Published in final edited form as:
Arch Womens Ment Health. 2008 September ; 11(4): 287–293. doi:10.1007/s00737-008-0021-x.

Women and Non-Cardiac Chest Pain: Gender Differences in Symptom Presentation

Cheryl N. Carmin, Ph.D.,
University of Illinois at Chicago

Raymond L. Ownby, M.D.Ph.D.,
University of Miami

Pamela S. Wiegartz, Ph.D., and
University of Illinois at Chicago

George T. Kondos, M.D.
University of Illinois at Chicago

Summary

A substantial number of individuals evaluated for complaints of chest pain do not suffer from coronary heart disease (CHD). Studies show that many patients who complain of symptoms that might be caused by CHD, such as shortness of breath or chest pain, may actually have an anxiety disorder. Gender differences in how patients present with these symptoms have not been adequately explored. The purpose of this study was to explore possible gender differences in the presentation of patients with CHD-like symptoms. Two groups were examined, one comprising 6,381 individuals self-referred for electron beam tomography (EBT) studies and a subset of these individuals who defined a “low-risk” group based on the absence of risk factors for CHD and low coronary artery calcium (CAC) scores. We explored gender differences in symptom presentation in each group after controlling for relevant variables by using logistic regression models.

These analyses showed that women were significantly more likely than men to endorse CHD symptoms that might also be caused by an anxiety disorder. Women in the low risk group reported CHD symptoms also referable to anxiety more often than men, but unlike men did not complain primarily of chest pain. Women were also more likely to have been prescribed antianxiety or antidepressant medication. In previous studies, non-cardiac chest pain has been considered a hallmark of anxiety in individuals seen in medical settings. This study suggests that in individuals with low risk for CHD chest pain was not related to gender, but other anxiety-related symptoms including heart flutter, lightheadedness, nausea, and shortness of breath were more likely to be reported in women than in men.

Keywords

Non-cardiac chest pain; anxiety; coronary heart disease; gender; symptom

Introduction

Anxiety disorders are the most frequently-occurring psychiatric condition in adults in the United States (Kessler et al. 2005b). Due to the similarity, acuity, and paroxysmal nature of

Address all correspondence to: Cheryl Carmin, Ph.D., University of Illinois at Chicago, Department of Psychiatry (MC 913), 912 S. Wood Street, Chicago, IL 60612, Phone: 312-413-1225, Fax: 312-996-4358, E-mail: ccarmin@psych.uic.edu.

some anxiety symptoms to those of coronary heart disease, persons with panic disorder are seen in a disproportionately large percentage of patients who present in cardiology practices (10–14%) compared to the general population (2–5%) (Beitman et al.,1989). Patients with panic disorder have more frequent physician visits (Frasure-Smith et al. 2002), a higher risk for unnecessary hospitalizations (Arad et al. 1996), a greater likelihood of using anti-anginal medications in spite of having no evidence of cardiac disease (Chignon et al. 1993) and to report that the presence of unexplained chest pain has a negative impact on their quality of life (Jerlock, Gaston-Johansson, & Danielson, 2005).

Epidemiological studies consistently show that women have significantly greater risks than men for developing anxiety disorders (Kessler et al. 2005a) while men have a greater risk for coronary heart disease (CHD; Taylor et al. 2005). Distinguishing between symptoms of coronary heart disease and anxiety disorder can be difficult due to the considerable overlap in their presentations. Persons who complain of cardiac-like symptoms (such as chest pain, shortness of breath, or nausea) but are judged by clinicians not to have coronary heart disease are said to have *non-cardiac chest pain*. A meta-analysis of research on non-cardiac chest pain showed that those in this group who sought treatment had higher rates of panic disorder and atypical chest pain, were more likely to be women, were younger and had higher levels of self-reported anxiety (Huffman & Pollack, 2003). Individuals who experience greater negative emotions as well as anxiety or depression have been found to report a higher incidence of non-cardiac chest pain (Kuijpers, Denollet, Wellens, Crijns, & Honig, 2007). In this paper, due to the possibility that such symptoms could arise either from coronary heart disease or anxiety, we refer to this group of complaints (heart flutter, burning pain in the chest, lightheadedness, nausea, pain and pressure in the chest, and shortness of breath) as “CHD-like symptoms.”

