



Validation of the Korean Version of the Anosognosia Questionnaire for Dementia

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Objective Anosognosia is a common phenomenon in individuals with dementia. Anosognosia Questionnaire for dementia (AQ-D) is a well-known scale for evaluating anosognosia. This study aimed to establish a Korean version of the AQ-D (AQ-D-K) and to evaluate the reliability and validity of the AQ-D-K in patients with Alzheimer's disease (AD) dementia.

Methods We translated the original English version of AQ-D into Korean (AQ-D-K). Eighty-four subjects with very mild or mild AD dementia and their caregivers participated. Reliability of AQ-D-K was assessed by internal consistency and one-month test-retest reliability. Construct validity and concurrent validity were also evaluated.

Results Internal consistencies of the AQ-D-K patient form and caregiver form were high (Cronbach alpha 0.95 and 0.93, respectively). The test-retest reliability of AQ-D-K measured by intra-class correlation coefficient was 0.84. Three factors were identified: 1) anosognosia of instrumental activity of daily living; 2) anosognosia basic activity of daily living; and 3) anosognosia of depression and disinhibition. AQ-D-K score was significantly correlated with the clinician-rated anosognosia rating scale (ARS), center for epidemiological studies-depression scale (CES-D) and state-trait anxiety inventory (STAI).

Conclusion The findings suggest that the AQ-D-K is a reliable and valid scale for evaluating anosognosia for AD dementia patients using Korean language.

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Key Words Anosognosia, Alzheimer's disease, Dementia, AQ-D, AQ-D-K.

INTRODUCTION

Anosognosia is a common phenomenon associated with

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Alzheimer's disease (AD) dementia and occurs in about 42% to 80% of AD dementia patients.^{1,2} It is observed not only in advanced AD dementia cases but also in relatively early cases of the disease.² Given that anosognosia can lead to refusal for appropriate treatment or care resulting in poorer treatment outcome and increased caregiver distress, an accurate assessment of anosognosia in dementia is important for clinical practice and care planning.³

The anosognosia questionnaire for dementia (AQ-D) is a well-known, widely used scale for assessing anosognosia in AD dementia patients.⁴ It measures the degree of anosognosia based on the discrepancy of the symptom severity reported by patient and caregiver⁴ and was reported to be highly reliable and valid.^{5,6} The original English version of AQ-D was previously translated into the Japanese and Italian.^{7,8} Never-

theless, AQ-D was unavailable in Korean. Therefore, the aim of the current study is to establish the Korean version of the AQ-D and to verify reliability and validity in Korean older adults with AD dementia.

METHODS

Translation of the AQ-D into Korean

For the translation of the original English version of the AQ-D into Korean, we first obtained permission from the authors of the original English version. Then, a bilingual clinical neuropsychologist translated the English version into Korean. Back-translation of the Korean version into English was performed by a bilingual psychiatrist. After back-translation, four psychiatrists (DYL, KK, SYJ, and WJK) and a clinical neuropsychologist (DY) discussed the similarity and suitability of the translated Korean version. Refinement steps then followed to ensure appropriateness of the phrases and words used in the questionnaire to be mindful of cultural differences. Similar to the original English version, the final Korean version of the AQ-D (AQ-D-K) has 30 items (Supplementary Table 1 in the online-only Data Supplement)

Participants

A total of 84 AD dementia patients and their caregivers, who participated in the Korean Brain Aging study for the Early diagnosis and prediction of Alzheimer's disease (KBASE), an ongoing prospective cohort study,⁹ were included in this study. All AD dementia patients (age range 55–87 years) met the criteria for the diagnosis of dementia in the Diagnostic and Statistical Manual of Mental Disorders 4th Edition (DSM-IV)¹⁰ and the National Institute on Aging-Alzheimer's Association (NIA-AA) criteria for the diagnosis of probable AD,¹¹ and had clinical dementia rating (CDR)¹² global score of 0.5 or 1. All caregivers were family members who were able to provide reliable information about the patients; they either lived together or kept regular contacts at least three times a week with the patients. The exclusion criteria for both patients and caregivers were as follow: 1) presence of current major depressive disorder or other major psychiatric disorders; or 2) inability to understand and speak the Korean language used in the AQ-D-K.

