



The Persian validation of the Coronary Artery Disease Education Questionnaire Short Version for education of patients undergoing cardiac rehabilitation

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Original Article

Abstract

BACKGROUND: Coronary artery disease (CAD) is a leading cause of cardiovascular death worldwide. Therefore, assessing knowledge in patients with CAD needs a specific tool. This study aims to carry out the Persian validation of the Coronary Artery Disease Education Questionnaire Short Version (CADE-Q SV) for education of patients undergoing cardiac rehabilitation (CR).

METHODS: This study was a cross-sectional study. First, the original version of the CADE-Q SV was translated from English into Farsi using the standard approach. The face validity and content validity were measured using quantitative and qualitative approaches. The confirmatory factor analysis (CFA) was done to examine the construct validity. The reliability of the questionnaire was investigated through test-retest reliability and by calculating Cronbach's alpha coefficient. SPSS software was used to analyze the data, and the R package lavaan, to approve the CFA.

RESULTS: The result of quantitative face validity showed that the minimum score was 4.42. The minimum scores for quantitative content validity were 0.83 for content validity index (CVI) and 0.66 for content validity ratio (CVR); therefore, all the items were approved. According to the results of the CFA, the comparative fit index (CFI) was reported to be 0.969, indicating a good fit for the items. The Cronbach's alpha coefficient for the whole instrument was 0.679, and the test-retest correlation was measured to be > 0.4, after a 2-week interval.

CONCLUSION: In total, it can be concluded that the CADE-Q SV has good psychometric properties and proper reliability. It can be utilized in medical and CR centers.

Keywords: Validation; Coronary Artery Disease; Cardiovascular Disease; Rehabilitation

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Introduction

Coronary artery disease (CAD), as the most common cardiovascular disease (CVD) in the developed countries, is still the leading cause of death and the most common debilitating disease across the world, and seemingly the leading cause of death globally by the year 2030.¹⁻⁵

Mortality rates in developed countries have declined due to preventive measures. But it is still on the rise in developing countries and increasing in Iran due to improper lifestyle.⁶ Evidence shows that CVD is the leading cause of death in Iran.⁷

Rehabilitation is part of cardiovascular treatment

and is considered as an evidence-based intervention to change health behaviors.^{8,9} A cost-effective program is one which results in reduced complications, reduced re-hospitalizations and the recurrence of disease, increased quality of life, reduced mortality, improved physical and mental function, and reduced depression and anxiety.^{6,7,10}

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Evidence shows that there is 20% less chance for patients participating in rehabilitation programs to experience recurrent attacks, and 25% less mortality rate in them compared to those not participating in rehabilitation programs.¹¹

In order to perform rehabilitation programs, patients' knowledge must first be assessed. And rehabilitation programs should be developed based on the results. Numerous questionnaires have been designed and developed in different countries to assess the knowledge of the patients undergoing cardiac rehabilitation (CR), including the second version of Coronary Artery Disease Education Questionnaire (CADE-Q) for the patients under rehabilitation,¹² Cardiac Rehabilitation Knowledge in Patients With Chronic Heart Diseases,¹⁰ the Cardiovascular Management Self-efficacy Scale,¹³ and the comprehensive Heart Disease Knowledge Questionnaire.¹⁴

Although the above questionnaires cover some areas of rehabilitation properly, they do not cover all the areas of it, or have flaws such as having too many items and taking long to be completed. In this regard, the CADE-Q SV, developed for assessing the knowledge of the patients undergoing CR, covers 5 areas of rehabilitation, while having fewer items and taking less time to be completed.¹⁵

The first questionnaire was developed by Ghisi with 19 items. Unfortunately, this questionnaire did not consider the psychosocial aspect of rehabilitation.¹⁶ Later, the developer of the questionnaire added the psychosocial aspect to it (31 items).¹² Again, due to the high number of the items in the above questionnaire, the developer created a shorter version with 20 items, the validity and reliability of which were approved (a score of 9.10 ± 1.12 , and $\alpha > 0.7$, in terms of clarity).¹⁵

The questionnaire was also validated in Portuguese-Brazilian and French-Canadian, and its validity and reliability were again confirmed.^{17,18}

According to the researches, no studies have been carried out in Iran to translate and validate the CADE-Q SV in patients undergoing CR. Therefore, the present study aims to validate this tool in Iran.

