



## DEPRESSION AND CORONARY ARTERY DISEASE

## CTVS

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## ABSTRACT

The study was conducted by the investigator to find out the differences in the psychological variable named depression of subjects suffering from coronary artery disease (CAD) when they were compared with a group, having no coronary artery disease. A descriptive cross-sectional and co relational design was chosen. Subjects with CAD (N=405) were collected from CTVS Dept. and Cardiology Dept. of a Tertiary Care Hospital in Kolkata, West Bengal and subjects for matched control group (N=405) were collected from the community as well as individuals accompanied the patient. The tool used for this purpose was "Beck Depression inventory (BDI-II)" to rate individuals on 21-point scales for detailed evaluation of level of depression. The data was analysed with statistical tools. A total of 810 subjects participated in the study. Data was summarized by descriptive statistics, namely mean and standard deviation for numerical variables. Distribution of numerical variables was ascertained through Kolmogorov-Smirnoff goodness-of-fit test. BDI scores were normally distributed and CAD scores were skewed. Numerical variables had been compared between case and control groups by Student's unpaired t test. 2-tailed  $p < 0.05$  has been considered as statistically significant in this comparison. The significant difference was found between control and study group ( $p < 0.001$ ). Association between CAD scores and depression scores has been quantified by calculating Spearman's rank correlation coefficient. Results of this study suggest that inclusion of depression management may be necessary in successful prevention and clinical management of CAD.

## KEYWORDS

Coronary Artery Disease, Depression

## INTRODUCTION

According to World Health Organization (WHO), by the year 2020, both CAD and depression will be the two major causes of disability-adjusted life years. Data of different study suggest a bidirectional link between depression and CAD. Depression may be caused by CAD. Also, Depression is an independent risk factor for CAD

The Global Burden of Disease study estimate of age-standardized CVD death rate of 272 per 100 000 populations in India is higher than the global average of 235 per 100 000 populations (Prabhakaran et al., 2016). Also, their study revealed that years of life lost because of CVD in India increased by 59%, e.g. from 23.2 million (1990) to 37 million (2010). Though there are various different reasons in the prevalence of cardiovascular risk factors across different regions, CVD has emerged as the leading cause of death in all parts of India, including poorer states and rural areas. (Prabhakaran et al., 2016).

Non-modifiable cardiovascular risk factors, such as age, sex, family history, as well as modifiable risk factors, as sedentary lifestyle, body weight, smoking, diabetes, etc. are associated with increased cardiovascular risk.

But, typically these risk factors do not fully responsible for all the outcomes because there is a lack of definite relation between high-risk profiles and the occurrence of CAD. From different studies it is evident that a number of psychological states and traits, such as stress, anxiety, depression etc. have also been implicated as potential risk factors for CAD.

- To find out whether the patients suffering from CAD differ significantly from a matched control group with reference to their depression level.
- To determine whether there is relationship between CAD and depression

## Method

The study has been conducted at CTVS Dept. and Cardiology Dept. in SSKM Hospital, Kolkata, West Bengal. 405 patients were taken who were suffering from CAD. They were compared with control group (N= 405) having no CAD. Samples were collected from general population from the community as well as individuals accompanied the patient considering inclusion and exclusion criteria for the study. Semi-structured questionnaire was developed to obtain background data.

Table 1: Demographic profile frequency and percentage distribution of study and control group

| Variables     | Characteristics      | Study group |            | Control group |            |
|---------------|----------------------|-------------|------------|---------------|------------|
|               |                      | Frequency   | Percentage | Frequency     | Percentage |
| Age           | 31-40 yrs.           | 45          | 11.11      | 78            | 19.26      |
|               | 41-50 yrs.           | 105         | 25.93      | 153           | 37.78      |
|               | 51-60 yrs.           | 188         | 46.42      | 141           | 34.81      |
|               | 61-70 yrs            | 67          | 16.54      | 33            | 8.15       |
| Sex           | Male                 | 282         | 69.63      | 213           | 52.59      |
|               | Female               | 123         | 30.37      | 192           | 47.41      |
| Weight        | 45.1kg-55kg          | 129         | 31.85      | 147           | 36.30      |
|               | 55.1kg-65            | 183         | 45.19      | 189           | 46.67      |
|               | 65.1kg-75kg          | 84          | 20.74      | 51            | 12.59      |
|               | 75.1kg-85kg          | 9           | 2.22       | 9             | 2.22       |
|               | >85kg                | 0           | 0.00       | 0             | 0.00       |
|               | <45kg                | 0           | 0.00       | 9             | 2.22       |
| Occupation    | Daily earning        | Study group |            | Control group |            |
|               |                      | Frequency   | Percentage | Frequency     | Percentage |
|               | Farmer               | 27          | 6.67       | 27            | 6.67       |
|               | Small scale business | 111         | 27.41      | 99            | 24.44      |
|               | Service              | 57          | 14.07      | 54            | 13.33      |
|               | Retired from service | 33          | 8.15       | 18            | 4.44       |
|               | Unemployed           | 114         | 28.15      | 135           | 33.33      |
|               |                      |             |            |               |            |
| Family Income | Rs.3000-10000        | 252         | 62.22      | 255           | 62.96      |
|               | Rs.10001-20000       | 90          | 22.22      | 114           | 28.15      |
|               | Rs.20001-30000       | 27          | 6.67       | 15            | 3.7        |
|               | >Rs.30,000/-         | 9           | 2.22       | 18            | 4.44       |
|               | <Rs.3000/-           | 27          | 6.67       | 3             | 0.74       |
| Dietary habit | Non-vegetarian       | 381         | 94.07      | 387           | 95.56      |
|               | Vegetarian           | 24          | 5.93       | 18            | 4.44       |
| Smoking habit |                      | Study group |            | Control group |            |
|               |                      | Frequency   | Percentage | Frequency     | Percentage |
|               | Tobacco              | 174         | 42.96      | 105           | 25.93      |
|               | Alcohol              | 15          | 3.7        | 21            | 5.19       |
|               | Smokeless tobacco    | 30          | 7.41       | 30            | 7.41       |
|               | Tobacco & alcohol    | 18          | 4.44       | 12            | 2.96       |

