Assessing Dysphagia in Head and Neck Cancer Patients: Validation and Cultural Adaptation of the Thai M.D. Anderson Dysphagia Inventory (TH-MDADI)

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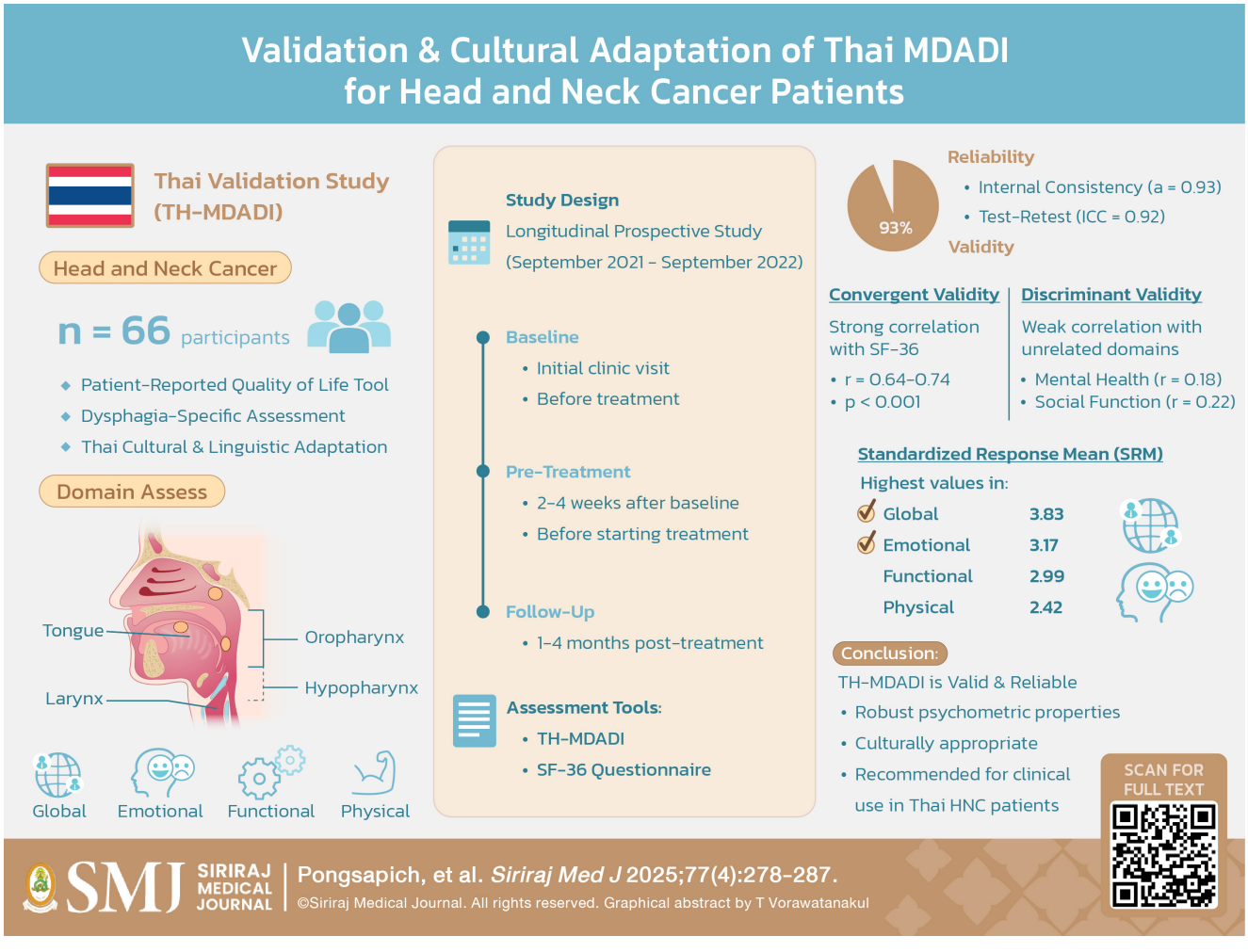

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ABSTRACT

Objective: The validation study of the Thai version of the M.D. Anderson Dysphagia Inventory (TH-MDADI) addresses a critical gap in head and neck cancer (HNC) care in Thailand. At leading institutions like Siriraj Hospital, patient-reported outcomes have been historically neglected, with care primarily focusing on routine medical services. This study aimed to validate the TH-MDADI to enhance dysphagia assessment and to promote patient-centered care.