Men and women also differ in whether they are prescribed anxiolytic and antidepressant medications. In the National Health and Nutrition Examination Survey of more than 20,000 adults, women received anxiolytic medications almost twice as often as men (4.1% vs. 2.2%) and antidepressants slightly less than two and one half times as often (3.1% vs. 1.4%) (Goldberg et al. 2000). Research has shown that 79.1% of primary care patients with medically unexplained symptoms are women (Carmin et al. 2003) and that 44.7% of patients in primary care who have a psychiatric illness have an anxiety disorder. Women may, then, be more likely to consult physicians for symptoms that do not have a clear physical cause and their complaints may often be anxiety related.

As many as 43% of individuals who undergo coronary angiography do not receive a diagnosis of CHD (Chignon et al. 1993). Instead, one quarter to a third of these individuals suffer from anxiety or depression (Beitman et al. 1989). It is clearly not cost effective to use coronary angiography to diagnose an anxiety disorder (Fleet et al. 1994). In fact, Carter et al. (1997) noted well over ten years ago that the annual cost of angiography for patients without CHD was approximately $750 million. Unlike coronary angiography, electron beam tomography (EBT) is a sensitive and non-invasive method to detect and quantify coronary artery calcium (CAC), a marker for CHD. The presence of CAC as detected by EBT is strongly correlated with the presence of coronary atherosclerosis (Laudon et al. 1999) and the degree of calcification predicts coronary events in individuals with and without known CHD (Cagnacci et al. 2003). EBT has also been useful in risk stratification of individuals presenting to emergency rooms with acute chest pain (Laudon et al, 1999). Individuals with chest pain but low-to-intermediate CHD risk factors and negative EBT results are thus likely to be among those patients with medically unexplained cardiac symptoms.

The purpose of this investigation was to evaluate the relation of gender to the presence and frequency of anxiety symptoms in persons evaluated with EBT. We also examined the same questions in persons with low risk for CHD based on their risk for CHD as determined by

current health status and personal and family medical histories. Based on epidemiological studies, we predicted that women would report more CHD-like symptoms but would have a lower incidence of CHD as assessed by EBT. We also hypothesized that CHD-like symptoms that are typical of panic disorder (chest pain, heart flutter, lightheadedness, nausea, shortness of breath) would be more common in women, in participants prescribed psychotropic medication, and in those without EBT-confirmed evidence of CHD. We hypothesized that gender would affect the presentation of CHD-like symptoms in all cases.

Materials & Methods

Study Participants

Unlike many medical tests or procedures, EBT does not require that a physician refer individuals for scanning. Thus, the sample was composed primarily of self- referred individuals who underwent cardiac EBT screening at either of the two University of Illinois at Chicago Cardiology Section offices one of which is located at the University of Illinois Medical Center and the other at their suburban location. All individuals over the age of 18 who could provide informed consent and complete a self-report questionnaire in English were included as part of a larger study the purpose of which was to develop the database for individuals who were undergoing this procedure. Those individuals excluded from EBT screening were pregnant or nursing women or individuals with an EBT scan within the past 12 months. No exclusions were based on cardiac symptoms or medical history. (Full details of the original study can be found in Hoff et al. (2001). The Institutional Review Board of the University of Illinois at Chicago approved both the original study and this subsequent reanalysis.

A subsample of these self-referred study participants was selected with low risk for CHD based on past medical history and current treatment. This was done based on our rationale that these low-risk individuals who request evaluation for a problem they are unlikely to have might be most likely to have non-cardiac symptoms related to anxiety. Based on their responses to the self-report measure described below, persons included in this group met the following criteria: 1) no history of CHD; 2) no major risk factors for CHD (e.g., diabetes, hypertension, hypercholesterolemia, peripheral vascular disease); 3) no history of myocardial infarction or stroke; 4) no use of medications for diabetes, hypertension or hypercholesterolemia, or any cardiac condition; and 5) no history of surgical cardiovascular intervention. We hypothesized that in these low risk patients, reported anxiety symptoms were less likely to reflect reality-based symptoms of cardiac disease but to represent non-cardiac symptoms.