Clinical assessments

All AD dementia patients were administered standardized clinical assessments based on the KBASE clinical assessment protocol which incorporated the the Korean version of Consortium to Establish a Registry for Alzheimer's Disease (CERAD-K) clinical assessment^{13,14} by board-certified psychiatrists. The KBASE protocol included the following assessments: CDR,

Blessed Dementia Scale-Activity of Daily Living (BDS-ADL)^{14,15} as a measure for ADL, and Neuropsychiatric Inventory (NPI)^{16,17} as a measure for behavior and psychological symptoms based on caregiver's report. The Center for Epidemiologic Studies Depression scale (CES-D)^{18,19} and the State-Trait Anxiety Inventory (STAI)^{20,21} were also administered to all patients in order to evaluate depression and anxiety symptoms, respectively. The Seoul Informant Report Questionnaire for Dementia (SIRQD),²² a dementia screening questionnaire based on informant report, were was administered to caregivers to investigate objective cognitive decline. All patients were also evaluated by a psychiatrist using the Anosognosia Rating Scale (ARS), which is an anosognosia evaluation instrument based on a clinical judgement.²³ ARS was rated in a four-point rubric score as full awareness, shallow awareness, no awareness, or denial of impairment. This study was approved by the Institutional Review Board of Seoul National University Hospital (IRB 1706-065-859), and all patients and their caregivers gave informed consent for the study participation.

Neuropsychological assessments

All patients underwent comprehensive neuropsychological assessment, administered according to a standardized protocol incorporating the CERAD-K neuropsychological battery²⁴ by trained psychometrists supervised by a neuropsychologist. The protocol included 8 tests in the CERAD-K neuropsychological battery, which are the Mini-Mental State Examination (MMSE), Verbal Fluency (VF), 15-item Boston Naming Test (BNT), Word List Memory (WLM), Word List Recall (WLR), Word List Recognition (WLRc), Constructional Praxis (CP), Constructional Recall (CR),²⁴ and the Stroop color word test (SCWT).²⁵ CERAD total score I (TS I),²⁶ which is calculated by summing the scores of six tests included in the CERAD-K neuropsychological battery (i.e., VF, BNT, WLM, WLR, WLRc, and CP), and CERAD total score II, which is the summation of TS I and score of construction recall²⁷ were also used as the measures of global cognition.

Administration and scoring of the AQ-D-K

The AQ-D-K consists of two forms: the patient form and the caregiver form. Each of the two form was administered to patient or his/her caregiver, respectively. The two forms have the same sentence structure and content except for the subject of the statements. Similar to the original instruction, patients were interviewed first and then their caregivers. Patients and their caregivers were requested to answer 'never', 'sometimes', 'usually', or 'always' for each item (scores ranging from 0 to 3). The AQ-D-K patient score (PS) and caregiver score (CS) were obtained by adding up the scores of each item of the patient form and caregiver form, respectively. Consis-

tent with the original version, the final score, AQ-D-K total score (TS), was the difference between CS and PS. Thus, positive TS indicates that the caregiver rates the patient as more impaired than the patient's own self-evaluation.⁴

The 30 items of the AQ-D-K, similar the original AQ-D, are categorized into two subscales. The first subscale (i.e., cognitive subscale; TS-cog) includes 22 items for cognitive function and ADL (item No. 1–22), whereas the second subscale (i.e., behavioral subscale; TS-beh) consists of 8 items for neuropsychiatric aspects (item No. 23–30). The total score is the difference of score sum for each of the two subscales between caregiver and patient form, respectively.

In order to assess the test-retest reliability, the AQ-D-K was administered again to 10 randomly selected AD dementia patients and their caregivers four weeks after the initial administration.

