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Psychometric Properties of the Persian Version of the Instrument for Assessing Cardiac Patients' Knowledge, Attitude, and Beliefs regarding Heart Attack

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ABSTRACT

Background: Patients' knowledge, attitudes, and beliefs about heart attack can affect the treatment process and their request for help during heart attacks. A valid and reliable instrument is required to examine cardiac patients' knowledge, attitude, and beliefs.

Objectives: This study aimed to translate and develop a reliable Persian version of the instrument for assessing cardiac patients' knowledge, attitude, and beliefs regarding heart attack.

Methods: In this methodological study, 306 patients with Acute Coronary Syndrome (ACS) were selected via convenience sampling to fill out the Persian version of the instrument for assessing cardiac patients' knowledge, attitude, and beliefs regarding heart attack. This instrument was translated based on the World Health Organization's (WHO) guidelines. Face, content, and construct validities of the instrument were assessed through exploratory and confirmatory factor analyses. Its reliability was also assessed using McDonald's omega and the Cronbach's alpha coefficient.

Results: Exploratory factor analysis led to the extraction of two factors in the attitude dimension, including 'recognition of symptoms' and 'request for help', which explained 77.31% of the total variance together. In the belief dimension, three factors were extracted that accounted for 49.59% of the total variance. Confirmatory factor analysis confirmed the goodness of fit of the two-factor model of attitude (RMSEA = 0.033, CFI = 1.00, NFI = 0.99, and PNFI = 0.40) and the three-factor model of belief (RMSEA = 0.038, CFI = 0.96, NFI = 0.89, PNFI = 0.54). Based on the Kuder-Richardson formula, the reliability of the knowledge dimension was reported as 0.938. The reliability of the two knowledge dimensions and the three attitude dimensions were reported as 0.776, 0.962, 0.527, 0.317, and 0.665, respectively. In addition, Cronbach's alpha coefficients of 0.810, 0.904, 0.798, 0.757, and 0.906 were found for these dimensions, respectively.

Conclusion: The Persian version of the instrument for assessing cardiac patients' knowledge, attitude, and beliefs regarding heart attack had good validity and reliability. Therefore, it can be used in future studies on cardiac patients.

1. Background

Cardiovascular Disease (CVD) is one of the most important causes of mortality in developed and developing countries, and accounts for about one-third of all deaths throughout the world (1). CVD is the most preventable cause of mortality across the globe. The related risk factors include hypertension, dyslipidemia, diabetes, obesity, smoking, physical inactivity, unhealthy lifestyle, and preventable or controllable stress (2). About 700,000 people in the world experience an acute heart attack each year, out of whom 167,000 die from these attacks and a large proportion experience some permanent impairments (3). More than half of patients with heart attacks die within one hour of the onset of their symptoms before arriving at the hospital

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and receiving medical emergencies (4).

Knowledge of CVD and the related risk factors is a vital prerequisite for changing the knowledge, attitude, and behavior of individuals about their lifestyles (2). Proper treatment of CVD and timely asking for help during cardiac attacks depend on patients' knowledge, attitudes, and beliefs regarding the heart attack symptoms (5-8). Knowledge refers to information and skills achieved through education and observation. Besides, attitude refers to the specific way one thinks or feels about something. Finally, belief has been defined as an acceptance that something is true (9). Various studies have shown that patients are more aware of the common heart attack symptoms, including aching sensation in chest or arms and dyspnea. Therefore, they can detect them and seek for treatment in an earlier stage. On the other hand, the highest mortality rate due to a heart attack is when patients experience less common symptoms, such as jaw pain, nausea, dental pain, and back pain, as they are less aware of these symptoms (10-13). Patients often find it difficult to recognize their symptoms, which can delay their decision-making and pre-hospital care. This stems from poor knowledge, attitude, and beliefs on heart attack among patients (10, 11, 13-16). According to the study by O'Brien et al. (2013), more than 70% of cardiovascular patients had low knowledge, negative attitudes, and incorrect beliefs about heart attack and how to deal with it (17). In another study, more than half of patients had low knowledge and a wrong attitude toward heart attack treatment (18). Various studies have emphasized the vital role of knowledge in reducing mortality associated with heart attack. Accordingly, individuals who are less aware of the signs and symptoms of heart attack tend to seek for treatment in the later stages. Therefore, they are faced with a higher chance of death from heart problems. Timely identification of symptoms and seeking for treatment depend on cardiac patients' proper attitude and correct beliefs about heart attack. Most problems faced by cardiovascular patients are associated with their level of knowledge, attitudes, and beliefs regarding heart attack symptoms (7, 18-20). Therefore, proper assessment of the knowledge and attitude of cardiac patients is believed to be important and necessary. Due to the lack of a valid and reliable questionnaire for assessing knowledge, attitudes, and beliefs about heart attacks in patients with acute coronary syndrome, researcher-made questionnaires are required to fully measure these subjective concepts. Therefore, translation and psychometric evaluation of this instrument among Iranian patients with CVD can lead to designing a reliable instrument for future research in the Iranian society.

