Original Article

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Validity and Reliability of the Korean Version of the MD Anderson Dysphagia Inventory for Head and Neck Cancer Patients

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Objective To translate the MD Anderson Dysphagia Inventory (MDADI) which is a self-administered questionnaire that assesses effect of dysphagia on the quality of life for patients with head and neck cancer, into Korean and to verify the validity and reliability of the Korean version of MDADI.

Methods We performed 6 steps for the cross-cultural adaptation which consisted of translation, synthesis, back translation, review by an expert committee, cognitive debriefing, and final proof reading. A total of 34 dysphagia patients with head and neck cancers from Seoul National University Hospital answered the translated version of the questionnaire for the pre-testing. The patients answered the same questionnaire 2 weeks later to verify the test-retest reliability.

Results One patient was excluded at second survey because he changed his feeding strategy. Overall, 33 patients completed the study. Linguistic validations were achieved by each step of cross-cultural adaptation. We gathered statistically strong construct validity (Spearman rho for subdomain scores to total score correlation range from 0.852 to 0.927), internal consistency for subdomains (Cronbach's alpha coefficients range from 0.785 to 0.889) and test-retest reliability (intra-class correlation coefficient range from 0.820 to 0.955)

Conclusion The Korean version of the MDADI achieved linguistic validations and demonstrated good construct validity and reliability. It can be a useful tool for screening and treatment planning for the dysphagia of patients with head and neck cancers.

Keywords Quality of life, Deglutition disorders, Head and neck neoplasm, Questionnaires

INTRODUCTION

The absolute number of head and neck cancer survivors is expected to increase as the treatment outcome improves [1,2], although there is considerable variability in reported frequency worldwide [3]. The improved treatment outcome in nasopharyngeal cancer by concurrent chemoradiation therapy is case in point [4,5]. Therefore, the interest in health-related quality of life (QOL) of cancer survivors is increasing. The previous study reported

that dysphagia of head and neck cancer patients degrades the health-related QOL [6-8] which has increased demands for dysphagia-specific health-related QOL measurement tools. In this regard such tools are being developed and used around the world [9-11]. However, there is no standardized Korean tools for measuring dysphagia-specific health-related QOL. The MD Anderson Dysphagia Inventory (MDADI) developed by Chen et al. [12] is the dysphagia-specific health-related QOL measurement tool for head and neck cancer patients. The MDADI contains 20 questions covering four subdomains (Appendix 1). In addition, it has been used in many studies due to high validity and reliability [12].

The purpose of this study was to provide the academic basis of the Korean version of MDADI (K-MDADI) with the linguistic validation [13-18], construct validity, and reliability.

MATERIALS AND METHODS

Subjects

The survey was performed with the 34 volunteers (31 males, 3 females) who had head and neck cancers. They were asked to fill out the final version of K-MDADI and took videofluoroscopic swallowing study (VFSS) on the same day. The mean age of patients was 61.18 years

Table 1. Characteristics of the subjects

Variable	No.
Gender	
Male	30
Female	3
Lesion site	
Nasopharynx	9
Oral cavity	14
Hypopharynx (laryngopharynx)	4
Others	6
Treatment	
Surgical	10
Non-surgical	6
Combined	17
Feeding strategy	
Tube feeding only	6
Modified food	21
Normal diet	6

(range, 37–79 years) and the average duration of dysphagia was 59.38 months (range, 3–252 months). The cancer lesion, treatment method, and current diet are summarized in Table 1.

MDADI

MDADI is a free questionnaire developed by Chen et al. [12] to evaluate the dysphasia-specific health-related QOL for head and neck cancer patients. The survey contains 20 self-administered questions to measure 4 subdomains of global (1 question), emotional (6 questions), functional (5 questions), and physical category (8 questions). Each question was composed of Likert scale and expressed as from 1 (very unlikely) to 5 (very likely). But it was expressed in inverse order for two questions: Question 5. I do not feel self-conscious when I eat; Question 15. I feel free to go out to eat with my friends, neighbors, and relatives. The average score for each question of subdomain was multiplied by 20 to calculate subdomain score. Higher scores meant better dysphagia-specific health-related QOL.

Translation of the survey

The translation consisted of the following (Fig. 1) according to the cross cultural adaptation method [19,20].

Forward translation: In order to develop the K-MDADI, the translation was performed with the authorization from original author of MDADI, Chen AY. Two translators who are proficient at both English and Korean participated; one translating with preliminary knowledge of MDADI and the other with no medical background.

