Original Article

Standardization of European Medical Risk Related History questionnaire for use with Persian-speaking population

Adeleh Pooyafared[1,2,3], Maryam Alsadat Hashemipour[1,2,3], Kheyzaran Baharloey[4], Leili Shafiei[2,1,5], Forogheh Montajeb[2,1]

[1]Social Determinants on Oral Health Research Center, [2]Kerman Dental and Oral Diseases Research Center, [3]Department of Oral Medicine, [4]Department of Restorative Dentistry, [5]Department of Pediatric Dentistry, School of Dentistry, Kerman University of Medical Sciences, Kerman, Iran

ABSTRACT

Background: Today, the dental practitioners are finding many more medically compromised patients in their practice. **Aims:** The aim of this study was standardization of the European Medical Risk Related History (EMRRH) questionnaire for use among Persian population. **Materials and Methods:** The English original version of the EMRRH questionnaire was translated into Persian language by a forward–backward translation method. Then reliability was tested on 50 subjects. Also, the sensitivity, specificity, and validity of the questionnaire were assessed. **Statistical Analysis Used:** Cohen's kappa, a measure of agreement between observers that includes an adjustment for chance agreement, was likewise calculated. **Results:** The reliability coefficient (Cronbach's alpha) of the EMRRH was above the recommended 0.7 threshold and considered excellent (alpha 0.87). Specificity of the questions was 94% and of per EMRRH item was 93%. Sensitivity per question was 86.1% and of per EMRRH item was 94%. Cohen's kappa for the questionnaire was 0.89 and for subsequent questions was 0.82. **Conclusions:** The EMRRH (Persian version) has been shown to be valid in comparison with the gold standard (a medical history taken by a physician experienced) and this instrument would be an effectual method of history taking for the dentist.

Key words: European Medical Risk Related History questionnaire, reliability, sensitivity, specificity, validity

INTRODUCTION

A large number of people of a wide age range, from children to geriatric patients, undergo dental treatment procedures every day. A number of these individuals have some systemic conditions. Various studies have shown that of 10,000 dental patients, 16 are prone to bacterial endocarditis; of 2000, 400 have high blood pressure; of 100, 12 have gastrointestinal disorders; and of 1000, 30 have asthma.[1,2] On the other hand, dental procedures, administration of local anesthetic agents, and stress from dental procedures might lead to clinical manifestations or exacerbation of systemic conditions of patients,[3-5] including the occurrence of syncope, angina pectoris, orthostatic hypotension, toxicity with local anesthetic agents, hypoglycemic shock, asthmatic attacks, convulsions, and acute myocardial infarction during dental procedures.[6]

Recent advances in medicine in relation to the treatment of high-risk patients have increased patients' life expectancy and the majority of diseases are brought under control with appropriate maintenance protocols. Therefore, some apparently healthy individuals might have serious and

Address for correspondence: Prof. Maryam Alsadat Hashemipour, Department of Oral Medicine, School of Dentistry, Shafa Street, Kerman, Iran.
E-mail: m-hashemipour@kmu.ac.ir

Access this article online	
Quick Response Code:	Website: www.jehp.net
	DOI: 10.4103/2277-9531.157227

This article may be cited as: Pooyafared A, Hashemipour MA, Baharloey K, Shafiei L, Montajeb F. Standardization of European Medical Risk Related History questionnaire for use with Persian-speaking population. J Edu Health Promot 2015;4:41.

chronic medical conditions.[7,8] For example, of 1000 dental patients, 70 have diabetes and almost half of them are not aware of their problem.[2]

On the other hand, aging of the population which has occurred in recent years will continue, i.e. more patients will need dental treatment in future. Since some conditions such as diabetes and cardiovascular problems are prevalent in old age, such patients require more accurate evaluation. Studies have shown that in 2000, 15% of the European population was over 65 years of age and it is estimated that the number will double during the next 25 years. Since the incidence of medical conditions increases with advancing age, it is expected that the number of dental patients with systemic conditions will increase.[1,8,9]

In addition, studies have shown that in some cases, dental practitioner might be the first person to recognize a systemic condition. Therefore, as a legal principle, during the first visit of the patient, their personal and family medical histories and periodic medical examinations should be recorded. A number of patients do not report their medical history because they believe it is not important for dental procedures, they fear that they will not receive dental treatment, or they are not aware of their systemic conditions; therefore, the patients should be directly questioned about their medical histories to avoid errors and problems.[10]

