

Self-reported muscle tension assessment: Validation study of the Visual Analog Scale for tension

Öz bildirime dayalı kas gerginliği değerlendirilmesi: Gerginlik için Görsel Analog Skalası'nın geçerlilik çalışması

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ABSTRACT

Background: This study aims to evaluate the validity of the Visual Analog Scale-Tension (VAS-T).

Patients and Methods: This cross-sectional study included a total of 100 patients with chronic pain and 100 individuals without pain complaints between April 2021 and April 2022. All participants completed a sociodemographic information form, the Visual Analog Scale for Tension (VAS-T), the Depression Anxiety Stress Scale (DASS-42), and the Toronto Alexithymia Scale (TAS-20). Additionally, patients with chronic pain completed the Visual Analog Scale for Pain (VAS-P) and algometer assessments. The discriminant, concurrent, and convergent validity of the VAS-T was evaluated.

Results: Concerning discriminant validity, analyses revealed that individuals in the pain group exhibited significantly higher VAS-T scores compared to the control group ($p < 0.001$). There was a significant correlation between VAS-T scores, muscle tension algometer scores, and anxiety, stress, and alexithymia levels ($p < 0.01$). Participants reporting low tension on the VAS-T differed significantly from those reporting high tension regarding these variables ($p < 0.05$).

Conclusion: The self-reported VAS-T is a rapid, practical and valid self-reported tool for assessing muscle tension.

Keywords: Algometer, chronic pain, muscle tension, pain intensity, pain management, Visual Analog Scale.

Pain, an unpleasant sensory and emotional experience associated with actual or potential tissue damage, is a prevalent public health problem.^[1,2] Additionally, pain is a complex and

ÖZ

Amaç: Bu çalışmada, Gerginlik için Görsel Analog Skalası'nın (VAS-T) geçerliliği değerlendirildi.

Hastalar ve Yöntemler: Bu kesitsel çalışmaya, Nisan 2021 and Nisan 2022. tarihleri arasında kronik ağrısı olan toplam 100 hasta ve ağrı şikayeti olmayan 100 katılımcı dahil edildi. Tüm katılımcılar sosyodemografik bilgi formunu, Gerginlik için Görsel Analog Skalası (VAS-T), Depresyon Anksiyete Stres Skalası (DASS-42) ve Toronto Aleksitimi Skalası'nı (TAS-20) doldurdu. Ayrıca, kronik ağrısı olan hastalara Ağrı için Görsel Analog Skalası (VAS-P) ve algometre değerlendirmeleri uygulandı. Gerginlik için Görsel Analog Skalası'nın ayırt edici, eş zamanlı ve yakınsak geçerliliği değerlendirildi.

Bulgular: Ayırt edici geçerlilik açısından yapılan analizler, ağrı grubundaki bireylerin kontrol grubuna kıyasla anlamlı derecede daha yüksek VAS-T puanlarına sahip olduğunu gösterdi ($p < 0.001$). Gerginlik için Görsel Analog Skalası puanları ile kas gerginliği algometre ölçümleri ile anksiyete, stres ve aleksitimi düzeyleri arasında anlamlı korelasyon bulundu ($p < 0.01$). Gerginlik için Görsel Analog Skalası'nda düşük gerginlik bildiren katılımcılar ile yüksek gerginlik bildirenler bu değişkenler açısından anlamlı farklılık gösterdi ($p < 0.05$).

Sonuç: Öz bildirime dayalı VAS-T, kas gerginliğini değerlendirmek için hızlı, pratik ve geçerli bir ölçüm aracıdır.

