Sex Differences and Symptoms of Acute Coronary Syndrome

Tahereh Najafi Ghezeljeh [1*], Mesfin Kassaye Tessma [2], Azita Emami [3]

1. Department of Critical Care Nursing, School of Nursing and Midwifery, Iran University of Medical Sciences, Tehran, Iran.
2. Medical Statistics Unit, Department of Learning, Informatics, Management and Ethics, Karolinska Institutet, Stockholm, Sweden.
3. School of Nursing, University of Washington, Seattle, United State of America.

Article info:
Received: 03 Jan. 2015
Accepted: 28 Jun. 2015

ABSTRACT

Background: The purpose of this study was to examine symptoms of acute coronary syndrom (ACS) with resect to sex differences.

Methods: This comparative cross-sectional study was performed on patients older than 20 years with ACS who were hospitalized at cardiac wards. Sampling was performed through stratified sampling on the basis of sex. Five hundred male and female patients met all eligiblity criteria. The questionnaire included demographic, disease characteristics, and the Iranian version of the accompanying symptom checklist. Data collection completed over one year. SPSS version 21 was used for data analyses by using Chi-square test, independent t test and Multiple logistic regression. The level of significance was specified at 0.05.

Results: Men reported tiredness (77.2%), weakness (72.4%), diaphoresis (70.0%) and anxiety (83.6%) as their most frequent symptoms. For women, the most frequently chosen symptoms were anxiety (94.8%), tiredness (90.0%), palpitation (85.2%), and weakness (82.8%). Statistically significant differences were observed between women and men with regard to symptoms. Multiple logistic regression indicated that sex was the most important explanatory variable, which is independently associated with different symptoms.

Conclusion: According to the results, significant differences were observed between women and men regarding ACS symptoms. The major implication of this investigation is the need for accurate cardiac assessment according to sex. Further research should investigate the nature and consequences of sex differences in language use of initial presentation with coronary symptoms, through the referral process.

Keywords:
Acute coronary syndrome, Gender, Symptoms

1. Background

Coronary heart disease (CHD) is the leading cause of death in the world. Its clinical manifestation in the form of acute coronary syndrome (ACS) comprises unstable angina, non-ST segment elevation myocardial infarction, or ST elevation myocardial infarction. Evidently, health care providers should consider sex in caring process of CHD (Emslie 2005). However, what we known about CHD is based on studies on men. The gender gap in clinical studies and knowledge should be addressed. Besides, previouse studies about seeking medical care indicated that women with ACS delay longer than men in seeking medical care (Nguyen et al. 2010). This delay leads to fewer treatment choices, which are less effective and timely. In addition, the morbidity and mortality is higher in these patients (Nguyen et al. 2014; Pagidipati et al. 2013). One of the possible explanation for this issue is the different expereience of similar symptoms in women and men (Butala et al. 2011).

*** Corresponding Author:**
Tahereh Najafi Ghezeljeh, PhD
Address: *Department of Critical Care Nursing, School of Nursing & Midwifery, Rashid Yasemi St., Valiasr St., Tehran, Iran.*
Tel: *+98 (21) 88882885* ***Fax:*** *+98 (21) 88201978*
E-mail: *najafi.t@iums.ac.ir*

Obviously, symptoms are important and trigger seeking medical care. How patients report their symptoms can affect treatment and mangaemnat of illness and clinical history is one of the factors for decision of health care providers on treatment. Therefore, understanding sex specific differences in CHD symtpoms can be useful in its treatment and mangement. By exploring symtpom experience and characteristics, positive reactions can be determined and misinterpretations evaluated (O'Neill & Morrow 2001). Underestanding characteristics of symptoms can help reduce morbidity and mortality rates through timely diagnosis and management in patients with ACS. Therefore, research is essential to explore the sex differences in symptom experiences and characteristics (Lockyer 2005). Unfortunately, little information exists about the characteristics of symptoms in Iranian patients with ACS. In a previous study by Najafi et al. (2010), sex differences in the location of experienced pain in patients with angina pectoris were pointed out; women rated their pain intensity higher than men. Likewise, the purpose of this study was to examine sex differences in symptoms of patients with ACS.

