The Prevalence of Depressive Symptoms in a Trinidadian Cardiac Population

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ABSTRACT

The current study investigated the prevalence of depressive symptoms in persons with self-reported cardiovascular disease and the interactions of depressive symptoms, reported cardiovascular disease and gender in a Trinidadian population. Between June 2009 and August 2009, 425 participants were recruited from the Eric Williams Medical Sciences Complex (EWMSC) Heart Clinic and all the participants completed the Center for Epidemiologic Studies Depression Scale. Clinical and demographic variables were obtained from the sociodemographic questionnaire. Forty-seven per cent of the self-reported cardiovascular disease participants were identified as having high depressive symptoms as compared to 32% of those who did not report having a cardiovascular illness. The odds ratio indicated that high depressive symptoms are more likely to occur in individuals with reported cardiovascular disease. The Mann-Whitney test revealed females had significantly higher levels of depressive symptoms than males. Previous studies suggest that depression is a risk factor for adverse prognosis in a cardiac population, therefore future research examining the link between depression and cardiovascular disease is warranted.

Keywords: Cardiovascular disease, depressive symptoms, gender, myocardial infarction

Prevalencia de Síntomas Depresivos en una Población Cardiaca de Trinidad

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RESUMEN

El presente estudio investigó la prevalencia de síntomas depresivos en personas con enfermedad cardiovascular autoreportadas y las interacciones de los síntomas depresivos, las enfermedades cardiovasculares reportadas y el género en una población de Trinidad y Tobago. Entre junio y agosto de 2009, 425 participantes fueron reclutados de la Clínica Cardiológica del Complejo de Ciencias Médicas Eric Williams (EWMSC), todos los participantes respondieron la Escala de Depresión del Centro de Estadios Epidemiológicos, y se obtuvieron las variables demográficas y clínicas del cuestionario sociodemográfico. Cuarenta y siete por ciento de los participantes con enfermedades cardiovasculares autoreportadas fueron identificados con síntomas depresivos altos en comparación con el 32% de aquellos que no reportaron tener enfermedad cardiovascular. El cociente de probabilidades (OR) indicó que los síntomas depresivos altos tienen mayor probabilidad de ocurrir en individuos con enfermedades cardiovasculares reportadas. La prueba de Mann-Whitney reveló que las hembras presentaban niveles significativamente mayores de síntomas depresivos que los varones. Los estudios previos sugieren que la depresión es un factor de riesgo para un pronóstico adverso en una población cardiaca. Por lo tanto, es un hecho que la investigación futura necesita examinar el vínculo entre depresión y enfermedad cardiovascular.

Palabras claves: Enfermedad cardiovascular, síntomas depresivos, género, infarto del miocardio

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INTRODUCTION

Emotional distress and depression have been identified as risk factors for cardiac illness and serve as indicators for negative cardiac events in the presence of cardiovascular disorders (1−6). Studies have shown depression occurs in higher frequencies among coronary patients when compared to the general population (1, 5). For example, the prevalence of depression among myocardial infarction (MI) survivors was found to be higher than that of a healthy population (4). Furthermore, when depressive symptoms and its association with cardiovascular diseases (CVDs) was investigated among 11 122 male and female Hungarian participants, it was found that approximately one-fifth of those who had been treated for CVD and approximately half of the population with cardiovascular problems exhibited depressive symptoms (5). Additionally, a study examining the association between a history of depression and patient-reported angina frequency among 1957 patients who were alive seven months after acute coronary syndromes (ACS) found that of those patients who reported daily angina, 43% had a history of depression, whereas among patients who reported rare or no angina, 19% had a history of depression (7). A history of depression was found to be significantly associated with angina frequency after controlling for demographic, cardiac and non-cardiac variables. Also, the prevalence of depression after ACS was significantly higher than that found in the general medicine population and in the general population (7).

The objective of the current study was to investigate the prevalence of depressive symptoms in persons with self-reported CVD. Following previous findings, it is expected that there will be a higher prevalence of depressive symptoms among persons who report having CVD as compared to persons without a self-reported cardiac illness. For the purpose of the present study, the following diagnoses were included in the definition of CVD − coronary artery disease (CAD), coronary heart disease (CHD), coronary heart failure (CHF), ischaemic heart disease (IHD), acute coronary syndrome (ACS), myocardial infarction (MI) and angina.

