Anxiety-driven Cardiopulmonary Complaints during COVID-19 Pandemic Outbreak

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Abstract

Background

We intend to examine whether the COVID-19 outbreak influences medical decision-making (MDM) among Non-COVID patients.

Method

We recruit 287 patients who admit to ER department due to cardiovascular complaints. Anxiety level was measured using three questionnaires (GAD-7, Beck Inventory, and the cardiac anxiety questionnaire). A fourth survey was designed to assess MDM considerations.

Results

64% of patients were male (median age 54). Almost half of the patients were found to have moderate to severe levels of anxiety.79.3% of patients reported that the outbreak influenced their MDM. 44.5% of patients sought medical care 2-3 from the onset of symptoms. Coronary artery disease was found in only 26 patients (9.1%). Almost half of the patients stated that they would have gone earlier if not for the current pandemic.

Conclusion

Non-COVID patients seeking medical care had a high anxiety level that directly affected decision-making and put them at unnecessary risk.

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1. Introduction

COVID-19 was initially declared a pandemic by the WHO on March 11, 2020 [1]. The unpredictable nature of the pandemic, together with the measures taken worldwide to contain it, has increased risk factors for mental health disorders [REF]. Among others, these include lockdown, social distancing, isolation, decreased familial support, inactivity, temporary or indefinite employment termination, loss of income, and increased access to food and alcohol. The downturn in the economy caused by COVID-19 and its continued breakdown, likely to occur in its aftermath, has caused financial insecurity and unemployment, leading to damaging effects on physical and mental health – in both previously healthy people and those with preexisting conditions [2].

Anxiety disorders involve excessive fear or anxiety and may cause people to avoid situations that trigger or worsen their symptoms [3]. The link between anxiety and cardiac or respiratory symptoms has been extensively studied and proven in randomized studies and meta-analyses known as Non-Cardiac Chest Pain (NCCP) [4-6]. The majority of these studies focused on chest pain as a primary symptom due to the clinical importance of negating the organic component [7-9]. A survey conducted in 1989 demonstrated that in approximately 43% of people who underwent coronary angioplasty to determine chest pain etiology, no significant coronary heart disease was found to explain their symptoms. Instead, researchers believe it is likely that a large proportion of these people suffer from anxiety [9].

Compared to heart disease patients, NCCP patients appear to experience higher levels of fear, distress, and autonomic pain sensations [10-12]. Moreover, they avoid situations resulting in cardiac or respiratory exertion that may endanger them and often live at a high level of conscious fear of a catastrophic event [13].

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Heart-focused anxiety (HFA) is the fear of cardiac-related stimuli and sensations because of their perceived negative consequences. Eifert et al. [14] developed and validated an 18 item survey known as the Cardiac Anxiety Questionnaire (CAQ) designed to measure HFA. In this validation study, it was demonstrated that a higher score in the Questionnaire indicated a higher level of anxiety and risk of developing HFA.

To assess the general population's anxiety level, we use two of the most commonly used Questionnaire: the Generalized Anxiety Disorder (GAD) Assessment and the Beck Anxiety Inventory (BAI), developed by Georg H. Eifert and Aaron Temkin Beck.

People with GAD display excessive anxiety for at least six months, which may cause influence social interactions, school, and work [14]. The Generalized Anxiety Disorder Assessment (GAD-7) is a seven-item survey that is used to assess the severity of generalized anxiety disorder (GAD). Using a threshold score of 10, the GAD-7 has a sensitivity of 89% and a specificity of 82%. It was also found to be an accurate screening tool for three other common anxiety disorders - panic disorder (sensitivity 74%, specificity 81%), social anxiety disorder (sensitivity 72%, specificity 80%), and posttraumatic stress disorder (sensitivity 66%, specificity 81%) [14-16].

The Beck Anxiety Inventory (BAI) is a 21-question2 multiple-choice inventory used to measure the severity of anxiety among adults. Higher scores indicate increased severity of anxiety symptoms. The standardized cutoffs are 0–7, 8-15, 16-25, and 26-63 for minimal, mild, moderate, and severe, respectively [17-18].