Statistical analyses

Reliability

In order to verify the reliability of the AQ-D-K, internal consistency and test-retest reliability were examined. The internal consistency for each of the patient and caregiver form was assessed by Cronbach α coefficient.²⁸ Four-week test-retest reliability for the patient and caregiver form was assessed using the intraclass correlation coefficient (ICC).²⁸

Construct validity

To evaluate construct validity, exploratory factor analysis on 30 items of the AQ-D-K was performed by using principal component analysis. Inspection of eigen values and a scree plot produced by the principal component analysis with varimax rotation indicated that 3 to 5 factors were appropriate for consideration. After examining 3 to 5 factor solutions, we chose the final model considering the interpretability of factor structure and the accordance with the results from previous validation studies.^{6–8} We removed items with communalities of 0.2 or less.²⁹ Retained factors should have items with a loading greater than 0.4.³⁰

Concurrent validity

To verify the concurrent validity of the AQ-D-K, the associations of TS, TS-cog, TS-beh with ARS score were first examined by using Spearman's correlation analysis. Additionally, Pearson correlation analyses were conducted to assess the relationships of TS, TS-cog and TS-beh with SIRQD, CDR sum of boxes (SOB), BDS-ADL, NPI, STAI, and CES-D scores. Pearson correlation analyses were also performed to examine the relationships of TS, TS-cog, TS-beh with the z-score of each neuropsychological test or CERAD total score.

In all analysis, $p < 0.05$ was taken to indicate statistical significance. All statistical analyses were performed using IBM SPSS Statistics 23 (IBM Corporation, Armonk, NY, USA).

RESULTS

Demographic characteristics

The demographic and clinical characteristics of the study participants are summarized in Table 1. Caregivers consisted

Table 1. Demographic and clinical characteristics

	Patient (N=84) Mean (SD)	Caregiver (N=84) Mean (SD)
Sex [female, N (%)]	58 (69.0)	52 (61.9)
Age (years)	73.08 (8.13)	56.51 (13.78)
Education (years)	8.97 (5.31)	13.78 (3.44)
CDR [N (%)]		
0.5	29 (34.5)	
1	55 (65.5)	
TS	8.86 (17.99)	
TS-Cog	7.10 (15.05)	
TS-Beh	1.76 (4.261)	
BDS-ADL	3.80 (1.06)	
NPI	7.20 (9.29)	
CES-D	32.32 (9.91)	
STAI	81.12 (22.22)	
ARS	1.55 (0.75)	
VF (z score)	-1.21 (0.96)	
BNT (z score)	-0.62 (1.28)	
MMSE (raw score)	16.58 (4.13)	
MMSE (z score)	-3.08 (1.43)	
WLM (z score)	-1.57 (1.18)	
CP (z score)	-0.92 (1.86)	
WLR (z score)	-2.27 (0.78)	
WLRc (z score)	-2.66 (1.56)	
CR (z score)	-1.79 (0.54)	
SCWT (z score)	-1.28 (1.12)	
TS I (z score)	-2.25 (1.14)	
TS II (z score)	-2.34 (1.08)	

SD: standard deviation, CDR: Clinical Dementia Rating, TS: Total score of Anosognosia Questionnaire for Dementia Korean version, TS-Cog: Total score of cognitive subscale, TS-Beh: Total score of behavioral subscale, BDS-ADL: Blessed Dementia Scale-Activity of Daily Living, NPI: Neuropsychiatric Inventory, CES-D: The Center for Epidemiologic Studies Depression scale, STAI: State-Trait Anxiety Inventory, ARS: Anosognosia Rating Scale, VF: Verbal Fluency, BNT: Boston Naming Test, MMSE: Mini-Mental State Examination, WLM: word list memory, CP: constructional praxis, WLR: word list recall, WLRc: word list recognition, CR: constructional recall, SCWT: Stroop color word test, TS I: CERAD total score I, TS II: CERAD total score II

of spouses (41.7%), daughters (36.9%), sons (15.5%) and daughter in law (6.0%).

