

## Validity and Reliability of the Thai Version of the Cardiac Anxiety Questionnaire–Revised Among Thai Cardiac Patients

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### Abstract:

**Objective:** To translate and validate the Thai version of the Cardiac Anxiety Questionnaire – Revised.

**Material and Methods:** This was a descriptive statistic and exploratory factor analysis. The data collection was from March 2020 until December 2020. From this, 213 acute myocardial infarction patients, aged from 30–59 years, who answered the questionnaire – Revised were included. The internal reliability of identified domains was evaluated using Cronbach’s alpha coefficient  $>0.7$ . An item–total correlation coefficient between 0.3 and 0.7. Factor loading  $\geq 0.4$  were acceptable as enough to establish a factor. A p-value of less than 0.050 was considered significant.

**Results:** The Cronbach’s alpha of the Cardiac Anxiety Questionnaire – Revised Thai version was 0.83. Item–total and inter–item correlation coefficients were also tested ( $r=0.21$  to  $0.81$ ,  $r=0.00$  to  $0.72$ , respectively). Five factors that explained 65.1% of the total variance were identified. Communalities in each factor; ranging from 0.38 to 0.83. Factor 1 had four items reflecting avoidance (Items 2, 7, 9 and 12). Factor 2 had five items that captured worry and fear (Items 10, 13, 14, 15 and 16). Factor 3 had three items that captured attention (Items 1, 6 and 8). Factor 4 had two items, these two items had high factor loading ( $>0.80$ ) that explained abnormal symptoms (Items 3 and 4) and factor 5 had four items that reflected safety and seeking (items 5, 11, 17 and 18)

**Conclusion:** The reliability and validity of the Thai version of the Cardiac Anxiety Questionnaire – Revised was suitable to measure anxiety in Thai acute myocardial infarction patients.

**Keywords:** acute myocardial infarction, anxiety, instrument, Thai

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## Introduction

Anxiety is a prevalent disorder within the general population, and is associated with an increased risk of acute myocardial infarction.<sup>1</sup> Its psychosocial factors have also been studied in relation to heart disease. Anxiety commonly occurs after an acute myocardial infarction,<sup>2</sup> and recently, the impact of anxiety symptoms on cardiac prognosis in patients with heart disease has received greater attention. Meta-analysis found that post-myocardial infarction anxiety was associated with a 36.0% increased risk for heart-related adverse events.<sup>3,4</sup>

Anxiety is a transient emotional condition composed of apprehensive feelings, nervousness, and physiological consequences; such as, an increased heart rate or breathing.<sup>5</sup> It is common among patients with myocardial infarction, and may induce complicated outcomes.<sup>6,7</sup> Anxiety can activate the sympathetic nervous system and the hypothalamic pituitary adrenal axis, which are physiological responses occurring in conjunction with anxiety. It causes an alteration in coagulation<sup>7</sup>, a reduced immune response<sup>7-9</sup>, delayed wound healing, an increased heart rate and heart contraction with a significant increase in workload and consumption of the heart muscle.<sup>6</sup> These physiological effects create negative patient outcomes. Thus, Anxiety assessment remains of importance for acute myocardial infarction, due to high cardiac anxiety being associated with decreased quality of life in myocardial infarct patients.<sup>6,10</sup>

In Thailand, a study of anxiety has been conducted in patients with acute illness and chronic illness. A prospective study of anxiety in patients with acute myocardial infarction, presenting after an event of myocardial infarction at 31 days, showed that more than two-thirds of these patients had anxiety disorders.<sup>11</sup> Patients with anxiety that have been impacted from a crisis event that put them at risk of death, could lead them think about how life can go back to normal, after said crisis event.<sup>11,12</sup>

This tool is required to assess anxiety in patients who have an acute myocardial infarction. The evaluation tool should be logical, comprehensible, and easy to use. The Cardiac Anxiety Questionnaire – Revised was developed by Elfert, for assessing anxiety and uses a Likert scale for measuring anxiety items.<sup>13</sup> To assess the level of anxiety in patients with acute myocardial infarction, a highly valid and reliable instrument with the appropriate number of questions and format is required. So far, there is no such instrument for patients with acute myocardial infarction in Thailand. Therefore, the goal of this study was to determine whether this tool would be valid in a new population. The significance of the Cardiac Anxiety Questionnaire – Revised in the Thai version was tested on in Thai patients with acute myocardial infarction.

