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Journal Title: PAIN
Volume: Volume 101, Number 1-2
Publisher: Lippincott, Williams & Wilkins | 2003-01-01, Pages 45-53
Type of Work: Article | Post-print: After Peer Review
Publisher DOI: 10.1016/S0304-3959(02)00319-6
Permanent URL: https://pid.emory.edu/ark:/25593/tvgdn

Final published version: http://dx.doi.org/10.1016/S0304-3959(02)00319-6

Published in final edited form as:
Pain. 2003 January ; 101(0): 45–53.

Gender differences in pain characteristics of chronic stable angina and perceived physical limitation in patients with coronary artery disease

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Abstract

Chronic stable angina pectoris, the chest pain associated with reversible myocardial ischemia has detrimental effects on health-related quality of life, particularly in women. The limited research on gender differences in chronic stable angina suggests that angina may be experienced differently in women and that women report greater functional disability related to angina symptoms. No studies have examined gender differences in chronic stable angina from a multidimensional pain perspective or have included reliable and valid measures of pain that would facilitate comparing chronic angina patients with other chronic pain populations. The purpose of this descriptive study was to examine gender differences in characteristics of chronic stable angina using the short-form McGill pain questionnaire (SF-MPQ) and to explore relationships among these pain characteristics and perceived limitation in performing physical activities in patients with coronary artery disease (CAD) (physical limitation subscale of the Seattle angina questionnaire). One hundred and twenty-eight subjects (30.5% women) with stable CAD and angina pectoris documented by a cardiologist completed study questionnaires in an outpatient cardiology clinic. Results of the study suggest that men and women with chronic stable angina had more similarities than differences in chest pain characteristics. No significant gender differences were demonstrated in total sensory or affective intensity scores, the present pain intensity index, or the number of pain words chosen. However, women did report significantly greater pain intensity on the SF-MPQ visual analogue scale. Women were also significantly more likely to describe their chronic angina as ‘hot-burning’ and ‘tender’ and to have greater intensity of pain for these two descriptors. Despite the similarities in pain characteristics, women reported greater physical limitation related to anginal pain. The variables of social status and years diagnosed with CAD significantly interacted with gender in predicting physical limitation suggesting that gender-specific models of physical limitation in angina patients need to be explored. To our knowledge, this is one of the first studies that has assessed chronic anginal pain using a reliable and valid generic pain instrument. More research is needed to better understand the nature of gender differences in functional limitation secondary to anginal pain and the physiologic, cognitive-perceptual and psychosocial mechanisms that lead to angina-related functional disability.

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Keywords

McGill pain questionnaire – short form; Gender differences; Physical functional limitation; Quality of life

1. Introduction

Chronic stable angina pectoris, the chest pain associated with reversible myocardial ischemia (Gibbons et al., 1999), is a serious health problem. Present in over 6,000,000 Americans (AHA, 2001), chronic angina pectoris has detrimental effects on health-related quality of life, particularly in women (Kimble and Kunik, 2000). To date, studies of gender differences in chest pain have primarily focused on symptoms experienced by patients prior to a confirmed diagnosis of coronary artery disease (CAD) (Bairey Merz et al., 1999) or acute chest pain associated with acute myocardial infarction (Zucker et al., 1997; Meischke et al., 1998; Goldberg et al., 1998, 2000). The limited research on gender differences in chronic stable angina suggests that angina may be experienced differently in women (Wenger, 1997) and that women report greater functional disability related to angina symptoms (Steingart et al., 1991; Pinsky et al., 1990). No studies have examined gender differences in chronic stable angina from a multidimensional pain perspective or have included reliable and valid measures of pain that would facilitate comparing chronic angina patients with other chronic pain populations. Moreover, better understanding of gender differences in the pain characteristics of chronic stable angina is needed to determine if gender-specific interventions are necessary to effectively reduce chronic angina-related morbidity. Therefore, the purpose of this descriptive study was (1) to examine gender differences in characteristics of chronic stable angina using the short-form McGill pain questionnaire and (2) to explore relationships among these pain characteristics and perceived limitation in performing physical activities in patients with CAD.

2. Methods

2.1. Subjects

Patients with history of CAD, currently stable disease, and angina pectoris documented by cardiologists in the medical record were recruited from three outpatient cardiology clinics affiliated with a large health sciences center and one outpatient cardiology clinic in a large urban public hospital. All of the clinics were located in the same metropolitan area in southeastern United States. Other inclusion criteria were that subjects had experienced an episode of chronic stable angina pectoris within the previous week and had a literacy level of a fourth grade reading level or higher as measured by the revised Slosson oral reading test (SORT-R) (Slosson, 1994). It was important that subjects had a similar time frame for pain recall and adequate literacy to read and comprehend study questionnaires.

