# Prevalence of Anxiety and Depression in Young Patients Presenting with Atypical Chest Pain with Normal Coronaries

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## ABSTRACT

***Objective:*** To determine the prevalence of anxiety and depression in young patients presenting with atypical chest pain and normal coronary arteries.

***Study Design:*** Analytical, Cross-Sectional Study.

***Place and Duration of Study:*** Armed Forces Institute of Cardiology/National Institute of Heart Diseases Rawalpindi, Pakistan, from Jul to Dec 2021.

***Methodology:*** This study was carried out on 750 participants (having normal coronaries) of both gender and age<40years divided into study group (presented with atypical chest pain; n=375) and comparison group (no chest pain; n=375). Consecutive sampling technique was applied to collect data. Hospital Anxiety and Depression Scale (HADS) Questionnaire was used. Patients scoring 11 or more out of 21 points in Depression and Anxiety scale were identified as positive. Data was analyzed using SPSS version 24:00. Chi Square test was applied to find association between variables and *p*-value <0.05 was taken as significant value.

***Results:*** Out of n=750 patients 619(82.4%) were males and 131(17.6%) were females. Mean age at presentation was 33.54±5.54 years and 30.93±5.68 years in study and comparison group respectively. About 230(61.3%) participants had anxiety in the study group compared with 189(50.4%) in the comparison group, which was statistically significant (*p*=0.003). 221(58.9%) participants in study group and 132(35.2%) in comparison group had depression (*p*<0.001).

***Conclusion:*** Non cardiac chest pain is a common manifestation of depression and anxiety. Early recognition and prompt referral of these patients should be ensured to improve quality of life and prevent future unnecessary hospital visits.

**Keywords:** Anxiety, Depression, Non-Cardiac Chest Pain, Normal Coronaries, Young Patients.

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## INTRODUCTION

One of the most prevalent presenting complaints in emergency department is chest pain. Approximately, 60% of such cases eventually have a non-cardiac etiology.[1,2] Non-Cardiac Chest Pain (NCCP) is presence of recurrent angina-like chest pain and no evidence of heart disease after thorough medical examinations.[2] Chest pain especially non cardiac is rarely accompanied with cardiac disease in young patients. Young patients who present with unexplained chest pain are usually found to have high levels of depression and anxiety. Psychological stress is important trigger of non-cardiac chest pain. Since chest pain is an important manifestation of Coronary Artery Disease (CAD), presence of chest pain usually requires cardiology referral for further investigation. Hospital Anxiety and Depression Scale (HADS) is designed to estimate cognitive manifestations of depression and anxiety.[3] It is a well-validated assessment and is extensively utilized in other chronic ailments as well.[4,5]

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Patients having NCCP may present with variety of symptoms ranging from or dizziness and light headedness to cold sensations and hot flushes as well as fear of impending doom more patients with documented high score on HADS .[6]

NCCP without evidence of accompanying coronary artery disease has exaggerated chances of future cardiovascular events on follow up. Study by Jordan KP in 2017 depicted that 3% of patients with normal coronaries suffered from cardiovascular events approximately after five years follow up.[7]

There is documented two-fold enhanced relative risk of cardiovascular adverse events on long term follow up over a course of 5–26 years when compared with general population.[1]

Chest pain is a common presentation in emergency department as well as in outdoor clinics leading to high annual expenditure entailing many investigations which usually come out to be normal. The annual estimated expenditure for management and evaluation of chest pain in young United States Veterans has been

estimated to be as much as $69,009 for CAD and $57,336 for Non-Cardiac Chest Pain (NCCP).[8] The costs accompanying medical services for chest pain evaluation were estimated between $8 and $13 billion per year in United States.[9]

In present study, ischemic status of study participants was assessed by electrocardiograms (ECG), Troponin-I levels and CT-Angiography. Aim of current study was to determine the prevalence of anxiety and depression in young patients presenting with atypical chest pain and normal coronary arteries and comparing with healthy patients (normal coronaries and no chest pain), in cardiology outpatient department.

