Original Article

Translation and psychometric evaluation of kember's reflective thinking questionnaire in Iranian physicians

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Abstract

Background & Objective: Physicians require to develop some abilities such as self-assessment, critical thinking, self-regulatory learning, and lifelong learning. Reflection is one of the essential educational concepts that make it possible to cultivate and create such abilities in medical students and health professionals. The aim of this study was translation and psychometric evaluation of Kember reflective thinking questionnaire in Iranian physicians.

Materials & Methods: First, the Kember reflective thinking questionnaire was translated according to backward-forward translation procedure. Then, face validity was evaluated by examining the opinion of experts. Next, content validity was assessed by calculating content validity index and content validity ratio. Subsequently, exploratory factor analysis and confirmatory factor analysis was studied among 280 specialist and general physicians. Then, reliability was examined by calculating the intra-class correlation coefficient and investigating Cronbach's alpha coefficient.

Results: Cronbach's alpha coefficient for the whole scale was 0.849 and the intra-class correlation coefficient was 0.714. Content validity index was 0.849 and content validity ratio was 0.825. Exploratory factor analysis and confirmatory factor analysis resulted in a four-factors model including habitual action, understanding, reflection and critical reflection in the Iranian medical community.

Conclusion: The Persian version of Kember reflective thinking questionnaire with four factors has the desired reliability and validity in the Iranian medical community. Due to the appropriate psychometric properties, and ease of implementation, it can be used to evaluate the level of reflection of doctors.

Keywords: Validity, Reliability, Reflection, Questionnaire, Kember

Introduction

Reflective thinking is one of the necessary and inseparable components in the education and learning of health professions. It can result in deep and meaningful learning rather than superficial education. Reflective thinking is a controllable process, and various educational strategies can be used to strengthen and develop it. Reflective applications and structured educational strategies can strengthen and foster reflective thinking in clinical practice (1).

In medical education, especially clinical education, the importance of reflective thinking and reflective practice has been referred to multiple times. The concept of reflective thinking was first proposed in 1933 by John Dewey (2). Since then, several definitions have been proposed for this concept. The concept of reflective thinking has been widely used in various fields, from medical to educational. In the field of education, the concept of reflection is the process of going back, reviewing, and revising what has been learned in order to interpret or analyze these learnings (3). This process is usually created through an encounter, experience, or situation, resulting in an increase in knowledge,

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understanding, and comprehensive awareness. Therefore, it is possible to define reflective thinking as a metacognitive process that takes place at different times of a situation (before, during, and after the situation) in an attempt to gain a deeper understanding of the person and the situation in which he/she is placed. Moreover, it leads to a person's awareness of his/her performance, as well as strengths and weaknesses in that situation. This will ultimately improve one's future exposures (4).

Furthermore, in the constantly changing context of the medical world, physicians need to continuously achieve the highest standards in optimal patient care. Physicians currently work in a world where their professional performance is under more scrutiny by medical associations, the media, and patients, which has resulted in a major change in teaching methods in medical schools and monitoring the standards of professional conduct of students (5). Moreover, due to the expansion of information, the goal of medical schools today should be to train physicians who can benefit from self-regulated learning. Physicians need to become lifelong learners who can control their learning needs and activities using self-regulated learning (6).

For this reason, reflective rethinking can lead to improved levels of awareness and performance in the learning process by creating self-regulation and guiding life-long learning (7). Therefore, in recent years, the Accreditation Council for Graduate Medical Education and the American Board of Medical Specialties have called for the inclusion of reflective thinking in all levels of medical education (8). This call is from a growing medical education literature showing that reflection improves professional performance and competencies. Reflective learning can improve professionalism and clinical reasoning, and reflective practice can lead to improvement of continuous performance and better management of the complex health system, and improved patient care (9). Physicians can find the best practice or different solutions in solving undefined problems and events by reflecting on their daily educational and therapeutic experiences, as well as analyzing and criticizing educational events in a complex clinical environment (10).

In reflective thinking, a deep understanding of the experience takes place through internal evaluation, and the person can improve his/her knowledge, attitude, values, behavior, and action (3). Therefore, reflective thinking will be the final part of any education, which will lead to the organization of learning, acquiring critical thinking skills, self-awareness, and self-directed learning (11). Reflective thinking leads to a change in attitude and behavior when it is internalized in the cognitive structure of the person, and this internalization occurs at higher levels of reflection (10).

