Original Article

Adaptation and Validation of a Sinhala version of the Radbound Oral Motor Inventory (ROMP) for Parkinson's disease

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Abstract

Background: The Radboud Oral Motor Inventory for Parkinson's disease (ROMP) is a patient-rated assessment measuring patients' perceptions of speech, swallowing, and saliva control among patients with idiopathic Parkinson's disease (IPD). **Objective:** The present study was carried out to adapt and validate the Sinhala version of the ROMP questionnaire in a Sinhala-speaking patient cohort diagnosed with IPD. **Materials and Methods:** The study population consisted of patients diagnosed with IPD attending a tertiary care neurology clinic at the National Hospital of Sri Lanka. ROMP was translated from English to Sinhala, and an expert committee verified its content. Construct validity was assessed by correlating the Sinhala ROMP scores with the subscales in speech, salivation, and swallowing of the Unified Parkinson's Disease Rating Scale and with five-point Likert-type scale to assess dysarthria, dysphagia, and drooling by a speech and language therapist. Test–retest reproducibility was assessed by repeating the questionnaire in 2 weeks. **Results:** A cohort of 21 patients was evaluated (male to female ratio = 2.5:1, mean age was 58.8 [±8.3] years). The Spearman's correlations between ROMP and the Likert-type scale assessment, that is, speech $r = 0.85$ ($P < 0.01$), swallowing $r = 0.86$ ($P < 0.01$), and drooling $r = 0.88$ ($P < 0.01$), and subscales of the UPDRS were statistically significant, that is, speech $r = 0.75$ ($P < 0.01$), swallowing $r = 0.96$ ($P < 0.01$), and salivation $r = 0.94$ ($P < 0.01$). Reproducibility of the three domains and total intraclass correlation coefficients indicated a high level of agreement in test–retest reproducibility (range: 0.98–0.99). The three subdomains of the instrument also had excellent internal consistency (total Cronbach's $\alpha = 0.99$). **Conclusion:** The Sinhala version of ROMP has proved to be a good assessment tool for dysphagia, dysarthria, and drooling in the early stage of IPD patients.

Keywords: Idiopathic Parkinson's Disease, Radboud Oral Motor Inventory, Sinhala version of ROMP

Introduction

Idiopathic Parkinson's disease (IPD) is a chronic progressive degenerative neurological disorder caused by the loss of dopamine-producing cells in the substantia nigra, resulting in a lack of dopamine, which reduces the stimulating function of the basal ganglia on the motor cortex.[1] Studies show that up to 90% of people with IPD may present with speech abnormalities.[2] Dysarthria of patients with IPD are hypokinetic, and hypokinesia with rigidity manifests itself in all aspects of speech. Breathing is affected by reduced respiratory movement, while vocalization in patients with IPD can be hoarse, with a soft or high voice, or with aphonia. Articulation and resonance can be affected in IPD. Patients can have monotonic and monodynamic prosody. They can also have impairments in speech rate, such as talking too fast with accelerating speech or having difficulty initiating phonation.[2]

Hypokinesia and rigidity in the mouth can lead to oropharyngeal dysphagia.[3] Dysphagia in IPD can be attributed partly to dopamine shortage and partly to a non-dopaminergic defect in the brainstem, where the "central pattern generator" for primarily the pharyngeal phase is located. When a patient with IPD has a swallowing impairment, chewing and swallowing occur more slowly and food stays longer in the mouth before the patient swallows, making residue-free swallowing of solid food more difficult.