Patients were excluded from participating if they had experienced acute myocardial infarction or coronary revascularization such as coronary artery bypass grafting surgery or percutaneous intervention in the previous 6 months. Patients were also excluded if they screened negative on the supplemented Rose questionnaire (RQ-S) (Bass et al., 1989), had any active exacerbation of gastrointestinal (GI) problems such as an ulcer or a hiatal hernia or were unable to differentiate between their GI symptoms and anginal pain. These criteria were used to help increase the likelihood that patients' chest pain was cardiac in nature rather than non-cardiac.

One hundred and seventy patients met all inclusion/ exclusion criteria and were approached about participating in the study. Forty patients refused to participate citing reasons such as not feeling well enough (n = 8; five men, three women), no desire to fill out study forms or talk with study research assistants (n = 20; nine men, ten women, one unknown gender), and were in a hurry to leave the clinic (n = 12; 11 men, one woman). One hundred and thirty subjects consented to participate. Two subjects were excluded from the analysis because greater than 75% of their data were missing on study questionnaires. Thus the final sample included 128 subjects, 89 men and 39 women.

2.2. Instruments

2.2.1. The Slosson oral reading test-revised—The SORT-R (Slosson, 1994) was used to screen for literacy level. The instrument consists of ten lists of 20 words each, with word lists arranged in increasingly difficult order. Patients read the word lists aloud and a raw score is obtained of correctly pronounced words. The raw score is then converted into an approximate reading level ranging from the first grade to the twelfth grade. The SORT-R has substantial evidence for its reliability and validity and takes approximately 2–5 min to administer (Slosson, 1994).

2.2.2. The supplemented Rose questionnaire—The RQ-S was used to screen potential subjects for the study. The original Rose questionnaire has demonstrated reliability and validity as a screening tool for the presence of angina (Rose, 1962; Rose et al., 1977). Bass et al., 1989 added additional questions to the Rose questionnaire to help increase sensitivity in screening for angina in women. The RQ-S is a series of questions which focuses more on precipitants, duration, and relief measures for pain rather than pain descriptors and pain intensity. The RQ-S also focuses on patients' general experience with angina and not a specific pain episode, thus overlap with the short form McGill pain questionnaire (SF-MPQ) was minimal. Using standardized scoring rules, patients were screened as positive on the RQ-S if they reported ever having experienced pain, discomfort, pressure or heaviness in the chest, jaw, neck, or left arm related to exertion or mental stress that was relieved by rest or sublingual nitroglycerin and lasted less than 10 min. Patients were screened as negative on the RQS if they reported that their pain or discomfort was worse when lying flat, bending over, or if it was relieved by deep breathing or changing positions.

2.2.3. The Hollingshead two factor index of social position—Social status was measured with the Hollingshead two factor index of social position (HTFI) (Hollingshead, 1957). The HTFI was developed in the late 1950s to estimate persons' social position within society. It has been used to assess the social status of cardiac patients including older women with heart disease (Friedman, 1997) and has demonstrated validity (Hollingshead and Redlich, 1958). Information about patients' current occupation or occupation prior to retirement as well as their education is used to calculate a social position score. The range of scores is 11– 77 with lower scores indicating persons have a social position of higher status.

2.2.4. The short-form McGill pain questionnaire—

Chronic angina pain was measured with the SF-MPQ (Melzack, 1987). The SF-MPQ is based on the original McGill pain questionnaire (Melzack, 1975), a multidimensional pain instrument that has been widely used to measure the sensory, affective, and evaluative pain dimensions in patients with a variety of different painful conditions (Byrne et al., 1982; Kremer and Atkinsson, 1981; Burkhardt, 1984; Graham et al., 1980; McGuire, 1984). The SF-MPQ was developed to reduce the amount of time required to complete the questionnaire and to increase feasibility of using the questionnaire in clinical populations (Melzack, 1987). Adequate reliability and validity of the SF-MPQ has been determined (Melzack, 1987).

The SF-MPQ has a total of 17 items. Fifteen items are descriptors from the original McGill pain questionnaire (MPQ), 11 reflect the sensory dimension of pain and four reflect the affective pain dimension. Subjects rate the intensity of each of the descriptors on a scale of zero ‘none’ to three ‘severe’. From the original instrument, Melzack also retained a visual analogue scale (VAS) to rate overall pain intensity. The VAS is a 10 mm horizontal scale with anchors of ‘no pain’ on the left and ‘worst possible pain’ on the right. Scores on the VAS are coded in millimeters. Overall pain intensity is also measured with an additional item called the present pain intensity index which includes a six point Likert scale from zero ‘no pain’ to five excruciating‘(Melzack, 1987). Scores obtained from the SF-MPQ include (1) total sensory intensity score (sum of the intensity ratings for the 11 sensory items); (2) total affective intensity score (sum of the intensity ratings for the four affective items); (3) total intensity score (sum of the intensity ratings for all 15 items); and (4) total number of words chosen (NWC) to describe pain (count of the number of words subjects used to describe chest pain).

