

# Effects of Guided Imagery on Anxiety and Physiological Indicators in In-patients with Acute Coronary Syndrome

4

## Abstract

**Background and Objective:** One of the most important complaints of patients with acute coronary syndrome (ACS) is anxiety, whose control is particularly important. The purpose of this study was to determine the effects of guided imagery on state and trait anxiety and their physiological indicators in patients with ACS.

**Materials and Methods:** At this clinical trial selected 50 patients by convenience sampling and randomly allocated to control and experimental groups using permutation blocks. Anxiety and physiological indicators in both groups were measured using the Anxiety Inventory (STAI), a monitoring device and a checklist respectively. In addition to the routine cares for the control group, the experimental group listened to a guided imagery CD for three days, twice a day (16 minutes). The data were analyzed using paired t-test and ANOVA.

**Results:** Only trait anxiety was significantly reduced in the experimental group. Furthermore, there was no significant statistical difference between the two groups in terms of the mean blood pressure, heart rate and SpO<sub>2</sub>; respiratory rate in the experimental group was however significantly less than that in the control group after the intervention.

**Discussion and conclusion:** Based on these findings, GI may be useful in reducing trait anxiety and some physiological indicators in ACS patients.

**Key words:** Guided imagery - State anxiety - Trait anxiety - Acute coronary syndrome - Empirical study.

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## Introduction

At the moment, coronary artery disease is the leading cause of death in developed countries [1]. With a change in lifestyle, this disease has gradually turned into one of the most common causes of death in developing countries, as well [2]. Most patients get anxious upon hospitalization in cardiac intensive care units (CICU). This anxiety, which is normally more severe in the first 48 hours of hospitalization, may be related to stressors such as alienation of the environment, complex and noisy machines, potential problems facing the patient, resuscitation measures and death of other patients [1]. Anxiety, as a kind of internal fear of life-threatening situations, exacerbates cardiovascular reactions, and influences physiological indicators in patients, for example, respiratory rate, heart rate, blood pressure and myocardial oxygen consumption, putting them at risk [3]. Review studies show that anxiety in patients with coronary heart disease (CHD) ranks second among common diseases after depression with prevalence of 10.4. Fear, anxiety and CHD risk factors such as hypertension lead to the pathogenesis mechanism of the heart, which might affect the cardiovascular function [4].

Numerous studies mentioned anxiety as a comorbidity and perhaps the most important risk factor in coronary artery disease and recommended anxiety reduction as a preventive strategy in the development of this type of disorders [5]-[8]. Some authors mentioned state and trait anxiety as situational and personal anxiety respectively [9]. These types of anxiety may lead to different reactions to therapeutic interventions. It has been suggested that personal traits of patients (like trait anxiety) and state anxiety be considered effective factors in patients with coronary heart diseases in the next studies because patients with high levels of trait or state anxiety might be differently affected by the interventions [10]. Some studies have tried to answer the question of how much of heart related anxiety in patients with coronary heart disease can be explained by the illness severity or trait anxiety and it is

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51 concluded that ways to overcome the subjective symptoms of the illness should be focused  
52 when treating anxiety in patients [11].

53 Several drugs have so far been used to treat cardiovascular disease anxiety. Using mild  
54 tranquilizers and anti-depressants pills may reduce anxiety, but they are accompanied with a  
55 variety of side effects [12]. Therefore, researchers have always highlighted non-  
56 pharmacological methods that affect the mind-body axis and enhance the prevention of  
57 adverse clinical events in patients especially patients with heart failure [13]. Guided imagery  
58 is a mind-body based complementary therapy by which people feel relaxed through focusing  
59 and using images, landscapes, sounds, music and words [14]. This method is easily accepted  
60 by the patient and does not need special equipment or extensive training [15].