2. Objectives

This study aims to translate and assess the psychometric properties of the Persian version of the instrument for assessing cardiac patients' knowledge, attitude, and beliefs regarding heart attack.

3. Patients and Methods

This cross-sectional, methodological study aimed at translation and psychometric evaluation of the Persian version of the instrument for assessing cardiac patients' knowledge, attitude, and beliefs regarding heart attack. The study was conducted in Towhid hospital, Sanandaj, Iran in 2018.

3.1. The Instrument

The instrument for assessing cardiac patients' knowledge, attitude, and beliefs regarding heart attack was used in an interventional study that assessed the symptoms of CVD and how to get help or get admitted to a hospital (21). It was revised by Dracup in 2006 (18). In 2007, its psychometric properties were assessed by Regel et al. (7). The knowledge dimension has 26 questions (21 Yes/No and 5 True/False questions). The total score of this dimension ranges from 0 to 26. The attitude dimension consists of five questions on a four-point Likert-type scale ranging from never (1) to always (4). These items examine the respondents' attitude towards recognizing heart attack symptoms and their confidence in their ability to engage in appropriate help-seeking behaviors. The belief dimension contains nine items measuring the respondents' beliefs on how to respond to heart attack symptoms. The items on this dimension are rated on a four-point Likert-type scale ranging from completely agree (1) to completely disagree (4) (17).

3.2. Translation Process

After obtaining permissions from the copyright holder, according to the World Health Organization's (WHO) guidelines and using the forward and backward method, the instrument was translated from English to Persian by two independent translators. Next, it was back translated to English by two other translators (22). An individual as the coordinator of the translation process compared the Persian and English versions and developed the final version, which was sent to the copyright holder for approval.

3.3. Face and Content Validities

Face and content validities were examined using a qualitative approach. To assess the face validity of the Persian version of the translated instrument, it was given to 10 cardiac patients selected via convenience sampling to report their opinions on relevance, difficulty, and ambiguity of the items. For content validity, it was sent to 10 qualified specialists (seven nurses and instructors and three cardiologists) selected using purposeful sampling. They were asked to assess the instrument in terms of grammar, wording, phrases, etc. Then, some changes were made based on their recommendations.

3.4. Item Difficulty and Discrimination Indices

To calculate the difficulty index for knowledge items, the proportion of subjects who have answered a question correctly is divided by all subjects. A lower score indicates that the question is more difficult and vice versa. Item difficulty values ranging from 0.3 to 0.7 are considered to be appropriate. The discrimination index helps identify a weak group and a strong group. Higher item discrimination values indicate greater item discrimination power. The discrimination index is calculated by subtracting the strong group's correct answer from the weak group's correct answer, and dividing the result by the number of people in

one group (strong or weak) (23).

3.5. Construct Validity

In the first step, construct validity was assessed using exploratory factor analysis to extract hidden factors. Separate exploratory factor analyses were performed for knowledge and attitude dimensions. The minimum sample size required to conduct exploratory factor analysis is considered 3 - 10 samples per item (24). In this study, 306 cardiac patients referred to Towhid hospital, Sanandaj, Iran were selected using convenience sampling. The inclusion criteria were suffering from a heart problem (diagnosed by a physician) and having the ability to complete the instrument. At this stage, Kaiser-Meyer-Olkin (KMO) test and Bartlett's test of sphericity were performed. KMO values closer to 1 indicated better sampling adequacy to conduct factor analysis (24). KMO values ranging from 0.70 to 0.80 and from 0.8 to 0.90 were considered good and excellent, respectively (25). Hidden factors were extracted using scree plot, maximum likelihood estimation, and varimax rotation with the assumption that the factors were independent. The analyses were performed using the SPSS software, version 18. A cut-off point of 0.40 was considered for factor loadings.