2.2.5. The Seattle angina questionnaire – physical limitation subscale—

The Seattle angina questionnaire (SAQ) was used to measure perceived limitation in performing physical activities (Spertus et al., 1994). The SAQ is a reliable and valid self-report instrument with 19 items that yields five subscale scores including the physical limitation subscale which measures how common daily activities are limited by angina. Nine of the SAQ's 19 items comprise the physical limitation subscale. The nine items represent physical activities that have low, medium, and high exertional requirements. Low exertional requirement items include ‘dressing yourself’, ‘walking indoors on level ground’ and ‘showering’. Medium exertional requirement items include ‘climbing a hill or flight of stairs without stopping, gardening, vacuuming, or carrying groceries’ and ‘walking more than a block at a brisk pace’. Items representing the high exertional requirement activities include ‘jogging or running, lifting or moving heavy objects (e.g. furniture, children)’, and ‘participating in strenuous sports (e.g. swimming, tennis)’. On a five-point Likert scale, subjects indicate whether they have been ‘not limited’ to ‘severely limited’ in their ability to perform these activities because of their angina over the previous 4 weeks. Subjects may also indicate if they are limited in performing the activities for reasons other than angina. The possible range of scores for the physical limitation subscale is 0–100 with higher scores

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indicating less limitation in ability to perform physical activities. A change of ten points in any of the subscales is considered to be clinically important (Spertus et al., 1995).

2.3. Procedures

The study protocol was approved by the human investigations committee of the health sciences center with which the cardiology clinics were affiliated. Research assistants screened charts of potential subjects who were waiting to be evaluated in the outpatient cardiology clinics. Those patients with CAD and angina documented by a cardiologist were then questioned about whether they had experienced anginal chest pain in the previous week and had a recent history of acute myocardial infarction or coronary intervention. Subjects who met the chart-review and patient history inclusion/exclusion criteria were then screened with the revised SORT-R and the RQ-S to determine if they read at the fourth grade level or higher and had chest pain characteristics consistent with chest pain of cardiac origin. Patients who met all the inclusion/exclusion criteria were then invited to participate in the study and written informed consent was obtained.

Subjects answered questionnaires in the presence of a trained research assistant. Along with the SF-MPQ and the SAQ, demographic and clinical data were also collected. Subjects were paid US$ 5.00 for their participation.

2.4. Statistical analysis

All data were entered into the SPSS version 10.0 statistical program software (SPSS, 1999). Descriptive statistics were calculated for all variables. A problem with the data was observed after the completion of the study secondary to repeated duplication of study forms. Variations in the length of the SF-MPQ VAS were noted with some subjects having completed scales between 9.1 and 9.8 mm in length rather than 10 mm. In instances where subjects completed VASs less than 10 mm in length, scores were standardized to reflect a 10 mm scale.

Chi-square analyses were conducted to examine relationships between categorical variables and *t*-tests were used to examine mean differences between men and women on normally distributed continuous variables. Multiple linear regression was used to examine relationships between gender, other clinical and demographic variables, SFMPQ scores, and perceived physical limitation as measured by the SAQ. Categories for marital status and ethnicity were collapsed and dichotomously coded to reflect ‘not married vs. married’ for the marital status variable and ‘Caucasian vs. African-American’ for the ethnicity variable. The two subjects whose ethnicity was not Caucasian or African-American were excluded from the regression analysis. Alpha was set at $P < :05$ as the criterion for statistical significance.

3. Results

3.1. Subjects’ demographic and clinical characteristics

Subjects ranged in age from 35 to 86 years with a mean age of 63.1 years (SD = 11.8) and had been diagnosed with CAD for a mean of 11.6 years (SD = 9.7 years). Table 1 summarizes other demographic and clinical characteristics by gender. When compared to men, women had been diagnosed with CAD for a significantly shorter period of time and significantly more women were African-American and without a partner. Women also had a significantly higher HTFI score, indicating they had lower social status as compared to men. Men were more likely to have experienced acute myocardial infarction and coronary artery bypass grafting surgery.