## METHODOLOGY

This Analytical Cross-Sectional Study was done at a Armed Forces Institute of Cardiology/National Institute of Heart Diseases, Rawalpindi, Pakistan for 6-months from July 2021 and December 2021. Institutional approval was obtained from the Institutional Ethical Review Board (IERB Ltr# 18/5/R&D/2021/105).

Sample size of n=39 for each study group was calculated by two group method using 17.6% and 45.9% prevalence of depression,[10] in healthy individuals and in patients with chest pain respectively by keeping 95% confidence interval and a 80% power of study. However, we collected data from 750 participants with 375 study members in each group.

**Inclusion Criteria:** Patients of age less than 40 years, presenting with non-cardiac chest pain with normal ECG, cardiac troponins levels and coronary CT angiography.

**Exclusion Criteria:** Patients with cardiac chest pain, previous history of cardiovascular disease, STEMI/NSTEMI, unstable angina, left ventricular failure, arrhythmias were excluded from the study.

In present study, ischemic status of study participants was assessed by ECG, Troponin-I levels and CT-Angiography. They were divided into two groups; Study Group (Group-I) and Comparison Group (Group-II), each group had n=375 participants. Group-I were the patients who presented with atypical chest pain while Group-II had no history of chest pain and visited the hospital as attendants of other patients.

Data was collected on Hospital Anxiety and Depression Scale (HADS) Questionnaire after taking informed consent. HADS estimates presence as well as severity of symptoms of both anxiety as well as depression. It was initially developed in 1983 for screening of affective disorders in patients. This scale comprises of 14 questions in which 7 questions pertaining to anxiety (HAD-A) and other 7 questions were regarding depression (HAD-D), each question has score from 0-3. A total score of 11 or above in each group indicates anxiety and depression.[11]

Statistical Package for Social Sciences (SPSS) version 24.00 was used for data management and analysis; descriptive as well as inferential statistics were applied to find numeric. Frequencies, percentages, means and standard deviations were calculated. Comparison between study and comparison group was made by applying Pearson's Chi-square test with $p$-value≤0.05 as significant.

## RESULTS

Of the n=750 patients, male count was higher in both study groups (study group and comparison group); 309 (82.4%) vs 310(82.7%) respectively. Mean age of study group at presentation was 33.54±5.54 years and 30.93±5.68 years in comparison group. Majority were non-smokers in both groups; 205(54.7%) and 243(64.8%) respectively. Maximum study participants were married; 284(75.7%) in study group and 228(60.8%) in comparison group as depicted in Table-I.

**Table-I: Baseline Characteristics of Study Participants (n=750)**

| | Study Group-I (Total=375) | Comparison Group-II (Total=375) |
|---|---|---|
| Age (years) (Mean±SD) | 33.54±5.54 | 30.93±5.68 |
| **Gender** | | |
| Male | 309(82.4%) | 310(82.7%) |
| Female | 66(17.6%) | 65(17.3%) |
| **Smokings** | | |
| Smokers | 170(45.3%) | 132(35.2%) |
| Non smokers | 205(54.7%) | 243(64.8%) |
| **Marital Status** | | |
| Married | 284 (75.7%) | 228(60.8%) |
| Unmarried | 91(24.3%) | 147(39.2%) |

Out of 750 participants, 230(61.3%) had anxiety in the Group-I, compared with 189(50.4%) in the Group-II. Anxiety was significantly more prevalent in patients with NCCP as compared to Group-II ($p$=0.003). About 221 (58.9%) had depression in the Group-I, compared with 132(35.2%) in the Group-II. Depression was signifi-cantly more prevalent in patients with NCCP as compared to controls ($p$<0.001) as shown in Table-II.

Among patients with depression, 142(64.3%) were smokers and 79(35.7%) were nonsmokers. Smoking was significantly more prevalent in patients with

depression ($p$<0.001). Depression was present in 159 (71.9%) male patients and 62(28.1%) female patients out of total 375. Frequency of depression was significantly higher in females (62 out of 66 Females) ($p$<0.001). Furthermore, marital status was found insignificantly associated with depression ($p$>0.05), as shown in Table-III.