A study by Inpijn *et al.* in seven countries showed that during the past 10 years, 120 deaths have occurred in dental offices in the UK, with 208 emergency cases during a 1-year period in the Netherlands, including sudden death due to myocardial infarction. This study and other similar studies show the importance of identifying high-risk patients by recording patients' medical histories.[7]

Search for an appropriate questionnaire to identify systemic conditions has been the subject of many studies in recent years and it appears there is an absolute need for such a questionnaire to prevent neglecting a number of medical conditions. In 2008, a group of researchers, headed by Dr. Abraham Inpijan in the Netherlands, prepared European Medical Risk Related History (EMRRH) questionnaire, which consists of 21 questions about systemic conditions, including cardiovascular problems, gastrointestinal disorders, hepatitis, asthma, epilepsy, pulmonary disturbances, renal problems, use of medications, etc., which has been translated into eight languages so far and whose reliability has been confirmed.[10]

Considering the importance of systemic conditions in dental procedures and with special considerations for each patient, the aim of the present study was to translate the EMRRH questionnaire into Persian and determine its reproducibility and reliability in the Iranian population because there are no standard questionnaires in Iran for the evaluation of systemic conditions.

MATERIALS AND METHODS

The study was conducted in Kerman, the largest province of Iran that is located 895 km south of the capital. First, the questionnaire was translated into Farsi, separately, by two translators who were completely familiar with translating technical English texts; they made an attempt to translate the questionnaire into Farsi by preserving the syntax and semantics and conveying the exact meanings of the sentences. The translators were asked to only convey the meaning in cases where adhering to syntax and semantics and structural considerations distorted the translated text. Then two other translators, who had no information about the English text of the questionnaire and had sufficient experience in translating from Farsi into English, translated the questionnaire into English again. In the next stage, the two English versions were compared and when there were discrepancies between the two English texts, a meeting was held between the two groups of translators to reach an agreement about the final translated text. Since the questionnaire should be completed by patients, the translated version was submitted to 15 patients who were illiterate, had inadequate education, and had high school education to confirm the intelligibility of the questionnaire. The questionnaire was submitted to five physicians who had a very good command of English for final confirmation; the physicians were asked to provide comments on compatibility of the two English and Farsi texts and the ambiguities in the questions. The questionnaire was finally prepared for use after completing all the steps given above and final revisions were made.[11]

In order to determine the reproducibility of the EMRRH questionnaire, it was submitted to 10 experienced physicians after final revisions were made in the translated text and discussions were held in relation to level and intelligibility of questions; their views showed that the reproducibility of the content of the questionnaire was at an appropriate level.[12]

In addition, some extra questions were included in order to determine the reproducibility of the questionnaire in this population, which are as follows:

- Have you ever had any problems or complications during surgical or dental procedures?
- Have you ever had any adverse reactions due to the use of certain drugs?
- Have you visited a general practitioner or a specialist during the past year?
- Have you noticed any changes in your health status recently?
- Has your physician recently made any modifications to the drugs you take?.

Cronbach's alpha was used to examine the internal consistency of the questionnaire in order to determine its reliability. In addition, for the purpose of re-evaluation in a sample of 50 patients, the questionnaire was re-filled by the same patients after a week and the correlation coefficient was calculated through calculation of intraclass correlation

coefficient (ICC).[12] In addition, reproducibility of the questionnaire was evaluated by calculating the sensitivity and specificity of the questionnaire. Based on previous studies in this respect, the questionnaire was distributed to 400 patients and the individuals accompanying them, who had referred to private offices and dental clinics in Kerman, and they were asked to fill it up.

The aim of the study was explained to each of the patients, and if they were interested in taking part, the questionnaire was given to them. Each subject was assured that the data provided would remain confidential and only be used for statistical analysis. The questionnaires were filled out anonymously and lack of cooperation in filling out the questionnaire did not preclude dental treatment. The patients were referred to a physician in cases wherein a medical condition was identified. One inclusion criterion was age over 18. In this study, persons with more than 18 years were chosen, because most of the systemic diseases occur in this group. Besides, the ASA criteria is due to age over 18.