Based on this, in 2000, Kember et al. developed a reflective thinking skills questionnaire. Based on Mezirow's seven levels of reflection, which is one of the most famous reflection models (12). Mezirow's Theory of Reflective Learning has four levels of habitual action, recognition, reflection, and critical reflection (13). Although there are many theories on reflective thinking and its different levels in higher education, it is difficult to objectively measure its levels (13). The reflective thinking evaluation scale of Kember et al. was designed and psychometrically evaluated based on one of the famous theories of reflective thinking, and it has special importance in this aspect. Moreover, in the studies conducted, this questionnaire is known to be a valid and reliable tool for evaluating reflective thinking (12).

In several studies, psychometric characteristics and validity of the Kember scale have been confirmed and its reliability coefficient has been reported to be between 0.70 and 0.90 (14, 15). Nonetheless, so far, no Persian questionnaire related to determining the levels of reflective thinking based on Mezirow's reflective thinking theory has been psychometrically evaluated among the Iranian medical community. Considering the importance of the subject, it seems necessary to have an accurate and reliable tool to evaluate reflective thinking in the medical community in Iran. In light of the aforementioned issues, the present study aimed at the translation and psychometric evaluation of Kember's Reflective Thinking Questionnaire in general practitioners and specialists in Iran.

Materials & Methods

Design and setting(s)

The current cross-sectional research was conducted in the universities of medical sciences in Kerman and Qom in 2022. This research was approved by the Research Ethics Committee of the Kerman University of Medical Sciences (code: IR.KMU.REC.1401.201).

Participants and sampling

A total of 280 general practitioners and specialists were selected by the available sampling method. Their participation was voluntary, and the subjects could withdraw from the study whenever they wished. The objectives of the research and ethical issues were explained to the participants both verbally and written.

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Moreover, the participants in the research were assured of the confidentiality of the information, and it was explained that the results would be used only for the purposes of the research. The inclusion criterion was the willingness to participate in the study, and the exclusion criterion was questionnaires with more than 10% of unanswered questions.

Tools/Instruments

Kember's Reflective Thinking Questionnaire is a 16-item self-report instrument that consists of four subscales of habitual action (4 items), recognition (4 items), reflection (4 items) and critical reflection (4 items). Items are answered on a 5-point Likert scale (1=no opinion, 2=strongly disagree, 3=somewhat disagree, 4=somewhat agree, and 5=strongly agree). The scale score is reported as the score obtained from each subscale. Higher scores in each subscale indicate a higher level of the individual in that subscale.

The validity of the original version of the questionnaire was investigated using confirmatory factor analysis in a statistical population of 303 people, and the results confirmed the four-factor structure (X^2=179.3, df=100, CFI=0.903). Moreover, its reliability was confirmed, rendering a Cronbach alpha of 0.75 (12). After preparing the questionnaire, with permission from the main designer of the scale via email, the seven-step guideline on the instrument translation, adaptation, and validation process developed by Sousa et al. (2011) was used (15). To this end, in step 1, the original version of the tool was translated from English to Farsi simultaneously by two independent translators fluent in English. One of these translators had expertise in translating medical texts, and the other had expertise in translating colloquial expressions. These translators were not aware of the structure of the tool. In step 2, another expert compared the translations with each other, and the questions were matched in terms of meaning and concept.

In the third step, the questionnaire was translated into English by two other translators who had sufficient knowledge and experience of Persian to English translation and were not familiar with the Kember questionnaire. In step 4, the two translated versions of the instrument were compared. In the fifth step, the pre-final version of the tool was provided to 10 physicians, and their corrective comments were applied in the field of fluency of the questionnaire language. In steps 6 and 7, the final version of the Persian questionnaire was psychometrically evaluated, which will be explained in detail below.

In order to psychometrically evaluate the questionnaire, face validity, content validity, construct validity, and reliability of the questionnaire were examined. After making the suggested modifications, the questionnaire was given to 10 physicians, and they were asked to identify the questions that were difficult to understand or contained difficult words. Based on their opinions, the desired modifications were made to the questionnaire. To check the face validity, the questionnaire was given to five experts consisting of three medical education specialists and two clinical faculty members, and they were asked to evaluate the criteria of grammar, use of appropriate words, necessity, and placement of expressions. Review and provide feedback in the appropriate place.