2. Materials & Methods

This paper is a part of a larger study about exploring CHD patients' experiences of their symptoms. A comparative, cross-sectional design included a single data collection point for each subject. Study approvals were obtained from the Iran University of Medical Sciences Ethics Committee and Ministry of Health and Medical education. The study was performed on patients who were admited at Shahid Rajaie, Cardiovascular, Medical and Research Center, Tehran, Iran and were hospitalized at cardiac wards.

The participants were older than 20 years old patients with ACS. Patients who 1) had severe cognitive impairment, 2) were too ill to participate, or 3) had a history of acute myocardial infarction or coronary revascularization in the last 6 months excluded from this study. Sampling was performed through stratified sampling on the basis of sex. Two hundred and fifty male and 250 female patients met all eligiblity criteria and were enrolled in the study.

The questionnaire included demographic (e.g. age and marital status), and clinical characteristics (e.g. disease duration, and risk factors) of patients. To assess the patients' symptoms, the Iranian version of the the accompanying symptom checklist was utilized. Reliability and validity of the instrument were already determined and the KR20 coefficient was 0.65. (Najafi et al. 2008; Najafi et al. 2009). The questionnaire consisted of 13 items for evaluating accompanying symptoms as follows: Dyspnoea, cough, diaphoresis, nausea, vomiting, heart burning, anorexia, dizziness, faint, tiredness, weakness, palpitation, and anxiety. Each symptom on the checklist was scaled with a dichotomous answer (yes or no). Numeric rating scale (NRS) was also used to rate the overall pain intensity.

Data collection completed during 2009. During this period, hospitalized patients in cardiac wards were screened. Of participants who met the eligiblity criteria and were willing to participate in the study, written informed consents were obtained. Next, instructions on how to complete the questionnaire were provided. Then, the researcher read the items and documented their answers.

Descriptive statistics for demographic data are presented, including median, interquartile range, mean and standard deviation. Differences in patient characteristics

Table 1. Demographic characteristics, disease duration, and risk factors of study sample (n=500).

Characteristics	Men, n=250	Women, n=250	Test result, P-value*
Demographic			
Age, mean (SD), y	59 (10.0)	62.1 (9.2)	t=3.63, <0.001
Married	93.2%	74.0%	X^2=56.14, <0.001
Illiterate	20.0%	41.6%	X^2=38.30, <0.001
Disease duration, Mean (SD), y	29.29(45.58)	38.06(61.86)	t=1.75, 0.08
Risk factors			
Smoking	40.0%	10.8%	X^2=88.44, <0.001
Diabetes	26.4%	35.6%	X^2=4.94, 0.03
Obesity	21.6%	46.4%	X^2=34.26,<0.001
Family history	46.4%	52.0%	X^2=1.57, 0.21

* T-test for numerical variables or Chi-square test for categorical variables.

Table 2. ACS symptoms of study participants (n=500).

Symptom	Men, n=250 Percentage	Women, n=250 Percentage	OR (95%, CI)
Dyspnoea	68.8	76.6	1.4 (-0.97, 2.1)
Cough	47.2	45.6	0.9 (-0.66, 1.3)
Diaphoresis	70.0	72.8	1.1 (-0.78, 1.7)
Nausea	44.0	58.0	1.8 (1.2, 2.5)**
Vomiting	24.8	34.8	1.6 (1.1, 2.4)*
Heart burning	44.4	47.2	1.1 (-0.79, 1.6)
Anorexia	32.8	49.6	2.0 (1.4, 2.9)***
Dizziness	40.8	60.4	2.2 (1.5, 3.2)***
Faint	28.4	34.0	1.3 (0-.89, 1.9)
Tiredness	77.2	90.0	2.7 (1.6, 4.4)***
Weakness	72.4	82.8	1.8 (1.2, 2.8)**
Palpitation	68.0	85.2	2.7 (1.7, 4.2)***
Anxiety	83.6	94.8	3.6 (1.9, 6.9)***

* P<0.05, ** P<0.01, *** P<0.001.

Client-Centered Nursing Care

between men and women were examined using Chi-square test for categorical variables and the independent t-test for continuous variables. Odds ratios were computed and corresponding 95% confidence interval determined. Multiple logistic regression was performed to examine the associations between the different symptom and clinical and demographic explanatory variables. All data analyses were performed by SPSS version 21. The level of significance was specified at 0.05.