After the questionnaires were filled out, the questions were again asked by an experienced general practitioner. During this stage, the questions were asked in an open-ended manner, i.e. in the form of a direct conversation with the patient, and the answers were considered the gold standard because these questions were asked to get more details about the general health, a history of disease(s), and the medications used. In addition to filling out of the EMRRH questionnaire and random sample collection, the demographic data, including age, gender, occupation, and educational status, were collected and recorded. The answers provided by the subjects were recorded based on the American Society of Anesthesiologists (ASA) scale.[10] In order to evaluate the questionnaire, in general, based on ASA scale, the highest ASA sore in each questionnaire was considered the ASA score of that questionnaire. For example, if a patient had given a "Yes" answer to Question 1, ASA III was assigned and the whole questionnaire was considered ASA III risk category, despite the fact that the patient might have been in the ASA I category based on the answers to the rest of the questions. EMRRH questionnaire consists of 21 questions about various systemic conditions, including cardiovascular problems, gastrointestinal disorders, hepatitis, asthma, convulsions, pulmonary problems, renal diseases, use of drugs, etc. with Yes/No answers. The questions consist of main and accessory questions, with the main questions printed in bold type. A negative (No) answer to a main question indicates that the subject is not suffering from the condition and is placed in ASA I category. A positive (Yes) answer indicates ASA II category. Each main question is accompanied by two or more accessory questions graded proportional to the severity of the condition.

Therefore, the subjects were asked to provide "Yes" or "No" answers for each systemic condition in front of the relevant question. The answers provided were evaluated based on ASA scale of the American Heart Association. ASA V was not evaluated in the present study because patients in this category cannot attend a dental office. Each question received a score of 1–4 based on the reply chosen by the subject (score 1 to ASA I, score 2 to ASA II, score 3 to ASA III, and score 4 to ASA IV).[12] The overall questionnaire score was calculated, which was in the range of 21–84. An example of the questions in the questionnaire is:

Have you ever had chest pain during sports?

The subject was given a score of 1 if the answer was "No"; (s) he/she was given a score of 2 if the answer was "Yes"; and if the accessory questions were answered, the patient was given a score of 3 or 4.

In order to evaluate the overall sensitivity and specificity of each questionnaire, "Yes" and "No" answers (separately for the patient and the physician) were taken into account. Questionnaires with all "No" answers were reported as completely healthy and questionnaires with "Yes" answers (even one "Yes" answer) were reported as unhealthy. Since the questionnaire is a medical questionnaire and is filled out by the patient, it should be evaluated as a medical test too. Sensitivity and specificity are used to evaluate a medical test. In the present study, filling out of the questionnaire by the subject was considered a medical test and filling out of the questionnaire by the physician was considered a gold standard. Again, the evaluation criterion was ASA scale.

Real positive: The cases which were ASA I, II, III by both the subject and the physician, i.e. the subjects were not healthy.

False positive: The cases placed in ASA I category by the physician but were placed in ASA categories of II–IV based on patient judgment.

False negative: Cases which were placed in ASA category I based on their answers, but in ASA categories II–IV by the physician.

Sensitivity: Sensitivity of a medical test is the odds of a positive test result. In other words, sensitivity refers to the percentage of real-positive results, which is calculated by dividing the number of patients with real-positive results by the number of patients with real- and false-positive results.[13]

Specificity: Specificity of a medical test is the odds of a negative test result for a healthy individual; in other words, specificity refers to the percentage of real-negative test results, which is calculated by dividing the number of real-negative test results by the number of real-negative and false-positive test results. Both specificity and sensitivity values of a test should be higher than 80% so that the test can be considered an effective tool to evaluate patient status.[13]

Student's *t*-test was used to determine sensitivity and specificity of the questionnaire in order to evaluate reproducibility of the questionnaire. Cronbach's alpha was used to evaluate

reliability of the questionnaire at a 0.7 minimum acceptable value. Paired *t*-test was used to compare means between the two time intervals and two-way random effects with absolute agreement were used to calculate ICC. SPSS (version 16.0; SPSS, IBM, Inc, Chicago, IL, USA) was used for statistical analysis.