SUBJECTS AND METHOD

The study comprised 425 participants, 217 (51.1%) females and 208 (48.9%) males, who were recruited from June to August 2009 at the Eric Williams Medical Sciences Complex (EWMSC) Heart Clinic. Participants included EWMSC patients with clinic appointments as well as relatives and/or friends accompanying the patients. Persons in the clinic were approached and informed about the study and asked for their consent to participate. Individuals with and without a self-reported cardiovascular illness were included in the study. Information pertaining to cardiac illness was obtained from the sociodemographic questionnaire. The exclusion criteria were self-report of a psychotic disorder and the inability to understand or read English. Participants' ages ranged from 16 to 87 years with a mean (SD) age of 54.4 years (13.9). The reported race/ethnicity of the participants was: 226 (53.2%) Indian, 107 (25.2%) African, 89 (20.9%) Multiracial, 2 (0.5%) European and 1 (0.2%) Hispanic. Ethics approval was obtained from the ethics committee of the Faculty of Medical Sciences at The University of the West Indies, St Augustine.

Depressive symptoms were assessed using the 20-item Center for Epidemiologic Studies Depression Scale [CES-D] (8). Among community samples, the CES-D has high internal consistency estimates with Cronbach's alpha coefficients that range from 0.8 to 0.9 and test-retest reliability ranging from 0.4 to 0.7 for duration of 25 weeks to one year (8, 9). The scores have also been found to correlate highly with other self-report depression instruments (10). The CES-D has adequate reliability and validity for use in the general population and with patients with medical co-morbidities (10). In addition, the CES-D has been shown to be a reliable measure for assessing the number, types, and duration of depressive symptoms across racial, gender, health and age categories (8, 9, 11). Concurrent validity by clinical and self-report criteria and evidence of construct validity has been demonstrated (8). The instrument has a four-point Likert scale with a total possible score ranging from 0 to 60, with higher scores reflecting greater severity of depressive symptoms reported during the past week. A cut-off score of 16 was used for reporting prevalence of high depressive symptoms (8).

An independent quasi-experimental research design was applied. One-way independent analysis was carried out on the 425 participants (the general sample). Participants were also dichotomized into two groups, those who reported 'yes' to having CVD and those who did not report having a CVD. These two groups (the CVD group and the non-CVD group) were created for independent sample analysis. The CVD group consisted of 273 participants, 136 (49.8%) females and 137 (50.2%) males. The participants' ages ranged from 16 to 87 years with a mean (SD) age of 57 (12.9) years. The race/ethnicity of the 273 participants was: 160 (58.6%) Indian, 57 (20.9%) African, 53 (19.4%) Multiracial, 2 (0.7%) European and 1 (0.4%) Hispanic. The non-CVD group consisted of 152 participants, 81 (53.3%) females and 71 (46.7%) males. The participants' ages ranged from 16 to 80 years with a mean (SD) age of 49.9 (14.4) years. The race/ethnicity of the 152 participants was: 66 (43.4%) Indian, 50 (32.9%) African and 36 (23.7%) Multiracial. Additionally, a third group consisting of participants who reported having experienced a MI (the MI group) was created for independent sample analysis. The MI group consisted of 172 participants, 73 (42.4%) females and 99 (57.6%) males. The participants' ages ranged from 16 to 84 years with a mean (SD) age of 57.9 (11.3) years. The race/ethnicity of the 172 participants was: 107 (62.2%) Indian, 34 (19.8%) African, 29 (16.9%) Multiracial, 1 (0.6%) European and 1 (0.6%) Hispanic.