As for the patients, 69% were women, and the average years of educational attainment was 9. CDR was 0.5 (questionable dementia) in 34.5% and 1 (mild dementia) in the rest of the patients. The average score of MMSE was 16.58, and the average z scores of CERAD TS I and TS II were -2.25 and -2.34, respectively. The averages of TS, TS-Cog, and TS-Beh, which are the main variables of interest in this study, are 8.86, 6.80 and 1.76, respectively. Another measure of anosognosia, ARS, had average score of 1.55. Other mean and standard deviation of the variables including BDS-ADL, NPI, CES-D, STAI and individual neuropsychological test scores are described in Table 1.

Reliability

Internal consistency measured by the Cronbach's coefficient α was 0.95 for patient form and 0.93 for caregiver form. ICC between test and retest score was 0.79 for patient form and 0.82 for caregiver form.

Construct validity

Through the exploratory factor analysis, 3 separate factors, i.e., 'Instrumental activity of daily living (iADL)', 'Basic activity of daily living (bADL)' and 'Depression disinhibition' were finally extracted (Table 2). We did not include the four items that were double-loaded for two factors (A-4, A-5, A-6, and A-13) (Table 2) and the item with communality less than 0.20 (B-28; communality value: 0.150) in final model. For the final

Table 2. Factor loading of reduced items (with varimax rotation)

Items	iADL	bADL	Depression and disinhibition
A-12. Problems with remembering appointments	0.850		
A-22. Problems with doing clerical work	0.817		
A-16. Problems with remembering shopping lists	0.814		
A-10. Problems with handling money	0.788		
A-8. Problems with remembering where things were left	0.777		
A-3. Problems with remembering telephone calls	0.759		
A-7. Problems with keeping belongings in order	0.734		
A-1. Problems with remembering dates	0.666		
A-9. Problems with writing	0.616		
B-23. More rigid and inflexible about decisions	0.607		
A-18. Problems with understanding the plot of a movie	0.597		
A-2. Problems with orienting in new places	0.560		
A-15. Problems with doing mental calculations	0.560		
A-20. Problems with doing home activities	0.537		
A-4. Problems with understanding conversations	0.464	0.453	
A-11. Problems with orientation in your neighborhood		0.739	
A-14. Problems with communicating with people		0.619	
A-21. Problems with feeding oneself		0.557	
A-5. Problems with signing the name		0.554	0.522
A-6. Problems with understanding the newspaper	0.522	0.554	
A-19. Problems with orienting in the house		0.549	
A-17. Problems with bladder control		0.523	
B-30. More depressed			0.733
B-25. More irritable			0.641
B-26. More frequent crying episodes			0.638
B-24. More egotistical and self-centered			0.614
A-13. Problems with practicing favorite hobbies	0.499		0.508
B-29. Less interest in favorite activities			0.491
B-27. Laughing inappropriately			0.445

The number written represent loading ≥ 0.40 . Only items with bold numbers are included to separate factors. A: cognitive deficit, B: behavioral problem (Mirogoleli et al, 1996). iADL: instrumental activity of daily living, bADL: basic activity of daily living

Table 3. Comparison of factor structure between AQ-D-K and previous validated AQ-D (see with Supplementary Table 2 in the online-only Data Supplement)

Author	Year	Factor structure	Items
Starkstein et al. ⁶	2006	1. iADL	1, 2, 3, 4, 7, 8, 10, 12, 15, 16, 18, 22
		2. bADL	5, 17, 19, 21
		3. Depression	23, 24, 25, 26, 13, 30
		4. Disinhibition	27, 28
Sato et al. ⁸	2007	1. ADL	10, 13, 14, 15, 17, 18, 19, 20, 21, 22
		2. Episodic memory and orientation	1, 2, 3, 4, 5, 6, 8
		3. Disinhibited behavior	25, 26, 27, 28
		4. Apathy and depression	23, 24, 29, 30
Gambina et al. ⁷	2015	1. iADL	1, 2, 3, 6, 7, 8, 10, 11, 12, 13, 15, 16, 18, 20, 22, 29
		2. bADL	5, 9, 14, 17, 19, 21
		3. Depression and apathy	4, 23, 24, 26, 30
		4. Disinhibition	26, 27, 28
Byeon et al. (AQ-D-K)	2020	1. iADL	1, 2, 3, 7, 8, 9, 10, 12, 15, 16, 18, 20, 22, 23
		2. bADL	11, 14, 17, 19, 21
		3. Depression and disinhibition	24, 25, 26, 27, 29, 30