RESULTS

In the present study, 400 patients and people accompanying them, who had referred to private offices and dental clinics of Kerman, were evaluated. The mean age of the patients was 32.7 ± 9.9 years with a range of 18–68 years. The male and female subjects were 35.1 ± 10.4 and 31.3 ± 9.1 years of age, respectively.

The Cronbach's alpha for the reliability of EMRRH questionnaire was 0.87, with a range of 0.81–0.87 for various questions [Table 1]. Item scale correlation for all the questions was greater than 0.4. The ICC for reliability of the questionnaire in re-evaluation was 0.06 (a range of 0.82–0.91 at a confidence interval of 95%).

Table 2 presents the reproducibility of the questionnaire based on general questions. As the table shows, there was a significant relationship between the subjects' scores and these questions. In other words, subjects who had experienced problems or complications during surgical or dental procedures, those who had experienced problems due to the use of medications, and those who had visited a general practitioner or a specialist during the past year had a higher mean score in the questionnaire.

Table 3 presents the status of the subjects in relation to each question based on ASA scale. In order to evaluate real- and false-positive results and real- and false-negative results, along with sensitivity and specificity and agreement coefficient between the patient and the physician for each question, the answers of the subjects were classified into two broad categories of healthy (ASA I) and unhealthy (ASA I, II, and III) based on ASA scale.

Table 4 presents false-negative and false-positive results along with sensitivity, specificity, and agreement coefficients between the patients and physicians for each of the questions during filling out of the questionnaire (Kappa coefficient). The sensitivity and specificity of the questionnaire were 71.5–100% and 69–100%, respectively. In addition, the overall sensitivity and specificity of the questions were reported to be 86.1% and 94%, respectively. Kappa coefficient was 0.82 (between 0.64 for coagulation problems and 1 for epilepsy, diabetes, and cancer).

Table 5 presents various ASA categories based on patient and physician judgments. The overall Kappa agreement coefficient for various ASA categories was 0.81.

The current study showed overall sensitivity, specificity, and Kappa coefficient values of 91.5%, 83%, and 0.89, respectively, indicating that based on EMRRH questionnaire, the odds of a patient to be labeled a "patient" is 91.5% and the odds of recognition of a healthy individual is 83%.

Table 1: Corrected item scale correlations and Cronbach's alpha values if the item deleted

Item	Item scale correlation	Cronbach's alpha if item deleted
Angina pectoris	0.42	0.81
Myocardial infarction	0.48	0.84
Heart murmurs	0.52	0.81
Heart palpitations	0.62	0.83
Heart failure	0.45	0.87
Hypertension	0.54	0.84
Bleeding tendency	0.42	0.84
Epilepsy	0.65	1
Asthma	0.52	0.87
Lung disease	0.43	0.82
Allergy	0.48	0.81
Diabetes mellitus	0.68	1
Thyroid condition	0.62	1
Liver disease	0.51	0.82
Kidney disease	0.42	0.80
Malignancies	0.57	1
Infectious disease	0.49	0.84
Hyperventilation	0.54	0.84
Fainting	0.45	0.81
Antibiotics	0.52	0.81
Medication	0.52	0.81

Table 2: Comparison of EMRRH scores according to general questions

Question	No.	Mean±SD	*P* value*
Have you ever had any problems or complications during surgical or dental procedures?			
Yes	51	31.2±10.1	0.001
No	349	21.8±8.1	
Have you ever had any adverse reactions due to the use of certain drugs?			
Yes	39	41.2±9.2	0.002
No	361	24.2±8.1	
Have you visited a general practitioner or a specialist during the past year?			
Yes	313	42.2±803	0.001
No	87	27.2±4.1	
Have you noticed any changes in your health status recently?			
Yes	148	39.7±10.3	0.001
No	252	24.2±7.1	
Has your physician recently made any modifications to the drugs you take?			
Yes	59	43.2±9.3	0.001
No	341	21.2±10.1	

SD=Standard deviation, EMRRH= European Medical Risk Related History

Table 3: The status of the subjects in relation to each question based on ASA scale

