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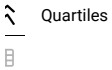

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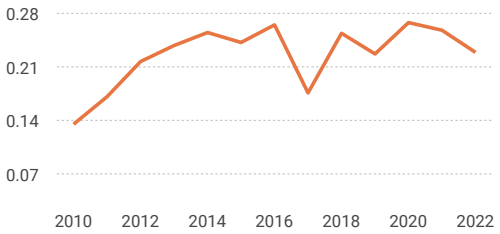

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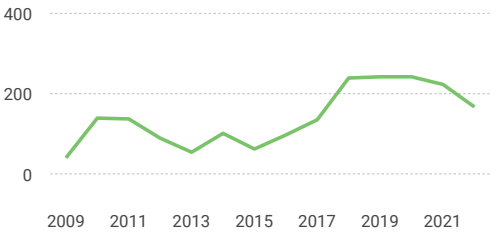

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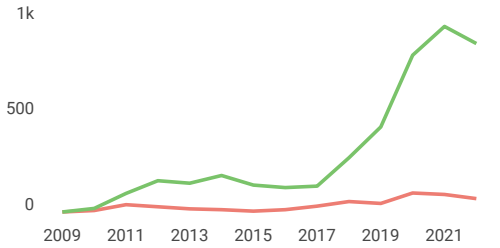

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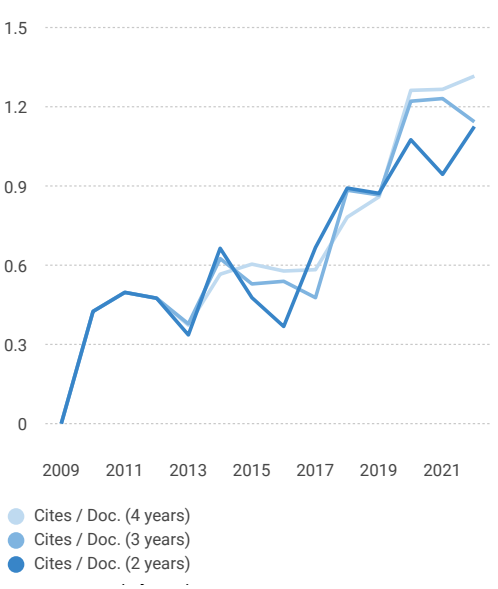

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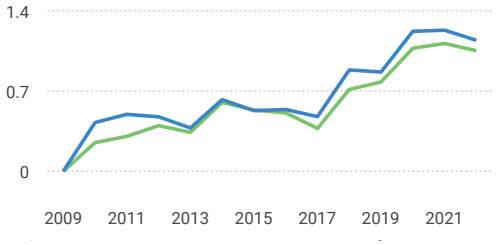

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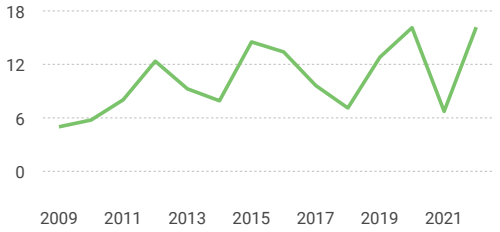

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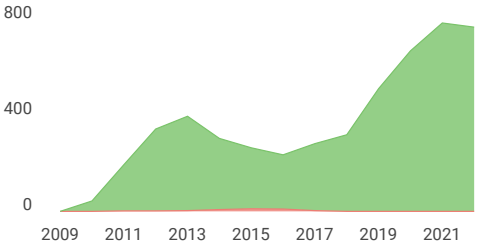

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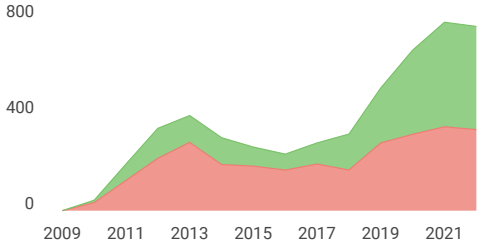

