Depression and Acute Coronary Syndromes: Gender-Related Differences

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Objective

Investigate whether social and demographic characteristics, clinical diagnosis, smoking status, alcohol consumption, and anxiety are associated with depression in patients with Acute Coronary Syndromes (ACS) stratified by gender.

Methods

Three hundred forty-five consecutive patients with unstable myocardial ischemic syndrome (206 with myocardial infarction and 139 with unstable angina) were interviewed. The interviews included questions about sociodemographics, smoking status, screening for depression (Prime MD e BDI), trait and state anxiety, (IDATE), and alcohol consumption (AUDIT).

Results

Diagnosis of depression has significantly correlated with female gender, age under 50 years, and higher average scores on trait anxiety and state anxiety. Depressed men (245) were usually younger than 50 years of age, smokers and had higher average score on trait anxiety and state anxiety than those non-depressed. The multivariate analysis highlights that age is negatively associated with depression (OR 0.9519 95% CI 0.9261 – 0.9784) and that higher scores on trait anxiety are positively associated (OR 1.0691 95% CI 1.0375 – 1.1017) with depression in the male gender. In the female sample (100), depressed women differ from non-depressed women in that they have a higher average score on trait anxiety and state anxiety. In the multivariate analysis of the female sample, a higher score on trait anxiety was independently associated with depression (OR 1.1267 95% CI 1.0632 - 1.1940).

Conclusion

It was concluded that, among hospitalized patients with ACS, women, as well as men under 50 years and who suffer from anxiety are more likely to experience depression.

Keywords

depression; myocardial infarction; unstable angina; anxiety

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Coronary heart disease (CHD) and depression have great impact on health, since they are highly prevalent conditions that reflect both on mortality rates and quality of life of contemporary man.

Depression has a complex relationship with CHD. Evidence shows it is a risk factor,[1-4] as well as a contributing factor for morbidity,[1] mortality[3,5-7] and quality of life[8] of the CHD patient.

In a meta-analysis study, which included data published between 1945 and 1985[9], depression was associated with CHD and considered the highest psychological risk for heart disease. Regarding the association between CHD and depression, literature shows a prevalence ranging from 14 to 60%[1,5,7], with 15 and 44%[3,5,10,11] among patients with myocardial infarction or unstable angina.

Despite being an isolated risk factor for the development of CHD, depression is often associated with other risk markers. Studies conducted with non-cardiac populations point to an association with obesity (prevalence of depression in 51% of obese subjects with Binge Eating Disorder (BED) and in 14% of non-BED obese subjects)[12], diabetes (a three-fold higher prevalence of depressed subjects among diabetics than in the general population)[13] and cigarette smoking (prevalence ranging from 18.5 to 60.6%)[14].

Depression may also affect the development and course of CHD, as emphasized by Glassman and Shapiro[2], since in addition to the negative impact of the depressed mood in the management of heart disease, evidence shows that its physical concomitants have a direct effect on heart function. Discouragement, apathy, intolerance to frustrations and inflexible thinking, all typical of depressed mood, create unfavorable conditions that make the patient unmotivated to comply with drug therapy and change in lifestyle. Additionally, the physiological changes associated with depression, such as enhanced platelet aggregation, sympathoadrenal hyperactivity, reduction in heart rate variability and decrease in ventricular fibrillation threshold, directly affect the progression of CHD[15]. These pathophysiological mechanisms, together with failure to comply with treatment and changes in lifestyle, account for the higher risks of myocardial infarction (MI) recurrence and increased mortality rates among depressed patients.

It must be emphasized that depression tends to be poorly recognized by cardiologists in patients with CHD, because it is not always that it presents itself in its typical form, with symptoms of depressed mood, marked lack of interest or pleasure in usual activities, feelings of worthlessness or guilt, recurrent thoughts of death, and suicidal ideation. On the contrary, somatic symptoms, such as tiredness, lack of energy, psychomotor retardation, loss or increase of appetite, insomnia, and hypersomnia, are more common and can be mistaken for the heart disease symptomatology. It is also important to consider that depression might present itself in its atypical form, for example, with irritability, hyperphagia and hypersomnia, rather than loss of appetite and insomnia, respectively. All these characteristics of the depressive symptoms in CHD patients determine a tendency towards failure in diagnosis and treatment.

Studies conducted with non-cardiac patients also suggest that depressed patients find it more difficult to quit smoking[16] and alcohol abuse[17]. Thus, the recognition and treatment of depression may significantly reduce failure in the management of heart disease.