A gold standard to evaluate a patient's speech with IPD is during a spontaneous speech when interviewing the patient. Dysarthria can be assessed by evaluating the following features of speech: respiration, voice (quality, loudness, and pitch), articulation, resonance, and prosody (intonation and speech rate).[4] Swallowing assessment comprises a clinical bedside assessment and instrumental analysis if indicated, including video fluoroscopic study of swallowing (VFSS) and fiberoptic endoscopic evaluation of swallowing (FEES).[5]

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There is a need for a patient-reported outcome measure to assess swallowing and speech for timely identification and referral of IPD patients with such impediments to speech and language therapists/pathologists for evaluation and intervention. Only a few validated scales developed for IPD can address the above issue of assessing drooling, dysarthria, and dysphagia. The Radboud Oral Motor Inventory for Parkinson's disease (ROMP) is a patient-rated assessment measuring patients' perceptions of speech, swallowing, and saliva control among patients with Parkinson's disease.[6] This questionnaire assesses the three domains of speech, swallowing, and saliva control. ROMP is sensitive to the patient's perceptions regarding speech, swallowing, and saliva control changes. This scale was first developed and validated in Dutch and then translated to English for subsequent validation.

In Sri Lanka, a validated screening measure for assessing IPD is yet to be established. Therefore, the present study intended to adapt and validate the Sinhala version of ROMP questionnaire in Sri Lankan patients diagnosed with IPD.

Materials and Methods

The study population consisted of patients diagnosed with IPD according to the UK Parkinson's Disease Society Brain Bank clinical diagnostic criteria[7] and attending a tertiary neurology clinic at the National Hospital of Colombo, Sri Lanka. The patients needed to fulfill the following inclusion criteria: patients who were literate in Sinhala language and patients whose cognitive functions were not affected because of the progression of Parkinson's disease. This was because of the requirement to read and comprehend the questionnaire. Patients with additional comorbidities such as depression (Beck Depression Inventory ≥17), cognitive deficits (Mini-Mental State Examination ≤24), dementia, altered oral comprehension, auditory and visual impairments, and those who refused to participate in the study were excluded. Patients with a diagnosis of atypical parkinsonian syndromes were also excluded. Presotto *et al*.[8] validated ROMP to Brazilian Portuguese population, and they used 27 participants with Parkinson's disease. Similarly, the current study used 29 participants with Parkinson's disease, and a consecutive sampling method was used to obtain data. The study protocol was approved by the ethics review committee, Faculty of Medicine, University of Kelaniya, Sri Lanka. Informed consent was obtained from the individuals who agreed to participate in the study.

Construct validation and assessment of the reliability of a Sinhala translation of the ROMP questionnaire were carried out in the study. ROMP is a self-evaluative instrument in the three domains of speech, swallowing, and saliva control. It comprises 23 items; seven items in the speech domain, seven items for swallowing, and nine items related to saliva control. Patients have to mark the frequency of symptoms from 1 to 5 (1 = normal; 5 = worst score). The score ranges from a minimum score of 23 and a maximum of 115 points.[6]

Initially, ROMP was translated from English to Sinhala by a Sri Lankan professional who was fluent in both languages. Subsequently, back-translation of the Sinhala ROMP was done by a different English translator who was fluent in both languages without previous knowledge of the questionnaire, resulting in a back-translated version. Both translations were analyzed by a committee of five specialists, three speech therapists and two neurologists, evaluating the semantic, idiomatic, experimental, and conceptual equivalence, resulting in the final version. Several terminological changes were made in linguistic and cultural translation and adaptations such as substituting "apple sauce" with "thick liquid" and adding more elaborative terms specifically to differentiate the terms "drooling" and "dryness of mouth." None of the questions was eliminated during this process.

A neurologist estimated the disease severity by using the motor examination of the Unified Parkinson's Disease Rating Scale (UPDRS) part III (range: 0–108). The neurologist was blinded to the scores of ROMP. Construct validity was assessed by correlating the Sinhala ROMP scores with the subscales in speech, salivation, and swallowing of the UPDRS[9] (which are contained in part 11 of the tool). Oral motor functioning was assessed using the UPDRS part II subscales for speech, chewing and swallowing, eating tasks, and salivation and drooling (each question has five responses: 5 = normal, 1 = slight, 2 = mild, 3 = moderate, and 4 = severe) by a speech language therapist/pathologist, who was also blinded to the Sinhala ROMP scores. Scores were correlated with the Sinhala ROMP (only the scores of the relevant subscales were used in the analysis). A five-point Likert-type scale, with responses being very good, good, reasonable, poor, and very bad, was used to assess dysarthria, dysphagia, and drooling by another speech and language therapist/pathologist. The validity of the Sinhala ROMP against other concurrent measures was expressed using Spearman's correlation. The level of significance adopted was $P \leq 0.01$.

