

Research Article

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## Psychometric Factors in Quality of Life and Pain Perception in Patients with Chronic Nonspecific Neck Pain

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### Abstract

**Introduction:** Nonspecific neck pain is the most common cause of neck symptoms and usually presents psychosocial aspects that make treatment difficult.

**Objective:** Analyze the association of psychometric factors in quality of life and pain perception in patients with chronic nonspecific neck pain.

**Methodology:** 17 individuals with chronic nonspecific neck pain submitted to an evaluation through validated questionnaires for pain, quality of life, kinesiophobia, catastrophism, anxiety and depression

**Results:** Correlations with quality of life were observed between pain intensity in the domains of pain ( $r=-0.73$ ;  $p=0.001$ ), general health status ( $r=-0.74$ ;  $p=0.001$ ) and limitation by social aspects ( $r=-0.60$ ;  $p=0.01$ ); interference and functional capacity ( $r=-0.50$ ;  $p=0.04$ ), physical limitations ( $r=-0.50$ ;  $p=0.008$ ), pain ( $r=-0.82$ ;  $p=0.001$ ), condition general health ( $r=-0.65$ ;  $p=0.005$ ) and limitation by social aspects ( $r=-0.57$ ;  $p=0.02$ ); this correlation was also seen with catastrophism and limitation by social aspects ( $r=-0.65$ ;  $p=0.004$ ); anxiety with functional capacity ( $r=-0.60$ ;  $p=0.01$ ), with pain ( $r=-0.59$ ;  $p=0.01$ ) and social limitation ( $r=-0.60$ ;  $p=0.01$ ). Pain intensity was significant when correlated with catastrophism ( $r=0.51$ ;  $p=0.03$ ), anxiety ( $r=0.55$ ;  $p=0.02$ ), and pain interference with catastrophism ( $r=0.70$ ;  $p=0.002$ ), anxiety ( $r=0.49$ ;  $p=0.05$ ) and with the pain intensity itself ( $r=0.78$ ;  $p=0.0003$ ).

**Conclusion:** Individuals who have chronic nonspecific neck pain and present some of the psychometric factors studied, have less quality of life, and more pain interference in their life.

**Keywords:** Nonspecific neck pain; Anxiety; Depression; Kinesiophobia; Catastrophism; Quality of life

**Abbreviations:** HADS-Hospital Anxiety and Depression Scale; PRCTS-Pain-Related Catastrophizing Thoughts Scale; QoL-Quality of Life; SF-36-Short-Form Health Survey 36; SD-Standard Deviation; SPSS-Statistical Package for the Social Sciences; TSK-Tamp Scale of Kinesiophobia; UNIFESO-University Center Serra dos Órgãos; WBPQ-Wisconsin Brief Pain Questionnaire

## **1. Introduction**

Neck pain may be the manifestation of several pathological disorders, including alterations due to musculoskeletal and rheumatic problems, or associated structures such as the thyroid, larynx, thorax and diaphragm [1]. Nonspecific types are the majority in which the anatomopathological etiology of the symptoms does not lead to a decisive diagnosis [2, 3]. This type of neck pain usually presents psychosocial aspects that cause a difficulty to the treatment, altering the functional capacity of the individuals. The attention to these aspects brings more expressive results when applied treatments such as those proposed by Physiotherapy through kinesiotherapy and manual therapy, improving the quality of life (QoL) related to the health of patients who are normally compromised, preventing them from participating of its activities [4, 5]. Among the main factors in this type of neck pain are the emotional ones, such as anxiety and depression [6, 7]. These factors are linked to feelings of fear and sadness [8]. One of the possible ways to contribute or to generate the onset of depression is kinesiophobia, which is described as an irrational and exacerbated fear of the movement as a consequence of previous experience or for fear of recurrence of the injury and is linked to the presence of catastrophism. This is a set of negative thoughts that increase the pain sensation, through a previous experience of pain that anticipates this sensation [9-11]. QoL in these patients may also be affected, as chronic pain and the presence of psychometric factors influence its reduction [12]. In the foregoing, the present study intends to evidence the presence of these factors and to understand the influence they exert on individuals with chronic nonspecific neck pain.

