Reliability and Validity of an Indonesian Version of the Patient's Denture Assessment (PDA): A Self-Assessment Instrument for Measuring Patient Satisfaction with Complete Dentures

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Abstract

Background and aim: Several factors, including the nature of the clinical examination and patient satisfaction, influence the success of complete denture treatment. In the past, methods that do not necessarily represent complete denture quality have been used to assess patient satisfaction with complete dentures. A valid and reliable multidimensional self-assessment instrument, which includes various factors that influence perceived treatment outcomes, is needed to assess patient satisfaction with complete dentures. The purpose of this study was to develop and evaluate the reliability and validity of an Indonesian vision of the Patient's Denture Assessment (PDA) questionnaire (PDA-Id) as a tool to measure patient satisfaction (and the cause of patient dissatisfaction) with complete dentures. Patients and methods: In total, 101 patients (50 men and 51 women) aged 45 years and older participated in this study. The reliability of the PDA-Id questionnaire was determined by examining its internal consistency and test-retest reliability. The internal consistency of all the questionnaire items in the six subscales of the PDA was measured by determining Cronbach'sα values and average inter-item correlation coefficients among the 101 participants. The test-retest reliability was determined in 25 of the 101 patients by administering the questionnaire two weeks after the initial completion of the PDA-Id. The PDA-Id questionnaire was validated using factor analysis, and its convergent validity was determined by examining the correlation between the summary score of the PDA questionnaire and masticatory ability, which was evaluated using color-change able chewing gum, of the 101 patients. Results: The results of the validation and reliability test of the PDA were satisfactory (Cronbach's α summary score: 0.708). The Cronbach's α score for each of the PDA components ranged from 0.765–0.834, and the intra class correlation coefficient (ICC) in the test-retest was 0.797. Spearman's correlation analysis of the correlation between masticatory performance and patient satisfaction revealed values of p=0.001 r=0.0633. Conclusion: The reliability of the PDA-Id questionnaire was good, as determined by the assessment of its internal consistency and test-retest reliability. It also showed good validity, as demonstrated by the results of the factor analysis and convergent validity.

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Introduction

Tooth loss, especially complete edentulism, can have functional (a decrease in masticatory function and speech) and emotional consequences (loss of confidence). Tooth loss often occurs among the pre-elderly and elderly

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due to changes in oral anatomy, including pathological changes. The missing teeth need to be replaced with dentures to restore masticatory function, phonetics, and esthetics.[1] Not all individuals who experience tooth loss seek dentures or undergo prosthodontic treatment. According to a study by the Health Research Association in 2007, the prevalence of denture use in Indonesia was just 4.6%.[2]

Complete dentures replace all permanent maxilla and mandibular teeth.[3,4] The function of complete dentures is to restore loss of specific

functions(e.g., mastication and speech) caused by missing teeth and to provide support for the lips and cheeks. However, in many cases, complete denture treatment is unsuccessful, either because of problems in the anatomical oral cavity or technical errors.[5] In such cases, the treatment fails to fulfill the expectations of patients as regards restoration of dentalfunction.[1]

According to epidemiological data in the U.S., the need for dentures to replace missing teeth is expected to increase in the next 20 years due to an aging population, with increased numbers of pre-elderly and elderly people who have lost all their teeth.[6]

The increased prevalence of complete dentures among patients highlights the need for a measurement instrument to determine patient satisfaction with dentures. At present, a number of methods are employed to measure patient satisfaction with complete dentures. These include assessments of chewing ability, retention, stabilization, pain, comfort, fitness, and esthetics.[6] However, none of these methods represent the overall quality of complete dentures. In addition, to date, no denture quality index has been developed that is accepted and used universally.[7] There have been no studies of the reliability and validity of a measurement instrument to evaluate denture quality in Indonesia.

Recently, researchers at the Department of Gerodontology and Oral Rehabilitation, Tokyo Medical and Dental University (TMDU) developed a multidimensional self-assessment instrument called the Patient Denture Assessment (PDA)for application in patients with complete dentures.[6] The instrument includes various factors that influence perceived treatment outcomes.