Measures

Prior to EBT screening, study participants completed a history questionnaire focused on demographic data, general medical and cardiovascular disease history, symptom complaints, medication use, and CHD risk factors. The questionnaire included a broad range of physical symptoms, several of which overlap with those of anxiety disorders (e.g., chest pain or pressure, burning chest pain, nausea, shortness of breath, heart flutter, and lightheadedness). Because this self-report measure did not permit us to make a definitive diagnosis of anxiety, we refer to these as anxiety-related symptoms. In contrast, other symptoms such as pain in the arm or neck, orthopnea, edema in the lower extremities, and/or abdominal swelling were not considered indicative of anxiety. The medications were listed in a categorical fashion (e.g., antianxiety/antidepressants, antihypertensives) rather than by specific name. In all cases, subjects were asked to indicate which element(s) of each item applied to them.

EBT Imaging Procedures

EBT scanning was performed with an Imatron C-100 or C-150 scanner. To image the entire heart, 40 transverse 3mm thick slices were obtained during two breath holding periods. To

improve sensitivity, an additional set of 20 transverse 3mm thick slices scans of the proximal coronary arteries were obtained and the higher of the two scores were used to report the total coronary artery calcium score. Calcium within the borders of a coronary artery was considered present when 3 or more continuous pixels with an attenuation was ≥ 130 Hounsfield units were identified. These lesions were then scored using the Agatston method[15] and the total coronary artery calcium score was the sum of all of the calcium found in the four major coronary arteries: left main, left anterior descending, circumflex and right coronary.

Data Analysis

Data were analyzed using SAS, version 9.1 (Cary NC: SAS Institute, 2004). Student's *t*-test was used to examine differences between men and women's total coronary calcium score and percentage of coronary calcium. Chi square analyses were used to assess gender differences in frequency of physical symptoms that might suggest CHD. The number of CHD-like symptoms was calculated for each individual, and chi-square analyses were completed to assess the relation of gender to number of symptoms. The significance of this relation was assessed using the Cochran-Armitage test for trend and by stratifying this evaluation based on low risk group and by the absence or presence of any coronary calcium (i.e., total score either 0 or greater than 0). As results for the assessments of low-risk group (based on history and current medical treatment) and coronary artery calcium score were similar, we present only results for stratification on risk group.

Logistic regression models were then developed to further assess the relation of gender to CHD-like symptoms to gender, psychotropic medication use, and the absence or presence of any coronary artery calcium. Use of medications for anxiety was defined by subjects' self-report on the history questionnaire. Absence or presence of coronary calcium was defined by a total coronary calcium score of either 0 or any value greater than 0. Logistic regression allowed us to model the relation between CHD-like symptoms and gender when the presence or absence of the group of symptoms are assessed, as might occur in a clinical evaluation. Analyses predicting psychotropic medication use were constructed to assess the possible contribution of symptoms and gender to the likelihood of being prescribed medication. Analyses predicting the absence or presence of coronary calcium allowed us to evaluate whether specific CHD-like symptoms might predict this variable, and the role of gender after allowing for symptoms.

Results

Data were complete for 6,381 individuals who underwent EBT scanning. Of these, 76.41% were male. Study participants ranged in age from 21 to 86 years (M = 50.98, SD = 9.87). Most subjects were Caucasian (80.9%). The ethnic/racial composition of the remaining subjects was African American (14.1%), Asian (2.0%), Hispanic (1.6%) or from some other background (1.4%). Eighty-three percent were married, 8.2% were single, 5.1% were divorced, 2.3% were widowed, and 1.8% were separated (Table 1).

There was a significant difference found in total CAC scores for men compared with women, with women having significantly less CAC. Four hundred sixty-two (7.25%) study participants were taking psychotropic medications with women being significantly more likely to have been prescribed psychotropic medication than men. (See Table 2.)

To better understand the potentially unique role of CHD-like symptoms we also analyzed data from a subsample of individuals who were judged to be at low risk for CHD. As noted, this group excluded participants with a history of CHD or related illness (e.g., myocardial infarction, hypertension, diabetes), had any device or procedure (e.g., pacemaker, by-pass surgery), or who took medications for any of these conditions. There were 2,224 subjects in

the resulting low cardiac risk subsample. Demographic information characterizing this subsample can be found in Table 1.

