Psychosomatic background of cervical spine pain assessed during the Covid-19 pandemic period

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Abstract

Background: By location, cervical spine pain ranks second only to L-S spine pain. The causes of spinal pain can be many, and we must not forget that they can also be psychosomatic in nature.

Aims: This study aimed to evaluate the association of the severity of cervical spine pain with stress intensity and disability in subjects examined during the COVID-19 pandemic.

Material and methods: The study involved 47 subjects with a mean age of 34.5 ± 5.9 years. The participants were divided into a study group (24 women and 11 men), subjects characterized by cervical spine pain, and a control group (6 women and 6 men), subjects without pain. The study used a diagnostic survey method using the author's questionnaire augmented by research using the PSS-10 Perceived Stress Scale, the NDI Cervical Disability Index, and the Visual Analogue Scale for Pain (VAS). Abbreviations need to be elaborated on, as here they occur for the first time.

Results: The mean value of the PSS-10 in the study group (with pain complaints) was 18.4 points, while in the control group (without pain complaints), the value was lower at 16.1 points. The percentage of subjects characterized by a high stress level was significantly higher in the study group (48.5%) than in the control group (16.6%). The pain level for those in the group identified as representing a low stress level was 2.4. For the group with an average stress level, 2.6, while the highest values - 3.8 - were recorded in the group in which the stress level was identified as high. For the study group, the average disability in subjects with low stress intensity was 4.0 ± 2.8, average 5.4 ± 5.6, and high 8.1 ± 3.9. For the control group of subjects with low stress, the intensity was 2.6 ± 2.1, an average of 2.6 ± 1.7, and high 4.0 ± 0.0.

Conclusions: The study shows that people with cervical spine pain are more characterized by a high-stress level than those who do not report pain. Those in the high-stress group reported higher cervical spine pain compared to the low- and medium-stress groups. The study also showed that those with higher stress levels have a greater cervical spine disability.

Key words

COVID-19 pandemic, cervical spine pain, psychosomatic symptoms.

Introduction

By location, cervical spine pain is second only to lumbosacral spine pain. Both anatomical structure and biomechanics predispose this particular section of the spine to overload, which is the cause of pain generally regarded as cervical pain syndrome [1]. The range of motion in the cervical spine segment depends on the individual's anatomical structure, biomechanical capabilities, and psychological predisposition. The ligamentous apparatus performs the main stabilizing function; however, the muscular system and its functioning is no less important biomechanical aspect. Any abnormalities in muscle tone can adversely affect the mobility of the cervical segment and thus induce other disorders. Therefore, correct functional diagnosis is crucial to determine the cause, location, and mechanics of the dysfunction, which allows proper planning of therapeutic management [2,3,4].

There are many causes of cervical pain, and they can also be psychosomatic in nature. The study of the relationship between the body, with its biomechanics, and the mind, with its mechanisms of the emotional sphere, is essential for a holistic understanding of a person. According to the definition by Jarosz [5], psychosomatic disorders are defined as "diseases in the etiopathogenesis of which, as well as in their course, a significant role is played by psychological factors, which are understood primarily as emotional factors". Numerous studies confirm the relationship between psychological factors and health, and that people diagnosed with psychosomatic syndrome are characterized by higher levels of stress and lower overall well-being compared to healthy people [6].

Despite the existence of classification systems for psychosomatic disorders, it is still ambiguous. According to the American Psychiatric Association, according to the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) criteria, a psychological factor influences overall health when a disorder with known physical pathology exists, is preceded by certain significant psychological events, and is judged to contribute to its onset and worsening. Psychosomatics is also referred to as the nocebo effect, in contrast to the placebo phenomenon. This definition emphasizes the importance of psychological factors not only in stimulating recovery but also in the emergence of the disease [7].

A large impact on the development of psychosomatic symptoms is attributed to stress. Therefore, the ability to respond healthily to stress plays a key role in alleviating psychosomatic symptoms. It depends on many factors: personality dispositions, defense mechanisms, as well as health-promoting behaviors, which can become an important protective factor with regard to the effects of chronic stress [8]. With the current lifestyle and stress burden, psychogenic disorders will be encountered more and more often in physiotherapy practice, so learning about this area, as well as introducing specific therapeutic techniques, is necessary.

The COVID-19 pandemic was a serious threat to mental health. The constant news of a surge in new infections and fatalities, the need to isolate also from loved ones, and the constant sense of danger increased stress [9].