1.1 Rationale of the study

The impact of the global pandemic Covid-19 outbreak was first seen in Israel early in the year 2020. There was a general national lockdown during this period, and health services operated on a limited basis only. Patient-Doctor interactions were achieved

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mainly through a virtual communication system. Road traffic commuting was prohibited except for essential personal necessities and emergencies. The study's goal was to examine whether the COVID-19 outbreak affected the level of stress and anxiety among patients who seek medical care due to cardiovascular-related complaints and whether it has impacted medical decision-making.

2. Methods

We designed a cross-sectional survey-based prospective cohort study conducted in the Cardiology Department at Emek Medical Center in collaboration with the Med-Psych service and the Emergency Department. Patient recruitment began in February 2020 and lasted until September 2020. The study population included patients admitted to the Emergency Department with a primary complaint of chest pain. Patients were excluded from the study if they were younger than 18 years old, mentally disabled, pregnant, or were positive for COVID-19 infection.

Patients were recruited only after complete triage screening and preliminary medical examination to exclude urgent scenarios.

Patients were instructed to independently complete four questionnaires written in Israel's four most common languages (Hebrew, Arabic, Russian, and English). Three of the questionnaires were The Beck Anxiety Inventory, the Cardiac Anxiety Questionnaire, and the General Anxiety Questionnaire (S1-S3). We designed an additional fourth self-report questionnaire (MD-19), intended to measure the influence of COVID-19 on the patient's medical decision-making process (S4). The Questionnaire contains two parts; the first is a nine-item multiple-choice survey measuring the level of awareness and involvement of COVID-19 in patients' daily life

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decisions. In the second part, the patients were instructed to choose three out of 12 sentences best describing their decision-making considerations before seeking medical care. For analysis purposes, we grouped these sentences into four categories: Mental, medical, economic, and general concerns, based on the sentence's nature. Patients who did not fulfill at least 30% of the Questionnaire were excluded from the analysis.

Patients' medical information regarding essential characteristics, occupational and marital status was collected from the Clalit health data service systems (Orion, Ofek, and Chameleon software).

2.1 Ethics

The Ethics Committee approved the study of the hospital following the Helsinki Convention No. EMC-20-0057. Recruitment was performed within 24–48 hours of hospital arrival after obtaining informed consent. Eligible patients underwent a personal interview during which they were asked to answer a structured self-assessment questionnaire written in their native language. Supplemental data on demographics, clinical data, and medical history were obtained using computerized medical records ("Orion," Ofek," and "Chameleon").

2.2 Research Planning

During the study period, 810 patients were admitted to the Emergency Department with a primary complaint of chest pain. Thirty-six patients did not meet the inclusion criteria (Age < 18, COVID-19 positive, Flu-like symptoms, urgent scenarios such as shock, pulmonary edema, refractory pain, respiratory failure, and physical or mental disability). Seven hundred seventy-four patients were eligible for the study. We

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succeeded in recruiting 290 patients (37.5% recruit rate). Three patients were excluded from the analysis due to the inability to fulfill at least 30% of the questionnaires. The study population included 287 patients (Figure 1).

2.3 Sample Size

Calculation of the sample size was based on three main criteria: the population size – the total number of patients who were admitted to the emergency department during the study period due to chest pain (estimated as 840 patients), an estimated recruit rate to the study of about 0.3 and a response distribution of 50%. To achieve a margin of error of 5% and a 95% confidence level, we needed to recruit at least 264 patients.

2.3 Statistics

A chi-square test was performed to analyze the association between the questionnaires and categorical variables. For continuous variables, we used the t-test (alternatively the Wilcoxon two-sample test). Categorical variables were presented using frequencies and percentages. Means and standard deviations were calculated for continuous data and frequency and percent for categorical data. 95% confidence intervals were calculated for key admission characteristics. Pearson correlation was performed to test the association between CAQ and BAI and GAD. Differences considered statistically significant were at the 2-sided p level of 0.05. Statistical analysis was performed using SPSS version 24 (IBM).

