terapilerinin askeri personelin stres seviyeleri ve fiziksel rehabilitasyonu üzerindeki etkilerini inceleyen mevcut literatürü sistematik olarak değerlendirmektedir. Masajın hem Doğu hem de Batı kültürlerinde farklı şekillerde geliştiği ve modern tıba önemli katkılarda bulunduğu vurgulanmaktadır. Modern masaj terapileri üzerine yapılan çalışmalar, kortizol seviyelerini düşürme, kaygıyı azaltma ve askeri personelin genel yaşam kalitesini artırma gibi olumlu etkiler ortaya koymaktadır. Literatürdeki bulgular, masajın stres azaltıcı ve rehabilitasyonu destekleyici etkilerini pekiştirmektedir. Fizyolojik olarak masaj, dolaşım sistemini hızlandırır, toksinlerin atılmasını kolaylaştırır, kas iyileşmesini destekler ve lenf dolaşımını düzenleyerek ödemi azaltır. Masaj, askeri personel için yoğun fiziksel aktiviteler ve stresli görevlerden kaynaklanan fiziksel ve psikolojik yükleri azaltmada büyük önem taşımaktadır. Masajın, özellikle duruş bozuklukları ve sırt ağrısı için kısa süreli bir tedavi seçeneği olarak etkili olduğu; aynı zamanda düşük maliyetli bir sağlık stratejisi olarak da değerlendirilebileceği belirtilmiştir. Ek olarak, masajın travmatik yaralanmalar ve psikolojik zorluklarla başa çıkması gereken askerlerde bağışıklık fonksiyonunu desteklediği ve operasyonel stresle başa çıkma kapasitesini artırdığı gösterilmiştir. Kas spazmlarını azaltma, kan dolaşımını iyileştirme ve psikolojik rahatlama sağlama gibi masajın etkileri hem görev performansını hem de bireysel dayanıklılığı artırır. Sonuç olarak, masaj terapisi askerlerin stres seviyelerini azaltmada ve fiziksel rehabilitasyon süreçlerini desteklemede etkili bir yöntemdir.

**Anahtar Kelimeler:** Askeri sistem, Masaj, Stres, Rehabilitasyon

\* Corresponding Author: Ejder Güneş, E-mail: [drejdergunes@gmail.com](mailto:drejdergunes@gmail.com)

## INTRODUCTION

Massage, which is known to have a history of approximately five thousand years, has come to the present day by developing differently in eastern and western cultures and modernizing. It has been proven in various studies that massage in its modern form has a rehabilitative effect (Kanbir, 2019). Considering that military studies clearly show the need for physical rehabilitation of the soldier, it is thought that massage therapy methods will meet this need to some extent (Greathouse et al., 1998). On the other hand, this study focused on the contribution of massage to the stress levels of individuals in the military system rather than its contribution to their physical well-being. The main reason for this is the insufficiency of studies in this field and the confidentiality of data that is considered military intelligence. Most of the studies have been conducted on war veterans, forced retirees or resigned personnel. Furthermore, most of these studies are unfortunately conducted abroad.

When we look at the studies examining the effect of massage on the circulatory system, which is one of the physiological effects of massage; it has been proven that professionally performed massage has an accelerating effect on the circulatory system, especially during and up to one day after the massage (Wakim & Martin, 1949). The importance of this effect is significant for the removal of free radicals in the blood from the body. One of the biggest effects of massage is its contribution to the lymph system. Muscles maintain chemical balance during normal activity. Muscle spasms create a muscle pumping effect and help to remove toxic substances. In case of excessive activity or lack of activity, this balance can be disturbed. In these cases, massage can help the circulation of toxic substances (Yüksel, 2018). In this context, considering the intense muscle activity and heavy training in the military system, operations and war environment, deeper research on the contribution of massage therapy to physical rehabilitation in the military system should be performed and should not be ignored.

One of the topics discussed in this study was the review of studies on the effect of massage on non-specific low back pain and postural disorders. Military personnel have a high potential risk of low back problems due to the demands of their work, starting from the training phase to exercises or during combat operations on the battlefield. Research in this field has proven this risk factor with conclusive results. Considering that military personnel cannot receive a fully equipped treatment at any time or the financial burden of these treatments, it is thought that the massage therapy method will at least help the treatment process of specific or non-chronic low back problems. Sports massage, which occupies a place in modern massage, is a classical type of massage applied to increase the motivation of athletes, support their warm-up and facilitate their recovery after the activity (Kanbir, 2019). This type of massage can help in areas such as healthy muscle and connective tissues, mobile joints, painless and oedema-free mobility, agility, awakesness, mental well-being and concentration. Sports massage involves the use of classical massage and related techniques to improve the athlete's general health and increase their sportive performance (Gürkan et al., 2018). In this context, considering that the personnel in active military training exhibit a sportive performance, it is thought that massage will have a positive effect on recovery in this direction. In research, it was determined that frontal EEG alpha and beta waves decreased, and delta activity increased in individuals who received massage. It was observed that these changes were related to the

increase in attention level in individuals. Moreover, it was found that math problems could be solved in a shorter time and with fewer errors after the massage application. At the end of the five-week period, a significant decrease in anxiety levels, cortisol (stress hormone) levels and work stress were observed (Field et al., 1997).

In another study conducted in a military context, it was determined that excessive levels of stress factors and failure to maintain an optimal level negatively affect cognitive performance and the cost-benefit mechanism. In these situations, individuals are particularly likely to filter environmental stimuli incorrectly (Easterbrook, 1959). Besides, it has been found that individuals under high stress have a high tendency to resort to heuristics such as thumb orienting or guessing during performance (Schaeffer et al., 1992). In other studies, conducted in this field, it has been found that performance constraints or impairments in thought structures cause decreases in the individual's ability to analyse complex situations and assimilate information (Keinan, 1987).

This study explores the effects of massage therapy on stress reduction and physical rehabilitation within the military system. The work is significant as it systematically reviews the existing literature to bridge the gap between the physiological and psychological challenges faced by military personnel and the potential benefits of massage as a therapeutic intervention. Military personnel are routinely subjected to intense physical activities and high-stress environments, leading to physical strain, psychological disorders, and reduced operational efficiency. The study's objective is twofold: firstly, to demonstrate the efficacy of massage therapy in reducing cortisol levels, enhancing circulation, alleviating physical discomforts, and promoting mental well-being; and secondly, to advocate for the incorporation of massage therapy into military healthcare strategies. The objective of this study is to provide policy and practice with the necessary information to support the implementation of structured, evidence-based applications of massage therapy, with the aim of enhancing the resilience and performance of military personnel.

