

Reliability and Validity of the MD Anderson Dysphagia Inventory Among Japanese Patients

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Abstract This study aimed to validate the Japanese version of a dysphagia-specific quality of life questionnaire, the MD Anderson Dysphagia Inventory (MDADI-J), and to verify trends between MDADI-J and Functional Oral Intake Scale (FOIS) scores. The original 20 MDADI items were translated using a forward–backward method following accepted cultural adaptation guidelines. Seventy-two patients with a history of head and neck cancer treatment completed the MDADI-J between October 2015 and August 2016. Concurrent validity was determined by correlations with the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire-Core 30 (EORTC QLQ-C30) and the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire-Head and Neck 35 (EORTC QLQ-H&N35) instruments. Discriminant validity was examined using cancer stage grouping between stages I–II and III–IV. Additionally, trends between the FOIS and the MDADI-J total scores were analyzed using a trend test. The Cronbach’s α coefficient of the MDADI-J total score was 0.92, indicating high internal consistency. The average inter-item correlation coefficients ranged from 0.39 to 0.49. ICC, an indicator of test–retest reliability, was 0.84 for the total

score, and 0.58 to 0.81 for individual subscales. The total score and all subscales were significantly associated with the scores for each factor of the EORTC QLQ-C30 and EORTC QLQ-H&N35. The total score and all subscales were significantly different between clinical tumor stages I–II and III–IV. The total scores all increased with the progress of the FOIS. In conclusion, this study validated the Japanese version of the MDADI and showed that as FOIS scores deteriorate, MDADI-J scores tend to constantly decrease.

Keywords Quality of life · Head and neck cancer · Dysphagia · Deglutition · Questionnaire

Introduction

In Japan, the cancer incidence by head and neck region was estimated to be nearly 16,000 in 2009. The number of head and neck cancer (HNC) patients tends to increase yearly [1]. Dysphagia is common in patients with a history of HNC [2]. Dysphagia can lead to not only malnutrition but also aspiration pneumonia [3]. As a result, dysphagia causes discomfort and loss of quality of life (QoL) [4, 5].

In recent years, patients’ reported outcomes, especially using QoL questionnaires, in addition to the improvement of therapeutic outcomes, have played an important role [6]. There are some health-related QoL questionnaires for patients with HNC: the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire-Core 30 (EORTC QLQ-C30) and the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire-Head and Neck (EORTC QLQ-H&N), the Swallowing Quality-of-Life Questionnaire (SWAL-QOL), and the MD Anderson Dysphagia

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Inventory (MDADI) [7–9]. The EORTC QLQ-C30 is a general measure of health-related QoL for all patients with cancer. The EORTC QLQ-H&N is a disease-specific QoL instrument for patients with HNC. The Japanese versions of the EORTC QLQ-C30 and EORTC QLQ-H&N have already been validated [10]. The EORTC QLQ consists of one questionnaire including two sections: a core questionnaire 30 and an additional module for each tumor site. The combination of the two instruments, the EORTC QLQ-C30 and EORTC QLQ-H&N, provides a better measure of QoL as affected by HNC treatment side effects including dysphagia [7]. The SWAL-QOL is generally used for dysphagia-related psychological characteristics of HNC patients in the research field [11]. On the other hand, the SWAL-QOL is a QoL instrument for all patients with dysphagia, which is not specific to HNC. Therefore, the EORTC QLQ-C30, EORTC QLQ-H&N, and SWAL-QOL are commonly used for measuring QoL for HNC patients. In recent years, the scope of QoL questionnaires has widened. For example, health-related QoL utilizes outcome measures of therapeutic interventions, predictors of outcomes, and screening tools for diseases [12]. In fact, health-related quality of life (EORTC QLQ-H&N and SWAL-QOL) can predict subsequent survival using cutoff scores for screening as an example [13]. However, the EORTC QLQ-C30, EORTC QLQ-H&N, and SWAL-QOL have many questionnaire items. Therefore, there is a problem of the feasibility of completing these questionnaires [13]. The MDADI (containing 20 items and 4 subscales) was developed to assess dysphagia's effects on the QoL of patients with HNC. The MDADI has two notable points. First, it is easy to use for clinical practice because this questionnaire has a small number of items. The developer of the MDADI also commented that information from the MDADI can be useful in treatment decision making by patients and physician [14, 15]. Second, the content validity of the MDADI was ensured using patients with HNC and their families, whereas the content validity of the SWAL-QOL was not specific for HNC patients. As a screening tool for HNC patients with dysphagia, the MDADI may be able to identify patients with high mortality risk with high accuracy [16]. The MDADI was considered useful for patients' reported outcomes and as a screening tool in clinical practice. Nevertheless, there is no Japanese version of the MDADI.

