

# Psychosomatic disorders and their impact on the muscular system: Analysis of the phenomenon and practical implications for the physiotherapist

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## Abstract

**Background:** Psychosomatics is a widely used term, but its meaning is not standardized. This concept combines the bidirectional influence of the emotional state and the body. An issue closely related to psychosomatics is stress, which can directly affect mental health, resulting in reactions such as the breakdown of muscle proteins or changes in muscle reactivity. Research has identified muscles that are particularly susceptible to emotional stimuli, such as the facial muscles, trapezius, and diaphragm. Therefore, the patient's therapy should aim at relaxing selected muscles.

**Aims:** Presentation of views and scientific research results on the influence of specific emotional states on the locomotor system functioning.

**Material and methods:** With this aim, scientific papers (on psychosomatics, muscle tone, and musculoskeletal physiology) available in PubMed, Pedro, Elsevier, and Springer were analyzed.

**Results:** The pathophysiological processes of tissues, changes in the functioning of selected muscles, and various therapy models were mentioned, including the cooperation of a physiotherapist with a psychologist.

**Conclusion:** The problem of psychosomatic disorders, especially those related to psychological stress, although often neglected in the process of physiotherapy planning, seems to be an important factor that may influence the final effectiveness of physiotherapy treatment.

## Key words

stress,  
muscle tension,  
psychosomatics,  
psychosomatic  
disorder

## Introduction

The term "psychosomatics" comes from the Greek language: "psyche" (greek ψυχή "soul", latin Psyche "soul"), "soma" (greek Σώμα "body"). Nowadays, the term is used widely, but its meaning is not standardized. However, it is possible to define the term psychosomatic dysfunction. It is a phenomenon in which an adverse mental state affects the physiological functioning of the body [1, 2].

Emotions related to body physiology play a fundamental role. The existence of the different nature of these emotions must be kept in mind. A critical emotional factor that affects bodily function appears to be, broadly defined, stress. Also worth considering is the bidirectionality of psychosomatics: the impact of emotions on dysfunction, as well as the impact of dysfunction on emotional functioning [3].

One can adopt the definition of psychosomatic conditions according to Whitlock's understanding of them as those in which the influence of emotions play a significant role in the genesis, recurrence, or amplification of somatic symptoms [4]. In addition to the psychosomatic disorders referred to in the literature as the "Chicago Seven": bronchial asthma, rheumatoid arthritis, ulcerative colitis, atopic dermatitis, hyperthyroidism, peptic ulcer disease, and hypertension [5], there are also musculoskeletal symptoms such as breakdown of muscle proteins or changes in muscle reactivity. However, these are not the first attempts to explain the phenomenon of psychosomatics, and the first mention of the term dates back to the early 19th century [6].

It should be noted that despite the popularity of the term psychosomatics, there are very few credible and factual papers that explain this process, which highlights the ambiguity of the term.

## Aims

The aim of this paper was to present the views and scientific research findings on the influence of specific emotional states on musculoskeletal system functioning. Furthermore, this paper attempts to point out suggestions in Evi-

dence-Based Physiotherapy (EBP) and compare them with existing, not fully validated information reproduced in recent years, in reference to the term psychosomatics.

## Materials and methods

In order to achieve this objective, scientific papers (dealing with psychosomatics, muscle tension, physiology of the musculoskeletal system) available in PubMed, PEDro, Elsevier, and Springer databases were analyzed. The following words and word combinations were selected in a critical review of the literature: "psychosomatic", "psychosomatic dysfunction", "muscle tonus stress", "fascia stress", "muscle psychological stress" (Table 1).

Search inclusion and exclusion criteria: (1) years of article publication: 1950–2020, (2) papers published in a peer-reviewed journal, and (3) journals with a PEDro database rating greater than seven were searched for in the first phase. However, this criterion was eliminated due to the very low number of papers meeting this requirement.

Of the 94,544 records, only 70 of them, which is less than 1%, met the inclusion criteria. This shows how niche of an issue psychosomatic disorders are. This resulted in an expansion of the search to include publications prior to the year 2000. Ultimately, papers from 1950 to 2020 were included in the literature review.

## Historical background

The term "psychosomatics" came to light in 1818 through the German psychiatrist Johann Christian August Heinroth [6]. Heinroth used it to describe the causes of insomnia in a patient who was traumatized by a religious violation [7]. The German physician Walter Georg Groddeck (1866–1934) is considered the founder of psychosomatic medicine. His paper "Psychic Conditioning and the Psychoanalytic Treatment of Organic Disorders", published in 1917, can be seen as the basis for the formation of modern psychosomatic medicine [8].