iADL: instrumental activity of daily living, bADL: basic activity of daily living, AQ-D-K: Anosognosia Questionnaire for Dementia Korean version

model with three factors, the Kaiser-Meyer-Olkin (KMO) value was 0.85 and the significance level of the Bartlett's sphericity test was less than 0.001, indicative of a suitable model. The variance explained by the three factors (R^2) was 50.45%.

Concurrent validity

As shown in Table 3, TS, TS-cog, and TS-beh had significant positive correlations with ARS scores, whereas they did not show any significant correlation with SIRQD, CDR-SOB, BDS-ADL, and NPI scores. TS, TS-cog, and TS-beh also did not show any significant correlations with any neuropsychological test scores (Table 4).

Additionally, TS and TS-cog showed significant negative correlation with CES-D and STAI scores (Table 3). TS-beh also had significant correlation with CES-D score and trend toward significance ($p=0.06$) with STAI score.

DISCUSSION

In this study, we developed the AQ-D-K by translating the English version of the AQ-D and verified the reliability and validity of the AQ-D-K. In regard of the reliability of the AQ-D-K, Cronbach α value, a measure of internal consistency,³¹ is more than 0.9 for both patient form and caregiver form. This result indicates that the items of AQ-D-K consistently evaluate a concept of anosognosia. Additionally, ICC between test and retest was approximately 0.8 for both forms, which supports that AQ-D-K has good test-retest reliability.

Table 4. Correlation with other anosognosia scale (ARS), scales of depression, anxiety and neuropsychiatric symptoms

	TS	TS-Cog	TS-Beh
ARS	0.301**	0.288**	0.245*
SIRQD	0.136	0.111	0.184
CDR-SOB	0.197	0.208	0.095
BDS-ADL	0.098	0.095	0.079
NPI	-0.054	-0.047	-0.059
STAI	-0.267*	-0.260*	-0.210
CES-D	-0.317**	-0.301**	-0.275*

* $p<0.05$, ** $p<0.01$, *** $p<0.001$. AQ-D-K: Anosognosia Questionnaire for Dementia Korean version, ARS: anosognosia rating scale, CDR: clinical dementia rating, BDS-ADL: blessed dementia scale-activities of daily living, NPI: neuropsychiatry inventory, SIRQD: Seoul informant report questionnaire for dementia, CES-D: center for epidemiological studies-depression scale, STAI: state-trait anxiety inventory, TS: AQ-D-K total score, TS-Cog: Cognitive part of AQ-D-K total score, TS-Beh: Behavioral part of AQ-D-K total score

A factor analysis revealed that the AQ-D-K is composed of three primary factors: iADL, bADL, and depression & disinhibition factor. This finding is generally consistent with the original design of the AQ-D, which included both cognitive or functional and neuropsychiatric subscales, and with the factors structures of the original English version or other language versions of AQ-D (Table 5). However, the number of factors of the AQ-D-K (i.e., three factors) was not exactly the same with those of the original English version or the Italian version of the AQ-D, which had four factors.^{6,7} This discrep-

Table 5. Correlation between AQ-D-K and Neuropsychological tests

Neuropsychological tests (z-scores)	TS	TS-Cog	TS-Beh
VF	0.003	0.003	0.034
BNT	-0.057	-0.073	0.018
MMSE-KC	0.071	-0.085	<0.001
WLM	0.077	0.064	0.099
CP	0.089	0.093	0.049
WLR	-0.142	-0.145	-0.087
WLRc	0.069	0.079	0.011
CR	0.002	0.010	-0.027
SCWT	0.114	0.111	0.091
TS I	-0.005	-0.007	0.004
TS II	0.007	<0.001	0.029

