Depressive Symptoms and Health-Related Quality of Life in Patients with Cardiovascular Diseases Attending a Tertiary Care Hospital, Puducherry—A Cross-Sectional Study

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Abstract

Background  Globally, coronary artery disease (CAD) was the leading cause of health losses. The emergence of revascularization has brought a major change in the management of CAD. Depression and cardiovascular diseases (CVD) are the two highly prevalent noncommunicable diseases (NCD), which lead to poor quality of life and high socio-economic loss for the patient. The rate of depressive episodes was higher in CAD population in comparison to population with other heart problems.

Objectives  The primary objective of the current study is to determine the proportion of those with depressive symptoms through Patient Health Questionnaire-9 (PHQ-9) among CAD patients in a tertiary care public hospital.

Methods  It was a cross-sectional analytical design, which assess the percentage of patients with depressive symptoms among CAD patients, using a pretested, semistructured questionnaire. The PHQ-9 and EuroQoL five-dimensional three-level (EQ-5D-3L) questionnaire, a quality-of-life instrument (five items), were used, which was validated in the Tamil version.

Statistical Analysis  Categorical variables was expressed as proportion. We used Chi-square as a statistical test to calculate the p value and risk estimation with 95% CI.

Results  Out of 541 patients, 159 (30%) patients had mild-to-moderate depressive symptoms, of which 144 (89%) participants were greater than 50 years. In EQ-5D-3L, around one-third of the participants reported pain or discomfort and anxiety or depression.

Keywords  ► cardiovascular disease  ► coronary artery disease  ► HRQoL  ► depression  ► patient health questionnaire 9  ► EQ-5D-3L

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Introduction

The relation between depression and coronary artery disease (CAD) has been the subject of research since the past two decades. More studies have shown that there was a strong association between depression and prognosis of coronary heart disease (CHD). Psychological constructs are risk factors for incident CAD and also act as a major risk factors for cardiac morbidity and mortality in the context of established CHD. It also suggests that depression is linked to adverse cardiac outcomes. Depression and cardiovascular disease (CVD) are two highly prevalent noncommunicable diseases (NCD), which lead to poor quality of life and high socioeconomic loss for the patient.

Globally, CAD was the leading cause of major health losses. The emergence of revascularization has brought a major change in its management. More specifically, percutaneous coronary intervention has become the major modality of treatment, which plays a major role in decreasing the disease burden, thereby decreasing anxiety and depression and increasing quality of life among CAD patients.

The rate of depressive episodes was higher in CAD population as compared with population with other heart problems. Moreover, depression is associated with 2-fold increase in the risk of major adverse cardiac events and mortality. Depression and quality of life were strongly associated in deciding patient's health and recovery. Anxiety and depression also have a major impact on treatment compliance. CAD patients are more liable for mood affect and finally land up with depression. This implies that these patients certainly need detection of anxiety and depression for a correct referral and support for the treatment.

The American Heart Association (AHA) recommended that depression following CAD should be considered as one of the risk factors for bad cardiac outcome, as the evidence indicates that it has an association with cardiac mortality and other nonfatal cardiac events.

Health-related quality of life (HRQoL) has a multispectral relation to physical and psychological health, work, leisure time, social functioning, and belongingness in CAD patients. Anxiety and depression are the two factors which have major influence on quality of life, even cause death among CAD patients. Hence, it is important to study HRQoL and psychosocial factors related to their disease status and coping strategies. Despite the significance of identifying depression in this population, there is paucity of literature in the Indian context. This study will help to assess its burden and facilitate treatment in CAD patients and this will, in turn, reduce the risk of future cardiac events. Assessing the association between mild-to-moderate depressive symptoms with sociodemographic and behavioral characteristics among cardiac patients can help to plan better treatment strategies. These will also help in planning a suitable cardiac rehabilitation program within the available resources and suitable for our context.

Methodology

This is a hospital-based cross-sectional study design. The study was conducted in the cardiology outpatient department (OPD) of the superspeciality block from September to November 2018. It has an average of 400 to 450 patients visit as outpatients every day. All patients attending cardiology OPD at JIPMER diagnosed with CHD were considered. The adult patients attending cardiology OPD (≥18 years), diagnosed with CHD (post-acute coronary syndrome), patients receiving treatment from cardiology OPD for minimum 3 months, and patients with other major comorbidities like chronic kidney disease, cerebrovascular accident and other peripheral vascular diseases were also included in the study. The patients who were diagnosed to have depression before onset of CHD were excluded from the study. Sample size was calculated using OpenEpi version 3.01. Assuming the prevalence of depressive symptoms in CAD patients to be 34%, α error 5% (95% confidence level) and 4% absolute precision, the sample required is 539. The sample size was covered between Monday and Thursday from 8 am to 2 pm at the cardiology OPD.