Materials and Methods

This was a cross-sectional study that the researchers took the following steps to implement it:

- Obtaining permission from the ethics committee
- Determining the sample size
- Obtaining permission from the author of the questionnaire
- Questionnaire translation

-Statistical analysis

This was a cross-sectional study on patients with CAD undergoing CR, hospitalized in the cardiac care unit (CCU) of Golestan Hospital and Imam Khomeini Hospital or visiting the Cardiac Rehabilitation Center from October 2019 to March 2020 in the city of Ahvaz, Iran.

According to Hair et al., the sample size consisted of a total of 240 subjects, after taking into account a 20% dropout rate and selecting 10 subjects per item.¹⁹ The inclusion criteria included the diagnosis and the confirmation of CAD by a specialist, being at least 18 years old, the willingness to participate in the study, the lack of mental, cognitive, and visual diseases, the ability to read and write, and fluency in Farsi. The exclusion criterion was not completing the questionnaire. The data were collected using the CADE-Q SV and the demographic questionnaire.

The CADE-Q SV assesses the knowledge of the patients undergoing CR. This questionnaire consists of 20 items in the 5 areas of exercise, nutrition, risk factors, medicine and treatment, and the psychosocial aspect. Each item can be answered as correct, wrong, or I don't know. Each correct answer has one point, and no point is assigned to the two other options. A higher score is an indicator of higher knowledge.

First, the questionnaire developer, Gabriella de Melo Ghisi, was asked for permission via email. The questionnaire was first translated into Farsi, separately, by two Farsi speakers, fluent in English (expert and master in English language in the field of Medicine). The two translations were then investigated by the research team, consisting of two experts holding Doctor of Philosophy (PhD) in nursing and one holding Master of Science (MSc) in nursing. After exchanging opinions and combining the translations, the final translated version was prepared. The Farsi questionnaire was then back-translated into English by two other translators fluent in English and Farsi (master and PhD in English language in the field of Medicine). The first two translators and the latter ones who translated the tool into Farsi and English were not aware of each other's work. Then, the two English translations were compared and a single version was prepared. The final translation was sent to the original developer of the tool, via email. The developer examined the submitted English version and approved the translated questionnaire.

Statistical analysis

Face validity: The face validity was measured using qualitative and quantitative approaches. In

order to determine the qualitative face validity, 10 patients with CAD who had completed their rehabilitation period were asked to examine the items in terms of their understandability, simplicity, and clarity.²⁰ They were also asked to score the items in terms of clarity (1 to 3), and simplicity and understandability (1 to 4). At this stage, some items were not clear or understandable to patients. The items were reassessed by the research team and the necessary changes were made, in a way that the content of the items remained intact.

For measuring the quantitative face validity, each item of the questionnaire was scored based on a Likert scale as follows: really important (5 points), pretty important (4 points), moderately important (3 points), slightly important (2 points), and not important at all (1 point). Then, 10 patients undergoing CR were given the questionnaires and were asked to score each item from 1 to 5, in terms of importance.

Content validity: The content validity was also evaluated using qualitative and quantitative approaches. The qualitative validity is assessed according to the expert opinions and judgments. In this research, the questionnaire was distributed among 12 CR specialists by the researcher. The specialists were asked to examine the items in terms of grammar, the use of appropriate words, the importance of items, the proper sorting of items, and the questionnaire completion time, and submit their opinions within a week.²⁰ A week later, the questionnaires were collected by the researcher and the necessary corrections were made according to the experts' opinions and the suggestions of the research group.

In order to quantitatively measure the content validity, the experts' opinions were examined by calculating the two indicators: content validity ratio (CVR) and content validity index (CVI), to ensure that the most important and appropriate content is chosen (the item necessity), and the questionnaire items are designed in the best way to measure the content, respectively.