Item	ASAI	ASAII	ASAIII	ASAIV
Angina pectoris				
Patient	297	3	5	2
Physician	321	0	2	2
Myocardial infarction				
Patient	389	0	32	0
Physician	388	15	29	0
Heart murmurs				
Patient	346	31	16	56
Physician	348	32	9	38
Heart palpitations				
Patient	295	12	6	22
Physician	313	14	6	18
Heart failure				
Patient	350	49	0	0
Physician	353	40	0	0
Hypertension				
Patient	339	12	6	4
Physician	350	9	3	3
Bleeding tendency				
Patient	369	3	0	0
Physician	376	1	0	0
Epilepsy				
Patient	393	6	4	4
Physician	390	6	6	1
Asthma				
Patient	379	7	14	15
Physician	378	2	2	9
Lung disease				
Patient	360	17	3	4
Physician	371	18	4	2
Allergy				
Patient	369	3	16	0
Physician	367	6	14	0
Diabetes mellitus				
Patient	376	1	7	10
Physician	371	3	6	11
Thyroid condition				
Patient	375	3	5	2
Physician	371	0	2	2
Liver disease				
Patient	377	10	0	0
Physician	377	14	0	0
Kidney disease				
Patient	372	24	0	0
Physician	372	18	0	0
Malignancies				
Patient	394	1	0	0
Physician	391	2	0	0
Infectious disease				
Patient	225	14	0	0
Physician	216	17	0	0
Hyperventilation				
Patient	355	32	0	0
Physician	369	22	0	0
Fainting				
Patient	386	6	0	0
Physician	388	3	0	0
Antibiotics				
Patient	377	72	0	0
Physician	377	71	0	0
Medication				
Patient	114	285	0	0
Physician	16	382	0	0

ASA=American society of anesthesiologists

Since only healthy individuals were taken into account in evaluating sensitivity and specificity of the questionnaire, in the second stage, the healthy individuals (based on the judgment of the physician and the subjects, all the answers were "No," i.e. all the negatives were real), which consisted of 24 individuals, were excluded from the study because their negative answers did not assist in the recognition of shortcomings of the questionnaire; then the rest consisting of 376 individuals were evaluated, who had answered a total of 7896 (376 × 21) questions. Data showed sensitivity, specificity, and kappa coefficient values of 94%, 93%, and 0.89, respectively, after the healthy individuals were excluded. The current study showed a higher prevalence of systemic conditions based on patient judgment in the 35-over age group in males and females. However, no significant relationship was observed between age and gender on one hand and systemic conditions on the other. In addition, the same conclusion was reached in relation to the judgment of physicians about the relationship between systemic conditions, and age and gender.

DISCUSSION

Advances in medicine and improvements in the health status and living standards in most countries have contributed to a longer life in patients with systemic conditions; therefore, more patients with systemic conditions visit dental offices at present. In addition, since in many western countries the age of the onset of first chronic disease has not undergone any changes (50 for females and 59.5 for males), patients with chronic diseases live longer and a large number of these patients receive treatments out of hospitals and even do not pay regular visit to the physicians.[7,8,10,14]

On the other hand, medical advances have caused fewer patients to be hospitalized and it has become more difficult to make a distinction between a healthy individual and a patient due to an increase in the ability of patients to use drugs. In addition, advances in oral hygiene procedures have helped many people retain their natural teeth; therefore, more senile patients seek dental treatments.[15-21] Previous reports have confirmed that medical emergencies might arise in patients with systemic conditions during dental procedures.[10] The

Table 4: Results per disease based on false-negative, false-positive, sensitivity, specificity, and agreement coefficients between the patients and physicians

Item	False negative	False positive	Sensitivity	Specificity	Kappa coefficient
Angina pectoris	10	34	86.3	89.2	0.7
Myocardial infarction	2	1	75	99.7	0.82
Heart murmurs	10	6	72.2	98.2	0.74
Heart palpitations	14	36	82.3	88.4	0.74
Heart failure	4	6	89.1	98.2	0.85
Hypertension	2	10	94.8	97	0.84
Bleeding tendency	4	12	71.5	96.7	0.64
Epilepsy	0	0	100	100	1
Asthma	2	3	84.6	99.1	0.81
Lung disease	2	17	90	95.4	0.73
Allergy	6	5	75	98.6	0.75
Diabetes mellitus	0	0	100	100	1
Thyroid condition	3	1	85	99.7	0.89
Liver disease	3	2	72.2	99.4	0.76
Kidney disease	0	7	100	98.1	0.92
Malignancies	0	1	100	99.7	1
Infectious disease	1	1	92.3	99.5	0.92
Hyperventilation	14	5	72.3	96	0.72
Fainting	3	0	100	99.2	0.77
Antibiotics	10	5	92.2	96.6	0.8
Medication	5	101	73.5	69	0.8