## Material and Methods

This study was approved by the Human Research and Ethics Committee from three hospitals: Police General Hospital, IRB no. Nq0901120/63, King Chulalongkorn Memorial Hospital, IRB no. 063/63 and Faculty of Medicine Siriraj Hospital, SIRB Protocol No. 221/2563(IRB2).

This descriptive research was performed in three hospitals within the capital of Thailand. The enrollment period was between March 2020 and December 2020.

The method for approaching the participants was via the use of simple random sampling. There were 213 acute myocardial infarction patients enrolled in the study. No data was missing. The sample size had to be over 100 to respond to the statistical power for factor analysis.<sup>14</sup> Subjects were recruited from the cardiology outpatient department, based on the following inclusion criteria : (1) Thai patients with first diagnosis of acute myocardial infarction, with post percutaneous transluminal coronary angioplasty within 1–7 months, who came for follow up at the outpatient department of the cardiac center; (2) Aged between 30–59; (3) had

no cognitive impairment or illness complications; based on current medical records; (4) willingness to be involved in this study; and (5) good reading and writing ability in the Thai language. All patients were briefed on the purpose of the study, the benefits, risks, and the time required to complete the interview. All respondents signed an informed consent form prior to completing the questionnaire.

In this study, anxiety is defined as an emotional state occurring from when the patients had experienced a crisis situation; which consisted of: feeling uncomfortable, nervousness, or worried about the consequences from the event.<sup>5</sup> The Cardiac Anxiety Questionnaire –Revised was developed by Eifert.<sup>15</sup> The items on this questionnaire are listed by a range of psychologists and cardiologists who have experience in managing psychiatric and cardiac patients.<sup>13,15</sup> Eighteen items were selected by consensus, which constitutes the face validity of the scale; both positive and negative items were selected. The instrument was structured on a Likert scale, from 0 (never) to 4 (always). The Cardiac Anxiety Questionnaire – Revised is a self-rating scale of 18-items, used specially for 178 patients who were post-angiography in the cardiology unit at West Virginia University hospital; and 10 outpatients who had been referred to the behavior cardiology liaison service for psychological evaluation and treatment of anxiety-related problems.<sup>13</sup> Participants answered the questions for each item from 0 (never) to 4 (always). The item-total correlations were assessed from all 18 items of the Cardiac Anxiety Questionnaire – Revised, Correlations being greater than 0.30. Cronbach's alpha of the questionnaire was high (Cronbach's alpha=0.83), as were the alpha coefficients for each of the subscales (worry and fear,  $r=0.81$ ; avoidance,  $r=0.81$ ; attention  $r=0.69$ ; safety-seeking,  $r=0.70$ ).

Before the translation process, the authors asked for permission to use the tool and the owner permitted the use of the tool. After this we started the process of translation into the Thai language.

For the translation, forward translation, backward translation, and reconciliation<sup>16</sup>, this tool was translated from English to Thai by two expert English instructors, who work at the Language Institute of the University of Chulalongkorn and an independent translator; a nurse educator who has experience and expertise in cardiovascular nursing, whom had studied overseas for more than five years. The Thai version was reviewed by two, bilingual Thai/English speakers. Then the translated questionnaire was translated into English by two independent Thai-English experts, who work at the Language Institute of the University of Chulalongkorn, and an independent translator who has been a specialist nurse educator in cardiovascular nursing and had studied abroad for more than five years.

The researchers compared the two versions and the original language, then discussed the differences with advisors, then summarized this for a final questionnaire version. The final Thai version was tested for validity by a psychiatrist, a cardiologist, two nursing educators and a nursing instructor, to ensure that the final version was both acceptable, and the meaning of each item was appropriate for use. Thirty patients with acute myocardial infarction in cardiology, at the cardiology outpatient department, Police General Hospital, were recruited for a pilot study for the final Thai version of the Cardiac Anxiety Questionnaire – Revised.

Following approval to invite the subjects, the researcher explained the benefits and risks of the intervention with protection of human rights to participate in the study. The patients who met the inclusion criteria and agreed to participate were then asked to sign a consent form. After that the participants filled out the questionnaire. During the answering of the questionnaire, the participants had the right to decline further participation or leave the study without consequence. The interview process was between 10 and 15 minutes in length. Data collection took place from March 2020 to December 2020.

Validation of the content was accessed by five experts; one cardiologist, one psychiatrist, two nursing educators and one nursing instructor. The five experts were asked to assess the level between the components and the definition of the concepts, as presented. For rating each item, a Likert scale ranging from 0 (never) to 4 (always) was used. The content validity index (CVI) was calculated for the Cardiac Anxiety Questionnaire – Revised.