At this stage, 12 CR specialists were asked to score each questionnaire's item using the following three options: "necessary", "useful but not necessary", and "not necessary". The CVR was calculated based on below equation:

$$CVR = \frac{n_e - \frac{N}{2}}{\frac{N}{2}}$$

where, n_e is the number of the experts who selected necessary and N is the total number of expert appraisers.

After calculating the CVR, the obtained value

was examined, using the Lawshe's table. According to the Lawshe's table, a CVR value of ≥ 0.52 is considered necessary, and the item is retained for further analysis. For measuring CVI, the experts were asked to give their opinions on the relevance of each item, based on a Likert scale by choosing one of the following: completely relevant = 4, relevant = 3, relatively relevant = 2, and not relevant = 1. To calculate the CVI, the number of the experts giving an item a score of 3 or 4 is divided by the total number of the expert participants. The obtained score would be considered acceptable if it was ≥ 0.78 .²⁰

Construct validity: The construct validity checks to see if the tool examines exactly what the proposal suggests, and is based on logical relationships. In this study, confirmatory factor analysis (CFA) was performed to evaluate the construct validity. In CFA, it is determined whether the data are consistent with a specific factor structure and the items in a domain are interrelated and cover exactly that very domain. It is used when a questionnaire or tool has appropriate construct validity. The following indices, including comparative fit index (CFI), the normed fit index (NFI), Tucker-Lewis index (TLI), the incremental fit index (IFI), the standardized root mean square residual (SRMR), the root mean square error approximation (RMSEA), and the chi-square/degree of freedom (χ^2/df) were used to perform the goodness-of-fit assessment.²¹

Reliability and stability: In order to assess the internal consistency of the CADE-Q SV, the Cronbach's alpha coefficient was estimated for the whole questionnaire. An alpha value above 0.7 was considered to indicate good internal consistency.²²

Then for assessing the stability, a test-retest was done and 20 of the same patient participants were asked to fill out the questionnaires again two weeks later. The test-retest reliability was assessed using the Kappa agreement coefficient.

Data analysis was performed using SPSS software (version 22, IBM Corporation, Armonk, NY, USA) and the R version 3.6.3 (2020-02-29).

Ethical consideration: This study was approved by the Ethics Committee of Ahvaz Jundishapur University of Medical Sciences under the code NCRCCD-9826.

Results

The face validity and the content validity were evaluated using qualitative and quantitative approaches. While measuring face and content

validity, minor changes were made according to the participants and the rehabilitation experts, without changing the content of items. Then it was reviewed and finally approved by the research team. For quantitative face validity, the items' impact score was calculated, with the minimum score of 4.42. Therefore, all the items were confirmed. For quantitative content validity, CVR and CVI were calculated. The minimum score was reported to be 0.83 for CVI, and 0.66 for CVR. Thus, all the items were approved.²⁰

In construct validity of 240 samples, the questionnaires not fully completed were excluded from the study and a total of 226 subjects were included in the study. Of these 226 samples, 102 were women (45.1%) and 124 were men (54.9%), with a mean age of 54.04 ± 10.41 years. The rest of the demographic information is shown in table 1.

Descriptive finding of history of disease in patients that participated in construct validity is shown in table 2. In the study of rehabilitation phases, significant differences were observed in the 2 areas of rehabilitation including risk factors ($P = 0.009$) and exercise ($P = 0.023$). There were no significant differences in the 3 areas of medicine and treatment, nutrition, and psychological aspects. Patients in the phases 3 and 4 of rehabilitation had more knowledge compared with the patients in

phases 1 and 2, but this difference was not significant in the areas of medicine and treatment ($P = 0.094$) and psychosocial aspect ($P > 0.05$) (Table 2).