3.2. Angina frequency, most recent episode of angina and reasons for recalling specific angina episode

When subjects were asked about the frequency of anginal chest pain within the previous 7 days, men reported a mean of 6.58 episodes (SD 7.95) with an observed range of one to 50 episodes. Women reported a mean of 4.23 episodes (SD 3.34) with an observed range of one to 20 episodes. Normality diagnostics suggested that the pain frequency variable was not normally distributed, therefore, the non-parametric test of Mann–Whitney U was used to examine rank differences in pain frequency by gender. No significant differences were demonstrated ($z = -1{:}186$, $P = 0{:}236$).

One hundred and seventeen subjects (80 men and 31 women) were asked about when they had experienced their most recent anginal pain episode. Data for the remaining 11 subjects were missing at random. Men reported a mean of 1.7 days (SD 1.8) since their last pain episode. Women were not significantly different from the men, reporting a mean of 1.9 days (SD 1.7) since their last anginal pain episode ($t = 2{:}51, P = 0{:}61$). The number of days since the last anginal pain episode was not significantly correlated with any of the SF-MPQ pain characteristics or with perceived physical limitation.

When completing the SF-MPQ, subjects were asked to recall any episode of angina they had experienced in the previous week and to answer items on the SF-MPQ based on that episode. Twelve percent of the male subjects ($n = 11$) and 10% of the female subjects ($n = 4$) had experienced only one episode of chest pain within the previous week and completed the SF-MPQ based on recall of a single episode. Those subjects experiencing more than one chest pain episode in the previous week had to choose one specific angina episode to recall. The reason why subjects chose to recall a specific chest pain episode was obtained from 34 men and 11 women. For this subset of subjects, the most commonly reported reason for recalling a specific pain episode for both men (52.9%) and women (36.4%) was that it was the most recent episode of pain. The second most commonly reported reason for recalling a specific pain episode was that it was the most painful (14.7% men, 18.2% women). For purposes of analysis, reasons for recalling a specific episode of angina were coded into categories of ‘most recent’, ‘most painful’ and ‘other’ (which included reasons such as the ‘typical pain episode’, ‘the pain woke the patient from sleep’, or ‘type of activity that precipitated the pain’). No gender differences in reasons for recalling a specific episode of chest pain were demonstrated ($\chi^2 = 0{:}93, P = 0{:}627$).

3.3. Gender differences in profiles of SF-MPQ pain descriptors and intensities

Table 2 summarizes gender differences in percentages of patients who chose specific pain words to describe their angina and the mean pain intensities of the pain descriptors. For men, the most frequently chosen words to describe angina were aching (74.2%), heavy (70.8%), tiring–exhausting (70.8%), and sharp (56.2%). For women, the most frequently chosen words to describe angina were aching (76.9%), tiring–exhausting (76.9%), heavy (66.7%), hot–burning (61.5%), sharp (53.8%) and fearful (51.3%). Chi-square analysis revealed women were more likely to describe their angina as hot–burning and tender. No other gender differences in percentages of patients who chose specific pain words to describe their angina were noted.

Overall, the reported intensities for individual pain descriptors were low. Men reported the greatest pain intensity for the descriptors of heavy and tiring–exhausting while women reported the greatest pain intensity for the words tiring–exhausting and aching. In independent samples *t*-tests, women reported significantly greater intensity than men for the descriptors of hot–burning and tender.

Table 3 summarizes the scores for the sensory, affective, and total intensity ratings as well as the total number of pain descriptors chosen (NWC), VAS, Present pain intensity index, and the physical limitation subscale of the SAQ. Women reported significantly higher overall pain intensity as measured by the VAS. Slightly higher scores for remaining SF-MPQ scores were observed in women, however none of the differences were statistically significant. Women reported significantly greater physical limitation as reflected in lower scores on the SAQ subscale.

3.4. Relationships among gender, SF-MPQ and perceived physical limitation

A multiple linear regression analysis was conducted with the physical limitation subscale score on the SAQ as the dependent variable and age, gender, sensory intensity score, affective intensity score, VAS, and the present pain intensity index as the independent variables. Because gender differences in years since diagnosed with CAD, marital status, ethnicity, HTFI score, and history of acute myocardial infarction and coronary artery bypass grafting surgery were observed in the sample, these were also included in analyses. Angina frequency in the last week was also included as a predictor. However, because this variable was not normally distributed, a median split was used to divide the sample into a dichotomy of those who had experienced less than four episodes of angina and those who had experienced four or more episodes of angina in the last week.