In the second step of the construct validity examination, the extracted factors were assessed using confirmatory factor analysis. The common model fit indices, such as goodness of fit, root mean of squares of approximation, comparative index of fitness, standardized normal goodness index, and goodness index of adjusted fit, were assessed using Lisrel software, version 8.8. The threshold for the acceptance of model fitting has been presented in Table 1 (26). The sample size used for factor analysis should not be less than 200 people; therefore, 200 patients were recruited in this study (24).

3.6. Reliability

The Cronbach's alpha coefficient and McDonald's omega were used to assess reliability. McDonald's omega was calculated based on the following formula:

$$\Omega = 1 - \left[\left[a - \sum h_i'\right]/\left[a + 2b\right]\right]$$

Where a was the number of questions, was the distribution of items, and b was the total loading factor (27).

Given that knowledge questions were answered as correct/incorrect, Kuder-Richardson Formula-20 (KR-20) was used to examine the reliability of this dimension.

3.7. Ethical Considerations

Before the study, the study objectives and processes were described to the patients and their informed consent forms were obtained. In addition, the participants were assured that their personal information would remain confidential. The present article was extracted from a research project approved by Kurdistan University of Medical Sciences, Sanandaj, Iran (MUK.REC.1397.13).

4. Result

4.1. Sample Characteristics

The study sample included 178 males (58.2%) and 128 females (41.8%) with CVD. Their mean age was 50 ± 8.4 years. They were mostly married (70.9%), were self-employed (41.2%), had primary and secondary education levels (51.6%), and had a low level of financial satisfaction (46.1%). The duration of the disease was 2-5 years for 148 patients (48.4%).

4.2. Face and Content Validities

Qualitative face and content validities were confirmed after examining and applying the perspectives of patients and specialists. To improve content validity, 'TNG spray' in item #5 was replaced by "TNG pearl", because TNG pearls (sublingual tablets) are used during cardiac emergencies and TNG sprays are not available in Iran. The mean and standard deviation of cardiac patients' knowledge, attitudes, and beliefs have been reported in Table 2.

A review of knowledge items showed that the item difficulty values were higher than 0.9 for items 11 and 22. The lowest item difficulty value (0.425) was related to item 12. In addition, the item discrimination values obtained for items 11 and 22 were lower than 0.2. The highest item discrimination values were related to items 2, 7, 18, 25, and 26 (all were 0.63). More details have been presented in Table 3.

4.3. Construct Validity

The KMO value was 0.711 (X2 = 682.556, df = 10 and P = 0.001) and 0.664 (X2 = 239188, df = 28 and P = 0.001) for the attitude and belief dimensions, respectively. Therefore, based on the sampling adequacy and the correlation matrix, performing the factor analysis was justified. In exploratory factor analysis, two factors including recognition of symptoms (items 1, 2, and 3) and request for help (items 4 and 5) with eigenvalues of 2.86 and 1.001, respectively were extracted, which accounted for 77.7% of the total variance of cardiac patients' attitude toward heart attack (Table 4).

In exploratory factor analysis of the belief dimension, three factors were extracted. Item 3 (women are less likely to have a heart attack) was not loaded on any of the factors and was deleted. After performing the analysis for several times, three factors were selected. In the next step, another factor analysis was performed, which led to the

Table 1. Acceptable Thresholds of the Fit Indices in the Confirmatory Factor Analysis Model

Fit Indices	Acceptable Range	Attitude	Function
P value X2	> 0.05	0.01	0.087
RMSEA	Good < 0.08	0.033	0.038
CFI	Intermediate < 0.08 to 0.1	1.00	0.96
NFI	Weak < 0.1	0.99	0.89
PNFI	> 0.9	0.40	0.54

Abbreviations: RMSEA, root mean square error of approximation; CFI, comparative-fit index; NFI, non-normed-fit index; PNFI, parsimonious normed fit index