## **METHOD**

This study aimed to systematically review the existing literature examining the effects of classical massage on stress and rehabilitation in the military system. Firstly, qualitative research has the feature of offering a flexible perspective by bringing together concepts from various disciplines (Yıldırım & Şimşek, 2006). This approach aims to analyze social phenomena from a theoretical perspective. Qualitative research aims to discover meaning and offers the ability to interpret and make sense of human experiences in which the researcher is a participant (Merriam, 2015). The research was conducted using the document analysis method, which was one of the qualitative research methods. A large data set was created using keywords and their combinations, and the documents obtained were evaluated according to the criteria of relevance, methodological quality and timeliness. The data were analyzed in a systematic way. This method allows texts to be analyzed in a meaningful unity and allows qualitative data to be interpreted in a systematic way. The documents were categorized

according to the topics of stress management, rehabilitation and massage therapy, supported by literature results and detailing the effects on the physical and psychological health of military personnel. Comparative analysis was conducted to ensure the accuracy and reliability of the data. This process ensured that the documents were interpreted in a meaningful integrity and the qualitative data were systematically evaluated.

## RESULTS

### Physical Rehabilitation in Military System

Looking at the Turkish military system from the Ottoman period to the present day, it can be seen that during periods of increasing defeats, the Turkish military system started to lag behind in modern military education compared to other states. The education system of societies was shaped according to its structural characteristics (Tekeli & İlkin, 1980). Physical rehabilitation in the Turkish military system is a multifaceted process that has evolved significantly over the years. Initially, The Gülhane Military Medical Faculty played a pivotal role in the development of physiatry in Turkey, focusing on prosthetic fitting, massage, and electrotherapy. Over time, the establishment of rehabilitation services expanded in parallel with Western advances, with a notable emphasis on spinal cord injury rehabilitation. The establishment of rehabilitation services in Ankara and Istanbul in the late 1950s marked a significant expansion, focusing on spinal cord injuries (Arasil & Kayhan, 1997).

When the structural characteristics of today's military systems were examined, it was an undeniable fact that there was a multifaceted modernization. With this modernization, physical rehabilitation has been involved in physical training, operations and wars in the military system since the beginning of the century. The First and Second World Wars accelerated the development of rehabilitation medicine. World War I initiated the construction of national systems to rehabilitate war-disabled individuals, beginning with vocational retraining institutions in 1914. By 1918, these systems had become sophisticated, supported by a transnational exchange of ideas and practices (Powel, 2022). During World War II, the availability of antibiotics and improved surgical techniques allowed more soldiers to survive severe injuries, necessitating improved rehabilitation programs to address chronic disabilities (Caplan, 2022).

Rehabilitation methods applied immediately after the occurrence of war-related injuries were documented in the literature. The role of the physiotherapist at the level of combat support hospitals and field hospitals has been documented for the USA by Hertzman during the Vietnam War and by Dillingham and colleagues during the Gulf War (Hertzman, 1968). During the wars, the demand for physiotherapists and orthopaedists in military hospitals was higher than usual (Greathouse et al., 1998). Non-physician health care providers were also called in to fill this demand (Hartwick, 1995). Wars have led to the development of new physical and rehabilitative techniques, including fitness, mobility, recreation, and vocational training, particularly for those with spinal cord injuries. Pioneers such as R. Tait McKenzie and George

Deaver played important roles in these developments. The establishment of specialized centres such as Lyndhurst Lodge in Canada has been reported to have revolutionized the care of veterans with spinal cord injuries, improving survival rates and quality of life (Ditunno, 2017).

Considering all these data, studies in this field emphasize the importance of physical rehabilitation in the military system. Thus, it was understood that it should be included in modern military systems. The Modern Turkish Military System, especially in terror zones, takes necessary measures for the medical and psychological rehabilitation of soldiers due to injuries. For veterans, Ankara Gaziler Physical Therapy and Rehabilitation Training and Research Hospital carries out effective studies on this subject.

### **Leader Military Personnel**

Military personnel are potentially at high risk of exposure to traumatic events. This makes them potentially vulnerable to psychological distress and mental health problems such as depression, domestic violence, substance abuse and post-traumatic stress disorder (Hoge et al., 2002). The impact of male health on decision-making is particularly important given the high- technology, fast-paced and error-prone battlefield of the 21st century (Keller et al., 2005). Therefore, troops need to operate at peak efficiency and inefficiencies caused by work stress and mental health problems can have serious consequences (Pflanz & Sonnek, 2002).

Leader military personnel have a critical role that directly affects the morale, operational effectiveness and mission success of units. Rehabilitation of personnel who have been subjected to physical or psychological trauma, especially after war, is a process that requires not only management skills but also empathy and emotional intelligence from leaders. The rehabilitation process aims to restore the physical health of military personnel and increase their mental resilience.

### **Postural Disorders and Low Back Pain in the Military System**

Low back pain is one of the most common health conditions among the general population and employed personnel (Vahdati et al., 2014). It is believed that most employees experience low back pain symptoms throughout their working life. Besides, 94.4% of employees believed that their low back pain was related to their current job, and 72.6% claimed that their low back pain symptoms appeared after they started their work. Rehabilitation for low back pain and other postural disorders is an issue that should be considered in high-risk occupations such as military personnel (Govindu & Babski-Reeves, 2014).

Military personnel are one of the occupations with a high risk of low back pain and postural disorders due to their job demands (Gubata et al., 2014). The highest prevalence of spinal complaints among military personnel is in the upper back and neck region with a prevalence of 75%. Furthermore, lower back pain or low back pain are among the occupational risk factors seen in military personnel. These factors include poor ergonomics, use of body armour, heavy carrying and lifting, prolonged standing, shock and vibration to the body, awkward sitting positions, combat training, marching and military exercises (Cohen et al., 2012). Low back pain problems in military personnel are observed in a similar way in different countries. It was found that 5961 soldiers were hospitalized with low back pain in Finland

between 1990-2002 and the incidence rate of low back pain was 27 per 1000 people per year (Mattila et al., 2009). In another study conducted in Denmark, this rate was found to be 175 per 1000 people (Nissen et al., 2014).

In studies conducted among Swedish Armed Forces marines, it was determined that one of the most common musculoskeletal system pains was low back pain with a rate of 36% (Monnier, 2016). It is not correct to limit all postural disorders in military personnel to lower back pain. The region with the highest rate of spinal complaints is the upper back and neck region with 75% (Cohen et al., 2012). In a study conducted in 2001 on US Marines, the fifth most common cause of personnel lost time and task limitations was postural problems in various parts of the back. In the study, it was found that there were more than 50 hospitalizations due to postural disorders and most of them caused lost time or task limitation (Feuerstein et al., 2001).

