Non–Coronary Patients with Severe Chest Pain Show More Irrational Beliefs Compared to Patients with Mild Pain

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Background: Despite providing insufficient medical evidence of the existence of a real cardiac condition, patients with non-coronary chest pain still interpret their pain incorrectly. The present study, therefore, sought to compare the irrational beliefs in non-coronary patients with mild chest pain against those with severe chest pain.

Methods: A cross-sectional design was used. The statistical population comprised non-coronary patients who presented to the Heart Emergency Center of Kermanshah city, Iran. Using a matching method, 96 participants were selected and studied in two groups of 48. The instruments used were the Comorbidity Index, Brief Pain Index, and the Jones Irrational Beliefs Test (short-form). The multivariate analysis of variance, chi-square test, and t-test were used for data analysis.

Results: Controlling for the effects of age and comorbid conditions, the severity of three types of irrational beliefs, including emotional irresponsibility (P < 0.001), hopelessness changes (P < 0.001), and problem avoiding (P = 0.002) was higher among patients with severe chest pain (according to effect level). However, in terms of demand for approval, no difference was seen between the two groups (P = 0.180).

Conclusion: Non-coronary patients with severe chest pain showed a greater number of irrational beliefs in comparison to patients with mild pain. Irrational beliefs are common mental occurrences in patients with non-coronary chest pain, and they should be attended to by health professionals, especially in severe non-coronary chest pain. Further investigation to determine the association between irrational beliefs and non-coronary chest pain is necessary.

Keywords: Chest Pain; Cognitions; Patients
INTRODUCTION

Discomfort in the chest is one of the most common complaints reported by patients in clinical practice.11 This, in many cases, not only does not stem from the heart, as in nearly 66% of the patients, the existence of a clear physical cause could not be determined.2 This can indicate the role of psychological factors3-4 and their impact on the perception of chest pain.3 The existing evidence shows that most patients with chest pain indicate an unknown etiology and use avoidant and emotion-focused coping styles,6,7 and the few patients who use problem-bound strategies have less flexible styles than do other people with oppositional styles.8 This leads this group of patients to be unsatisfied and uneasy despite the physician’s assurance regarding the negativity of the assessment results.9 They generally believe this pain will lead to heart attack or the emergence of a serious disease or even death. Therefore, it is quite clear that despite providing enough documentation that their chest pain is not cardiac in origin, such patients still interpret their pain incorrectly.10 Some studies4,11 confirm the existence of negative automatic thoughts and the inclination towards catastrophic interpretation of bodily feelings in patients with non-coronary chest pain. However, none of these studies has investigated the effect of irrational beliefs in pain intensification in this group of patients. The frequent visiting of these patients to clinics consumes substantial time and money for evaluations and examinations, placing high economic burden on the medical system.12 Accordingly, the present study was performed to investigate and compare the irrational beliefs in non-coronary patients with mild chest pain against those with severe chest pain.

METHODS

1. Study Design
In this cross-sectional causal-comparative study, the irrational beliefs of patients with chest pain who presented to the Heart Emergency services of Imam Ali Hospital, Kermanshah, Iran in fall 2014, despite having normal angiography, were studied. Imam-Ali Hospital is a state specialized hospital for cardiology in Western Iran, and patients residing in Western Iran generally visit this hospital.

2. Inclusion Criteria
Inclusion criteria were (1) aged between 35 and 70 years, (2) educational level higher than elementary school, (3) history of at least 3 months of chest pain, (4) normal coronary angiography, and (5) no evidence of chest pain alleviation for at least 1 month after coronary angiography.

3. Patients, Sampling, and Implementation Method
The statistical population of the present study included 143 patients, the existence of a clear physical cause could not be determined.2 This can indicate the role of psychological factors3-4 and their impact on the perception of chest pain.3 The existing evidence shows that most patients with chest pain indicate an unknown etiology and use avoidant and emotion-focused coping styles,6,7 and the few patients who use problem-bound strategies have less flexible styles than do other people with oppositional styles.8 This leads this group of patients to be unsatisfied and uneasy despite the physician’s assurance regarding the negativity of the assessment results.9 They generally believe this pain will lead to heart attack or the emergence of a serious disease or even death. Therefore, it is quite clear that despite providing enough documentation that their chest pain is not cardiac in origin, such patients still interpret their pain incorrectly.10 Some studies4,11 confirm the existence of negative automatic thoughts and the inclination towards catastrophic interpretation of bodily feelings in patients with non-coronary chest pain. However, none of these studies has investigated the effect of irrational beliefs in pain intensification in this group of patients. The frequent visiting of these patients to clinics consumes substantial time and money for evaluations and examinations, placing high economic burden on the medical system.12 Accordingly, the present study was performed to investigate and compare the irrational beliefs in non-coronary patients with mild chest pain against those with severe chest pain.

