Parkinson Anxiety Scale: A Validation Study for the Brazilian Population

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ABSTRACT

Objective  The Parkinson Anxiety Scale (PAS) was developed to measure the severity of anxiety symptoms in patients with Parkinson’s disease (PD), and it has not yet been adapted and validated in Portuguese. Thus, this study evaluated the reliability and validity of a translated and adapted version of the PAS for the Brazilian population of PD patients.

Methods  The Parkinson Anxiety Scale – Brazilian Version (PAS-BV) was completed by 55 patients with PD. The reliability (test-retest reliability, interrater reliability and internal consistency) and construct validity of the PAS-BV were assessed by comparing it with the Beck Anxiety Inventory (BAI), the Parkinson’s Disease Fatigue Scale (PFS) and the Unified Parkinson Disease Rating Scale (UPDRS) part III.

Results  Patients with PD had an average age of 64.51 ± 9.20 years and had PD for an average of 6.98 ± 5.02 years. The reliability of the PAS-BV was 0.83, and the intraclass correlation coefficient (ICC) (retest-test) was 0.88. The scale presented good convergent validity with the BAI (r = 0.82, p < 0.05). It also presented good divergent validity with the PFS (r = 0.24, p > 0.05) and the UPDRS part II (r = -0.10, p > 0.05), part III (r = -0.21, p > 0.05), and part IV (r = 0.03, p > 0.05), as indicated by the absence of significant correlations. However, there was a significant correlation between the PAS-BV and part I of the UPDRS (r = 0.67, p < 0.05).

Conclusion  The PAS-BV presents substantial reliability and validity for patients with PD without dementia.

Key Words  Anxiety disorder; Parkinson’s disease; Validation study.
ity and predictive value of these tools are limited because none of them are specific to evaluating anxiety symptoms in PD. To overcome this limitation, Leentjens et al. developed the 12-item Parkinson Anxiety Scale (PAS), which includes three subscales that evaluate persistent anxiety, anxiety episodes and avoidance behavior. The PAS is a valid and reliable tool for measuring anxiety in PD patients, and its original version has good sensitivity and specificity. This tool is easy and brief to administer and presents better clinimetric properties than existing anxiety rating scales. However, its application is limited in countries with cultures and languages that are different from the original version, such as for the Brazilian population. Thus, the aim of this study was to evaluate the reliability and validity of a translated and adapted version of the PAS for Brazilian language and culture.

MATERIALS & METHODS

Design and study participants

The study was a cross-sectional and one-point-in-time evaluation with a retest study. The sample consisted of 55 patients with PD without dementia who were further invited and enrolled in the physical training project for patients with PD from the Pará State University. The patients had a mean age of 64.51 ± 9.20 years old and had been diagnosed with PD for an average of 6.98 ± 5.02 years. All evaluations were performed before patients participated in any intervention (e.g., physical exercise).

All participants had previously been seen by a neurologist who specialized in the evaluation of PD; this neurologist performed the assessment of cognitive status and anxiety levels, and only patients who met the following inclusion criteria were enrolled in the study: (i) stage 1–3 on the Hoehn and Yahr scale (H&Y), (ii) stable use of medication, (iii) signed the free and informed consent form, (iv) was not performing any kind of regular (≥ 2x/week) physical training, and (v) no severe cognitive impairments (Mini-Mental State Examination score ≥ 24). This research was approved by the ethics and research committee of the Pará State University (82885818.6.0000.5167), according to the rules of resolution 466/2012 of the National Council for Research Involving Human Beings and according to the Helsinki Declaration.

Translation and adaptation of the PAS

The PAS was developed to specifically evaluate the severity of anxiety symptoms in PD patients. It can be divided into three subscales (persistent anxiety, episodic anxiety, and avoidance behavior). The scale consists of 12 questions, each with five response options (0, never; 1, rarely; 2, sometimes; 3, frequent; and 4, always).

The PAS was translated into Brazilian Portuguese by following the recommendations in the literature. Four independent translators took part in the translation process. In addition, two translators who performed the back translation were unaware of the original version of the scale. The expert committee was composed of researchers who had experience in the application of interventions among patients with PD (Figure 1).

PAS-BV was tested patients with non-demented PD (n = 10)

Figure 1. Flowchart of the translation process of the Parkinson Anxiety Scale (PAS). T1: translator 1, T2: translator 2, T3: translator 3, BT1: back translator 1, BT2: back translator 2, PD: Parkinson disease.

PAS-BV was tested patients with non-demented PD (n = 10)

Parkinson Anxiety Scale – Brazilian Version (PAS-BV)
The study consisted of 55 patients with PD. The clinical and demographic characteristics of the patients are presented in Table 1. No patients reporting using any antidepressants or anticholinergic medication. The PAS-BV score was not significantly different from the BAI score ($Z = 1.38, p = 0.08$). In the test-retest analysis and when examining the scores between the evaluators, the data were not different ($Z = 1.20, p = 0.11$) and ($Z = 1.41, p = 0.07$), respectively. The data from the subscales measured by the two evaluators were also not different [(PA: $Z = 1.31, p = 0.09$), (EA: $Z = 1.33, p = 0.09$), (AB: $Z = 0.52, p = 0.29$)].