Materials and Methods: In this longitudinal prospective study, 66 HNC patients completed the TH-MDADI and SF-36 at baseline, pre-treatment, and post-treatment at Siriraj Hospital. Psychometric properties were evaluated, including internal consistency (Cronbach's α), test-retest reliability (intraclass correlation coefficient, ICC), convergent and discriminant validity (correlations with SF-36 domains), and responsiveness (standardized response mean, SRM).

Results: The TH-MDADI demonstrated excellent internal consistency (Cronbach's α = 0.93) and test-retest reliability (ICC = 0.92, 95% CI: 0.88–0.96). Strong correlations with related SF-36 domains (r = 0.64-0.74, $p < 0.001$) established convergent validity, while weak correlations with unrelated domains confirmed discriminant validity. High responsiveness to change post-treatment was observed, particularly in the Global (SRM = 3.83) and Emotional (SRM = 3.17) subscales.

Conclusion: The TH-MDADI demonstrates robust psychometric properties, establishing its value as a reliable tool for assessing dysphagia-related quality of life in Thai HNC patients. This validation represents a significant advancement for Thai cancer care, addressing the historical neglect of patient-reported outcomes. By providing clinicians with a validated assessment instrument, this study promotes a more systematic, patient-centered approach to HNC treatment in Thailand.

Keywords: Head and neck cancer; MDADI; SF-36; health-related quality of life (Siriraj Med J 2025; 77: 278-287)

INTRODUCTION

The evaluation of health-related quality of life (HRQOL) in individuals experiencing dysphagia, especially those affected by head and neck cancer (HNC), is essential for comprehending how the condition influences daily functioning and overall quality of life. The M.D. Anderson Dysphagia Inventory (MDADI) is a widely accepted assessment tool designed to measure quality of life in patients with dysphagia. It includes four subscales: global, emotional, functional, and physical.[1]

While the MDADI has been extensively validated and used in its original English version, there is an increasing need for validated translations in other languages to ensure its applicability across different cultural contexts. In Thailand, where the incidence of HNC is significant[2], having a properly validated Thai version of the MDADI is essential for accurate assessment and improved patient care.

Translating and adapting HRQOL questionnaires for different cultural settings is complex and requires careful consideration. *Herdman et al., 1997*[3] emphasized the importance of establishing equivalence between the original and translated versions of HRQOL assessments. They advocate for a standardized approach and terminology in cross-cultural adaptation, highlighting the need for conceptual equivalence, and suggesting that a universal perspective may be necessary to fully capture HRQOL across various cultures.[3] They advocated for a standardized terminology and approach in cross-cultural adaptations, highlighting the need for conceptual equivalence and suggesting that a universalist perspective may be necessary to fully capture HRQOL across different cultures.

This perspective is particularly relevant when validating the MDADI for use in Thailand. It underscores the importance of not only translating the questionnaire but also ensuring that the concepts being measured are relevant and understood similarly in the Thai cultural context. This process involves careful examination of linguistic nuances, cultural norms, and differences in the healthcare system to ensure that the Thai version of the MDADI maintains the conceptual equivalence of the original while being culturally appropriate and understandable to the Thai population.

To validate the Thai version of the MDADI, it is crucial to compare it with a well-established, general HRQOL measure. The Short Form-36 (SF-36)[4], which has already been translated and validated in Thai, serves as an ideal comparator. The SF-36 comprises eight domains: physical functioning, role limitations due to physical health, bodily pain, general health perceptions, vitality, social functioning, role limitations due to emotional problems, and mental health.[5] The general objective of this study is to analyze the validity and reliability of the Thai MDADI by correlating it with relevant domains

in the SF-36 questionnaire. The additional objectives of this study were as follows:

a) Assess the convergent validity of the Thai MDADI by demonstrating its relationship with relevant SF-36 domains (e.g., physical functioning, role limitations, and overall health).
b) Evaluate the discriminant validity of the Thai MDADI by highlighting its distinction from unrelated SF-36 domains (e.g., mental health and social functioning).

