Original Article

Validation of the Vietnamese version of the patient's denture assessment questionnaire in complete denture wearers

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Abstract *Background/purpose:* The patient's denture assessment (PDA) is a standardized self-reported questionnaire developed in Japan to evaluate patient satisfaction with complete dentures. Although it has been validated in multiple languages, no validated version existed for the Vietnamese population. This study aimed to assess the psychometric properties of the Vietnamese version of the PDA (PDA-V) in a clinical sample of complete denture wearers.
Materials and methods: A cross-sectional validation study was conducted with 200 complete

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denture wearers in a public dental hospital in Vietnam. Internal consistency was assessed using Cronbach's α. Test-retest reliability was evaluated in a subsample of 120 participants after a 7—14 day interval using intraclass correlation coefficients (ICCs). Convergent validity was examined through correlation with a 100-mm visual analog scale (VAS) of global denture satisfaction. Discriminant validity was tested by comparing PDA-V scores between patients clinically judged as needing new dentures and those who did not.

Results: The PDA-V demonstrated excellent internal consistency across all six subscales (Cronbach's $\alpha = 0.82-0.87$) and strong test-retest reliability (ICC = 0.86—0.92). A significant positive correlation was found between total PDA-V and VAS satisfaction scores ($\rho = 0.78$, $P < 0.001$), supporting convergent validity. Discriminant validity was confirmed by significantly lower PDA-V scores in patients assessed as needing new dentures ($P < 0.01$). No significant ceiling or floor effects were observed.

Conclusion: The PDA-V is a reliable and valid instrument for evaluating patient satisfaction with complete dentures. It is suitable for both clinical assessment and research purposes in the Vietnamese population.

Introduction

Complete edentulism remains a major oral health challenge worldwide, particularly among older adults, due to its detrimental effects on mastication, phonetics, facial aesthetics, and overall quality of life.[1—3] While implant-supported prostheses are increasingly adopted in contemporary prosthodontics, conventional complete removable dentures (CRDs) continue to serve as the primary treatment modality for edentulous patients, especially in low- and middle-income countries such as Vietnam, owing to their greater affordability, accessibility, and non-invasive nature.[4,5]

The success of denture therapy should not be judged solely by technical parameters such as retention, stability, or occlusion. Patient satisfaction plays a pivotal role in determining the acceptance, compliance, and long-term utilization of prostheses. Key factors influencing satisfaction include functional performance, comfort, esthetics, speech, and psychological adaptation.[2,6,7] Nevertheless, clinical evaluations often rely predominantly on dentists' subjective assessments, which may fail to capture patients' personal experiences and expectations. This gap highlights the importance of incorporating patient-reported outcome measures (PROMs) into routine prosthodontic evaluation to enable a more comprehensive, patient-centered assessment of treatment outcomes and to support shared decision-making in clinical practice.

To meet this need, the Patient's Denture Assessment (PDA) questionnaire was developed in Japan by Komagamine et al. as a validated self-reported instrument designed to quantify patients' perceptions of their complete dentures.[8] The PDA comprises 22 items across six domains: functional performance, esthetics and speech, upper denture fit, lower denture fit, expectations for improvement, and the perceived importance of dentures. Each item is rated using a 100-mm Visual Analog Scale (VAS), enabling the capture of nuanced subjective experiences ranging from extremely poor to excellent.[8] Since its development, the PDA has demonstrated robust psychometric properties and has been successfully adapted into several languages, including Thai and Indonesian.[9,10] However, despite the high prevalence of edentulism in Vietnam, no validated Vietnamese version was previously available.

A Vietnamese version of the PDA (PDA-V) was recently developed through a rigorous five-step cross-cultural adaptation process, following internationally recognized guidelines. While preliminary testing has confirmed the translated version's linguistic accuracy and internal consistency, comprehensive psychometric validation in a larger and more diverse clinical population is necessary to confirm its reliability and validity.