Aims

The main purpose of the study was to assess the relationship of pain intensity to stress intensity and functional limitation (disability) in the cervical spine in subjects during the COVID-19 pandemic. With the main purpose of the study in mind, an attempt was made to seek answers to the following research questions: Do people who experience pain in the cervical spine have the same high level of stress intensity as those who do not? Does the severity of pain in the cervical spine of respondents in the study group show a relationship with the intensity of stress in these

individuals? Does the level of stress show a relationship with the appearance of functional limitations (disability) in the cervical spine of the surveyed subjects?

Material and methods

The study enrolled 51 subjects, of whom 4 were excluded due to the presence of diagnosed structural changes in the cervical spine or past surgical procedures in this area. The study included 47 subjects over the age of 18 (30 women and 17 men) who gave informed consent to participate in the study. The mean age of the subjects was 34.5 ± 5.9 years. The group was divided into a study group of 24 women and 11 men, which were subjects characterized by pain in the cervical spine, and a control group of 6 women and 6 men, which were subjects without pain. Inclusion criteria included age over 18 and consent to participate in the study. Exclusion criteria included a history of diagnosed structural changes in the cervical spine or a history of surgery in this area.

The study used a diagnostic survey method using the questionnaire designed by the authors, augmented by research using the 10-item Perceived Stress Scale (PSS-10), the Neck Disability Index (NDI), and the Visual Analogue Scale (VAS).

To determine the level of stress, the PSS -10 was used. This scale contains 10 questions relating to subjective feelings about personal problems, behaviors, and coping methods. The respondent provides an answer by writing the appropriate number (0 – never, 1 – almost never, 2 – sometimes, 3 – quite often, 4 – very often). The overall score of the scale is the sum of all scores, the distribution of which is from 0 to 40. The higher the score received, the greater the severity of the stress experienced. The overall index, after conversion to standardized units, is subject to interpretation according to the properties that characterize the standardized scale (**Table 1**) [10,11].

To determine the level of functional disability of the cervical spine region, the NDI cervical disability index was used. This index consists of 10 categories covering activities of daily living that potentially generate pain in the cervical spine, so their performance is dependent on it. Each category contains 6 sub-items, scored from 0 to 5; thus, the maximum possible score is 50. The minimum significant clinical change in the subject's functioning is 5 out of 50 points. In the respondent's perception of functioning, such a change is defined as insignificant. The author of the questionnaire developed score ranges to facilitate the interpretation of the results (**Table 2**) [12].

Table 1. PSS-10 sten interpretation.

Sten	Interpretation
1-4	Low score
5-6	Average score
7-10	High score

The VAS scale was used to determine the intensity of pain. The measurement is subjective in nature, involving the subject determining the level of pain intensity by marking a point on a straight line. The line is usually 10 cm long in vertical or horizontal orientation, divided into individual sections. It comes in several graphical versions. The simplicity and reliability of the results obtained distinguish it. The respondent marks the pain level on a scale from 0 to 10, where 0 means no pain and 10 means the maximum pain imaginable [13].

Table 2. NDI scale interpretation.

Disability level	**Score** [points]
No disability	0-4
Mild disability	5-14
Moderate disability	15-24
Severe disability	25-34
Complete disability	35 and above

Results

The characteristics of the subjects are shown in **Table 3**. The entire group was divided into a study group (N=35), which consisted of subjects characterized by pain in the cervical spine (VAS scale ≥ 1), and a control group (N=11), which consisted of subjects without pain (VAS scale = 0).

Table 3. Descriptive statistics for the study group and the control group.

Variable	**Study group (n=35)** **x±SD**	**Control group (n=11)** **x±SD**
Age [years]	34.7 ± 6.1	32.9 ± 6.0
BMI [kg/m²]	23.8 ± 4.4	23.1 ± 2.4
Sex [F/M] %	31/69	50/50

Abbreviations: *x, mean*; SD, *standard deviation*; BMI, *body mass index*; F, *female*; M, *male*; *n, number of participants.*

In order to answer the first research question, "Do people who experience pain in the cervical spine have the same high level of stress intensity as those who do not have such complaints?" a comparative analysis was made of the mean values of the results obtained in the questionnaire measuring the intensity of stress PSS 10. The mean value of the results in the study group (with pain complaints) was 18.4 points, while in the control group (without pain complaints), the value was lower at 16.1 points. In the study group, higher stress intensity was also noted when converted to the sten scale, where the average value obtained was 6.1 sten, compared to the control group, where the average value was 5.3 sten. The results obtained are shown in **Table 4**.