3. Results

The total number of respondents was 500. The mean (SD) age for women was 62.1 (9.2) years and for men 59 (10.0) years. Statistically highly significant differences were observed between men and women with regard to marital status, age, and educational level (P<0.001). Women in the sample were significantly older, married, and illiterate. However, women compared to man were less likely to smoke (P<0.001), were more overweight (BMI>25) (P<0.001), and had more children (P=0.03). No significant difference was observed between sexes with regard to disease duration (Table 1).

Women reported significantly higher pain intensity, with mean (SD) of 8.2 (2.00) compred to men with mean (SD) of 6.9 (2.01) (P<0.001). Table 2 presents the symptoms in patients with ACS. The most frequent symptoms reported by men were tiredness (77.2%), weakness (72.4%), diaphoresis (70.0%), and anxiety (83.6%). For women, the most frequently chosen symptoms were anxiety (94.8%), tiredness (90.0%), palpitation (85.2%), and weakness (82.8%).

Statistically highly significant differences were observed between women and men regarding ACS symptoms, particularly anorexia, dizziness, tiredness, palpitation, and anxiety (P<0.001). Multiple logistic regression indicated that sex was the most probable explanatory variable, which was independently associated with the different symptoms (Table 3). For all symptoms, sex had an independent effect that persisted even after adjusting other demographic and clinical factors. Overall, sex was the most important predictor. Multiple logistic regression indicated that women compared to men experienced significantly more nausea, vomiting, anorexia, dizziness, tiredness, palpitation, and anxiety. After controlling demographic and clinical variables, women were still more likely to report those symptoms.

4. Discussion

This research was focused on different presentation of ACS symptoms in men and women and the results suggest some differences between sexes with respect to ACS symptoms. Also, there were significant sex differences with regard to marital status and smoking. The smokers were mostly men. Women compred to men were more likely to have diabetes or obesity, i.e. comorbidities are seen more in women with ACS. This study

Table 3. Factors associated with symptoms among patients with ACS (n=500).

Variable		B	SE (X^2)	Wald	P-value	OR (95% CI)
Nausea	Sex	0.62	0.20	9.8	0.002	1.9 (1.30, 2.70)
	Married	-0.30	0.15	4.1	0.04	0.7 (0.56, 0.99)
Vomiting	Sex	0.49	0.22	5.1	0.03	1.6 (1.10, 2.50)
	Married	-0.33	0.17	3.8	0.053	0.7 (0.52, 1.00)
	Widow	0.16	0.07	6.0	0.01	1.2 (1.03, 1.30)
Anorexia	Sex	0.65	0.20	10.1	0.001	1.9 (1.30, 2.80)
	Married	-0.28	0.15	3.5	0.06	0.8 (0.57, 1.01)
	Educational level	-0.21	0.08	6.6	0.01	0.8 (0.69, 0.95)
Dizziness	Sex	0.78	0.20	15.1	<0.001	2.2 (1.47, 3.24)
	Married	-0.35	0.15	5.3	0.02	0.7 (0.53, 0.95)
	Disease duration	0.007	0.003	5.0	0.03	1.007 (1.001, 1.013)
Tiredness	Sex	0.94	0.28	11.0	0.001	2.6 (1.47, 4.44)
Palpitation	Sex	0.91	0.24	14.1	<0.001	2.5 (1.55, 4.00)
	Disease duration	0.012	0.004	8.3	0.04	1.012 (1.004, 1.021)
Anxiety	Sex	0.88	0.35	6.5	0.01	2.4 (1.22, 4.74)
	Married	1.17	0.60	3.8	0.051	3.2 (1.00, 10.4)
	Educational level	-0.24	0.12	4.3	0.04	0.8 (0.63, 0.99)
	Disease duration	0.012	0.006	4.3	0.04	1.013 (1.001, 1.024)

showed that female subjects were,on average, older than male subjects.

The current study indicated that women experienced more pain intensity than men. High pain intensity cause panic reactions that increase severity of symptoms in women. In line with the current study, Granot et al. (2004) reported that women rated greater the severity of their chest pain compared to men. They recommended that special attention was paid to individualized clinical manifestation in men and women. In this regard, we could expect more descriptions and intensity of pain from women. With respect to the pain experience, sex and anxiety are effective factors in predicting reactions to pain (Keogh & Asmundson 2004; Keogh et al. 2004), feeling palpitations, and severity of cardiac symptoms (Keogh et al. 2004).