Anahtar sözcükler: Algometre, kronik ağrı, kas gerginliği, ağrı şiddeti, ağrı yönetimi, Görsel Analog Skalası.

subjective experience with behavioral, emotional, and cognitive dimensions.^[2] Pain scales in clinical pain assessments help provide an objective framework for understanding the inherently subjective experience of

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pain.^[3] One of the methods used in pain assessment is the measurement of pressure pain threshold (PPT) with an algometer. An algometer is a pressure tolerance test used to determine the PPT, defined as the point at which an individual perceives a maximum applied pressure as pain.^[4] Algometry is a valid and reliable measurement method in clinical settings.^[5] A recent meta-analysis and systematic review have shown that chronic pain patients have significantly lower PPT values than healthy controls, with interventions targeting muscle tension and sensitivity resulting in increased PPT values.^[6]

Research indicates that muscle tension is one of the most significant determinants of pain.^[7] The Tension Model of Chronic Pain (TMCP), a contemporary biopsychosocial model, claims that muscle tension is a central component in the development of chronic pain.^[8] Tension, while often defined as muscular tension or the degree of stretch or shortening of muscle fibers, is also used to encompass the entire somatic component, including autonomic activation levels and other sensory and physiological indicators.^[8] Examining the pain literature from a psychological perspective reveals that studies consistently focus on the relationships between chronic pain and adverse childhood experiences, commonly observed personality patterns in pain cases, patients' locus of control, pain outcomes, and ongoing adverse life experiences.^[9-13] However, it is noteworthy that the relationship between these factors and chronic pain is moderate,^[14] whereas some studies have reported no significant relationship.^[15,16] In this context, the TMCP suggests that physical tension mediates the relationship between the precursors of tension and pain intensity. In other words, increased muscle tension leads to the onset of pain, which, over time, becomes a factor that further amplifies tension. Therefore, measuring and managing tension could effectively assess and manage pain.

The Visual Analog Scale for Tension (VAS-T) is a self-report assessment tool developed as an alternative to algometry, a device not always accessible in clinical settings, to measure levels of muscle tension.^[8] This tool offers a faster and more practical means of measuring perceived muscle tension levels across all conditions. In the present study, we aimed to test the validity of the VAS-T, which provides practical use in assessing tension. For this purpose, we grouped the hypotheses developed based on the literature according to the type of validity and present them below.

Discriminant validity

The TMCP suggests that tension is a significant determinant of chronic pain experiences.^[8] Therefore, if the VAS-T is a valid measurement tool, it is expected to differentiate between groups with and without pain in terms of tension. Accordingly, the first hypothesis of this study is as follows:

H1: The VAS-T scores of the pain group will be statistically significantly higher compared to the non-pain comparison group.

Concurrent validity

Researchers consider PPT values measured with an algometer as an outcome variable in interventions targeting muscle tension and sensitivity.^[6] Accordingly, the VAS-T, a self-reported measure of muscle tension, is expected to correlate with PPT values. Based on this, the other hypotheses of this study are as follows:

H2: Participants in the pain group who report high tension levels will have significantly lower PPT values in their tense muscles than those who report low tension levels.

H3: In the pain group, there will be a significant negative correlation between VAS-T scores and PPT values in tense muscles. At the same time, there will be no significant correlation with PPT values in non-tense muscles.

Convergent validity

Factors such as depression, anxiety, stress, or alexithymia can increase pain sensitivity and intensity.^[17-19] The TMCP predicts that the VAS-T measures tension, the closest precursor of pain sensitivity and intensity. We expect that VAS-T scores will correlate with these variables. In line with this, the other hypotheses of this study are as follows:

H4: There will be a positive and significant relationship between VAS-T scores and scores of VAS-A, depression, anxiety, stress, and alexithymia.

H5: Participants reporting high levels of tension according to VAS-T scores will have significantly higher scores for depression, anxiety, stress, and alexithymia compared to participants reporting low levels of tension.

H6: The frequency distribution of participants categorized as having high, medium, or low levels of alexithymia will differ significantly across the low- and high-tension categories on the VAS-T. Specifically, we expect a significantly higher percentage of participants with high alexithymia in the high-tension group than in the low-tension group.