By establishing these relationships and examining the Thai MDADI's performance over time, this study seeks to provide a validated Thai version of the MDADI, enhancing its utility in assessing Thai HNC patients with dysphagia. This validation will contribute to the growing body of evidence supporting the use of the Thai MDADI, ultimately leading to improved patient care and outcomes in Thailand and potentially informing similar efforts in other Southeast Asian countries.

MATERIALS AND METHODS

Study design

This study employed a longitudinal prospective design to validate the Thai version of the M.D. Anderson Dysphagia Inventory (TH-MDADI) in HNC patients. Data was collected from both the Out-Patient Department (OPD), and In-Patient Department (IPD) by two instructors from the Otorhinolaryngology Head and Neck Surgery Department, Faculty of Medicine Siriraj Hospital, Mahidol University, Thailand, over a one-year period from September 30, 2021, to September 29, 2022.

Ethical considerations

The study was approved by the Siriraj Institutional Review Board of the Faculty of Medicine Siriraj Hospital, Mahidol University (Protocol No. 629/2563(IRB4), COA No. Si 807/2020). Informed consent was obtained from all participants prior to their enrollment in the study. The study adhered to the Declaration of Helsinki and Good Clinical Practice guidelines.

Participants

Eligible participants were adult patients (≥18 years) diagnosed with HNC and scheduled to undergo either surgical intervention or primary concurrent chemoradiotherapy (CCRT) at our institution. Exclusion criteria included an inability to understand or read Thai, cognitive impairment preventing questionnaire completion, and presence of other conditions significantly impacting swallowing function unrelated to HNC.

Data collection

Clinical data were extracted from medical records at Siriraj Hospital, a tertiary referral center in Thailand. The data collected included patient demographics such as age, gender, clinical staging, and treatment modality. Participants were asked to complete the TH-MDADI along with the previously validated Thai version of the Short Form-36 (SF-36) at three time points:

1. Baseline: During the initial clinic visit, prior to the initiation of treatment.
2. Pre-Treatment Confirmation: 2-4 weeks after the baseline assessment, before the commencement of primary treatment (either surgery or concurrent chemoradiotherapy [CCRT].
3. Follow-Up: 1-4 months post-treatment completion.

The MDADI consists of 20 items across four domains: global, emotional, functional, and physical. Each item is scored on a 5-point Likert scale, with total scores ranging from 20 to 100. Higher scores indicate a better quality of life.

The SF-36 includes 36 items across eight domains: physical functioning, role limitations due to physical health, bodily pain, general health perceptions, vitality, social functioning, role limitations due to emotional problems, and mental health.

Statistical analysis

All analyses were conducted using Python (version 3.12.6) with the following libraries:

- **Data Processing & Visualization:** *pandas, numpy, matplotlib, seaborn*
- **Statistical Analysis:** *scipy.stats, statsmodels, pingouin, fancyimpute*

Descriptive Statistics summarized demographic and clinical characteristics, presenting continuous variables as means ± SD or medians (IQR) and categorical variables as frequencies and percentages.

Reliability

Internal consistency was assessed using Cronbach's alpha (>0.70) calculated via the *pingouin. cronbach_alpha*. Intraclass correlation coefficients (ICC) were calculated for 30 participants using the *pingouin.intraclass_corr* package.

Construct validity

- **Convergent validity:** Pearson correlations were calculated between MDADI and related SF-36 domains (physical, role limitations, overall health) using *scipy.stats.pearsonr*.

- **Discriminant validity:** Pearson correlations between MDADI and unrelated SF-36 domains (mental health, social functioning).

Responsiveness

The Standardized Response Mean (SRM) was calculated as the mean of change in scores divided by the standard deviation (SD) scores.

Known-Groups Validity MDADI scores were compared across tumor stages and treatment modalities using one-way ANOVA (*statsmodels.stats.anova.anova_lm*) or independent t-tests (*scipy.stats.ttest_ind*).