|                            |                        |             |            |                   |            |
|----------------------------|------------------------|-------------|------------|-------------------|------------|
| Exercise                   | Regular exercise       | 87          | 21.48      | 59                | 14.57      |
|                            | Irregular exercise     | 5           | 1.23       | 4                 | 0.99       |
| Years of suffering         | 4yrs 1month – 8yrs     | 105         | 25.93      | No history of CAD | NA         |
|                            | >8yrs                  | 27          | 6.67       |                   |            |
|                            | <1yr                   | 54          | 13.33      |                   |            |
|                            | 4yrs 8yrs              | 105         | 25.93      |                   |            |
| Family history             | Father/                | 34          | 8.4        | 19                | 4.69       |
|                            | Mother/ Brother        |             |            |                   |            |
|                            |                        | Study group |            | Control group     |            |
|                            |                        | Frequency   | Percentage | Frequency         | Percentage |
| Blood pressure (Systolic)  | 90- 110 mm of mercury  | 84          | 20.74      | 78                | 19.26      |
|                            | 111- 130 mm of mercury | 171         | 42.22      | 243               | 60         |
|                            | 131- 150 mm of mercury | 96          | 23.7       | 54                | 13.33      |
|                            | 151- 170 mm of mercury | 36          | 8.89       | 27                | 6.67       |
|                            | 171- 190 mm of mercury | 18          | 4.44       | 3                 | 0.74       |
| Blood pressure (Diastolic) | 71- 80 mm of mercury   | 141         | 34.81      | 189               | 46.67      |
|                            | 81- 90 mm of mercury   | 105         | 25.93      | 90                | 22.22      |
|                            | 91- 100 mm of mercury  | 42          | 10.37      | 3                 | 0.74       |
|                            | 60- 70 mm of mercury   | 117         | 28.89      | 123               | 30.37      |
| Body mass index            | 18.5 – 24.9            | 231         | 57.04      | 270               | 66.67      |
|                            | 25- 29.5               | 114         | 28.15      | 105               | 25.93      |
|                            | 30 and above           | 24          | 5.93       | 21                | 5.19       |
|                            | <18.5                  | 36          | 8.89       | 9                 | 2.22       |

In terms of age, most of subjects of study & control group (72.35% & 72.59% respectively) were from 41-60 years of age. In terms of sex, 69.63% were male & 30.37% were female in study group and in control group male & female were 52.59% & 47.41%. Range of weight of the most subjects were 45.1kg to 65kg of study & control group (77.04% & 82.97) respectively.

Height of the most subjects of study & control group ranged from 5'–5'6" (80.74% & 78.52). 47.41% & 40% subjects of study and control group had secondary level educational background and next higher group was upto primary level(31.11&24.44%respectively). 95.56% of study group & 97.78% of control group were married. 97.78% of study group & 90.37% of control group were Hindu.

Most of the participants of study group and control group were either from daily earning group (15.56% & 17.78%), small scale business group (27.41% & 24.44%) or service group(14.07%&13.33%)respectively. 62.22% of study and 62.96% of control group had their family income between Rs.3000-10000. 94.07% & 95.56% of both the group respectively were non-vegetarian.

Data revealed that history of smoking habit of study group was 42.96%, whereas, 25.93% in control group. History of regular exercise in study group was 21.48% & in control group was 14.57%. Most of the CAD patients (54.07%) were suffering from 1yr–4yrs. Family history in study group & control group was 8.40% & 4.69% respectively.

Blood pressure of most of the subjects (study & control) was within normal limit (Systolic–42.22 % & 60% and Diastolic–60.74% & 68.89% respectively).Body mass index of subjects of study & control group (57% & 66.67% respectively)was also within normal limit (18.5-24.9).