Evidence regarding the broad, negative impact of depression on the development, course, severity, and treatment of CHD warns us of the benefits derived from further knowledge on the peculiarities of depression associated with CHD. Studies performed with foreign populations show that depression in patients with MI or unstable angina is associated to the same psychosocial factors observed in non-cardiac patients: women, unmarried, no close friends[3,18]. Unlike non-cardiac patients, however, depression is not associated with cigarette smoking in CHD patients[3,19]. As far as we know, no studies on the subject have been conducted among Brazilians with unstable myocardial ischemic syndrome.

Therefore, this study aimed at investigating whether sociodemographic characteristics, clinical diagnosis, smoking status, alcohol consumption, and anxiety are associated with depression in a population of patients with Acute Coronary Syndromes (ACS), comparing men and women.

Methods

The study protocol was submitted to and approved by the Research Ethics Committee of the institution in which it was performed on May 10th, 2000.

The study was performed with a sample of 345 consecutive patients diagnosed with ACS, 206 with myocardial infarction (MI) confirmed by clinical and electrocardiographic findings and/or biochemical markers of myocardial necrosis and 139 with unstable angina (UA). All patients were hospitalized and had been contacted while still in the Emergency Room or in the Intensive Coronary Care Unit between July 2000 and July 2001.

After informed consent was obtained, a research psychologist assistant conducted the interviews, always during the admission period, from the third day in case of MI or from the second day of onset in case of unstable angina. Patients with co-existent severe non-cardiac condition, cognitive deficit, use of antidepressant and older than 80 years were excluded from the study.

To prevent any possible bias from the psychological stress caused by examination, the interviews were not conducted in the same day of the hemodynamic study. They were conducted, on average, 4.15 $\pm$ 1.56 days post MI. Patients with UA were interviewed, on average,

within 2.94 ± 1.30 days**.** This study includes partial data from an investigation into factors associated with and predictive of smoking maintenance in patients with ACS, and this explains a sample of 135 smokers, 109 ex-smokers and 104 non-smokers. Twenty-four patients refused to participate in the study.

The interview included:

• A questionnaire designed to collect sociodemographic data and smoking history.

• Critério de Classificação Econômica Brasil CCEB (Brazilian Criterion of Economic Classification) for the evaluation of financial status[16].

• Prime MD – Primary Care Evaluation of Mental Disorders (mood module),[17] version translated into Portuguese by Fráguas Jr. e Henriques Jr., and a short scale (17 items) for diagnosing mood disorders, based on the Diagnostic and Statistical Manual of Mental Disorders - Fourth Edition (DSM-IV), developed for primary care research.

• The Beck Depression Inventory (BDI)[18,19] scale to diagnose depression. This is a 21-item scale with scores ranging from 0 to 3 designed to assess the presence and severity of depressive symptoms, yet inappropriate to diagnose depression. The cut-off point used was: <10, for no or minimal depression; 10 to 18 for mild to moderate depression; 19 to 29 for moderate to severe depression; 30 to 63 for severe depression.

• IDATE state-trait anxiety inventory to measure trait anxiety and state anxiety[21]. This inventory consists of two scales, each one containing 20 items. One of the scales evaluates state anxiety, characterized by subjective feelings of tension and apprehension, followed by autonomic nervous system responses[22] at a given moment. Trait anxiety, assessed by the other scale, refers to a relatively stable tendency to perceive situations as threatening and react anxiously to them. Given the difficulties faced by the studied population to deal with a five-point Likert-type scale, (such as IDATE), detected in a previous study[23], we have created cards depicting graphically all the alternatives.

• AUDIT - The Alcohol Use Disorder Identification Test[24], version translated by Figlie,[25] is a ten-item questionnaire with scores ranging from 0 to 40 that assess alcohol consumption, abuse and dependence.

The chi-square test was used in the univariate analysis to compare categorical variables: gender, age group, level of education, socioeconomic status, clinical diagnosis, smoking status, and BDI score. Student's t-test was used to compare mean values for age, AUDIT score (alcohol consumption), and IDATE score (trait anxiety and state anxiety). Equality of variances was checked by Levene's test, when necessary. A p-value < 0,05 was considered statistically significant.

Considering depression (Prime-MD) a dependent variable, the significant variables in the univariate analysis were evaluated in three logistic regression models: with the total sample, male sample and female sample. The Stepwise method was used, and the statistically nonsignificant variables were removed according to Wald test.