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3. Results

Two hundred eighty-seven patients participated in the study (183 males; median age 54, range 19-87 years). Of the 287 patients, 64% were male. Nearly all were married (238; 90.8%) and fully functional (without any disabilities that prevent them from work) (257; 94.1%). More than a quarter of the patients were unemployed at the recruitment time (79; 27.5%). More than 40 percent of the patients had been previously diagnosed with anxiety, depression, or other mental illness (19.4%, 12.9%, and 10.5%, respectively). 44.7% of patients had at least two cardiovascular risk factors (Table 1).

Of the 287 patients, 130 (45.3%) were hospitalized. 69 (53.1%) underwent at least one noninvasive cardiac test, and 56 (43.1%) underwent diagnostic cardiac catheterization. Percutaneous coronary intervention (either by balloon angioplasty or drug-eluting stenting) was needed in 26 (46.4%) patients. Non-significant coronary artery disease was found in more than half (26; 53.6%) of the patients who underwent catheterization (Table 2). Four patients (1.4%) were eventually found to be positive for COVID-19.

Survey Questionnaire Results

95.8% of patients fulfilled the General Anxiety Disorder (GAD-7) questionnaire. Scores of 5, 10, and 15 were taken as the cutoff points for mild, moderate, and severe anxiety, respectively, as proved in previous trials. Survey results indicate that more than 55% of patients had mild GAD while almost 45% had moderate to severe GAD (Figure 2).

Two hundred and seventy-eight (96.9%) patients completed the Beck Anxiety Inventory (BAI) questionnaire. 75 (27.0%) patients had minimal anxiety levels, 62 (22.3%) patients had mild anxiety levels, and more than half of the patients (141, 50.7%) had moderate to severe anxiety levels (Figure 3).

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276 (99.2%) patients completed the Cardiac anxiety questionnaire. CAQ is positively correlated with GAD (r=.431, p<.001) and BAI (r=.620, p<.001). As GAD increases, so does the CAQ score. Similarly, as depression increases, the CAQ score increases (Figure 3).

An average of 268 (93.4%) completed the MD-19 Questionnaire. 259 (90.2%) patients stated that they were familiar with COVID-19. 18 (6.6%) patients reported that they did not listen, read, or watch the News at all, while most patients (159, 94.4%) reported that nowadays they are listening, read, or watched the News more than three times a day.

One hundred thirty-five (50.8%) patients discussed the COVID-19 with surrounding people more than three times a day, while 22 (8.3%) patients declared that they did not speak of the subject at all. Most of the patients (225; 80.9%) were worried about the current pandemic and situations created by it, and a third of them (76; 33.7%) were significantly concerned.

Two hundred and five (74.5%) patients believed that the pandemic was not considered before seeking medical care, while 57 (20.7%) patients thought it influenced their decision. 122 (44.5%) patients sought medical care two to three days after the onset of symptoms, and more than a third of them (43, 35.2%) visited the emergency department a week after the start of symptoms [Table S-1].

One hundred sixty-eight (61.6%) patients stated that they would have gone to the emergency room earlier had there not been a pandemic and a nationwide lockdown, and 177 (64.1%) patients indicated fear of visiting the hospital in recent days. (Table2, Figure 4).

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In the second part of the DM-19 Questionnaire, patients were instructed to mark the sentences best describing their considerations before coming to the hospital. We clustered the sentences into four main groups: Mental concerns indicated anxiety, stress, depression, and fear. Economic crisis marked fear of employment, dismissal, financial loss, or loss of livelihood. Medical considerations meant fear of having been or of becoming infected, fear of death, and denial of medical conditions. General state considerations best-described patients' knowledge and familiarity with current government guidelines and laws (Table 3).