61 Various studies have used complementary medicine to reduce anxiety in heart patients,  
62 particularly patients with coronary heart disease and other medical conditions. For example, a  
63 clinical trial conducted by Mizrahi et al. [16] showed that meditation with an audio CD at  
64 home significantly reduced anxiety and improved mood in patients with inflammatory bowel  
65 disease [17]. Bradt et al. [11] reported that listening to music reduced anxiety in patients with  
66 coronary heart disease [10]. Meanwhile, numerous researchers demonstrated the effect of  
67 music on a range of different outcomes in patients such as heart rate, respiratory rate, blood  
68 pressure, hormone levels, and anxiety [10].

69 Halpin, Speir, Capobianco, and Barnett [18] revealed that guided imagery reduced  
70 treatment costs, anxiety and duration of hospitalization [17]. Alam and et al. [19] showed that  
71 guided imagery reduced preoperative anxiety [18], while Thomas and Sethares [20] found no  
72 reduction in postoperative anxiety with this technique [19]. Antall and Kresevic [15] found it  
73 effective on reducing pain, anxiety and hospitalization duration, and recommended  
74 investigating both state and trait anxiety in future studies [15]. Relevant studies consider only  
75 the whole anxiety and not state and trait anxiety separately, and are limited and focus on the  
76 in-person training. The present research aimed to investigate the effects of guided imagery on  
77 state and trait anxiety as well as physiological indicators in patients with acute coronary  
78 syndrome in CICUs using training CDs.

## 80 **Materials and methods**

81 This clinical trial was conducted on patients with acute coronary syndrome hospitalized in the  
82 CICUs of 22-Bahman Hospital in Gonabad, Iran in 2015. Convenience sampling was used to  
83 select the samples, and permutation block random sampling was used to assign them to  
84 control and experimental groups. Given a test power of 90% and a confidence level of 95%,  
85 after conducting a pilot anxiety study on 10 people (five in each group), the sample size was  
86 calculated as 19 for each group based on the mean comparison formula for two independent  
87 populations. Considering possible sample loss, a total of 50 individual including 25 in each  
88 group were recruited. Inclusion criteria comprised patient's informed consent for  
89 experimentation, definite diagnosis of acute coronary syndrome based on clinical symptoms,  
90 electrocardiography (ECG) and cardiologist's discretion, having suffered a heart attack for  
91 the first time, 30-80 years old, not taking anti-arrhythmic drugs during the hospitalization, a  
92 history of a cardiovascular disease for 0.5-6 years, absence of severe mental illnesses with  
93 signs of delusions and hallucinations, no cardiopulmonary resuscitation (CPR) upon  
94 admission, full consciousness and their ability to answer the questions, no history of sudden  
95 death in the family due to cardiovascular diseases, not having other serious physical illnesses  
96 that reduce life expectancy and the doctor's approval for patient's participation. Exclusion  
97 criteria consisted of patient's unwillingness to continue, emergence of arrhythmia, initiating  
98 its treatment or receiving CPR during the intervention period.

99 The measurement tools comprised a personal information form, Spielberger's State-Trait  
100 Anxiety Inventory (STAI), a monitoring device and a checklist for recording physiological

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**Comment [EF12]:** "numerous researchers" doesn't seem compatible with one citation

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101 indicators. STAI consists of two parts; the first part (S) consists of 20 items, measures state  
102 anxiety and indicates how one feels currently about the present situation while the second  
103 part (T), consists of 20 items, measures trait anxiety and shows how one feels in general [20].  
104 A study confirmed the reliability of the test with Cronbach's alpha, which was calculated as  
105 0.90 and 0.94 for the normal and case groups, respectively. Moreover, its reliability was  
106 confirmed through the ratio of true score variance to the observed variance in the normal  
107 group, which was calculated as 0.94. The standard error was 4.64, while the correlation of the  
108 observed scores with true scores and error scores was respectively 0.97 and 0.23. The mean  
109 trait, state and total anxiety scores were separately calculated in order to determine STAI  
110 validity, which were significant at 0.95 and 0.99 confidence levels [21].