Table 5: The various ASA categories based on patient and physician judgments

ASA I			ASA II			ASA III			ASA IV		
Patient	Physician	Kappa	Patient	Physician	Kappa	Patient	Physician	Kappa	Patient	Physician	Kappa
58	15	0.78	190	275	0.82	48	36	0.87	104	74	0.76

ASA=American society of anesthesiologists

patient should not leave the dental office in an inappropriate general condition and it is incumbent on the dental practitioner to have the necessary skills and expertise to not only help patients with their systemic condition but also to manage emergency cases.[21-24]

EMRRH was designed for this reason.[7,16,25,26] Use of this questionnaire in comparison with the control group in 1998 showed that this tool can help identify many medical conditions.

In the present study, EMRRH, which is one of the most valid and reliable tools to identify systemic conditions, was translated into Farsi and its validity was confirmed through evaluation of its reliability, reproducibility, sensitivity, and specificity. An important consideration in the evaluation of EMRRH questionnaire was the evaluation of patients' medical history by an experienced physician, which is considered a gold standard. It should be pointed out that in the present study, no medical examination or medical test was carried out because the aim of the study was not to identify a new medical condition.

Reliability of the questionnaire was 0.87, which was higher than the threshold (0.7). A literature review has shown that none of the previous studies have evaluated the reliability of the questionnaire, making comparisons impossible.

Sensitivity and specificity of the questions were 71.5–100% and 69–100%, respectively. In addition, the overall sensitivity and specificity of the questions were 86.1% and 94%, respectively. Kappa agreement coefficient was 0.82. In the present study, ASA scales of the subjects were as follows: ASA III, 25%; ASA IV, 34%; ASA I, 6%; and ASA II, 35%. In a study carried out in the Netherlands, the ASA scales of 29,424 patients with a mean age of 37.1 years were as follows: ASA II, 12%; ASA III, 5.7%; and ASA IV, 36%. In addition, in a study carried out in Belgium (with a patient mean age of 47 years), the scale percentages were 21%, 11%, and 7%, respectively.[18,27] Kozák *et al*. reported ASA scale percentages of 35%, 24%, 17%, and 23.2%, respectively, in 207 patients over 50 years of age.[28]

In a study carried out by Abraham-Inpijn *et al.* on patients with a mean age of 50.9 years, the majority of the subjects were in the ASA I and ASA II categories.[10] In addition, in a study performed by de Jong *et al.* on 4087 patients in the Netherlands, the ASA percentages were 7.3%, 25.63%, 8.9% and 2.1%, respectively.[16] As it is seen, the percentage of subjects in the ASA I category in the above-mentioned

study is much less than those in similar studies, which might be attributed to the larger number of systemic conditions in Iran compared to European countries. This is confirmed by the fact that in the present study, the number of patients in the ASA IV category was much higher than that in Belgium, which is of interest considering the older age of the subjects in Belgium compared to subjects in the present study with a mean age of 37.7 ± 9.9 years. Although the results of the present study showed a higher prevalence of systemic conditions based on the judgment made by the patients and the physician in the >35 year age group in males and females, there were no significant relationships between age and gender, and systemic conditions.