The patients' most significant considerations before seeking medical care were reported in the general state cluster (122; 83.7%). Medical care considerations were the second most common (125, 58.1%). Mental state considerations were seen in more than a third of the patients (106, 38.4%). Economic concerns during medical decision-making were the least reported by the patients.

4. Discussion

Evidence of COVID-19 related mental health disorders has been demonstrated in several surveys of the general public that have been conducted. These surveys display an increase in anxiety symptoms due to the previously mentioned stressors, along with additional psychosocial factors such as fear of contracting the disease, fear of future financial consequences, life routine disruption, and more. Additionally, these surveys observed numerous behavioral changes contributing to and associated with developing depression and anxiety symptoms, such as increased exposure to social media, online gambling, alcohol consumption, and binge-watching television.

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Our study included 287 patients. Most of them were in their fifth decade of life with two or more cardiovascular risk factors. Most of the patients were male and married.

Coronary artery disease (CAD) was found in 26 (9.1%, 95% CI: 15.3-24.5) patients, which indicates that despite the high cardiovascular risk profile, in most patients, the cause of chest pain was noncardiac related pain (NCCP). This rate was found to be significantly higher than previously reported.

Most of the patients reported that they were very aware of COVID-19; they are updated through the media daily and even several times a day and state that they are very concerned about the current pandemic. Analysis of the questionnaires revealed a significant anxiety threshold (moderate to high) among more than 30-40% of patients (be precise about the data). This anxiety threshold has also been demonstrated in correlation tests between the questionnaires.

Medical decisions were significantly affected by the pandemic and the current situation where nearly half of patients reported that they sought medical care only a few days after the onset of symptoms and that if not for the pandemic, they would have turned to medical care earlier.

In analyzing the considerations in deciding whether or when to seek medical care, the special considerations appeared to be a concern arising from a lack of information about new government roles, guidelines, and restrictions, especially concerning public services, including health, education, transportation, and policing.

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Patients were also highly concerned about whether their stay in the hospital would cause them to be infected with COVID-19 or found positive for COVID-19 in a routine test. This fear was further strengthened by a fear of the economic consequences of being infected by COVID-19, which they believe will result in dismissal and loss of livelihood.

Our study reveals high anxiety levels among patients with significant cardiovascular risk profile seeking medical during a pandemic state. This mental state seems to positively influence decision-making regarding their medical condition, leading to a higher morbidity and mortality rate not directly related to COVID-19 and can be easily preventable.

4.1 Limitations of the study

Our study covers a single center's experience for a relatively short period, yet our center covers a large area in the northeast of the country and serves a diverse population. This time in Israel was characterized by the highest rate of COVID-19 positive test reports.

5. Conclusions of the study

Our study revealed high anxiety levels among patients admitted to the emergency department due to chest pain during the COVID-19 outbreak. The mental state, based on self-reported questionnaires, seems to influence medical decision-making. The patients, whose most of them found to be with a moderate to high cardiovascular risk profile, tended to ignore medical symptoms and seek medical care only after a few days

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and sometimes after a week. Patients reported that their decisions derived from concerns related to government decisions and limitations, fear of being infected with COVID-19, the mental state in which they were afflicted, and the economic consequences of being infected. Most of the patients stated that they would turn earlier to medical care if not the current outbreak.

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Legends for tables & figures

Fig 1: Study Plan

Table 1. Patient essential characteristics among the study population

Table 2: Patients characteristics at admission

Figure 2: Anxiety level among population study based on the General Anxiety disease (GAD-7) Questionnaire

Figure 3: Anxiety level among population study based on the Beck Anxiety Inventory questionnaire

Figure 4. Correlation of the Cardiac Anxiety score among the study population with the general anxiety disease questionnaire (upper figure) and the Beck Anxiety Inventory (lower figure)

Figure 5. Awareness and decision making among study population based on the MD-19 Questionnaire

Table 3. Decision-making consideration Clustered into four groups: Mental (Peach), Medical (grey), Economic (purple), and General state (aqua) considerations.