Test–retest reproducibility of the questionnaire was assessed. Patients completed ROMP during their first visit to the clinic and reattempted the questionnaire 2 weeks afterward during their second clinic visit. The time between the two responses was thought to be adequate to reduce the chances of modification of the questionnaire responses because of possible changes in the oral motor symptoms due to progression of the disease and to prevent the individual from remembering the protocol questions and their previous responses. The test–retest reliability was calculated with intraclass correlation coefficients (ICC), and the correlation index 0.75 was considered the minimum acceptable agreement; values from 0.90 were considered high. Cronbach's α was calculated to assess internal consistency, where the minimum for sufficient consistency was accepted as 0.70. Analyses were performed using version 22 of Statistical Package for the Social Sciences (SPSS).

Results

The questionnaire was distributed among 29 patients with IPD. However, eight patients were excluded: five were unavailable to retest and three had cognitive impairment and depression. Thus, a cohort of 21 patients with IPD was evaluated. The male to female ratio was 2.5:1. The mean age was 58.8 (±8.3) years, and the mean disease duration was 8.7 (±7.1) years. All patients were within Hoehn and Yahr stages 2 (n = 6) and 3 (n = 15). There was no significant difference in the mean scores at baseline between males and females.

Test–retest mean scores and standard deviation for speech, swallowing, and saliva are presented in Table 1.

Results indicated that the Spearman's correlations between the three domains of ROMP and the Likert-type scale assessment made by the speech and language therapist/pathologist on the outcomes of dysarthria, dysphagia, and drooling severity were significant. The correlation coefficient of the subscale of speech was 0.85 ($P < 0.01$), swallowing was 0.86 ($P < 0.01$), and saliva control was 0.88 ($P < 0.01$).

Spearman's correlation between the three domains of ROMP and the corresponding subscales of the UPDRS was also statistically significant with the following results: the correlation coefficient of the subscale of speech was 0.75 ($P < 0.01$), salivation was 0.94 ($P < 0.01$), and swallowing was 0.96 ($P < 0.01$). Correlation coefficient for the total score was 0.82 ($P < 0.01$).

Reproducibility of the three domains and total ICC are presented in Table 2. The ICC of the total score and the three subdomains ranged from 0.98 to 0.99, indicating a high level of agreement in test–retest reproducibility.

Internal consistency of the three domains and total – Cronbach's α are given in Table 3. The value of Cronbach's α for the total scores and the three subdomains of the instrument were above 0.97, indicating that ROMP had an excellent internal consistency.

Table 1: Means and standard deviations

Variable	Mean	Standard deviation
ROMP speech		
Test score	10.6	4.1
Retest score	10.7	3.9
ROMP swallowing		
Test score	11.0	4.8
Retest score	11.8	5.0
ROMP saliva		
Test score	11.7	3.9
Retest score	11.8	4.3
ROMP total		
Test score	33.3	9.0
Retest score	34.3	9.3

ROMP=Radboud Oral Motor Inventory for Parkinson's disease

Discussion

The Sinhala ROMP questionnaire is a simple, quick-to-apply, and easy-to-understand instrument, and the scales of measurements have remained the same in our study as in the study by Kalf *et al*.[6] In the present study, the Sinhala ROMP demonstrated high reliability with a high Cronbach's α and high degrees of reproducibility (high ICC). It was also valid, demonstrating good agreement with speech, swallowing, and saliva subscales of the UPDRS II. The questionnaire also demonstrated good agreement with the Likert-type scale for assessing dysarthria, dysphagia, and drooling, which a speech and language therapist/pathologist performed. Thus, it would seem that the Sinhala ROMP would be an effective tool in gauging patient-reported outcomes regarding dysphagia, dysarthria, and drooling, which are specific to IPD.