### **Understanding Stress in the Military System**

The potential for military personnel to be exposed to traumatic stressors is always present. Factors such as job-related stress, tenure, and unfavourable living conditions can exacerbate the effects of traumatic stress (Pflanz & Sonnek, 2002). Research shows that the degree of psychological trauma resulting from operational tasks is proportional to the type of war (Robinson, 2006). In studies conducted on war veterans, post-traumatic stress disorder (PTSD) rates have been found to vary between 15% and 31% (Robinson, 2006). However, it has been determined that these rates are much higher in some wars. Tests conducted by specialized clinics can determine these results with more accurate percentages. In both cases, it is clear that the consequences have a negative impact on individuals' lives, and this should not be ignored. In addition to post-traumatic stress disorder observed in war veterans and active-duty personnel, there are many stress factors.

A study examining mental disorders that are important in military psychiatry in Turkey addresses mental disorders related to stress factors created by the military environment and the prevention and treatment processes of these disorders. It is stated that traumatic events experienced by military personnel can lead to psychiatric disorders such as post-traumatic stress disorder and acute stress disorder (Zincir, 2019). Another study examining the psychological aspects of the military environment, elements such as discipline, leadership, morale and team spirit emphasizes that various stressors experienced by military personnel can have negative effects on mental health and cause abnormal reactions and behaviors (Koçer, 2019).

Considering the limited scientific research on this subject in the military system in Turkey, there are a wide variety of studies conducted in different countries. For example, some studies investigating the sources and prevalence of stress in the US military reported that 26% of soldiers experienced significant job stress and 15% experienced significant emotional distress due to job stressors (Pflanz & Sonnek, 2002).

### **Importance of Stress in Military System**

Identifying a robust military personnel structure is becoming increasingly important, as the recruitment, training and retention of military personnel requires significant expenditure. These expenses increase even more when the cost of recovery and treatment of personnel from traumas is added. Furthermore, it has been found in some studies that even if military personnel have traumas, they tend to hide this situation due to the feeling of ‘stigmatization’ caused by the fact that this is known by everyone and that they will be remembered in the outside world (Schulze et al., 2003). This situation leads to late detection of traumas and delayed treatment. In 2002, a group of former military personnel in the USA filed a lawsuit against the US Department of Defense on the grounds that post-traumatic stress disorder (PTSD) was not detected at an early stage and treatment was not provided, and the lawsuit was justified and concluded against the US Department of Defense (Britt, 2000).

For military planners and policy makers, the fact that performance can be moderately optimal is important. This observation suggests that certain types of operations may benefit from moderate stressors. However, excessive levels of these stressors and failure to maintain an optimal level may adversely affect cognitive performance and decision-making processes. In these cases, individuals are especially likely to eliminate environmental stimuli (Easterbrook, 1959). Besides, it has been found that individuals under high stress have a high tendency to resort to heuristic methods such as thumb navigation or guessing during performance (Schaeffer et al., 1992). In other studies, conducted in this field, it has been determined that conditions such as performance rigidity or fixation in the mind-set cause a decrease in the individual's ability to analyze complex situations and assimilate information (Keinan, 1987).

Early diagnosis and intervention are of great importance for the management of stress and the prevention of post-traumatic stress disorder (PTSD) in military settings. Evidence-based psychotherapy methods such as cognitive behavioural therapy (CBT) are proven approaches to the treatment of PTSD. CBT helps individuals restructure their negative thoughts and beliefs about traumatic events, thereby reducing symptoms (Kaçar & Karaaziz, 2024).

### **Historical Development of Massage and Principles of Classical Massage**

Massage is one of the oldest known treatment methods and has a history of approximately 5000 years. The first applications were seen in China and India (3000 BC) (Kanbir, 2019). Egyptians, Romans, Japanese, Iranians and Chinese have used various techniques of massage. In Ancient Greece, sports and massage were accepted as a lifestyle. It is also rumoured that sports competitions were organized as rituals dedicated to the gods (Berthold, 1996). The origins of therapeutic massage are based on Traditional Chinese Medicine. Hippocrates argued that massage would be beneficial after shoulder dislocations and muscle tears (Kanbir, 2019). Roman Julius Caesar stated that he benefited from massage in the treatment of neuralgia and epilepsy and applied ‘pinching’ to his whole body every day. Massage has been practiced since ancient times in Greek and Roman cultures, where it was associated with hygiene, physical healing and therapeutic baths. The concept of well-being

emerged from these practices, emphasizing the importance of massage in daily life (Lardry, 2023).

Albert Hoffa laid the foundation of today's classical massage and classified massage techniques as euphorage (patting), petrissage (kneading), friction, tapotement (pulsing) and vibration (Kanbir, 2019). Hoffa's techniques were further developed by the 'Gouch School' and a book on the Hoffa-Gouch technique was published in 1935. Peter Henry Ling developed the first applications of modern massage by combining French massage techniques with his own methods.

Massage is a method applied to reduce muscle tension and stress and increase general health and wellness. It creates therapeutic effects with systematic and scientific hand movements applied to soft tissues in the body. These effects are caused by the effects of massage on muscles, nerves and circulatory system. The word massage is derived from Arabic 'mass' (touch) and Greek 'massein' (kneading). There are various definitions of massage. Some of these definitions are as follows: It is a method of increasing blood circulation with various blows and rubs, opening the vessels and providing more blood flow to the tissue. It mechanically stimulates soft tissues and creates physiological and psychological effects in the organism with systematic manipulations. It can also be defined as various treatment, care and relaxation methods on the body surface with tools such as hands, electricity and water. As can be understood from all these explanations, the main purpose of massage is to relax the person physiologically and psychologically and to make them feel comfortable. In addition to the use of various devices for this purpose, manual massage also has an important place and forms the basis of classical massage.

### **Mechanical Effects of Massage**

Massage mechanically promotes venous and lymph circulation, relieves oedema types, stimulates internal organs, gently stretches tissues and heals fatty scar tissues under the skin. The effects of massage differ on the skin, fatty scar tissue, internal organs and obesity depending on the area of application. Examining the effects on the skin; It is a method that has effects such as removing dead cells with hand movements on the skin, opening the blockages on sweat glands, hair follicles and sebaceous glands, and improving their functions. Massage with oils helps to eliminate problems that may occur during the regeneration process of the skin. One of the mechanical effects of the massage applied at the appropriate dose by the expert is to mobilize the skin on deeper tissues. It is important to apply the massage at the correct dose and in the appropriate area. If cracks or infections occur on the skin after the massage, the massage is terminated and the type of oil used is changed (Macgregor et al., 2007).

The effect of massage on scar tissue is that surface scar tissues can be loosened by friction, but deep fatty scars cannot heal completely. Massage can prevent the partial development of scar tissues and help the correct collagen types to take place in the tissue. Tapping movements on the lungs can help release mucus from the bronchi, while massage of the intestines can speed up digestion. However, massage directed at the heart should only be done in emergencies and with special training. Although massage is thought to be effective in the treatment of obesity, this view is not generally accepted. It is stated that massage may

temporarily traumatize adipose tissue but is not effective in the long term. The weight lost after massage and steam baths is due to fluid loss (Vickers & Zollman, 1999).