111 A standard monitoring device (Sadat Company, Iran) was used to measure physiological  
112 indicators in patients such as respiratory rate, blood pressure, heart rate and SpO<sub>2</sub>, and they  
113 were then recorded in the checklist. Equivalent reliability was used to assess reliability, as the  
114 accuracy of sphygmomanometer was checked with a mercury sphygmomanometer (Riester  
115 Company, Germany); respiratory rate and heart rate were checked with a wrist watch, and  
116 SpO<sub>2</sub> was checked with another pulse oximeter every day before starting the work. A text  
117 was first developed for the audio CD under the supervision of psychology professors based  
118 on Persian and English resources. Then, soundbites were recorded in several stages and  
119 sound effects were added with the help of sound recording professionals. The entire process  
120 was conducted with the approval of the psychology professors. CD's text contained phrases  
121 to visualize beautiful scenery such as a beach, pleasant scenes and positive affirmation to  
122 reduce anxiety.

123 This study obtained the ethics committee approval from Gonabad University of Medical  
124 Sciences (GMU.REC.1392.58) and was registered in the Iranian Registry of Clinical Trials  
125 (IRCT2014031016919N1). After obtaining permission from the authorities of 22-Bahman  
126 Hospital in Gonabad, the researchers provided patients with the informed consent form and  
127 explanation on the purpose of the study. After obtaining a written informed consent, the  
128 demographic information form and the research subject selection checklist were completed.  
129 Both groups completed STAI before the intervention, which started at the beginning of  
130 hospitalization for the experimental group. In addition to routine cares, members in the  
131 experimental group listened to the guided imagery CD for 16 minutes in the first three days  
132 of hospitalization, twice a day (8-10 AM and 8-10 PM) using CD players and headphones,  
133 while the control group received only routine cares. The researcher was present at all sessions  
134 to control confounding factors and proper use of the CD. Physiological indicators such as  
135 systolic and diastolic blood pressure, heart rate, respiratory rate and arterial blood oxygen  
136 saturation were measured with the monitoring device in the experimental group and recorded  
137 in a checklist during the three days of intervention, in the morning and at night before and  
138 after guided imagery, while the same was performed in the control group without guided  
139 imagery. Both groups completed STAI again after the three-day intervention.

140 The data were analyzed at a significance level of less than .05 using SPSS-14.5 and  
141 statistical tests such as Chi-square, Fisher's exact test, paired difference t-tests and repeated  
142 measures ANOVA.

143

## 144 **Results**

145 Males and females, who comprised 60% and 40% of the study population respectively, had a  
146 mean age of 58.16 years. Illiterate patients comprised 50% of the samples, 30% were high  
147 school dropouts while the rest had a diploma or higher. They were matched for age, gender,  
148 education level, income and the number of hospitalizations ( $p > .05$ ) (Table 1).

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150 Table 1: Comparison of frequency and percentage of sample demographic information in  
 151 both groups

Demographic variables		Control		Case		P
		N	Percent	N	percent	
Sex	Male	14	56	16	64	.56
	Female	11	44	9	36	
Education	Illiterate	15	60	10	40	.26
	Under Diploma	5	20	10	40	
	Diploma and higher	5	20	5	20	
Age	35-50	4	16	6	24	.35
	51-65	17	68	12	48	
	66-80	4	16	7	28	
Income	Adequate	10	41.7	14	58.3	.25
	Inadequate	15	57.7	11	42.3	
Number of Hospitalization	Once	24	96	23	92	1
	Twice	1	4	2	8	

152 Table 2: The difference between the mean score of pretest and posttest for trait and state  
 153 anxiety in both groups  
 154

Variables	Groups	N	Mean of pretest	Mean of Post test	Difference of mean	SD	Std Error	t	p
Trait Anxiety	Case	25	37.04	29.20	-7.84	8.69	1.74	2.30	.025
	Control	25	37.60	34.92	-2.68	7.04	1.41		
State Anxiety	Case	25	43.08	33.44	-9.64	6.93	1.38	1.22	.23
	Control	25	43.56	36.88	-6.68	9.98	1.99		

155 According to the data in Table 2, trait anxiety scores in the experimental group significantly  
 156 reduced after the intervention ( $p < .05$ ), while the reduction in the state anxiety scores in this  
 157 group was not significant compared to the control group ( $p > .05$ ). However, the trait and state  
 158 anxiety scores were not in pathological range in before and after intervention.