The significant variables for depression in the univariate analysis, considered as independent variables in the multivariate analysis of the total sample, were gender, age, state anxiety and trait anxiety. Age, smoking, state anxiety and trait anxiety were the independent variables included in the logistic regression model of the male sample; whereas trait anxiety and state anxiety were included in the female sample.

Statistical treatment was performed using SPSS for Windows 8.0.

Results

The mean age of the population sample was 59.45 ± 10.52 years, male predominance, 71% (n = 245); living with a partner, 69.2% (n = 240); with low education level, up to elementary and middle school (K-8) 55.9% (n = 193) and belonging mostly to C, 24.4% (n = 84) and B2, 24 % (n = 83) socioeconomic classes (table I)

Depression rate was 46.7% (n = 161). Patients diagnosed with depression had lower mean age (p = 0.003), were usually under 50 (p = 0.009), mostly female and had higher trait (p < 0.001) and state anxiety mean scores (p < 0.001) (table I)

BDI results demonstrate that women were more likely to have higher levels of depression than men (p < 0.0001) (table II).

Multivariate analysis shows that female gender (OR 2.4026, 95% CI 1.4424 – 4.0020), age below 50 years (OR 1.9722 95% CI 1.1055-3.5185), and higher scores on trait anxiety (OR 1.0825 95% CI 1.0541 –1.1117) were significantly associated with depression.

Univariate analysis of the male sample shows that those with depression were often younger (p < 0.0001), below 50 years of age (p=0.001), smokers (p=0.018), and had mean trait anxiety scores (p<0.001) and higher state anxiety scores than those non-depressed (table III).

Multivariate analysis suggests that age is negatively associated with depression (OR 0.9519, 95% CI 0.9261 – 0.9784) and that higher scores on trait anxiety are positively associated (OR 1.0691 95% IC 1.0375 – 1.1017) with depression.

The univariate analysis of the female sample revealed that the only difference between depressed women and non-depressed women is that the former have higher mean score on trait anxiety (p < 0,0001) and state anxiety (p = 0,001) (table IV).

In the multivariate analysis, a higher score on trait anxiety was significantly associated with depression (OR 1.1267, 95% CI 1.0632-1.1940).

Table I - Frequency distribution of depression based on sociodemographic characteristics, clinical diagnosis, smoking status, alcohol consumption, trait anxiety and state anxiety

	Total Population n=345		Depression				
	n	%	Yes	%	No	%	p
Age (mean)	59,45±10,52		57,66±10,73		61,01±10,11		0.003
<40 years	12	3.5%	7	58.3%	5	41.7%	
40 - 49 years	53	15.4%	34	64.2%	19	35.8%	
50 - 59 years	108	31.3%	55	50.9%	53	49.1%	
60 - 69 years	103	29.8%	38	36.9%	65	63.1%	
>70 years	69	20.0%	27	39.1%	42	60.9%	0.009
Gender							
Male	245	71.0%	99	40.4%	146	59.6%	
Female	100	29.0%	62	62.0%	38	38.0%	<0.001
Marital status							
With a partner	240	69.6%	107	44.6%	133	55.4%	
With no partner	105	30.4%	54	51.4%	51	48.6%	0.241
Education level							
Illiterate	128	37.1%	64	50.0%	64	50.0%	
Elementary and middle school	65	18.8%	30	46.2%	35	53.8%	
Second school	83	24.1%	38	45.8%	45	54.2%	
Undergraduate level	69	20.0%	29	42.1%	40	57.9%	0.753
Social class							
A1	17	4.9%	7	4.2%	10	58.8%	
A2	54	15.7%	23	42.65%	31	57.4%	
B1	77	22.4%	36	46.8%	41	53.2%	
B2	83	24.0%	39	47.6%	43	52.4%	
C	84	24.4%	41	48.8%	43	51.2%	
D	29	8.4%	14	48.3%	15	51.7%	
E	1	0.3%	1	100%	0	0%	0.927
Clinical diagnosis							
MI	179	51.9%	85	47.9%	94	52.5%	
UA	166	48.1%	76	45.8%	90	54.2%	0.751
Smoking status							
Smoker	134	38.8%	70	52.2%	64	46.8%	
Non-smoker	211	61.2%	91	43.1%	120	56.9%	0.098
Alcohol consumption	1.78±3.44		1.47±2.81		2.05±3.90		0.113
Trait anxiety	44.83±9.99		48.52±7.80		41.55±10.56		<0.0001
State anxiety	42.45±9.22		44.33±8.60		40.80±9.44		<0.0001
Total	345	100%	161	46.7%	184	53.3%	

