Validation of the Italian version of the Non Motor Symptoms Scale for Parkinson's disease

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ABSTRACT

Objective: To validate the adapted Italian version of the Non-Motor Symptoms Scale (NMSS), a tool to assess non-motor symptoms (NMS) in Parkinson's disease (PD).
Methods: A cross cultural adaptation of the NMSS into Italian and a psychometric analysis of the translated version of the NMSS was carried out in patients with PD from two university centres −affiliated hospitals. The quality of data and the acceptability, reliability and construct validity of NMSS were analyzed. The following standard scales were also applied: Hoehn and Yahr staging, Unified Parkinson's Disease Rating Scale (UPDRS) part III, Montreal Cognitive Assessment, Beck Depression Inventory, Neuropsychiatric Inventory, Epworth Sleepiness Scale, Autonomic Scale for Outcomes in Parkinson's disease-Motor, Movement Disorder Society-Sponsored Revision of the Unified Parkinson's Disease Rating Scale part I and Modified Cumulative Illness Rating Scale (CIRS). Levodopa equivalent daily dose (LEDD) was calculated.
Results: Seventy-one patients with PD were assessed (mean age years 69.8 ± 9.6 SD; 31% women; mean length of disease 6.3 ± 4.6 years; H&Y median: 2). Mean NMSS was 39.76 (SD 31.9; skewness 0.95). The total score of NMSS was free of floor or ceiling effects and showed a satisfactory reliability (Cronbach's alpha coefficient on total score was 0.72 [range for domains: 0.64−0.73], SEM value was 3.88 [½ SD = 31.90]). Significant positive correlations were found among total NMSS and other NMS standard tests, but no significant correlation appeared with UPDRS part III, CIRS and LEDD.
Conclusions: The Italian NMSS is a comprehensive and helpful measure for NMS in native Italian patients with PD.

1. Introduction

Parkinson's disease (PD) is a progressive neurological condition, characterized by a dopamine deficiency causing tremor, rigidity, bradykinesia and gait problems mainly arising from dopamine deficiency. During the last decade, PD has been increasingly recognized as also implying non-dopaminergic dysfunction and non-motor symptoms (NMS) that can appear at all stages of the disease [1] and have a relevant impact on patients' health and quality of life [2–5].

Non-motor symptoms mainly include neuropsychiatric symptoms, sleep disorders, autonomic dysfunction, gastrointestinal symptoms and sensory symptoms [6]. Unfortunately, NMS are still underdiagnosed, and therefore undertreated [7]. A comprehensive assessment including both motor and non-motor symptoms is essential in clinical practice [8], but adequate instruments for the detection and assessment of the burden of NMS in patients with PD are still lacking in Italy.

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The Non-Motor Symptoms Scale for PD (NMSS) was developed and validated for a comprehensive assessment of non-motor symptoms [9]. The NMSS is a 30-item scale including the following 9 domains: cardiovascular, sleep/fatigue, mood/cognition, perceptual problems, attention/memory, gastrointestinal, urinary, sexual function and miscellaneous.

Although translations in several languages exist, the NMSS has not yet been translated into Italian.

The aim of this study was to perform a translation and adaptation of the NMSS into Italian following a precise translation protocol based on international standards, and to analyze the reliability and construct validity of the translated version and its usefulness as a measure for non-motor symptoms in Italian patients with PD.

2. Methods

2.1. Study participants

We enrolled consecutive outpatients with PD from two university centres-affiliated hospitals in Italy - in Rome and Milan between September 2015 and December 2015. PD was defined according to Gelb's criteria [10]. The NMSS was based on structured questions that movement specialists already use in several countries, and the assessment is an example of good clinical practice. Thus, specific approval for use of the scale was not required. However, we have specified in the informed consent form and the informative sheet submitted to all patients included in this study that it is essential to investigate the possible presence of non-motor symptoms and that this study could provide additional insights into Parkinson's disease. Moreover, the study protocol was proposed in accordance with the standards of good clinical practice and the current revision of the Declaration of Helsinki. Personal data were treated in accordance with Italian privacy laws. The written informed consent to participate was obtained from all patients.

