

## Relationship of some risk factors and symptoms in patients with acute coronary syndrome

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**Abstract:** Acute coronary syndrome (ACS) is one of the major causes of death in the worldwide. Clinical manifestations are different. So it's necessary to have knowledge about the types of symptoms experienced by patients with ACS. This study was performed to assay the Relationship of some risk factors and symptoms in patients with acute coronary syndrome. This cross-sectional study, were studied 294 patients with acute coronary syndrome at least 24 hours after admission had survived. Data was collected by a questionnaire that included demographic data form and check list of some symptoms and history of risk factors. There was a significant relationship between STEMI with vomiting (OR=1.94) and anxiety (OR=1.83) and UA with vomiting (OR=0.42). Between sex with weakness (OR=2.29) and anxiety (OR=1.82), diabetes with dyspnea (OR=1.8), weakness (OR=1.02) and tinnitus (OR=2.06) and hyperlipidemia with weakness (OR=2.35) and tinnitus (OR=2.49) was available significant difference. The findings of this study indicate that the appearance of symptoms of acute coronary syndrome were different as for ECG changes and risk factors, and more focused on those symptoms that they are common with any other diseases. Since, many of the symptoms of acute coronary syndrome can be potentially dangerous and life threatening, accurate diagnosis and timely action is crucial for the patients.

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**Key words:** Acute Coronary Syndrome, Risk factors, Symptom

### Introduction:

Acute coronary syndrome (ACS) refers to a group of heart disorders, identifies with various degrees of ischemic heart disease. The most common modes are

unstable angina (UA), myocardial infarction with the ST segment elevation (STEMI) and without ST segment elevation (NSTEMI) (1). Although unstable angina is not defined yet, but it can be define as a stage between stable angina and myocardial infarction (2).

Recent studies have shown that around 840,000 patients diagnosed with acute coronary syndromes are admitted to hospitals in America (3). On the other hand, more than 13 million people in America suffering from coronary artery disease (CAD) are at a high risk of developing acute coronary syndrome (4). American Heart Association announced that acute coronary syndrome is one of the major causes of death in this country, so that in 1998, 459,841, or one of every five deaths was due to coronary artery disease. These statistics in 2001 reached to 1.1 million in Americans, which is estimated that about 40% of them will die of coronary syndrome (5). NSTEMI and UA estimate for about 2.5 million admissions annually worldwide, while ST elevation STEMI accounts for another 1 million (6).

In the latest statistics of the Ministry of Health in 1380, almost 46% mortality in 18 provinces of Iran has been devoted to cardiovascular disease and myocardial infarction (7).

In 1970s, acute coronary syndrome and the relationship between coronary artery occlusion with no clinical manifestations were reported in studied. From then, different studies were done to evaluate the prognosis and risk factors in the patients and finally compared with acute coronary syndrome in those who had clinical manifestation, because their symptoms are related to the risk factors (8). Unfortunately, in developing countries in Asia has been little attention to ischemic heart disease (9), so that the main cause of pre-hospital death in patients with acute coronary syndrome is the delay in deciding for the choosing and starting of treatment and care (10).

To influence the onset of treatment, it's necessary to have information and knowledge about the types of symptoms experienced by patients with acute coronary syndrome (11). Because of the delay in providing hospital medical treatment, most patients also delayed by the lack of awareness of symptoms occurs, so nurses by educating about the symptoms can have an effective role in reducing therapy's delay (12).

Nikravan quoted Ahmadi says because nurses are the closest person to the patients, so, any change in the patient's condition is noticed by them immediately. Given that one of the nurse's goals is to help diagnoses, they can acquire knowledge in the field of symptoms, to prevent the mortality of patients (7). With increasing nurses' knowledge about similarities and differences between acute coronary syndrome symptoms in patients with multiple risk factors, they can conduct instant and precise diagnosis and finally, effective triage can be established. So the extent of necrosis area and also mortality can be reduced (13). Although chest pain is the most important symptom for diagnosis of ACS, but it's associated with the non-typical and non-specific symptoms, such as quality, spreading, location

and severity of chest pain. These symptoms have been reported different in various populations. Previous studies investigate, the differences in symptoms between men and women, while evidence suggests that symptoms differences can be seen in age, risk factors and race (14).

Considering the few studies have been conducted on this issue in developing countries (15), especially in Iran, this study investigates the Relationship of some risk factors and symptoms in patients with acute coronary syndrome.

#### **Methods:**

This cross-sectional study was conducted in Imam Reza hospital in Amol (Iran), which is in the north of Iran, has the population of one million, from May 2010 to July 2010.