Table 2. Mean and Standard Deviation of Cardiac Patients' Knowledge, Attitudes, and Beliefs Regarding Heart Attack (n = 306)

Variable	Minimum	Maximum	Mean	Standard Deviation
Knowledge	12	26	19.97	2.91
Attitude	5	20	12.72	2.54
Belief	26	39	33.44	2.70

Table 3. Item Difficulty and Discrimination Indices for the Instrument

Item	Item Difficulty	Item Discrimination
Cardiovascular disease is the leading cause of death in the world.	0.48	0.648
Most heart attacks occur in people over 65 years of age.	0.63	0.611
There are facilities in hospitals that can reduce the risk of heart attack.	0.40	0.570
The location and size of heart attack is varied and depends on the blocked coronary artery.	0.63	0.50
Most patients should use TNG sublingual tablets as soon as they experience heart attack symptoms.	0.44	0.666
Lower abdominal pain (stomach pain)	0.37	0.555
Pain in the arms or shoulders	0.63	0.685
Inability to move the arm	0.60	0.703
Backache	0.55	0.648
Pain, pressure, and tightness in the chest	0.25	0.870
Feeling of discomfort in the chest	0.14	0.925
Cough	0.48	0.425
Dizziness and lightheadedness	0.48	0.611
Headache	0.41	0.610
Burning heart / dyspepsia / stomach problems	0.41	0.685
Jaw pain	0.44	0.740
Loss of consciousness / fainting	0.52	0.592
Nausea / vomiting	0.63	0.685
Neck pain	0.52	0.703
Numbness in the arms or hands	0.52	0.703
Dullness, gray tint to the skin, or discoloration	0.41	0.537
Palpitation / increased heart rate	0.18	0.907
Shortness of breath / difficulty breathing	0.48	0.648
Talking in an inaudible manner	0.41	0.574
Sweating	0.63	0.685
Weakness / fatigue	0.63	0.685

Table 4. The Results of Exploratory Factor Analysis, Extracted Factors, Eigenvalues, and Predicted Variance Percentages

Attitude Items	Factor 1	Factor 2
5. How confident are you to help yourself if you think you have a heart attack?	0.833	
4. How confident are you that you can help other people who think they have a heart attack?	0.867	
3. How confident are you to tell the difference between the symptoms of a heart attack and other medical problems?		0.842
2. How confident are you to identify the signs and symptoms of a heart attack?		0.735
1- How confident are you to identify the symptoms of a heart attack in someone else?		0.712
Eigenvalue	2.86	1.001
Percentage of variance	57.29	20.02
Cronbach's alpha coefficient	0.768	0.810
McDonald's omega	0.962	0.904

deletion of item 3. The other items were loaded on three factors, including quick referral (1, 2, and 4), doubts (5, 6, and 7), and decision making (8 and 9). These factors had eigenvalues of 1.87, 1.34, and 1.24, respectively, and explained 49.59% of the total variance of cardiac patients' beliefs about heart attack (Table 5).

In confirmatory factor analysis, first the Chi-square goodness of fit test was performed. Next, other indices were examined to evaluate the goodness of fit of the model. According to Table 1, all the fit indices confirmed the goodness of fit of the final model. The results showed that the confirmatory factor analysis resulted from the exploratory factor analysis (attitude and belief) had a good fit to the data (Figure 1 and Table 1).

4.4. Reliability

The reliability of knowledge questions based on the Kuder-Richardson formula was found to be 0.938. In addition, the reliability of the 'request for help' and 'recognition of symptoms' (attitude dimension) was respectively 0.767 and 0.962 using Cronbach's alpha coefficient and 0.810 and 0.904 according to McDonald's omega. Moreover, the

Table 5. The Results of Exploratory Factor Analysis, Extracted Factors, Eigenvalues, Cronbach's Alphas, and Predicted Variance Percentages