Therefore, the present study aimed to evaluate the psychometric properties of the PDA-V in a clinical sample of Vietnamese complete denture wearers. Specifically, the study assessed the instrument's internal consistency, test-retest reliability, and construct validity, including both convergent and discriminant validity, to determine its suitability for use in clinical and research settings.

Materials and methods

Study design and participants

This cross-sectional validation study was conducted at the Ho Chi Minh City Odonto-Stomatology Hospital, Vietnam, between September 2024 and April 2025. A total of 200 patients with complete edentulism who had been wearing both maxillary and mandibular CRDs for at least six months were recruited through convenience sampling from the General Outpatient Department, the Department of Prosthodontics, and the Department of Geriatric Dentistry. Inclusion criteria were: (1) the ability to read and understand Vietnamese, (2) no signs of cognitive impairment, and (3)

willingness to provide written informed consent. Exclusion criteria included: (1) ongoing denture adjustments, (2) denture relining within the past three months, and (3) inability to comprehend the questionnaire. All participants provided written informed consent prior to participation. The study protocol was approved by the Institutional Review Board (IRB No. 03/GCN-TTT).

Instrument: Patient's denture assessment-Vietnamese version (PDA-V)

The PDA was culturally adapted into Vietnamese in accordance with the guidelines proposed by Beaton et al. for the cross-cultural adaptation of self-report instruments.[11] This process was supervised by a panel of prosthodontists and bilingual experts and consisted of five key phases: (1) forward translation, (2) reconciliation of the two forward translations into a single version, (3) back-translation, (4) expert committee review to assess semantic, idiomatic, experiential, and conceptual equivalence, and (5) pretesting with 40 edentulous patients who had been wearing CRDs for at least six months. These patients were recruited from the Ho Chi Minh City Odonto-Stomatology Hospital, Vietnam. Details of the cultural adaptation procedure and preliminary reliability testing were previously published in a peer-reviewed Vietnamese medical journal.[12] The finalized PDA-V consists of 22 items covering six subscales: Functional Performance, Esthetics and Speech, Upper Denture Fit, Lower Denture Fit, Expectations, and Importance of Dentures. Each item is rated on a 100-mm VAS, anchored from 0 ("worst condition") to 100 ("best condition"), with higher scores indicating better patient-reported outcomes.

Validation procedures

Participants were asked to complete the PDA-V and a global satisfaction VAS as an external criterion[13] during a single clinic visit. Each item on the PDA-V was rated using a 100-mm VAS, anchored at 0 ("worst condition") and 100 ("best condition"). Participants indicated a point along the scale that best represented their subjective perception of each aspect of their dentures. The questionnaire was self-administered under standardized written and verbal instructions to ensure procedural consistency across all participants.

Reliability testing

Internal consistency was assessed using Cronbach's α coefficients for each subscale and the overall scale score. A Cronbach's α value of ≥ 0.70 was considered acceptable, indicating adequate internal consistency.[14] Test-retest reliability was evaluated in a subsample of 120 participants who completed the PDA-V a second time after an interval of 7–14 days. This timeframe is commonly recommended in psychometric research to minimize the risk of recall bias and clinical changes.[15,16] No dental treatments or adjustments were provided during this period. The sample size for test-retest reliability was determined based on established guidelines for estimating the intraclass correlation coefficient (ICC). According to Bonett (2002), a minimum of 100 participants is required to detect an ICC of 0.80 with a 95 % confidence interval width of ± 0.10, assuming two repeated measurements per participant. Our sample of 120 participants exceeded this threshold, ensuring sufficient statistical power for the reliability analysis.[17] Test-retest reliability was calculated using two-way mixed-effects ICCs with absolute agreement. In accordance with standard benchmarks, ICC values between 0.75 and 0.90 indicate good reliability, while values above 0.90 are considered indicative of excellent reliability.[18,19]