One hundred nineteen (5.36%) low cardiac risk subjects were prescribed psychotropic medication. Women in the low cardiac risk group were more than 2.5 times more likely than men to have been prescribed psychotropic medication. Anxiety-related symptoms in men and women in the entire group and the low cardiac risk subsample are presented in Table 3. Only men in both risk stratification groups endorsed chest pain (25.96% in the larger group;19.51% in the low cardiac risk group) with greater frequency than other anxiety symptoms. In both the complete and low cardiac risk samples, women endorsed heart flutter and shortness of breath most often. Additional analyses investigated the relation of gender to total number of CHD-like symptoms (see Table 4). Increasing total number of CHD-like symptoms was related to gender (significant test for trend) in the low risk group and in those with some risk.

Logistic regression analyses evaluating the relation of symptoms to gender, psychotropic medication use, and the presence or absence of coronary calcium are presented in Tables 5–7.

Gender differences and anxiety related symptoms

A logistic regression model was used to evaluate the relationship between CHD-like symptoms and gender (Table 5) A significant relationship was found between gender and some symptoms with women more likely to endorse CHD-like symptoms than men in both the entire and low cardiac risk groups (see Table 5). The gender-related pattern of symptoms is similar in both risk groups. Heart flutter, lightheadedness, and shortness of breath were significantly associated with female gender. The odds ratios of women in the entire sample were 1.2 – 2.2 greater than those of men with respect to burning chest pain, heart flutter, lightheadedness and shortness of breath. Similarly, in the low cardiac risk sample, the odds ratios for women were 1.5 – 2.5 times greater to report these CHD-like symptoms with the exception of burning chest pain.

Psychotropic medication use and CHD-like symptoms

A second logistic regression model examined the relation between CHD-like symptoms and the prescription for psychotropic medication while controlling for gender (see Table 6). In the larger group, burning chest pain, heart flutter, nausea, shortness of breath, and female gender were related to medication prescriptions while lightheadedness and chest pain/pressure were not. The odds of participants with CHD-like symptoms being prescribed psychotropic medications were 1.3 to 2 times greater than those who did not endorse such symptoms. In the low cardiac risk subsample, heart flutter, lightheadedness, shortness of breath and being female were similarly significantly related to psychotropic medication prescriptions, while symptoms of chest pain or pressure, burning chest pain, and nausea were not. The odds, then, were between 1.7 and more than 2.0 times greater for low cardiac risk participants to report symptoms consistent with anxiety. Notably neither of the CHD-like symptoms that focused on chest pain itself predicted psychotropic medication use.

Coronary calcium score and CHD-like symptoms

Final models involving both the entire and low risk groups examined the relation between CHD-like symptoms and the presence or absence of coronary calcium while controlling for gender and psychotropic medication use (Table 7). In the larger group, both chest pain symptoms and female gender were significantly related to the absence or presence of coronary calcium. The complaints of chest pain (burning pain and pain and pressure) and shortness of breath were significantly related to coronary calcium scores greater than 0. Men were more likely than women to have calcium scores greater than 0. In the low risk group, only the

complaints of chest pain and pressure and shortness of breath were related to coronary calcium scores greater than 0. Men were more likely than women to have scores greater than 0.

Discussion

This study illustrates that gender differences play a role in the frequency with which men and women report CHD-like symptoms that might arise from either coronary heart disease or anxiety. We also examined the occurrence of these symptoms in a group of patients with low risk for coronary heart disease, and the relation of CHD-like symptoms to psychotropic medication use and to the absence or presence of coronary calcium.

We hypothesized that CHD-like symptoms would be reported more frequently in women than in men. Results of univariate chi-square analyses and in tests for trend in both low and increased risk groups confirm this hypothesis. In the entire group, women were more likely than men to complain of any of the symptoms, while in the low-risk group, women were more likely than men to complain of heart flutter, lightheadedness, and shortness of breath. We also hypothesized, based on previous studies, that women would have less evidence of objective risk for CHD than men, and this hypothesis was also confirmed. Men had higher coronary calcium scores. Women were more likely to have been prescribed psychotropic medications, also as we hypothesized. We hypothesized that some symptoms might be increased in frequency in those prescribed psychotropic medications and in those with low coronary calcium scores. Our findings show that some symptoms may be more common in individuals with prescriptions for psychotropic medications and with coronary calcium scores greater than 0. Finally, we hypothesized that gender would affect outcomes in all of these analyses. We found a consistent and pervasive effect of gender across all our analyses.