In an exploratory analysis, interaction terms between gender and all of the predictor variables were created. Stepwise regression was used to determine whether any of the predictor variables interacted with gender and contributed significantly to the variance in perceived physical limitation. An alpha of $P < 0:05$ was used as the criterion for entry of an interaction term into the model. The number of pain words chosen (NWC) variable was not included in the final regression analyses as regression diagnostics suggested it produced a multicollinearity problem (Kachigan, 1991).

Table 4 summarizes the results of the first step of the multiple regression analysis. The independent variables, not including the interaction terms, significantly predicted 49% of the variance in perceived physical limitation. Closer examination of the standardized beta coefficients revealed history of coronary artery bypass grafting surgery, greater intensity of affective pain descriptors, higher VAS score, greater pain frequency, and higher HTFI score reflecting lower social status were all significant predictors of greater perceived physical limitation.

In the stepwise regression analysis, two interaction terms were significant, the interaction term of gender and HTFI score and the interaction of gender and number of years subjects were diagnosed with CAD. The interaction between gender and social status was the first interaction term that reached the significance criterion to enter the regression model. Its entry resulted in a significant increase in R^2 from 0.491 to 0.534 (F of change 9.046, P = 0:003). The interaction between gender and number of years diagnosed with CAD entered the model next and resulted in another significant increase in R^2 from 0.534 to 0.554 (F of change 4.305, P = 0:041). None of the other interaction terms made a significant contribution to the R^2. Thus the full model of predictors and the two gender-based interaction terms accounted for a total of 55.4% of the variance in perceived limitation in physical activity (F = 7:96, P = 0:001).

To interpret the interactions, sample scores for HTFI were divided into tertiles so that there was a ‘low’, ‘medium’ and ‘high’ group for this variable. The low group represented a score of less than 37 (greater social status), the medium group a score between 37 and 47, and the high group a score of greater than 47 (lesser social status). The graph in Fig. 1 depicts the mean perceived physical limitation scores in women and men by HTFI group. For men, as HTFI scores increased over each of the three groups, scores on the SAQ decreased, reflecting greater perceived physical limitation. In comparison, social status appeared to have little impact on perceived physical limitation in women, as SAQ scores were similar across the three HTFI groups.

For the variable, number of years diagnosed with CAD, the sample scores were divided by quartiles resulting in four groups of subjects: those diagnosed with CAD for less than 4 years, those diagnosed between 4 and 9 years, those diagnosed between 10 and 14 years, and those diagnosed for 15 years or longer. Fig. 2 depicts the mean perceived physical limitation scores for men and women by years diagnosed with CAD groups. The graph suggests that while men initially reported greater physical limitation in the early years following diagnosis, however, as number of years diagnosed with CAD increased there was little influence on perceived physical limitation. Women were similar to men in the early years following diagnosis as they also reported greater physical limitation. However, women differed from men as number of years diagnosed with CAD increased, with women who had been diagnosed with CAD for 10 or more years demonstrating markedly increased physical limitation as compared to women diagnosed between 4 and 9 years.

4. Discussion

The results of this study suggest that men and women with chronic stable angina have more similarities than differences in chest pain characteristics. It is possible that the screening process using the RQ-S may have led to men and women with similar pain characteristics entering the study, however, the only pain descriptor specifically mentioned on the RQ-S was the word ‘heavy’. We believe the RQ-S allowed for reasonable variation in the pain experience while helping assure that the subjects in the study were truly having angina.

Both women and men predominantly described their chest pain as aching, tiring–exhausting, heavy and sharp. The pain descriptors of aching and heavy are consistent with clinical descriptions of typical angina pectoris (Gibbons et al., 1999). Descriptions of the pain as tiring– exhausting, an affective descriptor, are interesting and may reflect that angina often accompanies activities requiring physical exertion. Chronic angina may also make patients feel exhausted both physically and emotionally. The finding that both women and men described their angina as sharp is unexpected. In fact, descriptions of chest pain as sharp are often used as diagnostic indicators consistent with chest pain of non-cardiac origin (Swartz, 1998). If future research confirms that a sharp sensation is indeed a common sensory experience for chronic stable angina, diagnostic criteria for angina may need to be revised.

The main difference between men and women in pain descriptors was that women were more likely to describe their pain as hot–burning and tender. It is possible that these findings are unique to this sample and might not be observed in other studies. However, should women's angina have more hot–burning characteristics it might lead to problems for angina symptom evaluation for two reasons. First, hot-burning sensations in the chest area can occur with GI disorders such as gastroesophageal reflux disease (Fang and Bjorkman, 2001). Similar sensory sensations for chronic angina and other co-morbid conditions may make it difficult for patients to ascertain the source of their symptoms leading to inappropriate decision-making about when to seek medical attention and what physical activity may be safely conducted. Second, research suggests that during acute myocardial infarction, women are more likely than men to experience GI symptoms such as indigestion (Milner et al., 1999) and nausea (Goldberg et al., 2000). Women with chronic angina who have sensory sensations similar to GI discomfort as part of their stable symptom pattern may be less likely to seek treatment for acute myocardial infarction escalation of their symptoms involving GI discomfort, as they may not be able to distinguish acute symptoms from chronic stable symptoms.