Figure 1. Study implementation method.
quired data. When the groups were specified, the patients were
provided with the Jones Irrational Beliefs Test, and after the cli-
cial psychologist presented the required explanations, they were
requested to fill out the forms accurately. The forms were col-
lected and the information was analyzed using the statistical
methods outlined below.

4. Instruments
1) The Comorbidity Index
This index, designed by Ifudu et al.\(^\text{[13]}\) in 1998, is a scoring
index for evaluating comorbid physical conditions. It consists of 14
components to evaluate 14 main bodily conditions. These con-
ditions are (1) ischemic heart disease; (2) other cardiovascular
problems; (3) chronic respiratory diseases such as asthma; (4)
autonomic neuropathy; (5) other neurologic problems; (6) mus-
cular-neurologic disorders; (7) infections such as human immu-
nodeficiency virus; (8) pancreas and biliary diseases; (9) blood
disorders; (10) backache, spine ache, or joint disorders; (11) vi-
sion disorder (decreased vision to complete blindness); (12)
limbs disorder; (13) genital and urinary diseases; and (14) psy-
chiatric illness. A number from 0 (no comorbid physical condi-
tion) to 3 (high comorbid condition) is assigned to each item.\(^\text{[13]}\)

2) The Brief Pain Inventory
This scale scores pain severity on a 10-degree index where 0 in-
dicates no pain and 10 indicates severe pain. The validity of this
inventory has been studied in Iran by Mirzamani et al.,\(^\text{[14]}\) who
reported suitable validity in Iranian participants.

3) The Jones Irrational Beliefs Test (short-form)
The questions of the 40-item Jones Irrational Beliefs Test in
Iran were extracted and validated based on the original Jones
Test by Ebadi and Motamedin (2005). This includes four mini-
scales of hopelessness changes (15 items), demand for approv-
al (10 items), problem avoiding (5 items), and emotional irres-
ponsibility (10 items). The scoring of questions is based on a
5-point Likert scale, and those being tested indicate the option
that they agree with based on this scoring. In each mini-scale,
higher scores indicate greater intensity of irrational beliefs.
Cronbach’s alpha was reported to be 0.75, and validity was re-
ported to be 0.76 using the split-half method.\(^\text{[15]}\)

5. Statistical Analysis
The data were analyzed by multivariate analysis of variance
(MANOVA), chi-square test, and t-test using IBM SPSS for Win-
dows ver. 19.0 (IBM Co., Armonk, NY, USA). The chi-square
test was used to investigate the non-significance of the differ-
ence between the two groups on nominal variables, including
job status and smoking and alcohol abuse. The t-test was used
to study the non-significance of the difference between the two
groups on quantitative variables, including age and comorbid-
ties. MANOVA was used to compare the two groups in terms of
dependent variables. Further, significance was determined
with P-values less than 0.05, and eta-square was used to evalu-
ate the effect size for each dependent variable.

RESULTS

Each group included 33 women and 15 men. The mean ± SD
age was 52.21 ± 7.39 years for women with severe pain and
52.36 ± 8.69 for women with mild chest pain. The mean ± SD age
for men with severe chest pain was 54.53 ± 8.39 years and
54.07 ± 9.80 for those with mild chest pain. Moreover, the
mean ± SD pain severity in the group with severe chest pain was
7.01 ± 1.24, and in the group with mild chest pain, it was
3.33 ± 1.14. Demographic and behavioral variables are shown in
Table 1.

As shown in Table 1, there was no significant difference in
any of the demographic or behavioral variables between the
two groups. Table 2 presents means and SDs of the studied
variables by group. Table 2 shows the results of the MANOVA
comparing the two groups.

