

Designing and standardizing a questionnaire for evaluating knowledge, attitude, and practice of Iranian adults with cardiovascular diseases about oral health

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Original Article

Abstract

BACKGROUND: Cardiovascular diseases are the most common cause of death in Iran. Moreover, periodontal diseases are very common in our country. In this study, we have designed a standardized questionnaire for evaluating knowledge, attitude, and practice (KAP) of Iranian adult patients with cardiovascular diseases about oral health.

METHODS: For designing and standardizing a self-administered questionnaire, we performed a cross-sectional pilot study on 51 cases with periodontal complaints. A dentist carried out the physical examination to determine oral health indicators. Twelve experts and ten lay people of the target population answered questions about validity. Cronbach's alpha, factor analysis, and Pearson correlation coefficients were used in the analysis.

RESULTS: The cases of this pilot study were middle aged, with moderate financial and health status, but low oral health and educational level. Debris score was correlated with all other physical exam findings except decay, missing, and filled (DMF). Reliability was 0.826 according to Cronbach's alpha score. Face validity was higher than 80%. Content validities of the whole of the questionnaire were 85.98% for clarity, 78.05% for relevancy, 85.16% for simplicity, and 82.32% for consistency of each question with the question set. Factor analysis showed that 15 components explain 74% of the total variance.

CONCLUSION: This questionnaire is culturally adjusted and appropriate for our community, valid and reliable, and sufficiently estimates the variance of the oral health status. It can be used as a standard tool in further studies in adult population of the Iranian middle aged patients with low level of education and moderate socioeconomic status.

Keywords: Questionnaires, Reproducibility of Results, Validation Studies, Validity, Reliability, Oral Health, Periodontal Diseases

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Introduction

Cardiovascular diseases are the most common cause of death in Iran.¹ Periodontal diseases are also very common in our country.²⁻³ A recent systematic review showed that there are limited studies on the efficacy of oral health promotion activities in patients with cardiovascular diseases. Moreover, it stated that efforts related to oral health promotion seem to

improve periodontal health and change endothelial function in the short term. However, it is not clear whether these effects can result in reducing the risk of secondary cardiovascular events yet.⁴

It is also undetermined whether the association between oral and cardiovascular diseases is real (causal) or confounded by unknown/unmeasured factors. A recent prospective genetic study among

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twins showed evidence of shared genetic factors between cardiovascular disease and dental/periodontal disease. It stated that common pathogenetic mechanisms exist between poor oral health and cardiovascular disease.⁵ However, it seems that dental health behavior and cardiovascular diseases share a common behavioral background.⁶ Therefore, this association is mostly explained by confounders, particularly those relating to health behavior.⁷

There are some questionnaires about knowledge, attitudes, and practice of different persons (healthy appearing or patients) in different subgroups like school children, pregnant women, diabetics, hypertensive and obese patients, health care workers, and even dentists about oral health.⁸⁻¹³ However, in this study we designed an Iranian version of this type of questionnaire in adult Iranian patients with cardiovascular diseases and standardized it.

Even if there is no association between oral health and cardiovascular disease, both have common risk factors. Therefore, policy makers' awareness of the patients' knowledge, attitude, and practice (KAP) will enable them to plan health programs for disease prevention and raise the health status of the patients as much as possible in a better way (by understanding the exact weak points of the patients according to KAP study).

Within the KAP model we are searching to understand in which subjects the knowledge of people is not sufficient and which interventions can help us rapidly improve the attitudes and practice of our target population to increase their oral health situation.

By this study, we have developed and standardized a questionnaire for evaluating knowledge, attitude, and practice of Iranian adult patients with cardiovascular diseases about oral health which can be used as a standard tool in further studies in this field. Before this study, there was no Iranian questionnaire with psychometrics properties for this population.

Materials and Methods

Study population

This project consists of different steps for producing and standardizing a questionnaire about KAP of patients with cardiovascular diseases about oral health. After designing the questionnaire, in the second step, 12 experts were involved to ensure the validity of the questionnaire. In the third step, as a cross-sectional study, 51 cases (39-73 years old, 32 males and 19 females) with cardiovascular diseases,

29 hospitalized and 21 outpatient cases, answered the questions in a self administered manner. This step was followed by a reliability analysis to determine internal consistency of the items with each other and reduce the items which do not have consistency with other items. Finally, a factor analysis was done on 150 cases separately for confirming the grouping of items.