The study is powered at 80% with a 2-sided 5% to achieve a statistically significance on a moderate standardized effect size of 0.4. 294 patients diagnosed with acute coronary syndrome, hospitalized in cardiac ward which had survived at least 24 hours, Purposive Sampling, enrolled to the study.

Patients were excluded if they had any history of Alcoholism, mental, psychological and verbal problems, decreased of consciousness, acute skeletal muscle (at least a week before the onset of symptoms), gastrointestinal diseases such as peptic ulcer, reflux and congestive heart failure.

The data collected by a researcher made questionnaire that included demographic data, history of risk factors such as sex, diabetes, hypertension and hyperlipidemia and also clinical coronary artery disease symptoms. Symptoms of coronary artery disease (CAD), such as chest pain, dyspnea and sweating were gathered from the patients by an expert interviewer. To determine the validity of the questionnaires, the content related validity was utilized and their validity was confirmed by 10 cardiologists in Amol University of Medical Sciences. Also, in order to determine the internal consistency reliability, Cronbach's alpha coefficient was used ( $r=0.91$ ).

#### **Definition:**

Acute coronary syndrome: ACS has been identified with ST depression less than one mm, ST elevation more than two mm in leads V1-V4 or more than one mm in any other lead, inverted T wave in each lead or increase in blood levels of at least one biochemical marker (16).

STEMI: ST elevation more than two mm in leads V1-V4 or over one mm in any other lead was defined as STEMI.

NSTEMI: 1) The existence of more than 20 minutes to angina along with higher levels of troponin T or I. 2) ECG changes in ST segment depression and inverted T

wave, even a normal ECG was defined as NSTEMI (15).

#### Ethical Considerations:

No further diagnostic procedure or treatment imposed on the process of treating patients and all information obtained from the patients remained confidential and given no legal and real authority. The study was approved by the ethics committee of Babol University of Medical Science.

#### Statistics:

Data analyzed by using SPSS version 16 software with descriptive statistics, Chi-square and logistic regression. In the logistic regression model, the independent variables were treated as a binary variable. Results were expressed as crude and adjusted odds ratio and 95% confidence interval. The variables with  $p$  less than 0.1 in the crude analysis were entered in the adjusted model and in adjusted odds ratio all variables entered simultaneously by backward stepwise regression model. A probability level of  $P < 0.05$  was accepted as statistically significant.

#### Results:

From two hundred ninety four subjects participated in this study, 172 subjects (58.5%) with mean age 26/12(SD=67/59) years old and weights 19/15 (SD=75/73) Kg were men. One hundred thirty three subjects (45.2%) had normal body mass, 245 subjects (83.3%) were Married, 180 of them (61.2%) were illiterate and 116 subjects (39.5) were smokers .

From the whole subjects with ACS, 121 subjects (41.1%) had UA (CI95%: 36 - 46), 141 (48%) had STEMI (CI95%: 42-53) and 32 (10.9 %) had NSTEMI (CI95%:6-13). Ninety two subjects (31.3%) of subjects had a history of diabetes, 121 (41.2%) had hypertension and 144 (49%) patients had hyperlipidemia. According to the results of this study, no significant relationship was found between NSTEMI and symptoms. But there was a significant relationship between symptoms such as chest pain ( $p=0.03$ ), vomiting ( $p=0.006$ ), hiccups ( $p=0.04$ ), belch ( $p=0.03$ ) and anxiety ( $p=0.007$ ), with STEMI. Also, there was a significant relationship between symptoms such as sweating ( $p=0.01$ ), nausea ( $p=0.01$ ), vomiting ( $p=0.001$ ), hiccups ( $p=0.01$ ) and anxiety ( $p=0.01$ ), with UA.

Table 1 shows crude and adjusted odds ratio for ischemic heart disease symptoms in acute coronary syndrome. Since, there was no significant relationship between NSTEMI and symptoms, researcher did not enter the symptoms with NSTEMI in logistic regression model.

On the other hand, according to the adjusted model, STEMI increases probability of vomiting and anxiety symptoms up to 96% and 83% respectively.

Also, UA reduces probability of vomiting symptom less than 58%. According to the chi-square test, although men had experienced chest pain more than women ( $p=0.04$ ) but the symptoms of weakness ( $p < 0.001$ ), fatigue ( $p=0.02$ ), hiccups ( $p=0.01$ ) and anxiety ( $p=0.001$ ) were reported in women more than the men.

Also, patients with diabetes, reported dyspnea ( $p=0.002$ ), weakness ( $p < 0.001$ ), sweating ( $p=0.02$ ), fatigue ( $p=0.001$ ), hiccups ( $p=0.01$ ), belch ( $p=0.01$ ) and tinnitus symptoms ( $p=0.002$ ) more than the patients without a history of diabetes.