Sensitivity and specificity of the questions were 71.5–100% and 69–100%, respectively. The overall sensitivity and specificity of the questions were 86.1% and 94%, respectively. In a study by Abraham-Inpijn *et al.*[10] conducted in 10 European countries, the sensitivity and specificity of the questions were 85–100% and 87–100%, respectively, with overall sensitivity and specificity of 94% and 91%, respectively, which is consistent with the present study and a study by Fenton and Mc Cartan, in which the sensitivity and specificity of the questions were 84.4% and 98.9%, respectively.[27] The results of the study by Abraham-Inpijn in 10 European countries showed Kappa coefficients of 0.79 and 0.97 for hepatic diseases and epilepsy, respectively.[10] The mean of Kappa coefficient was 0.64 in a study by de Jong *et al.*,[16] with Kappa coefficients of 0.64 for coagulative disorders and 1 for epilepsy, diabetes, and cancer; the overall Kappa coefficient of the questionnaire was 0.89. The differences might be attributed to the fact that coagulative disorders were not a very familiar problem for the subjects in that study, i.e. the majority of the subjects were not fully aware about the disorder or its adverse effects. In addition, according to medical references,[22] abnormal menstrual hemorrhages are the result of coagulative disorders in many cases, which had been overlooked by a relatively large number of subjects while answering questions in this respect.

The overall sensitivity and specificity in the present study were 91% and 83%, respectively, which increased to 94% and 93%, respectively, after healthy subjects were excluded from the study. In addition, the Kappa coefficient of the questionnaire was 0.89. In a study by de Jong *et al.* on 99 patients referring to dental offices, the sensitivity and specificity of EMRRH questionnaire were 57% and 86%, respectively, which increased to 88% and 98%, respectively, after healthy individuals were excluded. In addition, the Kappa coefficient of the questionnaire was reported to be 0.87.[29] In another study by the same author on EMRRH questionnaire, the sensitivity and specificity were reported to be 85% and 90%, respectively.[30]

In a study by Pistorius *et al.* on 194 patients, the sensitivity and specificity were 96% and 98%, respectively. Kappa coefficient of the questionnaire was 0.89.[14] In addition, a study by Abraham-Inpijn *et al.* on standardization of the EMRRH questionnaire in 10 European countries showed that the sensitivity of this questionnaire is variable, from 85% in France to 98% in Iceland. In addition, the specificity of the questionnaire was 98% in Germany and the Netherlands and 100% in Hungary, Spain, and Sweden. The Kappa coefficient was 0.81 in France and 0.98 in Spain.[10] Comparison of sensitivity and specificity values of EMRRH questionnaire in the present study with those in other studies in different countries and in different languages showed an acceptable level of sensitivity and specificity of the questionnaire in the present study.

The present study showed that 420 questions had been answered with false-negative replies, i.e. the subjects believed they were healthy, but they were labeled as unhealthy by the physician. False-negative replies are the replies that are overlooked in many encounters with patients, resulting in various problems. Of these questions, allergy can be mentioned, in which patients have neglected drug hypersensitivities. False-positive answers are less important than false-negative answers. In the present study, 30 questions had been answered with false-positive replies, a large number of which were related to chest pain, which had been erroneously believed to be gastrointestinal pain. In the case of high blood pressure, the patients had erroneously reported one or two cases of high blood pressure as hypertension; these reports are consistent with other studies in this respect.[7,10,29-31]

CONCLUSION

The results of the present study showed that the Farsi version of EMRRH questionnaire has an appropriate level of reproducibility, sensitivity, and specificity compared to direct questioning of the patient by an experienced physician.

ACKNOWLEDGMENT

This study was supported by Kerman University of Medical Sciences. The authors would like to thank the Research Deputy for their financial support.

REFERENCES

1. Little JW, Falace DA, Miller CS, Rhodus NL. Dental management of the medically compromised patients. 2nd ed. Philaderphia: WB Sunders; 2008. p. 127-56.
2. Greenburg M, Glick M. Burket's oral medicine. 8th ed. Hamilton: BC Decker; 2008. p. 352,258, 427, 238.
3. Malamed SF. Managing medical emergencies. J Am Dent Assoc 1993;124:40-53.
4. Saef SH. Assessment of the medical emergency. Dent Clin North Am 1995;39:487-99.
5. Fast TB, Martin MD, Ellis TM. Emergency preparedness: A survey of dental Practitioners. J Am Dent Assoc 1986;112: 499-501.
6. Malamed SF. Medical emergency in the dental office. 5th ed. Chapter 1. St. Lonis: Mosby Co.; 2000. p. 3:11,51-3.
7. Abraham-Inpijn L. The health care paradox and dentistry in the Netherlands. tandläkartidningen årg 1998;12:152-61.
8. Smeets EC, de Jong KJ, Abraham–Inpijn L. Detecting the medically compromised patient in dentisty by Means of the Medical Risk Related History; a survey of 29.424 dental patients in the Netherlands. Prev Med 1998;27:530-5.