The study participants were selected from cardiology OPD using systematic random sampling technique, based on usual flow rate of patients from the previous day. On an average, around 400 patients visited the clinic each day. Assuming data collection period of 16 days, we were required to cover 34 patients/day. The sampling interval was calculated based on this assumption, that is, 400/34, which gives the sampling interval of around 12. So, every 12th patient was selected. However, there are fluctuations in patient flow rate; hence, the sampling interval was adjusted accordingly. A pretested, semistructured questionnaire was used for data collection through Epi collect software. It includes the following domains: sociodemographic variables and clinical characteristics; behavioral...
risk factors and adherence to secondary prevention methods were collected. For assessing symptoms of depression, Patient Health Questionnaire-9 (PHQ-9), validated in Tamil version, was used. A cutoff score greater than or equal to 5 is most commonly used to identify mild depression, and those patients who scored above this threshold were considered failed screen and were referred to Department of Psychiatry for further evaluation and management. Various studies have used PHQ-9 to study patients with arthritis, HIV-AIDS, and person with disabilities for depressive symptoms screening. EuroQOL five-dimensional three-level (EQ-5D-3L) questionnaire is a self-administered quality-of-life instrument consisting of five dimensions (mobility, self-care, usual activities, pain or discomfort, and anxiety or depression), three levels (mild, moderate, and severe), and a visual analog scale (VAS) scoring from 0 to 100. Each of the five dimensions is divided into five perceived levels of problems (no, slight, moderate, severe and extreme or unable). It is also used to assess the health utilities in health technology assessment studies. Both instruments were validated in the Indian context and translated into many languages. After approval from JIPMER Scientific and Ethics committee, the study was carried from September 1 to November 5, 2018 at cardiology OPD JIPMER. Written informed consent was obtained from the subjects. The details were collected through a pretested, semistructured questionnaire.

Data entry was done in EpiCollect 5 and transferred as CSV file to Excel 2016; thereafter, data was exported to IBM Statistical Package of Social Science (SPSS) V.20 for management and analysis. Continuous variables were described as mean and standard deviation (SD) or median and interquartile range (IQR), based on the distribution of the data. Categorical variables were described as proportion. Prevalence of depression was expressed as proportion with 95% confidence interval (CI). The association between independent variables and presence of depressive symptoms was tested for statistical significance using Chi-square/Fischer's exact test. p value < 0.05 was considered to be statistically significant. Multivariate analysis was done using binomial logistic regression for independent variables with significant p value (< 0.05) to get adjusted odds ratio (OR).

Result

A total of 541 individuals attended the cardiology clinic during the reference period. Median age for study participants was 45 years, with minimum of 18 years to maximum of 85 years. One-third was between 41 to 50 years of age. Three-fourths were males, and more than half were between class 6th to 10th standard. Around two-thirds were unskilled workers and 5% were housewives. Two-thirds were from Tamil Nadu and the rest were from Puducherry. Regarding socioeconomic classification, mainly around half were from middle class. Majority (93%) of participants were married (Table 1).

EQ-5D-3L instrument was used to assess the HRQoL among the study participants, and it included five domains. Around 15% participants had problems in mobility. The second domain describes self-care—one-third of participants (29%) had problems in their self-care activities. More than one-third of participants reported that problem persists in their usual activities. One-third reported pain or discomfort and anxiety or depression (Table 2).