Among the subjects, there was a significant relationship between a history of hypertension with symptoms of chest pain ( $p=0.04$ ), dyspnea ( $p=0.04$ ), sweating ( $p=0.01$ ), nausea ( $p=0.01$ ), vomiting ( $p=0.03$ ) and hiccups ( $p=0.03$ ). Finally, ACS Patients with hyperlipidemia experienced more symptoms of dyspnea ( $p=0.001$ ), weakness ( $p < 0.001$ ), fatigue ( $p=0.003$ ) and tinnitus ( $p < 0.001$ ).

Table 2 shows crude and adjusted odds ratio for ACS symptoms according to sex, diabetes, hypertension and hyperlipidemia risk factors in the logistic regression model.

According to the adjusted model, symptoms of weakness (129%) and anxiety (82%) are more likely in female gender.

These results showed subjects with diabetes, risk of dyspnea, weakness and tinnitus is up to 101%, 106% and 80% respectively. Also, hyperlipidemia increases the experience of symptoms such as weakness and tinnitus 135% and 149% respectively.

ACS patients with a history of hypertension in the crude model, showed the dyspnea 64%, vomiting 74% and hiccups symptoms 99% more than the other. But in adjusted logistic regression model, no symptoms remained in patients with a history of hypertension.

#### Discussion:

Ischemic heart disease is the main cause of disability and death in the most countries of the world. Despite the major improvements in diagnosis and treatment, one third of patients with ACS die. Half of these patients, within the first hour and before reaching to the hospital die. And two-thirds of those who survive do not ever fully recover and do not return to normal life (17).

According to the results of this study, although no significant relationship was seen between the symptoms of ischemic heart disease and NSTEMI, But in the study of Thuresson there was significant relationship between chest pain, nausea, vomiting and dizziness with NSTEMI (11). This result was not consistent with our research finding. NSTEMI (UA and NSTEMI patients) were included in the Thuresson study, which could explain this discrepancy. But in our research, those patients who had increased troponin T,

but no ECG changes and ST elevation, enrolled to the study. In the literature review no other study conducted on ischemic heart disease symptom and NSTEMI.

The present findings imply that patients with STEMI show more symptoms of vomiting and anxiety. This result is consistent with Thuresson research finding (11).

Nausea and vomiting may be established in a STEMI due to the activation of vagal reflex or stimulate left ventricular receptors that is part of the Bezold-Jarisch. These symptoms are seen in the inferior STEMI than the anterior. The more symptoms can be seen in inferior STEMI than the anterior. Although nausea and vomiting are the two common symptoms of STEMI, but when ACS pain is experienced in the epigastric region, it may simply mimic acute cholecystitis, gastritis or peptic ulcer symptoms (18).

On the other hand, the results of this study indicate that UA reduces the vomiting symptom, but may increase the symptoms such as sweating, pale cold skin, and sinus tachycardia (18). Unfortunately, there was no study found on ischemic heart disease symptoms in the patients affected by UA.

Coronary artery wall atherosclerosis progression which accompanies with accumulation of fat particles leads to many inflammatory reactions. On the other hand, bringing Macrophages to the damaged area, leads to the release of biochemical substances which increase endothelium damage and leads to platelet aggregation and clot formation.

Severity of ACS is associated with the involvement area and the degree of coronary artery occlusion with thrombosis. Complete occlusion of a coronary artery and cut off blood supply to the heart muscle lead to STEMI, and in the partial occlusion the UA/NSTEMI symptoms appear (19). According to our study women reported more symptoms such as weakness, fatigue, hiccups and anxiety than men, but men experienced just chest pain more than the women. In Devon study women had experienced more symptoms of dyspepsia, Palpitation, nausea, numbness fingertips, weakness, and cough than the men, but the men reported more dizziness (20).

Some studies reported that men had experienced more chest pain and dyspnea and women more sweating and dyspnea (21). Another study indicated that the appearance of vomiting, dyspnea, fatigue and anxiety in women is more than the men and also hiccups, sweating and fainting, are more common in the men (7).

Contradictory findings have reported in association with ACS symptoms with regard to sex, maybe along with many other diseases, which ultimately may cause

a delay in decision making, diagnosis and treatment (20).

We found the patients with ACS who had a history of diabetes, experienced more dyspnea, weakness and tinnitus. Although in the study of Funk et al. there was no significant relationship between diabetes and ACS symptoms (15). But Culić have reported that diabetic patients have more experiences of dyspnea, weakness, cough and vomiting that may be due to neuropathy and Autonomic Dysfunction nerve fibers (14).

The risk of cardiovascular events in diabetic patients is 2-8 times more than Non-diabetic, and 75% of diabetic patients' mortality is due to CAD (18).