The objective of the present study was to develop and evaluate the reliability and validity of an Indonesian vision of the PDA questionnaire (PDA-Id) as a tool to measure patient satisfaction (and the cause of patient dissatisfaction) with complete dentures. The validation of the instrument in an Indonesian population can be expected to aid further research and guide operational standards to assess post-treatment patient satisfaction with complete dentures.

Material and Methods

This study was conducted in the Dental Teaching Hospital, Faculty of Dentistry, Universitas Indonesia. The study group consisted of 101 edentulous patients aged 45 years and older who had been fitted with complete dentures at the Teaching Dental Hospital of the Faculty of Dentistry, Universitas Indonesia. The inclusion criteria were having full dentures, treatment administered at the Teaching Dental Hospital clinic in the Faculty of Dentistry, Universitas Indonesia, and the ability to communicate in the Indonesian language.

The study was approved by the Ethical Committee of the Faculty of Dentistry, Universitas Indonesia (No. 79/ethical approval/ FKGUI/XII/2015). All the participants provided informed consent before enrolment.

Validation of the PDA questionnaire from the Japanese language into the Indonesian language was done using translate-back translate methods. First, two translators translated the Japanese version of the PDA questionnaire into the Indonesian language. Two clinicians then synthesized the Indonesian translation and made minor corrections to adapt the instrument to cultural elements specific to Indonesia. Back-translation was then conducted to enable the instrument to be used in Indonesia. The results of the back-translation in Japanese were re-evaluated via a panel discussion with the TMDU team from the Gerodontology and Oral Rehabilitation Department that devised the Japanese version of the PDA questionnaire. The back-translation results were compared again with the Indonesian PDA format to verify whether it had been correctly translated. The test-retest reliability of the PDA-Id questionnaire was tested with 25 patients two weeks after completion of the initial questionnaire.

To assess convergent validity, the correlation between the summary score of the PDA questionnaire and masticatory ability was examined. Masticatory performance was assessed using color-changeable chewing gum. Patient satisfaction with the complete denture set was measured using the PDA-Id questionnaire. Each patient was instructed to chew the color-changeable chewing gum 100 times and then complete the PDA-Id questionnaire.[8] Immediately after the patient had finished chewing the gum, it was flattened by compression between two glass plates to a thickness of 1.5mm. The color was then measured using a color chart.[8]

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Subscale	Questionnaire items
Function	Q1. How much pain do you feel?
	Q2. How easy is it for you to swallow food boluses and water?
	Q3. How well do you enjoy your meals?
	Q4. How worn out does your jaw feel?
Aesthetics & Speech	Q5. How worried are you about other people watching?
	Q6. How easy is it for you to speak?
	Q7. How worried are you about your mouth?
	Q8. How often do your dentures click when chewing?
Lower denture	Q9. How often does food debris get stuck under your lower denture?
	Q10. How is your lower denture retained on the ridge?
	Q11. How does your lower denture fit?
	Q12. How uncomfortable is your lower denture?
Expectation	Q13. How satisfactory will the new dentures be?
	Q14. How problematic will the new dentures be?
	Q15. How well will the new dentures fit?
Upper denture	Q16. How often does food debris get stuck under your upper denture?
	Q17. How does your upper denture fit?
	Q18. How often does your upper denture fall down?
Importance	Q19. How much do you consider your dentures as part of your body?
	Q20. How important are your dentures to you?
	Q21. How much can you care for your dentures without any difficulty?
	Q22. How at ease do you feel when wearing your dentures?

Figure 1. English Version of the PDA-Id.

Statistical Analysis

Statistical analysis was performed using SPSS software, version 22. Statistical significance was accepted at a value of $p<0.05$. A factor analysis was conducted, and Cronbach's α and intra class correlation coefficients (ICCS) were calculated to determine the validity and reliability of the data and test-retest validity.

To assess convergent validity, Spearman's rank correlation coefficients (r) were calculated to analyze the correlation between chewing gum and the gummy jelly measurement.