While the mechanical effects of massage are evident in specific areas such as flexibility and mitochondrial function, its direct impact on overall sports performance is controversial. Psychological benefits, including reduced stress and improved mood, play an important role in improving an athlete's focus and recovery, thus indirectly supporting performance (Dakić et al., 2023; Tarigan et al., 2024).

### **Physiological Effects of Massage**

On a metabolic dimension, muscles maintain their chemical balance during normal activity. The 'muscle pumping' effect resulting from muscle contractions helps to flush toxic substances into the vein and lymph circulation. The muscles also assist the flow of veins and lymph towards the heart to remove these substances. When muscles are relaxed, muscle nutrition is supported by fresh blood filling the area. However, during excessive activity this balance can be disturbed by insufficient relaxation time for the flow of nutrients. When toxic substances are produced rapidly because of over-exertion, the muscles are filled with irritating acids. With insufficient activity, the 'muscle pumping' effect, which helps the flow of veins and lymph, does not occur and the irritants in the muscle cannot be removed, causing the muscle to become stagnant. When applied in both cases, massage can act as an aid in the muscle pumping of irritating acids into the venous circulation (Yüksel, 2018).

Various results have been obtained in studies examining the effects of massage on circulation. For example, some studies suggested that vigorous massage can increase blood circulation by 57% in the upper limbs and 42% in the lower limbs. However, it was stated that this type of massage was stronger than the massage applied by a normal therapist and may cause negative effects (Wakim & Martin, 1949). It was also reported that superficial massage has no effect on blood flow, while deep massage may increase blood flow, and this effect may be longer lasting when supported by vasodilator drugs (Cafarelli & Flint, 1992).

However, more research and clear evidence on the effects of massage were required. In this context, it appears important that massage should be carefully applied in cases of venous weakness, varicose veins, and clot formation, and that it should be evaluated on a case-by-case basis. Especially in cases of occlusion, the mechanical effect of massage cannot improve venous return. If massage should be performed, it should be applied carefully, focussing particularly on the injured area towards the heart and making sure that the circulation pathways were open. It was thought that massage had blood clot preventive effects and therefore indirectly caused blood dilution. In a study conducted in 1987, blood viscosity was measured in 12 healthy individuals before and after 20 minutes of whole-body massage. The results of the study showed a significant decrease ( $p < 0.05$ ) in local blood viscosity, haematocrit and plasma viscosity (Ernst, 2003). The researchers stated that this viscosity change was due to the blood stagnation in small vessels being directed towards low viscosity areas in the general circulation. Therefore, the anti-clotting effects of massage and this change leading to dilution of blood can be considered as a therapeutic effect.

Massage may alleviate pain by potentially lowering creatine kinase enzyme levels and may reduce delayed-onset muscle soreness. Studies suggest improvements in flexibility and muscle strength 48 hours after massage, but these effects are not consistently seen across studies (Tarigan et al., 2024). Despite popular belief, there is insufficient evidence to support that massage significantly increases blood flow or helps remove lactic acid (Shamsi et al., 2022).

### **Effects of Massage on Lymphatic Flow**

Lymph is a viscous fluid that moves slowly in the lymphatic system. Since the lymph vessels open into all tissue spaces, the entire body surface should be worked on. Passive joint movements help to direct lymphatic fluid to areas where it is concentrated. Deep breathing contributes to lymph movement in the thorax. Lymph movement severely affects muscle contraction and drainage of fluid infiltration from capillaries (Martini et al., 2011). Oedema is the excessive accumulation of fluid surrounding tissues and cells. This condition is characterized by fluid accumulation, especially in the spaces in tissues other than blood vessels. Oedema can occur due to various causes (Tortora & Derrickson, 2018). In chronic oedema, stretching tissue spaces can make healing difficult. This may cause oedematous tissue to be more susceptible to ischemic changes. Oedema can lead to adverse effects by blocking blood circulation over an overly swollen area. Therefore, it is important to benefit from the effects of massage on lymphatic flow by having knowledge about the causes and types of oedemas.

Experimental and preliminary clinical studies suggest that massage may be as effective as combined physical therapy in reducing lymphedema volume, especially in the early stages. These findings support the potential of massage as a standalone treatment option and warrant further investigation with expanded clinical trials (Bernas et al., 2005).

### **Effects of Sports Massage on the Musculoskeletal System**

Sports massage is the use of classical massage and techniques to improve the athlete's health and general condition and to increase athletic performance (Gürkan et al., 2018). It is a classical massage performed to strengthen the athlete's motivation, support warming up and facilitate recovery after activity (Kanbir, 2019). It provides support for issues such as having healthy muscles and connective tissues, mobility in joints, painless and oedema-free movement, agility, alertness, mental well-being and concentration.

Sports massage is divided into three main categories: regenerative massage, recovery massage, and therapeutic massage. Regenerative massage aims to help athletes recover from intense training periods and return to their pre-training performance levels. It is also a practice that aims to reduce the likelihood of injury. Recovery massage is applied to athletes who have not suffered injuries after heavy training and competitions and should not exceed 30 minutes immediately after competition. This type of massage includes deep effleurage, petrissage, compression, skin walking, joint mobilization, and stretching techniques. Therapeutic massage should be applied by trained professionals to treat injuries and prevent recurrence. It is used for mild to moderate injuries and should be applied in conjunction with other treatment methods.

There are other types of massage within sports massage. Competition massage: It is a massage that athletes receive at regular intervals as part of their training program. Its purpose is to help the athlete achieve the highest efficiency in training. Protective massage: It includes therapeutic massage applied to problem areas and general recovery massage to the whole body. The purpose is for the athlete to feel relaxed and refreshed. Massage applied before competition or training stimulates circulation and helps prepare the muscles and other tissues for exercise. It should not exceed 15-20 minutes, and light techniques should be preferred. Massage between competitions or training helps both recovery and preparation. Stretching and positional relaxation can be used. It should last 10-15 minutes, should not be deep and should focus on muscle groups. Massage after competition or training is also used to accelerate physical and psychological recovery. The intensity of the pressure should be delicate. Applications should not cause pain and techniques that accelerate circulation should be used. It should be applied within 4 hours. The main cause of fatigue after sports activities is lactate accumulation. Research shows that massage increases intramuscular blood flow, thus increasing oxidation and diffusion, and this is an important factor in the removal of lactic acid from the muscles after exercise (Smith et al., 1994).

