Depression Among Congestive Heart Failure Patients: Results of a Survey from Central China

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ABSTRACT

BACKGROUND: Congestive heart failure (CHF), a chronic debilitating disease, is often accompanied by anxiety and/or depression, even after optimal control with therapy. The aims of our study were to estimate the frequency of depression among Chinese patients suffering from CHF and to assess the association of depression with their clinical parameters.

METHODS: A questionnaire-based study was conducted at Tongji Medical College hospital, Wuhan, China from June 2009 to May 2010. 200 patients with systolic CHF [Left Ventricular Ejection fraction (LVEF) <40%] were classified according to NYHA Functional Classification for heart failure. Depression was evaluated by Beck Depression Inventory (BDI). Patients with a previous history of major depression, psychological disorders, or severe debilitating diseases were excluded. Chi-square and t-test were used to assess the relationship between variables.

RESULTS: The mean age of participants was 62 ± 9 years. 76% (n=152) were in NYHA class II, 21% (n=42) were in Class III and 3% (n=6) were in Class IV. A majority of the participants (60%, n=120) suffered from depression with a significant female predominance (73.9% females and 47.1% males, p=0.024). We found that worse NYHA functional status was associated with more severe depression. Majority of the participants in class II heart failure (67.4%) were mildly depressed (BDI $\geq$10 to <17); whereas majority of patients in class III (64%) and class IV (80%) were severely depressed (BDI score $\geq$17). Among the 36 patients who were severely depressed, mean blood pressure ($140 \pm 12/90 \pm 9$mmHg vs. $135 \pm 8/86 \pm 7$mmHg, p=0.03) and mean blood glucose (147 ± 62mg/dl vs. 131 ± 55mg/dl, p=0.01) were significantly worse than those in patients with mild depression, whereas the converse was true about the LVEF ($30 \pm 3\%$ in severely depressed vs. $32 \pm 4\%$ in mildly depressed, p=0.02).

CONCLUSION:
Depression is common among CHF patients. Severe depression is more frequent than mild depression at higher NYHA Classes of CHF and is associated with worse physiologic parameters.

Key words: Depression, Congestive Heart failure, Heart Rate

INTRODUCTION

Nearly every medical illness is accompanied by bio-psycho-social changes and possesses an element of anxiety and depression to some extent [1]. According to the Diagnostic and Statistical Manual of Mental Disorders IV (DSM-IV), approximately 25% of the people with general medical conditions will become depressed during the course of their chronic condition [2]. With the rising incidence of cardiac diseases due to modernization of lifestyle, the number of patients presenting with congestive heart failure (CHF) is increasing rapidly. [3]. Modern medicine has brought effective management options for CHF and its associated complications [4, 5]. However,

psychological issues accompanying the disease receive less recognition. Given its nature as a chronic debilitating disease with a high mortality (about 24% at one year), CHF is accompanied by psycho-social stress.[6] While the prevalence of minor depression in general population of Western countries is between 5% to 10%, the reported rates of depression in patients hospitalized with CHF range from 40% to 75% [7-9].

Among CHF patients, depression may be a contributing factor to frequent hospital visits, admissions, complications and worsening congestive heart failure symptoms [9-11]. These estimates are from western countries and sparse data is available from central China. By some estimates, approximately 50% of all cardiovascular patients in China suffer from some degrees of CHF [12-14]. Considering the large population and the increasing prevalence of cardiovascular diseases, obtaining estimates of the prevalence of depression in CHF patients in China is of great importance.

The primary aim of this study was to estimate the frequency of depression among Chinese patients with systolic congestive heart failure. A secondary aim was to assess the association of depression with the clinical parameters.