## **2. Materials and Methods**

It is a cross-sectional study to evaluate the association between pain intensity, pain interference in the individual's life, anxiety, depression and quality of life through the application of measurement instruments in patients and undergraduate Physiotherapy and physiotherapists of the Serra dos Órgãos University Center (UNIFESO), all with nonspecific chronic neck pain. All participants were diagnosed with chronic nonspecific neck pain. Participants as volunteers were men and women of at least 18 years of age diagnosed by their care doctor with chronic nonspecific neck pain for at least 3 months. Exclusion criteria were all those who reported chronic pain not related to the cervical spine region, or who had a history of trauma or fracture, surgical history or diagnosis of rheumatic disease. This study was approved by the Human Research Ethics Committee of UNIFESO (CEP / UNIFESO n° 1,853,167).

The application of the instruments was performed by three blind evaluators, in the afternoon and with no time limit established. The evaluator was instructed not to influence the answers, if the participant did not understand the question, it was read to him. The participant also had access to the questionnaires and the answer sheet, if this one showed interest.

The measurement instruments adapted for the Portuguese language of Brazil were applied to all participants of this study. Wisconsin Brief Pain Questionnaire (WBPQ) was adapted to Portuguese by Toledo et al. [13] and consists of 17 items and two scales (intensity and interference of pain in the individual's life). The pain intensity scale has three items and a numerical scale of 0 to 10 points; zero indicating "no pain" and ten indicating "worst pain imaginable". On the other hand, the pain interference scale is 24 points, with each item having a numerical scale of 0 to 4 points; zero indicating "no interference" and 4 indicating, "Interferes greatly" [13]. Hospital Anxiety and Depression Scale (HADS) validated for Portuguese by Castro et al. [15], used in patients with chronic pain. This instrument is self-filled and consists of 14 items, seven items for anxiety and seven items for depression, followed by four items, with values ranging from 0 to 3 points. The maximum final score is 21 points and indicates anxiety and depression. The cut-off score for defining anxiety and depression is 8 points [14, 15]. The Tamp Scale of Kinesiophobia (TSK), which consists of a self-completed questionnaire and was adapted into Portuguese by SIQUEIRA et al. [16]. It consists of 17 items on pain and intensity of symptoms. The minimum score is 17 points and the maximum score is 68 points, with the cut point score being 37 points. The higher the score, the higher the degree of kinesiophobia [16].

Pain-Related Catastrophizing Thoughts Scale (PRCTS) was adapted to Portuguese by Junior et al. [17]. It is composed of 9 items arranged on a Likert scale ranging from 0 to 5 points, with zero indicating "almost never" and five indicating "almost always", which are allotted at the extremities. The final score is the sum of the values obtained in the items answered and divided by the number of questions answered. There are no cutoff scores for this scale [17]. Short-Form Health Survey 36 (SF-36) validated for the Portuguese language by Ciconelli et al. [18] addresses QoL in the context of daily life activities. This questionnaire assesses QoL through 8 domains: functional capacity, limitation by physical aspects, pain, general health, vitality, social aspects, limitation by emotional aspects and mental health. The domains present a score of 0 to 100 points, zero indicating "worse" and one hundred indicating "better" health-related quality of life [18]. The Statistical Package for the Social Sciences (SPSS) software version 14.0 was used to analyze the data. The descriptive statistics of the sample of individuals with chronic nonspecific neck pain was performed through the calculation of mean, median and standard deviation. The parameters considered were: WBPQ, HADS, TSK, PRCTS and SF-36.

The correlation analysis between the measures of intensity and interference of pain, intensity of pain and HADS, intensity of pain and TSK, intensity of pain and PRCTS, intensity of pain and SF-36, pain interference and HADS, interference of pain and TSK, pain interference and PRCTS, pain interference and SF-36, HADS and TSK, HADS and PRCTS, HADS and SF-36, TSK and PRCTS, TSK and SF-36, PRCTS and SF-36. This analysis was performed using the Pearson correlation coefficient (or parametric test) or Spearman test (non-parametric test), as observed or

not the normal distribution of values. The magnitude of the correlation for the Pearson or Spearman correlation coefficient was established according to the classification proposed by Ajzen [19]  $\leq 0.20$  very low; 0.21-0.40 low; 0.41-0.60 moderate; 0.61-0.80 high and 0.81-1.0 very high. The level of significance was  $p \leq 0.05$  [19].