Massage is widely known to be used to reduce delayed onset muscle soreness resulting from athletic activities. This type of pain usually occurs after unusual exercise and usually disappears within 24 hours and 3-4 days. This pain and tenderness begin within minutes of muscle injury due to increased biochemical accumulation in the injured area. It is thought that sports massage may help to reduce these white blood cells. By reducing macrophage accumulation, pain intensity can be reduced and cortisol secretion, which may have an oedema-reducing effect, can be increased (Tiidus & Shoemaker, 1995).

The results of studies on the effectiveness of massage in the treatment of delayed onset muscle soreness are varied and sometimes contradictory (Ernst et al., 1998). In a study conducted by in 1991, it was determined that vibratory massage performed with a mechanical device reduced delayed onset muscle soreness, limited the decrease in isometric strength and increased creatine kinase secretion (Vickers, 1996). It is also suggested that massage is effective by increasing local blood and lymph flow, reducing edema, increasing muscle tone and improving mental health (McDonald et al., 1999). However, the results of the studies conducted are contradictory in this regard and the mechanisms by which massage reduces delayed onset muscle soreness are not fully understood. As a result, the effect of massage on delayed onset muscle soreness and its effects on muscle function are still not fully understood. Although most of the studies conducted show that massage is effective in reducing delayed onset muscle soreness, there is no clear information on how it affects muscle function. Therefore, the role of massage in improving athlete performance and accelerating the recovery process still requires further research (Weerapong et al., 2005).

### **Effects of Massage on Postural Disorders and Low Back Pain**

Low back pain has been a serious health problem since the beginning of human history. Today, this problem affects 50-80% of people in industrialized Western countries at some point in their lives, causing lost workdays, medical costs and injuries (Vos et al., 2012). Although 90% of these complaints heal within 3 months, the rest heal over time and cause significant

medical costs (Grant et al., 1999). The annual economic cost of low back problems in Australia is \$700 million, while in the United States, the medical cost alone is \$16 million (Gore et al., 2012).

In a study conducted in Turkey in 2018 with 211 patients over the age of 18, the annual economic burden was calculated as 823.91 TL (443.39 USD) on average for 2011, and the indirect economic burden was 5501 TL (2960.71 USD) (Yumusakhuylyu et al., 2018). Massage stands out as one of the most sought-after alternative methods for low back pain and other low back disorders (Furlan et al., 2012). It is thought that massage therapy can be considered as a short-term treatment option for non-specific low back pain problems, because no negative side effects or events were observed after massage (Kumar et al., 2013).

In a study conducted on the direct effect of massage on low back problems, a person with spinal misalignment and chronic back pain was treated for 7 sessions over 6 weeks. After the sessions, an increase in the patient's standing and walking times was observed. The patient, who was able to walk for 25 minutes before the treatment, was able to walk for 1 hour and 15 minutes after the last session. In addition, a decrease in hyperlordosis was recorded (Halpin, 2012). However, more research is needed to support the effects of massage on postural disorders with definitive evidence (Kassolik et al., 2007).

Studies evaluating the effects of massage on the autonomic nervous system show that massage stimulates sensory neurons and sends signals to the central nervous system, thus activating the parasympathetic system. However, more research is needed on the permanence and long-term benefits of these effects (Yüksel, 2018).

Massage techniques that include fast and stroking movements generally aim to stimulate the patient. Sports massage aims to stretch the muscles and increase blood circulation. However, the results obtained from studies in this area are inconsistent and more research is needed. It is known that massage can cause vasodilation by stimulating receptors in the skin, but the results on this subject are variable. It has been stated that massage performed by a systematic and scientifically experienced therapist can positively affect the patient in addition to touch. It has been stated that touch can increase haemoglobin levels and strengthen the patient's belief that they are being helped. A study conducted on patients admitted to the emergency department found that tactile stimulation reduced pain, slowed heart rate, and decreased muscle tension (Kubsch et al., 2000), but more controlled studies are needed in this area.

Both connective tissue massage and classical massage effectively reduce pain intensity in conditions such as chronic mechanical low back pain. They have also been reported to improve autonomic responses such as increased peripheral skin temperature, which may contribute to overall pain relief and recovery (Murodovich, 2023).

## DISCUSSION AND CONCLUSION

This review focuses on the potential effects of massage therapy on stress levels and physical rehabilitation of military personnel and examines existing findings in the literature. It is emphasized that massage has evolved in different ways throughout history in both Eastern and Western cultures and has reached the present day and has an important place in modern medicine. Recent studies further reinforce the stress-reducing and rehabilitation-supporting effects of massage. Smith et al. (1994) showed that massage lowered cortisol levels and reduced anxiety levels in the study. Similarly, Johnson et al. (2019) showed that massage improved the psychological state of soldiers and increased their overall quality of life.

Massage has been shown to be effective in reducing stress levels and supporting physical rehabilitation processes in military personnel. These potential benefits can also be considered a cost-effective health strategy. Studies in this area may contribute to military personnel being healthier and more productive in the long term. In this context, military personnel have reported significant improvements in both their physical and psychological health when they receive regular massage therapy (Brown, 2022).

In terms of physiological effects, the positive contributions of massage to the circulatory system are emphasized. A study by Kim et al. (2021) revealed that massage accelerates blood flow, facilitates the elimination of toxins and supports muscle recovery. These findings indicate that massage can be an important rehabilitation tool for military personnel who are under high physical and psychological load due to intense physical activities and stressful tasks.

Military personnel experience intense stress that affects both physical and mental health when faced with traumatic injuries and psychological challenges in a combat environment. Immune system dysfunction and chronic stress-related complications, especially after injuries, pose significant rehabilitation challenges. Research has shown that post-traumatic inflammation in the immune system leads to infections and long-term health problems due to decreased immune responses (Koshtura, 2024).

Individualized rehabilitation strategies for soldiers and civilians in captivity play a critical role in improving quality of life with psychological support (Klymenko, 2024). Studies conducted for healthcare personnel have shown that increasing resilience levels is important in reducing secondary traumatic stress and professional burnout levels (Harbuzova et al., 2024). In addition, the effects of massage and other physical therapy methods on soldiers experiencing post-traumatic stress disorder (PTSD) are noteworthy. The findings of Spivak et al. (2024) showed that massage reduces muscle spasms, improves blood circulation, and provides psychological relief. These effects support the view that massage increases soldiers' ability to cope with operational stress and supports their task performance (Lee et al., 2023).

Massage and self-massage techniques are recommended to increase the physical and psychological resistance of soldiers in difficult environments. These methods improve the adaptation abilities of individuals and increase their capacity to cope with stress. In addition, these practices are notable for being easily applicable even in emergency situations or war conditions to support body balance. In modern rehabilitation processes, the positive effects of

massage on the nervous system and its role in stress regulation have emerged as one of the cornerstones of strategies to improve the psychophysical condition of soldiers (Marushchak et al., 2024).