MATERIALS AND METHODS
The study was conducted at the cardiology departments of Tongji Medical College and its allied teaching hospitals, Wuhan, capital of central Chinese province Hubei, China over a period of 1 year from June, 2009 to May, 2010. A total of 200 adult patients aged above 40 years, presenting with CHF were recruited. Systolic CHF was defined as left ventricular ejection fraction (LVEF) <40% on echocardiogram. Patients were subsequently examined clinically and classified according to NYHA Classification (Class I to IV). Patients with a previous history of major depression, severe debilitating diseases including malignancies, uncontrolled hypertension, diabetes mellitus, renal failure, end-stage liver disease and cardiac failure secondary to thyroid disease, or a history of myocardial infarction in the past 6 months were excluded from the study. The study was approved by the ethical committee of Tongji Medical College.

A standardized questionnaire designed with the collaboration of cardiologists and psychiatrists of the Union Hospital, was administered to participants after verbal informed consent was obtained, either a day prior to or on the day of discharge from the health care centre. The questionnaire included details on demographics, symptoms, the Beck Depression Inventory (BDI) scale, living conditions, family support system, personal habits, and any previous medical, surgical or psychological problems.

The BDI is one of the most widely-used tools for the assessment of depression, involving 21 questions, each with four response options. This scale is used as a diagnostic tool to evaluate the severity of depression among individuals above 14 years of age. BDI scoring classifies the patients into various degrees of depression, but usually a range of 10-17 is used to classify the patients in to two groups, mild-to-moderate and severe depression. A BDI score of ≥10 but <17 indicates mild to moderate initial-stage non-specific depression which may proceed towards severe clinical depression with classic signs and symptoms in the presence of aggravating factors, whereas a score of ≥ 17 is considered significant and shows that the subject is already clinically suffering from depression and needs urgent psychiatric treatment. We considered cases of both, mild to moderate as well as severe depression. Cases of mild to moderate depression were labeled as minor depression while severe clinical depression subjects were labeled as major depression. Social conditions like formal education level, financial status and family bonds were also taken in to consideration. Economic status was categorized as upper, middle and lower class based on the monthly income. Upper class included participants with an income of more than $500 per month, middle class $200-500 per month and lower class below $200 per month. Personal habits like smoking and alcoholism were also included in the questionnaire. Smoking was defined as a history of half PACK-YEAR OR GREATER (DURING ANY TIME PERIOD WITHIN THE LAST 5 YEARS). Drinking was defined as the use of 12 ounces of 4% beer or 5 ounces of 10% wine or 1.25 ounces of 43% whiskey at least 3 times per week for 6 months (DURING ANY TIME PERIOD WITHIN THE LAST 5 YEARS).

The data was analyzed using SPSS version 12. Frequencies and measures of central tendency were calculated where appropriate. For univariate comparison of the data, chi-squared test or t-test were used, as applicable. P-value of <0.05 was considered statistically significant. We further subdivided subjects into two groups based on BDI scores: Group A (BDI ≥ 17) and Group B (BDI ≥ 10 but < 17).

RESULTS
The mean ± SD age of the 200 participants was 62 ± 9 years (Table 1). Hypertension was present in 44% (n=88) of the patients and almost half of the total (49%, n=98) belonged to middle economic class.

Demographics of Patients	Total % (n=200)	Sex-wise distribution	
		Males % (n=104)	**Females % (n=96)**
Hypertension	44 (88)	46.6 (41)	53.4 (47)
Diabetes Mellitus	38 (76)	44.7 (34)	55.3 (42)
Lipid disorders	29 (58)	39.7 (23)	60.3 (35)
Smokers	30 (60)	80 (48)	20 (12)
Alcoholics	26 (52)	57.7 (30)	42.3 (22)
Level of education			
No education	26 (52)	48.1 (25)	51.9 (27)
Primary/Secondary Education	24 (48)	58.4 (28)	41.6 (20)
College Education	31 (62)	56.5 (35)	43.5 (27)
University degree	19 (38)	52.7 (20)	47.3 (18)`
Economic class			
Lower Class (<300 $/Month)	44 (88)	45.5 (40)	54.5 (48)
Middle class(300$ - 1000$/Month)	49 (98)	45.9 (45)	54.1 (53)
Upper class(>1000$/Month)	7 (14)	64.3 (9)	35.7 (5)
Family status			
Patients living alone(or only with spouse)	34 (68)	51.5 (35)	48.5 (33)
Patients in combined family system(with relatives or children)	66 (132)	48.5 (64)	51.5 (68)
NYHA Heart Failure Classification			
NYHA I	0 (0)	0 (0)	0 (0)
NYHA II	76 (152)	42.8 (65)	57.2 (87)
NYHA III	21 (42)	47.7 (20)	52.3 (22)
NYHA IV	3 (6)	66.7 (4)	33.3 (2)