### 3. Results

The study was carried out with 18 participants, one of the volunteers being excluded because there was no neck pain represented in the WBPQ body scheme, constituting 17 individuals, of which 13 were students of the physiotherapy course of UNIFESO (76%) and 4 physiotherapists (24%). Of these, 82% (n=14) were single and female and 18% (n=3) married, male, all with mean age of 25.6 years and standard deviation (SD) of  $\pm 7.5$  years, with a time of neck pain of  $3.4 \pm 2.9$  years. The WBPQ result (Table 1) demonstrated that the participants (n=17) in filling the figure of the human body to locate the pain reported that they felt pain in the cervical region. They also identified pain in other places, such as: lumbar spine (n=8), thoracic spine (n=4), head (n=7) and elsewhere (n=13). In relation to the most uncomfortable region, 88% (n=15) said to be in the cervical and 12% (n=2) in other places, comprised by lumbar and thoracic spine. Regarding the type of pain felt, 59% of the individuals (n=10) reported being of the deep type and 41% (n=7) being of the superficial type. Regarding the treatment performed by the participant to improve their pain, 59% of the participants reported having to do a combination therapy, that is, medication and physical therapy, 18% (n=3) said only physical therapy, 12% oral and 12% no treatment.

WBPQ	Mean $\pm$ SD	Median
<b>Intensity of pain</b>		
Worse pain	6.3 $\pm$ 2	7
Pain on average	4.5 $\pm$ 1.5	4.5
Pain now	1.7 $\pm$ 1.8	1
Final score	12.5 $\pm$ 3.8	13
<b>Pain Interference</b>		
Humor	1.5 $\pm$ 1.2	1,5
Relationship with people	1.39 $\pm$ 1.2	1
Walk	0.89 $\pm$ 0.8	1
Sleep	1.22 $\pm$ 1	1
Normal work	0.56 $\pm$ 1.1	0
Pleasure to live	0.56 $\pm$ 0.9	0

SD-Standard Deviation

**Table 1:** Descriptive statistics of the study sample referring to the items of the WBPQ pain intensity and interference scales.

The HADS score shows that 65% (n=11) had cut-off scores for anxiety and 6% (n=1) for depression. The value of the cut score presented a mean of  $9.8 \pm 3.2$  and a median of 10 points for anxiety and for depression  $3.7 \pm 2.8$  with a median of 3 points. The TSK score presented a mean of  $34.6 \pm 5.11$  and a median of 34 points, with 35% (n=6) of

the sample being kinesiophobic, with a mean of  $40 \pm 3.57$  and a median of 38.5 points. The other 65% (n=11) of the participants were not kinesiophobic and scored on average  $32.1 \pm 2.96$  and a median of 32 points. The PRCTS total score had a mean of  $1.4 \pm 0.8$  points and a median of 1.6 points. The obtained score is subjective of the presence of catastrophism, however, we consider the reference value obtained being low level for catastrophism, once the study population reached an average of 28% (1.4) of the total score (5.0) and the instrument does not present a cut-off note. The result of the analysis of SF-36 domains is shown in Table 2.

SF-36 (Domains)	Mean $\pm$ SD	Median
Functional capacity	82.9 $\pm$ 16.3	90
Physical aspects	55.8 $\pm$ 35.9	50
Pain	48.5 $\pm$ 16.4	51
General health status	59.3 $\pm$ 16	57
Vitality	45 $\pm$ 16.7	40
Social aspects	73.5 $\pm$ 26	87.5
Emotional Aspects	52.9 $\pm$ 38	66.7
Mental health	56.9 $\pm$ 11.3	60