9. Sommons MS, Little JW, Rhodus NL, Verrusio AC, Kunik RL, Merry JW. Screening dentists for risk factors associated with cardiovascular disease. Gen Dent 1994;42:440-5.
10. Abraham –Inpijn L, Russell G, Abraham DA, Bäckman N, Baum E, Bullón-Fernández P, *et al*. A patient – administered Medical Risk Related History questionnaire (EMRRH) for use in 10 European countries (Multicenter trial). Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2008;105:597-605.
11. Navabi N, Nakhaee N, Mirzadeh A. Validation of a persian version of the oral health impact profile (OHIP-14). Iran J Public Health 2010;39:135-9.
12. Golafshani N. Understanding reliability and validity in qualitative research. Qual Rep 2003;4:597-697.
13. Knapp RG, Miller MC. Clinical epidemiology and biostatistics. 1st ed. Maryland: William and Wilkins; 1992. p. 39-43.
14. Pistorius A, Kunz M, Jakobs W, Willershausen B. Validity of patient-supplied medical history data comparing two medical questionare. Eur J Med Res 2002;7:35-43.
15. Steward CM, Lado EA. Preparation for office emergencies; equipment. Skills and attitudes of general dentists and specialists. Gen Dent 1988;36:211-4.
16. de Jong KJ, Abraham-Inpijn L. A risk-related patient-administered medical questionnaire for dental practice. Int Dent J 1994;44:471-9.
17. Keur I, Smeets EC, de Jong KJ, Abraham-Inpijn L. medical accidents in dental practices. Ned Tijdschr Tandheelknd 1998;105:162-6.
18. Atherton GJ, McCaul JA, Williams SA. Medical emergencies in general dental practice in Great Britain. Part I: Their prevalence over a 10 year period. Br Dent J 1999;186:72-9.
19. Atherton GJ, Pemberton MN, Thornhill MH. Medical emergencies: The experience of staff of a UK dental teaching hospital. Br Dent J 2000;12:320-4.
20. Lamey PJ, Lewis MA. Oral medicine in practice: The medically ings geriatric populations with diverse medical backgrounds. compromised patient. Br Dent J 1990;168:389-94.
21. Broadbent JM, Thomson WM. The readiness of New Zealand general dental practitioners for medical emergencies. N Z Dent J 2001;97:82-6.
22. Miyatake Y, Kazama M, Isoda M, Nejima J. Internal medicine education in dentistry: Knowledge required varies according to dental specialty. Eur J Dent Educ 2004;8:18-23.
23. Greenberg MS. Improving dental treatment for the medically complicated patient. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2005;99:133-4.
24. Gill Y, Scully C. Attitudes and awareness of final-year predoctoral dental and medical students to medical problems in dentistry. J Dent Educ 2006;70:99-105.
25. Bäckman N, Holm AK, Folkesson U, Olofsson AL. Does the quality of dentistsx risk assessments need to be improved? Tandläkartidningen 1998:29-33.
26. Larsson B, Bäckman N, Holm AK. Medical risk assessment by means of ASA classification. Tandläkartidningen 2000:28-32.
27. Fenton MR, McCartan BE. Validity of a patient self-completed health questionnaire in a primary care dental practice. Community Dent Oral Epidemiol 1992;20:130-2.
28. Kozák L, Abrám E, Kivovics P. Use of questionnaires in screening for risk factors in the dental care of elderly patients. Fogorv Sz 2005;98:21-5.
29. de Jong KJ, Abraham-Inpijn L, Vinckier F, Declerck D. The validity of a medical risk-related history for dental patients in Belgium. Int Dent J 1997;47:16-20.
30. de Jong KJ, Borgmeijer-Hoelen A, Abraham-Inpijn L. Validity of a risk-related patient-administered medical questionnaire for dental patients. Oral Surg Oral Med Oral Pathol 1991;72:527-33.
31. Klasser GD, de Leeuw R, Albuquerque RJ. Self-report health questionnaire: A necessary and reliable tool in dentistry. Gen Dent 2005;53:348-54.

Source of Support: Nil, **Conflict of Interest:** None declared