The content validity was evaluated by calculating the content validity ratio (CVR) and content validity index (CVI). To calculate the CVR, the Lawshe formula was used. Since the number of specialists was 10, the minimum value of CVR, according to the Lawshe table, should be considered equal to 0.62 (16). For this purpose, a questionnaire prepared by the Development and Education Office of Teaching Hospitals of Qom and Kerman Medical Sciences Universities was sent to 10 specialist and General practitioners working in the above hospitals.

After being provided with the objectives of the questionnaire, they were requested to rate items as it is necessary, it is useful but not necessary, and it is not necessary after carefully studying each of the items in the questionnaire in order to determine the CVR of each item. To check CVI, Waltz and Basel method was used. In this way, the prepared questionnaire was sent to 10 specialists, and they were requested to rate items in terms of the criteria of "relevance or specificity," "clearness or clarity," and "simplicity or fluency." According to Waltz and Basel's method, if the score of each item was more than 0.79, that item remains in the questionnaire. If the CVI was between 0.7 and 0.79, the item was questionable and needed to be revised, and if it was less than 0.7, the item was unacceptable and should be removed (17).

Following that, to check the construct validity, an electronic questionnaire was distributed to 300 specialists and General practitioners at Qom and Kerman Universities of medical sciences. After receiving the answers, confirmatory and exploratory factor analysis was performed. Confirmatory factor analysis was performed in LISREL software (8/83) using the indices of the relative chi-square index, the normalized fit index (NFI), the Non-normed fit index

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(NNFI), the comparative fit index (CFI), the goodness of fit index (GFI), Root Mean Square Error of Approximation (RMSEA) was used to determine the fit of the proposed model with the data.

Data Analysis

Using SPSS software, the Kaiser-Meyer-Olkin (KMO) index, and Bartlett's test, the ability to perform exploratory factor analysis and sample size adequacy were assessed. For the KMO test, the value of KMO ≥ 0.7 and the significance of Bartlett's test results were considered acceptable criteria for sample size adequacy and correlation matrix. Exploratory factor analysis was performed with the Varimax rotation method and SPSS software (version 22). To check reliability, the questionnaire was distributed among 20 general practitioners and specialists with a time interval of 10 days using the test-retest method. Reliability was evaluated in terms of reproducibility by calculating the intraclass correlation coefficient (ICC) and in terms of internal consistency by calculating Cronbach's alpha coefficient. A satisfactory value of Cronbach's alpha was considered greater than 0.7.

In the assessment of face validity, the response rate to the questionnaires was 100%. The majority of respondents (80%) were female. Based on the results of the face validity assessment, the items that seemed to contain difficult words (for example, items 2, 6, and 13) or had complex sentence structures (item 7) were modified so that it would be easier for physicians to respond to the tool. In the assessment of content validity, the response rate to the questionnaires was 100%. The majority of these cases (70%) were medical specialists and half of them (50%) were female.

The CVR was obtained as 0.825, which is acceptable since it is more than 0.62 based on the Lawshe table. The CVI was calculated at 0.849 using the Waltz and Basel method (relevance or specificity=0.847, clarity or transparency=0.850, simplicity or fluency= 0.850). To assess construct validity, 280 general practitioners and specialists (response rate = 93.3%) completed the questionnaire. In terms of gender, 66 cases (48.5%) were female, and the rest were male (76.7%). Moreover, 120 respondents (42.8%) were general practitioners, and 57.1% were specialists.

Exploratory factor analysis was performed with the varimax rotation method. Exploratory factor analysis resulted in four factors. Moreover, sample size adequacy was examined using the Kaiser-Meyer-Olkin test, which showed an acceptable level of results (0.84). Bartlett's test was used to determine the significance of the correlation matrix. The results demonstrated that the desired factor analysis was justified ($\chi2$=72.1016, df=190, P <0.001). These findings indicated the necessary presuppositions for using confirmatory factor analysis.

Four factors were identified in the exploratory factor analysis. Each of these factors consisted of four items (Table 1).