Synthesis of the translations: Two translations were synthesized into one interim version through the discussion between authors and translators.

Backward translation: The interim version was translated into English again by a 3rd translator who was bilingual in English and Korean with no medical background. Thereafter, the difference of backward translation from concept of the original survey was verified by three professionals composed of rehabilitation medicine doctors who were fluent in both English and Korean, and have treated dysphasia patients for over two years.

Review of expert committee: The authors and translators gathered again to check any potential errors.

Cognitive debriefing: The preliminary examination was performed on 5 head and neck cancer patients with the translated MDADI before finalization of translation. The understanding and answering of questions without any help were verified and the opinions on the ambiguity, misunderstanding, awkward expression, and cultural differences were collected through in-depth interviews.

The final proof-reading: The development of the K-MDADI was completed after inspecting the survey style and typing error.

Validation of the final version

The head and neck cancer patients with dysphasia were surveyed on the same day of VFSS. The survey was self-administered and performed again two weeks after the

Fig. 1. Process of cross-cultural adaptation.

initial survey for verifications of reliability whether there had been changes of the general condition and feeding strategy was checked on the second survey.

Swallowing function

The American Speech-Language-Hearing Association National Outcome Measurement System (ASHA-NOMS) was determined after VFSS [21]. The correlation between measured ASHA-NOMS score and K-MDADI score was analyzed.

Data analysis

The linguistic validation of K-MDADI was verified by the cross cultural adaptation method [13-20]. The SPSS ver. 18.0 (SPSS Inc., Chicago, IL, USA) was used for statistical analysis. The correlation coefficient was used to measure the construct validity of K-MDADI [14,15,22]. The four subdomains were defined as the construct and the Spearman rho was calculated between subdomain scores and total scores to check whether the test scores well measured the defined constructs. The Cronbach's alpha was calculated for internal consistency of subdomains [23] and intra-class correlation coefficient was obtained for test-retest reliability [24]. The correlation between ASHA-NOMS score and total score of the K-MDADI was checked by Spearman rho.

RESULTS

K-MDADI

A total of 20 questions were translated and validated by the cross cultural adaptation method (Appendix 2). The order of each question was same as the original and questions were sequentially numbered. The table for scoring was attached at the end of K-MDADI (Appendix 3).
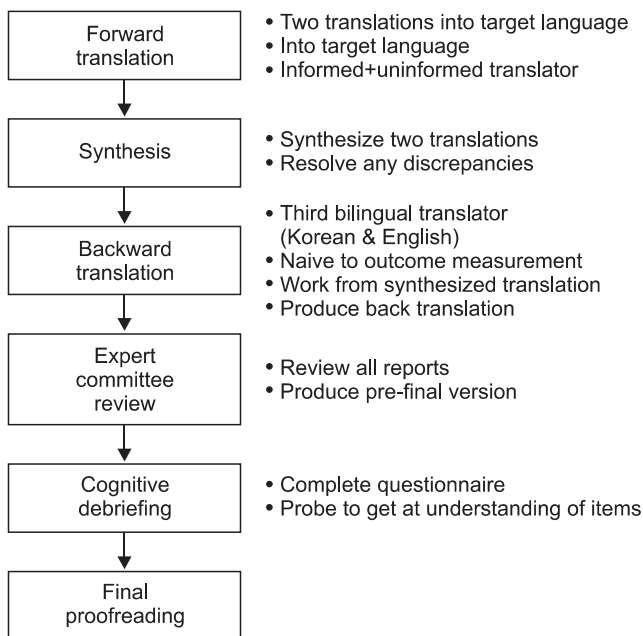
Table 2. Correlation matrix of overall scores and subdomain scores of the Korean version of the MD Anderson dysphagia inventory

	Global	Emotional	Functional	Physical	Total score
Global	1	-	-	-	-
Emotional	0.677*	1	-	-	-
Functional	0.708*	0.802*	1	-	-
Physical	0.720*	0.869*	0.797*	1	-
Total score	0.852*	0.903*	0.927*	0.901*	1

*p<0.05.