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161 Table 3: Comparison of the mean systolic and diastolic blood pressure in both groups during  
 162 the study period

Days		Control				Case				P		
		Mean		SD		Mean		SD				
		sys	Dias	sys	Dias	sys	Dias	Sys	Dias	Sys	Dias	
FIRST	M	Pre	143	84.68	24.32	10.74	129.24	81.76	24.37	10.74	.97	.93
		Post	127.64	78.16	27.15	13.92	130.52	83.48	23.85	16.01		
	E	Pre	123.24	76.60	18.12	13.92	123.12	78.36	24.13	15.72		
		Post	123	76.56	13.77	10.84	121.24	77.52	20.65	12.99		
Second	M	Pre	123.68	79.88	13.67	11.10	127.20	81.04	24.53	13.02		
		Post	123	80	12.99	9.89	121.32	74.12	22.79	14.61		
	E	Pre	120	76	11.08	8.16	126.68	76.48	28.06	10.26		
		Post	118.80	74.80	12.35	12.94	125.68	75.88	28.23	10.68		
Third	M	Pre	117.40	74.88	14.29	9.12	118.44	75.04	20.06	10.49		

		Post	115.6 0	74.68	14.23	9.40	114.7 6	74.80	12.60	10.15		
		Pre	114.4 4	73.12	13.96	9.01	114.8 0	73.20	14.10	9.98		
	E	Post	113.8 0	71.60	14.52	9.65	112.2 0	71.80	11.46	9.77		

163 M= Morning E= Evening  
 164 M= Morning E= Evening  
 165

166 Table 3 shows no significant difference between the control and experimental groups in terms  
 167 of the mean systolic and diastolic blood pressure ( $p > .05$ ).  
 168

169 Table 4: Comparison of the mean heart rate, respiratory rate and SpO<sub>2</sub> in both groups during  
 170 the study period

Days		Control						Case						
		Mean			SD			Mean			SD			
		HP	RR	SPO <sub>2</sub>	HP	RR	SPO <sub>2</sub>	HP	RR	SPO <sub>2</sub>	HP	RR	SPO <sub>2</sub>	
First	M	PRE	79.16	18.72	96.96	12.57	3.24	2.17	76.44	20.16	97.52	19.81	12.68	0.71
		Post	76.56	18.44	96.96	15.96	3.32	1.96	72.28	17.20	97.56	8.98	2.63	0.71
	E	Pre	73.28	17.68	97.40	10.54	3.02	1.50	71.48	16.28	97.64	10.17	2.82	0.70
		Post	72.84	17.64	97.52	10.17	3.38	1.53	71.48	15.96	97.64	10.71	2.89	0.70
Second	M	Pre	72.40	17.28	97.56	9.98	2.88	1.44	72.60	15.32	97.76	11.12	2.21	0.72
		Post	72.68	17.32	97.52	9.41	2.91	1.63	71.32	15.44	97.80	9.67	2.25	0.70
	E	Pre	73.36	17.40	97.52	6.94	2.80	1.63	69.76	15.64	97.72	9.42	2.16	0.73
		Post	73.44	17.48	97.48	6.56	2.75	1.44	69.08	15.72	97.60	10.12	2.26	0.76
Third	M	Pre	74.72	17.76	97.52	7.11	2.47	0.71	71.32	15.84	97.72	13.27	2.41	0.84
		Post	75.68	17.84	97.48	6.43	2.28	0.71	73.68	15.76	97.84	11.83	2.54	0.74
	E	Pre	75.32	17.60	97.56	4.46	1.35	0.71	71.28	15.92	97.80	8.84	2.58	0.57
		Post	74.92	17.64	97.64	4.28	1.38	0.56	70.40	15.88	97.80	7.89	2.74	0.50
HP/F		$p = .17$						$F = 1.94$						
RR/F		$p = .02$						$F = 5.44$						
SPO <sub>2</sub> /F		$p = .31$						$F = 1.07$						