Table 1: Participants Details

Most of the statistics were comparable in males and females except smoking status, with males being much more frequent smokers (80%, n=48 male smokers vs. 20%, n=12 female smokers, p=0.01). 66% (n=132) participants were living with their extended families in combined family system, while 44% (n=68) were living either alone or with their spouse only. Of the 200 participants, 76% (n=152) had Class II, 21% (n=42) had Class III and 3% (n=6) had class IV NYHA heart failure.

A majority of the participants (60%, n=120) had depression according to BDI scores with a significant female predominance (73.9% of the females and 47.1% of the males, p=0.024, Table 2). Depression was more frequent in participants who had a history of smoking (p=0.036), alcoholism (p=0.029) and hypertension (p=0.031) as compared to those without such a history. Though insignificant, a majority of patients with diabetes (53.9%, n=40) and with hyperlipidemia (53.5%, n=31) were depressed.

Among the 152 patients in NYHA class II heart failure, 60.5% (n=92) were depressed. Although, the sample size in Class IV heart failure was small, the proportion of patients with depression increased significantly with higher functional class from 59.5% in NYHA Class III to 83.3% in NYHA Class IV heart failure patients, respectively (p=0.01). Moreover, majority of the participants in class II heart failure (67.4%) were mildly

depressed (BDI ≥10 to <17); whereas the majority of patients in class III (64%) and class IV (80%) were severely depressed (BDI score ≥17) (Table 3). More patients were depressed who were living alone or only with their spouse in comparison to those who were living in extended families (60.3% vs. 51.1%, respectively, p=0.034) (Table 2). Level of education and economic status had no significant association with depression (p=0.23 and p=0.16, respectively).

For the 36 patients in Group A who were severely depressed (BDI score ≥17), the blood pressure (p=0.031) and the mean blood glucose (p=0.01) were significantly worse than those for group B participants. On the other hand, the mean LVEF (p=0.02) was worse in the minor depression group B (Table 3).

DISCUSSION

In this study, the majority of the hospitalized CHF patients (60%) suffered from depression. Depression was more frequent among females. In addition, severe depression was associated with the presence of lower LVEF, higher blood pressure and higher blood glucose. In a study conducted in northern China in 2001, Jiang et al screened 374 hospitalized patients with heart failure using the Beck Depression Inventory score and found that 35% had scores of 10 or higher (indicative of at least mild depression) [15]. Since emotional disturbance is not typically considered as a disease by many Chinese patients, depressed individuals might not readily present