PATIENTS AND METHODS

This cross-sectional study was conducted at Istanbul University, Department of Physical Medicine and Rehabilitation, Algology Clinic between April 2021 and April 2022. Our study sample consisted of two groups: the chronic pain group and the comparison group. The chronic pain group included patients followed with a diagnosis of chronic pain. The comparison group included participants who did not report any pain. We recruited participants in the comparison group from the researchers' social networks, taking the inclusion criteria into account, and included them in the study. A power analysis conducted using G*Power version 3.1.9.7 software (Heinrich Heine University Düsseldorf, Düsseldorf, Germany) determined a minimum sample size of 100 participants per group, resulting in a total sample size of 200. Considering seven variables in the model, this calculation was based on an effect size of 0.15, a significance level of 0.05, and a power of 95%. The data were collected using a convenience sampling method, with a total of 100 participants for each group.

Inclusion criteria were as follows: (1) having been diagnosed with chronic pain, (2) reporting pain complaints persisting for the last three months, (3) being between 18 and 65 years of age, (4) being literate, and (5) volunteering to participate in the study. Inclusion criteria for the comparison group were as follows: (1) not having been diagnosed with any chronic pain condition, (2) not reporting any pain complaints in the past three months, (3) being between 18 and 65 years of age, (4) being literate, and (5) volunteering to participate in the study. We excluded participants with a psychiatric diagnosis from both groups. Finally, a total of 200 participants were recruited. A written informed consent was obtained from each patient. The study protocol was approved by the Istanbul University Social and Human Sciences Research Ethics Committee (Date: 17.03.2021, No: 139320). The study was conducted in accordance with the principles of the Declaration of Helsinki.

Measurement tools

The sociodemographic and personal information form

We developed this form to describe the sociodemographic and pain-related characteristics of the participants.

Visual Analog Scale-Pain (VAS-P)

Bryant^[20] developed VAS-P to assess self-reported pain intensity. Participants rated their pain on a 0-10 scale, with higher scores indicating greater pain intensity. We administered the VAS-P only to the pain group.

Visual Analog Scale-Tension (VAS-T)

Developed by Sertel Berk^[8] to assess muscle tension levels based on self-report, this scale allows participants to rate their perceived tension intensity on a scale from 0 to 10. Higher scores indicate higher levels of perceived muscle tension. We collected data using the VAS-T from both the pain and comparison groups. In line with hypotheses for H2, H5, and H6, we also converted the VAS-T scores into a two-category variable, categorizing them as low (scores of 5 and below; n=41) and high (scores of 6 and above; n=59), based on the mean χ^2 : 5.99 ± 2.95). This variable had a high and positively significant relationship with the VAS-T scores ($r = 0.847$, $p < 0.01$).

Depression-Anxiety-Stress Scale (DASS-42)

The DASS-42 was developed by Lovibond and Lovibond^[21] to measure current (past week) symptoms of depression, anxiety, and stress. Bilgel and Bayram^[22] carried out the Turkish adaptation of the scale. The scale consists of 42 items, each rated on a four-point scale ranging from "Never" to "Always." Higher scores on the scale indicate increased levels of depression, anxiety, and stress. Scores ranging from 0 to 9 for depression, 0 to 7 for anxiety, and 0 to 14 for stress are considered to be within the normal range. In the original validation study, Cronbach's alpha coefficients for the depression, anxiety, and stress subscales were 0.92, 0.86, and 0.88, respectively. In the present study, Cronbach's alpha coefficients for these subscales were 0.93, 0.86, and 0.89, respectively. Data were collected from both groups using the DASS-42.