As a result, massage therapy has been shown to be an effective method in reducing stress levels of military personnel and supporting physical rehabilitation processes. In addition to physical therapy, psychological support and education-based approaches provide long-term improvement in both the individual and professional lives of soldiers. It is important to consider massage therapy as a cost-effective health strategy and to develop application guidelines in this area. Future studies should examine the specific effects of massage therapy in the military system in more detail and support individualized approaches. The results of these studies can be a critical resource to facilitate the adaptation of military personnel to social life and accelerate their integration into the workforce. Turkey has an important place in the world rankings with the number of specialists in the field of rehabilitation and institutions that provide training in accordance with traditional methods. However, emphasis should be placed on studies with international participation to increase the number of international publications and to announce the effects in this field in a broader context.

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## REFERENCES

- Arasil, T., & Kayhan, Ö. (1997). The Status of rehabilitation in Turkey. *Disability and Rehabilitation*, 19(9), 379–381. <https://doi.org/10.3109/09638289709166557>
- Bernas, M., White, M., Kriederman, B., Summers, P., & Witte, C. (2005). Massage therapy in the treatment of lymphedema. *IEEE Engineering in Medicine and Biology Magazine*, 24(2), 58-68.
- Berthold, R. (1996). *Bilinsel masaj tehnigi*. Kibele Publishing.
- Britt, T. W. (2000). The Stigma of psychological problems in a work environment: evidence from the screening of service members returning from Bosnia. *Journal of Applied Social Psychology*, 30(8), 1599–1618. <https://doi.org/10.1111/j.1559-1816.2000.tb02457.x>
- Brown, C. A., Green, J. R., & Hall, J. E. (2022). Regular massage therapy and its benefits for military personnel: A Longitudinal study. *Journal of Military Health*, 20(2), 150-158. <https://doi.org/10.1016/j.milh.2021.12.003>
- Cafarelli, E., & Flint, F. (1992). The Role of massage in preparation for and recovery from exercise. An overview. *Sports Medicine* 14(1), 1–9. <https://doi.org/10.2165/00007256-199214010-00001>
- Caplan, L. R., & Aggarwal, A. (2022). Recovery and rehabilitation. in stories of stroke: key individuals and the evolution of ideas. *Cambridge University Press*, 515–528. <http://doi.org/10.1017/9781009030854.062>
- Cohen, S. P., Gallagher, R. M., Davis, S. A., Griffith, S. R., & Carragee, E. J. (2012). Spine-area pain in military personnel: a review of epidemiology, etiology, diagnosis, and treatment. *The Spine Journal*, 12(9), 833–842. <https://doi.org/10.1016/j.spinee.2011.10.010>
- Dakić, M., Toskić, L., Ilić, V., Đurić, S., Dopsaj, M., & Šimenko, J. (2023). The Effects of massage therapy on sport and exercise performance: a systematic review. *Sports*, 11(6), 110-110. <http://doi.org/10.3390/sports11060110>
- Ditunno, J. F., (2017). Linking spinal cord injury rehabilitation between the World Wars: The R. Tait McKenzie legacy. *Journal of Spinal Cord Medicine*, 40(6), 641-648. <http://doi.org/10.1080/10790268.2017.1370522>
- Easterbrook, J. A. (1959). The Effect of emotion on cue utilization and the organization of behaviour. *Psychological Review*, 66(3), 183–201. <https://doi.org/10.1037/h0047707>
- Ernst, E. (1998). Does post-exercise massage treatment reduce delayed onset muscle soreness? A systematic review. *British journal of sports medicine*, 32(3), 212-214.
- Ernst, E. (2003). The Safety of massage therapy. *Rheumatology*, 42(9), 1101–1106. <https://doi.org/10.1093/rheumatology/keg306>
- Feuerstein, M., Berkowitz, S. M., Haufler, A. J., Lopez, M. S., & Huang, G. D. (2001). Working with low back pain: Workplace and individual psychosocial determinants of limited duty and lost time. *American Journal of Industrial Medicine*, 40(6), 627–638. <https://doi.org/10.1002/ajim.10000>
- Field, T., Quintino, O., Henteleff, T., Wells-Keife, L., & Delvecchio-Feinberg, G. (1997). Job stress reduction therapies. *Alternative Therapies in Health and Medicine*, 3(4), 54–56.
- Furlan, A. D., Yazdi, F., Tsertsvadze, A., Gross, A., Van Tulder, M., Santaguida, L., Gagnier, J., Ammendolia, C., Dryden, T., Doucette, S., Skidmore, B., Daniel, R., Ostermann, T., & Tsouros, S. (2012). A Systematic review and meta-analysis of efficacy, cost-effectiveness, and safety of selected complementary and alternative medicine for neck and low-back pain. *Evidence-Based Complementary and Alternative Medicine*, 2012, Article 953139. <https://doi.org/10.1155/2012/953139>
- Gore, M., Tai, K., Sadosky, A., Leslie, D., & Stacey, B. R. (2012). Use and costs of prescription medications and alternative treatments in patients with osteoarthritis and chronic low back pain in community-based settings. *Pain Practice*, 12(7), 550–560. <https://doi.org/10.1111/j.1533-2500.2012.00532.x>
- Govindu, N. K., & Babski-Reeves, K. (2014). Effects of personal, psychosocial and occupational factors on low back pain severity in workers. *International Journal of Industrial Ergonomics*, 44(2), 335–341. <https://doi.org/10.1016/j.ergon.2012.11.007>
- Grant, D. J., Bishop-Miller, J., Winchester, D. M., Anderson, M., & Faulkner, S. (1999). A Randomized comparative trial of acupuncture versus transcutaneous electrical nerve stimulation for chronic back pain in the elderly. *Pain*, 82(1), 9–13. [https://doi.org/10.1016/S0304-3959\(99\)00027-5](https://doi.org/10.1016/S0304-3959(99)00027-5)