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Original Article

Nonmotoric Symptoms Scale (NMSS) Validity and Reliability Test in Patients with Parkinson's Disease in Dr. Soetomo General Hospital, Surabaya, Indonesia: A Questioner Validation Study

Muhammad Hamdan*, Priya Nugraha, Pramitha Nayana Librata, Cindy Cecilia

ABSTRACT

Background: Nonmotor symptoms are common but less reported in Parkinson's disease. it's the cause of decreased quality of life and disability in many patients with Parkinson's disease compared to the motor symptom. Our study aimed to translate the original English-language version of the nonmotor symptom scale (NMSS) into the Indonesian version of the NMSS. And also to evaluate its validity and reliability for use in Indonesian-speaking Parkinson's disease patients. This for better and valid usage of NMSS scale in the Indonesian patient and health care provider **Material and Method:** This was descriptive-analytic study. Cross-cultural adaptation of NMSS and psychometric analysis of the Indonesian version of NMSS was carried out from 2 Teaching Hospital centers in Surabaya, East Java. Several other scales were also examined, including MMSE, ESS, BDI, and Scopa-Aut. A reliability test was performed using Alpha Cronbach. **Results:** A total of 35 patients were included in this study. the average age was 64.03±12.92 with the female sex 42.9% (n=15) and the male 57.1% (n=20), and Hoehn and Yahr stage II 57.1% (n=20). The total average NMSS is 11.64. The validity of contents and constructs of the NMSS on each domain has been proven valid. Internal reliability of internal consistency in these tools with an alpha Cronbach value of 0.836. Each domain correlates with several other scores including MMSE, BDI, ESS, and Scopa-aut. **Conclusion:** The Indonesian version of NMSS has good validity and reliability in assessing nonmotor symptoms in Parkinson's disease patients in Indonesia.
Key words: Nonmotoric Symptoms Scale, Parkinson's Disease, Validity, Validation.

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INTRODUCTION

Parkinson's disease (PD) is a progressive chronic neurodegenerative disease with striatal dopamine deficiency as the hallmark of its pathology.[1] According to systematic analysis, studies stated that in 2016 there were 6.1 million people with Parkinson's disease worldwide. It has increased by 2.4 times since 1990 worldwide with an average age of onset approaching 60 years old.[2]

Parkinson's disease presented not only with motor symptoms but also non-motor symptoms (NMS).[2,3] These symptoms are associated with losing striatal dopaminergic neurons in the dopaminergic and nondopaminergic areas.[2] Typical motor symptoms in PD are bradykinesia, rigidity, tremor, and postural instability.[3,4] Non-motor symptoms of Parkinson's disease are varied including cognitive impairment, depression, apathy, anxiety disorders, hallucinations, sexual dysfunction, sleep disorders, and indigestion.[3,4] These non-motor symptoms accelerate the progression of the disease. This also reduced patient's quality of life and give a burden to families, and caregivers.[5]

Some questionnaires that can assess NMS in people with PD include the non-motor symptoms questionnaire for Parkinson's Disease (NMSQuest), and Non-motor Symptom Scale (NMSS). Non-motor Symptom Scale is used to assess the quantification of the severity of nonmotor symptoms including autonomic function, psychiatric disorders, cognitive impairment, and sleep disorders in people with Parkinson's disease.[6,7] The NMSS instrument can assess a more thorough measurement of non-motor symptoms.

Nonmotor Scale (NMSS) was first published in 2007. NMSS is used to assess the severity and frequency of NMS at all stages of Parkinson's disease. NMSS can broadly assess nonmotor symptoms and has the potential to identify specific nonmotor symptoms in Parkinson's disease. NMSS has 30 non-motor symptoms grouped into nine domains; cardiovascular and falls, sleep/fatigue, perception problems, mood/apathy, attention/memory, gastrointestinal, camping, sexual, and others (pain, smell, weight changes, and hyperhidrosis).[8]

This instrument was developed 13 years and has been validated and used in several countries including the United Kingdom, Germany, Spain, Korea, Brazil, China, and Japan. As far as researchers know, there is currently no instrument to assess the severity of nonmotor symptoms in Parkinson's patients that has been validated and published in Indonesia. This study aims to test the validity and reliability of the Indonesian version of NMSS, hereinafter referred to as the Indonesian version of NMSS.

