

Comparison of Depression, Anxiety, and Stress Between Mild and Severe Non-cardiac Chest Pain

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Abstract

Background: Physical and psychological factors affect one another in patients presenting with non-cardiac chest pain. Studying the psychological components of these patients may improve their treatment process.

Objectives: To compare depression, anxiety, and stress severity between mild and severe chest pain in patients with non-cardiac chest pain.

Patients and Methods: A cross-sectional design was used. The statistical population comprised patients with non-cardiac chest pain admitted to the Heart Emergency Center in Kermanshah, Iran. Using a matching method, 94 participants with mild and severe non-cardiac chest pain were selected and studied in two groups of 47. The instruments used in this study include the Comorbidity Index, the brief pain index (BPI), and the depression, anxiety, and stress scale (DASS). The multivariate analysis of variance, chi-squared test, and t-test were used for data analysis.

Results: After adjusting for the effects of age and comorbid conditions, results showed that there was a significant difference between the two groups in terms of depression, anxiety, and stress; the severity of these variables was exacerbated in patients with severe chest pain ($P < 0.001$).

Conclusions: Depression, anxiety, and stress are common psychological components in patients with non-cardiac chest pain especially those with severe chest pain and it is essential that health professionals pay attention to these factors. Therefore, paying attention to psychological factors could help experts to choose solutions that will decrease pain and side effects of the diseases. It may also facilitate treatment procedures among patients in severe pain. Further investigation to determine the association between these variables and non-cardiac chest pain should be considered.

Keywords: Anxiety, Chest Pain, Depression, Psychologic Stress

1. Background

Chest pain is a common symptom among the general population (1) and is regarded as the second-most common cause for which people visit cardiology hospitals (2, 3). However, only 23 percent of visiting patients with chest pain have a serious disorder like coronary artery disease (CAD) (4). For others, chest pain is due to other causes, such as pulmonary problems, musculoskeletal issues, gastritis, and psychological factors (5). Specifically, in 66 percent of patients, no definite cause is identified for their chest pain (6); the cause of pain in 41 percent of patients is related to psychological factors (4). Psychological factors and psychiatric disorders play significant roles in the development of such pains (7, 8). Among these factors, anxiety and depression are considered the most common, pronounced problems (9). Several studies have addressed the evaluation of stress, anxiety, and depression in patients with non-cardiac

chest pain and have also shown the effect of these factors on pain development (10-12). However, few studies have evaluated the effect of these variables on chest pain exacerbation. Therefore, understanding that the frequent visitations of such patients to clinics takes a lot of time and money for evaluations and examinations puts high economic pressure on medical systems (13), studying the psychological components of these patients may improve the process of their treatment.

2. Objectives

The present study was undertaken to investigate and compare depression, anxiety, and stress severity between mild and severe non-cardiac chest pain.

3. Patients and Methods

3.1. Study Design

In this cross-sectional study, depression, anxiety, and stress of patients with chest pain who later were found to have normal coronary angiography were studied. Patients were admitted to the heart emergency department (HED) of Imam Ali hospital, Kermanshah, Iran during the winter of 2014. This treatment center is a specialized hospital of the state for cardiology in Western Iran.

3.2. Inclusion Criteria

Inclusion criteria were: 1) an education level higher than elementary school, 2) ages between 30 and 70 years, 3) history of chest pain for more than three months, 4) normal coronary angiography, and 5) no evidence of chest pain alleviation for more than one month after angiography (14). The reason for the exclusion of illiterate patients was due to their inability to understand certain questions related to depression and mood status. We thought that the inclusion of illiterate persons and documenting their mood status based on the researcher's assumptions may result in a measurement bias. Also, patients over 70 years were excluded due to weakened sensorimotor abilities.