The significance level of $p < 0.05$ was applied. For missing data exceeding 5% multiple imputation was performed using *fancyimpute.IterativeImputer*.

Translation process

The original English version of the M.D. Anderson Dysphagia Inventory (MDADI) was meticulously translated into Thai to ensure linguistic and conceptual equivalence. The translation process was conducted by The Center for Translation and Language Services (CTLS) at Mahidol University. The following steps were undertaken to ensure a culturally appropriate translation:

1. **Forward Translation:** Two independent bilingual translators, fluent in English and Thai, performed forward translations of the MDADI. The goal was to accurately convey the original content while adapting it to the Thai linguistic and cultural context.
2. **Reconciliation:** The two forward translations were reviewed and reconciled by a panel of experts, including linguists and specialists in swallowing disorders, to create a unified Thai version. Any discrepancies were discussed and resolved to maintain the integrity of the questionnaire.
3. **Backward Translation:** The reconciled Thai version was then translated back into English by two different bilingual translators who were not familiar with the original MDADI. This back-translation was compared with the original English version to identify and rectify any inconsistencies or deviations in meaning.
4. **Expert Committee Review:** An expert committee, consisting of clinicians, researchers, and language specialists, reviewed all versions of the MDADI to ensure that the conceptual meaning remained unchanged between the original and translated versions.
5. **Pre-Testing (Cognitive Interviewing):** The pre-final Thai version was pilot-tested on a sample of **30 Thai-speaking individuals** representative of the target population. Cognitive interviews were conducted to assess the clarity, relevance, and comprehensibility of each item. Participant feedback was incorporated to further refine the questionnaire.
6. **Finalization and Validation**
   Based on feedback from the pre-testing phase, the Thai MDADI was finalized. This version underwent further psychometric testing to confirm its reliability, validity, and responsiveness, ensuring its appropriateness for assessing dysphagia-related quality of life in Thai head and neck cancer patients.

RESULTS

Population characteristics

A total of 66 patients diagnosed with HNSCC were enrolled in the study. The mean age of participants was 65.4 ± 7.2 years, with 66.7% being male. Primary tumor sites were distributed as follows: oral cavity (53.0%), oropharynx (25.8%), larynx (12.1%), and hypopharynx (9.1%). Most presented with advanced disease, with 39.4% at Stage III and 33.3% at Stage IVA, as detailed in Table 1.

Questionnaire completion rates

Out of the initial 66 participants:

- **Baseline:** All 66 participants completed the questionnaires during the first clinic visit.
- **Pre-Treatment Confirmation:** 41 participants completed the questionnaires approximately 2–4 weeks after the baseline assessment, prior to the initiation of primary treatment.
- **Follow-Up:** 53 participants completed the questionnaires 1–4 months post-treatment.

Quality of life outcomes

Quality of life was assessed using both the MD Anderson Dysphagia Inventory (MDADI) and the Short Form-36 (SF-36) questionnaire.

MDADI scores:

Global: 76.8 ± 5.8
Emotional: 76.5 ± 5.7
Functional: 75.5 ± 6.2
Physical: 76.6 ± 5.3

SF-36 scores:

Physical Functioning: 76.1 ± 5.5
Role Limitations due to Physical Health: 75.2 ± 5.5
Overall Health: 76.1 ± 5.6
Mental Health: 79.2 ± 12.0
Social Functioning: 76.5 ± 11.9

TABLE 1. Baseline and clinical characteristics.