Earlier studies have examined non-cardiac chest pain in samples of men who have undergone cardiac catheterization to diagnose CHD. In this study, because of the large sample, we were able to investigate whether men and women self-report anxiety symptoms, including non-cardiac chest pain, differently.

Consistent with our hypothesis, women endorsed anxiety-type symptoms considerably more often than men. Further, in contrast to existing studies of men with non-cardiac chest pain, we found that women who were evaluated with EBT scan were more likely to report panic-like symptoms of heart flutter, lightheadedness, and shortness of breath rather than chest pain. When the relationship between anxiety and gender was evaluated, chest pain was not linked to female gender while complaints of palpitations and lightheadedness were. One explanation for this difference may be that men are more sensitized to the association between chest pain and heart attack and will seek out medical assistance for this symptom. It is certainly possible that women have become better informed that chest pain may not be the predominant symptom of a heart attack and as a result, sought further assessment because of their discomfort with these other, unexplained symptoms. For both men and women, it could prove beneficial if they were informed that anxiety may be one of the explanations for their symptoms.

In addition to anxiety symptom complaints, when anti-anxiety/antidepressant medication use was modeled, female gender and symptoms other than chest pain (shortness of breath and heart flutter) were significantly related to the prescription of psychotropic medication regardless of the risk factors for CHD. Women were significantly more likely than men to be prescribed psychotropic medications for anxiety symptoms other than chest pain when they were free of coronary calcium. Since anxiety disorders are more prevalent in women (Kessler et al. 2005a), these women may have been correctly identified as suffering from one of these conditions. However, this finding does not explain why men are not treated similarly if their non-cardiac chest pain symptoms are related to anxiety.

The issue of gender differences is of considerable importance in understanding the ways in which patients present with medically ambiguous symptoms. Several studies have shown that women and men who have had an acute myocardial infarction report different symptoms (Goldberg et al. 1998). Our investigation underscores that for women who are seen in general medical settings, focusing solely on the symptom of chest pain and not the full constellation of symptoms may result in the inadvertent elimination of anxiety as a possible diagnostic consideration. Our data suggest that for women, symptoms such as palpitations and lightheadedness are significantly related to the presence of anxiety. Just as in cases where cardiac disease is present, our findings highlight that women are apt to experience and/or describe their symptoms differently than men.

This investigation has several limitations. Our subjects were predominantly male, Caucasian, and married thus limiting the generalizeability of these data. More detailed information about psychotropic medication use, symptoms associated with anxiety, and a complete psychiatric history were not available in this naturalistic sample. Since no psychiatric diagnostic clinical interview was conducted, we can only speculate as to whether study participants, based on their symptom endorsement, met criteria for an anxiety disorder or whether their symptoms were subsyndromal.

The absence of a definitive CHD diagnosis in study participants, despite their subjective complaint of cardiac symptoms, warrants further investigation. Some participants may have symptoms better explained by anxiety or another psychological factor. Our research on heart focused anxiety (HFA) suggests that HFA can be a particularly salient feature and have an impact on overall functioning (Carmin et al. 2003). Since other anxiety-related symptoms may be endorsed more frequently than non-cardiac chest pain but have not received the same degree of attention, women who report this broader array of symptoms may not be regarded as suffering from anxiety. As a result, these women may repeatedly seek out medical explanations for their suffering. Not evaluating the full range of anxiety-related symptoms may contribute to why so many individuals do not receive appropriate treatment despite the availability of effective interventions. Future studies could allow for the early identification of and mental health intervention for individuals whose symptoms have a psychological component. This may reduce the cost of unnecessary procedures and services.

Additional studies in more diverse populations are needed. In addition, a more detailed analysis of the psychological components of cardiac-like symptoms in individuals without evidence of coronary calcium would help clarify the relationship between these symptoms and disease outcomes. Future research efforts should focus on expanding successful treatment interventions for anxiety disorders to individuals suffering from cardiac anxiety. These interventions could increase the quality of life of these individuals as well as to decrease their overuse of an already overburdened healthcare system.