The VAS score describes the HRQoL by imaginable score from 0 to 100, which informs us about their current health marked by the patient. The mean VAS score was 56. Around 80% of the participants rated their health as moderate, while 7% said it was the worst imaginable health status (Table 3). The proportion of depressive symptoms among the study participants was assessed using PHQ-9, which comprises of

### Table 1 Sociodemographic characteristics of patients with CAD (N = 541)

| Variables                  | Classes | Frequency (%) |
|----------------------------|---------|---------------|
| Age (in years)             | 18–30   | 60            | 11.1          |
|                            | 31–40   | 133           | 24.6          |
|                            | 41–50   | 204           | 37.8          |
|                            | 51–60   | 110           | 20.4          |
|                            | ≥60     | 33            | 6.1           |
| Gender                     | Male    | 396           | 73.2          |
|                            | Female  | 144           | 26.6          |
|                            | Transgender | 1      | 0.2           |
| Educational status         | Illiterate | 46      | 8.5           |
|                            | Class 1–5 | 139        | 25.7          |
|                            | Class 6–10 | 316       | 58.4          |
|                            | Higher secondary | 23    | 4.3           |
|                            | Graduation | 17       | 3.1           |
| Occupation                 | Manual/heavy | 338    | 62.5          |
|                            | Sedentary | 125          | 23.1          |
|                            | Unemployed | 78        | 14.4          |
| Residence                  | Tamil Nadu | 361     | 66.7          |
|                            | Pondicherry | 153     | 28.3          |
|                            | Kerala    | 12           | 2.2           |
|                            | Andhra Pradesh | 6     | 1.1           |
|                            | Others    | 9            | 1.7           |
| Socioeconomic status *     | < 938 (lower class) | 26    | 4.8           |
|                            | 938–1875 (lower middle class) | 5 | 0.9 |
|                            | 1876–3126 (middle class) | 260 | 48.1 |
|                            | 3127–6253 (lower middle class) | 158 | 29.2 |
|                            | ≥6254 (upper class) | 40 | 7.4 |
| Marital status            | Married | 501           | 92.6          |
|                            | Unmarried | 40        | 7.4           |

Abbreviation: CAD, coronary artery disease.

*Modified BG Prasad scale for socioeconomic status (May 2017)
nine questions related to their daily functioning and coping for the past 2 weeks rated on a scale of 0 to 3 (0—not at all, 1—sometimes, 2—nearly half a day, and 3—nearly all the day). This scale assesses their level of depression like none, mild, moderate, and severe. One-third study participants (29.4%) had mild depression (score of 5 to 9), while three of them had moderate depression. None of them had severe depression. Prevalence of any depression was 30% (95% CI) and this includes mild and moderate forms of depression (Table 4).

Out of 541 patients, 30% patients had mild-to-moderate depression, of which 144 (89%) participants were greater than 50 years, 20% were females, and one-third had educational status until primary level. Individuals belonging to age category more than 50 years had 5.3 times higher odds of having mild-to-moderate depression compared with younger subjects; adjusted OR was 5.76. Similarly, females had 1.56 times higher odds of having mild-to-moderate depression compare with males; when adjusted for other factors, the odds were 1.26 times higher. Higher socioeconomic status was also a risk factor for any depression (OR 1.76). Individuals with positive family history had 2.5 times higher odds compared with those who had negative family history and odds were similar (2.34) when adjusted for the factors (Table 5).

### Discussion

In our study, the prevalence of mild-to-moderate depression in the study population was around 30%. This is high when compared with other studies where depression postmyocardial infarction (MI) ranged from 13% to 15% in USA. Another study showed that around 20% of cardiovascular patients were affected by depression. Severity of depression was more in another study done in India (35% prevalence of major depressive disorder) among ischemic heart disease (IHD) patients.

However, in our study, moderate depression was present in only three patients who warranted referral for counseling, while mild depression was observed in the majority. This could be due to the longer duration of disease duration in the study participants, which allows for various coping strategies as observed in the qualitative results. This may lead to better quality of life and hence levels of depression could be low. This was corroborated by the fact from an earlier study that depression reduced from 70% to 18% at the end of the year in the same study setting.

However, it is possible that this may be high in the community which may not be able to access these services and hence are not under the radar of the health system. It should be noted that the study patients had access to hospital and are availing services. So, generalization of study results is not possible. Lower levels of moderate and severe depression in this study could indicate their coping capacity, quality of care they receive in the hospital, and the psychosocial support they receive from their home. Depression can occur in many

### Table 2

| Domains of EQ-5D tool | Frequency | % |
|-----------------------|-----------|---|
| Mobility              |           |   |
| No problems           | 459       | 84.8 |
| Have problems         | 82        | 15.2 |
| Self-care             |           |   |
| No problems           | 387       | 71.5 |
| Have problems         | 154       | 28.5 |
| Usual activities      |           |   |
| No problems           | 352       | 65.1 |
| Have problems         | 189       | 34.9 |
| Pain/discomfort       |           |   |
| No problems           | 356       | 65.8 |
| Have problems         | 185       | 34.2 |
| Anxiety/depression    |           |   |
| No problems           | 366       | 67.7 |
| Have problems         | 175       | 32.4 |

Abbreviations: CAD, coronary artery disease; HRQoL, health-related quality of life.