Characteristics	Value
Age (years)	Mean ± SD: 65.4 ± 7.2 Range: 27 - 81
Gender, n (%)	Male: 44 (66.7%) Female: 22 (33.3%)
Cancer Site, n (%)	Oral Cavity: 35 (53.0%) Oropharynx: 17 (25.8%) Larynx: 8 (12.1%) Hypopharynx: 6 (9.1%)
AJCC 8 Stage, n (%)	Stage I: 4 (6.1%) Stage II: 14 (21.2%) Stage III: 26 (39.4%) Stage IV: 22 (33.3%)
Primary Treatment Modality, n (%)	Definitive surgery: 4 (6.1%) Surgery with adjuvant CCRT: 37 (56.1%) Definitive radiotherapy: 3 (4.5%) Definitive chemoradiotherapy: 22 (33.3%)

Reliability analysis

Internal consistency

The TH-MDADI demonstrated excellent internal consistency, with an overall Cronbach's alpha of 0.93. Subscale-specific alpha values ranged from 0.87 in the Global domain to 0.91 in the Functional domain, confirming the tool's reliability across various quality-of-life dimensions, as detailed in Table 2. These findings underscore the TH-MDADI's robust consistency for assessing dysphagia-related quality of life in head and neck cancer (HNC) patients.

Test and retest reliability

Test-retest reliability was assessed using intraclass correlation coefficients (ICC) in a subset of 30 participants who completed the MDADI on two occasions within a two-week interval, with no treatment changes during this period. The ICC for the overall MDADI score was 0.92 (95% CI: 0.88–0.96), demonstrating excellent stability over time, with subscale ICCs from 0.88 to 0.94. These results, also in Table 2, confirm the instrument's reliability across domains.

In the context of the reliability analysis for the Thai MDADI, Fig 1 visually presents both the Cronbach's Alpha and ICC values for each subscale and the overall score. The figure highlights the high internal consistency of the MDADI, with Cronbach's alpha values ranging from 0.87 for the Global domain to 0.93 for the Overall score. Additionally, the ICC values, represented by the red line, confirm the strong test and retest reliability, with ICCs ranging from 0.90 to 0.94 across all domains.

Construct validity

Convergent validity

Convergent validity was assessed by examining Pearson correlation coefficients between MDADI domains and related SF-36 domains, including Physical Functioning, Role Limitations due to Physical Health, and Overall, Health. These correlations confirmed strong convergent validity.

Discriminant validity

Discriminant validity was demonstrated by examining MDADI correlations with unrelated SF-36 domains (Mental Health and Social Functioning), which were weak and statistically non-significant: Mental Health ($r = 0.18$, $p = 0.15$) and Social Function ($r = 0.22$, $p = 0.10$).

TABLE 2. Cronbach's Alpha and Intraclass Correlation Coefficients for the Thai MDADI.

Domain	Cronbach's Alpha	ICC (95% CI)
Global	0.87	0.90 (0.84–0.95)
Emotional	0.89	0.91 (0.86–0.96)
Functional	0.91	0.94 (0.90–0.97)
Physical	0.90	0.92 (0.88–0.96)
Overall	**0.93**	**0.92 (0.88–0.96)**