METHODS

This is descriptive analytics with a cross-sectional approach. The research is divided into 2 stages, the validity test stage and the reliability test stage. The validity test stage is in the form of a content validity test, construct validity, and criteria validity. The reliability test stage using an internal consistency

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test. The Indonesian version of NMMS test has a translation/editing/proofreading certificate from "Airlangga University Language and Multi-Cultural Center on September 1, 2021, with the number 286/UN3.39/TA/2021. This research has submitted an ethical feasibility study at the Research Ethics Committee of RSUD Dr. Soetomo with number 0350/KEPK/I/2022. This research translation had been approved by the MDS society.

The samples in this study were people with Parkinson's disease in the Outpatient Installation of the Neurology Section of Hospital centres in Surabaya, East Java and Outpatient Neurology Section of Hospital Education in Surabaya, East Java who met the inclusion and exclusion criteria.

The inclusion criteria in this study include Outpatients diagnosed with Parkinson's Disease, male and female, level of Awareness with Glasgow Coma Scale 15, Patients who can speak Indonesian, and patients who can read.[9] The exclusion criteria in this study are; Uncooperative following the study, Severe visual impairment (<1/60), Severe hearing loss (whispering sound test <1 meter), Unwilling to take part in the study, Severe cognitive function impairment (MMSE <18).

Patients who met the inclusion criteria were asked for the contents of the instrument. Sample size generated from the sample size formula for the correlative test. So, the number of samples obtained is 35 subjects. Then, the sampling method used is consecutive sampling.

The data collection procedure begins with the subject being explained the purpose and risks of the research, then asking for consent by signing an informed consent. Not only by filling in the instrument but the subject will be taken by anamnesis and filled in the PD severity scale.

The tools used to analyze the Aiken score with Microsoft excel. Then in testing the validity of the criteria and construct validity, the statistical analysis used is product moment. In the Internal Consistency Reliability test, the statistical analysis used is Alpha Cronbach.[2-4] All statistical tests in this study and the statistical test application used were SPSS version 23.

RESULTS

Instrument needs to be tested in the field or samples. Based on the data collection results, 35 subjects with PD were in Hospital centers in Surabaya, East Java and Hospital Education in Surabaya, East Java during January - April 2022. Consisting of men, 20 subjects (57.1%) and women are 15 subjects (42.9%). The youngest age group is the adult age group, and the average age of the subjects is 64 years. Clinical characteristics are divided into several categories based on the degree of severity with a scale of *Hoehn and Yahr.* They were Stage I (8.6%), 20 subjects, stage II (57.1%), 11 subjects, stage III (31.4%), 1 subject, and stage IV (2.9 %).

The content validity index used is Aiken Validation Index (table 1). Assessment is carried out by giving item values 1 – 5 (irrelevant – very

Table 1: Validity content of Aiken.