Acknowledgements

This research was supported by grant #K23MH064600-02 from the National Institute of Mental Health awarded to the first author. This author had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

The authors would like to thank Pauline Maki, Ph.D., Peter Buttrick, MD and Laura Miller, MD for their feedback and assistance with this manuscript.

References

Arad Y, Spadary LA, Goodman K, Lledo-Perez A, Sherman S, et al. Predictive value of electron beam computed tomography of the coronary arteries: 19-month follow-up of 1173 asymptomatic subjects. Circulation 1996;93:1951–3. [PubMed: 8640967]

Beitman BD, Mukerji V, Lamberti JW, Schmid L, DeRosear L, et al. Panic disorder in patients with chest pain and angiographically normal coronary arteries. American Journal of Cardiology 1989;63:1399–403. [PubMed: 2729113]

Cagnacci A, Tarquini R, Perfetto F, Arangino S, Zanni AL, et al. Endothelin-1 and nitric oxide levels are related to cardiovascular risk factors but are not modified by estradiol replacement in healthy postmenopausal women. A cross-sectional and a randomized cross-over study. Maturitas 2003;44:117–24. [PubMed: 12590007]

Carmin CN, Wiegartz PS, Hoff JA, Kondos GT. Cardiac anxiety in patients self-referred for electron beam tomography. Journal of Behavioral Medicine 2003;26:67–80. [PubMed: 12690947]

Carter CS, Servan-Schrieber D, Perlstein WM. Anxiety disorders and the syndrome of chest pain with normal coronary arteries: Prevalence and pathophysiology. Journal of Clinical Psychiatry 1997;58 (Suppl):70–73. [PubMed: 9133495]

Chignon J, Lepine J, Ades J. Panic disorder in cardiac outpatients. American Journal of Psychiatry 1993;150:780–5. [PubMed: 8386907]

Dammen T, Arnesen H, Ekeberg O, Husebye T, Friis S. Panic disorder in chest pain patients referred for cardiological outpatient investigation. Journal of Internal Medicine 1999;245:497–507. [PubMed: 10363751]

Fleet RP, Dupuis G, Marchand A, Burelle D, Beitman BD. Panic disorder, chest pain, and coronary artery disease: Literature review. Canadian Journal of Cardiology 1994;10:827–34. [PubMed: 7954018]

Frasure-Smith N, Lesperance F, Gravel G, Masson A, Juneau M, Bourassa MG. Long-term survival differences among low-anxious, high-anxious, and repressive copers enrolled in the Montreal heart attack readjustment trial. Psychosomatic Medicine 2002;64:571–9. [PubMed: 12140346]

Goldberg R, Goff D, Cooper L, Luepker R, Zapka J, et al. Age and sex differences in presentation of symptoms among patients with acute coronary disease: The REACT trial. rapid early action for coronary treatment. Coronary Artery Disease 2000;11:399–407. [PubMed: 10895406]

Goldberg RJ, O'Donnell C, Yarzebski J, Bigelow C, Savageau J, Gore JM. Sex differences in symptom presentation associated with acute myocardial infarction: A population-based perspective. American Heart Journal 1998;136:189–195. [PubMed: 9704678]

Hoff JA, Chomka EV, Krainik AJ, Daviglus M, Rich S, Kondos GT. Age and gender distributions of coronary artery calcium detected by electron beam tomography in 35,246 adults. American Journal of Cardiology 2001;87:1335–1339. [PubMed: 11397349]

Huffman JC, Pollack MH. Predicting panic disorder among patients with chest pain: An analysis of the literature. Psychosomatics 2003;44:222–236. [PubMed: 12724504]

Jerlock M, Gaston-Johansson F, Danielson E. Living with unexplained chest pain. Journal of Clinical Nursing 2005;14:956–964. [PubMed: 16102147]

Katon W, Hall ML, Russo J, Cormier L, Hollifield M, et al. Chest pain: Relationship of psychiatric illness to coronary arteriographic studies. American Journal of Medicine 1988;84:11–19.