On the other hand, swallowing function can be objectively assessed by various methods. Gold standards for examination and diagnosis of dysphagia include fiber optic endoscopic evaluation of swallowing (FEES) and videofluoroscopic swallowing study (VFSS) [17]. However, FEES and VFSS have some problems such as being time consuming, costly, and a burden for patients with dysphagia [18]. The Functional Oral Intake Scale (FOIS) is an objective and noninvasive

dysphagia assessment tool. It has a seven-point scale reflecting the dietary intake of patients with dysphagia. The evaluator can assess swallowing function by comparing the seven severities of FOIS. In addition, the FOIS requires no training for the assessor, no VFSS is required for scoring, and has high inter-rater reliability. The validity and ratings of FOIS are found to be associated with dysphagia severity [19]. Past research showed that VFSS findings are correlated with QoL scores [20]. In addition, some studies have examined whether the FOIS was correlated with the MDADI [21]. However, little has been reported on the stepwise relationship between the severity of FOIS and MDADI scores, that is, whether or not there is a discrepancy between the severity of FOIS and MDADI scores.

From the above, the purpose of this study was to translate and validate the Japanese version of a dysphagia-specific quality of life questionnaire, the MD Anderson Dysphagia Inventory (MDADI-J). Our secondary purpose was to determine the stepwise correlation between the MDADI and FOIS by trend testing in Japanese patients with HNC.

Materials and Methods

Translation Process

We followed internationally accepted guidelines [22–24] (Fig. 1). First, two bilinguals (whose native language is Japanese and second language is English) translated the MDADI into Japanese with the permission of the original

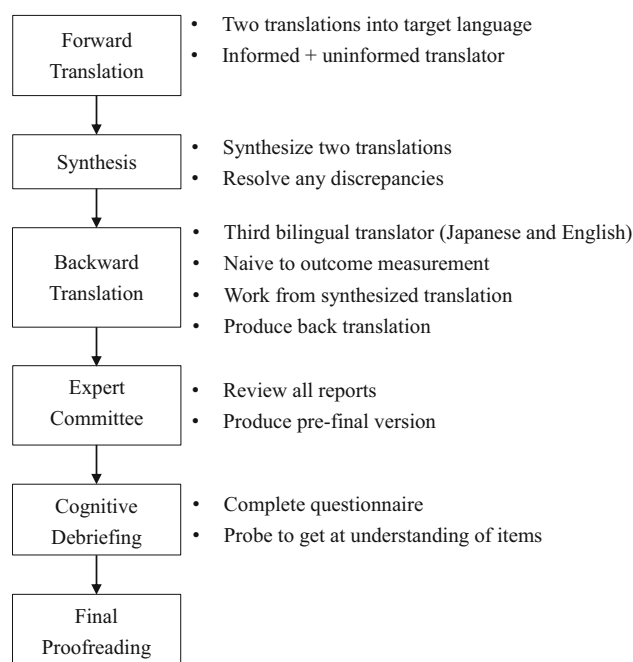


Fig. 1 Process of cross-cultural adaptation

author (forward translation) [24]. The two experts compared the two versions, and an iterative consensus was obtained. Second, the consensus version of the Japanese translation was sent to two additional bicultural experts (whose native language is English and second language is Japanese), who translated it into English (back-translation). This back-translated version was subsequently compared to the original English version to ensure that the translations were accurate. We repeated the translation and back-translation procedures until the discrepancies between the original and back-translated versions were resolved.

Data Collection

Patients who fulfilled the following criteria were included in our study: (1) patients treated for head and neck cancer, (2) outpatients treated for HNC in Dentistry and Oral Surgery in NTT Medical Center Tokyo (Tokyo, Japan) and Oral Surgery and Oral medicine in Kyushu Dental University Hospital (Fukuoka, Japan), (3) aged 20 years or older, and (4) able to respond to a self-administered written survey. The patients were excluded by the following criteria: receiving treatment for a mental disorder or had a prior history of mental disorder.

During the survey period from October 2015 to August 2016, we recruited participants using a sequential sampling method in NTT Medical Center Tokyo and Kyushu Dental University. After that, we selected participants based on a random sample for test–retest reliability. This study was conducted with the approval of the institutional ethics committee of Tokyo Medical and Dental University (approval number 1256). Written informed consent was obtained from each of the participants prior to their participation in the study.

Survey Instruments Scoring

MDADI

The MDADI consists of 20 items containing four subscales: global (a single item), emotional (eight items), functional (five items), and physical (six items). Respondents were asked which response best reflected their experience in the past week, and response options were as follows: “strongly agree,” “agree,” “no opinion,” “disagree,” or “strongly disagree”; these were scored on a scale of one to five. On the other hand, E7 (I do not feel self-conscious when I eat) and F2 (I feel free to go out to eat with my friends, neighbors, and relatives) were scored as five points for strongly agree and one point for strongly disagree. The average score for each question of a subscale was multiplied by 20 to calculate subscale scores [14].

EORTC QLQ-C30 and EORTC QLQ-H&N35

The EORTC QLQ-C30 (version 3.0) is a cancer-specific health-related QoL questionnaire. The EORTC QLQ-C30 consists of 30 items containing five functional subscales (physical, role, emotional, social, and cognitive), eight symptoms (fatigue, pain, nausea/vomiting, appetite loss, constipation, diarrhea, insomnia, and dyspnea), global health/QoL, and financial impact. The scores of the EORTC QLQ-C30 are linearly transformed to a scale of 0–100, with a higher score indicating a higher level of functioning or global health-related QoL, or a higher level of symptoms or problems [25].