2.2. Adaptation of the NMSS

The NMSS was adapted into Italian from the original English version following a precise translation protocol based on international standards [11,12]. First, the NMSS was translated into Italian by two professional translators, and then a reconciled version was elaborated by an independent translator competent in movement disorders and highly proficient in both languages (NV), who identified and resolved any possible inadequate expressions or discrepancies between the two forward translations. Then, a professional translator, different from the translators who performed the original English-to-Italian translation and with no knowledge of the English original scale, translated the reconciled version back into English. This back-translation was compared to the original version by a panel of experts to verify the equivalence of the two English versions in terms of meaning and conceptual content. The two versions resulted equivalent, thus the last Italian version of the NMSS was considered final. The translated instrument was then pre-tested on 10 patients with PD to assess their understanding of the questions. No major issues were found during the pre-testing phase, thus the final joint translation was carried out, named NMSS-PD Italian version (esupp. file 1).

2.3. Patients assessment

Demographic data including age, gender and education, and information on the disease such as age at onset, length of disease and treatment were collected. The levodopa equivalent daily dose (LEDD) [13] was calculated.

All patients underwent a clinical examination. The Hoehn and Yahr scale (H&Y) [14] and the Unified Parkinson's Disease Rating Scale (UPDRS) part III [15] were used for the motor assessment and the staging of disease. Somatic comorbidities were quantified using the Modified Cumulative Illness Rating Scale (CIRS) [16].

The answers to the NMSS were obtained through interviews carried out by the neurologist in regular follow-up visits. The NMSS-PD scale includes 30 items grouped in the following 9 domains: cardiovascular (2 items); sleep/fatigue (4 items); mood/apathy (6 items); perceptual problems/hallucinations (3 items); attention/memory (3 items); gastrointestinal tract (3 items); urinary function (3 items); sexual function (2 items); and miscellaneous (4 items). The assessment period was "the past 1 month". The scores for each item are based on a combination of severity (from 0 to 3) and frequency scores (from 1 to 4), to capture symptoms that are severe but relatively infrequent or that are less severe but persistent. The total NMSS score ranges from 0 to 360.

Non-motor symptoms were further investigated, in addition to the NMSS, by specialized clinical psychologists (CP or GA) in the centre of Rome using a set of tests including the Montreal Cognitive Assessment (MoCA) [17] to assess cognitive disorders, the Beck Depression Inventory (BDI) [18] for depression, the Neuropsychiatric Inventory (NPI) [19] for behavioral disturbances, the Epworth Sleepiness Scale (ESS) [20] for sleepiness, the Autonomic Scale for Outcomes in Parkinson's disease-Motor (SCOPA-Aut) [21] for autonomic issues, and the Movement Disorder Society-Sponsored Revision of the Unified Parkinson's Disease Rating Scale (MDS-UPDRS) part I [22] for a global non-motor assessment.

For most rating scales (BDI, NPI, ESS, SCOPA-AUT and MDS-UPDRS part I), higher scores reflect higher severity on the construct being measured, whereas for MoCA lower scores correspond to worse cognitive performances.

To evaluate the stability of the Italian version of the NMSS (test-retest reliability), a group of patients (n 15) repeated the NMSS two weeks after the first evaluation with a different researcher than the one who performed the previous evaluation (CP or GA).

2.4. Data analysis

Descriptive statistics were used for the characterization of the sample. The univariate ANOVA test for continuous variables and the Pearson's χ^2 test for categorical variables were used to compare separately the characteristics of males and females among the two groups of patients (Rome and Milan).

The following characteristics were explored for the Italian version of the NMSS.

2.4.1. Quality of data
The proportion of computable data was considered adequate if more than 95% of the NMSS data were fully computable [9].

2.4.2. Acceptability
The range of scores, the floor and ceiling effects (maximum acceptable value for both: 15%), and the skewness (limits: −1 and +1) were calculated.

2.4.3. Reliability
Precision for the NMSS domains was determined by means of the standard error of measurement (SEM), the smaller the standard error of measurement, the more reliable the test (a SEM value < ½ standard deviation was used as a criterion of acceptable precision).

Internal consistency was tested using the Cronbach's alpha coefficient (values ≥ 0.70 was considered appropriate). Test-retest reliability over a time interval of 14 days was assessed in a group of 15 patients through the Intra-class Correlation (ICC), for which