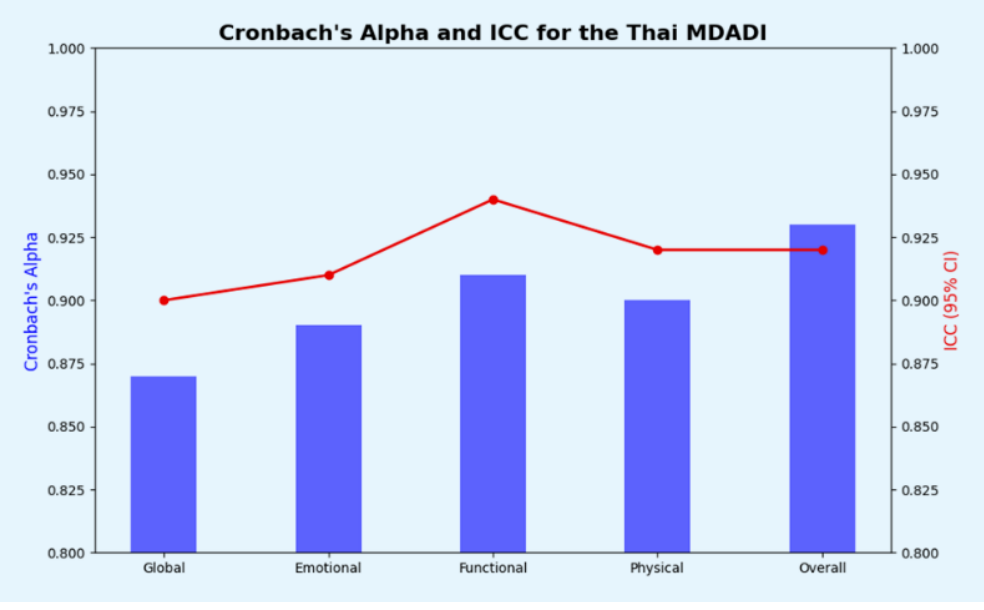

Fig 1. Cronbach's Alpha and Intraclass Correlation Coefficients (ICC) for the Thai MDADI Across Subscales and Overall Score.

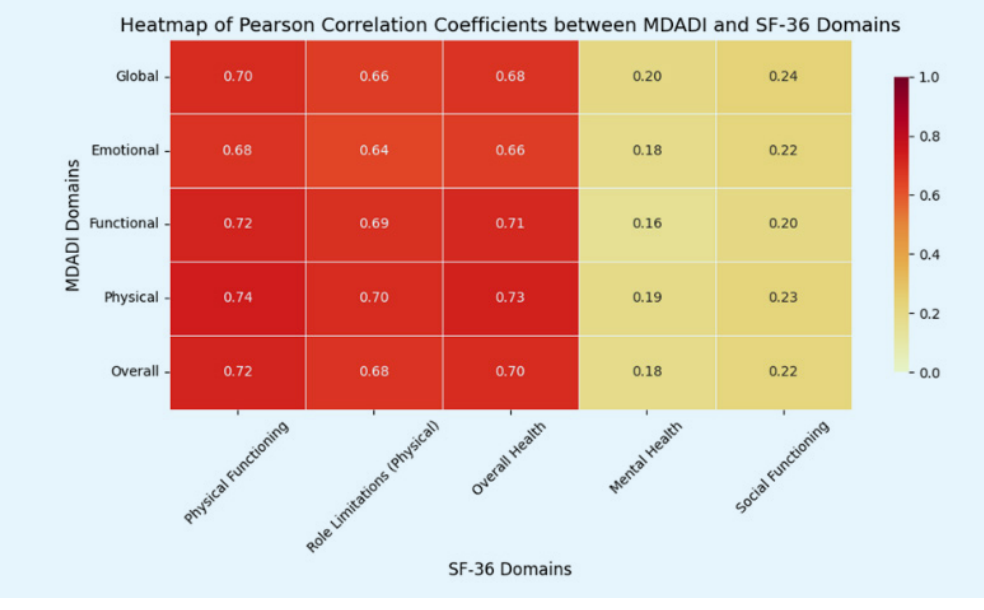

Fig 2. Heatmap of Pearson Correlation Coefficients Between MDADI and SF-36 Domains.

Responsiveness

Standardized Response Mean (SRM) values, assessing sensitivity to treatment effects, highlighted the TH-MDADI's responsiveness across domains. SRM values were highest in the Global domain (3.83), followed by the Emotional (3.17) and Functional (2.99) domains, indicating substantial responsiveness to treatment outcomes, especially in physical and emotional health. Table 3 summarizes these SRM values, alongside comparisons with SF-36 domains, demonstrating that both MDADI and SF-36 are effective in capturing post-treatment quality-of-life changes.

Standardized Response Mean (SRM) analysis

The Standardized Response Mean (SRM) was calculated for both the MDADI and SF-36 domains to assess sensitivity to treatment effects. Higher SRM values indicate greater responsiveness, with the MDADI showing very high SRM in the Global domain (3.83), high in Emotional (3.17) and Functional (2.99), and moderate in Physical (2.42). The SF-36 showed very high responsiveness in Physical Functioning (4.17), followed by Mental Health (3.65) and Role Limitations (3.13), with moderate responsiveness in Overall Health (2.50). Fig 3 further visualizes SRM values in a radar plot, comparing MDADI (green) and SF-36 (purple) responsiveness across domains. This figure highlights how each instrument captures changes in quality of life, especially in physical and emotional domains.