Table 4. Average raw scores and per-sten scores for both groups.

Variable	Study group (n=35) x±SD	Control group (n=11) x±SD
PSS-10 average [points]	18.4 ± 7.5	16.1 ± 4.9
PSS-10 average [stens]	6.1 ± 2.2	5.3 ± 1.6

Abbreviations: *x, mean*; SD, *standard deviation*; *n, number of participants*; PSS-10, *10-item Perceived Stress Scale.*

After converting the raw results into a sten scale and interpreting them according to the instructions of the questionnaire's creators, it was checked what percentage of the subjects in each group were characterized by low, average, and high stress levels, respectively.

The percentage of subjects characterized by a high stress level was significantly higher in the study group (48.5%) than in the control group (16.6%). In contrast, the percentage of subjects with low or average stress levels was significantly higher in the control group (83.4%) than in the study group (51.5%). The results are shown in **Table 5**.

Table 5. Percentage of people with different levels of stress in the two groups.

Variable	Study group (n=35) x±SD	Control group (n=11) x±SD
Low level of stress [%]	28,6	41,7
Average level of stress [%]	22,9	41,7
High level of stress [%]	48,5	16,6

Abbreviations: *x, mean*; SD, *standard deviation*; *n, number of participants.*

Based on the above analyses, it was shown that people with pain in the cervical spine are characterized by higher levels of stress than those who do not report pain.

In order to answer the second research question: "Does the severity of cervical spine pain in respondents in the study group show a relationship with the intensity of stress in these individuals?" after converting the raw results of the PSS 10 stress intensity questionnaire into a one-sten scale and interpreting it according to the questionnaire developers' instructions, the mean values of the pain intensity scale (VAS) were calculated for each of the following groups: low, average and high-stress levels.

The pain level for those in the group identified as representing a low stress level was 2.4. For the group with an average stress level, 2.6, while the highest values - 3.8 - were recorded in the group in which the stress level was identified as high. The average VAS value for all subjects was 2.3. The results are shown in **Figure 1** and **Table 6**.

Figure 1. VAS scores in the whole group.

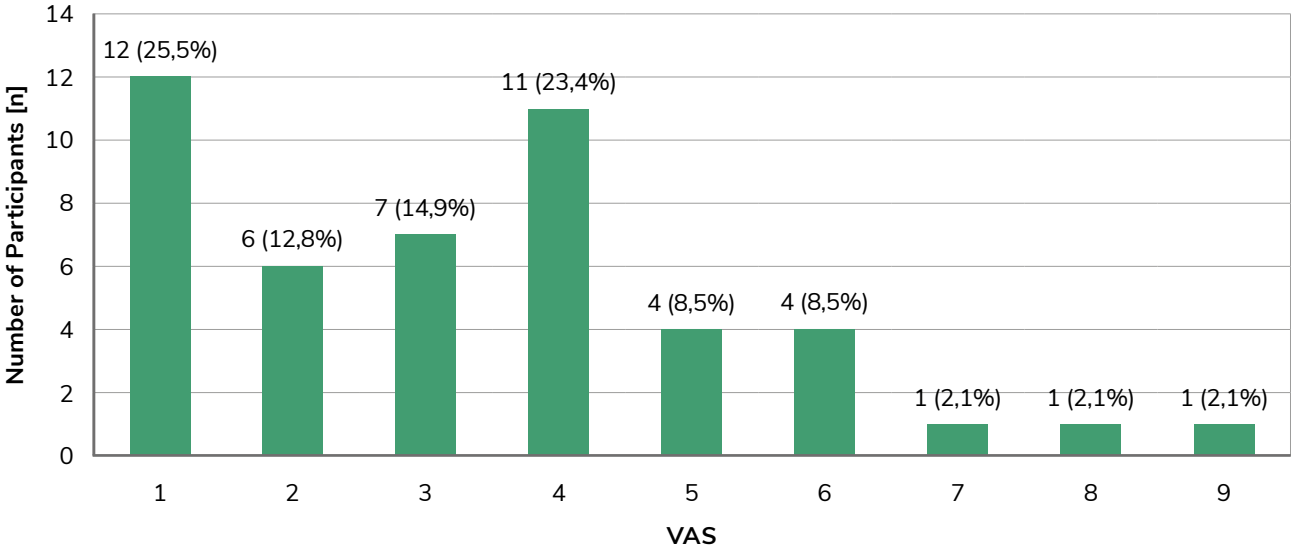

Table 6. Mean values of the VAS scale in the study group depend on the stress level in PSS-10.