The Cronbach’s alpha of the PAS-BV was 0.83. We analyzed reliability for each subscale: persistent anxiety had a Cronbach’s alpha of 0.73, episodic anxiety had a Cronbach’s alpha of 0.71, and avoidance behavior had a Cronbach’s alpha of 0.70. In addition, we used the Cronbach’s alpha coefficients to determine how much each item impacts the total PAS-BV score (Table 2).

| Variable | Values |
|----------|--------|
| Age (years) | 64.51 ± 9.20 |
| Duration of disease (years) | 6.98 ± 5.02 |
| Levodopa + carbidopa (mg) | 5 |
| Levodopa + decarboxylase inhibitor (mg) | 100 |
| Decarboxylase inhibitor (mg) | 25 |
| Dopamine agonist (mg) | 0.18 |
| Anticholinergic (mg) | 2 |
| Gender (F/M) | 20/35 |
| H&Y stage | 1–3 |
| BAI* | 19 (6–12) |
| PFS* | 20 (14–26) |
| UPDRS* | |
| UPDRS part I | 23 (20–30) |
| UPDRS part II | 14 (8–22) |
| UPDRS part III | 28 (21–35) |
| UPDRS part IV | 1 (1–1) |
| PAS-BV* | |
| PAS-BV day 1 | 20 (5–12) |
| PAS-BV day 2 | 17 (5–12) |
| PAS-BV interviewer 2 | 16 (12–26) |
| Education levels | |
| Primary school (%) | 49.09 |
| High school (%) | 40.00 |
| University (%) | 10.91 |

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The ICC between the first and second evaluation (test-retest reliability) was 0.88 (0.78–0.93; $p < 0.05$); the Kappa coefficient, representing the interrater reliability, was substantial (0.65); and the Bland–Altman plots presented good test-retest agreement and good agreement between the two evaluators for the PAS-BV (Figure 2).

Acceptable convergent construct validity was indicated by the significant correlation between the BAI and the PAS-BV scores (Figure 3A: $r_s = 0.82, p < 0.05$). Good divergent construct validity was indicated by the nonsignificant correlations between the PAS-BV and the PFS (Figure 3B: $r_s = 0.24, p > 0.05$) and the UPDRS part II (Figure 3C: $r_s = -0.10, p > 0.05$), part III (Figure 3D: $r_s = -0.21, p > 0.05$), and part IV (Figure 3E: $r_s = 0.03, p > 0.05$).
consistently, ensuring the accuracy, stability and coherence of the instrument.\textsuperscript{20} PAS-BV retained the reliability aspects of the original version.\textsuperscript{20} In the visual analysis of the Bland–Altman plot, the test-retest results indicate that the instrument has a risk of bias close to zero, with positive agreement.\textsuperscript{20}

In addition to good reliability, it is essential to have validity, which is defined as the interpretation or specific purpose of the instrument.\textsuperscript{19,21,22} The PAS-BV presented good convergent and divergent construct validity, as it was correlated with the BAI, which also evaluates anxiety symptoms. In addition, the PAS-BV was not associated with the PFS or the UPDRS. These data indicate that the instrument measures exactly what they propose to measure\textsuperscript{15,22} and it not significantly influenced by other symptoms of PD.\textsuperscript{5,8,23}

Our result shows a significant correlation between the scores of the PAS-BV and the UPDRS part I; previous studies have shown that anxiety symptoms occur in parallel with other non-motor symptoms of PD,\textsuperscript{5,7,24} which are measured by part I of the UPDRS.\textsuperscript{16}

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However, there was a significant correlation between the PAS-BV and the UPDRS part I (Figure 3F: \( r_s = 0.67, p < 0.05 \)).

**DISCUSSION**

The main finding of this study was that the observer-rated PAS-BV presented acceptable reliability and validity for patients with PD without dementia. Reliability refers to stable and consistent measurements for multiple attempts over time.\textsuperscript{14,19} Validity refers to the ability to measure the variable (anxiety) with minimal error.\textsuperscript{14,19}

When an instrument is developed to monitor the symptoms of a given disease, it is essential to translate and adapt the instrument to populations in other countries to account for cultural variations.\textsuperscript{14} In the case of the PAS, the author highlighted the importance of translation and adaptation to other languages and populations with PD.\textsuperscript{11}

The present study was the first to explore the psychometric properties of a translated version of the PAS-BV for patients with PD without dementia and with a disease staging between 1–3 on the H&Y scale. The reliability of the PAS-BV (0.83) and its subscales – persistent anxiety (0.73), episodic anxiety (0.71) and avoidance behaviors (0.70) – were acceptable in the present study. Additionally, we identified an acceptable correlation between the items within the instrument and their high reliability. In addition, acceptable test-retest reliability and interrater reliability were observed.