The EORTC QLQ-H&N35 is a head and neck cancer-specific health-related QoL questionnaire. The EORTC QLQ-H&N consists of 35 items containing seven subscales: pain (four items), swallowing (five items), senses (two items), speech (three items), social eating (four items), social contact (five items), and sexuality (two items). There are 11 single items covering problems with teeth, dry mouth, sticky saliva, cough, feeling ill, opening the mouth wide, weight loss, weight gain, use of nutritional supplements, feeding tubes, and painkillers. The scores of the EORTC QLQ-H&N35 are linearly transformed to a scale of 0–100, with a higher score indicating a higher level of symptoms or problems [25]. We expected that swallowing function-related subscales of the EORTC QLQ-H&N would be correlated with the overall MDADI-J and with all subscales.

FOIS

Oral intake and nutritional status were scored with the FOIS (range from one to seven with score), with a higher score indicating a higher level of swallowing function [26].

Statistical Analysis

Reliability was evaluated by internal consistency (Cronbach’s α coefficients), average inter-item correlation, and test–retest reliability (intra-class correlation coefficient, ICC) over 2 weeks [27]. Concurrent validity was assessed using Pearson’s correlation coefficients between the MDADI-J and EORTC QLQ-C30, and the EORTC QLQ-H&N referring to the method of a previous study [28]. Discriminant validity was assessed by Student’s *t* test between clinical tumor stages I–II and III–IV. The trends between the MDADI-J total score and FOIS were analyzed using the Jonckheere–Terpstra test. Each mean number was shown by average \pm standard deviation. Statistical analysis was performed using SPSS (version 22; SPSS Japan Inc., Tokyo Japan). We calculated two-tailed *P* values in all the analyses. The alpha level of significance was set at 0.05.

Results

Patient Characteristics

A total of 75 participants enrolled in the study. When we analyzed the data, 3 (4.0%) were excluded because of failing to meet the inclusion criteria. Nineteen (26.4%) of the patients completed a second survey 2 weeks later. The patient characteristics are summarized in Table 1. This survey was completed by 72 patients treated for head and neck cancer, 39 of whom (54.2%) were male and 33 of whom (45.8%) were female. The mean age of the patients was 64.1 ± 11.4 years, with a range of 34–82 years. For the 72 patients who received treatment, the mean (SD) time since last treatment was 11.7 (24.8) months, with a range of 1.0–168 months. The oral cavity was the most frequent primary tumor site, and some patients had advanced stage or recurrent cancer. Dysphagia status was assessed using the FOIS (Table 2). There were no patients with grade 1 of FOIS: none of the patients had unstable medical conditions because of severe saliva aspiration.

Reliability and Validity

Internal Consistency

Cronbach's α coefficients were calculated for each subscale of the MDADI-J (Table 3). The Cronbach's α was 0.67 for MDADI-J emotional, 0.81 for MDADI-J functional, 0.83 for MDADI-J physical, and 0.92 for MDADI-J total score. The global subscale was excluded because it consists of a

Table 2 Distribution of patients for the Functional Oral Intake Scale (FOIS)

Category	Total	NTT Medical Center Tokyo	Kyushu Dental University
FOIS			
Level 1	1	0	1
Level 2	3	3	0
Level 3	1	1	0
Level 4	10	7	3
Level 5	20	8	12
Level 6	14	9	5
Level 7	23	8	15

Table 3 Cronbach's α coefficients and average inter-item correlation coefficients for total scores on the subscales of the Japanese version of the MD Anderson Dysphagia Inventory ($N = 72$)

Subscale	No. of items	Cronbach's α coefficient	Average inter-item correlation coefficient
Total score	20	0.92	0.42
Global	1	–	–
Emotional	6	0.67	0.49
Functional	5	0.81	0.47
Physical	8	0.83	0.39

single question. The average inter-item correlation coefficients for all question items were 0.42, and for the 3 subscales it ranged from 0.39 to 0.49.

Table 1 Demographic and clinical characteristics ($N = 72$)

Variable	Category	Total	NTT Medical Center Tokyo	Kyushu Dental University
Sex	Male	39	23	16
	Female	33	13	20
Age (years)	Range	34–82	34–82	42–82
	Mean \pm SD	64.1 ± 11.4	63.1 ± 11.8	65.1 ± 11.1
Primary tumor site	Oral cavity	64	30	34
	Oropharynx	7	5	2
	Larynx	1	1	0
Clinical tumor stage	I	24	15	9
	II	15	5	10
	III	14	8	6
	IV	19	8	11
Treatment	Surgery	50	22	28
	Surgery + RT	8	6	2
	Surgery + RT + CHT	12	7	5
	RT + CHT	2	1	1

SD standard deviation, RT radiotherapy, CHT chemotherapy

Test–Retest Reliability

Reproducibility, as assessed by the ICC, was 0.580 for global, 0.78 for emotional, 0.79 for functional, 0.81 for physical, and 0.84 for the total score (Table 4).