Item	Expert 1 (r)	Expert 2 (r)	Expert 3 (r)	S1	S2	S3	∑S	V	Results
1	5	5	4	4	4	3	10	0.83	Valid
2	4	5	5	3	4	4	11	0.91	Valid
3	5	5	5	4	4	4	12	1	Valid
4	5	5	5	4	4	4	12	1	Valid
5	4	5	5	3	4	4	11	0.91	Valid
6	4	5	5	3	4	4	11	0.91	Valid
7	4	5	4	3	4	3	10	0.83	Valid
8	4	5	4	3	4	3	10	0.83	Valid
9	5	5	4	4	4	3	11	0.91	Valid
10	5	5	5	4	4	4	12	1	Valid
11	3	5	5	2	4	4	10	0.83	Valid
12	4	5	5	3	4	4	11	0.91	Valid
13	4	5	5	3	4	4	11	0.91	Valid
14	5	4	4	4	3	3	10	0.83	Valid
15	5	5	4	4	4	3	11	0.91	Valid
16	5	5	4	4	4	3	11	0.91	Valid
17	4	4	5	3	3	4	10	0.83	Valid
18	5	5	4	4	4	3	11	0.91	Valid
19	5	5	4	4	4	3	11	0.91	Valid
20	5	5	4	4	4	3	11	0.91	Valid
21	5	5	5	4	4	4	12	1	Valid
22	5	5	5	4	4	4	12	1	Valid
23	5	5	5	4	4	4	12	1	Valid
24	5	5	4	4	4	3	11	0.91	Valid
25	5	5	5	4	4	4	12	1	Valid
26	5	5	5	4	4	4	12	0.91	Valid
27	5	5	4	4	4	3	11	0.91	Valid
28	3	5	4	2	4	4	10	0.83	Valid
29	5	5	4	4	4	3	11	0.91	Valid
30	5	5	4	4	4	3	11	0.91	Valid

relevant), and index V values between 0-1. Based on the V index value, it can be categorized as ≤ 0.4, including less validity, 0.4 - 0.8, including moderate validity, and ≥ 0.8 very valid.

Then construct validity using the Pearson correlation analysis between the first and second questions with the domain of cardiovascular symptoms, including falls found that the Indonesian version of the NMSS question items had a value >0.3, so the instrument was declared acceptable (table 2).

The reliability test result in table 3 was declared reliable (table 4). Cardiovascular symptoms, including falls, had a low correlation with Scopa-Aut, and a moderate correlation with BDI and ESS. The Sleep/ fatigue domain has a high correlation with ESS, a moderate correlation with BDI, and a low correlation with Scopa-Aut. The mood domain has a high correlation with BDI and ESS and a low correlation with Scopa-Aut. The attention/memory domain has a low correlation between BDI and Scopa-Autoderate correlation with ESS. Attention/ memory domain has the highest correlation coefficient value among all that negatively correlated with MMSE. In the digestive tract domain, it is moderately correlated with Scopa-Aut. The urinary domain strongly correlates with Scopa-Aut and a low correlation with BDI and ESS. The sexual function domain has low correlation with other tools.

DISCUSSION

This Study was adopting the cross-cultural instruments, which had been adapted from the Movement disorder Society (MDS). Non-motor symptoms less well notice by general physician. In the early stage of Parkinson disease, NMS significantly reduced quality of life. In Advance disease, it could reduce the independency of people with Parkinson's disease.[10] Non-motoric Symptoms Scale is the simplest scale to detect early NMS in Parkinson's disease patient. Early detection in NMS is fundamental. We translate NMSS to Indonesian language for Indonesian speaking patient with PD. This can reduce misinterpretation and give more valid and reliable result. The stage of processing this questionary was including translation, reconciliation, analysis of expert judgment and field testing.

The correlation test results of each domain have parallel with previous cross-cultural study. The domain of cardiovascular symptoms in accordance with research from Italy by Cova *et al.* and Martinez *et al.*[11,12] The correlation coefficient value between the cardiovascular domain including falls and ESS in the study was 0.30-0.59; in this study 0.419. Research by Martinez *et al.* showed the hight correlation coefficient between the sleep/fatigue domain and ESS was 0.3-0.59.[11] This were in line with this study with hight correlation coefficient 0.695. Sleep

Table 2: Instrument value of Pearson product moment.