Designing and standardizing the questionnaire

Item generation

After a thorough search in the literature, we planned two focus group discussions and one expert panel in order to design our flowchart for characterizing main domains of our KAP survey. Then, we detailed our main domains to some questions. Participants of the focus groups were 16 experts in related fields, which consisted of dental diseases, cardiovascular disease, epidemiology, community medicine, psychology, and psychiatry. Sessions were held at the Dental Implants Research Center of Tehran University of Medical Sciences, Tehran, Iran, between May 2011 and July 2011. They were selected based on a small assessment by researchers of this study.

Item modification

According to expert opinions, we changed the face and content of some questions. A pilot study on 51 persons was done to help us modify the structure and content of the primary questionnaire. Choices of each question were also revised according to the different answers to questions in the pilot study.

Item reduction (Factor analysis)

Factor analysis provides a better understanding of which variables form a "relatively coherent subset, independent of others".⁶ We performed this analysis to see whether our main domains (knowledge, attitude, and practice), which were categorized by this analysis, were consistent with our primary pattern in which we first categorized them. We wanted to confirm our primary flowchart of the questionnaire in this way.

Item standardization

Reliability: Internal consistency reliability (Cronbach's alpha), which measures the extent that the questions both in each domain and also in all three main parts (knowledge, attitude, and practice) tap a particular concept, was determined according to the pilot study.¹⁴

Face validity: A separate sample of 10 lay cases of cardiovascular diseases from the target population of interest and 12 experts in the field of dental diseases and/or designing the questionnaire reviewed the questionnaire and answered the question: "How well do you think the questionnaire

measures knowledge, attitude, and practice of a patient with cardiovascular diseases about oral health status"? They responded using a 5-point Likert scale from 1 (not at all) to 5 (very well).

Content validity: The content validity of the final questionnaire was determined according to the clarity, relevancy, simplicity, and consistency of each question with the questions set from 12 experts in the field of dental diseases (6 persons) and methodologists (6 persons). They evaluated the instrument for important deletions or inappropriate choices of items.

For decreasing the prestige bias, demographic variables were inserted at the end of the questionnaire. For quality assurance, there was also a guidance form for the examiner to know how everybody should be examined.

Data collection

Subjects answered the questionnaire of knowledge, attitudes, and practice about oral health and its association with cardiovascular diseases. Each questionnaire was evaluated for missing data as soon as getting them from the patients. In case of need, the questionnaire was returned in order to be completed by the interviewees.

Then, an expert dentist carried out the physical examination to determine oral health indicators.¹⁵ He defined the indices oral hygiene, debris, calculus, periodontal disease, and decay, missing, and filled (DMF) in addition to exam for presence and extent/severity of gingivitis, periodontitis, plaque, artificial teeth, loosed teeth, and gingival bleeding. One assistant helped assessment of the files of the hospitalized patients for completing demographic variables.

Demographic variables

Age, gender, height, weight, marital status, education level, job, financial status, dental insurance, living area (rural/urban), smoking behavior, and diet were among our demographic variables.

Physical examination

After oral examination of each case by an expert dentist, the dentist recorded the below mentioned indices.

The Oral Hygiene Index is composed of the combined Debris Index and Calculus Index, each of these indices is in turn based on 12 numerical determinations representing the amount of debris or calculus found on the buccal and lingual surfaces of each of three segments of each dental arch.¹⁶

Debris Index = (The total of the upper and lower buccal scores) + (The total of the upper and lower lingual scores) / (The number of segments scored).¹⁶

Calculus Index = (The total of the upper and lower buccal scores) + (The total of the upper and lower lingual scores) / (The number of segments scored).¹⁶

The average individual or group debris and calculus scores are combined to obtain Oral Hygiene Index.¹⁶

Periodontal disease index (Ramfjord's Periodontal Index) is a thorough clinical examination of the periodontal status of six teeth, with an evaluation of the gingival condition, pocket depth, calculus, and plaque deposits, attrition, mobility, and lack of contact. Individuals with clinically normal gingiva have an index of 0 to 0.2. The index reaches a maximum of 8.0 in persons with severe terminal destructive periodontitis.¹⁶

DMF index (decayed, missing, filled) is a technique for managing statistically the number of decayed, missing, or filled teeth in the oral cavity. Analysis may be based on the average number of DMF teeth (sometimes called DMFT) per person or the average number of DMF tooth surfaces (DMFS).¹⁶

Data analysis

We calculated the internal consistency of the questionnaire using Cronbach's alpha coefficient. Factor analysis was done for data reduction and grouping the related variables in conceptually similar and statistically related groups. Extraction method was the principal component analysis. Varimax rotation method was used, and we extracted factors based on Eigenvalue greater than 1. Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's test of sphericity were used, and cut off point for loading on each factor was 0.3.