Table 2. Descriptive findings of history of disease

Variable		n (%)
Diabetes mellitus	Yes	71 (31.4)
Hypertension	Yes	127 (56.2)
Hyperlipidemia	Yes	92 (40.7)
Obesity	Yes	54 (23.9)
Smoking	Yes	44 (19.5)
Duration of chronic diseases (year)	< 2	28 (12.4)
	2-5	56 (24.8)
	5-10	37 (16.4)
	> 10	50 (22.1)
	No diseases	55 (24.3)
Duration of heart diseases (month)	< 1	77 (34.1)
	2-4	36 (15.9)
	4-6	13 (5.8)
	> 6	100 (44.2)
Rehabilitation stage	1	117 (51.8)
	2	66 (29.2)
	3	31 (13.7)
	4	12 (5.3)

According to the results, the highest and the lowest scores were associated with the areas of nutrition (3.13 ± 0.87) and psychosocial aspect (2.52 ± 0.94), respectively (Table 3).

Table 1. Socio-demographic information

Variable		Value
Age (year) (mean \pm SD)		54.04 \pm 10.41 (minimum: 30, maximum: 85)
Gender [n (%)]	Men	124 (54.9)
	Women	102 (45.1)
Education level [n (%)]	Elementary school	41 (18.0)
	Middle school	53 (23.5)
	Diploma	80 (35.4)
	Associate degree	13 (5.8)
	Master and higher	39 (17.3)
Job [n (%)]	Jobless	13 (5.8)
	Householder	80 (35.4)
	Retired	53 (23.5)
	Jobholder	56 (24.8)
	Other jobs	24 (10.5)
Marital status [n (%)]	Married	196 (86.7)
	Single	10 (4.4)
	Divorced	8 (3.5)
	Widow	12 (5.4)
Emolument (toman) [n (%)]	< 2 million	44 (19.5)
	2-3 million	52 (23.0)
	3-4 million	45 (19.9)
	4-6 million	43 (19.0)
	> 6 million	42 (18.6)

SD: Standard deviation

Table 3. Relationship between knowledge level and rehabilitation stage

Area	Rehabilitation stage	N	Mean ± SD	P
Medicine and treatment	1	117	2.51 ± 0.72	0.094
	2	66	2.62 ± 0.63	
	3	31	2.84 ± 0.64	
	4	12	2.75 ± 0.45	
Risk factors	1	117	3.03 ± 0.74	0.009
	2	66	3.04 ± 0.59	
	3	31	3.40 ± 0.62	
	4	12	3.25 ± 0.62	
Nutrition	1	117	3.12 ± 0.92	0.187
	2	66	3.00 ± 0.82	
	3	31	3.39 ± 0.80	
	4	12	3.33 ± 0.78	
Exercise	1	117	3.01 ± 1.28	0.020
	2	66	3.07 ± 0.84	
	3	31	3.68 ± 0.47	
	4	12	3.08 ± 0.90	
Psychosocial risk	1	117	2.58 ± 0.92	0.251
	2	66	2.35 ± 0.94	
	3	31	2.71 ± 1.01	
	4	12	2.42 ± 0.90	

SD: Standard deviation

Considering the goodness of fit indices (GFIs) such as the CFI, NFI, TLI, IFI, SRMR, RMSEA, and χ^2/df , it can be concluded that the model fits the data well (Table 4).

Cronbach's α coefficient used to measure the internal consistency indicated a debatable internal consistency for the whole questionnaire, and unacceptable for each dimension (Table 5).

The results of test-retest and the correlation among the obtained answers were studied for the 5 dimensions of the questionnaire, and the coefficients were reported to be above 0.4, indicating the moderate reliability of the questionnaire (Table 6).

Discussion

The aim of this study was to validate Persian version of the CADE-Q SV for education of patients undergoing CR and develop plans based on the patient's knowledge.

Therefore, the Persian version of the CADE-Q SV has been translated, culturally-adapted, and psychometrically-validated through a rigorous process. Face, content, criterion, and construct validities as well as reliability and stability were all

established, and demonstrated the utility of this tool.