SD-Standard Deviation

**Table 2:** Descriptive statistics of the study sample referring to the domains of the SF - 36 questionnaire.

The correlation of the SF-36 (Table 3), functional domain with the pain interference scale of the WB PQ, ( $r=-0.50$  and  $p < 0.04$ ); with PRCTS ( $r=-0.55$  and  $p < 0.02$ ) and with HADS ( $r=-0.60$  and  $p < 0.01$ ) was of moderate magnitude and statistically significant. The physical aspects of the SF-36 obtained a high-magnitude correlation with pain interference ( $r=-0.62$  and  $p < 0.008$ ) and with the other instruments the correlation was low to moderate magnitude, especially depression ( $r=-0.42$  and  $p < 0.09$ ) among the others. The pain domain of the SF-36 obtained a high magnitude correlation with pain intensity ( $r=-0.73$  and  $p < 0.001$ ) and very high with WB PQ pain interference ( $r=-0.82$  and  $p < 0.001$ ). The HADS correlation was of moderate magnitude for anxiety ( $r=-0.59$  and  $p < 0.01$ ) and for depression ( $r=-0.19$  and  $p < 0.47$ ); ( $r=-0.19$  and  $p < 0.46$ ) presented a very low magnitude of correlation and with the PRCTS was of moderate magnitude ( $r=-0.45$  and  $p < 0.07$ ). The SF-36 general health domain showed a correlation with high magnitude when correlated with the pain intensity scale ( $r=-0.74$   $p < 0.001$ ) and WB PQ pain interference ( $r=-0.65$   $p < 0.005$ ); with PRCTS was moderate ( $r=-0.33$  and  $p < 0.19$ ); with HADS for anxiety presented a very low magnitude ( $r=-0.12$  and  $p < 0.65$ ) and for depression showed a high magnitude ( $r=-0.45$  and  $p < 0.07$ ) except for TSK ( $r=0, 17$  and  $p < 0.51$ ) that did not present negative correlation. The social aspects domain of the SF-36 obtained a moderate magnitude correlation with the pain intensity scales of WB PQ ( $r=-0.60$   $p < 0.01$ ), WB PQ pain interference ( $r=-0.57$   $p < 0.02$ ) and with HADS for anxiety ( $r=-0.60$   $p < 0.01$ ). The correlation with the PRCTS ( $r=-0.65$   $p < 0.004$ ) was of high magnitude correlation. On the other hand, the correlation with HADS for depression ( $r=-0.40$   $p < 0.11$ ) and with TSK ( $r=-0.35$   $p < 0.17$ ) was of low magnitude. The correlation of the pain intensity scale of the WB PQ (TABLE 4) obtained a moderate magnitude correlation with the PRCTS ( $r=0.51$  and  $p < 0.03$ ) and with the HADS for anxiety ( $r=0.55$  and  $p < 0.02$ ); with HADS for depression ( $r=0.40$  and  $p < 0.12$ ) showed a low magnitude and with

TSK ( $r=0.08$   $p <0.76$ ) showed a very low magnitude (Table 4). The WPBQ pain interference obtained a high magnitude correlation with the PRCTS ( $r=0.70$  and  $p <0.002$ ), moderate magnitude with the HADS for anxiety ( $r=0.49$  and  $p <0.05$ ), low magnitude with the HADS for depression ( $r=0.26$  and  $p <0.31$ ) and for TSK ( $r=0.23$  and  $p <0.37$ ).

SF - 36 Domains	Intensity		Interference		Catastrophism		Anxiety		Depression		Kinesiophobia	
	(r)	(p)	(r)	(p)	(r)	(p)	(r)	(p)	(r)	(p)	(r)	(p)
Functional capacity	-0.44	0.07	-0.50	0.04	-0.55	0.02	-0.60	0.01	-0.31	0.22	-0.31	0.23
Physical aspects limitation	-0.38	0.13	-0.62	0.008	-0.36	0.15	-0.25	0.34	-0.42	0.09	-0.15	0.55
Pain	-0.73	0.001	-0.82	0.001	-0.45	0.07	-0.59	0.01	-0.19	0.47	-0.19	0.46
General health status	-0.74	0.001	-0.65	0.005	-0.33	0.19	-0.12	0.65	-0.45	0.07	0.17	0.51
Vitality	-0.32	0.21	-0.31	0.23	-0.21	0.43	0.06	0.81	-0.38	0.13	0.25	0.33
Limitation by social aspects	-0.60	0.01	-0.57	0.02	-0.65	0.004	-0.60	0.01	-0.40	0.11	-0.35	0.17
Emotional Aspects	-0.18	0.49	-0.40	0.11	-0.33	0.19	-0.40	0.11	-0.27	0.29	-0.39	0.13
Mental health	-0.32	0.21	-0.38	0.13	0.08	0.75	-0.15	0.56	-0.27	0.30	0.04	0.89