**Table 1.** The number of searched keywords in each database.

Keywords	Database			
	PubMed	PEDro	Elsevier	Springer
Psychosomatic	34593	151	41600	690
Psychosomatic dysfunction	4110	2	1618	278
Muscle tonus stress	395	0	403	250
Fascia stress	1153	1	1579	361
Muscle psychological stress	1153	30	4646	1531

In 1964, the World Health Organization Expert Committee defined two different meanings of the term psychosomatics. The first was a holistic view of medicine, abandoning the limited focus only on affected organs or systems. Research has begun to pay attention to the mental state of patients. The intention was to introduce a more individualized approach to diagnosis and treatment. The second, somewhat more limited use of the term narrows it to diseases in which psychological factors have a particular influence on the onset of the disease itself [9].

The pioneers of psychotherapy were discovering connections between emotions and the body. One of them was Wilhelm Reich, a student of Freud who believed that body posture reflects psychological posture [10]. In contrast, psychotherapist Alexander Lowen, Reich's student and patient, continued his teacher's insights by deepening the concept of the body-mind connection; according to his concepts, long-term negative emotions can influence the body's response by changing the patient's posture [11]. Nowadays, "psychosomatics" is a widely used term, but its meaning is unclear and not systematized.

### Mechanisms of psychosomatic disorders

Stress is closely related to psychosomatics, which can directly affect emotions. Currently, the most prevalent theory of stress in psychology is a transactional model of stress and coping developed by Lazarus and Folkman. According to this concept, a stressful situation is a specific, defined relationship between an individual and the environment that has been evaluated as stressful and poses a threat to the individual's well-being [12]. This theory differs from previous conceptualizations that define stress in 3 notions: stimulus, response, or process. The first notion is the perspective of stress as an event, situation, or external stimulus with certain specific properties. A connection to this approach is a well-known and still valid concept of life changes by Holmes and Rahe [13], which mentions more than forty changes that may occur in one's life and require adaptive efforts. Some examples of life changes include the death of a spouse, divorce, job change, illness, and new addition to the family.

Another notion of perceived stress is the reactions a person experiences internally as a result of a particular event. It is necessary to look at the

so-called "fight or flight" model, whose creator is Walter Cannon [14]. David Mechanic's notion of stress as a reaction of discomfort in a person in a particular situation is also an example that is still taken into account [15]. This notion incorporates the colloquial view of stress as a state of tension, a sense of threat or anxiety. The relationship between human characteristics and external factors is the third notion of psychological stress. This is a view in which stress is not located within the individual or the environment but involves a specific type of relationship between the two. This relationship is captured as an imbalance between an individual's capabilities and the resources of the environment [16].

The mechanisms of this relationship are not fully understood; some phenomena may be explained by physiological reactions resulting from a long-term stressful situation. In a stressful situation, hydrocortisone, which belongs to the group of glucocorticosteroids, is extensively synthesized by the adrenal cortex and released into the blood. It motivates our body to take action by, among other things, raising blood glucose levels, having an anti-inflammatory effect, or retaining salt in our body. However, chronically elevated hydrocortisone levels also have a negative impact on our body. Chronically elevated levels of hydrocortisone in the body can cause significant loss of muscle tissue leading to decreased muscle strength. This occurs due to the process of muscle protein breakdown [17].

In a stressful situation, glucose is obtained through gluconeogenesis, which involves the transformation of substances such as glycerol, lactic acid, or amino acids into glucose. Amino acids used in gluconeogenesis are derived from muscle protein breakdown processes [17]. Thus, losses in muscle tissue and decreases in muscle strength can be detrimental and lead to impaired motor activity and the production of compensation. In order to prevent these processes, it seems beneficial to apply holistic therapy, combining elements of psychotherapy with a physiotherapeutic approach.

### **Applications for physiotherapists working with psychosomatic patients**

Patients with tension disorders or decreased muscle strength often seek help from a physiotherapist. Psychosomatic disorders are an ambiguous issue, making it difficult to obtain a clear clinical diagnosis. There are many scientifically validated methods of stress reduction by working with the body [18-21]. However, some of the mentioned publications need to be updated. Further research is needed to confirm these relationships. Researchers are working on a concept that would present an approach to permanently relax myofascial structures and allow the vicious cycle between individual muscle tension and the body's stress response to be broken. Among the many muscles potentially involved in the stress response, those that have been studied and their reactivity to emotional factors have been scientifically validated were selected. Muscles particularly susceptible to stress stimuli such as the facial muscles, the trapezius, and the diaphragm have been selected [18-22, 34-36].