The pilot study for reliability of the CAQ was tested by 30 participants. The reliability of the Cardiac Anxiety Questionnaire – Revised was tested for internal consistency and a Cronbach's alpha coefficient  $>0.7$  was found to be suitable. The item-total correlation coefficients tested for the homogeneity of the tool. Acceptable item-total correlation coefficients were between 0.3 and 0.7, if coefficients were less than 0.3 those items were cut off, also if coefficients were more than 0.7 it indicated repetition.<sup>14</sup>

Principal component analysis extraction was applied, with varimax rotation for the extracted factors. For extraction and conceptual consideration, factors with eigenvalues greater than 1 were extracted, a screen plot was prepared, and all the cumulative percent of variance was extracted. Factor loadings  $\geq 0.4$  were set as enough to establish a factor.<sup>14</sup>

Statistical analysis was performed with the SPSS Statistics software package, version 22 (licensed by Chulalongkorn University). For the level of statistical significance the p-value was 0.05. Descriptive statistics and factor analysis were used to test the validity of the Cardiac Anxiety Questionnaire – Revised.

## Results

The characteristics of 213 patients with acute myocardial infarction in Thailand who met the inclusion criteria are shown in Table 1. The subjects ranged from 33 to 59 years of age. Almost all of the subjects were men,

87.3%, and 78.4% were married, 35.0% of subjects had a high school diploma; 29.6% had a bachelor's degree and 12.2% had a diploma. Most participants (41.3%) earned between 15,000 and 30,000 Baht monthly (~500–1,000 USD). The Cardiac Canadian Society Class was used to categorize the severity of patient symptoms. The participants had class I (62.4%), class II (8.0%), class III (13.2%) and class IV (16.4%), respectively.

The average level of relevance was 100.0%, which showed that the Thai version of the Cardiac Anxiety Questionnaire – Revised had reflected the English version. The CVI was 1.0, which demonstrated a good level of validity of the content.

The Cronbach's alpha was 0.83. Item-total and inter-item correlation coefficients were  $r=0.21$  to  $0.81$ ,  $r=0.00$  to  $0.72$ , respectively. Before proceeding with the exploratory factor analysis, the assumptions required were tested. The correlation coefficients were 0.83. In this study, the Kaiser-Mayer-Olkin measure of sampling was 0.84, which was adequate and considered a good score. The Bartlett's test of sphericity of the 18 items were significant ( $\chi^2=1576.91$ ,  $df=153$ ,  $p\text{-value}=0.000$ ); meaning that it was not an identity matrix.

The principal component analysis extraction method was analyzed for extracting the factors. The Cardiac Anxiety Questionnaire – Revised had an orthogonal rotation of varimax factors (Table 2). The five factors that explained 65.1% of the total variance were identified. Communalities in each factor; from 0.38 to 0.83. Factors 1 through 5 explained 16.1%, 16.1%, 12.2%, 10.9% and 9.9%, of the variance, respectively (Table 2).

Overall, the factor structure was understandable and appropriate. Factor 1 had four items, which meant avoidance (Items 2, 7, 9 and 12). Factor 2 had five items that captured worry and fear (Items 10, 13, 14, 15 and 16). Factor 3 had three items that captured attention (Items 1, 6

**Table 1** Demographic and clinical characteristics

Characteristics	N=213	Percent
Gender		
Male	186	87.3
Female	27	12.7
Age, min-max, (mean±S.D.)	33-59, (51.88±5.12)	
Financial status, monthly income		
<15,000 Baht	38	17.8
15,000-30,000 Baht	88	41.3
30,001-45,000 Baht	60	28.2
>45,000 Baht	27	12.7
Marital status		
Single	25	11.7
Widowed	7	3.3
Divorce	9	4.2
Separated	5	2.3
Married	167	78.4
Education level		
No education	1	0.5
Primary school	23	10.8
Secondary school	76	35.7
Diploma school	26	12.2
Bachelor's degree	63	29.6
Above bachelor's degree	24	11.3
Smoking status		
Non-smoker	88	41.3
Smoker	34	16.0
Ex-smoker	91	42.7
Alcohol consumption		
Non-alcohol	91	42.8
Alcohol	74	34.7
Ex-drinker	74	34.7
Underlying disease		
Non-underlying disease	49	23.0
1 underlying disease	78	36.6
2 underlying diseases	54	25.4
3 underlying diseases	25	11.7
4 underlying diseases	7	3.3
Cardiac Canadian Society Class		
Class 1	133	62.4
Class 2	17	8.0
Class 3	28	13.2
Class 4	35	16.4