Table 1. Results of exploratory factor analysis

Factor	Item	Result of factor analysis
Habitual action	I do some activities without any hesitation or thought.	0.983
	I do the desired activity several times so that I can handle it without any hesitation or special thought.	0.980
	Just memorizing the content of the textbooks for the exam is enough for me, and I don't need to think anymore.	0.982
	If I follow what the teacher says in class, I don't have to think much anymore.	0.982
Recognition	This course requires me to understand the concepts presented by the speaker well.	0.972
	To pass this course, it is necessary to understand the presented content well.	0.965
	I need to understand the material presented by the professor in order to complete the assignments of this course.	0.976
	In this course, I need to constantly think about the taught material.	0.942
Reflection	I sometimes think about the ways others do things and try to think of a better way.	0.980
	I like to think about what I have done and consider alternative ways of doing it.	0.979
	I often think about my work to see if I could have done it in a better and more appropriate way.	0.978
	I often reflect on my experiences so that I can learn from past experiences to perform better in the future.	0.980
Critical thinking	As a result of this course, I changed the way I look at myself.	0.988
	This course challenged some of my beliefs and ideas.	0.991
	As a result of this course, I changed my usual ways of doing my work.	0.989
	During this period, I realized that many of my previous beliefs, which I thought were correct until now, were wrong.	0.990

The amount of common variance between the variables for these four factors together was 51.59% of the total variance of the variables, which expressed 0.89% of the total variance. In the results of confirmatory factor analysis, the goodness of fit indices displayed acceptable values (CFI=0.986, RSMEA=0.078, $\chi2$=295.78, P-value=0.001) (Table 2).

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Table 2. Goodness of fit indices of confirmatory factor analysis

Goodness of fit criteria	Index	Estimated value	Required value
Relative chi-square index	x^2/df	2.75	Maximum 3
Root mean square index of approximation error	RMSEA	0.078	Maximum 0.1
Normalized fit index	NFI	0.98	Minimum 0.9
non-normed fit index	NNFI	0.995	About one
Comparative fit index	CFI	0.986	Minimum 0.9
Relative fit index	RFI	0.97	Minimum 0.9
Goodness of fit index	GFI	0.92	Minimum 0.9
Adjusted goodness of fit index	AGFI	0.905	Minimum 0.9

The results demonstrated that all the fit indices were at an acceptable level, and as a result, the confirmatory factor analysis model has a good relative fit with the data and has acceptable construct validity in the Iranian medical community (Figure 1).