Convergent validity and discriminant validity testing

Convergent validity was assessed by examining the correlation between PDA-V scores and a global 100-mm VAS measuring overall denture satisfaction. To facilitate this analysis, participants were stratified into two groups based on their VAS scores: the satisfaction group (VAS $\geq$79 mm) and the less-satisfaction group (VAS <79 mm). This threshold was adopted from the study by Kawai et al.,[13] which identified 79 mm as the optimal cutoff to distinguish between "slightly satisfied" and "satisfied" denture wearers. Mean PDA-V and VAS scores were compared between the two groups. The correlation between total PDA-V scores and VAS ratings was analyzed using Spearman's rank correlation coefficient (ρ), with values equal to or greater than 0.50 considered indicative of acceptable convergent validity.[20] Discriminant validity was evaluated by comparing PDA-V scores between participants who were clinically assessed by prosthodontists as requiring new complete dentures and those who were not. The need for denture replacement was determined based on the presence of one or more clinical signs, such as poor retention or stability, excessive wear of denture teeth, or mucosal irritation attributable to the prosthesis. Subjective dissatisfaction alone was not deemed sufficient unless accompanied by clinically identifiable deficiencies.[21] All prosthodontists conducting the assessments were blinded to the PDA-V scores to minimize potential bias. Although clinical classification followed established guidelines, no formal inter-rater calibration session was conducted, which may have introduced variability in the evaluations. Group comparisons were performed using the Mann–Whitney U test due to the non-parametric nature of the data. A P-value of less than 0.05 was considered statistically significant. All statistical analyses were conducted using IBM SPSS Statistics version 25.0 (IBM Corp., Armonk, NY, USA). No imputation was performed for missing data; participants with incomplete responses were excluded using listwise deletion.

Results

Participant characteristics

A total of 200 patients participated in the study, with a mean age of 63.8 ± 8.7 years (range: 48–82 years). The sample comprised 112 females (56 %) and 88 males (44 %). The average duration of complete denture use was

11.6 ± 5.1 years, indicating that participants had sufficient experience with their prostheses to provide meaningful evaluations of their satisfaction. Among all participants, 120 individuals (60 %) were randomly selected to complete the PDA-V retest 7–14 days after the initial assessment. No significant differences were observed in age, gender, or duration of denture use between those who completed the retest and those who did not ($P > 0.05$), suggesting good comparability between the two groups.

Reliability assessment

The PDA-V demonstrated high internal consistency across all six subscales. Cronbach's α coefficients ranged from 0.82 to 0.87, and the overall α for the total scale was 0.89, indicating excellent internal reliability (Table 1). Test-retest reliability was assessed in 120 participants who completed the questionnaire twice, with a 7- to 14-day interval. ICCs for the subscale scores ranged from 0.86 to 0.92, and the ICC for the total PDA-V score was 0.91 (95 % CI: 0.88–0.94), demonstrating excellent temporal stability (Table 2).

Convergent validity and discriminant validity assessment

Among the total sample (n = 200), participants were stratified into two groups based on their global denture satisfaction VAS scores. The satisfaction group (n = 112; VAS ≥79 mm) demonstrated a significantly higher mean PDA-V score (85.4 ± 5.2) compared to the less-satisfied group (n = 88; VAS <79 mm), whose mean score was 62.3 ± 8.7. A strong and statistically significant correlation was observed between total PDA-V scores and VAS ratings across all participants (Spearman's ρ = 0.78, $P < 0.001$), supporting the convergent validity of the Vietnamese version of the instrument (see Table 3). Discriminant validity was assessed by comparing PDA-V scores between participants who were clinically evaluated as needing new dentures (n = 72) and those who did not (n = 128). The median total PDA-V score was significantly lower in the "need new dentures" group (median: 54.2) than in the "no need" group (median: 72.8), with a statistically significant difference (Mann–Whitney U = 3192.5, $P < 0.01$) (Table 4). The corresponding effect size (r = 0.255) indicates a small to moderate effect. Similar trends were observed across all six PDA-V subscales, with significantly lower scores in the

Table 1 Internal consistency of the patient's denture assessment-Vietnamese version (PDA-V) by subscale (n = 200).