\*S.D.=standard deviation

**Table 2** Total variance explained and communalities (n=213)

Component	Initial Eigenvalues			Rotation Sums of Squared Loadings			Communalities
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	
Anxiety1	5.80	32.3	32.3	2.89	16.1	16.1	0.73
Anxiety2	2.06	11.5	43.7	2.89	16.1	32.2	0.69
Anxiety3	1.54	8.6	52.3	2.19	12.2	44.4	0.82
Anxiety4	1.29	7.2	59.5	1.95	10.9	55.2	0.83
Anxiety5	1.02	5.7	65.1	1.79	9.9	65.1	0.38
Anxiety6	0.98	5.4	70.6				0.55
Anxiety7	0.84	4.7	75.3				0.76
Anxiety8	0.75	4.2	79.4				0.66
Anxiety9	0.62	3.4	82.8				0.72
Anxiety10	0.49	2.7	85.6				0.65
Anxiety11	0.43	2.4	87.9				0.68
Anxiety12	0.41	2.2	90.2				0.73
Anxiety13	0.36	2.0	92.2				0.47
Anxiety14	0.36	2.0	94.2				0.68
Anxiety15	0.32	1.8	95.9				0.61
Anxiety16	0.28	1.6	97.5				0.62
Anxiety17	0.24	1.3	98.8				0.68
Anxiety18	0.22	1.2	100.0				0.45

and 8). Factor 4 had two items, these two items had high factor loading ( $>0.80$ ) that explained abnormal symptoms (Items 3 and 4) and Factor 5 had four items that reflected safety and seeking (items 5, 11, 17 and 18) (Table 3).

## Discussion

In this study, the reliability and validity of the Cardiac Anxiety Questionnaire – Revised was acceptable for the evaluation of anxiety in Thai, post-acute myocardial infarction. Cronbach's alpha was 0.83, meaning for the internal consistency this was enough, and the scores of the item-total and inter-item correlation coefficients were suitable ( $r=0.21$  to  $0.81$ ,  $r=0.00$  to  $0.72$ , respectively). The reliability analysis was on the task's perceived value scale, which included 18 items. Cronbach's alpha showed that the questionnaire was sufficiently reliable ( $\alpha=0.83$ ). Most of the items seemed worth keeping, which resulted in a decrease in the alpha if deleted. In the event when some items were

deleted, as these had  $r < 0.30$  Cronbach's alpha, There was no difference if we kept every item. Furthermore, all the items measured the symptoms of anxiety in the same way as the original version. These results were consistent with Hair, Black, Babin and Anderson<sup>14</sup>, which indicated that an item-total correlation coefficient  $>0.30$  was found to be acceptable. For inter-item correlations, coefficients less than 0.3 meant that items were cut off, also if coefficients were more than 0.7 it indicated repetition.

This factor analysis of the Cardiac Anxiety Questionnaire – Revised in the Thai version revealed five subscales of anxiety; avoidance, worry and fear, attention, abnormal symptoms, and safety and seeking. The Thai version was considered incompatible with the original version, as there was a difference between the items of each subscale. Because of the great cultural and language differences, it needs to take this into consideration in the items that discuss avoidance, worry and fear, attention,

**Table 3** Factor loading (n=213)

Item	Factor				
	1	2	3	4	5
1. I pay attention to my heartbeat	0.162	0.120	<b>0.810</b>	0.049	0.167
2. I avoid physical exertion	<b>0.818</b>	0.076	0.105	0.063	0.095
3. My racing heart wakes me up at night	0.214	0.214	0.055	<b>0.850</b>	-0.028
4. Chest pain/discomfort wakes me up at night	0.059	0.269	0.026	<b>0.865</b>	0.099
5. I take it easy as much as possible	0.210	-0.033	-0.361	-0.114	<b>0.439</b>
6. I check my pulse	0.246	0.173	<b>0.675</b>	-0.068	-0.045
7. I avoid exercise or other physical work	<b>0.829</b>	0.208	0.133	0.072	0.084
8. I can feel my heart in my chest	0.108	<b>0.421</b>	0.555	0.399	0.056
9. I avoid activities that make my heartbeat faster	<b>0.730</b>	0.179	0.337	0.111	0.160
10. If tests come out normal, I still worry about my heart	0.164	<b>0.614</b>	0.376	0.166	0.281
11. I feel safe being around a hospital, physician or other medical facility	0.113	0.081	0.309	0.245	<b>0.711</b>
12. I avoid activities that make me sweat	<b>0.841</b>	0.061	-0.003	0.113	0.053
13. I worry that doctors do not believe my symptoms are real	0.193	<b>0.624</b>	-0.048	0.146	-0.128
14. I worry that I may have a heart attack	0.059	<b>0.754</b>	0.187	0.245	0.126
15. I have difficulty concentrating on anything else	0.055	<b>0.767</b>	0.097	-0.009	0.087
16. I get frightened	0.135	<b>0.679</b>	0.230	0.274	0.116
17. I like to be checked out by a doctor	0.038	0.274	0.387	0.120	<b>0.665</b>
18. I tell my family or friends	0.070	0.027	-0.099	-0.065	<b>0.658</b>