Results

In total, 101complete denture wearers (50 men and 50 women) aged 45 years and older agreed to participate in this study. The patients were classified into two age categories: 45–60 years ($n = 22$, 21.8%) and >60 years ($n = 79$, 78.2%).

Following the back-translation, one question in the PDA-Id questionnaire was revised after a panel discussion with the TMDU team. In this question, in the revised version, the phrase "*at ease*" was replaced with the word "*comfortable.*"

The results of the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy (MSA) revealed a value of 0.811, indicating satisfactory sampling adequacy. The Cronbach's α summary score for the PDA-Id was 0.708, and Cronbach's α for each of the PDA-Id components ranged from 0.765 to 0.834 (Table 5.1). The ICC in the test-retest of the 25 subjects two weeks after completion of the initial questionnaire was 0.797 (Table 5.2).

The results of Spearman's correlation analysis revealed a strong positive correlation between masticatory performance and patient satisfaction ($p=0.001$, $r=0.633$).

Figure 2. PDA-Id Questionnaire.

Discussion

Validity and Reliability of the PDA-Id Questionnaire

The compatibility between the results of a clinical examination and the patient's assessment determines the success of denture treatment.[9] In this study, we used color-changeable chewing gum to assess the masticatory performance of complete denture wearers. We selected chewing gum because of its light weight, ease of use in evaluations using a color scale, and non adherence to dentures.[8] Self-assessment by the patient, in addition to being a cost-effective method, is considered a more specific and valid method in measuring the success of denture treatment.[6] After obtaining the results of a clinical examination by a clinician, patient satisfaction was compared based on the completed questionnaires.

The internal reliability of the PDA-Id questionnaire was tested using Cronbach's α internal consistency value, as well as the ICCs in the test-retest reliability assessment. In the validation study of the Japanese PDA

questionnaire, Komagamine et al. reported a Cronbach's α value of 0.91 for the overall PDA score.[6] In the same study, the Cronbach's α values for each of the major components of the PDA questionnaire (function, esthetics, speech, mandibular denture, expectations, maxillary denture, and importance) were in the range of 0.56–0.93. The highest Cronbach's α value was obtained for "expectations," and the lowest value was obtained for "importance". In the present study, Cronbach's α value for the overall score of the PDA-Id questionnaire was 0.704, which means that the internal consistency of the questionnaire was acceptable. Cronbach's α value of each major component was in the range of 0.765–0.834. According to a previous study, a Cronbach's α value of 0.747 was acceptable.[10]

To evaluate the test-retest reliability, the period between the questionnaires should be long enough to prevent the subject from recalling previous events but short enough to preclude the occurrence of clinical changes. Although there is no consensus on the optimum period, an interval of one to two weeks is the usual goal, as the closer the distance, the higher the correlation between the test and retest.[11] In the present study, the test-retest reliability of the PDA-Id questionnaire was assessed in 25 patients two weeks after they had completed the initial questionnaire. Based on the overall score of the PDA-Id questionnaire, the results of the test-retest showed good to excellent agreement (ICC: 0.797).

In the present study, the validity of the PDA-Id questionnaire was tested using factor analysis and convergent validity. To determine which of the items were eligible for inclusion in subsequent analyses, the KMO was conducted. The KMO MSA value was 0.811, which meant that all the items were suitable for inclusion in the analysis. The convergent validity was then assessed to determine the correlation between the new measurement instrument (PDA-Id questionnaire) and similar instruments (i.e., the Japanese version of the PDA). In the present study, the mastication performance was measured using color-changeable chewing gum.

Based on the results of the PDA-Id questionnaire, there was a significant correlation between patient satisfaction with complete dentures and mastication performance, as measured using color-changeable chewing gum (p = 0.001). In addition, the results of Spearman's correlation analysis (0.6333) revealed a positive strong correlation between patient satisfaction with complete dentures and mastication performance (Table 5.2). Based on the results, the PDA-Id questionnaire can be considered a valid tool for assessing patient satisfaction with complete dentures.

Conclusion

The PDA-Id questionnaire demonstrated good validity and reliability in the assessment of patient satisfaction with complete dentures.

Acknowledgment

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