Variable	The level of pain experienced (VAS) x±SD
Low level of stress	2.4 ± 1.3
Average level of stress	2.6 ± 1.6
High level of stress	3.8 ± 1.8

Abbreviations: *x, mean; SD, standard deviation; n, number of participants; PSS-10, 10-item Perceived Stress Scale; VAS, Visual Analogue Scale.*

Based on the above analyses, it was shown that those in the high-stress group reported greater complaints of cervical spine pain compared to the low- and medium-stress groups.

To answer the third research question: "Does the level of stress show an association with the appearance of functional limitations (disability) in the cervical spine of the subjects?" a comparative analysis of the mean values of the results obtained in the NDI questionnaire according to the intensity of stress was carried out: the group with low, average and high stress intensity. The results are shown in **Table 7**.

Based on the above analyses, it was shown that those with higher stress declared a higher degree of cervical spine disability. However, the relationship is more clearly observed in the study group. For the study group, the average disability in subjects with low stress intensity was 4.0 ± 2.8, average 5.4 ± 5.6, and high 8.1 ± 3.9. For the control group of subjects with low stress, the intensity was 2.6 ± 2.1, an average of 2.6 ± 1.7, and high 4.0 ± 0.0.

Table 7. Average NDI scores in both groups according to the stress level in (PSS-10).

Variable	Study group NDI x±SD	Control group NDI x±SD
Low level of stress	4.0 ± 2.8	2.6 ± 2.1
Average level of stress	5.4 ± 5.6	2.6 ± 1.7
High level of stress	8.1 ± 3.9	4.0 ± 0.0

Abbreviations: *x, mean; SD, standard deviation; n, number of participants; PSS-10, 10-item Perceived Stress Scale; NDI, Neck Disability Index.*

Discussion

The study found that those experiencing pain in the cervical spine area had higher stress levels than those without pain. At the same time, those in the high-stress group reported significantly greater pain and a higher degree of disability in the cervical spine compared to groups with lower levels of stress, which is in line with the results of Svedmark et al., (2018) [14]. In addition, the aforementioned authors also indicated reduced work performance in these individuals.

It should be emphasized that pain is a sensory and emotional sensation arising from a mental interpretation based on previous experiences and psychosomatic conditions. The function of pain is a warning to counteract or minimize the effects of ongoing inflammation by limiting activity at the affected site [15]. The stress generated by everyday life, as well as the information that the COVID-19 pandemic has generated for us over the past two years, and prolonged sitting in non-ergonomic positions while working remotely, have also largely contributed to the increase in low back pain. Recent studies confirm that prolonged remote work in a sedentary position is associated with significant psychological and physical strain [16], and Svedmark et al., (2018) [14] indicated that both psychosocial workplace exposure and stress should be taken into account to improve outcomes for people with neck pain.

Stress affecting the central structures of the autonomic nervous system (ANS) changes its activity. This is because, in the course of a reflex reaction, the relationship between the sympathetic and pre-sympathetic parts of the autonomic system is altered in favor of one of them [17]. The chronic functioning of the sympathetic nervous system carries adverse changes both in the mental sphere and in the body structures themselves. In the light of research, it has been proven that the vagus nerve, which determines physiological responses together with the sympathetic nervous system, also plays an important role. It is worth noting that, according to recent studies, the vagus nerve also has an immunosensory effect [18].

The authors of the present study are aware of some limitations of this research to be discussed. One was the small group of subjects studied, which did not allow for in-depth statistical analyses. In addition, the causes of anxiety associated with COVID-19 were not investigated.

Conclusions

The study found that higher stress levels characterized those experiencing pain in the cervical spine area than those not reporting pain in this area. Those in the high-stress group reported significantly higher cervical spine pain compared to the low- and medium-stress groups. In addition, the study showed that the higher the stress level was, the greater the degree of cervical spine disability. The relationship was more clearly observed in the study group.

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