The F-value for group effects when controlling for confound-
ing variables [F[4,91] = 5.97; P < 0.001; eta-square = 0.21] showed
a significant difference for at least one of the dependent vari-
bles between the two groups. According to the table, patients
with severe pain showed significantly higher scores than did
patients with mild pain in emotional irresponsibility [F[1,94] =
17.37; P < 0.001; eta-square = 0.16], hopelessness changes [F[1,94]
= 14.66; P < 0.001; eta-square = 0.14], and problem avoiding
[F[1,94] = 10.24; P = 0.002; eta-square = 0.10]. Eta-square, which
shows the effect size for each variable, suggests that the major
differences were in irresponsibility, hopelessness changes, and
problem avoiding. However, there was no significant difference
between groups in the need for approval variable [F[1,94] = 1.83;
P = 0.180; eta-square = 0.02] (Figure 2). Meanwhile, after apply-
ing the Bonferroni correction (P = 0.012), because of the four
existing dependent variables, and given the significance levels
of the variables, the significant difference was confirmed.

DISCUSSION

The present study was carried out to compare the irrational be-
liefs in non-coronary patients with severe and mild chest pain.
In line with van Peski-Oosterbann et al.\(^\text{[11]}\) and Achem,\(^\text{[4]}\) the re-
sults showed a significant difference between the two groups in
terms of hopelessness changes, problem avoiding, and emo-
tional irresponsibility. The intensity of these variables was
higher in patients with severe pain chest compared to those
with mild chest pain. However, no difference was seen between
the two groups in terms of the need for approval. As irrational
beliefs dominate the individual’s psyche and determine the
way individuals comment on, interpret, and define the life incidents that can regulate the quantity and quality of the behaviors and emotions,\cite{16} it is somewhat predictable that we would observe higher scores on these beliefs in patients with severe pain. Dysfunctional attitudes and irrational beliefs are known as the underlying and intermediate factors in different disorders. They appear inflexible, resistant to change, and dysfunctional. These beliefs are initiated by environmental stresses and are often experienced by individuals as facts.\cite{17} Therefore, there appears to be a defective communicative cycle between the experience of negative thoughts and dysfunctional beliefs, such that the existence of each one strengthens the other.

One of the results showed that the degree of hopelessness changes seen was higher in patients with severe chest pain than it was in those with mild chest pain. Irrational beliefs affect the cognitive performance of the individual and weaken the effectiveness of cognition.\cite{18} This leads the individual to incorrectly relate the existing problems and especially the pain, to uncontrollable external factors, including physician’s negligence, and they start to feel that doctors are unable to alleviate the pain. Continuing to feel hopeless and establishing it as an irrational belief, pain control becomes more complicated and the patient starts to report the ongoing feeling of pain.

Another finding indicated that the degree of problem avoiding is higher in patients with higher intensity of pain than it is in those with lower pain intensity. As irrational beliefs do not follow synchronization and coordination,\cite{20} they result in stressful situations and enhance negative behavior and perfor-

Table 1. Comparison of demographic and behavioral features and comorbidities by group

| Variable          | Severe pain (n = 48) | Mild pain (n = 48) | Total (n = 96) | t      | P-value* |
|-------------------|----------------------|-------------------|---------------|--------|----------|
| Sex†              |                      |                   |               | 1.02   | 0.82     |
| Male              | 15                   | 15                | 30            |        |          |
| Female            | 33                   | 33                | 66            |        |          |
| Age (y)‡          | 52.25 ± 7.78         | 52.58 ± 9.95      | 52.42 ± 8.88  | 0.18   | 0.85     |
| Comorbidity‡      | 1.13 ± 4.73          | 1.27 ± 4.42       | 1.20 ± 4.58   | 0.21   | 0.89     |
| Education level   |                      |                   |               |        |          |
| Junior school     | 40                   | 40                | 80            |        |          |
| High school diploma | 7                   | 7                  | 14            |        |          |
| University degree | 1                    | 1                  | 2             |        |          |
| Job†              |                      |                   |               | 1.75   | 0.59     |
| Housewife         | 32                   | 32                | 64            |        |          |
| Office worker     | 4                    | 4                  | 8             |        |          |
| Self-employed     | 8                    | 6                  | 14            |        |          |
| Retired           | 4                    | 4                  | 8             |        |          |
| Marital status    |                      |                   |               |        |          |
| Married           | 40                   | 40                | 80            |        |          |
| Widowed/separated | 8                    | 8                  | 16            |        |          |
| Smoking†          |                      |                   |               | 2.01   | 0.15     |
| Yes               | 10                   | 7                 | 17            |        |          |
| No                | 38                   | 41                | 79            |        |          |
| Drinking†         |                      |                   |               | 2.05   | 0.16     |
| Yes               | 2                    | 4                 | 6             |        |          |
| No                | 46                   | 44                | 90            |        |          |

Values are presented as number or mean ± SD.