Women characterizing their chest pain as tender is an unexpected finding and needs further study to determine whether feelings of tenderness were experienced midsternally, retrosternally or in the breast tissue. If tender sensations are experienced in the breasts, this could also make anginal symptom interpretation more difficult, as breast tenderness secondary to cyclical hormonal changes in premenopausal women or hormone replacement therapy in postmenopausal women are common (Youngkin and Davis, 1998). Actual use of an atypical word such as tender to describe angina symptoms may also be problematic for women as research suggests gender differences in the language used to describe angina symptoms may have a negative impact on physicians’ treatment recommendations for women such as revascularization (Philpott et al., 2001).

In this sample, greater intensity of affective descriptors but not sensory descriptors was associated with greater perceived physical limitation. One potential explanation for this finding is that chronic angina patients who use affective words to describe their pain are focusing their attention on the emotional and evaluative aspects of their angina rather than the objective features of their pain. According to self-regulation theory, focusing on the affective aspects of stressful experiences leads to less effective coping (Johnson and Laver, 1989). Patients who experience their anginal pain as fearful, punishing or cruel may be more likely to avoid physical activities or situations that precipitate angina or they may modify their activities to prevent pain, thus leading to further physical deconditioning. For a health problem like chronic stable angina where the likelihood of death from a cardiac event is low, patients who are able to have a more objective view of their cardiac symptoms, without the affective or emotional overlay, and continue with normal day-to-day activities may be the most effective in managing their angina (Lewin, 1999). In general, assessing the frequency and severity of angina and whether angina is occurring at lower levels of activity or at rest are considered to be the primary areas for clinical monitoring of chronic angina patients. While frequency and severity of angina were significant predictors of perceived physical limitation, these data suggest that assessing whether pain intensity has an affective component may also be important in addressing functional limitations.

The finding that social status was not related to perceived physical limitation in women is surprising, as lower socioeconomic status has been related to poorer outcomes in patients with chronic diseases (Kingston and Smith, 1997) including cardiac patients (Sykes et al., 1999; Vogel et al., 1999; Lenfant, 1996). The HTFI was developed primarily to assess social status based on information about the head of the household or the primary income earner of the family. It is possible that the social status of married women may have been underestimated in this sample, as we did not assess the HTFI of subjects' spouses. However, another potential explanation of this finding is women's perceptions of physical limitation may focus on traditional activities that are common to women across the social spectrum, such as household and caregiving tasks. Little is known about how the traditional roles of women such as maintaining a household and providing care to children or elders influence women's responses to cardiac symptoms (Angus, 1996; Brezinka and Kittel, 1995; Kimble, 2001; Abbey and Stewart, 2000) including whether women perceive these activities as less amenable to modification.

This study had several limitations. Anginal pain episodes were retrospectively reported and the timeframe for recall, as well as the basis for recalling a specific angina episode, were not standardized among subjects. Men and women differed on several key demographic and clinical variables and the impact of these differences on chronic anginal pain are unknown. Perhaps the most important clinical variable that was not assessed in this study was CAD severity. A history of coronary artery bypass grafting was associated with greater perceived physical limitation and this most likely reflects the influence of severity of CAD. Patients with more severe CAD are more likely to require surgical revascularization. The finding that women who had been diagnosed with CAD for more than 10 years had markedly greater perceived physical limitation as compared to men who had been diagnosed for a similar period of time should be viewed with caution. Because we did not objectively measure cardiac disease severity, it is difficult to assess whether the interaction between gender and years diagnosed with CAD is related to age, cardiac disease severity or was simply observed by chance

Another important limitation of the study was that key psychosocial variables such as anxiety, depression, and life stress were not assessed and research suggests that these variables differ in women and men with chronic stable angina (Billing et al., 1997). In a study of patients undergoing elective cardiac catheterization, Sullivan et al. (1997) found that disease severity was significantly associated with physical function at the time of cardiac catheterization. However, 1 year later, depression and anxiety were the strongest predictors of physical function. Future research should include these psychosocial variables and also examine potential interactions between gender and psychosocial variables in relation to physical function.