Items	Factor 1	Factor 2	Factor 3
2. Many people who experience a heart attack experience a severe and overwhelming pain.	0.805		
4. If I have a chest pain not getting better after 15 minutes, I should go to the hospital very quickly.	0.695		
1. Most people who think they have had a heart attack should go to the hospital quickly.	0.613		
9. If I realize that I have had a heart attack, I will go to the hospital immediately.		0.863	
8. If I have a chest pain, but I am not completely sure that it is a heart attack, I should again go to the hospital.		0.859	
6. If I think that I have a heart attack, I will not go to the hospital until I become completely sure.			0.728
7. If I think that I have had a heart attack, I will prefer to be taken to the hospital by my family and friends, not an ambulance.			0.619
5. If I go to the hospital because of a heart attack, but it becomes clear that my problem is not due to a heart disease, I will feel embarrassed.			0.597
Eigenvalue	1.87	1.34	1.22
Percentage of variance	20.89	14.93	13.97
Cronbach's alpha coefficient	0.527	0.665	0.317
McDonald's omega	0.798	0.906	0.757

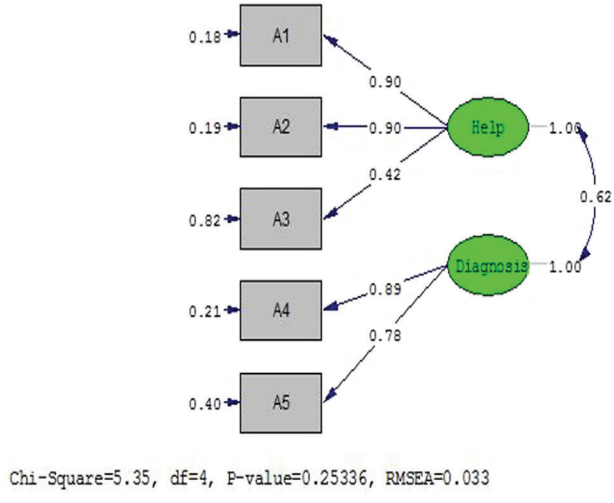

Figure 1. The Final Structure of the Model of Cardiac Patients' Attitude toward Heart Attack

reliability of 'quick referral', 'doubts', and 'decision making' (the belief dimension) was respectively 0.5217, 0.317, and 0.665 using Cronbach's alpha coefficient and 0.778, 0.757, and 0.966 using McDonald's omega. Finally, the Intra-class Correlation Coefficient (ICC) was found to be 0.888 for the attitude dimension (95% CI: 0.781 - 0.956; P = 0.001) and 0.557 for the belief dimension (95% CI: 0.267 - 0.802; P = 0.001).

5. Discussion

This study aimed to assess the psychometric properties of the instrument for assessing cardiac patients' knowledge, attitude, and beliefs regarding heart attack. This instrument has been translated and adopted in other languages in different countries (7, 17, 18, 28, 29). According to the item difficulty and discrimination indices, two items; i.e., 11 and 22, could be removed. However, no significant difference was found in the reliability of the knowledge instrument when these two items were present or removed. Therefore, they were not removed from the knowledge instrument. In examining the item difficulty and discrimination indices, no items were eliminated. However, in the study by Riegel et al., eight items (2-5, 11, 12, 22, 26) were deleted (7). Consistent with the results of the study by Riegel et al., the lowest item difficulty values were related to items 11 and 22 in the current study. Nonetheless, the mean scores found in the former study were lower than those found in the present study (14.6% vs. 19.9%). Buckley et al. reported a mean score of 16 for patients' knowledge (28). In the studies by Dracup et al. and Eshah, the percentage of knowledge was found to be 71% and 60.6%, respectively (18, 29). Differences among the reported scores in these studies could be due to demographic differences in the samples. Additionally, in the study by Buckley et al., providing training and counseling for patients with CVD increased their knowledge of their problem. The authors believed that improving patients' knowledge was the first and most important step in dealing with the symptoms of acute coronary syndrome (28).

In exploratory factor analysis, the attitude items were loaded on recognition of symptoms (1, 2, and 3) and request for help (4 and 5) with eigenvalues of 2.86 and 1.001, respectively. These two factors explained 59.29% and 20.02% of the total variance of cardiac patients' attitude towards heart attack, respectively and accounted for 77.31% of the total variance. In the research performed by Riegel et al., the items of the attitude dimension were loaded on recognition of symptoms (1, 2, and 3) and request for help (4 and 5), accounted for 27.6% and 15.4% of the total variance of attitude, respectively, and together explained 76% of the total variance. The position of the attitude items and the percentage of variance in the present study were similar to those reported by Riegel et al. (7). In the study by Dianati et al., patients with lower knowledge levels sought for medical care with delay, and those with higher knowledge levels had a more positive attitude towards dealing with their problems (30). The attitude mean score in the current study (12.7) was lower than that reported by Riegel et al. (14.5%) and O'Brien et al. (14.2) (7, 17), but higher than that reported by Buckley et al. (11.5) (28). Lower attitude scores found in the present study could be attributed to the study participants who were mostly illiterate or had low levels of education.