The Kolmogorov-Smirnov test indicated the sample groups were all significantly ($p < 0.05$) different from a normal distribution; therefore non-parametric tests were used for the statistical analysis. The measure of depressive symptoms was used as the dependent variable and reported CVD, reported MI and gender were used as the independent variables. Depressive symptoms were categorized into high symptoms (a score ≥ 16) and non-high symptoms [< 16] (8). Spearman's rho correlation coefficient, r_s, was calculated to determine the strength of the relationship between depressive symptomatology and the independent variables. An effect size of 0.1 was considered to be a small effect, 0.3 was considered a medium effect and 0.5 was considered to be a large effect (12). The Mann-Whitney test was used to examine the associations between depressive symptomatology and the independent variables. The Pearson χ^2 statistic was used to examine the two-way interactions between depressive symptoms and reported CVD, reported MI and gender. Loglinear analysis was conducted to analyse three-way interactions between the variables. The effect size was assessed using the odds ratio. All *p*-values were one-tailed, and *p*-values less than or equal to 0.05 were considered statistically significant. All analyses were conducted using SPSS for Windows, version 12.0.

RESULTS

Depressive symptoms and its clinical characteristics

The number of participants identified with high depressive symptoms for the sample groups were: 176 (41.4%) in the general sample (n = 425), 128 (46.9%) in the CVD group, 79 (45.9%) in the MI group and 48 (31.6%) in the non-CVD group. Table 1 displays the percentages for the reported clinical characteristics and high depressive symptoms in males and females for the sample groups. In the general sample, there was a significant relationship between depressive symptoms and self-reported CVD, $r_s = 0.17$, p (one-tailed) < 0.01. Those with a reported CVD had significantly higher levels of depressive symptoms (m = 228.2) as compared to those without a reported CVD (m = 185.7), U = 16 596.50, p (one-tailed) < 0.001. A significant interaction between depressive symptoms and reported CVD was found, χ^2 (1, n = 425) = 9.43, p (one-tailed) < 0.01. Table 2 displays the frequencies for the interactions between depressive symptoms and CVD participants and depressive symptoms and non-CVD participants. Based on the odds ratio, individuals with a reported CVD were 1.9 times more likely to have high depressive symptoms. Individuals who did not report having a CVD were 0.5 times as likely to have high depressive symptoms. Furthermore, there was a significant relationship between depressive symptoms and reported MI, $r_s = 0.08$, p (one-tailed) < 0.05. Those who reported experiencing MIs had significantly higher levels of depressive symptoms (m = 225.0) as compared to those who did not report experiencing MIs (m = 204.8), U = 19 690.00, p (one-tailed) = 0.05. However, Pearson Chi-square analysis revealed the interaction between depressive symptoms and MI was not significant, χ^2 (1, n = 425) = 2.43, p (one-tailed) = 0.07.

In the CVD group, depressive symptoms were not significantly correlated with MI, $r_s = 0.04$, p (one-tailed) 0.05. Those who reported experiencing MIs did not have significantly higher levels of depressive symptoms (m = 135.7) as compared to those who did not report having MIs but reported having CVD (m = 139.2), U = 8461.50, p (one-

Table 1: Percentages for self-reported clinical characteristics and high depressive symptoms in males and females for the sample groups

General sample (n = 425)		**Males (n = 208) n (%)**	**Females (n = 217) n (%)**
	Cardiovascular diagnosis	137 (65.9)	136 (62.7)
	Myocardial infarction	99 (47.6)	73 (33.6)
	High depressive symptoms	71 (34.1)	105 (48.4)
Cardiovascular disease group (n = 273)		Males (n = 137) n (%)	Females (n = 136) n (%)
	Myocardial infarction	99 (72.3)	73 (53.7)
	High depressive symptoms	46 (33.6)	82 (60.3)
Myocardial infarction group (n = 172)		Males (n = 99) n (%)	Females (n = 73) n (%)
	High depressive symptoms	37 (37.4)	42 (57.5)
Non-cardiovascular disease group (n = 152)		Males (n = 71) n (%)	Females (n = 81) n (%)
	High depressive symptoms	25 (35.2)	23 (28.4)

Table 2: Interactions between depressive symptoms (CES-D score) and cardiovascular disease (CVD) participants and non-cardiovascular disease (non-CVD) participants