**Table-II: Prevalence of Anxiety and Depression in study and comparison group (n=750)**

| | Study Group-I (Total=375) | Comparison Group-II (Total=375) | *p*-value |
|---|---|---|---|
| **Anxiety** | | | |
| Yes | 230 (61.3%) | 189 (50.4%) | 0.003 |
| No | 145 (38.7%) | 186 (49.6%) | |
| **Depression** | | | |
| Yes | 221 (58.9%) | 132 (35.2%) | <0.001 |
| No | 154 (41.1%) | 243 (64.8%) | |

**Table III: Characteristics of Study Participants with NCCP (Group-I) (n=375)**

| | Depression Present (Total=221) | Depression Absent (Total=154) | *p*-value |
|---|---|---|---|
| **Gender** | | | |
| Male | 159(71.9%) | 150(97.4% ) | <0.001 |
| Female | 62(28.1%) | 4(2.6%) | |
| **Smoking Status** | | | |
| Smoker | 142(64.3%) | 28(18.2%) | <0.001 |
| Non Smoker | 79(35.7%) | 126(81.8%) | |
| **Marital Status** | | | |
| Unmarried | 115(32.6%) | 123(31.0%) | 0.63 |
| Married | 238(67.4%) | 274(69.0%) | |

Among the patients with anxiety, majority were smokers 143(62.2%). Smoking was significantly more prevalent in patients with anxiety ($p$<0.001). Anxiety was more prevalent in males 169(73.5%) and smokers 143(62.2%) compared to females and non-smokers ($p$<0.001) while there was statistically insignificant association of marital status with anxiety ($p$>0.05) as presented in Table-IV.

**Table-IV: Characteristics of study participants with NCCP (Group-I) (n=375)**

| | Anxiety Present (Total=230) | Anxiety Absent (Total=145) | *p*-value |
|---|---|---|---|
| **Gender** | | | |
| Male | 169(73.5%) | 140(96.6%) | <0.001 |
| Female | 61 (26.5%) | 5(3.4%) | |
| **Smoking Status** | | | |
| Smoker | 143(62.2%) | 27(18.6%) | <0.001 |
| Non Smoker | 87(37.8%) | 118(81.4%) | |
| **Marital Status** | | | |
| Unmarried | 110(31.3%) | 128(32.1%) | 0.82 |
| Married | 241(68.7%) | 271(67.9%) | |

## DISCUSSION

According to estimates reported by Members *et al.,* and Cairns *et al.,* chest pain is the second most common presentation for Emergency Department (ED) visits, with trauma being the most common cause. Chest pain accounts for more than 6.5 million annual ED visits, accounting for up to 4.7% of total ED visits in United States and as much as four million outpatient visits annually.[12,13]

About 5.1-6% of patients reporting to Emergency department with chest pain have Acute Coronary Syndrome whereas most of these patients presenting to ED have a non-cardiac cause of chest pain.[14,15] Psychological mechanisms have an integral role in non-cardiac chest pain.[16]

Study carried out in Iran in 2016 by Mousavi depicted that mean age of patients reporting to ED with non-cardiac chest pain was 26.33±5.77 years and females accounted for majority of these participants 148(65.5%).[17] The mean age at presentation of non-cardiac chest pain in our study was 32.23±5.76 years.

Anxiety and depression are well known etiological factors behind non-specific chest pain not only in adults but also in young adolescents HADS score is a time tested tool for the early suspicion as well as diagnosis of these disorders. In a study conducted in 2005 by N S Demiryoguran, 49(31.2%) out of 157 patients had HADS score of more than 10.[6]

A study carried out in in young patients in 2016 by Khairandish had reported psychological factors asthe cause of chest pain in 29.9% of 194 patients enrolled for study, depression was present in 45.9% of patients and anxiety was present in 67.5 % of patients having psychological chest pain.[18] Study carried out by Kenar in 2019 also collaborated these observations.[19] Another review of recent literature showed that up to 65% of patients with major depressive disorder have somatic cause of chest pain and about 45% with a primary diagnosis of chest pain have mood disorders.[20] Our study showed a much higher prevalence of anxiety with 230(61.3%) patients had anxiety with HAD-A score 11 or more and depression 221(58.9%) with HAD-D score of 11 or more.