Figure 6. Distribution of decision making consideration clustered into four groups (Medical, Economical, Mental & General state)

Legends for supplementary material

S1: The Beck Anxiety Inventory (BAI) Questionnaire in English, Russian, Arabic, and Hebrew language versions

S2: The Cardiac Anxiety Questionnaire (CAQ) Questionnaire in English, Russian, Arabic, and Hebrew language versions

S3: The General Anxiety Disorder Questionnaire (GAD-7) in English, Russian, Arabic, and Hebrew language versions

S4: effect of Covid-19 on Medical decision making Questionnaire in English, Russian, Arabic, and Hebrew language versions

Table S-1. Symptoms-related self-assessment questions from DM-19 Questionnaire among the study population

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Figure 1. Study Plan

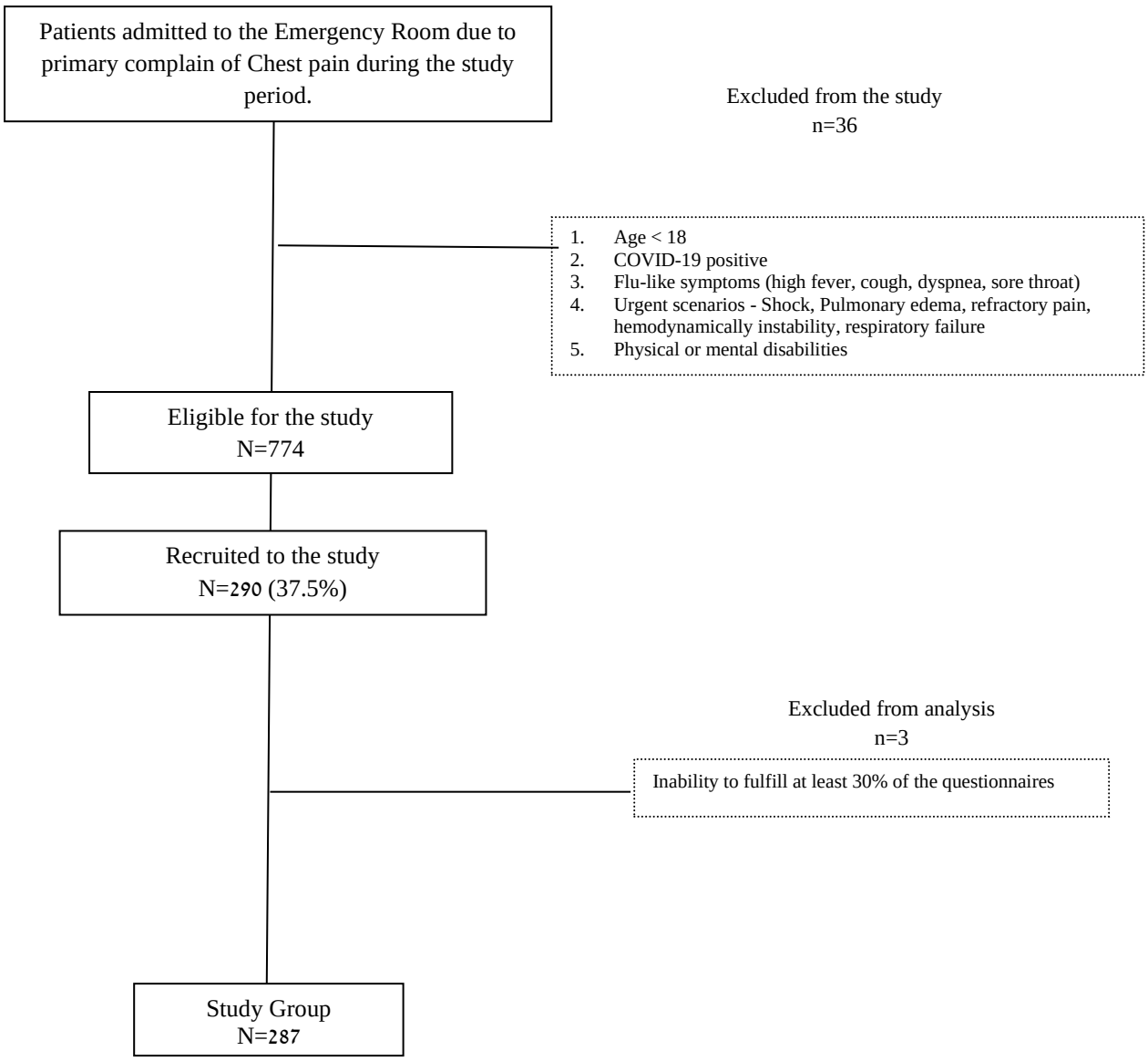

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Table 1. Patient essential characteristics among study population (N=287)

Patient characteristics	***N (%)***
Age, mean ± SD	52.7±14.9
(range)	(19-87)
Gender	
Male	183 (63.8)
Female	104 (36.2)
Marital status	
Married	238 (90.8)
Single	18 (6.9)
Divorced	6 (2.3)
Occupational status	
Currently working	176 (61.3)
Unemployed	79 (27.5)
Unknown	32 (11.2)
Functional status	
Fully functional	257 (94.1)
Partially functional	13 (4.8)
Disabled	3 (1.1)
Smoker	129 (44.9)
Obese	115 (40.1)
Family history of Ischemic Heart Disease	90 (31.4)
Hypertension	148 (51.6)
Hyperlipidemia	156 (54.4)
Chronic renal failure	19 (6.6)
Diabetes Mellitus	91 (31.7)
Coronary Artery Bypass Graft (CABG)	10 (3.5)
Atrial fibrillation	22 (7.7)
Ischemic heart disease	81 (28.2)
Heart failure	23 (8.0)
CVA/TIA	31 (10.8)
Anxiety	56 (19.4)
Depression	37 (12.9)
Other psychiatric illnesses	30 (10.5)
Drug users	1 (0.3)

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Table 2: Patients characteristics at admission