3.3. Patients and Procedure

Data were gathered using a checklist for demographic variables along with the depression, anxiety, and stress scale (DASS). After the groups were specified, patients were provided with the DASS and after the clinical psychologist presented the necessary explanations they were requested to complete the scales as accurately as possible. In the end, the scales were collected and the data analyzed using the suitable statistical methods. The statistical population of the current study included 153 patients with non-cardiac chest pain admitted to Imam Ali Cardiology Hospital. They reported pain lasting over one month after a normal angiography. In the first step, 32 people were excluded due to the absence of inclusion criteria. The remaining 121 were then invited to willingly participate in this research study after providing written informed consent. Of those 121, 12 patients opted not to participate, and so a final tally of 109 people were included. The brief pain inventory (BPI) and Comorbid Disease Index were administered to these 109 patients in order to gather data about their comorbid diseases and chest pain severity. According to the results obtained through a ten-degree pain severity categorization, 53 people with scores of 1-5 were included in the mild chest pain group and the 56 patients with scores of 6-10 were included in the severe chest pain group. Patients in the first group were then paired with patients in the second group

based on physiological sex and education level. After this, 47 people remained in each group (15 men, 32 women). Matching was accomplished by excluding 7 patients with severe pain and a high school degree or higher, as there were no matching counterparts in the other group. Then, we excluded 4 patients with mild chest pain and only elementary education, who were also lacking counterparts. Due to this lack of counterparts, 2 men from the mild pain group and 2 women from the severe pain group were excluded from the study. Ultimately, each group included 47 participants. A demographics checklist and the DASS were used to collect required data. Once the groups had been specified, the patients were provided with the DASS. After the clinical psychologist presented the necessary explanations, they completed the scales as accurately as possible. After collecting these scales, the data was analyzed using the statistical methods outlined below.

3.4. Instruments

3.4.1. The Comorbid Disease Index

This index, created by Ifudu et al. (15), is a scoring index for evaluating comorbid physical conditions. It evaluates the presence of 14 chronic illnesses. The evaluated conditions are: 1) ischemic heart disease; 2) other cardiovascular illness; 3) chronic respiratory diseases; 4) autonomic neuropathy; 5) other neurologic problems; 6) muscular-neurologic disorders; 7) infections, such as hepatitis; 8) blood disorders; 9) pancreas and biliary diseases; 10) genital and urinary diseases; 11) vision disorder; 12) limb disorder; 13) backache, spine ache, or joint disorders; and 14) psychiatric illness. Each comorbid condition is scored from 0 to 3 and represents the absence of the disease or the presence of severe disease, respectively. The total score ranges from 0 to 42, with a higher score being indicative of a greater comorbidity (15).

3.4.2. The Brief Pain Inventory (BPI)

This scale scores pain severity on a ten-degree scale, where zero indicates no pain and ten indicates a high degree of pain. This measurement index has been given validity in Iran and its reliability has been reported as appropriate for Iranian populations (16).

3.4.3. The Depression, Anxiety, and Stress Scale (DASS)

This scale, which was developed by Lovibond and Lovibond (17), consists of 21 items that measures three mini-scales of depression, anxiety, and stress (7 items each). The interviewee answers these items with "never," "few," "many," and "too many." The Cronbach's alpha of this scale was reported as 0.81 for depression, 0.73 for anxiety, and 0.81 for stress. Sahebi (18) obtained Cronbach's alpha in

Iran (n = 400) as 0.70 for depression, 0.66 for anxiety, and 0.76 for stress. Also, the Beck Depression Test correlation coefficient was significant for depression (0.66), anxiety (0.67), and stress (0.49).

3.5. Statistical Analysis

Obtained data were analyzed via multivariate analysis of variance (MANOVA), t-test, and chi-squared test using SPSS for Windows (v. 20.0). The t-test and chi square test were used to investigate respectively the non-significance of the difference between groups on quantitative variables, including age and comorbidities; and nominal variables, including job status, smoking, and drinking. Data were analyzed using a multivariate analysis of variance for comparing the two groups. Furthermore, significance was determined where the p-value was less than 0.05; eta-squared was used to evaluate the effect size for dependent variables.