*P < 0.05. †By chi-square test. ‡By t-test.

Table 2. MANOVA comparing between the two groups

| Variable          | Severe chest pain (n = 48) | Mild chest pain (n = 48) | Total (n = 96) | F      | P-value* | Eta-square |
|-------------------|---------------------------|--------------------------|---------------|--------|----------|------------|
| Hopeless          | 50.92 ± 8.82              | 44.01 ± 8.88             | 47.46 ± 9.46  | F(1,94) = 14.66 | 0.001* | 0.14       |
| Demand            | 37.12 ± 5.38              | 35.60 ± 5.63             | 36.36 ± 5.53  | F(1,94) = 1.83  | 0.180  | 0.02       |
| Problem           | 16.39 ± 3.12              | 14.23 ± 3.50             | 15.31 ± 3.47  | F(1,94) = 10.24 | 0.002* | 0.10       |
| Emotional         | 29.81 ± 5.33              | 25.33 ± 5.20             | 27.57 ± 5.70  | F(1,94) = 17.37 | 0.001* | 0.16       |

MANOVA (group)

|                  | Pilli’s trace (value) = 0.21 | Wilks lambda (value) = 0.79 | Hotelling’s trace (value) = 0.26 | Roy’s largest root (value) = 0.26 |
|------------------|-----------------------------|-----------------------------|----------------------------------|----------------------------------|
|                  | F(4,91) = 5.973             | F(4,91) = 5.973             | F(4,91) = 5.973                  | F(4,91) = 5.973                  |

MANOVA, multivariate analysis of variance.

*P < 0.01.
One of those beliefs that leads to negative performance is problem avoiding. While this leads patients to forget the reality, after a while, patients are overcome by self-dissatisfaction, the current situation, and the guilt of problem evasion. This causes the individuals to lack self-confidence and intensify the existing pain by self-blaming as the main reason for pain intensification and by retelling their irrational thoughts and behavior.

Another finding showed that the degree of emotional irresponsibility is higher in patients with severe chest pain than it is in those with mild chest pain. Ellis and Harper believe that appropriate emotional reactions originate from the rational thinking of individuals based on the awareness of the role of feelings in recognition of negative and positive emotions. Although Ellis and Harper emphasized the necessity of negative emotions in our lives and that their existence is not necessarily a serious problem, patients with high-grade emotional irresponsibility believe that their lives should be free of negative emotion, including fear and anxiety. Hence, the existence of these negative emotions indicates a serious problem that could be very dangerous if not resolved. The existence of these negative emotions is so troubling for these patients that its mere existence creates the continuity and intensity of the pain.

Moreover, the results showed that there was no difference in terms of demand for approval between patients with severe and mild chest pain. Those who seek approval from others are generally very anxious and feel insecure, and they are not the exception to this rule. Many of these patients expect the doctor to approve their theory of having heart problems in order to feel relaxed, while the doctor rejects their theory based on the medical evidence and assures them that there is not any kind of heart problem. After some repetitions, the patients begin to conclude that their complaints are not taken seriously. This happens in patients with both severe and mild chest pain, who equally seek the approval of the doctor and others to feel relaxed.

A limitation to the present study was a lack of consideration of variables that might affect the severity of non-coronary chest pain. Therefore, it is suggested that future studies investigate such variables. On the other hand, we could not match patients’ ages due to a small sample size, which seems essential to be considered in future studies. 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 the following items in future studies: family history of chest pain, kinds of drugs taken, and history of heart disease in first-degree relatives.

In conclusion, the present study was carried out to compare the irrational beliefs in non-coronary patients with severe and mild chest pain. The results showed that there was a significant difference between the two groups in terms of hopelessness changes, problems avoiding, and emotional irresponsibility, and the intensity of these irrational beliefs was higher in patients with severe chest pain. However, no difference was seen in terms of need for approval between the two groups. Therefore, it could be said that irrational beliefs are mental phenomena that should be attended to by health professionals when physical symptoms appear. Irrational beliefs are common mental phenomena in patients with non-coronary chest pain, and they should be attended to by health professionals, especially in severe non-coronary chest pain. Further investigations to determine the association between irrational beliefs and non-coronary chest pain are necessary.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