According to the results, men with ACS chose more frequently symptoms of anxiety, tiredness, weakness, and diaphoresis to express their diseases. Women also selected more frequently anxiety, tiredness, palpitation, and weakness. There are similarities in selecting more frequently accompanying symptoms by both men and women, except for diaphoresis and palpitation. In the current research, women compared to men were more likely to experience gastrointestinal problems (nausea, vomiting, and anorexia), dizziness, tiredness, weakness, palpitation, and anxiety.

These results were consistent with previous studies. For example, Coventry et al. (2011) in a systematic review of sex differences in patients with acute myocardial infarction from 1990 to 2009 indicated that women compared to men were more likely to report fatigue, neck pain, nausea, syncope, right arm pain, dizziness, and jaw pain. In the study on angina symptoms in men and women with stable coronary artery disease and evidence of exercise-induced myocardial perfusion defects, D'Antono et al. (2006) indicated that the most commonly symptoms were shortness of breath, fatigue, tightness in the chest, perspiration, palpitation, dizziness, and feeling weakness. Women reported upset stomach, trembling, palpitation, and feeling weakness more frequent than men.

In the study on Lebanese patients with CHD, women reported significantly more nausea/vomiting, dyspnea, indigestion, and palpitation (Noureddine et al. 2008). In a study on symptoms and type of symptom onset in ACS, Thuresson et al. (2005) reported that women differed from men in the type of symptom onset; They more frequently reported vomiting, and scored their pain intensity higher than men. In a previous study on patients with AMI, women compared to men were more likely to report 4 symptoms of vomiting, nausea, dizziness and fear of death.

However, their results related to dyspnea were in consistent with current research (Kirchberger et al. 2011). In the study of symptoms of men and women with ACS, Arslanian-Engoren et al. (2006) indicated that men were more likely to present diaphoresis, but nausea was more common in women. De Von et al. (2008) indicated that in comparison with men, women reported more indigestion, palpitations, nausea, numbness in the hands, and unusual fatigue. They related these sex differences in ACS symtoms to older age of women, higher prevelance of diabetes and mood disorders, including depression in women. These findings are in line with the results of the current study too.

Further research should investigate the nature and consequences of sex differences in language use of initial presentation with ACS symptoms, through the referral process. Our research was a single-center study and therefore not a fully established representative of other populations with ACS in different locations. The major implication of this investigation is the need for accurate cardiac assessment in women and men. In this regard, nurses should learn to anticipate different signs and symptoms in women and men. The other implication is the need for development of potential nursing interventions for patients with ACS, patients counseling, and teaching regarding ACS issues.

Conflict of Interests

Authors declared no conflict of interest.

Acknowledgments

This study was part of a research project, which was granted by Iran University of Medical Sciences, Tehran, Iran. The authors would like to thank the personnel of Shahid Rajaie, Cardiovascular, Medical, and Research Center.

References

Arslanian-Engoren, C, Patel, A, Fang, J, Armstrong, D, Kline-Rogers, E, Duvernoy, CS, & et al 2006, 'Symptoms of men and women presenting with acute coronary syndromes', *American Journal of Cardiology*, vol. 98, no. 9, pp. 1177–1181.

Butala, NM, Desai, MM, Linnander, EL, Wong, YR, Mikhail, DG, Ott, LS, & et al 2011, 'Gender differences in presentation, management, and in-hospital outcomes for patients with ami in a lower-middle income country: evidence from Egypt', *PLoS ONE*, vol. 6, no. 10, pp. e25904. doi:10.1371/journal.pone.0025904.

Coventry, LL, Finn, J, & Bremner, AP 2011, 'Sex differences in symptom presentation in acute myocardial infarction: a systematic review and meta-analysis', *Heart & Lung,* vol. 40, no. 6, pp.477-91.

D'Antono, B, Dupuis, G, Fortin, C, Arsenault, A, & Burelle, D 2006, 'Angina symptoms in men and women with stable coronary artery disease and evidence of exercise-induced myocardial perfusion defects', *American Heart Journal*, vol. 151, no. 4, pp. 813-819.

DeVon, HA, Ryan, CJ, Ochs, AL, & Shapiro, M 2008, 'Symptoms across the continuum of acute coronary syndromes: differences between women and men', *American Journal of Critical Care*, vol. 17, no. 1, pp. 14-25.