Factor loading >0.40 are in boldface

abnormal symptoms, and safety and seeking. Additionally, as one-third of the participants had a secondary school education (35.7%), they were able to seek information about cardiovascular disease. Therefore, they understood and were aware of the symptoms, and consequences of their cardiac disease.<sup>17,18</sup> Furthermore, many of the subjects were married (78.4%), so they had someone to take care of them. A number of Thai families, live with extended family, so this may be the reason that family members can support and care for these subjects.<sup>19</sup> In the subscales of all items, the Thai version had differences from the original version. These being; avoidance, worry and fear, attention, abnormal symptoms, and safety and seeking. However, all items reflected and presented anxiety among patients with acute myocardial infarction. Both versions were based on symptoms of anxiety. Therefore, Thai acute myocardial

infarction patients, in the Thai version of the Cardiac Anxiety Questionnaire – Revised has proven to measure anxiety.

There are some limitations to this research. The findings from this study cannot be generalized to patients with heart disease, other than myocardial infarction. The participants were diagnosed with only acute myocardial infarction, which is but one group of heart disease patients. The conclusion cannot be used for others; such as chronic diseases; including but not limited to, non-communicable diseases, cancers, chronic kidney disease and surgery patients.. Another limitation of this study, is that almost all of the subjects were men, 87.3%, so the level of anxiety consisted mostly from males. Additionally, most of the participants were married (78.4%), So there may be a lack of information concerning other marital status's. All patients with acute myocardial infarction received primary

percutaneous coronary intervention (PCI).; thus, this tool cannot be used with patients with acute myocardial infarction without PCI. For higher consistency of the results, test-retest reliability should be conducted. This study has not been compared with other anxiety tools, because this tool was for screening anxiety in cardiac patients. However, it could assist the care team for the screening and preparation of appropriate interventions for Thai patients with acute myocardial infarction.

In the future more studies are necessary to evaluate the use of the Cardiac Anxiety Questionnaire – Revised among other groups of patients with other diseases in Thailand. For good power factor analysis, a larger sample size of 300 is required.<sup>20</sup>

This study can help develop knowledge and strengthen nursing science to improve care for patients with acute myocardial infarctions. Based on the findings of this study, Anxiety assessment should be promoted to enhance care for patients with acute myocardial infarction, because a high level of anxiety may be related to recurrence of coronary artery stenosis. It would be advantageous for patients who have acute myocardial infarction to be screened for anxiety. Thus, an appropriate intervention may be provided to reduce the readmission rate among patients in this group.

Further experimental studies are required to demonstrate a real effect: decreased readmission within this group, so as to improve quality of life, have a longer life, and lower admission costs. It seems obvious that nurses should promote cardiac anxiety as part of their care for patients with acute myocardial infarction. As part of a multidisciplinary care team, nurses can assess the level of anxiety and discuss possible options with the health care team, so as to provide an appropriate intervention for each patient. For policymakers, this would be better, if

they could implement a screening tool for cardiac anxiety to help patients to deal with the severity of the disease, as this would improve quality of life and decrease the rate of readmission.

## Conclusion

The Thai version of the Cardiac Anxiety Questionnaire – Revised was valid and reliable in Thai patients with history of myocardial infarction. However, all information on the reliability and validity should be confirmed in larger populations for better results. Although, the components of the items in the factor analysis were different between the Cardiac Anxiety Questionnaire – Revised of the Thai version and the original version, the items of the Thai version were the same as the original version in reference to anxiety symptoms. Both nurses and other professionals can use this tool and gain knowledge from this article to evaluate anxiety in Thai patients with acute myocardial infarction.

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## Conflict of interest

The authors confirm that there are no potential conflicts of interest to declare.

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