Concurrent Validity

Pearson's correlation coefficients between the MDADI-J and EORTC QLQ-C30, and the EORTC QLQ-H&N were calculated (Table 5). The style of Table 5 was adopted, referring to the existing literature [28]. The EORTC QLQ-C30 and EORTC QLQ-H&N were associated with each factor of the MDADI-J.

Table 4 Intra-class correlation coefficient (ICC) of the Japanese version of the MD Anderson Dysphagia Inventory ($N = 19$)

Instrument	ICC [95% CI]
Global	0.58 [−0.14, 0.84]
Emotional	0.78 [0.42, 0.92]
Functional	0.79 [0.43, 0.92]
Physical	0.81 [0.49, 0.93]
Total score	0.84 [0.58, 0.94]

CI confidence interval

Table 5 Correlation coefficients between the Japanese version of the MD Anderson Dysphagia Inventory (MDADI-J) and the European Organization for Research and Treatment of Cancer Quality of Life

	MDADI-J				
	Global	Emotional	Functional	Physical	Total score
EORTC QLQ C-30					
Pain	−0.33*	−0.41*	−0.40*	−0.42*	−0.42*
Appetite loss	−0.35*	−0.48*	−0.51*	−0.48*	−0.48*
EORTC QLQ-H&N35					
Pain	−0.33*	−0.43*	−0.34*	−0.41*	−0.40*
Swallowing	−0.52*	−0.52*	−0.61*	−0.64*	−0.62*
Sensory problems	−0.31*	−0.42*	−0.38*	−0.41*	−0.41*
Speech problems	−0.44*	−0.55*	−0.48*	−0.56*	−0.54*
Trouble with social eating	−0.52*	−0.55*	−0.48*	−0.51*	−0.56*
Teeth	−0.41*	−0.54*	−0.41*	−0.46*	−0.49*
Opening mouth	−0.56*	−0.68*	−0.64*	−0.61*	−0.67*
Dry mouth	−0.57*	−0.72*	−0.68*	−0.65*	−0.70*
Sticky saliva	−0.57*	−0.70*	−0.67*	−0.62*	−0.69*
Coughing	−0.56*	−0.68*	−0.67*	−0.62*	−0.68*
Painkillers	−0.11	−0.13	−0.21	−0.22	−0.18
Nutritional supplements	−0.16	−0.18	−0.15	−0.12	−0.17

* $P < 0.01$

Discriminant Validity

Discriminant validity was compared with the independent variables using the Student's t test between stages I–II and III–IV. There were significant differences for each factor (Fig. 2).

Relationship Between MDADI and FOIS

Total scores all increased along with improvement of the FOIS (trend test) (Fig. 3).

Discussion

We translated the MDADI into Japanese from English and confirmed its validity and reliability. The Cronbach's α coefficients of other language versions (Dutch, Korean, Portuguese, and Swedish) range from 0.79 to 0.86 (0.67 in Japanese) for the emotional subscale, from 0.68 to 0.82 (0.81 in Japanese) for the functional subscale, from 0.74 to 0.89 (0.83 in Japanese) for the physical subscale, and from 0.81 to 0.94 (0.92 in Japanese) for the total score [13, 24, 29, 30]. The Cronbach's α coefficients of the Japanese version that ranged from 0.67 to 0.92 were almost on the same level with other language versions of the MDADI. The average inter-item correlation coefficients

Questionnaire-Core 30 (EORTC QLQ-C30) and the EORTC Quality of Life Questionnaire-Head and Neck 35 (EORTC QLQ-H&N35) ($N = 72$)

Fig. 2 Comparison of each subscale of the Japanese version of the MD Anderson Dysphagia Inventory between early and advanced stages. * $P < 0.05$, ** $P < 0.01$. ^aClinical tumor stages I–II, ^bclinical tumor stages III–IV