Toronto Alexithymia Scale (TAS-20)

Developed by Bagby et al.^[23] to assess individuals' levels of alexithymia, Güleç et al.^[24] carried out the Turkish adaptation of the scale. The 20-item scale consists of three subscales: Difficulty Identifying Feelings, Difficulty Describing Feelings, and Externally Oriented Thinking. In the validation study, Cronbach's alpha for the total scale was 0.78. In contrast, Cronbach's alpha coefficients for the subscales ranged from 0.57 to 0.80. In our study, the Cronbach's alpha internal consistency

coefficient for the entire scale is 0.82, while the coefficients for the subscales Difficulty Identifying Feelings, Difficulty Describing Feelings, and Externally Oriented Thinking are 0.84, 0.71, and 0.37, respectively. Responses to the scale range from 1 (Never) to 5 (Always). Higher scores on the scale indicate a higher level of alexithymia. Additionally, the scale includes cut-off scores. According to these cut-offs, we classify scores of 51 and below as indicating no alexithymia, scores between 51 and 59 as borderline, and scores of 59 and above as pure alexithymia. We collected data from both groups using the TAS-20.

Wagner compact manual algometer

It is a measurement tool used to determine the level of muscle tension. An increase in muscle tension indicates the presence of local pain in the related muscle.^[25] In other words, the muscle experiencing pain is tense. The TMCP supports this notion.^[8] Based on this, we defined tense muscles as those in which patients experienced pain, while we defined non-tense muscles as those in which patients did not perceive pain. The same researcher evaluated all participants to ensure consistency in the algometer measurements. Before taking the algometer measurements, we instructed participants to inform the researcher when they felt any pain and to avoid resisting the pressure. The measurement with the algometer can be summarized as follows: Pressure is applied with the algometer to the targeted muscle group with increasing intensity. The participant informs the researcher of the first sensation of pain, and the researcher stops the pressure at that point. We record the number displayed on the algometer. This procedure is repeated three times at 2-min intervals. We determine the average of the three measurements as the participant's pain threshold which means the moment when the participant first feels pain. As the average score obtained from the algometer decreases, the tension level of the measured muscle increases. In this study, we took measurements from the tense and non-tense muscles of participants in the pain group.

To enhance clarity for the readers, we used artificial intelligence to create an illustrative figure describing the algometry measurement procedure (Figure 1).

To assess the validity of the algometer, the mean scores obtained from tense (painful) and non-tense (pain-free) muscles were compared using a paired samples t-test. A significant difference was found ($t_{(99)} = -13.279$, $d = 1.315$, $p < 0.001$) between the mean algometer scores of the tense ($\chi^2: 3.63 \pm 1.37$)

and non-tense muscle groups ($\chi^2: 5.59 \pm 1.60$). Based on this finding, it was concluded that the algometer was a valid measurement tool.

Statistical analysis

Statistical analysis was performed using the IBM SPSS version 28.0 software (IBM Corp., Armonk, NY, USA). Descriptive data were presented in mean \pm standard deviation (SD), median (min-max) or number and frequency, where applicable. A paired samples t-test was used to test the validity of the algometer. An independent samples t-test, Pearson chi-square test, and Pearson correlation analysis were carried out to test the hypotheses. A p value of < 0.05 was considered statistically significant.

RESULTS

The study included a total of 100 patients with chronic pain and 100 participants without pain complaints. Of the participants, 24 were male and 176 were female, with a mean age of 39.18 ± 11.60 years (range, 18 to 64 years). In the pain group, 59% of the participants were graduates of high school, university, or postgraduate programs, whereas this proportion was 93% for the comparison group.

Discriminant validity

In accordance with Hypothesis 1, the pain group exhibited statistically significantly higher VAS-T scores compared to the comparison group (Table 1). Therefore, H1 is supported.