CES-D score		CVD participants	non-CVD participants	Total
Low CES-D (< 16)	Count	145	104	249
	Expected count	159.9	89.1	249.0
	% within CES-D score	58.2	41.8	100.0
	% within CVD and non-CVD	53.1	68.4	58.6
	% of total	34.1	24.5	58.6
High CES-D (≥ 16)	Count	128	48	176
	Expected count	113.1	62.9	176.0
	% within CES-D score	72.7	27.3	100.0
	% within CVD and non-CVD	46.9	31.6	41.4
	% of total	30.1	11.3	41.4
Total	Count	273	152	425
	Expected count	273.0	152.0	425.0
	% within CES-D score	64.2	35.8	100.0
	% within CVD and non-CVD	100.0	100.0	100.0
	% of total	**64.2**	**35.8**	**100.0**

CES-D = Center for Epidemiologic Studies Depression Scale

tailed) = 0.09. The interaction between depressive symptoms and MI was not significant, χ^2 (1, n = 273) = 0.17, p (one-tailed) = 0.39.

Depressive symptoms and gender

There was a significant relationship between depressive symptoms and gender in the general sample, r_s = 0.19, p (one-tailed) < 0.01. Females had significantly higher levels of depressive symptoms (m = 236.1) than males (m = 188.9), U = 17 555.00, p (one-tailed) < 0.001. A significant interaction between depressive symptoms and gender was found, χ^2 (1, n = 425) = 8.89, p (one-tailed) < 0.01. Table 3 displays the frequencies for the interactions between depressive symptoms and gender in the general sample. The odds ratio indicated females were 1.8 times more likely to have high depressive symptoms. Males were 0.6 times as likely to have high depressive symptoms.

Loglinear analysis revealed that the three-way interaction between self-reported CVD, depressive symptoms and gender was significant. The Pearson Chi-square for this model was χ^2 (0) = 0, p = 1, which indicated that the highest-order interaction (CVD x depressive symptoms x gender) was significant, χ^2 (1) = 10.99, p < 0.001. To break down this effect, separate Chi-square tests for depressive

Table 3: Interactions between depressive symptoms (CES-D score) and gender in the general sample

CES-D score		Male	Female	Total
Low CES-D (< 16)	Count	137	112	249
	Expected count	121.9	127.1	249.0
	% within CES-D score	55.0	45.0	100.0
	% within participant's gender	65.9	51.6	58.6
	% of Total	32.2	26.4	58.6
High CES-D (≥ 16)	Count	71	105	176
	Expected count	86.1	89.9	176.0
	% within CES-D score	40.3	59.7	100.0
	% within participant's gender	34.1	48.4	41.4
	% of Total	16.7	24.7	41.4
Total	Count	208	217	425
	Expected count	208.0	217.0	425.0
	% within CES-D score	48.9	51.1	100.0
	% within participant's gender	100.0	100.0	100.0
	% of total	**48.9**	**51.1**	**100.0**

CES-D = Center for Epidemiologic Studies Depression Scale

symptoms and gender were performed separately for the CVD participants and the non-CVD participants. For the CVD participants, there was a significant relationship between depressive symptoms and gender, $r_s = 0.30$, p (one-tailed) < 0.01. Females had significantly higher levels of depressive symptoms ($m = 160.6$) than males ($m = 113.6$), $U = 6112.00$, p (one-tailed) < 0.001. A significant interaction between depressive symptoms and gender was found, χ^2 (1, n = 273) = 19.56, p (one-tailed) < 0.001. Table 4 displays the frequencies for the interactions between depressive symptoms and gender among the reported CVD participants. The odds ratio indicated females were 3.0 times more likely to have high depressive symptoms. Males were 0.3 times as likely to have high depressive symptoms.

Again, loglinear analysis revealed that the three-way interaction between MI, depressive symptoms and gender was significant. The Pearson Chi-square for this model was χ^2 (0) = 0, p = 1, which indicated that the highest-order interaction (MI x depressive symptoms x gender) was significant, χ^2 (1) = 5.87, $p < 0.05$. To break down this effect, Chi-square tests for depressive symptoms and gender were performed separately for the MI participants. In the MI group there was a significant relationship between depressive symptoms and gender, $r_s = .23$, p (one-tailed) < 0.01.