We used mean \pm SD for expressing quantitative variables, and correlation test with Pearson coefficient for assessing the relation between these variables.

For calculating Item Content Validity Index (I-CVI), the average number of experts who believed that item was desirable/completely desirable was calculated and expressed as percentage. Scale Content Validity Index (S-CVI) for each one of clarity, relevancy, simplicity, and consistency was calculated as the average of items which our experts believed are desirable/completely desirable.

Ethics

All subjects signed an informed written consent before entering the study. This project is reviewed and accepted by the Ethics Committee of the Dental Implant Research Center with the code number: 90-03-104-17668.

Results

The final questionnaire consisted of five parts (Appendix 1):

1. Nine questions about knowledge,
2. Eleven questions about attitudes,
3. Twenty-one questions about practice,
4. Demographic variables

5. Physical examination part

Demographic characteristics of study participants

Fifty one subjects were assessed in the pilot study. They were middle aged and most of them had moderate physical activity, moderate financial status, moderate health status, but low educational level (Table 1).

Table 1. Demographic characteristics of participants in item reduction part of the study

Characteristic	Mean ± SD	n (%)
Age (year)	54.20 ± 8.10	
Weight (kg)	78.40 ± 12.60	
Height (cm)	166.20 ± 9.10	
BMI (kg/m ²)	28.50 ± 4.50	
Home area (m ²)	116.40 ± 53.50	
Number of rooms	2.26 ± 1.05	
Number of family members	4.30 ± 1.80	
Monthly income (Rials) [‡]	5250000 ± 2760000	
Marital status [†]		
Married		46 (90.2)
Not married		5 (9.8)
Occupation status		
Retired		8 (15.7)
Unemployed (free work)		11 (21.6)
Household		16 (31.4)
Education		
Illiterate		14 (27.5)
Primary		19 (37.3)
Secondary		9 (17.7)
University		6 (11.8)
Financial status		
Good		4 (7.8)
Moderate		35 (68.6)
Poor		11 (21.6)
Dental insurance coverage		
Yes		5 (9.8)
No		46 (90.2)
Smoking		
Current smoker		10 (19.6)
Ceased		9 (17.6)
Not at all		28 (54.9)
Hookah smoker		2 (3.9)
On medication		
Yes		41 (80.4)
No		10 (19.6)
General health status		
Good		4 (7.8)
Moderate		40 (78.4)
Poor		3 (5.9)
Living area		
Urban		45 (88.2)
Rural		6 (11.8)
Diet [†]		
Traditional		33 (64.7)
Mediterranean		11 (21.6)
Others		7 (13.7)
Physical activity		
Good		6 (11.8)
Moderate		26 (51)
Poor		18 (35.3)

* At the time of data collection each dollar was equivalent with 12260 Rials; † due to missing values, percentages do not reach 100%; In addition, in some variables, only important choices are mentioned; BMI: Body mass index

Psychometric properties

Reliability

Cronbach's alpha score, measuring the internal consistency of questions, was 0.826. Its value in each domain is shown in table 2.

Face validity

All experts rated the option (answer) 4 or higher except one person, producing an overall mean of 4.0 (from total score of 5). All lay experts also rated 4 or higher except two experts and the average was 4.0 in these 10 lay persons.

Content validity

The characteristics of the content validity of the whole questionnaire were clarity 85.98%, relevancy 78.05%, simplicity 85.16%, and consistency of each question with the questions' set 82.32% (Table 3).

Factor analysis

KMO was 0.39 and Bartlett's test of sphericity was significant ($P < 0.001$) which shows that our variables are related and therefore suitable for structure detection. Extraction communalities are estimates of the variance in each variable accounted for by the components. Our communalities were all above 0.62 and most of them above 0.75. Therefore, all are high, which indicates that the extracted components represent the variables well and we do not need to extract another component. Exploratory varimax rotations and discarding of redundant items resulted in 15 component solutions explaining 74% of the variance in KAP of the subjects.

Findings of the pilot study about main outcomes

Table 4 shows that the situation of both KAP status and oral health is not good.

As table 5 shows, Debris Index was correlated with all other physical exam findings except DMF and all KAP parts and DMF were not related with any other index except practice of participants.