Diniz stated that diabetes is considered one of the main causes of tinnitus, which is accompanied with spiral ganglion neuron atrophy and eighth cranial nerve demyelination, so 70% of diabetic patients in his study reported tinnitus (22).

Also in our study, ACS patients with a history of hyperlipidemia experienced more weakness and tinnitus. The study of Culić have shown that weakness, nausea, hiccups, and tinnitus symptoms is more experienced in patients with AMI with a history of hyperlipidaemia (14).

Tinnitus is seen more in over 50 years old people, especially when other risk factors such as angina, hyperlipidaemia and diabetes are present (23).

The results suggest that the appearance of dyspnea, vomiting and hiccups in ACS patients with a history of hypertension is higher. According to the Culić study the symptoms of chest pain, belch, cough and weakness in AMI patients with a history of hypertension was higher (14). The results of this study did not confirm our result.

This difference may be due to this fact that all of the patients in colic study had AMI, but in our study a part of participants were patients who had unstable angina.

#### **Conclusion:**

The findings show that the appearance of symptoms of acute coronary syndrome according to the ECG changes and risk factors is different and more related to those symptoms that may be common in many other diseases.

Since, many of the symptoms of acute coronary syndrome can be potentially dangerous and life-threatening, accurate diagnosis and timely action is crucial for the patients.

#### **Limitations of the Study:**

We couldn't assess another factor which affects ACS symptoms such as musculoskeletal disease, neurological and cognitive disorder and also lifestyle.



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**Conflict of interest**

There was no conflict of interest.

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**Table 1:** Ischemic heart disease-related symptoms in logistic regression model, patients with acute coronary syndrome

	Logistic Regression	Crude model			Adjusted model		
		OR	95%CI for OR	P value	OR	95%CI for OR	P value
ACS	Symptoms						
	Chest pain	3.27	1.02-10.14	0.04			
	Vomiting	2.12	1.23-3.64	0.006	1.94	1.12-3.38	0.01
STEMI (yes*/no)	Hiccup	1.95	1.01-3.74	0.04			
	Belching	1.75	1.03-2.98	0.03			
	Anxiety	1.99	1.19-3.30	0.008	1.83	1.09-3.09	0.02
UA (yes*/no)	Sweating	0.50	0.30-0.84	0.009			
	Nausea	0.54	0.33-0.89	0.01			
	Vomiting	0.36	0.02-0.66	0.001	40.42	0.23-0.77	0.005
	Hiccup	0.04	0.19-84	0.01			
	Anxiety	0.52	0.31-0.89	0.01			

All variables with  $p < 0.1$  in crude analysis were entered in the adjusted model in step 1; then using backward stepwise method, only significant variables were selected in the final adjusted model. OR; Odd ratio, CI; Confidence Interval.

**Table 2** :The relationship between acute coronary syndrome disease and risk factors such as sex, diabetes, hyperlipidaemia and hypertension

Logistic Regression		Crude model			Adjusted model		
Risk Factors	Symptoms	OR	95%CI for OR	P value	OR	95%CI for OR	P value
Sex(male/female <sup>*</sup> )	Weakness	66.2	4.33 -1.63	0.001 <	2.29	3.80 -1.37	0.001
	Fatigue	1.71	2.78 -1.05	0.02			
	Hiccup	2.18	4.15 -1.14	0.01			
	Anxiety	2.28	3.80 -1.37	0.001			
	Dyspnea	2.32	1.35 -2.32	0.002			
	Weakness	2.58	4.29 -1.55	<0.001			
Diabetes(yes <sup>*</sup> /no)	Sweating	1.95	3.49 -1.08	0.02	2.01	3.44 -1.17	0.01
	Fatigue	2.32	3.86 -1.39	0.001			
	Hiccup	2.19	4.19 -1.14	0.01			
	Blich	1.97	3.40 -1.14	0.01			
	Tinnitus	2.58	4.70 -1.41	0.002			
	Dyspnea	2.16	3.05 -1.34	0.002			
Hyperlipidemia(yes <sup>*</sup> /no)	Weakness	2.97	4.87 -1.81	0.001>	2.35	3.96 -1.4	0.001
	Fatigue	2.06	3.36 -1.27	0.003			
	Tinnitus	3.11	5.87 -1.64	0.001>			
Hypertension(yes <sup>*</sup> /no)	Dyspnea	1.64	2.67 -1.01	0.004			
	Vomiting	1.74	2.96 -1.02	0.004			
	Hiccup	1.99	3.87 -1.04	0.003			

**\*Reference**

All variables with  $p < 0.1$  in crude analysis were entered in the adjusted model in step 1; then using backward stepwise method, only significant variables were selected in the final adjusted model. OR; Odd ratio, CI; Confidence Interval.

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