Domain	Item Question	Correlation coefficient Pearson Product Moment	p-value	Results
Cardiovascular symptoms including falls	Q1	0.899	< 0.05	Valid
	Q2	0.807	< 0.05	Valid
Sleep/ Fatigue	Q3	0.834	< 0.05	Valid
	Q4	0.598	< 0.05	Valid
	Q5	0.578	< 0.05	Valid
	Q6	0.471	< 0.05	Valid
Mood/Cognition	Q7	0.801	< 0.05	Valid
	Q8	0.801	< 0.05	Valid
	Q9	0.902	< 0.05	Valid
	Q10	0.787	< 0.05	Valid
	Q11	0.905	< 0.05	Valid
	Q12	0.822	< 0.05	Valid
Perceptual Disturbance/ Hallucinations	Q13	0.889	< 0.05	Valid
	Q14	0.827	< 0.05	Valid
	Q15	0.516	< 0.05	Valid
Attention/Memory	Q16	0.829	< 0.05	Valid
	Q17	0.914	< 0.05	Valid
	Q18	0.846	< 0.05	Valid
Digestive Tract Domain	Q19	0.899	< 0.05	Valid
	Q20	0.838	< 0.05	Valid
	Q21	0.780	< 0.05	Valid
Urinary	Q22	0.801	< 0.05	Valid
	Q23	0.807	< 0.05	Valid
	Q24	0.869	< 0.05	Valid
Sexual Function	Q25	0.993	< 0.05	Valid
	Q26	0.993	< 0.05	Valid
Others	Q27	0.852	< 0.05	Valid
	Q28	0.681	< 0.05	Valid
	Q29	0.684	< 0.05	Valid
	Q30	0.850	< 0.05	Valid

Table 3: The total internal Reliability score of the Indonesian version of NMSS.

Item Questions	Cronbach Alpha Coefficient	Cut off value	Results
1-30	0.836	0.7	Reliabel

Table 4: Value of internal Reliability score of each domain.

Domain	Question Items	Cronbach Alpha Coefficient
Cardiovascular including Fall	1,2	0.618
Sleep/Tiredness	3,4,5,6	0.489
Mood/Cognition	7,8,9,10,11,12	0.904
Perceptual Disorders/ Hallucinations	13,14,15	0.544
Attention/Memory	16,17,18	0.824
Digestive Tract	19,20,21	0.678
Urinary	22,23,24	0.723
Sexual Function	25,26	0.985
Others	27,28,29,30	0.667

problem has been reported from Person with Parkinson disease and care partner as the most problem in NMS with prevalence 84% among all NMS.[10] The mood domain was significant with a high correlation coefficient 0.6 after sleeping domain.[11] This was in accordance with other previous research from Martinez *et al*. and Cova *et al*., which has a correlation coefficient between 0.3-0.59 and 0.5, respectively.[12] Mood domain is mainly expressed by anxiety and depression. Both were giving a significant impact on patient and care giver burden and quality of life.[10]

All domains are negatively correlated with MMSE with negative correlation results in all domains with the highest score in the attention/memory domain -0.371.[13] The result of study is similar to research conducted in Korea, China. The negative colleration was inversely moderate in both study with r= -0.19 in China, r= -0.27029 in Italy, and r(S)=-0.291 in Korea.[11,14] The attention/memory domain has a low correlation between BDI and Scopa-Aut, and a moderate correlation with ESS. However, NMSS may usefull in identifiying cognitive problem.[15] The digestive tract and urinary track domain had a strong correlation.[11,12] The sexual function domain correlated low and very low with others tools with correlation coefficient value with Scopa-Aut was 0.231. the sexual function, digestive, and urinary tract domain result was similar with research conducted in Italy, Brazil, and Korea.[11,12,16] The low coleration result in sexual dysfunction was due to the patient's lack of awareness of sexual function. Several respondents can't describe their sexual performance because of less libido and some refuse to describe their sexual life. another aspect was the patient was not expressing sexual dysfunction spontaneously. In Dutch survey also showed that neurologists often fail to discuss sexual dysfunction in parkinson disease.[17] It was reported males have 83% and females with 50% of orgasm dysfunction.[18] In other domains, it is moderately correlated with Scopa-Aut, this results accordance by research in Italy with a correlation coefficient of 0.660.[16]