r-correlation coefficient; p-significance level

**Table 3:** Spearman correlation between the measurement instruments used and the SF-36 domains.

Psychometric Factors	Intensity of pain		Pain Interference	
	(r)	(p)	(r)	(p)
Catastrophism	0.51	0.03	0.70	0.002
Anxiety	0.55	0.02	0.49	0.05
Depression	0.40	0.12	0.26	0.31
Kinesiophobia	0.08	0.76	0.23	0.37
Intensity of pain	-	-	0.78	0.0003

r-correlation coefficient; p-significance level

**Table 4:** Spearman correlation between the measurement instruments used and the intensity and interference of WPBQ pain.

#### **4. Discussion**

When analyzing the correlation of QoL with pain intensity, there were negative values of moderate and high magnitude, being statistically significant between pain domains, general health status ( $p < 0.001$ ) and social aspects ( $p < 0.01$ ). This demonstrates that the greater the pain intensity the lower the QoL. This was also observed in the study by Bacchi et al. [20] who found lower QoL in physical therapy students with chronic low back pain, and the study by Lorena et al. [21] in individuals with fibromyalgia [20, 21]. QoL is also affected when pain causes interference in the individual's life, such as mood, social relations, gait, sleep, work and pleasure of life observed with WBPAQ [13], which are directly related [22, 23] and already evidenced in studies with QoL [12, 24]. QoL is also diminished in the presence of anxiety and catastrophism by HADS, being common in the domains of functional capacity and social aspects of SF-36. Anxiety is also able to influence the pain domain, and although a significant score with catastrophism was not observed ( $p=0.07$ ), it shows a correlation of moderate magnitude ( $r=-0.45$ ). Anxiety is described as a negative emotion of fear [25] that would be able to provoke impediments of certain activities and thus contribute to the functional incapacity and worsening of the pain [26] being able to decrease the QoL [27-30].

When comparing catastrophism by PRCTS and QoL by SF-36, a negative correlation with functional capacity and social aspects is observed, evidencing a possible decrease in physical activity by the individuals. Such a claim has already been described in the study by Geelen et al.<sup>31</sup> who observed that the presence of catastrophism leads to a decline in physical activity but that, when compared with the intensity of pain, no such correlation was seen [31]. This is contrary to the results of the present study, where the intensity of pain ( $r=-0.51$  and  $p=0.03$ ) and its interference ( $r=-0.70$  and  $p=0.002$ ) when compared to catastrophism, statistically significant and with moderate correlation and high magnitude, respectively, evidencing its connection in the control and physical adaptation in the presence of chronic pain [32]. Lazaridou et al. [33] reported in their study that higher levels of catastrophism are capable of generating greater pain intensity, interference in physical activity and adverse reaction to medication when compared with participants who obtained lower catastrophic scores [33].

Physical inactivity has a negative impact on well-being, physical and mental health, as it decreases cardiac output, systolic volume, red blood cell production, androgen serum levels, spermatogenesis, sympathetic nervous system activity, body temperature and heart rhythms, leaving people more vulnerable to disease [34]. It is also linked to kinesiophobia, since it is described as an irrational fear of movement as a consequence of a previous pain experience, kinesiophobic have less physical activity due to fear of movement [9, 10]. Although the correlation with the HADS anxiety in the study did not score statistically significant with kinesiophobia by the TSK ( $p < 0.06$ ), these could be related ( $r=0.46$ ) due to the irrational fear that it exerts towards a (limb), fear (amygdala) and memory of this feeling (hypothalamus) [8, 35]. This idea may also be based on literature findings, which observe that the higher the anxiety and major depression is the presence of kinesiophobia [10, 30, 36], although the correlation with depression by HADS in the present study was very low ( $r=-0.08$  and  $p=0.76$ ).