DISCUSSION

This study aimed to validate the TH-MDADI for assessing the quality of life in HNC patients with dysphagia. Our findings demonstrate that the Thai MDADI has strong psychometric properties, supporting its use in clinical and research settings in Thailand.

Reliability and validity

The Thai MDADI showed excellent internal consistency (Cronbach's alpha = 0.93) and test-retest reliability (ICC = 0.92), indicating a high degree of measurement stability. These results are comparable to those reported for the original English version and other validated translations, such as Dutch (Speyer et al., 2011)[6], Italian (Schindler, Borghi, Tiddia, Ginocchio, Felisati, & Ottaviani, 2008)[7], Swedish (Carlsson et al., 2012)[8], Korean (Kwon, Kim, Park, Oh, & Han, 2013)[9], and Brazilian Portuguese (Guedes, Angelis, Chen, Kowalski, & Vartanian, 2013).[10] The strong reliability suggests that the Thai MDADI consistently measures dysphagia-related quality of life across subscales over time.

The validity of TH-MDADI was supported by strong correlations between its domains and related domains of the SF-36, such as Physical Functioning, Role Limitations due to Physical Health, and Overall Health. The correlation coefficients (ranging from 0.64 to 0.74) indicate that the Thai MDADI effectively captures the physical and functional aspects of dysphagia-related quality of life. Conversely, weaker correlations with

TABLE 3. Standardized Response Mean (SRM) Values for MDADI and SF-36 Domains Post-Treatment.

Domain	Instrument	SRM	Interpretation
Global	MDADI	3.83	Very High
Emotional	MDADI	3.17	High
Functional	MDADI	2.99	High
Physical	MDADI	2.42	Moderate
Physical Functioning	SF-36	4.17	Very High
Role limitation	SF-36	3.13	High
Overall, Health	SF-36	2.5	Moderate
Mental Health	SF-36	3.65	High

The interpretations align correctly with the SRM values, where an SRM greater than 3.0 is considered very high, between 2.0 and 3.0 is high, and values between 1.5 and 2.0 are considered moderate.

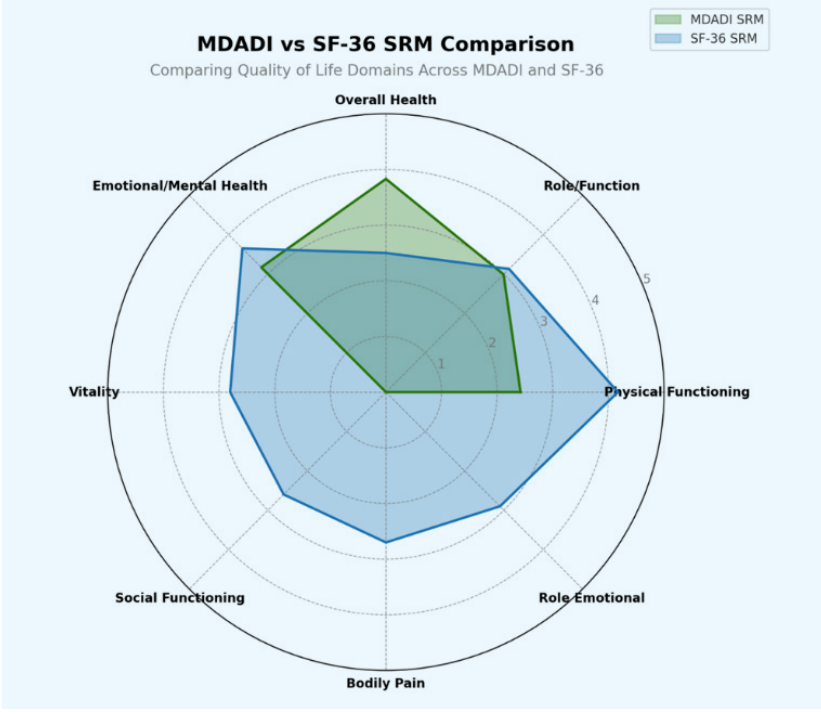

Fig 3. Comparison of Standardized Response Mean (SRM) Across Quality of Life Domains for MDADI and SF-36.