Kessler RC, Chiu WT, Demler O, Walters EE. Prevalence, severity, and comorbidity of 12-month DSM-IV disorders in the national comorbidity survey replication. Archives of General Psychiatry 2005a; 62:617–27. [PubMed: 15939839]

Kessler RC, Berglund P, Demler O, Jin R, Merikangas KR, Walters EE. Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the national comorbidity survey replication. Archives of General Psychiatry 2005b;62:593–602. [PubMed: 15939837]

Kuijpers PMJC, Dennollet J, Wellens HJJ, Crijns HM, Honig A. Noncardiac chest pain in the emergency department: The role of cardiac history, anxiety or depression and Type D personality. European Journal of Cardiovascular Prevention and Rehabilitation 2007;14:273–279. [PubMed: 17446807]

Laudon DA, Vukov LF, Breen JF, Sheedy PF. The cost-effectiveness of electron beam computed tomography in the evaluation of chest pain in the emergency department observations units. Annals of Emergency Medicine 1999;34:S5–6.

Patel H, Rosengren A, Ekman I. Symptoms in acute coronary syndromes: Does sex make a difference? American Heart Journal 2004;148:27–33. [PubMed: 15215788]

Taylor AJ, Bindeman J, Feuerstein I, Cao F, Brazaitis M, O'Malley PG. Coronary calcium independently predicts incident premature coronary heart disease over measured cardiovascular risk factors: Mean

three-year outcomes in the Prospective Army Coronary Calcium (PACC) project. Journal of the American College of Cardiology 2005;45:807–14. [PubMed: 16139129]

Table 1

Demographic Information

	Entire Group (N = 6381)	Low Risk Group (N = 2225)
Age, mean (SD)	50.95 (9.87)	48.44 (9.09)
Males	50.95 (9.78)*	48.41 (9.17)+
Females	51.04 (10.16)**	48.51 (8.88)++
Sex, n (%)		
Male	4876 (76.41)	1670(75.1)
Female	1505 (23.58)	555 (24.9)
Ethnicity, n (%)		
Caucasian	5160 (80.9)	1763 (79.27)
African American	900 (14.1)	353 (15.87)
Asian/Oriental	128 (2.0)	42 (1.89)
Hispanic	102 (1.6)	32 (1.44)
Other	91 (1.4)	35 (1.57)
Marital Status, n (%)		
Single	525 (8.2)	172 (7.69)
Married	5263 (82.5)	1861 (83.72)
Divorced	328 (5.1)	110 (4.95)
Separated	115 (1.8)	43 (1.93)
Widow(er)	150 (2.3)	39 (1.71)

* N = 4876

** N = 1505

+ N = 1670

++ N = 555

Table 2

Comparison of Subjects' Calcium Score and Anxiety Medication Use by Gender

	Males	**Females**		**p-value**
Calcium Score (mean)				
Entire sample	158.5	40.1	t = −16.18	<.0001
Low risk subsample	79.6	18.2	t = − 8.30	<.0001
Anxiety Medication (n/%)				
Entire sample	296 (6.07%)	168 (11.16%)	$\chi^2 = 44.17$	<.0001
Low risk subsample	53 (3.96%)	66 (9.55%)	$\chi^2 = 25.74$	<.0001

Table 3

Symptom endorsement in men and women

	Entire Sample (N = 6371)			Low Risk Subsample (N = 2224)		
Symptoms	**Women (N = 1505) n (%)**	**Men (N = 4876) n (%)**	**Univariate Chi-square[a] (df), *p***	**Women (N = 555) n (%)**	**Men (N = 1669) n (%)**	**Univariate Chi-square[a] (df), *p***
Heart Flutter	498 (33.2)	822 (16.9)	185.61 (1), p <0.001	138 (24.9)	175 (10.5)	71.22 (1), p < 0.001
Lightheaded	400 (26.6)	882 (18.1)	51.63 (1), p <0.001	123 (22.2)	204 (12.2)	32.87 (1), p < 0.001
Nausea	100 (6.6)	221 (4.5)	10.74 (1), p = 0.001	25 (4.50)	50 (3.00)	2.92 (1), p = 0.09
Short of breath	501 (33.3)	1121 (23.0)	64.34 (1), p <0.001	149 (26.8)	287 (17.2)	24.68 (1), p < 0.001
Chest pain/pressure	461 (30.6)	1266 (26.0)	12.63 (1), p <0.001	120 (21.6)	326 (19.5)	1.13 (1), p = 0.29
Burning chest pain	283 (18.8)	656 (13.5)	26.17 (1), p <0.001	71 (12.8)	170 (10.2)	2.92 (1), p = 0.09

[a]Chi-square evaluating frequency in men vs. women without adjusting for the frequency of other symptoms.