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. TS: Total score of Anosognosia Questionnaire for Dementia Korean version, TS-Cog: Cognitive part of AQ-D-K total score, TS-Beh: Behavioral part of AQ-D-K total score, AQ-D-K: Anosognosia Questionnaire for Dementia Korean version, CERAD-K: the Korean version of Consortium to Establish a Registry for Alzheimer's Disease. VF: verbal fluency, BNT: Modified Korean version of Boston Naming Test, MMSE-KC: Mini-Mental State Examination in the Korean version of the CERAD assessment packet, WLM: word list memory, WLR: word list recall, WLRc: word list recognition, CP: constructional praxis, CR: constructional recall, SCWT: Stroop color word test. TS I: CERAD-K total score I, TS II: CERAD-K total score II

ancy may be related to the difference of dementia severity of patients included in the studies. While the studies for the English and Italian version included AD dementia patients with wide range of severity from very mild to severe⁶ or from very mild to moderate,⁷ our study included only very mild or mild AD dementia patients. The clinical manifestations of impairment and awareness on the impairments can vary according to the severity of dementia.³² Depression has the highest prevalence in mild dementia compared to severe dementia, while apathy and disinhibition are not frequent in mild dementia but become pronounced as the severity of dementia progresses.³³⁻³⁵ Moreover, certain symptoms related to apathy [e.g., loss of interest (B-29)] and disinhibition [e.g., irritability (B-25) and crying (B-26)] are commonly associated with depression. Therefore, it is more likely that such symptoms are manifestations of depression rather than apathy or disinhibition in mid dementia, whereas they are more closely related to apathy or disinhibition in severe dementia.

However, although the validation study for the Japanese AQ-D⁸ included very mild or mild patients, it demonstrated that the Japanese AQ-D had four factors (Table 5). Therefore, language difference of the instruments and cultural background of participants may also be considered. When a test is constructed in one culture only and then transferred to an-

other culture and language, handicap in standardization process appear to be unavoidable.³⁶ Regarding the 'Problems with signing the name' item in AQ-D-K, signature is a basic life skill that is essential in everyday life in Western countries. But in Korea, especially the elderly uses a wooden stamp more often and rarely uses signature. In this respect, unlike the original scale, 'Problems with signing the name' was not loaded alone in the 'bADL' factor but double loaded in 'depression and disinhibition'. So, this item was excluded from the final factor analysis.

Consistent with the previous report on the Japanese version of AQ-D,⁸ a positive correlation was found between TS of the AQ-D-K and ARS score,²³ which supports concurrent validity of the AQ-D-K. Moreover, TS-cog and TS-beh, as well as TS, significantly correlated with ARS score, indicating that the two subscales of the AQ-D-K is useful for evaluating anosognosia on cognitive and neuropsychiatric domains of AD dementia symptoms. In contrast, neither TS nor TS-cog and TS-beh showed significant correlation with any objective measures for cognitive and functional impairments including SIQRD, CDR-SOB, BDS-ADL or neuropsychological tests scores in this study. This suggests that the degree of anosognosia, measured by the AQ-D-K, may be independent of cognitive symptoms and functional impairments. This is consistent with the result of previous reports on lack of significant associations between the neuropsychological test scores and anosognosia measured by AQ-D in mild AD.² Probably, this study only included patients with very mild or mild AD, so it is presumed that anosognosia was not related to clinical severity. Interestingly, there was trend for significance in negative correlation of AQ-D-K scores with both STAI and CES-D scores. The finding implies that depressive or anxious patients may evaluate their own symptoms more negatively. This is in line with the previous reports that AD patients with depression and anxiety symptoms show more apparent awareness about the disease.³⁷⁻³⁹