Subscale	Cronbach's α
Functional performance	0.86
Esthetics and speech	0.83
Lower denture fit	0.84
Upper denture fit	0.87
Expectations	0.82
Importance of dentures	0.82

Table 2 Test-retest reliability of the patient's denture assessment-Vietnamese version (PDA-V) by subscale (n = 120).

Subscale	ICC (95 % CI)
Functional performance	0.91 (0.88–0.94)
Esthetics and speech	0.89 (0.85–0.92)
Lower denture fit	0.90 (0.86–0.93)
Upper denture fit	0.92 (0.89–0.95)
Expectations	0.86 (0.82–0.89)
Importance of dentures	0.87 (0.83–0.90)

Table 3 Convergent validity: Patient's denture assessment-Vietnamese version (PDA-V) and visual analog scale (VAS) scores by satisfaction level.

Satisfaction group	n	PDA-V (mean ± SD)	VAS (mean ± SD)
Satisfaction	112	85.4 ± 5.2	89.2 ± 4.7
Less satisfaction	88	62.3 ± 8.7	65.4 ± 7.8

Note. Spearman's ρ (n = 200) = 0.78, $P < 0.001$.

Table 4 Discriminant validity: Patient's denture assessment-Vietnamese version (PDA-V) scores by clinical need for new dentures.

Group	n	PDA-V (median [IQR])	P-value (Mann–Whitney U test)
No need for dentures	128	72.8 [68.4–78.1]	<0.01
Need for new dentures	72	54.2 [48.7–59.3]	—

group requiring new dentures ($P < 0.05$), further confirming the instrument's discriminative ability (Fig. 1).

Ceiling and floor effects

Ceiling and floor effects were assessed by calculating the proportion of participants who achieved the minimum (0) or maximum (100) possible scores on each PDA-V subscale. All subscales exhibited ceiling and floor effects below the commonly accepted threshold of 5 %, indicating an appropriate range of item response and minimal saturation. The highest ceiling effect was observed in the "Importance of Dentures" subscale (4.5 %), primarily among participants in the satisfaction group (Table 5).

Discussion

This study aimed to evaluate the psychometric properties of the PDA-V among complete denture wearers. The findings demonstrated that the PDA-V possesses excellent internal
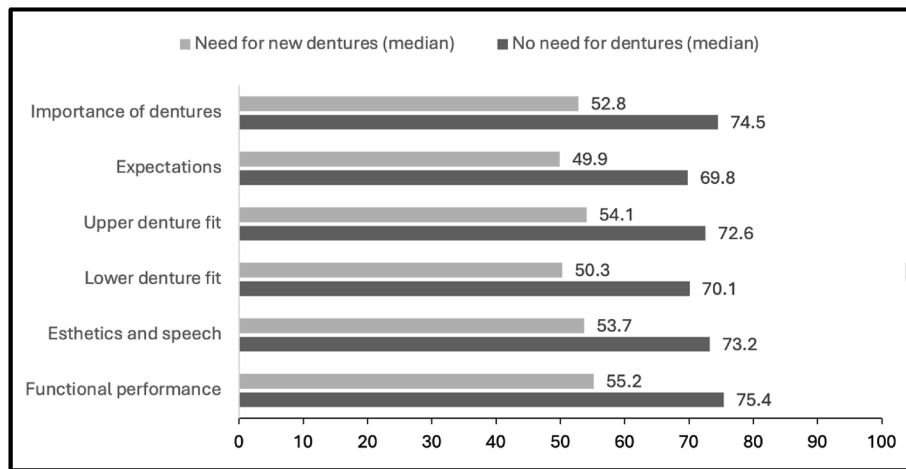
Figure 1 Median scores for each patient's denture assessment-Vietnamese version (PDA-V) subscale, stratified by clinical evaluation of denture replacement need. Patients assessed as requiring new dentures showed significantly lower scores across all subscales ($P < 0.05$).

Table 5 Ceiling and floor effects for the patient's denture assessment-Vietnamese version (PDA-V) subscales (n = 200).