unrelated SF-36 domains (Mental and Social Function) demonstrate good discriminant validity, suggesting that the Thai MDADI can distinguish between physical and psychosocial aspects. Building on these findings, it is useful to consider prior studies that have evaluated dysphagia assessments in various populations. For instance, previous research examining the safety of specific food consistencies in stroke patients (Kientchockwiwat et al., 2022)[11] or the correlation between tongue strength and aspiration risk (Keskool et al., 2018)[12] highlights the importance of having robust, validated tools. Apart from investigations that have evaluated swallowing function and dysphagia outcomes in different populations, our study aims to fill a gap in the clinical assessment of dysphagia-related quality of life among Thai head and neck cancer patients. For instance, studies such as those examining the safety of specific food consistencies in stroke patients with dysphagia (Kientchockwiwat et al., 2022)[11] or the relationships between objective tongue strength measures and aspiration risk (Keskool et al., 2018)[12] underscore the importance of robust, validated instruments in both research and clinical practice. By validating the Thai MDADI, we provide clinicians and researchers a reliable tool to complement existing objective measures, enabling more comprehensive assessments and potentially guiding treatment strategies.

Responsiveness to change

High SRM values in MDADI's Global (3.83) and Emotional (3.17) subscales confirm sensitivity to dysphagia-related quality-of-life changes post-treatment, crucial for tracking treatment outcomes. Fig 3 illustrates these SRM comparisons, supporting the MDADI's role as a dysphagia-specific measure alongside SF-36 in assessing physical and emotional impacts.

Cultural adaptation and equivalence

The rigorous translation and cultural adaptation process used in this study, following the guidelines proposed by *Herdman et al.* (1997)[3], ensured that the Thai MDADI maintains conceptual and linguistic equivalence with the original English version. This approach addresses the challenges of cross-cultural adaptation highlighted in previous literature (*Guillemin et al.*, 1993; *Beaton et al.*, 2000)[13,14] and adds to the growing body of evidence supporting the use of the MDADI across different cultures and languages.

Clinical implications

The validation of the Thai MDADI provides clinicians and researchers in Thailand with a reliable and valid tool for assessing dysphagia-related quality of life in HNC patients. This instrument can facilitate patient care by:

1. Enabling systematic assessment of dysphagia impact on quality of life
2. Assisting in treatment planning and decision-making
3. Monitoring treatment outcomes and recovery progress
4. Facilitating communication between healthcare providers and patients about dysphagia-related concerns

Limitations and future directions

Despite demonstrating strong psychometric properties, our study has several limitations. First, while the sample size was sufficient for initial validation, future studies with larger, more diverse populations would enhance the generalizability of the findings. Second, although both Videofluoroscopic Swallow Study (VFSS) and Fiberoptic Endoscopic Evaluation of Swallowing (FEES) are utilized at Siriraj Hospital for assessing swallowing physiology, this study did not include data from either of these objective assessments. Integrating VFSS parameters (e.g., Penetration-Aspiration Scale, residue scores) and FEES findings (e.g., penetration, aspiration, pharyngeal residue) into future research could establish correlations with TH-MDADI scores, bridging subjective self-reports and objective swallowing outcomes. This multimodal approach would further validate the clinical utility of the TH-MDADI and enhance its application in tracking treatment outcomes.

CONCLUSION

The Thai MDADI demonstrates strong reliability, validity, and responsiveness, making it a valuable tool for evaluating dysphagia-related quality of life in Thai HNC patients with dysphagia. Its validation contributes to the global effort to standardize dysphagia assessments and improve patient care across diverse cultural contexts.

Data Availability Statement

The data that support the findings of this study are available upon request from the corresponding author, [N.R.]. The data are not publicly available due to containing information that could compromise the privacy of research participants.

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DECLARATION

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Conflict of Interest

The authors declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Registration Number of Clinical Trial

Not registered in the clinical trial.

Author Contributors

W.P.; Conceptualization, Methodology, Supervision. N.R.; Data Curation, Project administration. N.R.; Data Curation, Investigation. S.O., P.P., C.C., P.S., and P.K.; Validation, Writing - Review & Editing.

Use of Artificial Intelligence

None

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