In conclusion, the results of this study demonstrated few gender differences in chronic stable angina characteristics in this sample. Consistent with previous research (Steingart et al., 1991; Kimble and Kunik, 2000; Pinsky et al., 1990), women reported greater physical limitation secondary to angina symptoms than men. Gender differences in physical function related to chronic anginal symptoms are likely a complex response to interrelated physiologic, cognitive-perceptual, and psychosocial factors. Moreover, the signifi-cant interactions between gender and predictors of physical limitation in this study suggest explanatory models of physical limitation in chronic angina patients may need to be gender-specific. Future research focused on gender differences in chronic stable angina should use prospective angina diary data along with ambulatory electrocardiograhic (Holter) monitoring to assess the nature and extent of myocardial ischemia; measure and statistically control for CAD severity, and include objective measures of physical limitation such as exercise treadmill testing and activity monitoring with actigraphs or other similar devices.

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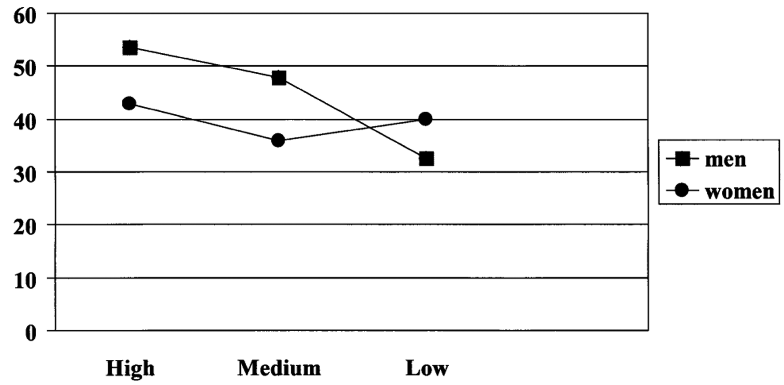

Fig. 1.
Mean perceived physical function scores by gender and social status group. Note: high social status group has Hollingshead score of < 37, medium group score of 37– 47, and low group a score of >47.

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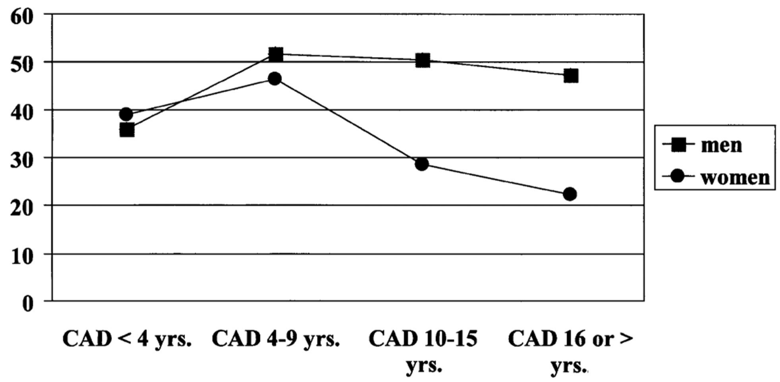

Fig. 2.

Mean perceived physical function scores by gender and years diagnosed with CAD group.

Table 1

Demographic and clinical characteristics by gender[a]

Variable	Men (n = 89) [mean (SD)]	Women (n = 39) [mean (SD)]	χ^2 value	t-value	P-value
Age	62.8 (11.7)	64.1 (11.8)		–0.57	0.572
Years with CAD	12.9 (9.6)	8.8 (9.8)		2.19	0.030
Hollingshead two factor index score	37.6 (16.5)	49.2(15.2)		–3.66	0.001
	%	%			
Race			14.704		0.001
African-American	13.5	43.6			
Caucasian	85.4	53.8			
Other	01.1	02.6			
Marital status			27.663		0.001
Married	82.0	35.9			
Single/widowed	10.1	25.6			
Divorced/separated	07.9	38.5			
Education			06.707		0.082
< HS graduate	25.0	33.3			
HS graduate	21.6	20.5			
Attended or graduated college	34.1	43.6			
Post-graduate	19.3	02.6			
Current smoking	13.5	10.3	00.258		0.610
History of diabetes	32.6	35.9	00.133		0.720
History of hyperlipidemia	87.5	87.2	00.003		0.960
History of hypertension	67.8	71.8	00.199		0.660
Family history of CAD	84.1	71.1	02.782		0.095
History of AMI	79.8	59.0	06.015		0.014
History of CABG	70.8	28.2	20.159		0.001
History of PTCA	63.6	53.8	01.085		0.298
History of GI problems	46.0	43.6	00.062		0.803

[a]Abbreviations: SD, standard deviation; CAD, coronary artery disease; AMI, acute myocardial infarction; CABG, coronary artery bypass grafting surgery; PTCA, percutaneous transluminal coronary angioplasty.