Subscale	% Minimum scores	% Maximum scores
Functional performance	1.0 %	3.5 %
Esthetics and speech	0.5 %	4.0 %
Lower denture fit	0.0 %	2.5 %
Upper denture fit	0.5 %	3.0 %
Expectations	1.5 %	2.5 %
Importance of dentures	0.5 %	4.5 %

consistency, strong test-retest reliability, and acceptable construct validity, confirming its utility as a reliable and valid instrument in Vietnamese clinical contexts. The internal consistency coefficients obtained in this study (Cronbach's $\alpha = 0.82-0.87$) indicate high internal reliability and align closely with previous validation studies. For instance, the original Japanese version of the PDA reported α values between 0.82 and 0.89,[8] the Thai version reported $\alpha = 0.81-0.87$,[9] and the Indonesian version reported α ranging from 0.765 to 0.834.[10] These consistent results across different cultural settings support the scale's structural integrity and adaptability. The PDA-V also demonstrated excellent temporal stability, with test-retest ICCs ranging from 0.86 to 0.92. These findings are comparable to those of the original Japanese version (ICC = $0.84-0.93$)[8] and the Indonesian version (ICC = 0.797),[10] further validating the reproducibility of the instrument over time.

Construct validity was supported by two key findings. First, the strong positive correlation between PDA-V scores and global satisfaction VAS scores ($\rho = 0.78$) confirms convergent validity, consistent with prior research using the original PDA.[13,18] Second, discriminant validity was demonstrated by significantly lower PDA-V scores among participants clinically determined to require denture replacement, indicating the instrument's sensitivity to

clinically meaningful differences in patient experience. These results suggest that the PDA-V not only reflects overall patient satisfaction but also distinguishes between levels of clinical adequacy.

Although exploratory or confirmatory factor analysis (EFA or CFA) is often encouraged to validate the underlying factor structure of translated instruments, such analyses were not conducted in this study due to sample size limitations. While our sample of 200 participants was sufficient for evaluating internal consistency and construct validity, it did not meet the recommended thresholds for CFA, which typically requires a minimum of 5–10 participants per estimated parameter or an overall sample size of at least 300 to ensure stable model estimation.[22] Future studies with larger and more diverse samples are needed to formally evaluate the factorial structure of the PDA-V through structural equation modeling approaches and to explore its longitudinal responsiveness to treatment-related changes.

This study has several limitations. The sample was drawn from a single public hospital, which may limit the generalizability of the findings to broader populations. The 7–14 day interval for test-retest assessment, although methodologically acceptable, may still be subject to minor recall bias. Additionally, the clinical judgment used to assess denture replacement need was not standardized through inter-rater calibration, which may introduce variability. Lastly, the absence of factor analysis restricts conclusions regarding the latent structure of the instrument.

Despite these limitations, the PDA-V represents a culturally adapted and clinically relevant tool for assessing patient satisfaction with complete dentures. Unlike generic oral health questionnaires, the PDA specifically addresses domains critical to denture wearers, including expectations and perceived importance, which are often shaped by cultural and socioeconomic contexts. Its application may enhance shared decision-making, support individualized treatment planning, and improve patient-clinician communication in prosthodontic care. Furthermore, prior studies have demonstrated the applicability of the original

PDA to various prosthesis types, including removable partial dentures and implant-supported overdentures,[23—25] suggesting that, with appropriate adaptation, the PDA-V may also be extended to other prosthodontic modalities in the Vietnamese population. By capturing nuanced patient perspectives that may be overlooked during routine clinical evaluation, the PDA-V holds promise as a valuable component of patient-centered care and outcome tracking in public dental health systems. Taken together, the findings support the PDA-V as a reliable and valid patient-reported outcome measure for Vietnamese complete denture wearers, and its integration into clinical practice may improve both treatment quality and patient satisfaction. Further research involving larger and more diverse populations is recommended to confirm its factor structure and evaluate its responsiveness to changes over time.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgments

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