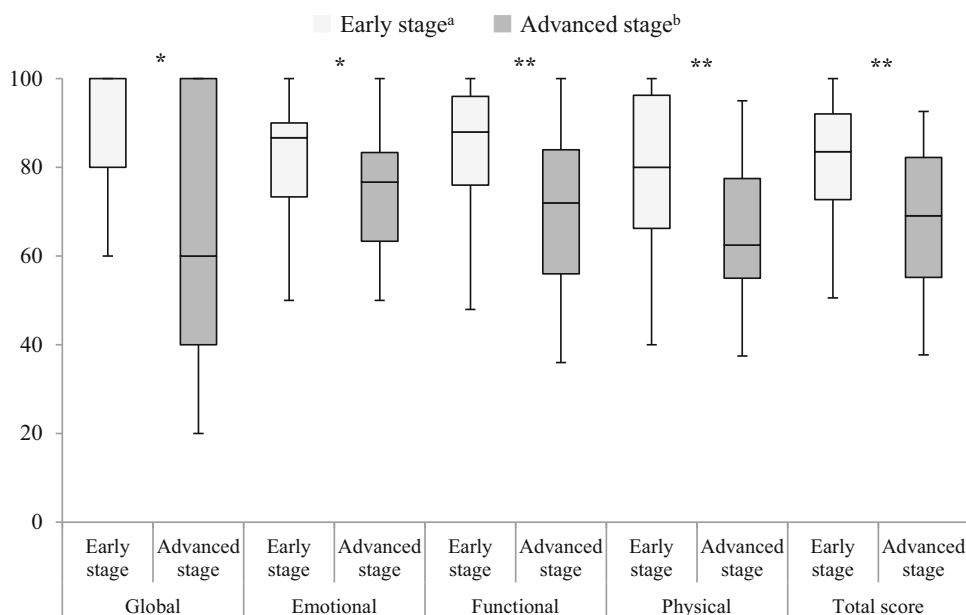
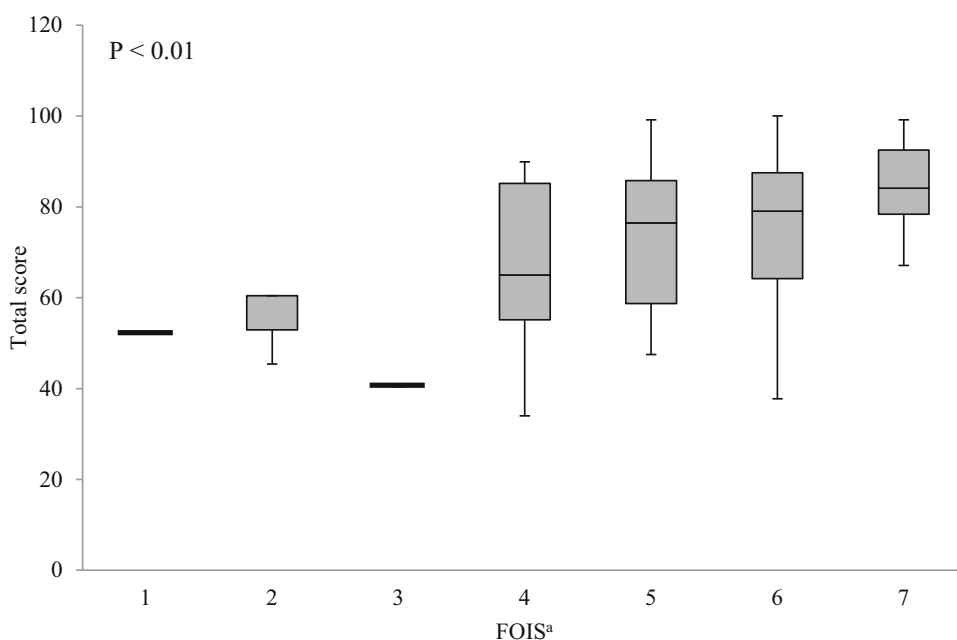


Fig. 3 Relationship between the total score of the Japanese version of the MD Anderson Dysphagia Inventory and Functional Oral Intake Scale (trend test). ^aFunctional Oral Intake Scale



had similar values to those previously reported [31]. For test–retest reliability, the ICC of other languages (Dutch, Korean, Portuguese, and Swedish versions) range from 0.82 to 0.83 for the global subscale, from 0.88 to 0.93 for the emotional subscale, from 0.84 to 0.97 for the functional subscale, from 0.84 to 0.94 for the physical subscale, and from 0.80 to 0.96 for the total score [13, 24, 29, 30]. Therefore, the ICCs of the Japanese version for all subscales, which ranged from 0.78 to 0.84, were comparable to the MDADI of other language versions, except for the global subscale (ICC = 0.58). The ICC of the global

subscale also has the lowest score of all subscales in the original, Korean, and Swedish versions (Dutch and Portuguese versions were not shown). This result may be because the global subscale was constructed with only a single item. However, the ICC of the total score in Japanese is of the same degree compared with studies using other languages [13, 29]. Therefore, the ICC of the total score was acceptable (with the highest ICC = 0.84).

The relationship between the MDADI-J and EORTC QLQ-C30, and the EORTC QLQ-H&N resulted in reasonable values. We expected that swallowing function-

related subscales of the EORTC QLQ-H&N (Swallowing, Trouble with social eating, Teeth, Opening mouth, Dry mouth, and Sticky saliva) would be correlated with the overall MDADI-J and with all subscales, because the MDADI-J was developed for HNC patients with dysphagia. Our hypothesis that the swallowing function-related subscales of the EORTC QLQ-H&N would correlate with all the MDADI-J subscales was correct, whereas there were no correlations between the MDADI-J subscales and the swallowing function-unrelated subscales of the EORTC QLQ-H&N (Painkillers and Nutritional supplements). These results were consistent with earlier studies showing that dysphagia-specific questionnaires such as the SWAL-QOL were more closely related to the MDADI than comprehensive questionnaires such as the Short Form-36 [14, 30]. Therefore, we considered that the concurrent validity of the MDADI-J was verified.

According to a review of previous research, discriminant validity has only previously been examined and verified in the Swedish version of the MDADI [29]. Equally, the discriminant validity of the MDADI-J was supported, as statistically significant differences were observed between distinctly different groups in clinical practice (clinical tumor stages I–II and III–IV). These results support the fact that several factors including clinical tumor stage have been identified that may predict worse QoL outcomes [32]. From the above, these results suggested that the reliability (internal consistency and reproducibility) and validity (concurrent and discriminant validity) of the MDADI-J have been confirmed, so we consider the MDADI-J to be useable.