Admission characteristics	***N (%)***	***95% CI***
Primary complaint		
Chest pain	226 (78.7)	73.6-83.1
Palpitations	18 (6.3)	
Dyspnea	13 (4.5)	
Other	30 (10.5)	
Abnormal ECG	11 (3.8)	2.2-6.7
Abnormal elevated cardiac enzymes	40 (13.9)	10.4-18.4
Noninvasive cardiac test during hospitalization	69 (24.0)	19.5-29.3
Cardiac catheterization during hospitalization	**56 (19.5)**	15.3-24.5
Results of cardiac catheterization		
No intervention	30 (53.6)	
PCI	26 (46.4)	
Rate of abnormal cardiac angiography	46.4 per 100	34.0-59.3

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Table 3. decision-making consideration Clustered into four groups: Mental (Peach), Medical (grey), Economic (purple), and General state (aqua) considerations.

10 I have a hard time dealing with the situation at home, so I had to go outside	**7** The rush at the hospital	**4**I was fearful of getting infected with the coronavirus	**1** I was afraid to leave the house because of the general closure in the country
11 I was worried I would not find transportation to the hospital	**8** I will not be able to support my family	**5** I was afraid my boss would fire me if he found out I was infected with Corona	**2** I was afraid I would be tested for Corona, and the result would be positive.
12 I was afraid they would fire me from work if they hospitalized me .	**9** I never thought that my condition serious	**6** My stay at home causes me stress	**3** I did not want to come to the hospital, but my family members pressured me to come

Mental consideration; clusters 3, 6, 10

Economic consideration; clusters 5, 8, 12

Medical consideration; clusters 2,4,9

General state consideration; clusters 1, 7, 11

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Figure 2: Anxiety level among population study based on the General Anxiety disease (GAD-7) Questionnaire