Non-cardiac chest pain is also reported to have an independent association with abnormal General Health Questionnaire (GHQ-28) score for determining psychological diseases (Odds ratio: 3.32).[17]

Study by Gastão in 2009 documented atypical chest pain of undetermined etiology in 71(54.6%) of 130 patients with anxiety prevalent in 53.5% and depression prevalent in 25.4% patients.[21] Martin *et al.* documented HADS score of greater than 8 for

depression and anxiety questions in about 15.2% and 30.4% patients, respectively.[22]

Anxiety and depression heralds severe adverse cardiac events in patients having stable CAD. As a result of increased morbidity and mortality accompanying depression among cardiac patients, the HADS score may prove to be a useful tool in identifying high risk patients.[23,24]

## LIMITATIONS OF STUDY

The study was cross sectional study and measured only the prevalence of anxiety and depression in patients presenting with non-cardiac chest pain but did not address the issue of predisposing factors for anxiety and depression in these patients.

## CONCLUSION

Non cardiac chest pain is a common manifestation of depression and anxiety whereas depression and anxiety are the leading causes of cardiac diseases. Early recognition and prompt referral of these patients should be ensured to prevent future cardiovascular events.

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**Conflict of Interest:** None.

**Authors' Contribution**

Following authors have made substantial contributions to the manuscript:

AA, SM & NAS: Manuscript writing, Data Analysis, Approval of the Final Version to be Published.

UI, MBS & MAV: Critical Review, Data Acquisition, Drafting the Manuscript, Approval of the Final Version to be Published.

SKS & AHS: Data Analysis, data Interpretation, Critical Review, Approval of the Final Version to be Published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

## REFERENCES

1. Meresh E, Piletz J. Noncardiac chest pain: systematic review of the literature on prognosis. Res Rep Clini Cardiol 2018; 9(1): 1-9. https://doi: 10.1136/openhrt-2018-000859. eCollection 2018
2. Roohafza H, Yavari N, Feizi A, Khani A, Saneian P, Bagherieh S, et al. Determinants of depression in non-cardiac chest pain patients: a cross sectional study. Korean J Pain 2021; 34(4): 417-426. https://doi: 10.3344/kjp.2021.34.4.417.
3. Hatch R, Young D, Barber V, Griffiths J, Harrison DA, Watkinson P. Anxiety, depression and post traumatic stress disorder after critical illness: a UK-wide prospective cohort study. Crit Care 2018; 22: 1-13. https://doi: 10.1186/s13054-018-2223-6.
4. Musey Jr PI, Schultebraucks K, Chang BP. Stressing out about the heart: a narrative review of the role of psychological stress in acute cardiovascular events. Acad Emer Med 2020; 27(1): 71-79. https://doi: 10.1111/acem.13882.
5. LoMartire R, Äng BO, Gerdle B, Vixner L. Psychometric properties of Short Form-36 Health Survey, EuroQol 5-dimensions, and Hospital Anxiety and Depression Scale in patients with chronic pain. Pain 2020; 161(1): 83-85. https://doi: 10.1097/j.pain.0000000000001700.
6. Demiryoguran N, Karcioglu O, Topacoglu H, Kiyan S, Ozbay D, Onur E, et al. Anxiety disorder in patients with non-specific chest pain in the emergency setting. Emer Med J 2006; 23(2): 99-102. https://doi: 10.1136/emj.2005.025163
7. Ford TJ, Ong P, Sechtem U, Beltrame J, Camici PG, Crea F, et al. Assessment of vascular dysfunction in patients without obstructive coronary artery disease: why, how, and when. Cardiovascular Interventions. 2020; 13(16): 1847-1864. https://doi: 10.1016/j.jcin.2020.05.052.
8. Safdar B, Dziura J, Bathulapalli H, Leslie DL. Chest pain syndromes are associated with high rates of recidivism and costs in young United States Veterans. BMC Fam Prac 2015; 16: 1-8. https://doi: 10.1186/s12875-015-0287-9
9. Castonguay J, Turcotte S, Fleet RP, Archambault PM, Dionne CE, Denis I, et al. Physical activity and disability in patients with noncardiac chest pain: a longitudinal cohort study. Bio Psycho Soc Med 2020; 14: 1-8. https://doi: 10.1186/s13030-020-00185-9
10. Khairandish Z, Jamali L, Haghbin S. Role of anxiety and depression in adolescents with chest pain referred to a cardiology clinic. Cardiol Young 2017; 27(1): 125-130.
11. Zigmond AS, Snaith RP. The hospital anxiety and depression scale. Acta psychiat Scandinavi 1983; 67(6): 361-370. https://doi: 10.1111/j.1600-0447.1983.tb09716.x
12. Members WC, Gulati M, Levy PD, Mukherjee D, Amsterdam E, Bhatt DL, et al. 2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR guideline for the evaluation and diagnosis of chest Pain: A report of the American College of Cardiology/American Heart Association joint committee on clinical practice guidelines. J Cardiovasculr Comp Tomograph 2022; 16(1): 54-122. https://doi: 10.1161/CIR.0000000000001030
13. Cairns C, Kang K. National hospital ambulatory medical care survey: 2019 emergency department summary tables. 2022. https://doi: 10.1093/ofid/ofad068
14. Alderwish E, Schultz E, Kassam Z, Poon M, Coplan N. Evaluation of acute chest pain: Evolving paradigm of coronary risk scores and imaging. Rev Cardiovascul Med 2019; 20(4): 231-244. https://doi: 10.31083/j.rcm.2019.04.589
15. Hsia RY, Hale Z, Tabas JA. A national study of the prevalence of life-threatening diagnoses in patients with chest pain. JAMA Inter Med 2016; 176(7): 1029-1032. https://doi: 10.1001/jamainternmed.2016.2498
16. Mourad G, Jaarsma T, Strömberg A, Svensson E, Johansson P. The associations between psychological distress and healthcare use in patients with non-cardiac chest pain: does a history of cardiac disease matter? BMC Psychiat 2018; 18(1): 1-10. https://doi: 10.1186/s12888-018-1689-8
17. Mousavi M, Mousavi S, Akbarian M, Raiesi M, Salehifar D. General mental health status of out-patients with atypical chest pain, a study control study. J Cardiol Curr Res 2016; 5(4): 00170. https://doi:10.15406/jccr.2016.05.00170
18. Khairandish Z, Jamali L, Haghbin S. Role of anxiety and depression in adolescents with chest pain referred to a cardiology clinic. Cardiol Young 2017; 27(1): 125-130. https://doi: 10.1017/S1047951116000238