In addition, we confirmed the monotonic increase between the total score and the FOIS by the trend test. The total MDADI-J score increased with the progress of the FOIS [33]. This finding raises the possibility that self-rated perception agrees with an objective evaluation in oropharyngeal dysphagia. This result corroborated previous reports that VFSS findings are correlated with MDADI scores [20]. The above results suggest that patients' complaints about oropharyngeal dysphagia as well as objective assessments can play an important role in clinical practice. Future studies could set MDADI cutoff scores for the classification of dysphagia severity with the aim of applying them to self-assessment tools for swallowing function in patients with HNC.

Our study has some limitations. First, sample size and characteristics of the sample may have influenced relationships among the variables: the study population may not be fully representative of the total population of patients with HNC, and thus further research is required. Second, the majority of patients included in the study received surgical treatment. However, a variety of patients with different treatment protocols were included. Therefore, this is a limitation that findings of a wider population may have been different. Third, the sample size of some groups was too small in the trend test, and therefore the accuracy of the statistical analysis was insufficient. However, the result of this trend test might remain the same even with larger samples. Fourth, interpretation of the MDADI-J global scale needs to be considered carefully because the ICC of the global subscale had the lowest score of all subscales. Fifth, in this cross-sectional study, the possibility of confounding by the patients' characteristics, such as the mean time since last treatment, cannot be excluded, and this requires further evaluation in longitudinal studies.

Conclusion

We have two major conclusions:

- (1) The validity and reliability of the Japanese version of the MDADI were confirmed.
- (2) The present study suggests that MDADI-J scores tend to constantly decrease as FOIS scores deteriorate.

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Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

Informed consent Written informed consent was obtained from all the participants before participation in the study.

Appendix

この質問票は、あなたの飲み込みの能力について問うものです。得られた情報から、あなたが感じている飲み込みの能力を評価することができます。

下記の質問文は、飲み込みの能力に問題を持つ人によって作られたものです。以下に、あなたの状態を把握できる質問文が用意されています。それぞれの質問を読み、あなたの過去1週間の経験に最もあてはまるものに丸を入れてください。