Factors (n=200)		Depressed (BDI ≥10) % (n=120)	Not depressed % (n=80)	p-value
Females (n=96)		73.9 (71)	26.1 (25)	**0.024 ***
Hypertension (n=88)		56.8 (50)	43.2 (38)	**0.031***
Diabetes Mellitus (n=76)		53.9 (41)	46.1 (35)	**0.18**
Hyperlipidemia (n=58)		53.5 (31)	46.5 (27)	**0.13**
Smoking (n=60)		73.3 (44)	26.7 (16)	**0.036***
Alcohol use (52)		65.4 (34)	34.6 (18)	**0.029***
NYHA Class	Class II (n=152)	60.5 (92)	39.5 (60)	
	Class III (n=42)	59.5 (25)	40.5 (17)	**0.01***
	Class IV (n=6)	83.3 (5)	16.7 (1)	
Education level	No formal education (n=52)	48 (25)	52 (27)	
	Primary or Secondary (n=48)	47.9 (23)	52.1 (25)	**0.23**
	College (n=62)	54.8 (34)	45.2 (28)	
	University (n= 38)	47.4 (18)	52.6 (20)	
Economic Class	Lower Class (n=88)	48.9 (43)	51.1 (45)	
	Middle Class (n=98)	51 (50)	49 (48)	**0.16**
	Upper Class (n=14)	42.8 (6)	57.2 (8)	
Family Status	Living alone (n=68)	60.3 (41)	39.7 (27)	
	Family living (n=132)	51.5 (68)	48.5 (64)	**0.034***

Table 2: Participants distribution of Depression
59.1% (n=71) of the females and 40.8% (n=49) of the males were among the total depressed population (n=120), respectively;
Male: Female ratio was 1: 1.4
* Statistically significant p-values

to psychiatric services. Thus, the difference in prevalence rates in our study and the study by Jiang et al may reflect variations in health-seeking patterns rather than intrinsic symptom patterns [16].

Previous studies in the West have also reported a higher prevalence of depression in hospitalized heart failure patients. In the general population, major depression has been reported to be common in individuals with chronic medical illnesses. In our study, the severity of depression worsened with increasing severity of heart failure, an important consideration when confronting patients with worsening heart failure [17]. These findings are consistent with some previous studies [2].

Identification of depression in patients with CHF is important from several aspects of their care. Rutledge et al found that the presence of depression in patients with heart failure predicts worse outcomes in terms of hospital readmission rates, functional status, and walk times [17-18]. Gottlieb et al found that quality-of-life scores were significantly worse in heart failure patients if they had a diagnosis of depression on the basis of the Beck Depression Index [2]. Mortality rate is higher for patients with both, heart failure and depression in

comparison to the patients with heart failure only [19, 20]

Our study has several limitations. Perhaps the most important one is a relatively smaller sample size. We were also unable to adjust for confounders in our analyses. The study design limits the generalizability of our findings to only hospitalized patients with CHF. It is possible that optimally controlled CHF patients living in community may have lower prevalence of depression. We were also unable to address the impact of depression on clinical outcomes. However, this study highlights the high prevalence of depression in CHF patients and does provide a basis for future studies to learn about the impact of depression on morbidity and mortality.

CONCLUSION
Depression is common among the congestive cardiac failure patients, with a female predominance. The severity of depression is directly proportionate to the degree of heart failure with severe depression being more frequent than mild depression in patients with higher NYHA Class. Moreover, important clinical parameters of the CHF patients with concomitant severe depression are worse than those with CHF alone. A

Parameters		Group A (BDI ≥17) Major Clinical depression (n=36)	Group B (BDI ≥10 but <17) Minor Depression (n=84)	p-value
Mean LVEF in % (mean ± SD)		30 ± 3	32 ± 4	0.02*
Mean Blood pressure (mmHg) (mean ± SD)	Systolic	140 ± 12	135 ± 8	0.03*
	Diastolic	90 ± 9	86 ± 7	
Mean Blood Glucose (mg/dl) (mean ± SD)		147 ± 62	131 ± 55	0.01*
NYHA Class	Class 2 (92 Depressed) % (n)	32.6 (30)	67.4 (62)	
	Class 3 (25 Depressed) % (n)	64 (16)	36 (9)	
	Class 4 (5 Depressed) % (n)	80 (4)	20 (1)	

Table 3: Depression and Cardiac Parameters Total No. of depressed (BDI≥10) = 120
* Statistically significant p-values

previous history of smoking, alcoholism and hypertension in the Chinese population is associated with a higher frequency of depression.

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