A couple of limitations should be mentioned. First, the current study included only AD dementia patients with very mild or mild severity. Although we verified that AQ-D-K is a reliable and valid instrument for the evaluation of anosognosia in those patients, further studies including more advanced AD dementia and other types of dementia patients are still required to increase the generalizability of the AQ-D-K. In addition, relatively small sample size also needs to be mentioned. In general, appropriate sample size for factor analysis is known to be more than three times of the number of variables (items) being analyzed. Given the number of AQ-D-K items is 30, 84 subjects included in our study is slightly less than the recommended 90 subjects. If the sample size is not enough, standard error of factor loading increases, which may

influence the factor structure.⁴⁰

In conclusion, the findings from the present study suggest that AQ-D-K can be useful in evaluating anosognosia in AD dementia patients using Korean language. The AQ-D-K is expected to facilitate the assessment of anosognosia for dementia patients in clinical practice and research.

Supplementary Materials

The online-only Data Supplement is available with this article at <https://doi.org/10.30773/pi.2020.0364>.

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Conflicts of Interest

The authors have no potential conflicts of interest to disclose.

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Supplementary Table 1. AQ-D-K (translated Korean version) for patients

질병인식불능증 설문지(AQ-D-K)-환자용	전혀없음	가끔씩	종종	항상
1. 당신은 날짜를 기억하는데 문제가 있습니까?	⊙	①	②	③
2. 당신은 낯선 곳에서 방향을 잃어 애를 먹는 경우가 있습니까?	⊙	①	②	③
3. 당신은 전화 대화 내용을 기억하는데 문제가 있습니까?	⊙	①	②	③
4. 당신은 대화를 이해하는데 문제가 있습니까?	⊙	①	②	③
5. 당신은 서명하는데 문제가 있습니까?	⊙	①	②	③
6. 당신은 신문 내용을 이해하는데 문제가 있습니까?	⊙	①	②	③
7. 당신은 소지품을 정돈하는데 문제가 있습니까?	⊙	①	②	③
8. 당신은 집에서 물건을 어디에 두었는지 기억하는데 문제가 있습니까?	⊙	①	②	③
9. 당신은 기록하거나 편지를 쓰는데 문제가 있습니까?	⊙	①	②	③
10. 당신은 돈을 관리하는데 어려움이 있습니까?	⊙	①	②	③
11. 당신은 동네에서 방향을 잃어 애를 먹는 경우가 있습니까?	⊙	①	②	③
12. 당신은 약속을 기억하는데 문제가 있습니까?	⊙	①	②	③
13. 당신은 좋아하는 취미생활을 하는데 문제가 있습니까?	⊙	①	②	③
14. 당신은 다른 사람과 의사소통에 문제가 있습니까?	⊙	①	②	③
15. 당신은 암산/속셈하는데 문제가 있습니까?	⊙	①	②	③
16. 당신은 쇼핑하러 가서 살 물건들을 기억하는데 문제가 있습니까?	⊙	①	②	③
17. 당신은 대소변 조절에 문제가 있습니까?	⊙	①	②	③
18. 당신은 영화 줄거리를 이해하는데 문제가 있습니까?	⊙	①	②	③
19. 당신은 집 안에서 방향을 잃을 때가 있습니까?	⊙	①	②	③
20. 당신은 (요리, 청소, 물건 수리 등) 가사 활동에 문제가 있습니까?	⊙	①	②	③
21. 당신은 혼자 밥을 챙겨 먹는데 문제가 있습니까?	⊙	①	②	③
22. 당신은 통장이나 지불금 관리에 문제가 있습니까?	⊙	①	②	③
23. 당신은 의사결정 할 때 남들보다 융통성이 없어서, 새로운 상황에 적응하는 능력이 부족합니까?	⊙	①	②	③
24. 당신은 남들보다 이기적이고, 다른 사람들의 요구에는 관심을 기울이지 않습니까?	⊙	①	②	③
25. 당신은 남들보다 더 짜증을 잘 냅니까? 즉 당신은 쉽게 성질을 냅니까?	⊙	①	②	③
26. 당신은 (최근에) 울게 된 일이 있습니까?	⊙	①	②	③
27. 당신은 웃지 말아야 할 상황에서 웃습니까?	⊙	①	②	③
28. 당신은 남들보다 성적인 주제에 관심이 많고, 섹스에 대한 글을 읽거나 이야기를 많이 하는 편입니까?	⊙	①	②	③
29. 당신은 이전에 좋아하던 취미나 특별활동에 흥미를 잃었습니까?	⊙	①	②	③
30. 당신은 이전보다 더 우울합니까?	⊙	①	②	③