The original version of CADE-Q SV was developed in 2016. The author reported face validity, content validity, criterion validity, and reliability (Cronbach's alpha). The result showed that all subscales of original questionnaire being considered were internally consistent ($\alpha > 0.70$).¹⁵ Moreover, the CADE-Q SV was culturally adapted to Brazilian-Portuguese version by Ghisi et al. in 2018. The author reported face validity, content validity, criterion validity, exploratory factor analysis (EFA) (5 subscales), and reliability and stability [Kuder-Richardson and intraclass correlation coefficient (ICC)]. The result showed that the scale had good reliability and stability (Kuder-Richardson = 0.7 and ICC > 0.7).¹⁷ The CADE-Q SV was also culturally adapted to French-Canadian version by Ghisi and Oh in 2021. The authors reported content validity, criterion validity, EFA (5 subscales), and reliability (Kuder-Richardson). The result showed that the scale had good reliability and stability (Kuder-Richardson = 0.72).¹⁸ The result of the studies is different from the current study in the field of reliability and this difference may be due to differences in the culture of societies.

Table 4. Approval of factor index validation model

Proportionality index	CFI	NFI	IFI	TLI	SRMR	RMSEA	χ^2/df
Acceptance range	> 0.900	> 0.900	> 0.900	> 0.900	< 0.090	< 0.080	< 3.000
Result	0.969	0.824	0.970	0.963	0.148	0.028	1.169

CFI: Comparative fit index; NFI: Normed fit index; IFI: Incremental fit index; TLI: Tucker-Lewis index; SRMR: Standardized root mean square residual; RMSEA: Root mean square error approximation; df: Degree of freedom

Table 5. Internal correlation coefficient (n = 226)

Areas	Mean ± SD	α	1	2	3	4	5	6
Medicine and treatment	2.60 ± 0.68	0.109	1					
Risk factors	3.11 ± 0.69	0.186	0.310*	1				
Exercise	3.12 ± 1.09	0.339	0.247*	0.300*	1			
Nutrition	3.13 ± 0.87	0.348	0.209*	0.364*	0.291*	1		
Psychosocial risk	2.52 ± 0.94	0.419	0.230*	0.300*	0.210*	0.321*	1	
Total	2.90 ± 0.56	0.679	0.561*	0.567*	0.687*	0.687*	0.650*	1

*P < 0.001

SD: Standard deviation

Table 6. Reliability

Areas	ICC	P
Medicine and treatment	0.449	0.004
Risk factors	0.746	< 0.001
Exercise	0.449	0.004
Nutrition	0.587	< 0.001
Psychosocial risk	0.564	< 0.001
Total	0.746	< 0.001

ICC: Intraclass correlation coefficient

The results of criterion validity of the questionnaire showed that people with higher education had more knowledge. These results are in line with previous studies.^{10,15,17,23} The people in phase 3 of rehabilitation had more knowledge than those in phases 1 and 2, which is consistent with two studies of Ghisi et al.^{15,24}

Besides, the result showed that the highest and the lowest scores of patients' knowledge were assigned to the areas of nutrition (3.13 ± 0.87) and psychosocial aspects (2.52 ± 0.94), respectively. In the study of Ghisi et al.,¹² exercise and nutrition received the highest, and medicine and treatment received the lowest score. Moreover, in the study conducted by Maroufi et al., medicine and treatment and risk factors obtained the highest knowledge score.²³ These different results seem to be the result of the lifestyle and the culture of various societies.

The followings are the limitations of the current study. Due to the low level of health literacy among some patients, the items should be read to them and explanations should be made in this regard. Moreover, test-retest reliability was performed in 20 patients, and the literature points that the minimum number should be 50.²⁵

Conclusion

According to the results, the CADE-Q SV has good validity and reliability, and due to the small number of items and the short time needed to complete it (10 ± 2 minutes), it can be used to measure the knowledge of patients with CAD undergoing CR (4 phases of CR). In addition, this scale can support healthcare providers and CR programs to assess

their patients' knowledge in clinical practice and promote greater provision of educational strategies.

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Conflict of Interests

Authors have no conflict of interests.

Authors' Contribution

ZO and NS contributed to the conception and design, acquisition of data, and interpretation of data as well as drafting the article and final approval of the version to be published. NE contributed to the conception and design and revising article critically for important intellectual content. SG contributed to the analysis and interpretation of data as well as drafting the article.

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