私の飲み込みの能力により、日々の活動が制限される。

とても当てはまる 当てはまる どちらでもない 当てはまらない

E2. 私は自分の食習慣を恥ずかしいと思う。

とても当てはまる 当てはまる どちらでもない 当てはまらない

F1. 周りの人は私に料理を作ることを難しいと感じている。

とても当てはまる 当てはまる どちらでもない 当てはまらない

P2. 1日の終わりほど、飲み込みがより難しくなる。

とても当てはまる 当てはまる どちらでもない 当てはまらない

E7. 食事をしているとき、特別に自分を意識しない。

とても当てはまる 当てはまる どちらでもない 当てはまらない

E4. 飲み込みの問題により、気が動転する。

とても当てはまる 当てはまる どちらでもない 当てはまらない

P6. 飲み込みに努力を要する。

とても当てはまる 当てはまる どちらでもない 当てはまらない

E5. 飲み込みに問題があるため、外出をしない。

とても当てはまる 当てはまる どちらでもない 当てはまらない

F5. 飲み込みが難しいため、収入を失った。

とても当てはまる 当てはまる どちらでもない 当てはまらない

P7. 飲み込みに問題があるため、食事により時間がかかる。

とても当てはまる 当てはまる どちらでもない 当てはまらない

P3. 周りの人に「なぜそれが食べられないの?」と聞かれる。

とても当てはまる 当てはまる どちらでもない 当てはまらない

E3. 私の食事の問題は他人をイライラさせる。

とても当てはまる 当てはまる どちらでもない 当てはまらない

P8. 液体を飲もうとすると咳き込む。

とても当てはまる 当てはまる どちらでもない 当てはまらない

F3. 私は飲み込みの問題によって、社会的および個人的な生活が制限される。

とても当てはまる 当てはまる どちらでもない 当てはまらない

F2. 友人や近所の人、親戚の人と気軽に外食することができる。

とても当てはまる 当てはまる どちらでもない 当てはまらない

P5. 飲み込みが困難なため、食事が制限される。

とても当てはまる 当てはまる どちらでもない 当てはまらない

P1. 飲み込みに問題があるため、体重を維持できない。

とても当てはまる 当てはまる どちらでもない 当てはまらない

E6. 飲み込みに問題があるため、自信がもてない。

とても当てはまる 当てはまる どちらでもない 当てはまらない

P4. 非常にたくさんの量の食べ物を飲み込んでいるように感じる。

とても当てはまる 当てはまる どちらでもない 当てはまらない

F4. 食習慣によって、周囲から除外されていると感じる。

とても当てはまる 当てはまる どちらでもない 当てはまらない

ご協力ありがとうございました。

References

- Hori M, Matsuda T, Shibata A, Katanoda K, Sobue T, Nishimoto H. Cancer incidence and incidence rates in Japan in 2009: a study of 32 population-based cancer registries for the Monitoring of Cancer Incidence in Japan (MCIJ) project. *Jpn J Clin Oncol*. 2015;45(9):884–91. doi:10.1093/jco/hyv088.
- Dholam KP, Dugad JA, Sadashiva KM. Impact of oral rehabilitation on patients with head and neck cancer: a study using the Liverpool Oral Rehabilitation Questionnaire and the Oral Health Impact Profile-14. *J Prosthet Dent*. 2016;117:559–62. doi:10.1016/j.prosdent.2016.06.019.
- Denaro N, Merlano MC, Russi EG. Dysphagia in head and neck cancer patients: pretreatment evaluation, predictive factors, and assessment during radio-chemotherapy, recommendations. *Clin Exp Otorhinolaryngol*. 2013;6(3):117–26. doi:10.3342/ceo.2013.6.3.117.
- Russi EG, Corvo R, Merlotti A, Alterio D, Franco P, Pergolizzi S, De Sanctis V, Ruo Redda MG, Ricardi U, Paiar F, Bonomo P, Merlano MC, Zurlo V, Chiesa F, Sanguineti G, Bernier J. Swallowing dysfunction in head and neck cancer patients treated by radiotherapy: review and recommendations of the supportive task group of the Italian Association of Radiation Oncology. *Cancer Treat Rev*. 2012;38(8):1033–49. doi:10.1016/j.ctrv.2012.04.002.
- Dale OT, Han C, Burgess CA, Eves S, Harris CE, White PL, Shah RT, Howard A, Winter SC. Long-term functional outcomes in surgically treated patients with oropharyngeal cancer. *Laryngoscope*. 2015;125(7):1637–43. doi:10.1002/lary.25226.
- Rogers SN, Heseltine N, Flexen J, Winstanley HR, Cole-Hawkins H, Kanatas A. Structured review of papers reporting specific functions in patients with cancer of the head and neck: 2006–2013. *Br J Oral Maxillofac Surg*. 2016;54(6):e45–51. doi:10.1016/j.bjoms.2016.02.012.
- Parkar SM, Shah MN. A relationship between quality-of-life and head and neck cancer: a systemic review. *South Asian J Cancer*. 2015;4(4):179–82. doi:10.4103/2278-330X.175955.
- Heutte N, Plisson L, Lange M, Prevost V, Babin E. Quality of life tools in head and neck oncology. *Eur Ann Otorhinolaryngol Head Neck Dis*. 2014;131(1):33–47. doi:10.1016/j.anorl.2013.05.002.
- Ojo B, Genden EM, Teng MS, Milbury K, Misiukiewicz KJ, Badr H. A systematic review of head and neck cancer quality of life assessment instruments. *Oral Oncol*. 2012;48(10):923–37. doi:10.1016/j.oraloncology.2012.03.025.
- Toth G, Tsukuda M. The European Organisation for Research and Treatment of Cancer (EORTC) quality of life questionnaire for Japanese patients with head and neck cancer—the Japanese version of QLQ-H&N35. *Gan To Kagaku Ryoho*. 2004;31(3):461–7.
- Rinkel RN, Verdonck-de Leeuw IM, van den Brakel N, de Bree R, Eerenstein SE, Aaronson N, Leemans CR. Patient-reported symptom questionnaires in laryngeal cancer: voice, speech and swallowing. *Oral Oncol*. 2014;50(8):759–64. doi:10.1016/j.oraloncology.2014.05.009.
- Fukuhara S, Yamazaki S, Hayashino Y, Green J. Measuring health-related quality of life in patients with end-stage renal disease: why and how. *Nat Clin Pract Nephrol*. 2007;3(7):352–3. doi:10.1038/ncpneph0510.
- Guedes RL, Angelis EC, Chen AY, Kowalski LP, Vartanian JG. Validation and application of the M.D. Anderson Dysphagia Inventory in patients treated for head and neck cancer in Brazil. *Dysphagia*. 2013;28(1):24–32. doi:10.1007/s00455-012-9409-x.
- Chen AY, Frankowski R, Bishop-Leone J, Hebert T, Leyk S, Lewin J, Goepfert H. The development and validation of a dysphagia-specific quality-of-life questionnaire for patients with head and neck cancer: the M.D. Anderson Dysphagia Inventory. *Arch Otolaryngol Head Neck Surg*. 2001;127(7):870–6.
- Hutcheson KA, Barrow MP, Lisec A, Barringer DA, Gries K, Lewin JS. What is a clinically relevant difference in MDADI scores between groups of head and neck cancer patients? *Laryngoscope*. 2016;126(5):1108–13. doi:10.1002/lary.25778.
- Osthus AA, Aarstad AK, Olofsson J, Aarstad HJ. Head and neck specific Health Related Quality of Life scores predict subsequent survival in successfully treated head and neck cancer patients: a prospective cohort study. *Oral Oncol*. 2011;47(10):974–9. doi:10.1016/j.oraloncology.2011.07.010.
- Heijnen BJ, Speyer R, Bulow M, Kuijpers LM. ‘What about swallowing?’ Diagnostic performance of daily clinical practice compared with the Eating Assessment Tool-10. *Dysphagia*. 2016;31(2):214–22. doi:10.1007/s00455-015-9680-8.
- Wilson RD, Howe EC. A cost-effectiveness analysis of screening methods for dysphagia after stroke. *PM&R*. 2012;4(4):273–82. doi:10.1016/j.pmrj.2011.09.006.
- Crary MA, Mann GD, Groher ME. Initial psychometric assessment of a functional oral intake scale for dysphagia in stroke patients. *Arch Phys Med Rehabil*. 2005;86(8):1516–20. doi:10.1016/j.apmr.2004.11.049.
- Yang CJ, Roh JL, Choi KH, Kim MJ, Choi SH, Nam SY, Kim SY. Pretreatment Dysphagia Inventory and videofluorographic swallowing study as prognostic indicators of early survival outcomes in head and neck cancer. *Cancer*. 2015;121(10):1588–98. doi:10.1002/cncr.29245.
- Heijnen BJ, Speyer R, Baijens LW, Bogaardt HC. Neuromuscular electrical stimulation versus traditional therapy in patients with Parkinson’s disease and oropharyngeal dysphagia: effects on quality of life. *Dysphagia*. 2012;27(3):336–45. doi:10.1007/s00455-011-9371-z.
- Beaton DE, Bombardier C, Guillemin F, Ferraz MB. Guidelines for the process of cross-cultural adaptation of self-report measures. *Spine*. 2000;25(24):3186–91.
- Yamazaki M, Inukai M, Baba K, John MT. Japanese version of the Oral Health Impact Profile (OHIP-J). *J Oral Rehabil*. 2007;34(3):159–68. doi:10.1111/j.1365-2842.2006.01693.x.
- Kwon CH, Kim YH, Park JH, Oh BM, Han TR. Validity and reliability of the Korean version of the MD Anderson Dysphagia Inventory for head and neck cancer patients. *Ann Rehabil Med*. 2013;37(4):479–87. doi:10.5535/arm.2013.37.4.479.
- Krebber AM, Jansen F, Cuijpers P, Leemans CR, Verdonck-de Leeuw IM. Screening for psychological distress in follow-up care to identify head and neck cancer patients with untreated distress. *Support Care Cancer*. 2016;24(6):2541–8. doi:10.1007/s00520-015-3053-6.
- Kraaijenga SA, Oskam IM, van der Molen L, Hamming-Vrieze O, Hilgers FJ, van den Brekel MW. Evaluation of long term (10-years+) dysphagia and trismus in patients treated with concurrent chemo-radiotherapy for advanced head and neck cancer. *Oral Oncol*. 2015;51(8):787–94. doi:10.1016/j.oraloncology.2015.05.003.
- Hama Y, Kanazawa M, Minakuchi S, Uchida T, Sasaki Y. Reliability and validity of a quantitative color scale to evaluate masticatory performance using color-changeable chewing gum. *J Med Dent Sci*. 2014;61(1):1–6.
- Barroso EM, Carvalho AL, Paiva CE, Murphy BA, Paiva BS. The Vanderbilt Head and Neck Symptom Survey Brazilian Portuguese version 2.0 (VHNS 2.0): psychometric properties for patients with head and neck cancer who have undergone radiotherapy. *BMC Res Notes*. 2015;8:522. doi:10.1186/s13104-015-1470-8.
- Carlsson S, Ryden A, Rudberg I, Bove M, Bergquist H, Finizia C. Validation of the Swedish M. D. Anderson Dysphagia Inventory (MDADI) in patients with head and neck cancer and neurologic swallowing disturbances. *Dysphagia*. 2012;27(3):361–9. doi:10.1007/s00455-011-9375-8.