AQ-D-K: anosognosia questionnaire for dementia Korean version

Supplementary Table 2. AQ-D-K (translated Korean version) for caregivers

질병인식불능증 설문지(AQ-D-K)-보호자용	전혀없음	가끔씩	종종	항상
1. 그분은 날짜를 기억하는데 문제가 있습니까?	○	①	②	③
2. 그분은 낯선 곳에서 방향을 잃어 애를 먹는 경우가 있습니까?	○	①	②	③
3. 그분은 전화 대화 내용을 기억하는데 문제가 있습니까?	○	①	②	③
4. 그분은 대화를 이해하는데 문제가 있습니까?	○	①	②	③
5. 그분은 서명하는데 문제가 있습니까?	○	①	②	③
6. 그분은 신문 내용을 이해하는데 문제가 있습니까?	○	①	②	③
7. 그분은 소지품을 정돈하는데 문제가 있습니까?	○	①	②	③
8. 그분은 집에서 물건을 어디에 두었는지 기억하는데 문제가 있습니까?	○	①	②	③
9. 그분은 기록하거나 편지를 쓰는데 문제가 있습니까?	○	①	②	③
10. 그분은 돈을 관리하는데 어려움이 있습니까?	○	①	②	③
11. 그분은 동네에서 방향을 잃어 애를 먹는 경우가 있습니까?	○	①	②	③
12. 그분은 약속을 기억하는데 문제가 있습니까?	○	①	②	③
13. 그분은 좋아하는 취미생활을 하는데 문제가 있습니까?	○	①	②	③
14. 그분은 다른 사람과 의사소통에 문제가 있습니까?	○	①	②	③
15. 그분은 암산/속셈하는데 문제가 있습니까?	○	①	②	③
16. 그분은 쇼핑하러 가서 살 물건들을 기억하는데 문제가 있습니까?	○	①	②	③
17. 그분은 대소변 조절에 문제가 있습니까?	○	①	②	③
18. 그분은 영화 줄거리를 이해하는데 문제가 있습니까?	○	①	②	③
19. 그분은 집 안에서 방향을 잃을 때가 있습니까?	○	①	②	③
20. 그분은 (요리, 청소, 물건 수리 등) 가사 활동에 문제가 있습니까?	○	①	②	③
21. 그분은 혼자 밥을 챙겨 먹는데 문제가 있습니까?	○	①	②	③
22. 그분은 통장이나 지불금 관리에 문제가 있습니까?	○	①	②	③
23. 그분은 의사결정 할 때 남들보다 융통성이 없어서, 새로운 상황에 적응하는 능력이 부족합니까?	○	①	②	③
24. 그분은 남들보다 이기적이고, 다른 사람들의 요구에는 관심을 기울이지 않습니까?	○	①	②	③
25. 그분은 남들보다 더 짜증을 잘 냅니까? 즉 그분은 쉽게 성질을 냅니까?	○	①	②	③
26. 그분은 (최근에) 울게 된 일이 있습니까?	○	①	②	③
27. 그분은 웃지 말아야 할 상황에서 웃습니까?	○	①	②	③
28. 그분은 남들보다 성적인 주제에 관심이 많고, 섹스에 대한 글을 읽거나 이야기를 많이 하는 편입니까?	○	①	②	③
29. 그분은 이전에 좋아하던 취미나 특별활동에 흥미를 잃었습니까?	○	①	②	③
30. 그분은 이전보다 더 우울합니까?	○	①	②	③

AQ-D-K: anosognosia questionnaire for dementia Korean version