REFERENCES

1. Kroenke K, Arrington ME, Mangelsdorff AD. The prevalence of symptoms in medical outpatients and the adequacy of therapy. Arch Intern Med 1990;150:1685–9.
2. Glombiewski JA, Rief W, Bosner S, Keller H, Martin A, Donner-Banzhoff N. The course of nonspecific chest pain in primary care: symptom persistence and health care usage. Arch Intern Med 2010;170:251–5.
3. Jones MP, Venketesan T, Wulsin LR. Evaluation of noncardiac chest pain: toward a positive diagnosis. J Clin Outcomes Manag 1999;6:41–51.
4. Achem SR. Noncardiac chest pain-treatment approaches. Gastroenterol Clin North Am 2008;37:859–78, ix.
5. Bass C, Mayou R. Chest pain. BMJ 2002;325:588–91.
6. Bradley LA, Richter JE, Scarinci IC, Haile JM, Schan CA. Psychosocial and psychophysical assessments of patients with unexplained chest pain. Am J Med 1992;92:655–73.
7. Tennant C, Mihailidou A, Scott A, Smith R, Kellow J, Jones M, et al. Psychological symptom profiles in patients with chest pain. J Psychosom

Figure 2. Comparison of irrational beliefs between the two studied groups.
Res 1994;38:365-71.

8. Cheng C, Wong WM, Lai KC, Wong BC, Hu WH, Hui WM, et al. Psychosocial factors in patients with noncardiac chest pain. Psychosom Med 2003;65:443-9.

9. McDonald IG, Daly J, Jelinek VM, Panetta F, Gutman JM. Opening Pandora’s box: the unpredictability of reassurance by a normal test result. BMJ 1996;313:329-32.

10. Jerlock M, Gaston-Johansson F, Danielson E. Living with unexplained chest pain. J Clin Nurs 2005;14:956-64.

11. Van Peski-Oosterbaan AS, Spinhoven P, van Rood Y, van der Does A, Bruschke AJ. Cognitive behavioural therapy for unexplained non-cardiac chest pain: a pilot study. Behav Cogn Psychother 1997;25:339-50.

12. Eslick GD, Coulshed DS, Talley NJ. Review article: the burden of illness of non-cardiac chest pain. Aliment Pharmacol Ther 2002;16:1217-23.

13. Ifudu O, Paul HR, Homel P, Friedman EA. Predictive value of functional status for mortality in patients on maintenance hemodialysis. Am J Nephrol 1998;18:109-16.

14. Mirzamani SM, Sadidi A, Salimi SH, Besharat MA. Validation of the Persian version of the Brief Pain Inventory. Acta Medica Iranica 2005;43:425-8.

15. Ebadi GH, Motamedin M. The study of factor structure of Jones’s irrational beliefs test. Knowl Res Psychol 2005;23:73-92.

16. Ellis A. Changing rational-emotive therapy (RET) to rational emotive behavior therapy (REBT). J Ration Emot Cogn Behav Ther 1995;13:85-9.

17. Weich S, Churchill R, Lewis G. Dysfunctional attitudes and the common mental disorders in primary care. J Affect Disord 2003;75:269-78.

18. MacInnes D. The theories underpinning rational emotive behaviour therapy: where’s the supportive evidence? Int J Nurs Stud 2004;41:685-95.

19. Ellis A. Humanistic psychotherapy: the rational-emotive approach. New York (NY): The Julian Press Inc., 1973.

20. Sahebi A. Metaphor therapy: the use of metaphors in cognitive restructuring. Tehran: SAMT Publication, 2008.

21. Bemejo-Tor L, Prieto-Ursua M. Teachers’ irrational beliefs and their relationship to distress in the profession. Psychol Spain 2006;10:88-96.

22. Shaﬁabadi A, Naseri GR. Theories of counseling and psychotherapy. Tehran: Center for Academic Publication, 2007.

23. Ellis A, Harper RA. A new guide to rational living. rev. ed. North Hollywood (CA): Wilshire Books, 1979.

24. Mahigir F, Kumar VG, Karimi A. The experience of irrational beliefs among Indian and Iranian cancer patients. Indian J Fundam Appl Life Sci 2013;3:592-99.

25. Bahremand M, Moradi G, Saeidi M, Mohammadi S, Komasi S. Reducing irrational beliefs and pain severity in patients suffering from non-cardiac chest pain (NCCP): a comparison of relaxation training and metaphor therapy. Korean J Pain 2015;28:88-95.