In a similar study, translation and linguistic and cultural adaptation of ROMP into Brazilian Portuguese were performed.[8] The reliability and validity of the Brazilian Portuguese ROMP were also tested and found to be of high. Therefore, it would be a useful endeavor to culturally adapt this tool to various clinical settings to assess patient-reported outcomes regarding dysphagia, dysarthria, and drooling.

Communication and swallowing deficits emerge in the early stages of Parkinson's disease (PD) and can become significantly debilitating in later stages of the disease.[10] Reduced speech intelligibility is a significant functional limitation associated with dysarthria, and in IPD, it is likely related to both articulatory and phonatory impairment.[11] Complications of dysphagia in IPD can include aspiration pneumonia, malnutrition, and dehydration. Early identification of speech and swallowing abnormalities is critical for minimizing the likelihood of these and other complications that negatively impact the health status and quality of life of the patient. Thus, there is a need for disease-specific screening tools that allow repeated evaluation and early identification of dysphagia, dysarthria, and drooling to ensure timely and efficient referral to a speech and language therapist/pathologist. The main advantage of the Sinhala version of ROMP is to facilitate patient-centered self-evaluation, and thus allow timely referral of patients, especially in clinical settings where every patient cannot be screened individually by either a specialist/neurologist or a speech and language therapist/pathologist. This is very relevant in the Sri Lankan clinical settings in which outpatient clinics have a high volume of patients, which increases the impracticability of screening every patient.

The major limitation to this study was that the patients with cognitive deficits, dementia, altered oral comprehension, and auditory and/or visual impairments were excluded from the study, which probably resulted in a very high internal consistency due to patients with similar disease characteristics (stage) and cognitive profile being recruited. Exclusion of patients in later stages or with more severe degrees of IPD (Hoehn and Yahr stages 4 and 5),[12] where cognitive deficits are more conspicuous and dysphagia and

Table 2: Reproducibility of the three domains and ICC

Variable	Measures	Intraclass correlation	95% Confidence interval		*F* test with true value 0
			Lower bound	Upper bound	Significance
Total	Average measures	0.994	0.958	0.998	0
Speech	Average measures	0.984	0.961	0.994	0
Swallowing	Average measures	0.984	0.961	0.994	0
Saliva	Average measures	0.990	0.975	0.996	0

ICC=Intraclass correlation coefficients

Table 3: Internal consistency of the three domains and total - Cronbach's α

Variable	Cronbach's α
Speech	0.99
Swallowing	0.99
Saliva	0.97
Total	0.99

dysarthria are most prominent,[13] was evident in our cohort. Cognitive impairment or sensory problems may hinder the self-perception of dysphagia and dysarthria symptoms and also affect comprehension, which limits the use of the Sinhala ROMP in this cohort of patients. However, such problems are present in the early stages of IPD, especially dysphagia, allowing for early detection of oro-motor dysfunction through the Sinhala ROMP. It is also known that, in the IPD population, dysphagia may be subclinical or asymptomatic (patients do not report symptoms). Even with the presence of clinical signs, patients may gradually adapt to them, believing it to be a natural consequence of the progression of the disease.[14,15] ROMP questionnaire will be limited in its use, especially in such patients.

Conclusion

The Sinhala version of ROMP has demonstrated that it is a good assessment tool for dysphagia, dysarthria, and drooling in early stages of IPD patients. It shows good agreement with clinician/speech and language therapist/pathologist's assessment of the said domains, allowing for its use in the Sri Lankan clinical setting.

Abbreviations

IPD = idiopathic Parkinson's disease.

ROMP = Radboud Oral Motor Inventory for Parkinson's disease.

ICC = intraclass correlation coefficients.

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Conflicts of interest

There are no conflicts of interest.

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