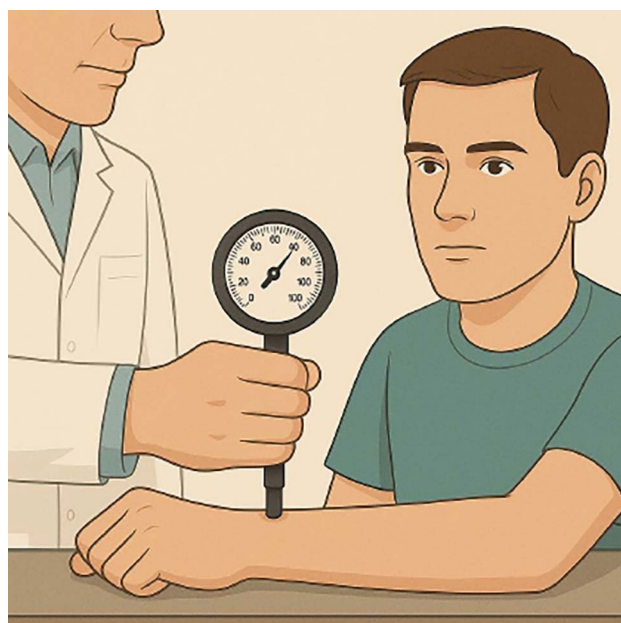


Figure 1. Illustration of the algometry measurement procedure.

Table 1. Independent Samples t-test findings

Hypothesis	Variables	Group	n	Mean±SD	t	df	p	Cohen's d coefficient
H1	VAS-T	Pain	100	5.99±2.95	3.875	198	0.000**	0.548
		Comparison	100	4.50±2.46				
H2	Tense muscle PPT scores	Low-tension	41	3.97±1.54	2.093	98	0.039*	0.420
		High-tension	59	3.39±1.20				
H5	Depression scores	Low-tension	41	13.31±10.29	-0.974	98	0.332	0.197
		High-tension	59	15.27±9.55				
H5	Anxiety scores	Low-tension	41	9.12±6.85	-2.022	98	0.046*	0.414
		High-tension	59	12.10±7.50				
H5	Stress scores	Low-tension	41	15.12±10.11	-2.328*	98	0.022*	0.529
		High-tension	59	19.92±7.90				
H5	Alexithymia scores	Low-tension	41	46.63±11.64	-1.933	98	0.056	0.396
		High-tension	59	51.44±12.61				

SD, standard deviation; df, degrees of Freedom; n, number of participants in the groups; H1, hypothesis 1; H2, hypothesis 2; H5, hypothesis 5; VAS-T, Visual Analog Scale-tension; PPT, algometer measurement score; * $p < 0.05$; ** $p < 0.001$. *Footnote:* For H1, since the number of participants in each group was 100, we examined the skewness and kurtosis values of the dependent variable in each group to test normality. Since the values were within the range of +1 and -1, we observed that GAS-G was normally distributed in both groups. For the other hypotheses, normality was assessed using the Kolmogorov-Smirnov test. We accepted a significance level of $p > 0.001$ and found that all dependent variables were normally distributed within each group.

Concurrent validity

First, within the scope of the second hypothesis for concurrent validity, we conducted a t-test to examine whether PPT measurement scores differed between patients in the pain group who reported low versus high levels of tension on the VAS-T. We found that participants reporting low tension had significantly higher PPT scores for tense muscles than those reporting high tension (Table 1). The results supported H2.

Furthermore, consistent with Hypothesis 3, Pearson correlation analysis revealed a significant negative correlation between VAS-T scores and PPT scores from the tense muscle. However, we found no significant correlation between VAS-T and non-tense muscle PPT scores (Table 2). We confirmed H3.

Convergent validity

To test Hypothesis 4, we conducted another Pearson correlation analysis. The results showed significant positive relationships between VAS-T scores and VAS-A, anxiety, stress, and alexithymia scores (Table 2). Our findings supported H4.

The results of the independent samples t-test, conducted in line with Hypothesis 5, show that individuals who reported low tension significantly differed from those who reported high tension in terms of anxiety and stress variables. Specifically, those in the high-tension group have higher anxiety and stress scores compared to those in the low-tension group. However, we found no statistically significant differences for the variables of depression and alexithymia (Table 1). Therefore,

Table 2. Pearson correlation coefficients showing the relationship between VAS-T score and other variables

Variables	VAS-T	VAS-P	PPT-Tense muscle	PPT-Non-tense muscle	Depression	Anxiety	Stress	Alexithymia
VAS-T	1	0.232	-0.235	-0.193	0.160	0.289	0.302	0.275
r ²	1	0.053	0.055	0.037	0.025	0.083	0.091	0.075
p-value		0.020*	0.019*	0.055	0.113	0.004**	0.002**	0.006**

VAS-T, Visual Analog Scale-tension; VAS-P, Visual Analog Scale-pain; PPT, algometer scores; r², coefficient of determination; * $p < 0.05$; ** $p < 0.01$.

this finding supported H5 only for the anxiety and stress scores.