4. Results

Each group contained 15 men and 32 women. The mean (SD) age for men with severe pain was 54.53 (\pm 8.39) years and 54.07 (\pm 9.80) for those with mild pain. For women, the mean (SD) age was 52.21 (\pm 7.39) years for those with severe pain and 52.36 (\pm 8.69) for those with mild pain. In relation to pain severity, the mean (SD) for patients with mild pain was 3.24 (\pm 1.11), while the mean (SD) in the severe pain group was 7.25 (\pm 1.32). Demographics and behavioral factors are shown in [Table 1](#).

As shown in [Table 1](#), there was no significant difference in any of the variables between the groups. Below, [Table 2](#) and [3](#) show the means and standard deviations of these variables by group. It also shows the results of the multivariate analysis of variance comparing the two groups.

The F-value for group effects when controlling for confounding variables [$F(3, 92) = 10.56$; $P < 0.001$; eta-squared = 0.26] showed a significant difference for at least one of the dependent variables between the groups. According to the data presented in [Tables 2](#) and [3](#), individuals with severe pain showed significantly higher scores than patients with mild pain in depression [$F(1, 92) = 13.02$; $P < 0.001$; eta-squared = 0.12], anxiety [$F(1, 92) = 31.83$; $P < 0.001$; eta-squared = 0.25], and stress [$F(1, 92) = 12.89$; $P < 0.001$; eta-squared = 0.12]. Eta-squared, which shows the effect size for each variable, suggests that the major differences were seen in anxiety, depression, and stress. After applying the Bonferroni correction ($P = 0.012$), because of the three existing dependent variables and given the significant p value levels, the differences were confirmed.

5. Discussion

The present study was carried out to compare depression, anxiety, and stress between mild and severe non-cardiac chest pain. Consistent with previous reports ([7](#), [10](#), [12](#)), our results showed that there was a significant difference between the groups in terms of depression, anxiety, and stress. The severity of these variables was higher in patients with severe chest pain than those with mild chest pain. There is a mutual relationship between the physical and psychological factors psychological factors likely play an important role in development of non-cardiac chest pain, for instance and chest pains are the underlying cause for the genesis of agitation ([19](#)). One of the findings showed that the degree of depression in patients with severe chest pain is higher than in patients with mild chest pain. Apart from the fact that the heart examination process causes patients to feel that they suffer from a heart problem and receiving a vague diagnosis from doctors may lead to agitation and psychological distress of the patient ([20](#)), the primary depression may also affect the intensity of pain felt ([10](#)).

According to reports ([21](#)), nearly 97 percent of depressed patients complain about loss of energy as a barrier that impedes their ability to perform routine daily tasks. About 80 percent of depressed patients complain of insomnia. Based on the cognitive model, depression is caused by certain cognitive distortions called “depressing schemas” and cause the person to perceive both internal and external data in an altered manner based on the impact of their initial experiences ([21](#)). To clarify this viewpoint, the assumption is that those suffering from depression distort their environmental data to become consistent with their negative inner thoughts; in this way, they eliminate and distort information that would be inconsistent with their dominant cognitive system ([22](#)). Therefore, the pain intensity in this group of patients may increase due to such cognitive distortions.

Other findings have shown that the degree of anxiety in patients with severe chest pain was higher than that observed in patients with mild chest pain. Anxiety often creates confusion and distortion in one’s perception of time and space, recognition of people, and the importance of events. These distortions can create disorder in an otherwise correct perception of events by decreasing concentration and recollection ability, and by upsetting the ability to correlate items properly ([21](#)). Anxious people often report thoughts and imagined scenarios that indicate a feeling of extreme danger in the present situation. It seems that this form of anxiety is an understandable response based on their distorted perceptions ([23](#)). This distorted perception-led anxiety can ultimately intensify the chest