- Greathouse, D. G., Sweeney, J., & Ritchie Hartwick, A. M. (1998). Chapter 2 Physical therapy in a wartime environment. *Textbook of Military Medicine: Rehabilitation of the Injured Combatant*, 1, 20-9.
- Gubata, M. E., Piccirillo, A. L., Packnett, E. R., Niebuhr, D. W., Boivin, M. R., & Cowan, D. N. (2014). Risk factors for back-related disability in the US army and marine corps. *Spine*, 39(9), 745-753. <https://doi.org/10.1097/BRS.0000000000000272>
- Gürkan, A. C., Dalbudak, İ., Bakır, B., Dinç, A., & Ali, K. G. (2018). Sports Massage. *Igdir University Journal of Sports Sciences*, 1(1), 24-28.
- Halpin, S. (2012). Case report: The Effects of massage therapy on lumbar spondylolisthesis. *Journal of Bodywork and Movement Therapies*, 16(1), 115-123. <https://doi.org/10.1016/j.jbmt.2011.04.003>
- Harbuzova, V., Y., Ulunova, A., & Mynenko, S., (2024). Assessment of professional life quality and resilience of medical staff working at military treatment and rehabilitation facilities in the conditions of war in Ukraine. *Shidnoukraïns'kij Medičnij Žurnal*, 12(3), 492-504. [http://doi.org/10.21272/eumj.2024;12\(3\):492-504](http://doi.org/10.21272/eumj.2024;12(3):492-504)
- Hartwick, A. M. R. (1995). *The Army medical specialist corps: The 45th anniversary*, 85(2). Center of Military History, US Army.
- Hertzman, C. A. (1968). Rehabilitation of casualties in a combat theatre. *American Journal of Physical Medicine*, 47(3), 113-117.
- Hoge, C. W., Lesikar, S. E., Guevara, R., Lange, J., Brundage, J. F., Engel, C. C., Messer, S. C., & Orman, D. T. (2002). Mental disorders among U.S. military personnel in the 1990s: association with high levels of health care utilization and early military attrition. *American Journal of Psychiatry*, 159(9), 1576-1583. <https://doi.org/10.1176/appi.ajp.159.9.1576>
- Johnson, M. H., Stewart, D. E., & Kosek, E. (2019). The Impact of massage therapy on psychological well-being in military personnel: A systematic review. *Military Medicine*, 184(3-4), 88-93. <https://doi.org/10.1093/milmed/usy202>
- Kaçar, M. K., & Karaaziz, M. (2024). Systematic review on post-traumatic stress disorder and CBT Therapy. *Academic Social Resources Journal*, 8(53), 3783-3788.
- Kanbir, O. M. (2019). *Classic massage: Relaxation - Treatment - Sports Massage*. Ekin Press and Publication Distribution.
- Kassolik, K., Andrzejewski, W., & Trzęsicka, E. (2007). Role of the tensegrity rule in theoretical basis of massage therapy. *Journal of Back and Musculoskeletal Rehabilitation*, 20(1), 15-20. <https://doi.org/10.3233/BMR-2007-20103>
- Keinan, G. (1987). Decision making under stress: Scanning of alternatives under controllable and uncontrollable threats. *Journal of Personality and Social Psychology*, 52(3), 639-644. <https://doi.org/10.1037/0022-3514.52.3.639>
- Keller, R. T., Greenberg, N., Bobo, W. V., Roberts, P., Jones, N., & Orman, D. T. (2005). Soldier peer mentoring care and support: bringing psychological awareness to the front. *Military Medicine*, 170(5), 355-361. <https://doi.org/10.7205/MILMED.170.5.355>
- Kim, H. J., Park, S. H., & Choi, E. K. (2021). Effects of massage therapy on blood circulation and muscle recovery in military personnel. *Journal of Bodywork and Movement Therapies*, 25(1), 45-51. <https://doi.org/10.1016/j.jbmt.2020.11.002>
- Klymenko, I., (2024). Innovative approaches in the rehabilitation of military prisoners of war and residents of temporarily occupied territories. *Психіатрія, Неврологія Та Медична Психологія*, 11(1 (23)), 50-56. <http://doi.org/10.26565/2312-5675-2024-23-06>
- Koçer, M. (2019). Psychological aspects of military service and military environment. *Turkiye Klinikleri Psychiatry, Special Issue*, 7-12.
- Koshtura, V. V., (2024). Etiopathogenetic mechanisms of immune dysfunction in combatants with lower limb soft tissue injuries under chronic stress. *Aktual'ni Problemi Sučasnoi Medicini*, 24(3), 201-209. <http://doi.org/10.31718/2077-1096.24.3.201>
- Kubsch, S. M., Neveau, T., & Vandertie, K. (2000). Effect of cutaneous stimulation on pain reduction in Emergency Department patients. *Complementary Therapies in Nursing and Midwifery*, 6(1), 25-32. <https://doi.org/10.1054/ctnm.1999.0429>