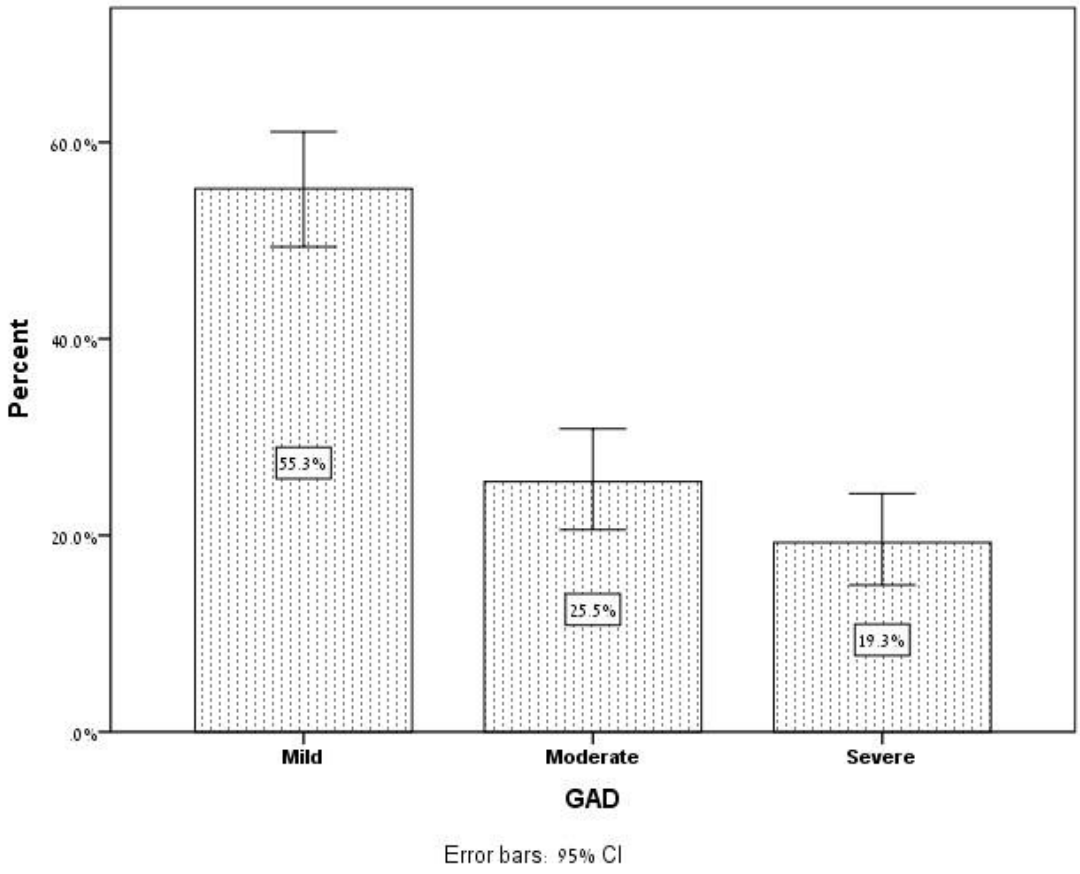

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Figure 3: Anxiety level among population study based on the Beck Anxiety Inventory questionnaire