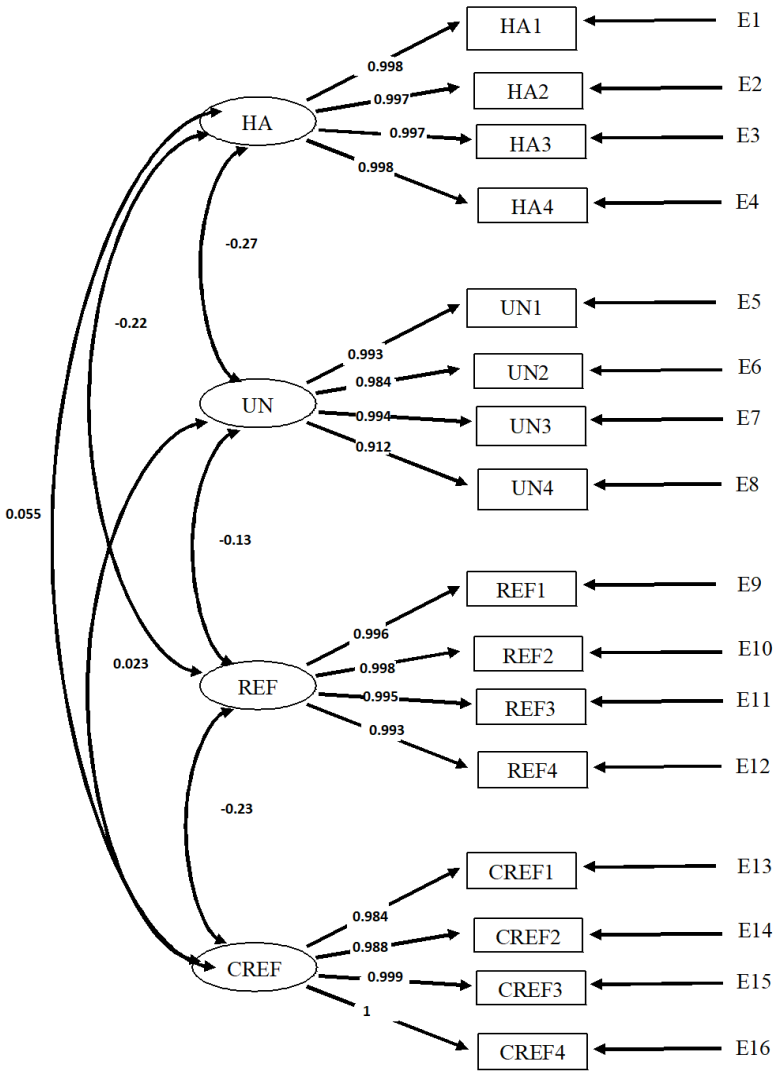

Figure 1. Matching model of questions and dimensions of the questionnair

The results of the reliability test illustrated that Cronbach's alpha coefficient for the whole scale was 0.849, and the intraclass correlation coefficient was 0.714. The correlation coefficients of the two tests between the scores of each factor and the total score were significant; therefore, the questionnaire had the necessary stability. Cronbach's alpha was obtained for the subscales, "habitual action" 0.905, "recognition" 0.775, "reflection" 0.926, "critical reflection" 0.907, and for the whole scale was 0.849. Moreover, by checking

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the "alpha coefficient in case of removing the item, " all questions were found to be appropriate, and no question was deleted," the ICC values for the subscales, "habitual action," "recognition," "reflection," "critical reflection," and the whole scale were obtained as 0.724, 0.789, 0.706, 0.739 and 0.714, respectively (Table 3).

Table 3. Cronbach's alpha and ICC results to check the reliability of the questionnaire

Factor	Number of items	Cronbach's alpha (α)	ICC
Habitual action	4	0/905	0/724
Recognition	4	0/775	0/789
Reflection	4	0/926	0/706
Critical reflection	4	0/907	0/739

Discussion

This study aimed at the translation and psychometric evaluation of Kember's Reflective Thinking Questionnaire in specialists and general practitioners in Iran. Kember's reflective thinking questionnaire is used to determine the level of interaction of people in the reflective thinking process. The evidence is indicative of the widespread use of this tool in different population samples and its high power as a reliable tool (14, 18). Nonetheless, despite the appropriate use of the mentioned tool to measure reflective thinking in the community of physicians, no Persian study has been conducted in this regard.

In the present research, after the translation of the tool based on a scientific and accepted framework, its psychometric analysis was carried out by examining reliability, content validity, face validity, and construct validity. The results of exploratory and confirmatory factor analysis demonstrated that the instrument has acceptable construct validity in the Iranian medical community. Exploratory factor analysis with principal component analysis identified four factors that predict 51.59% of the total variance. Habitual action refers to prior learning that is transformed through repeated use into activities that are performed automatically or with little conscious thought.

Reflection on habitual action plays an essential role in increasing the quality of physicians" therapeutic activities of doctors (12). Recognition in other studies is described as the student's achievement of conceptual understanding without affecting its importance (14). The reflection factor in education is the process of thinking about a learning experience, as well as analyzing and evaluating it, with the aim of deep learning and change in future performance (18). The similarity between the extracted factors and the study by Yuen Lie Lim in 2011, both in number and order, as well as the percentage of variance explained by the extracted factors, indicates the construct validity of this questionnaire (19).

The present results in this context illustrated that Cronbach's alpha coefficient for the whole scale was 0.849, and the intraclass correlation coefficient was 0.714, which are favorable coefficients. They are consistent with the results of other studies, such as the research by Lethbridge et al. in 2013, which was conducted with the aim of psychometrical evaluation of Kember's reflective thinking questionnaire in a population of 538 third-year nursing students in Canada using confirmatory factor analysis. The results of this research also suggested the desired reliability and validity of the mentioned tool (20). The validity of this questionnaire can be confirmed for various reasons. This questionnaire is designed based on the theoretical framework of Dewey (1933) and Shun (1983), as well as the model of Heaton and Smith (1995), which can be argued to be a strong theoretical basis for this concept (12).