Validity and reliability of K-MDADI

Overall 33 patients were included, because one patient changed diet strategy after initial VFSS. Construct validity was checked by Spearman rho. The Spearman rho between subdomain scores and total score of K-MDADI ranged from 0.852 to 0.927 (Table 2). The Spearman rho between each subdomain scores ranged from 0.677 to 0.869. The internal consistency was checked by Cronbach's alpha in three subdomains except the global subdomain which has only one question. Cronbach's alpha ranged from 0.785 to 0.889 (Table 3). The intra-class correlation coefficient of each subdomains and total score by test-retest method ranged 0.820 to 0.955 (Table 4).

Swallowing function and K-MDADI

The ASHA-NOMS [21] score and total score of K-MDADI showed no significant correlation (Fig. 2). The Spearman rho of total score of K-MDADI and ASHA-NOMS score was 0.282 (p=0.112).

DISCUSSION

The purpose of this study was to develop the K-MDADI and to verify its validity and reliability. The linguistic validation of K-MDADI was checked by the cross cultural adaptation method [13-20] and the construct validity and reliability was evaluated statistically.

The process of cross cultural adaptation caused little difficulty because MDADI had relatively simple and clear sentences. However, question 13 was modified because patients who could not drink water were unable to answer the question.

The patient's cooperation is very important for diagnosis and treatment of dysphagia. But the previous research reported various compliance of dysphasia diet with modified consistency [25-27]. Patients' perceived QOL is as an important determinant for higher compliance as objective functional evaluation such as VFSS. The study actually showed no statistical correlation between total score of K-MDADI and ASHA-NOMS score [21], and it means that the functional state only cannot fully explain the QOL of dysphagia patients. The previous study showed correlations between MDADI and performance status scale for dysphagia [28], but correlation with MDADI emotional domain than with other domains. It implied that self-administered MDADI reflects the subjective emotional condition of patients better than the performance status scale scored by clinicians [12]. Meanwhile, other study showed that depression was correlated with dysphasia for head and neck cancer patients, and low QOL was more highly correlated with depression rather than with severity of dysphasia [29]. Depression might aggravate treatment compliances, subjective pain, and

Table 3. Internal consistency of the Korean version of the MD Anderson dysphagia inventory

Sub-domain	No. of questions	Cronbach's coefficient
Global	1	-
Emotional	6	0.785
Functional	5	0.791
Physical	8	0.889

Table 4. Test-retest reliability of Korean version of the MD Anderson dysphagia inventory by ICC
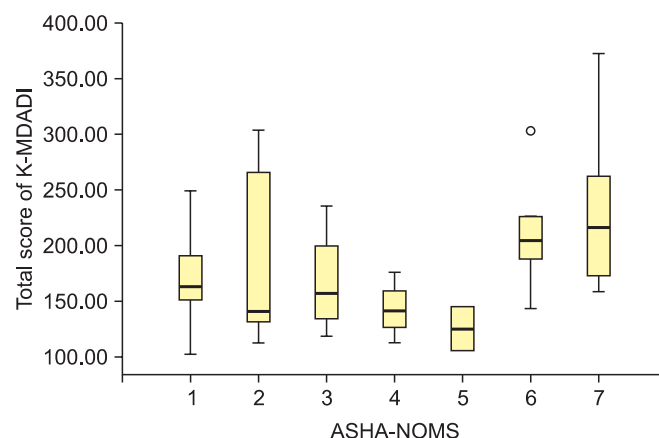
Item	ICC (95% CI)
Global	0.820 (0.663–0.908)
Emotional	0.875 (0.761–0.936)
Functional	0.835 (0.693–0.915)
Physical	0.839 (0.694–0.916)
Total score	0.955 (0.909–0.978)

ICC, intra-class correlation coefficient; CI, confidence interval.

Fig. 2. Distribution of total score of Korean version of the MD Anderson dysphagia inventory (K-MDADI) according to the American Speech-Language-Hearing Association National Outcome Measurement System (ASHA-NOMS) score.

suicidal risk. Therefore dysphagia-specific QOL as well as dysphasia function should be evaluated in the treatment of dysphasia [30].

MDADI is a dysphagia-specific QOL measuring tool for head and neck cancer patients and has been used widely and translated in many languages [31-33]. In addition, MDADI could be applicable to not only head and neck cancer patients but also stroke patients [32,34].

The limitations of this study lies in that we could not check the concurrent validity due to lack of another Korean version of dysphagia-specific QOL measurement tool and that the study had relatively small sample size although statistical analysis was possible. It was also limitation of this study that we did not evaluate depression. But in case of translation for other dysphasia-specific QOL measurement tool in the future, concurrent validity could be provided using the above-stated K-MDADI.