**The continuous variables are presented as means ± standard deviation; **The categorical variables are presented as frequencies and percentages. MI = myocardial infarction, UA = unstable angina*

Table II - Frequency distribution of severity of depression, comparing men and women

Score	Total Population n=345	%	Women n=100	%	Men n=245	%	p
0 to 10 (no depression)	155	44.9%	32	32.0%	123	50.2%	<0.0001
10 to 18 (mild depression)	115	33.3%	32	32.0%	83	33.9%	
19 to 29 (moderate depression)	65	18.8%	31	31.0%	34	13.9%	
30 to 63 (severe depression)	10	2.9%	5	5.0%	5	2.0%	

Discussion

A high prevalence of depression (46.7%) was observed in the population studied, higher than the one found in other studies conducted with ACS patients, whose results ranged from 15 to 44%[3,5,14,15]. This difference cannot be explained by the age factor, since it was very similar to that of other studies[3,5]. Rather, it may be justified by the use of different instruments or evaluation criteria or the large number of male smokers (who tend to be more depressed than non-smokers) included in the sample. On

Table III - Frequency distribution of depression based on sociodemographic characteristics, smoking status, alcohol consumption, trait anxiety and state anxiety in the male sample

	Total Population n= 245		Depression				
	n	%	Yes	%	No	%	p
Age	58.86±10.40		55.72±10.45		60.99±9.85		<0.001
<40 years	9	3.7%	6	66.7%	3	33.3%	
40 -49 years	39	15.9%	23	59.0%	16	41.0%	
50-59 years	79	32.2%	38	48.1%	41	51.9%	
60-69 years	74	30.2%	20	27.0%	54	73.0%	
>70 years	44	17.9%	12	27.3%	32	72.7%	0.001
Marital status							
With a partner	198	81.0%	82	41.4%	116	58.6%	
With no partner	47	19.0%	17	36.2%	30	63.8%	0.510
Education level							
Illiterate	69	28.1%	25	36.2%	44	63.8%	
Elementary and middle school	47	19.1%	19	40.4%	28	59.6%	
Secondary school	67	27.3%	28	41.8%	39	58.2%	
Undergraduate level	62	25.3%	27	43,5%	35	56.5%	0.848
Social class							
A1	16	6.5%	7	43.8%	9	56.3%	
A2	49	20.1%	21	42.9%	28	57.1%	
B1	60	24.6%	26	43.3%	34	56.7%	
B2	53	21.3%	19	36.5%	34	63.5%	
C	54	22.1%	20	37.0%	34	63.0%	
D	13	5.3%	6	46.2%	7	53.8%	
E	0	0%	0	0%	0	0%	0.949
Clinical diagnosis							
MI	132	53.9%	59	44.7%	73	55.3%	
UA	113	46.1%	40	35.4%	73	64.6%	0.139
Smoking status							
Smoker	104	42.4%	51	49.0%	53	51.0%	
Non-smoker	141	57.6%	48	34.0%	93	66.0%	0.018
Alcohol consumption	2.21±3.80		2.04±3.18		2.33+4.17		0.561
Trait anxiety	44.28+10.43		48.16±8.36		41.64±10.88		<0.001
State anxiety	42.44±9.29		44.00±8.87		41.38±9.44		0.030
Total	245	100 %	99	40.4%	146	59.6%	

**The continuous variables are presented as means + standard deviation; **The categorical variables are presented as frequencies and percentages. MI = myocardial infarction, UA = unstable angina*

the other hand, it may be a distinguishing trait of Brazilian samples; yet, we cannot corroborate this hypothesis due to the lack of previous studies on the subject.

While for some variables, such as education level, marital status, financial status, clinical diagnosis, alcohol consumption, trait anxiety and state anxiety, the relationship with depression for both genders has the same pattern, relevant differences were detected in some aspects. For example, women are more likely to experience depression, and in higher levels, than men.

The higher prevalence of depressive disorders among women is in keeping with literature data, which evaluated foreign populations[6,19,21,28]. It is also suggested that this might be associated to the higher in-hospital mortality of female gender [31,33].

Possible explanations for the higher prevalence of depressive disorders in women range from statistical artifacts, since they are more inclined to seek help and feel more at ease to report emotional aspects (thus contributing to the diagnosis), to biological and psychosocial aspects. Among the biological aspects, the importance of hormonal factors, genetic inheritance and differences in brain structure and function is postulated[33]. Psychosocial factors refer to different lifestyle and psychological mechanisms, as well as the family and social roles of women in view of the changing social environment and growing professional demands[34].