Moreover, among other positive features of this questionnaire, we can refer to the items based on the respondents' understanding in the form of precise sentences, which leads to ease of answering and more accurate results. Based on the present findings, it can be concluded that appropriate questions have been selected, and the tool maintains its structure with minimal changes. The results of the present research are in accordance with the research by Tutticci et al. (2017), which aimed to investigate the validity of this tool in the community of third-year nursing students in Australia (21).

In 2013, Başol et al. conducted a psychometric analysis of Kember's Reflective Thinking Questionnaire among 1,413 students from two Turkish universities. The samples were selected from different educational groups using the available sampling method. The correlation between the original questionnaire and the Turkish psychometrically evaluated version was reported to be r=0.8 and at a good level. The internal consistency of the instrument was reported to be good using Cronbach's alpha coefficient. In the results of confirmatory factor analysis, the goodness of fit indices showed acceptable values (CFI=0.93, RSMEA=0.07, P-value=0.001). Data analysis confirmed the psychometric scale of Kember in Turkish with four factors (22).

In 2006, in a cross-sectional psychometric study, Lucas et al. confirmed Kember's Reflective Thinking Questionnaire among the population of undergraduate

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students in one of the UK universities. The internal consistency of the tool was confirmed with Cronbach's alpha of 0.6. Finally, the four-factor version of Kember was confirmed by these researchers in the target population (23). Based on this, it seems that cultural and racial differences and different experiences of Iranian general practitioners and specialists have not caused the reflective thinking questionnaire to be evaluated differently in comparison with other respondents to the questionnaire.

In 2019, Rostami et al. translated and psychometrically evaluated the Groningen questionnaire, which was designed to evaluate reflective thinking. The results indicated that the face and content validity of this questionnaire was confirmed. The reliability of the questionnaire was confirmed with Cronbach's alpha coefficient of 0.73. This study showed that the Groningen Questionnaire is a useful tool for measuring students' reflective thinking (24).

In 2019, Naeemi et al. conducted a study with the aim of translation and psychometric evaluation of a scale that was designed to examine self-evaluation in medical students. The results denoted that the content validity of the scale was confirmed and the reliability was confirmed with Cronbach's alpha coefficient of 0.87. in addition, the construct validity of the questionnaire was investigated and confirmed using confirmatory factor analysis and exploratory factor analysis (25).

Among the notable limitations of the current research, we can refer to the fact that it was only conducted among general practitioners and specialists of two universities. Future research can be carried out in communities of physicians from more universities. Although the sample size of this research is a reliable criterion for the obtained results, future studies can investigate the validity of this tool in other samples of medical sciences that are engaged in treatment and education and have special characteristics.

Considering the complex nature of the medical profession, in which there are different dimensions of service delivery, human communication, and also educational activities, the results of the current research suggest that training courses be designed with a focus on improving the reflection of physicians. Nonetheless, a mere focus on reflection does not suffice, and effective strategies should be considered to evaluate and promote it. In this research, the reflective thinking tool that was translated and its validity was investigated can help to evaluate and promote reflection and even be used for self-evaluation and reflection-oriented education.

Conclusion

The results of the present study pointed out that in the community of Iranian physicians, Kember's reflective thinking questionnaire was approved with the same four primary factors and had good reliability and validity. This tool can be used to estimate the level of reflection of physicians for self-regulation, self-direction, and learning when they are involved in the development of professional behaviors through the medical education program. In general, it can be stated that due to the examination of the psychometric properties, reliability, appropriate validity, brevity, and ease of implementation, the conditions for the wide use of this tool by researchers have been provided; Therefore, this tool has adequate reliability and validity in the community of Iranian physicians and can provide the basis for numerous studies in the field of higher education and professional development.

Ethical considerations

This study was approved by the Ethics Committee of Kerman University of Medical Sciences (IR.KMU.REC.1401.201). This study was conducted with support of the Vice-Chancellor for Research and Technology of Kerman University of Medical Sciences (project number: 400001220).

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Conflict of interest

The authors declare that they have no conflict of interest.

Author contributions

HA formulated the research idea. HA and HK collected data and performed the analysis of the data. HA and MS wrote the manuscript and edited the draft of the paper. All authors approved the final manuscript.

Data availability

The datasets used and/or analyzed in the current study are available from the corresponding author upon reasonable request.

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