In line with Hypothesis 6, we examined the pain group by dividing them into three categories based on the cut-off scores of the TAS-20. The analysis showed that in the low-tension group, 73.2% exhibited low levels of alexithymia, while 17.1% fell into the high alexithymia category. These rates were 45.8% and 32.2% in the high-tension group, respectively. In other words, individuals with high alexithymia were significantly more frequent in the high-tension group compared to the low-tension group ($p < 0.05$). Thus, we confirmed H6.

DISCUSSION

It is well-known that the level of muscle tension plays a significant role in the experience of pain.^[8] In the present study, we examined the validity of the VAS-T, which provides practical use in assessing tension. Our study results showed that VAS-T was a valid, self-report measure for assessing tension. The discriminant validity study also revealed a significant difference in tension scores between the pain group and the control group, with the pain group reporting significantly higher VAS-T scores. In line with the present study's findings, the literature also indicates that individuals with pain exhibit more unconditional and conditional muscle responses to pain stimuli than healthy controls.^[7] Moreover, researchers suggest that individuals with pain experience increased muscle tension when exposed to stressful situations.^[26] This finding supports the notion that the VAS-T is a valid measure of tension.

The algometer is a measurement tool to identify trigger points and monitor changes in muscle tension in individuals with pain.^[25] Therefore, we used an algometer to test the concurrent validity of the VAS-T. The significant difference in PPT scores obtained from the tense muscles of participants who reported high versus low levels of tension provides evidence for the concurrent validity of the VAS-T. We also examined the relationship between VAS-T measurements and PPT scores as part of the concurrent validity assessments. We found that the VAS-T had no relationship with the PPT scores from non-tense muscles. Since the VAS-T measurement naturally assesses physical tension, the lack of relationship with PPT scores from non-tense muscles is both expected and desired. We found a significant relationship between the PPT measurements from tense muscles and VAS-T scores. Since the VAS-T scores and PPT measurements from tense muscles

aim to measure the same construct, we expect these measurements to be significantly related. The negative relationship between PPT measurements from tense muscles and VAS-T scores arises from the nature of the measurements. High scores on the VAS-T and low scores on the PPT indicate a high level of tension. This finding explains the negative correlation between the two constructs. Although the algometer can be used to monitor changes in muscle tension, it has some disadvantages in measuring muscle tension. First, to ensure measurement reliability, algometer measurements should be taken by the same practitioner.^[27] The sensitive nature of the algometer is a limitation, as its effectiveness can be influenced by the practitioner's technique. Additionally, the algometer is a more costly measurement tool than the VAS-T. Moreover, evaluating muscle tension with the algometer is more time-consuming than using the VAS-T, which is another disadvantage of the algometer. Finally, assessing muscle tension with manual algometers and taking the average of repeated measurements can increase the risk of measurement error. Unlike the algometer, the VAS-T, as a self-report measure of tension, does not require a practitioner, thereby eliminating any potential influence of the practitioner on measuring tension. Thus, using the VAS-T is more advantageous than the algometer for evaluating tension.