Depression is associated with age in the male gender, but not in the female gender. Men under 50 with ACS are more likely to get depressed than older men. The

Table IV - Frequency distribution of depression based on sociodemographic characteristics, smoking status, alcohol consumption, trait anxiety and state anxiety in the female sample

	Total Population n= 100		Depression				
	n	%	Yes	%	No	%	p
Age (mean)	60.89±10.73		60.76±10.54		61.11±11.17		0.876
<40 years	3	3%	1	33.3%	2	66.7%	
40-49 years	14	14%	11	78.6%	3	21.4%	
50-59 years	29	29%	17	58.6%	12	41.4%	
60-69 years	29	29%	18	62.1%	11	37.9%	
>70 years	25	25%	15	60.0%	10	40.0%	0.581
Marital status							
With a partner	42	42%	25	59.5%	17	40.5%	
With no partner	58	58%	37	63.8%	21	36.2%	0.664
Education level							
Illiterate	59	59%	39	66.1%	20	33.9%	
Elementary and middle school	18	18%	11	61,1%	7	38.9%	
Secondary school	16	16%	10	62.5%	6	37.5%	
Undergraduate level	7	7%	2	28.6%	5	71.4%	0.290
Social class							
A1	1	1%	0	0%	1	100%	
A2	5	5%	2	40.0%	3	60.0%	
B1	17	17%	10	58.8%	7	41.2%	
B2	31	31%	21	66.7%	10	33.3%	
C	30	30%	21	70.0%	9	300%	
D	16	16%	8	50.0%	8	50.0%	
E	1	1%	1	100%	0	0%	0.492
Clinical diagnosis							
MI	47	47%	26	55.3%	21	44.6%	
UA	53	53%	36	67.9%	17	32.0%	0.195
Smoking status							
Smoker	30	30%	19	63.3%	11	36.7%	
Non-smoker	70	70%	43	61.4%	27	38.6%	0.857
Alcohol consumption	0.72±1.98		0.55±1.72		1.00+2.34		0.270
Trait anxiety	46.09±8.73		49.10±6.84		41.18±9.32		<0.000
State anxiety	42.44±9.08		44.85±8.19		38.58±9.23		0.001
Total	100	100%	62	62.0%	38	38.0%	

**The continuous variables are presented as means + standard deviation. **The categorical variables are presented as frequencies and percentages. MI = myocardial infarction, UA = unstable angina*

emotional impact of a serious condition such as MI or UA in a productive age can account for the increased rate of depression among younger men. The psychological impact caused by an MI or UA episode on younger men, such as loss of the healthy status and of the productive capacity and, ultimately, the fear of dying, may be higher than on older men, depression being a manifestation of this impact. On the other hand, it may be considered that younger men, due to cultural issues related to the male stereotype, find it less difficult to perceive and express their feelings of fragility (thus reporting a depressive symptoms) than older men, for whom the internalized concept of masculinity is associated with the non-manifestation of emotions[35].

Another point to be considered, to justify the association between depression and younger ages, is the possible impact of a depressive disorder that might have been installed before the patient's cardiac condition became unstable. In this case, being depression a risk factor for CHD, the earlier onset of ACS in depressed patients compared to those non-depressed could be explained. Nevertheless, since history of depression was not investigated in this protocol, this hypothesis cannot be confirmed. Considering the differences of our results with those obtained with foreign populations, an association with age, [18,19] rather than with lack of a partner, was observed[18,19].

In this study, depression is associated with trait anxiety for women and men alike. This association is understood by the fact that trait anxiety is a characteristic of mental function, including the relatively constant subjective perception of feelings of tension and apprehension, and the revealing sign of lack of psychological resources and limited ability to cope with adverse situations, thus determining a higher predisposition to depression.

Our data reinforce the importance of screening for depressive symptoms in patients admitted with ACS, especially women as well as men under 50 and who suffer from anxiety. Preventing failure in diagnosis and management of depression may be important to a more favorable outcome for patients with CHD, reducing the risks of noncompliance with treatment, recurrence and mortality from ACS.

Besides allowing a richer discussion of our data, the inclusion of depression history and onset of the current condition into the investigation might confirm some of the hypothesis raised.

It was concluded that, in patients admitted with ACS, women, as well as men under 50 years who suffer from anxiety, are more likely to experience depression.

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