In the belief dimension, four factors (with 1, 2, 2, and 3 items) were extracted. Item 3 was deleted, and the other items were loaded on quick referral (items 1, 2, and 4), doubts (items 5, 6, and 7), and decision making (items 8 and 9), which had eigenvalues of 1.87, 1.34, and 1.24, respectively. In addition, they accounted for 20.89%, 14.93%, and 13.79%

of the total variance of cardiac patents' beliefs about heart attack, respectively. Moreover, they explained 49.59% of the total variance. Decision making appears to influence doubts and quick referral. Therefore, the proper recognition of symptoms improves patients' decision making and coping behaviors, reduces delay in seeking for medical help, and consequently reduces the complications of the disease.

The exploration factor analysis in the study by Riegel et al. showed that two factors, including expectations (items 2, 5, 6, and 7) and performance (items 1, 4, and 9) accounted for 8.6% and 8.5% of the total variance of cardiac patients' beliefs about heart attack, respectively, and explained 74% of the total variance (7). Ruston et al. showed that some patients consulted with authorized and unauthorized individuals to control their symptoms, which led to some delay in seeking for medical help. They also found that the onset of symptoms and request for medical care were affected by the number and quality of resources (31). In the present study, the mean score of the belief dimension was greater than that reported by Riegel et al., O'Brien et al., and Buckley et al. (33.4 vs. 22.8, 27.27, and 24.7, respectively) (7, 17, 28). These differences could be attributed to Iranian patients' tendency towards self-medicate and consultation with medical team members, because there is at least one medical team member in most Iranian families.

The overall reliability of the knowledge dimension (based on the Kuder-Richardson formula) was found to be 0.620. It should be noted that there was no significant difference in reliability with or without items 11 and 22. The reliability of the two attitude dimensions based on the Cronbach's alpha coefficient was found to be 0.76 and 0.81, respectively. In addition, the internal consistency of the three belief factors was respectively 0.779, 0.906, and 0.757 based on McDonald's omega and 0.527, 0.665, and 0.371 based on Cronbach's alpha coefficient. In the study by Reigel et al. (2007), Cronbach's alphas of 0.82, 0.76, and 0.74 were reported for knowledge, attitude, and beliefs, respectively. O'Brien et al. (2013) also assessed the reliability of the instrument using Cronbach's alpha coefficient and reported alphas of 0.85, 0.65, and 0.63 for knowledge, attitude, and beliefs, respectively (17). Buckley et al. also found Cronbach's alphas of 0.71 and 0.74 for attitude and beliefs, respectively (28).

Research has shown that patients' awareness of risk factors, signs, and symptoms of CVD prompts them to react quickly. Indeed, changing the lifestyle, behaviors, and beliefs and reducing delay in seeking for medical help can prevent irreversible damages to patients' health (32). One of the main limitations of this study was that some of the study participants were illiterate. As a result, the researcher had to read the questions to them and they might not have had the same understanding of the questions. Another limitation was that the study was conducted in an urban area of Iran with a specific culture, which might limit the generalizability of the findings. Moreover, the results of the retest of the belief dimension were lower than the standard level, which could be attributed to the specific features of the population under investigation. Therefore, the instrument is recommended to be assessed and adopted in different parts of Iran to make it applicable in other contexts.

5.1. Conclusion

Designing a reliable and valid instrument is the first and most important stage of assessing cardiac patients' knowledge, attitude, and beliefs regarding heart attack. Cardiac patients' knowledge, attitudes, and beliefs regarding heart attack could be improved using proper trainings and interventions. The current study results showed that the Persian version of the instrument was reliable, relevant, and valid for assessing cardiac patients' knowledge, attitudes, and beliefs regarding heart attack.

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Authors' Contribution

Study concept and design: RGG; data acquisition: HR; data analysis and interpretation: AE; manuscript drafting: DIJ.

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