Table 1. Status of Demographic, Behavioral Factors, and Comorbidities in Patients^a

Variable	Severe Pain, n = 47	Mild Pain, n = 47	Total	P Value ^b
Age ^c	52.27 (7.70)	52.53 (8.95)	52.40 (8.45)	0.88
Comorbidity ^c	1.17 (4.73)	1.26 (4.42)	1.22 (4.58)	0.91
Education Level				
Junior School	39	39	78	
High School Diploma	7	7	14	
University Degree	1	1	2	
Job^d				0.57
Housewife	31	31	62	
Office Worker	3	4	7	
Self-Employed	9	8	17	
Retired	4	4	8	
Marital Status				
Married	39	39	78	
Widowed/Separated	8	8	16	
Smoking^d				0.16
Yes	10	8	18	
No	37	39	76	
Drinking^d				0.17
Yes	2	4	6	
No	45	43	88	

^aValues are expressed as mean (SD) or number.

^bP < 0.05.

^ct-test.

^dChi-Square.

Table 2. Comparing Dependent Variables Between Groups^{a,b}

Variable	Severe Pain	Mild Pain	Total	F (1, 92)	P Value	Eta-Squared
Depression	9.90 ± 3.78	6.90 ± 4.35	8.40 ± 4.32	13.02	0.001	0.12
Anxiety	11.19 ± 4.04	6.92 ± 3.34	9.05 ± 4.27	31.83	0.001	0.25
Stress	13.42 ± 4.82	10.06 ± 4.32	11.74 ± 4.85	12.89	0.001	0.12
Total Score	34.50 ± 10.56	23.88 ± 10.62	29.19 ± 11.81	24.16	0.001	0.20

^aP < 0.01.

^b(n = 94).

pain felt in these patients. However, severe pain in chest probably heightens concerns about the seriousness of the disease and development of fatal consequences, which definitely leads to even higher levels of anxiety.

To explain the finding that the degree of stress in patients with severe chest pain is higher than in patients with mild pain, Kuijpers et al. (10), point out that patients who experience negative emotions as well as having anx-

iety and depression are reported to have higher degrees of chest pain. Stress is one of those negative emotions in which the person sees their physical and psychological well-being in danger. Stressed people often are stricken with fear, avoidance behavior, depression, and anger; these serve to induce reactions in others that cause these disharmonious and non-adaptive models to be preserved. As individuals evaluate the incidents based on their own cog-

Table 3. Results of Multivariate Analysis of Variance (MANOVA)^a

	Value	F (3, 90)	P Value	Eta-Squared
Pillai's Trace	0.26	10.567	0.001	0.26
Wilks Lambda	0.74	10.567	0.001	0.26
Hotelling's Trace	0.35	10.567	0.001	0.26
Roy's Largest Root	0.35	10.567	0.001	0.26

^aP < 0.01.

nitive schemas and orientations, an internal self-approval process forms (24). Therefore, patients may feel the pain to a greater extent than before.

A limitation to the current study was the lack of consideration of factors that might affect the severity of non-cardiac chest pain. In fact, there are many conditions that are comorbid with severity of pain, so future studies should attempt to control these potentially confounding variables. Another limitation of this study was the inability to study illiterate patients. In addition, regarding the sample size that we recruited and the probable loss of many patients because of careful matching, it is recommended to consider factors such as family histories of non-cardiac chest pain, kinds of drugs taken, and any history of cardiovascular disease in first-degree relatives in future studies.

Footnote

Authors' Contribution: Mostafa Bahremand participated in the design of the study, subject recruitment, data collection, data analysis, and drafted the manuscript. Mozghan Saeidi participated in the design of the study and revised the manuscript critically for important intellectual content. Fariba Takallo participated in the design of the study, data analysis, and revised the manuscript critically for important intellectual content. Saeid Komasi revised the manuscript critically for important intellectual content. All authors read and approved the final manuscript.

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