Table 4: Interactions between depressive symptoms (CED-D) and gender among participants with reported cardiovascular disease

CES-D score		Male	Female	Total
Low CES-D (< 16)	Count	91	54	145
	Expected count	72.8	72.2	145.0
	% within CES-D score	62.8	37.2	100.0
	% within participant's gender	66.4	39.7	53.1
	% of Total	33.3	19.8	53.1
High CES-D (≥ 16)	Count	46	82	128
	Expected count	64.2	63.8	128.0
	% within CES-D score	35.9	64.1	100.0
	% within participant's gender	33.6	60.3	46.9
	% of Total	16.8	30.0	46.9
Total	Count	137	136	273
	Expected count	137.0	136.0	273.0
	% within CES-D score	50.2	49.8	100.0
	% within participant's gender	100.0	100.0	100.0
	% of total	**50.2**	**49.8**	**100.0**

CES-D = Center for Epidemiologic Studies Depression Scale

Table 5: Interactions between depressive symptoms (CES-D score) and gender among participants with reported myocardial infarction

CES-D score		Male	Female	Total
Low CES-D (< 16)	Count	62	31	93
	Expected count	53.5	39.5	93.0
	% within CES-D score	66.7	33.3	100.0
	% within participant's gender	62.6	42.5	54.1
	% of total	36.0	18.0	54.1
High CES-D (≥ 16)	Count	37	42	79
	Expected count	45.5	33.5	79.0
	% within CES-D score	46.8	53.2	100.0
	% within participant's gender	37.4	57.5	45.9
	% of total	21.5	24.4	45.9
Total	Count	99	73	172
	Expected count	99.0	73.0	172.0
	% within CES-D score	57.6	42.4	100.0
	% within participant's gender	100.0	100.0	100.0
	% of total	**57.6**	**42.4**	**100.0**

CES-D = Center for Epidemiologic Studies Depression Scale

Females had significantly higher levels of depressive symptoms (m = 100.0) than males (m = 76.5), U = 2 625.00, p (one-tailed) < 0.01. A significant interaction between depressive symptoms and gender was found, χ^2 (1, n = 172) = 6.88, p (one-tailed) < 0.01. Table 5 displays the frequencies for the interactions between depressive symptoms and gender among the reported MI participants. Based on the odds ratio, females were 2.3 times more likely to have high depressive symptoms. Males were 0.4 times as likely to have high depressive symptoms.

For the non-CVD participants, depressive symptoms were not significantly correlated with gender, r_s = 0.03, p (one-tailed) = 0.05. There was no significant difference in depressive symptoms between females (m = 77.6) and males (m = 75.3), U = 2788.50, p (one-tailed) = 0.37. Pearson's Chi-square indicated the interaction between depressive symptoms and gender was not significant, χ^2 (1, n = 152) = 0.81, p (one-tailed) = 0.23.

DISCUSSION

The present findings showed that 46.9% of participants with a self-reported CVD were identified with high depressive symptoms whereas 31.6% of participants who did not report a CVD were identified with high depressive symptoms. These findings support the hypothesis that there is a higher prevalence of depressive symptoms among persons who report having CVD as compared to persons without a self-reported cardiac illness.

A significant relationship between depressive symptoms and self-reported CVD was found. Participants with a self-reported CVD were more likely to have high depressive symptoms when compared to those who did not report having CVD. Participants who reported experiencing MIs also had higher scores for depressive symptoms when compared to those who did not report having CVD. However, Pearson Chi-square analysis did not reveal a significant interaction between MI and high depressive symptoms, indicating that participants who reported experiencing MIs were not more likely to have high depressive symptoms when compared to participants who did not report having CVD. Moreover, in the CVD group, participants who reported experiencing MIs were not more likely to have high depressive symptoms when compared to those who reported a CVD but did not report having an MI. The significant relationship found between depressive symptoms and reported CVD is in accordance with findings from other studies. For example, depression has been found to occur in higher frequencies among patients with coronary disease than in the general population (1, 5) and depression has been associated with the incidence and progression of heart disease (13, 14). In the general sample and in the CVD and MI groups, females were more likely to have higher scores for depressive symptoms when compared to males. In the non-CVD group, there was no significant difference in the level of depressive symptoms for males and females. These findings suggest that females who report having CVD and females who report having experienced MIs are more susceptible to experiencing high levels of depressive symptoms as compared to males who report having CVD and males who report having experienced MIs.