171 M=Morning E=Evening HP=heart pulse RR=respiratory rate SpO<sub>2</sub>=Peripheral oxygen  
 172 saturation  
 173

174 Table 4 (repeated measures ANOVA) indicates no significant difference between the two  
 175 groups in terms of heart rate and the mean SpO<sub>2</sub> ( $p > .05$ ), while there is a significant  
 176 difference in terms of respiratory rate ( $p < .05$ ) because the respiratory rate in the  
 177 experimental group was less than that in the control group.  
 178

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## 179 Discussion

180 Results of the present research demonstrated that guided imagery reduced trait anxiety in the  
 181 experimental group, while it could not decrease state anxiety. This finding is compatible with  
 182 that of various studies [10],[14],[17],[18] but is not consistent with some others [9],[19]. It  
 183 seems guided imagery using CDs and headphones has helped patients focus their mind on  
 184 other subjects instead of focusing on the disease by visualizing relaxing places such as a  
 185 beach and listening to the sound of sea gulls and waves. This change in focus from illness to  
 186 relaxation has been able to alleviate the source of anxiety in cardiovascular patients, which  
 187 might have arisen from disturbing thoughts caused by the disease. In line with the mind-body  
 188 technique, this finding shows how patients' anxiety is reduced when they replace mental  
 189 disturbances caused by an illness with pleasant thoughts and imagination. In addition, it  
 190 seems that patients find fewer opportunities to activate and expand negative threatening  
 191 thoughts as the origin of negative emotional responses such as anxiety in their mind. Some  
 192 experts in the field express that guided imagery can change the transmission and perception

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193 of anxiety by distracting the patient's mind from anxiety-provoking stimuli, creating  
194 relaxation and affecting emotion and mood in patients [22]. From a physiological view,  
195 guided imagery affects the autonomous nervous system, limbic system and the release of  
196 endorphin through relaxation and reduces the feeling of stress and anxiety [23]. Furthermore,  
197 some hypotheses suggest that relaxation and positive imagery weaken hormonal and  
198 psychoneuroimmunology pathways that cause stress responses [15]. The inconsistency in the  
199 findings of this study and similar studies might originate from a difference in methodology  
200 such as lack of a pretest in the research design, the measurement tool and demographic  
201 differences. For instance, Jong et al. [10] expressed that guided imagery does not reduce the  
202 preoperative anxiety [9], which might have been caused by the difference in methodology  
203 such as measures (Amsterdam Preoperative Anxiety Scale versus Spiel Berger's inventory),  
204 the type of the disease and the research subject. Furthermore, the finding that guided imagery  
205 could not significantly reduce state anxiety in patients might be associated with the  
206 interference of the disease symptoms or state anxiety. In fact, imagery alleviates personal  
207 anxiety, but does not significantly reduce situational anxiety perhaps as a result of its  
208 interference with the symptoms of acute coronary syndrome. This finding is in line with the  
209 opinion of some authors based on the possibility of different reactions of coronary heart  
210 patients with state and trait anxiety to therapeutic interventions [10].  
211 Findings also indicate that guided imagery significantly reduced only respiratory rate and did  
212 not have a significant effect on systolic and diastolic blood pressure, heart rate and the mean  
213 SpO2 in patients. This finding is compatible with the study on the effect of music on the  
214 respiratory rate in coronary heart patients, but is not consistent with the same study in terms  
215 of heart rate and blood pressure [10] The finding of this study regarding the ineffectiveness of  
216 guided imagery on physiological indicators in patients seems to comply with the previous  
217 finding of the study. Guided imagery reduced trait anxiety in this study, but it had no effect  
218 on state anxiety and its physiological indicators especially those common with anxiety and  
219 acute coronary syndrome symptoms.  
220 This study suffered limitations such as using self-report questionnaires and consequent  
221 possible response bias as well as the failure to assess patients' imagery capability, which are  
222 recommended to be considered in the next studies.

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UNDER PEER REVIEW