In this study, within the context of the convergent validity test, we hypothesized that participants with high levels of tension would have statistically higher depression, anxiety, stress, and alexithymia scores compared to those with low levels of tension; however, no such difference was found for depression and alexithymia. The review of the literature reveals a wide range of factors, including muscle tension, quality of life, self-efficacy beliefs, pain intensity, fatigue, coping styles, pain-related disability, and catastrophizing, as predictors of depression in individuals experiencing chronic pain.^[28-32] We attribute the lack of significant differences in depression scores between groups to the fact that depression in individuals with chronic pain is associated with factors other than tension. In the convergent validity test context, we found no significant difference between the groups for alexithymia, a multidimensional personality trait. The dimensions of alexithymia include externally oriented thinking, limited capacity for imagination, difficulty identifying and describing emotions, and the inability to distinguish between emotional arousal and the muscle sensations that develop.^[33] Individuals with chronic pain have higher levels

of alexithymia compared to those without pain.^[34] Additionally, alexithymia is associated with muscle tension, and individuals with high alexithymia respond to stressors with greater muscle tension.^[35] Although alexithymia scores did not differ based on tension levels in this study, we found that many individuals with high tension levels, as measured by the VAS-T, reported high levels of alexithymia. This finding from the present study supports the view that alexithymia is one of the precursors of tension.^[8] Unlike depression and alexithymia, participants reporting low and high levels of tension showed significant differences in stress and anxiety scores. The increase in stress and anxiety scores with increasing tension levels may be associated with the tendency of individuals with chronic pain to respond to stimuli with muscle tension.^[18,19] In other words, these findings suggest that high levels of stress and anxiety in individuals with chronic pain may contribute to increased muscle tension. In addition to the group difference tests, we assessed convergent validity by examining the correlations between VAS-T scores and other variables. We found no significant correlation between VAS-T scores and depression scores. We attribute the lack of a significant correlation between VAS-T scores and depression scores to the multifactorial nature of depression.^[28-32] We observed that VAS-T scores were significantly related to pain intensity, anxiety, stress, and alexithymia. Since muscle tension is a precursor to pain,^[8] tension and pain intensity are expected to be significantly related. In the TMCP, anxiety and stress are considered outcomes of chronic pain.^[8] Additionally, the model suggests that when pain becomes chronic, the relationship between tension, pain, and its outcomes is reciprocal.^[8] This notion may explain the significant relationship between VAS-T scores and anxiety and stress scores. The significant relationship between VAS-T scores and alexithymia scores aligns with findings suggesting that alexithymia is associated with muscle tension.^[35] By evaluating the study's findings in the context of the literature, we concluded that the VAS-T meets the criteria for convergent validity.

Nonetheless, this study has several limitations. One of the limitations is the cross-sectional design of the research. Another limitation is related to the sample characteristics. Most of the pain group is female, and we observed differences in educational level and age between the groups, which are limitations associated with the sample characteristics. Considering that repeated measurements provide evidence on the reliability of the measurement tool,

we recommend testing the psychometric properties of the VAS-T in a longitudinal design.

On the other hand, as the literature has no self-report measurement tool with tested psychometric properties for measuring muscle tension, we believe that the VAS-T would fill this gap in the literature, which is the study's primary contribution. We also anticipate that this study would prompt further research on muscle tension. Given the critical role of muscle tension in managing chronic pain, this study would enable the use of VAS-T in treating and monitoring chronic pain. Testing multiple types of validity within the study is one of its strengths.

In conclusion, the significance of muscle tension in the experience of chronic pain creates the measurement of tension essential. Based on our study findings, the VAS-T seems to be a practical, valid self-report measurement tool for assessing muscle tension. Further multi-center, large-scale, prospective studies are needed to confirm these findings.

Author Contributions

T.E.D., A.N.A., H.Ö.S.B.: Concept, design, design, supervision, resources, materials, writing, critical review, analysis and/or interpretation; T.E.D.: Data collection and/or processing; T.E.D., A.N.A.: Literature search.

Conflict of Interest

The authors declared no conflicts of interest with respect to the authorship and/or publication of this article.

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Data Sharing Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

AI Disclosure

The authors declare that artificial intelligence (AI) tools were not used, or were used solely for language editing, and had no role in data analysis, interpretation, or the formulation of conclusions. All scientific content, data interpretation, and conclusions are the sole responsibility of the authors. The authors further confirm that AI tools were not used to generate, fabricate, or 'hallucinate' references, and that all references have been carefully verified for accuracy.

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