Knowledge of gender-related risk profiles in CVD and co-morbid depression is limited due to a lack of studies in gender-balanced populations, as well as a lack of randomized clinical studies with a larger number of women (15, 16). However, the findings of the present study fall in line with other studies which have found that the rate of depression in women is twice that of men in the cardiac patient population (17). Previous studies have also shown that after MI and coronary artery bypass surgery, women had a greater prevalence of depression than men (17, 18). These differences between females and males are not fully understood but it has been suggested that gender role-related stressors such as low socio-economic status and associated psychological attributes such as emotion-focussed coping styles and interpersonal orientation render females to be more vulnerable to depression than males (15, 16). Also, differences in endocrine stress reactions between women and men may leave women more susceptible to depression than men (15, 16). Subsequently, the increased vulnerability to depression increases the likelihood that females will become diagnosed with CVD (15, 16).

The findings of the present study need to be interpreted with some caution because there were several limitations in the study design. Firstly, cause and effect could not be determined because random sampling techniques were not employed and the study sample was not representative of a normal population. Secondly, the study relied on participant's self-reports on medical conditions rather than on clinical assessments or reports from medical providers. Therefore, the study lacked clinical significance on the reported measures for depressive symptoms and the other reported health variables such as CVD and MI diagnosis. Thirdly, the assessment for depressive symptoms was based on the CES-D. The CES-D has been shown to be a reliable measure for assessing the number, types, and duration of depressive symptoms across racial, gender, health and age categories (8); however, the CES-D has not been examined in a Trinidadian population. Thus, cross-cultural validation of the CES-D is needed for a Trinidadian population. Fourthly, there was no control for lifestyle factors such as diet, obesity and behavioural risk factors such as smoking and alcohol con-sumption. Fifthly, the relatively small number of participants and clinical events imply that the statistical power may have been too low and therefore may have contributed to some of the insignificant findings.

Research suggests depression is a risk factor for cardiac illness and so future research examining depression and cardiac illnesses in a Trinidadian population is warranted.

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Appendix: Sociodemographic Questionnaire

Please take the time to read and answer each question carefully.

1. What is your age? _____

2. What is your date of birth (date/month/year)? _____

3, What is your gender?

   Male □

   Female □

4. What is your race (i.e. African, Indian, European, Asian, Hispanic, Mixed, Other)?

   African □

   Indian □

   European □

   Asian □

   Hispanic □

   Mixed □

   Other □ (please specify) _____

5a. Have you ever been diagnosed as having a cardiovascular (heart) related disease and/or related illness?

   Yes □ No □

5b. If yes, please specify the diagnosis/disease. _____

6a. Have you ever experienced a myocardial infarction (heart attack)?

   Yes □ No □

6b. If yes, when did it occur (please specify month and year).

   _____

7a. Have you ever been diagnosed as having diabetes mellitus?

Yes □ No □

7b. If yes, please specify the diagnosis/disease (i.e. Type 1, Type 2).

_____

8. Have you ever been diagnosed as having hypertension (high blood pressure)?

Yes □ No □

9. Have you ever been diagnosed as having hypercholesterolemia (high cholesterol)?

Yes □ No □

10a. Have you ever been diagnosed as having cancer?

Yes □ No □

10b. If yes, please specify the diagnosis/disease. _____

11a. Do you smoke cigarettes?

Yes □ No □

11b. If yes, how many cigarettes do you smoke in a day? _____

12a. Have you ever been diagnosed with a Psychotic Disorder?

Yes □ No □

12b. If yes, please specify the diagnosis. _____

13. What is your marital status?

Married □

Single □

Divorced □

Separated □

Common-Law □

Other □ (please specify) _____

14. What is your weight? (please specify in pounds [lbs] or kilograms [kgs])

_____

15. What is your height? (please specify in feet, inches, or centimetres)

_____

16. What is your highest school achievement? _____

What is your monthly income? _____