Table 4

Relation of gender to number of symptoms stratified by risk group

Number of Symptoms	Women (N = 1505) n (%)	Men (N = 4876) n (%)
0	509 (8.0)	2360 (37.0)
1	343 (5.4)	1108 (17.4)
2	288 (4.5)	732 (11.5)
3	198 (3.1)	396 (6.2)
4	117 (1.8)	192 (3.0)
5	29 (0.5)	64 (1.0)
6	18 (0.3)	19 (0.3)

Cochran-Armitage test for trend in higher risk group, $Z = 10.27$, $p < .001$.

Cochran-Armitage test for trend in lower risk group, $Z = 7.00$, $p < .001$.

Table 5

Multivariate model of the relation of gender to panic-like symptoms[a]

	ENTIRE GROUP (N = 6371)			LOW RISK SUBSAMPLE (N = 2221)		
SYMPTOM	**OR**	**CI**	***p***	**OR**	**CI**	***p***
Burning chest pain	1.20	1.01 – 1.42	.04	0.99	0.72 – 1.38	0.97
Heart flutter	2.20	1.92 – 2.52	<.001	2.48	1.91 – 3.21	<.001
Lightheadedness	1.25	1.08 – 1.46	.004	1.65	1.25 – 2.18	0.0005
Nausea	1.00	0.77 – 1.30	.99	0.96	0.56 – 1.64	0.87
Chest pain/pressure	0.91	0.79 – 1.05	.21	0.79	0.61 – 1.03	0.09
Shortness of breath	1.38	1.20 – 1.58	<.001	1.45	1.13 – 1.86	0.004

[a]Odds ratios were calculated so that ratios greater than 1 indicate a higher likelihood of being a woman.

Table 6

Relation of gender and CHD-like symptoms to psychotropic medication use[a]

	ENTIRE GROUP (N = 6371)			LOW RISK SUBSAMPLE (N = 2221)		
SYMPTOM	**OR**	**CI**	**p**	**OR**	**CI**	**p**
Burning chest pain	1.32	1.03 – 1.69	.03	1.14	0.67 – 1.96	.63
Heart flutter	1.39	1.12 – 1.74	.003	1.98	1.28 – 3.07	.002
Lightheadedness	1.24	0.98 – 1.57	.07	1.740	1.09 – 2.784	.02
Nausea	1.99	1.43 – 2.77	<.001	2.03	0.99 – 4.15	.05
Chest pain/pressure	1.07	0.86 – 1.34	.55	0.98	0.62 – 1.56	.94
Shortness of breath	1.53	1.24 – 1.90	<.001	1.71	1.11 – 2.64	.01
Gender (female)	1.66	1.35 – 2.04	<.001	1.98	1.34 – 2.94	< .001

[a]Odds ratios were calculated so that ratios greater than 1 indicate a higher likelihood of having been prescribed a medication.

Table 7

Relation of gender and CHD-like symptoms to coronary calcium[a]

SYMPTOM	ENTIRE GROUP (N = 6371) OR	CI	p	LOW RISK SUBSAMPLE (N = 2221) OR	CI	p
Burning chest pain	1.26	1.07 – 1.47	.004	1.30	0.96 – 1.77	.09
Heart flutter	1.13	0.99 – 1.29	.07	1.00	0.76 – 1.31	.98
Lightheadedness	1.33	0.98 – 1.30	08	1.07	0.81 – 1.41	.64
Nausea	1.00	0.78 – 1.28	1.00	1.30	0.76 – 2.22	.34
Chest pain/pressure	1.37	1.21 – 1.56	<.001	1.37	1.08 – 1.75	.01
Shortness of breath	0.75	0.66 – 0.85	<.001	0.73	0.57 – 0.93	.01
Sex (female)	3.40	3.00 – 3.86	<.001	4.09	3.25 – 5.14	<.001
Medication	0.91	0.74 – 1.11	.33	0.67	0.44 – 1.02	.06

[a]Odds ratios were calculated so that ratios greater than 1 indicated a higher likelihood of having a coronary calcium score greater than 0.