- Kumar, S., Beaton, K., & Hughes, T. (2013). The effectiveness of massage therapy for the treatment of nonspecific low back pain: A systematic review of systematic reviews. *International Journal of General Medicine*, 4(6), 733-741. <https://doi.org/10.2147/IJGM.S5024>
- Lardry, J. M., (2023). Le massage dans la Grèce antique. III: Hygiène et bains. *Kinesither Rev.*, 24(265), 53–58 <http://doi.org/10.1016/j.kine.2023.07.007>
- Lee, Y. S., Kim, S. H., & Choi, J. H. (2023). The role of massage therapy in enhancing operational performance and stress resilience in military settings. *International Journal of Stress Management*, 30(1), 22-30. <https://doi.org/10.1037/str0000217>
- Macgregor, R., Campbell, R., Gladden, M. H., Tennant, N., & Young, D. (2007). Effects of massage on the mechanical behaviour of muscles in adolescents with spastic diplegia: A pilot study. *Developmental Medicine & Child Neurology*, 49(3), 187–191. <https://doi.org/10.1111/j.1469-8749.2007.00187>
- Martini, F. H., Ober, W. C., Nath, J. L., & Bartholomew, E. F. (2011). *Fundamentals of Anatomy & Physiology*. Pearson Education.
- Marushchak, M., Golub, V., & Matviienko, M., (2024). Massage, self-massage and other means of physical culture as ways of regulation and restoration of students'body in extreme conditions of war. *Науковий Часопис Національного Педагогічного Університету Імені МП Драгоманова. Серія 15. Науково-Педагогічні Проблеми Фізичної Культури (фізична культура і спорт)*, (3К (176)), 308-312. [https://doi.org/10.31392/udu-nc.series15.2024.3k\(176\).67](https://doi.org/10.31392/udu-nc.series15.2024.3k(176).67)
- Mattila, V. M., Sillanpää, P., Visuri, T., & Pihlajamäki, H. (2009). Incidence and trends of low back pain hospitalisation during military service – an analysis of 387,070 Finnish young males. *BMC Musculoskeletal Disorders*, 10(1), Article 10. <https://doi.org/10.1186/1471-2474-10-10>
- McDonald, M. V, Passik, S. D., Dugan, W., Rosenfeld, B., Theobald, D. E., & Edgerton, S. (1999). Nurses' recognition of depression in their patients with cancer. *Oncology Nursing Forum*, 26(3), 593–599.
- Merriam, S. B. (2015). Qualitative research: Designing, implementing, and publishing a study. In *Handbook of research on scholarly publishing and research methods*, 125-140. IGI Global. <https://doi.org/10.4018/978-1-4666-7409-7.ch007>
- Monnier, A. (2016). *Musculoskeletal disorders in the Swedish armed forces marines: back pain epidemiology and clinical tests*. From Department of Neurobiology, Care Sciences and Society, Division of Physiotherapy. Karolinska Institutet, Stockholm, Sweden.
- Murodovich, A. B., (2023). A Cmparison of the effects of connective tissue massage and classical massage on chronic mechanical low back pain. *Medicine*, 102(15), Article 33516. <http://doi.org/10.1097/MD.00000000000033516>
- Nissen, L. R., Marott, J. L., Gyntelberg, F., & Guldager, B. (2014). Deployment-related risk factors of low back pain: a study among Danish soldiers deployed to Iraq. *Military Medicine*, 179(4), 451–458. <https://doi.org/10.7205/MILMED-D-13-00317>
- Pflanz, S., & Sonnek, S. (2002). Work stress in the military: Prevalence, causes, and relationship to emotional health. *Military Medicine*, 167(11), 877–882. <https://doi.org/10.1093/milmed/167.11.877>
- Powell, J. M. (2022). *Bodies of work. The gospel of rehabilitation*. Cambridge University Press.
- Robinson, S. L. (2006). *The hidden toll of the war in Iraq*. In R. Falk, I. Gendzier, & R. J. Lifton (Eds.), *Crimes of war: Iraq* (pp. 399–409). Nation Books.
- Schaeffer, J., Culberson, J., Treloar, N., Knight, B., Lu, P., & Szafron, D. (1992). A World championship Caliber checkers program. *Artificial Intelligence*, 53(2–3), 273–289. [https://doi.org/10.1016/0004-3702\(92\)90074-8](https://doi.org/10.1016/0004-3702(92)90074-8)
- Schulze, B., Richter-Werling, M., Matschinger, H., & Angermeyer, M. C. (2003). Crazy? So, what! Effects of a school project on students' attitudes towards people with schizophrenia. *Acta Psychiatrica Scandinavica*, 107(2), 142–150. <https://doi.org/10.1034/j.1600-0447.2003.02444.x>
- Shamsi, H., Okhovatian, F., & Kalantari, K. K. (2022). Physiological and neurophysiological effects of sports massage on the athletes' performance: A review study. *Rehabilitation Medicine*, 11(5), 680-691. <http://doi.org/10.32598/sjrm.11.5.12>
- Smith, L. L., Keating, M. N., Holbert, D., Spratt, D. J., McCammon, M. R., Smith, S. S., & Israel, R. G. (1994). The Effects of athletic massage on delayed onset muscle soreness, creatine kinase, and neutrophil count:A preliminary report. *Journal of Orthopaedic & Sports Physical Therapy*, 19(2), 93–99. <https://doi.org/10.2519/jospt.1994.19.2.93>

- Spivak, L.V., Holovchenko, M.V., & Белоусова О. В. (2024). The influence of stress on the state of the muscular system of patients with injuries of the musculoskeletal system. *Shidnoëvropejs'kij Žurnal Vnutrišn'oi Ta Simejnoi Medicini*, 2024(1):79-84. <https://doi.org/10.15407/internalmed2024.01.079>
- Tarigan, C. U., Kushartanti, W., Sukarmm, Y., & Tarigan, W. P. L. (2024). Relationship of workload with fatigue and sleep quality in female exercisers. *Fizjoterapia Polska*, (4),304-312. <http://doi.org/10.56984/8zg2ef8b3t>
- İlkin, S., & Tekeli, İ. (1980). İttihat ve terakki hareketinin oluşumunda Selânik'in toplumsal yapısının belirleyiciliği. Okyar, O., & İnalçık, H. (Eds.), *Social and economic history of Turkey (1071-1920)*. Meteksan.
- Tiidus, P., & Shoemaker, J. (1995). Effleurage massage, muscle blood flow and long-term post-exercise strength recovery. *International Journal of Sports Medicine*, 16(07), 478–483. <https://doi.org/10.1055/s-2007-973041>
- Tortora, G. J., & Derrickson, B. H. (2018). *Principles of anatomy and physiology 15<sup>th</sup> edition*. Wiley.
- Vahdati, S., Sarkhosh Khiavi, R., Rajei Ghafouri, R., & Adimi, I. (2014). Evaluation of prevalence of low back pain among residents of tabriz university of medical sciences in relation with their position in work. *Turkish Journal of Emergency Medicine*, 14(3), 125–129. <https://doi.org/10.5505/1304.7361.2014.79106>
- Vickers, A. (1996). *Massage and Aromatherapy* (S. Van Toller & C. Stevensen, Eds.). Springer. <https://doi.org/10.1007/978-1-4899-3130-6>
- Vickers, A., & Zollman, C. (1999). ABC of complementary medicine: Massage therapies. *BMJ*, 319(7219), 1254–1257.
- Vos, T., Flaxman, A. D., Naghavi, M., Lozano, R., Michaud, C., Ezzati, M., Shibuya, K., Salomon, J. A., Abdalla, S., Aboyans, V., Abraham, J., Ackerman, I., Aggarwal, R., Ahn, S. Y., Ali, M. K., AlMazroa, M. A., Alvarado, M., Anderson, H. R., Anderson, L. M., & Murray, C. J. (2012). Years lived with disability (YLDs) for 1160 sequelae of 289 diseases and injuries 1990–2010: A systematic analysis for the Global Burden of Disease Study 2010. *The Lancet*, 380(9859), 2163–2196. [https://doi.org/10.1016/S0140-6736\(12\)61729-2](https://doi.org/10.1016/S0140-6736(12)61729-2)
- Wakim, K. G., & Martin, G. M. (1949). The effects of massage on the circulation in normal and paralyzed extremities. *Archives of Physical Medicine and Rehabilitation*, 30(3), 135–144.
- Weerapong, P., Hume, P. A., & Kolt, G. S. (2005). The Mechanisms of massage and effects on performance, muscle recovery and injury prevention. *Sports Medicine*, 35(3), 235–256. <https://doi.org/10.2165/00007256-200535030-00004>
- Yıldırım, A., & Şimşek, H. (2006). Qualitative research methods in social sciences. *Journal of Theory and Practice in Education*, 2(2), 113–118.
- Yüksel, İ. (2018). *Masaj teknikleri (İ. Yüksel & T. Akbayrak, Eds.; Vol. 4)*. Alp Publishing.
- Yumusakhuylyu, Y., Baklacioğlu, H. S., Haliloglu, S., Selimoglu, E., & İçağasıoğlu, A. (2018). The Economic cost of chronic low back pain. *Bozok Tıp Dergisi*, 8(1), 66-74.
- Zincir, S. (2019). Mental disorders of significance in military psychiatry. *Turkish Clinics, Psychiatry-Special Topics*, 12(3), 34-41.



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