The researchers suggest that increased facial muscle activity is involved in the experience of stress. It is determined mainly by the trigeminal facial nerves and the presence of a large number of both efferent and afferent fibers [19,22]. The result of the activation of these structures under chronic stress or depressed mood is an increase in the muscle bioelectrical activity, which can be described as an accumulation of tension within these muscles [23]. Researchers distinguish facial muscles especially often as the most sensitive to the emotional state, which emphasizes the sense and the need for further research activities in the field of psychosomatics to modernize the existing knowledge [24-29].

The trapezius muscle is also considered to be highly responsive to emotional factors. Psychosocial stress has been shown to affect several aspects of human motor control related to the fight or flight response [30-33], including increased upper trapezius activity [34-36]. It should be noted that its innervation comes from the accesso-

ry nerve (XI cranial nerve), which by its efferent properties is responsible for the state of muscle tension. Research suggests that psychosocial stress in people with anxiety causes more increased trapezius activity than in people without anxiety or distress [37], and its activity state is closely related to emotional state [36,38].

On the other hand, the diaphragm has many functions, including being responsible for maintaining systemic biochemical and emotional balance [39]. Diaphragm function is not only controlled by metabolic demands, but also by emotional states such as sadness, fear, anxiety, and anger [39]. The researcher does not provide a clear definition of metabolic requirements. One can speculate that the researcher refers to the complex physiological reactions occurring in the higher centers of the brain that control the rate and frequency of breathing. There is a close relationship between emotions, breathing, and baroreceptor intervention [40].

Emotional states, such as anxiety or depression and psychiatric disorders can negatively affect baroreceptor responses, increasing pain perception [41]. Stress can cause anxiety and/or depression, disrupting normal diaphragm function [42]. It is undeniable that respiratory distress can alter the emotional picture, and it is also true that altered emotional state worsens respiratory function [43,44]. Researchers report the effectiveness of musculoskeletal relaxation as a method of reducing stress symptoms through bodywork [20,22].

Myofascial muscle relaxation is proposed as a therapy concept [20]. Positive effects have also been shown after myofascial relaxation of the suboccipital and trapezius muscles [22]. Diaphragmatic breathing, proven effective by Ma's 2017 research, can be mentioned as another therapy alternative. Researchers demonstrated that diaphragmatic breathing had a significant positive effect on reducing the respiratory rate in the respiratory intervention group compared to the control group, and salivary cortisol levels were significantly reduced [21].

In their research, Joshi et al. [45], found a statistically significant effect on the decrease in blood pressure parameters in patients treated with deep breathing techniques. Another element that can be incorporated into a holistic treatment are techniques related to trigger point therapy of the head, neck, and shoulders. The researchers emphasize the effectiveness of these methods and demonstrate their impact on patient relaxation and increased parasympathetic activity [46]. Undoubtedly, relaxing selected muscles impacts the patient's emotional state. Therefore, therapy should aim to reduce muscle tension. It is worth noting that the suggested techniques should be used regularly, and other forms of treatment should also be offered to combat the causes of the ailment.

Because of the difficulty of obtaining an unambiguous clinical diagnosis, it seems important that the physiotherapist, based on his or her experience, has the ability to modify his or her approach to patients for whom classical therapy does not work or who have tension disorders in the areas indicated in this paper. It might also be worth working with a psychologist or psychotherapist in some instances.

## Summary

This paper attempts to point out suggestions in Evidence-Based Physiotherapy (EBP) and compare them with existing, not fully validated information reproduced in recent years in reference to the term psychosomatics. The presented pathophysiological processes of tissues and changes in the reactivity of selected muscles indicate a mutual influence between the long-term emotional state of a human being and the somatic activity of the organism. In light of the authors' attempts to explore the issue from a purely practical perspective for physiotherapists, even a condition such as long-term loss of function or a prolonged struggle with pain is itself a factor that can be a very powerful source of emotion for an individual. Consequently, a patient who is not initially treat-

ed for psychosomatic disorders may develop over time psychosomatic disorders with a prolonged period of dysfunction. Given the influence of the emotional factor on the processes involved in regulating the work of the nervous and muscular systems mentioned in this paper, it is possible that patients with long-term illnesses will develop dysfunctions of a psychosomatic nature. Consequently, they can affect the effectiveness of therapy and even make the patient's condition worse. Regarding this, the physiotherapist-psychologist collaboration is particularly important because of the bidirectional impact of psychosomatics.

Optimizing the work pattern requires global patient care that includes collaboration with a psychologist. There is a need for further research to increase the effectiveness of therapy for patients with psychosomatic dysfunction. Special attention should be paid to the investigation of selected muscles that may demonstrate variability in their reactivity under the influence of emotion. These muscles include the facial muscles, the diaphragm, and the trapezius. Investigating these will provide a better understanding of the above relationship, which may increase the effectiveness of therapy in clinical practice.

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