19. Kenar A, Örün UA, Yoldaş T, Kayalı Ş, Bodur Ş, Karademir S. Anxiety, depression, and behavioural rating scales in children with non-cardiac chest pain. Cardiol Young 2019; 29(10): 1268-1271. https://doi: 10.1017/S1047951119001896
20. Hu L, Liu Z-Z, Wang Z-Y, Jia C-X, Liu X. Associations between pain and depressive symptoms: A longitudinal study of Chinese adolescents. J Affect Disord 2022; 299: 675-681. https://doi: 10.1016/j.jad.2021.12.095
21. Soares-Filho GL, Freire RC, Biancha K, Pacheco T, Volschan A, Valença AM, et al. Use of the hospital anxiety and depression scale (HADS) in a cardiac emergency room–Chest Pain unit. Clini 2009; 64(3): 209-214. https://doi:10.1590100200/s1807-59322009000300011
22. Dunbar M, Ford G, Hunt K, Der G. A confirmatory factor analysis of the Hospital Anxiety and Depression scale: comparing empirically and theoretically derived structures. Bri J Clin Psychol 2000; 39(1): 79-94. https://doi: 10.1348/014466500163121
23. Jha MK, Qamar A, Vaduganathan M, Charney DS, Murrough JW. Screening and management of depression in patients with cardiovascular disease: JACC state-of-the-art review. J Am College Cardiol 2019;73(14):1827-45. https://doi: 10.1016/j.jacc.2019.10001.041
24. Frasure-Smith N, Lesperance F. Depression and anxiety as predictors of 2-year cardiac events in patients with stable coronary artery disease. Arch Gen Psychiat 2008; 65(1): 62-71. https://doi: 10.1001/archgenpsychiatry.2007.4.