**Tools Tool 1:** A set of semi-structured questionnaire was developed to collect demographic data of the samples.

#### Tool 2: Beck Depression inventory (BDI-II)

BDI- II, standardised tool developed by Aaron T. Beck et. al, is an instrument for measuring the depression level in adults above 13 years and older. It was used to rate individuals on 21-point scales to evaluate the severity of depression.

#### Result

Both descriptive and inferential statistics was computed of depression scores and CAD scores of both group(study and control) and compared.

**Table 2 Descriptive statistics of numerical variables of BDI– Case group [n = 405]**

| Variable | Minimum | Maximum | Mean ± Std.Dev. | Median(IQR) |
|----------|---------|---------|-----------------|-------------|
| BDI      | 1       | 45      | 19.77 ± 9.047   | 19(13-26)   |

Table 2 depicts the Minimum and maximum score related to variable, mean ± SD, median, and inter quartile range of depression in case group.

**Table 3 Descriptive statistics of numerical variables of BDI Control group [n = 405]**

| Variable | Minimum | Maximum | Mean ± Std.Dev. | Median(IQR) |
|----------|---------|---------|-----------------|-------------|
| BDI      | 0       | 44      | 14.28 ± 9.55    | 13(7-20)    |

Table 3 depicts the Minimum and maximum score related to variable, mean ± SD, median, and inter quartile range of depression in control group.

**Table 4 Comparison of numerical variables of BDI between Case (n=405) and Control(n=405) groups – Student's unpaired ttest**

|     | Mean ± SD     | t-value       | df    | p   |         |
|-----|---------------|---------------|-------|-----|---------|
|     | Case          | Control       |       |     |         |
| BDI | 19.77 ± 9.407 | 14.28 ± 9.548 | 8.402 | 808 | < 0.001 |

Table 4 shows that there was statistically significant difference between the groups in terms of BDI score ( $p < 0.001$ ). Thus depressive features have been reported significantly more in experimental group than in control group.

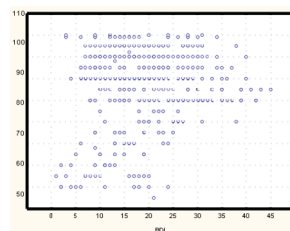
#### Relationship between CAD and Depression

**Table 5 Descriptive statistics of numerical variables – Case group [n = 405]**

| Variable | Minimum | Maximum | Mean ± Std.Dev. | Median | (IQR) |
|----------|---------|---------|-----------------|--------|-------|
| CAD      | 25      | 100     | 76.11 ± 17.892  | 80     | 70-90 |

Table 5 depicts the descriptive statistics in relation to CAD scores in the experimental group.

Association between CAD scores and psychological score has been quantified by calculating Pearson's correlation coefficient  $r$  or Spearman's rank correlation coefficient  $Rho$ , as appropriate. This has been done after checking the linearity assumption through scatter plots.



**Figure17. Depicting correlation of depression score with corresponding CAD score in 405 experimental group**

**Table 19 Spearman's rank correlation coefficient Rho**

|           | Valid n | Spearman's Rho coefficient | p-level |
|-----------|---------|----------------------------|---------|
| CAD & BDI | 405     | 0.007                      | 0.885   |

The above table indicates the correlation between depression and CAD. From the table it can be seen that there was positive but poor correlation.

#### DISCUSSION

The present study investigated whether the patients suffering from CAD differ significantly from a matched control group with reference to depression. Also, whether there was any relation between coronary artery disease (CAD) and depression.

In the present study depressive features have been reported

significantly high in experimental group than in control group. But the computation of correlation between depression and CAD did not show statistical correlation between the two.

Speculations about the link between psychosocial factors and disease are almost as old as medicine itself. Different research studies provide strong evidence for the adverse effects of psychosocial factors in the development of CVD and in the prognosis of patients with CAD (Franklin BA, 2009).

There was statistically significant difference between the groups in terms of BDI score ( $p < 0.001$ ). The results showed that there exists significant difference between control and experimental groups in terms of BDI scores. Thus depressive features have been reported significantly more in experimental group than in control group. Correlation was poor and was not significant at  $p$  level  $< 0.05$ .

A literature based study was conducted by Khawaja, S.I., et al. (2009) to determine whether or not a relationship between depression and coronary artery disease exists. Literature based search supported the following: Depression and coronary artery disease have a bidirectional relationship, i.e., coronary artery disease can cause depression and depression is a independent risk factor for coronary artery disease and its complications.

## CONCLUSION

The score of depression was assessed in 810 subject (Study group  $N=405$ , Control group  $N=405$ ). Student's unpaired  $t$  test results revealed significant group difference in respect of BDI between the study & control groups. Then psychological score related to depression of CAD patients were correlated with angiographic score. The result indicated poor relation and did not have significant relation with CAD. It was concluded that depression may have some role in the pathogenesis of coronary artery disease, also affects the consequences of CAD as there was significant group difference in relation of some psychological variable which was discussed above. In the present study depressive features have been reported significantly high in experimental group than in control group. But the computation of correlation between depression and CAD did not show statistical correlation between the two.

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