Table 2. Internal consistency of the questionnaire and its different domains

Domains	Cronbach's alpha
Knowledge	0.762
Practice	0.729
Attitude	0.700
All together	0.826

Table 3. Percentage of content validity according to different domains

Domains	Clarity	Relevancy	simplicity	Consistency
Knowledge	85.61	78.79	82.58	75.76
Practice	85.71	76.98	87.30	83.73
Attitude	87.04	79.63	83.33	87.04

Table 4. Results of physical findings and knowledge, attitude, and practice (KAP) questionnaire

Variables	Score (Mean \pm SD)
DMFS	48.6 \pm 29.7
PPI	4.1 \pm 3.5
Debris Index	2.2 \pm 1.0
Calculus Index	2.6 \pm 1.1
OHI	4.6 \pm 1.8
Knowledge score*	57.8 \pm 27.8
Attitude score*	46.4 \pm 22.7
Practice score*	43.3 \pm 18.1
Total score*	46.8 \pm 17.3

* Maximum possible score for knowledge, attitude, practice, and total score were 100; DMFS: Decayed, missing, and filled tooth surfaces in a person's mouth; PPI: Periodontal disease index; OHI: Oral hygiene index

Discussion

The questionnaire of KAP study in patients with cardiovascular diseases which was designed in this study had acceptable indices of a standard questionnaire.

About I-CVI and S-CVI, all percentages higher than 80% are considered as the minimum acceptable for a new tool.¹⁷⁻²⁰ Therefore, most of them are acceptable and such a questionnaire can be used in similar Iranian patients with cardiovascular diseases. It may also be used in other Iranian subjects who do not have significant demographic, clinical, and other characteristic differences which affect the validity of this questionnaire or force us to re-validate this questionnaire for that group.

As table 4 shows, mean knowledge score is higher than 50% (57.8%) of maximum possible score. However, attitude is lower than 50% (46.4%) and practice is the worst (43.3%) in comparison with knowledge and attitude. This finding is compatible with what we expect when comparing these domains in different studies.²¹⁻²⁴ This is also in line with the results of table 5 which shows that practice score is more highly correlated with the total score. As we expected, the subjects' knowledge and attitude are far from their practice, and practice is a more suitable index showing the total situation of each subject.

Debris Index, as the only one which is correlated with all other physical exam findings and all parts of KAP, can be evaluated when we do not have sufficient time or budget to evaluate similar group of subjects for KAP and/or oral health status. It can also be of interest as a proxy for different parts of oral health and KAP of subjects when there is an obstacle for evaluation of each of these variables. On the other hand, DMF is not a good indicator of the situation of the tooth, and knowledge and

Table 5. Correlation between different parts of knowledge, attitude, and practice (KAP) and physical exam findings

	DMFS	Debris Index	Calculus Index	OHI	Knowledge score	Attitude score	Practice score
Debris Index							
Calculus Index		r = 0.561*					
OHI		r = 0.851*	r = 0.618*				
Knowledge score		r = -0.285‡					
Attitude score		r = -0.400§			r = 0.487*		
Practice score	r = -0.262§	r = -0.440*		r = -0.281‡	r = 0.392§	r = 0.382§	
Total score		r = -0.503*		r = -0.324‡	r = 0.750*	r = 0.740*	r = 0.838*

DMFS: Decayed, missing, and filled tooth surfaces in a person's mouth; OHI: Oral hygiene index

* P < 0.001; § 0.001 < P < 0.01; ‡ 0.05 < P < 0.01

attitude of the patients about oral health, but a good indicator of the practice of the patients. Those with higher score of DMFS have a lower attitude score.

Factor analysis confirmed that there are no limited numbers of questions that can explain most of variance of the questionnaire. Fifteen factors explained 74% of variance; this shows that we have truly split the different parts of KAP into subtitles with least overlap. Factors were related to the same parts of KAP. In our study, the low value of KMO shows factor analysis may not be so useful for our data; however, significance level of Bartlett's test was less than 0.05 which indicates that a factor analysis may be useful with our data. It means that, although our sample size is not sufficient for factor analysis, factor analysis can run for such data. Maybe, by higher sample of the patients, indices of factor analysis improve to a higher degree.

Reliability of subscales was higher than 0.7 and of the total questionnaire higher than 0.8 which shows high internal consistency of the items.

In comparison with a similar study we performed for standardizing KAP of Iranian medical specialists about viral hepatitis, this study has higher reliability, comparable face validity, and lower content validity.²⁵ The results of factor analysis were also better in the present study.

Conclusion

We believe that this questionnaire which is culturally adjusted and appropriate for our community, valid and reliable, and sufficiently estimates much of the variance of oral health status, can be used as a standard tool in further studies in Iranian middle aged patients with cardiovascular diseases who have low level of education and moderate socioeconomic status.

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Conflict of Interests

Authors have no conflict of interests.

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