In this study we translated MDADI into Korean by cross cultural adaptation method for clinical purpose. And we also checked the validity and reliability of the K-MDADI for providing academic basis for medical research.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

ACKNOWLEDGMENTS

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Appendix 1. The MD Anderson dysphagia inventory

This questionnaire asks for your views about your swallowing ability. This information will help us understand how you feel about swallowing.

The following statements have been made by people who have problems with their swallowing. Some of the statements may apply to you.

Please read each statement and circle the response which best reflects your experience in the past week.

My swallowing ability limits my day-to-day activities.
Strongly Agree   Agree   No opinion   Disagree   Strongly Disagree

E2. I am embarrassed by my eating habits.
Strongly Agree   Agree   No opinion   Disagree   Strongly Disagree

F1. People have difficulty cooking for me.
Strongly Agree   Agree   No opinion   Disagree   Strongly Disagree

P2. Swallowing is more difficult at the end of the day.
Strongly Agree   Agree   No opinion   Disagree   Strongly Disagree

E7. I do not feel self-conscious when I eat.
Strongly Agree   Agree   No opinion   Disagree   Strongly Disagree

E4. I am upset by my swallowing problem.
Strongly Agree   Agree   No opinion   Disagree   Strongly Disagree

P6. Swallowing takes great effort.
Strongly Agree   Agree   No opinion   Disagree   Strongly Disagree

E5. I do not go out because of my swallowing problem.
Strongly Agree   Agree   No opinion   Disagree   Strongly Disagree

F5. My swallowing difficulty has caused me to lose income.
Strongly Agree   Agree   No opinion   Disagree   Strongly Disagree

P7. It takes me longer to eat because of my swallowing problem.
Strongly Agree   Agree   No opinion   Disagree   Strongly Disagree

P3. People ask me, "Why can't you eat that?"
Strongly Agree   Agree   No opinion   Disagree   Strongly Disagree

E3. Other people are irritated by my eating problem.
Strongly Agree   Agree   No opinion   Disagree   Strongly Disagree

P8. I cough when I try to drink liquids.
Strongly Agree   Agree   No opinion   Disagree   Strongly Disagree

F3. My swallowing problems limit my social and personal life.
Strongly Agree   Agree   No opinion   Disagree   Strongly Disagree

F2. I feel free to go out to eat with my friends, neighbors, and relatives
Strongly Agree   Agree   No opinion   Disagree   Strongly Disagree

P5. I limit my food intake because of my swallowing difficulty.
Strongly Agree   Agree   No opinion   Disagree   Strongly Disagree

P1. I cannot maintain my weight because of my swallowing problem.
Strongly Agree   Agree   No opinion   Disagree   Strongly Disagree

E6. I have low self-esteem because of my swallowing problem.
Strongly Agree   Agree   No opinion   Disagree   Strongly Disagree

P4. I feel that I am swallowing a huge amount of food.
Strongly Agree   Agree   No opinion   Disagree   Strongly Disagree

F4. I feel excluded because of my eating habits.
Strongly Agree   Agree   No opinion   Disagree   Strongly Disagree

Thank you for completing this questionnaire!

Appendix 2. 한국어판 MDADI

> 이 설문지는 삼키는 문제에 대한 건강 관련 삶의 질을 측정하기 위한 것입니다.
> 이어지는 문장을 읽으신 후 질문에 대한 귀하의 의견과 가장 일치한다고 생각되는 보기를 선택해 주십시오.

@다음 질문을 읽고 귀하의 의견과 가장 부합하는 보기에 체크해 주십시오.