Excellent and substantial reliability indicates an instrument’s ability to reproduce the results of a condition in space and time consistently, ensuring the accuracy, stability and coherence of the instrument.\textsuperscript{20} PAS-BV retained the reliability aspects of the original version.\textsuperscript{20} In the visual analysis of the Bland–Altman plot, the test-retest results indicate that the instrument has a risk of bias close to zero, with positive agreement.\textsuperscript{20}

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**Table 2. Internal consistency of the PAS-BV**

| Items                                      | Corrected item-total correlation | Alpha if item deleted |
|--------------------------------------------|----------------------------------|-----------------------|
| 1. Feel anxious or nervous                 | 0.667                            | 0.812                 |
| 2. Feel tense or stressed                  | 0.406                            | 0.832                 |
| 3. Had problems to relax                   | 0.355                            | 0.837                 |
| 4. Felt excessive apprehension about everyday matters | 0.453                            | 0.829                 |
| 5. Felt afraid of something bad or worse happen | 0.590                            | 0.819                 |
| 6. Felt panic or intense fear              | 0.689                            | 0.811                 |
| 7. Felt lack of air in the face of difficult times | 0.482                            | 0.827                 |
| 8. Felt palpitations or rapid heartbeats   | 0.354                            | 0.836                 |
| 9. Fear of losing control                  | 0.539                            | 0.823                 |
| 10. Avoided social situations              | 0.482                            | 0.828                 |
| 11. Avoided public environments            | 0.611                            | 0.817                 |
| 12. Avoided specific objects or situations | 0.388                            | 0.835                 |

PAS-BV: Parkinson Anxiety Scale – Brazilian Version.
mental systematic error that could underestimate or overestimate the reliability and validity of the instrument. In this sense, the evaluators followed the same instructions as the instrument, with one not following the other performing the evaluations. In the test-retest procedure, an interval of 7 days was used so that the results were not influenced by the memory of the participants or by the changing symptoms of anxiety. In all evaluations, only the volunteer and the evaluator were in the same neutral environment to avoid constraints and biases.

Although the study presented significant results for clinical and research applications, some limitations need to be highlighted. The study included participants with PD in stages between 1–3 on the H&Y scale, making it impossible to extrapolate the findings to more severe stages of the disease and to the non-PD population. Therefore, our results cannot be generalized to patients without these characteristics. In addition, the power calculation of the sample size was slightly below 80%, but we believe that its value (79%) did not compromise the findings of the study. Therefore, we encourage future studies with larger sample sizes to further evaluate the applicability of the PAS-BV.

In conclusion, the observer-rated PAS-BV presented accept-

Figure 3. Correlation between anxiety and the Unified Parkinson Disease Rating Scale (UPDRS), Beck Anxiety Inventory (BAI) and Parkinson’s Disease Fatigue Scale (PFS). We identified excellent convergent (A) and divergent validity (B-E) of the Parkinson Anxiety Scale – Brazilian Version (PAS-BV) with other instruments, this is fundamental for the accuracy of the scale.
able reliability and validity for patients with PD without dementia with staging of 1–3 according to the H&Y scale.

Conflicts of Interest
The authors have no financial conflicts of interest.

Acknowledgments
We are grateful to Albert F.G. Leentjens for the permission to use the Parkinson Anxiety Scale. We also thank all the patients and translators who participated in this study.

Author Contributions
Conceptualization: Renilson Moraes-Ferreira, Wilson Mateus Gomes da Costa Alves, Erik Artur Cortinhas-Alves. Data curation: Renilson Moraes-Ferreira, Erik Artur Cortinhas-Alves. Formal analysis: all authors. Investigation: Renilson Moraes-Ferreira, Wilson Mateus Gomes da Costa Alves, Clebson Pantoja Pimentel, Erik Artur Cortinhas-Alves. Methodology: all authors. Project administration: Renilson Moraes-Ferreira, Erik Artur Cortinhas-Alves. Resources: Renilson Moraes-Ferreira, Wilson Mateus Gomes da Costa Alves, Erik Artur Cortinhas-Alves. Software: Erik Artur Cortinhas-Alves. Supervision: Renilson Moraes-Ferreira, Wilson Mateus Gomes da Costa Alves, Erik Artur Cortinhas-Alves. Validation: Renilson Moraes-Ferreira, Wilson Mateus Gomes da Costa Alves, Erik Artur Cortinhas-Alves. Visualization: all authors. Writing—original draft: Renilson Moraes-Ferreira, Wilson Mateus Gomes da Costa Alves, Odillon Abraham, Erik Artur Cortinhas-Alves. Writing—review & editing: all authors.

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