One of the reasons that lead us to believe that the correlation is very low and negative with depression was the study population, since it was composed by academics and physiotherapists, and only 6 had kinesiophobic indexes. This may indicate that the population is aware of the approach to coping with kinesiophobia, which is knowledge about pain, providing a decrease in the fears that this imposes on it [37]. Another finding that can be defended through such an affirmation is the correlation between kinesiophobia by TSK and the domains of general health status ( $r=0.17$  and  $p=0.51$ ), vitality ( $r=0.25$  and  $p=0.33$ ) and mental health ( $r=0.04$  and  $p=0.89$ ) of SF-36. Despite this, it shows a low to moderate magnitude correlation, being negative with functional capacity domains ( $r=-0.31$  and  $p=0.23$ ), physical aspects ( $r=-0.15$  and  $p=0.55$ ), pain ( $r=-0.19$  and  $p=0.46$ ), social aspects ( $r=-0.35$  and  $p=0.17$ ) and emotional aspects ( $r=-0.39$  and  $p=0.13$ ) of SF-36. Although the evidence showed a correlation between kinesiophobia and pain, it was not present when correlated with pain intensity ( $r=0.08$  and  $p=0.76$ ) and its interference ( $r=0.23$  and  $p=0.37$ ) of the QBDW. This result has already been described in the literature [30, 38, 39].

In relation to catastrophism by PRCTS, the results were favorable with kinesiophobia by TSK ( $r=0.43$  and  $p=0.09$ ), but did not present a statistically significant difference. When compared with recent studies, this data is poorly explored, since many of them only show the influence of kinesiophobia and catastrophism on pain, not comparing them to each other [40-42].

The intensity of pain was extremely significant when correlated with pain interference ( $r=0.78$  and  $p < 0.003$ ), which are the factors addressed by WBPQ. Unfortunately, no studies were found in the literature that correlated the pain intensity and interference scores, but it was seen in a very similar questionnaire (Brief Pain Inventory) that the intensity when it is elevated increases the pain interference scores [43-45]. The interference of pain is also related to the presence of anxiety and catastrophism, and the greater the presence of these, the greater the interference of pain in the individual's daily life. This is because anxiety is able to interfere in the daily life of the individual, generating tension and fear in certain situations [46].

Although the correlation between depression with HADS with the other psychometric factors and the SF-36 domains was not statistically significant, the correlation coefficient was negative in all domains of the QoL questionnaire and positive with the other factors. This means that the greater the presence of depression, the more it favors the onset of catastrophism, kinesiophobia, anxiety, pain intensity, pain interference, and the lower the QoL [30, 38, 47]. Perhaps the presence of depression was not statistically relevant when correlated with QoL, because only a single person was able to achieve the depression cut-off point in the HADS.

Although the present study does not make clear the order of events (whether there is or is no presence of anxiety and depression before pain, or if these occur before or after the presence of kinesiophobia and catastrophism), one can assume that Vlayen's model et al. [10], a new way to understand the factors that interfere in the intensity of pain, interference of pain and QoL in these patients with chronic nonspecific neck pain. Taking into account the results and the discussion of the findings, there is first a painful event that added to the presence of anxiety, depression, catastrophism and kinesiophobia are able to intensify pain and interfere in the individual's life [10, 30, 36, 43, 44,



48]. In addition, catastrophism and kinesiophobia are also capable of increasing the intensity and interference of pain [23, 49-51], although such correlation with kinesiophobia was not seen in the present study. It is not clear whether the onset of catastrophism occurs before kinesiophobia, or the contrary, but it is evident that an influence on the appearance of the other and that both are due to the presence of cognitive problems [31, 44].

## 5. Conclusion

The main objective of the present study was to evaluate the presence of anxiety, depression, kinesiophobia, catastrophism, pain intensity and pain interference in order to highlight their respective influences on the quality of life of patients with chronic nonspecific neck pain. Through the results of this study, it was observed that the psychometric factors are related to the presence of pain, besides contributing to its worsening. Another point to be emphasized is that individuals who have chronic nonspecific neck pain and present some of these factors, have less quality of life, besides having more interference of the pain in their lives. As the study population was delimited with patients with chronic nonspecific neck pain, it is not known to us whether the same result is repeated in other diseases. For this, a greater investigation is necessary on the subject, evidencing through new studies the possibility of these being present or not in the various types of chronic pains.

## Conflict of Interest

The authors have no conflict of interest.

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