1. 삼키는 능력 때문에 나의 일상생활이 제한된다.
   매우 그렇다.   그렇다.   모르겠다.   그렇지 않다.   매우 그렇지 않다.
2. 나는 내가 음식을 먹는 방법 때문에 당혹스러울 때가 있다.
   매우 그렇다.   그렇다.   모르겠다.   그렇지 않다.   매우 그렇지 않다.
3. 사람들은 나를 위한 음식을 만들 때 어려움을 겪는다.
   매우 그렇다.   그렇다.   모르겠다.   그렇지 않다.   매우 그렇지 않다.
4. 저녁 때가 되면 삼키는 것이 더 힘들다.
   매우 그렇다.   그렇다.   모르겠다.   그렇지 않다.   매우 그렇지 않다.
5. 음식을 먹을 때, 나는 다른 사람들의 시선을 의식하지 않는다.
   매우 그렇다.   그렇다.   모르겠다.   그렇지 않다.   매우 그렇지 않다.
6. 나는 삼키는 문제 때문에 화가 난다.
   매우 그렇다.   그렇다.   모르겠다.   그렇지 않다.   매우 그렇지 않다.
7. 나는 삼키는데 많은 노력이 필요하다.
   매우 그렇다.   그렇다.   모르겠다.   그렇지 않다.   매우 그렇지 않다.
8. 나는 삼키는 문제 때문에 외출하지 않는다.
   매우 그렇다.   그렇다.   모르겠다.   그렇지 않다.   매우 그렇지 않다.
9. 나는 삼키는 문제로 인하여 수입이 감소했다.
   매우 그렇다.   그렇다.   모르겠다.   그렇지 않다.   매우 그렇지 않다.
10. 삼키는 문제 때문에 먹는 데 시간이 더 오래 걸린다.
    매우 그렇다.   그렇다.   모르겠다.   그렇지 않다.   매우 그렇지 않다.
11. 사람들이 " 당신은 왜 그걸 못 먹습니까?" 라고 물어본다.
    매우 그렇다.   그렇다.   모르겠다.   그렇지 않다.   매우 그렇지 않다.
12. 내가 잘 삼키지 못하는 것 때문에 다른 사람들이 짜증을 낸다.
    매우 그렇다.   그렇다.   모르겠다.   그렇지 않다.   매우 그렇지 않다.
13. 나는 음료수를 마실 때 기침을 하기 때문에 마시는 것이 어렵다.
    매우 그렇다.   그렇다.   모르겠다.   그렇지 않다.   매우 그렇지 않다.
14. 삼키는 문제로 인해 나의 사회적, 개인적인 삶이 제한된다.
    매우 그렇다.   그렇다.   모르겠다.   그렇지 않다.   매우 그렇지 않다.
15. 나는 나의 친구, 이웃, 친척들과 부담 없이 외식하러 간다.
    매우 그렇다.   그렇다.   모르겠다.   그렇지 않다.   매우 그렇지 않다.
16. 삼키는 문제 때문에, 나는 적게 먹는다.
    매우 그렇다.   그렇다.   모르겠다.   그렇지 않다.   매우 그렇지 않다.
17. 삼키는 문제로, 내가 원하는 체중을 유지 하기 힘들다.
    매우 그렇다.   그렇다.   모르겠다.   그렇지 않다.   매우 그렇지 않다.
18. 삼키는 문제로 인해, 나의 자존감이 낮아졌다.
    매우 그렇다.   그렇다.   모르겠다.   그렇지 않다.   매우 그렇지 않다.
19. 삼킬 때 한 번에 아주 많은 양을 넘기는 것처럼 느껴진다.
    매우 그렇다.   그렇다.   모르겠다.   그렇지 않다.   매우 그렇지 않다.
20. 나는 내가 먹는 모습 때문에 소외된다고 느낀다.
    매우 그렇다.   그렇다.   모르겠다.   그렇지 않다.   매우 그렇지 않다.

감사합니다.

Appendix 3. 한국어판 MDADI (MD Anderson Dysphagia Inventory) 점수 계산표

| | | 하위 범주 점수 | | | | | |
| | 전반적 (Global) | | 감정적 (Emotional) | | 기능적 (Functional) | | 육체적 (Physical) | |
	문항번호	점수	문항번호	점수	문항번호	점수	문항번호	점수
	1	( )	2	( )	3	( )	4	( )
			5	( )	9	( )	7	( )
			6	( )	14	( )	10	( )
			8	( )	15	( )	11	( )
			12	( )	20	( )	13	( )
			18	( )			16	( )
							17	( )
							19	( )
합산점수		( )		( )		( )		( )
평균점수 (합산점수/문항수)	1개 문항	( )	6개 문항	( )	5개 문항	( )	8개 문항	( )
하위 범주 별 점수 (평균점수×20)		( )		( )		( )		( )

※ 매우 그렇다: 1점, 그렇다: 2점, 보통이다: 3점, 그렇지 않다: 4점, 매우 그렇지 않다: 5점
※ 단, 문항번호 5과 15는 점수 체제가 역순임(매우 그렇다: 5점, 매우 그렇지 않다: 1점)