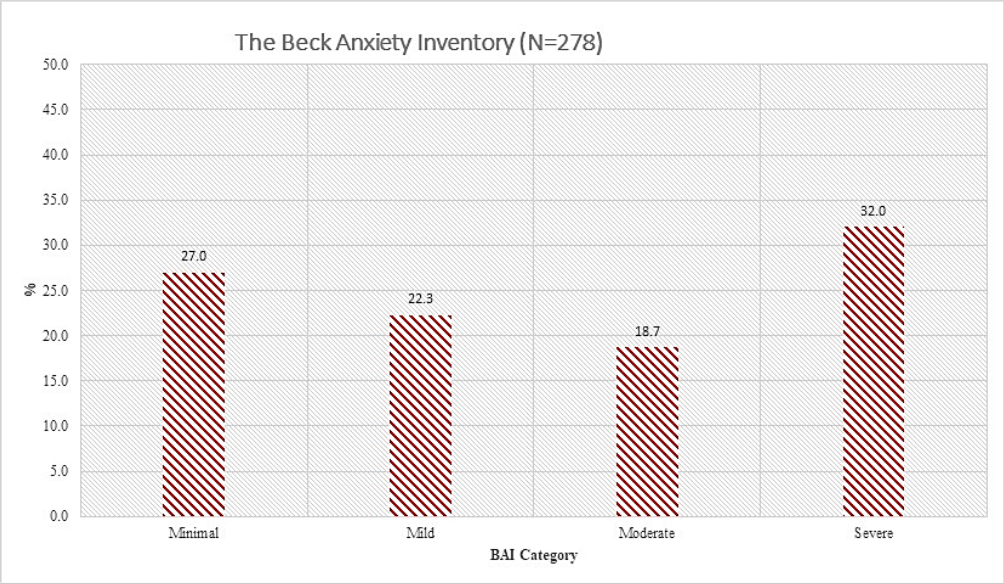

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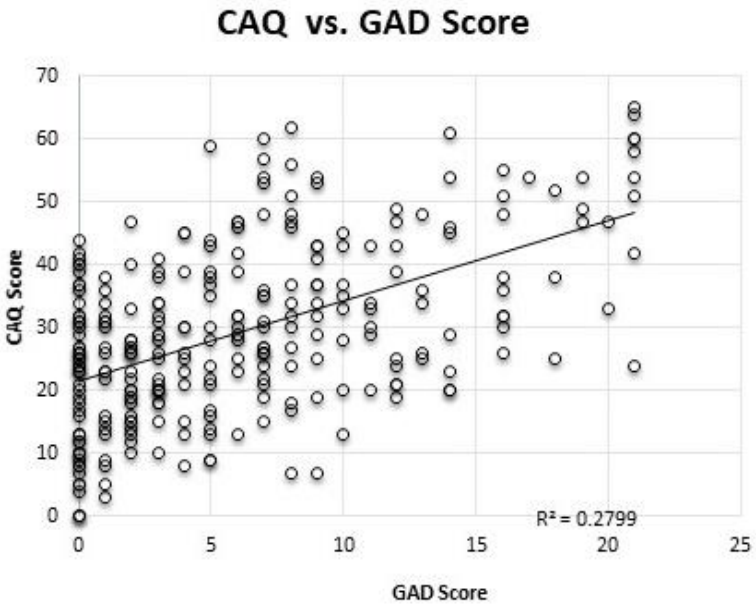
Figure 4. Correlation of the Cardiac Anxiety score among the study population with the general anxiety disease questionnaire (upper figure) and the Beck Anxiety Inventory (lower figure)



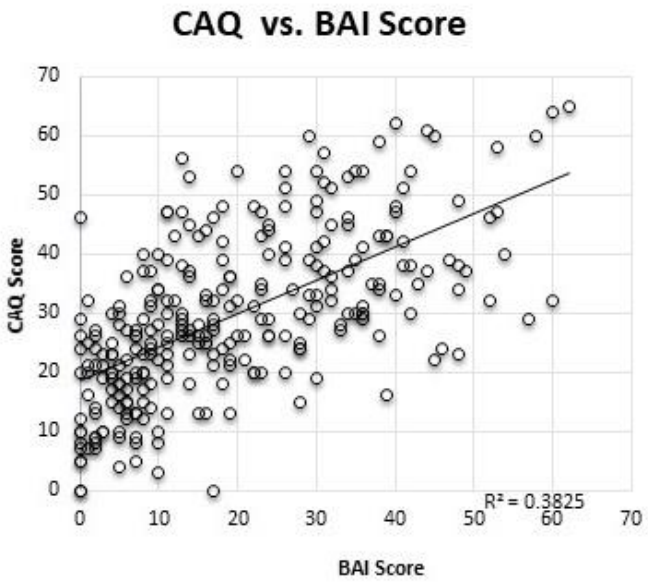


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Figure 6. Distribution of decision-making consideration clustered into four groups (Medical, Economical, Mental & General state)