### Table 3

| VAS                  | Rank     | Frequency | Percentage |
|----------------------|----------|-----------|------------|
| Best imaginable      | 100–70   | 36        | 12.2       |
| Moderate imaginable  | 70–40    | 439       | 81.1       |
| Worst imaginable     | below 40 | 66        | 6.7        |

Abbreviations: CAD, coronary artery disease; HRQoL, health-related quality of life; VAS, visual analogue scale.

### Table 4

| Status of depression | Score | Frequency | Percentages |
|----------------------|-------|-----------|-------------|
| None                 | 0–4   | 379       | 70          |
| Mild                 | 5–9   | 159       | 29.4        |
| Moderate             | 10–14 | 3         | 0.6         |
| Moderate severe      | 15–19 | 0         | 0           |
| Severe               | 20–27 | 0         | 0           |

Abbreviation: CAD, coronary artery disease.
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Chronic diseases, where patients are on prolonged treatments and their quality of life is affected. For example, depression in this study was lesser compared with 63% depressive symptoms among epileptic patients in the same setting. CVD and depression are both highly prevalent disorders and reduce their quality of life and imposes economic burden on the patients. Early identification and timely management of depression among CAD patients is necessary to reflect positive health outcome and improve quality of life.

In this study, we found a higher risk of presence of any depression among older patients, and twice the risk when family history of CAD was reported. Female patients and upper-class women had mildly elevated risk for depression, and these were statistically significant. Different determinants have been reported in different studies and this can be explained by the sociocultural milieu of their community. Young patients, females, being diabetic and previous history of depression were found to be significant determinants of depression in a study. In another Indian study, low literacy status, female gender, and the presence of type II diabetes mellitus were associated with psychiatric morbidity. Identification of people at high risk will help in screening of patients in an effective manner. This finding is comparable to earlier studies that have shown that among survivors of MI, depression and anxiety are key entry points and powerful predictors of quality of life.

Overall, one-third of the participants reported some problems in their usual activities of self-care or mental health, and lesser people had problems in mobility. Poor quality of life was reported in another Indian study where majority (61.5%) reported some difficulties; 24% patients reported inability to perform usual activities. Similar to our study, lesser proportion reported impairment in mobility in other settings. In a study conducted in Taiwan, the average EQ-5D index was 0.82 and mean VAS score was 77.8 (± 13.6). One-third of the study participants reported problems in pain or discomfort and anxiety or depression.
similar to our study. Self-care domain was affected in least proportion of people (20%). Similarly, in population-based studies on normal and high risk groups, impaired quality of life was reported in chronic diseases and patients with cardiovascular risk. Studies have shown that depression predicts subsequent quality of life, while others have shown that HRQoL is a risk factor for ongoing depression.

The strength of our study is, the use of validated tools like PHQ9 and EQ5D3L, which enables comparison of these attributes across different settings and countries. Recall and social desirability bias could be a possible limitations in the study.

Conclusion

Assessment of HRQoL is becoming increasingly important in the management of CVD patients. Quality of the additional life years gained is as important as length of life. Moreover, poorer QOL predicts adverse health outcomes like mortality and hospitalization. It is important to ensure good HRQoL by providing emotional, social, and physical well-being. Social support influences the presence and severity of depression. This is the basis of planning psychosocial interventions in CVD patients. Treatment of depression may improve subsequent physical HRQoL; hence, it is vital to address both of them during their follow-up to improve their outcomes.

Note

The study had been approved from the JIPMER Ethics Committee on August 1, 2018.

Authors’ Contributions

A.S. wrote the first draft of the manuscript with the support from L.S., D.K.G. and E.S. A.S. performed data cleaning and preparation for analysis. D.K.G. and A.S. performed the analysis. L.S., S.S. and V.M. provided statistical support and critical review of the manuscript with subsequent revision. All the authors approved the final manuscript. The corresponding author L.S. attests that all listed authors meet authorship criteria and that no others meeting the criteria have been omitted. A.S. is the guarantor.

Conflict of Interest

None declared.

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