Emslie, C 2005, 'Women, men and coronary heart disease: a review of the qualitative literature', *Journal of Advanced Nursing*, vol. 51, no. 4, pp. 382-395.

Granot, M, Goldstein-Ferber, S, & Azzam, ZS 2004, 'Gender differences in the perception of chest pain', *Journal of Pain and Symptom Management*, vol. 27, no. 2, pp. 149-55.

Keogh, E, & Asmundson, GJG 2004, 'Negative affectivity, catastrophizing and anxiety sensitivity', in GJG Asmundson, J Vlaeyen, G Crombez (eds), *Understanding and treating fear of pain*, Oxford University Press, Oxford.

Keogh, E, Hamid, R, Hamid, S, & Ellery, D 2004, 'Investigating the effect of anxiety sensitivity, gender and negative interpretative bias on the perception of chest pain', *Pain*, vol. 111, no. 1-2, pp. 209-217.

Kirchberger, I, Meisinger, C, Heier, M, Kling, B, Wende, R, Greschik, C, & et al 2011, 'Patient-reported symptoms in acute myocardial infarction: Differences related to ST-segment elevation', *Journal of Internal Medicine*, vol. 270, no. 1, pp. 58-64.

Lockyer, L 2005, 'Women's interpretation of their coronary heart disease symptoms', *European Journal of Cardiovascular Nursing*, vol. 4, no. 1, pp. 29-35.

Najafi, T, Momtahen, M, Tessama, MK, Nikravesh, MY, Ekman, I, & Emami, A 2010, 'Gender specific variations in the description, intensity and location of Angina Pectoris: A cross-sectional study', *International Journal of Nursing Studies*, vol. 47, no. 8, pp. 965–974.

Najafi, T, Nikravesh, MY, Ekman, I, & Emami, A 2008, 'Adaptation and validation of the Iranian version of Angina Pectoris characteristics questionnaire', *International Journal of Nursing Practice,* vol. 14, no. 6, pp. 470-476.

Najafi, T, Tessama, MK, Nikravesh, MY, Ekman, I, & Emami, A 2009, 'The Iranian version of Angina Pectoris characteristics

questionnaire: Reliability assessment', *Journal of Clinical Nursing*, vol. 18, no. 5, pp. 694-699.

Nguyen, HL, Saczynski, JS, Gore, JM, & Goldberg, RJ 2010, 'Age and sex differences in duration of pre-hospital delay in patients with acute myocardial infarction: A systematic review', *Circulation Cardiovascular Quality and Outcomes Journal Impact*, vol. 3, no. 1, pp. 82-92.

Nguyen, HL, Ha, DA, Phan, DT, Nguyen, QN, Nguyen, VL, Nguyen, NH, & et al 2014, 'Sex differences in clinical characteristics, hospital management practices, and in-hospital outcomes in patients hospitalized in a Vietnamese hospital with a first acute myocardial infarction', *PLoS ONE*, vol. 9, no. 4, e95631. doi:10.1371/journal.pone.0095631.

Noureddine, S, Arevian, M, Adra, M, & Puzantian, H 2008, 'Response to signs and symptoms of acute coronary syndrome: differences between Lebanese men and women', *American Journal of Critical Care,* vol. 17, no. 1, pp. 26-35.

O'Neill, ES, & Morrow, LL 2001, 'The symptom experience of women with chronic illness', *Journal of Advanced Nursing*, vol. 33, no. 2, pp. 257-268.

Pagidipati, NJ, Huffman, MD, Jeemon, P, Gupta, R, Negi, P, Jaison, TM, & et al 2013, 'Association between Gender, Process of Care Measures, and Outcomes in ACS in India: Results from the Detection and Management of Coronary Heart Disease (DEMAT) Registry', *PLoS ONE*, vol. 8, no. 4, e62061. doi:10.1371/journal.pone.0062061.

Thuresson, M, Jarlov, MB, Lindahl, B, Svensson, L, Zedigh, C, & Herlitz, J 2005, 'Symptoms and type of symptom onset in acute coronary syndrome in relation to ST elevation, sex, age, and a history of diabetes', *American Heart Journal*, vol. 150, no. 2, pp. 234-242.