Table 2

Gender differences in percentages of subjects who chose each pain descriptor and gender differences in mean pain descriptor intensities[a]

Descriptor	Men (%)	Women (%)	χ^2 Value	*P*-value	Men [mean (SD)]	Women [mean (SD)]	*t*-value	*P*-value
Throbbing	34.1	35.9	00.039	0.844	0.64 (0.98)	0.69 (1.03)	–0.291	0.770
Shooting	30.7	31.6	00.010	0.920	0.59 (0.97)	0.39 (0.64)	–1.146	0.250
Stabbing	33.0	28.2	00.283	0.595	0.64 (1.00)	0.51 (0.94)	–0.655	0.510
Sharp	56.2	53.8	00.060	0.807	1.10 (1.11)	0.90 (0.97)	0.933	0.320
Cramping	29.2	15.4	02.766	0.096	0.51 (0.87)	0.31 (0.80)	1.216	0.230
Gnawing	25.8	23.1	00.111	0.739	0.36 (0.68)	0.41 (0.85)	–0.360	0.720
Hot-burning	30.3	61.5	11.014	0.001	0.58 (1.00)	1.36 (1.25)	–3.431	0.001
Aching	74.2	76.9	00.111	0.739	1.43 (1.04)	1.59 (1.09)	–0.801	0.430
Heavy	70.8	66.7	00.217	0.641	1.48 (1.12)	1.46 (1.14)	–0.100	0.920
Tender	11.2	30.8	07.269	0.007	0.18 (0.53)	0.51 (0.91)	–2.122	0.039
Splitting	15.9	23.1	00.936	0.333	0.27 (0.69)	0.41 (0.85)	–0.963	0.337
Tiring-exhausting	70.8	76.9	00.514	0.473	1.48 (1.16)	1.77 (1.22)	–1.264	0.209
Sickening	33.0	42.1	00.968	0.325	0.55 (0.90)	0.82 (1.11)	–1.443	0.152
Fearful	45.5	51.3	00.368	0.544	0.81 (1.06)	1.05 (1.17)	–1.162	0.248
Punishing-cruel	20.2	23.1	00.133	0.716	0.34 (0.74)	0.59 (1.14)	–1.497	0.137

[a]Abbreviations: SD, standard deviation. The words throbbing through splitting were sensory descriptors. The words tiring-exhausting, sickening, fearful, and punishing-cruel were affective descriptors.

Table 3

Gender differences in total number of descriptors chosen, total pain intensity, present pain intensity and physical limitation[a]

Variable	Scale range	Men [mean (SD)]	Women [mean (SD)]	*t*-value	*P*-value
Total number of pain words chosen	0–15	05.8 (3.3)	06.4 (3.4)	–0.939	0.350
Total sensory intensity score	0–33	07.8 (5.6)	08.6 (5.8)	–0.746	0.457
Total affective intensity score	0–12	03.2 (2.7)	04.3 (3.7)	–1.873	0.101
Total intensity Score	0–45	11.0 (7.6)	12.9 (8.8)	–1.248	0.214
VAS	0–10	5.03 (2.4)	6.08 (2.7)	–2.120	0.036
Present pain intensity index	0–5	02.3 (0.9)	02.6 (1.1)	–1.970	0.051
SAQ physical limitation	0–100	46.8 (21.1)	37.6 (22.0)	2.200	0.030

[a]Abbreviations: SD, standard deviation; SAQ, Seattle angina questionnaire.

Table 4

Multiple regression analysis predicting perceived physical limitation secondary to chronic stable angina[a]

Predictors	**Standardized beta coefficients**	***t*-value**	***P*-value**
Age	0.074	0.768	0.444
Gender	–0.145	–1.514	0.133
Race	–0.144	–1.528	0.130
Marital status	–0.083	–0.855	0.395
Years with CAD	0.009	0.098	0.922
Hx. of AMI	–0.079	–0.986	0.327
Hx. of CABG	–0.258	–2.894	0.005
Angina frequency	–0.176	–2.309	0.023
Hollingshead two factor social index	–0.187	–2.354	0.021
Present pain intensity	0.060	0.676	0.501
Total sensory intensity	–0.059	–0.569	0.571
Total affective intensity	–0.303	–3.142	0.002
VAS	–0.286	–2.789	0.006
	R^2/variance explained	*F*-value	*P*-value
Model without interaction terms	0.491	7.27	0.001

[a]Abbreviations: Hx., history; CAD, coronary artery disease; AMI, acute myocardial infarction; CABG, coronary artery bypass grafting surgery.