30. Speyer R, Heijnen BJ, Baijens LW, Vrijenhoef FH, Otters EF, Roodenburg N, Bogaardt HC. Quality of life in oncological patients with oropharyngeal dysphagia: validity and reliability of the Dutch version of the MD Anderson Dysphagia Inventory and the Deglutition Handicap Index. *Dysphagia*. 2011;26(4):407–14. doi:[10.1007/s00455-011-9327-3](https://doi.org/10.1007/s00455-011-9327-3).
31. Komagamine Y, Kanazawa M, Kaiba Y, Sato Y, Minakuchi S. Reliability and validity of a questionnaire for self-assessment of complete dentures. *BMC Oral Health*. 2014;14:45. doi:[10.1186/1472-6831-14-45](https://doi.org/10.1186/1472-6831-14-45).
32. Murphy BA, Ridner S, Wells N, Dietrich M. Quality of life research in head and neck cancer: a review of the current state of the science. *Crit Rev Oncol Hematol*. 2007;62(3):251–67. doi:[10.1016/j.critrevonc.2006.07.005](https://doi.org/10.1016/j.critrevonc.2006.07.005).
33. Darvall KA, Bate GR, Adam DJ, Bradbury AW. Generic health-related quality of life is significantly worse in varicose vein patients with lower limb symptoms independent of CEAP clinical grade. *Eur J Vasc Endovasc Surg*. 2012;44(3):341–4. doi:[10.1016/j.ejvs.2012.06.022](https://doi.org/10.1016/j.ejvs.2012.06.022).

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