The internal consistency reliability performed using the Alpha Cronbach method with a coefficient value of >0.7 for the reliability of the total NMSS score. Based on the research results obtained correlation coefficient Alpha Cronbach highest in the domain of a sexual function, namely 0.985. This is in accordance with the Italian and Brazilian versions of the validation research, which obtained a coefficient value Alpha Croncbach on a total NMSS score of 0.72 and 0.60; with the reliability value of each item between 0.64-0.71 and 0.37-0.82; whereas in a study conducted by Martinez *et al*., the coefficient alpha Cronchbch 0.44-0.85.[11,12,16] Based on the results obtained correlation coefficient alpha Cronbach ≥0.7 and ≥0.3 both on the total NMSS score and in each domain, it can be concluded that instrument is internally consistent reliable and can be used to measure the severity of nonmotor symptoms in PD. The Aiken coefficient had a valid value is 0.83-1. Test the construct validity of the Indonesian version of the NMSS using the correlation coefficient product moment with a correlation coefficient value of >0.3 for each question item. Therefore, NMSS in the Indonesian version is valid.[5] The highest correlation coefficient was found in the domain of sexual function, with a coefficient value is 0.952.

The limitation of this research is that it needs to be carried out in larger and multicenter research. It did not carry out the validity of the criteria in the perception domain because tools comparison which in previous studies correlated with the perceptual domain, namely UPDRS. However, in similar studies in Italy, Brazil, and Korea, not all domains had comparisons on the criterion validity test. However, this study is the first to test the validity and reliability of the Indonesian version of the NMSS. In the future, this test will be useful for stratifying the severity of nonmotor symptoms in Parkinson's patients in Indonesia. The Indonesian version of the NMSS has been validated and can be used in clinical practice, further research, and data collection.

CONCLUSION

The Indonesian version of the NMSS instrument has proven validity and reliability to measure the severity of nonmotor symptoms in Parkinson's patients.

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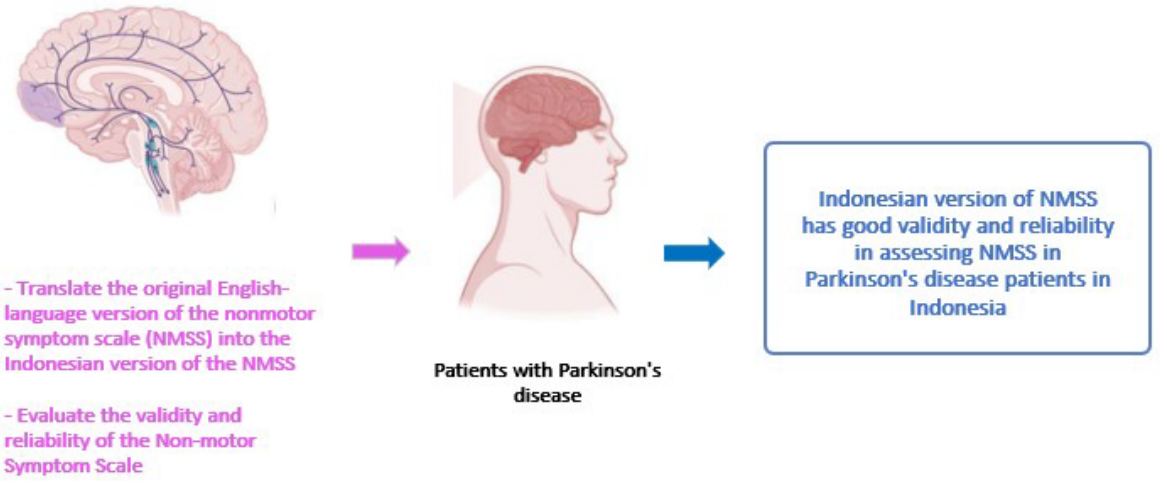
GRAPHICAL ABSTRACT



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