

Review Article

The impact of anxiety and depression symptoms on people with multiple cardiovascular risk factors

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ABSTRACT

Typical cardiovascular risk factors are mainly related to lifestyle. New research suggests that psychological factors, especially anxiety and depression, are closely linked to cardiovascular factors. Anxiety and depression have shown an abysmal increase in the number of people who suffer from them in recent years. Different factors are related to their appearance, among which the social, work, emotional and environmental environment stand out. Multiple studies mention their relationship with cardiovascular risk factors, although there are multiple mechanisms associated with psychological and cardiovascular factors, to date there is no way to measure them. The impact of psychological stress on the development of different cardiovascular factors and its effect on the autonomic nervous system causing its inflammation must be investigated and requires much interest. As such, tools are required to be able to evaluate the biological pathways that link anxiety/depression with the risk of developing cardiovascular diseases.

Keywords: Anxiety, Depression, Cardiovascular diseases, Risk factors

INTRODUCTION

The different risk factors for cardiovascular disease (CVD) are closely related to each person's lifestyle. New research suggests that psychological factors, especially anxiety and depression, are among the risk factors for CVD.¹ Anxiety and depression are the main mental illnesses around the world.² Depression is associated with a poor prognosis and increased economic and emotional costs in people suffering from CVD.

In context, one in five people with coronary artery disease or heart failure suffer from depression, and the incidence of depression is at least three times higher in the general population.³ Sedentary lifestyle, poor eating habits, tobacco use, and alcoholism are present in people who

suffer from anxiety and depression, and this significantly increases their cardiovascular risk and increases their risk of developing CVD tenfold.⁴ Depression can reduce motivation and cause patients to not take their medications or practice healthy habits.

The European society of cardiology (ESC) proposes comprehensive care for patients suffering from anxiety and depression, indicating that they should be assisted in a comprehensive manner by a team that includes psychologists and physicians experienced in the field.⁴ In line with these recommendations, we designed a review study to evaluate the relationship between the appearance of anxiety and depressive symptoms and the fulfilment of therapeutic objectives regarding cardiovascular risk factors. It is a descriptive-exploratory study type of

bibliographic review. The literature search period is from 2014 to 2024 in electronic databases such as PUBMED, ELSEVIER, and Web of Science.

The keywords used in the MesH search were anxiety, depression; cardiovascular diseases, risk factors. Inclusion criteria include search terms, level of evidence, summaries and keywords, Exclusion criteria include not related to the topic, outside the year limit, not available. They will be classified by year, type of study and level of evidence.

For eligibility, a critical reading is carried out, level of evidence, documents available for analysis and according to the topic. A total of 30 sources were obtained for analysis and synthesis.

Risk factors associated with cardiovascular disease

The risk factors associated with cardiovascular disease (CVD) are complex and multifactorial. Understanding these connections enables healthcare professionals to develop new strategies for addressing both mental health conditions, such as depression and anxiety, as well as cardiovascular diseases.

The literature demonstrates a bidirectional relationship between depression, anxiety, and cardiovascular diseases.⁵ Notably, secondary analyses of clinical trials have shown that improvements in depression correlate with better prognoses for coronary heart disease.⁶ This bidirectional relationship highlights evidence that depression increases the risk of cardiovascular disease.

Depression is directly associated with various cardiovascular conditions, including heart failure, with up to 30% of heart failure patients experiencing depressive symptoms. This association is strongly linked to poorer quality of life and adverse clinical outcomes.⁷ Furthermore, both anxiety and depression have been identified as risk factors for coronary heart disease.⁸

Additionally, certain symptoms commonly experienced by individuals with these mental health disorders—such as sleep problems, fatigue, and anhedonia—significantly increase the risk of major adverse cardiac events in patients with coronary heart disease, regardless of the presence of other depressive symptoms.⁹

Numerous studies have also shown that the unhealthy lifestyles associated with these mental health conditions, including poor dietary habits, sedentary behaviour, and smoking, elevate the odds of developing CVD.⁹

Conversely, cardiovascular diseases can also heighten the risk of developing depression and anxiety, as well as their complications. The treatment rate for depressive symptoms in patients with CVD remains low, with fewer than 20% receiving adequate treatment.¹⁰ This demonstrates that having cardiovascular disease is a risk factor for the development of complications related to

mental health disorders. The prevalence of depression among patients with coronary artery disease is estimated to be between 20% and 40%, significantly higher than the average for healthy individuals.¹¹ Moreover, a rate of 15% for major depressive disorder has been reported in patients following myocardial infarction or coronary artery bypass grafting.⁵

Regarding treatment options for anxiety and depression, selective serotonin reuptake inhibitors (SSRIs) have been shown to be safe for patients with cardiovascular illness and beneficial for those with co-occurring depression.¹² Additionally, psychotherapy has proven effective for treating depression in patients with coronary artery disease and heart failure, thereby serving as a factor that can improve outcomes for patients with cardiovascular disease.¹³

The bidirectional relationship between anxiety, depression, and cardiovascular disease is underpinned by several explanations, primarily rooted in the abnormalities induced by chronic stress associated with these mental health disorders. This chronic stress not only exacerbates the physiological strain on the cardiovascular system but also leads to a deterioration in the quality of life and overall mental health of patients diagnosed with CVD.⁵

Understanding these interconnected pathways is crucial for developing comprehensive treatment strategies that address both mental and physical health. By integrating mental health care into cardiovascular treatment plans, healthcare professionals can improve patient outcomes, ultimately fostering a more holistic approach to health that recognizes the significance of mental well-being in cardiovascular disease management.

Prognostic value and outlook of depression in patients with cardiovascular disease

Although it is true that subclinical coronary disease associated with depression, without underlying cardiovascular pathology, has not been shown to be associated with a higher risk of atherosclerotic events, as stated by Park, in a cross-sectional study with 3920 patients.¹⁴

According to Shozab et al, in his review of twenty-four studies, half had a positive association between depression and subclinical atherosclerosis as a cardiovascular disease. Therefore, there is mixed evidence between depression and cardiovascular disease, depressive symptoms may be associated with a greater modifiable risk factor in young people.¹⁵

De Hert states that mental disorders such as depression and coronary heart disease have a shared pathological association in terms of biological, behavioral, psychological and genetic mechanisms.¹⁶ This is corroborated by his study where he reports that the group

of people with serious mental illnesses such as major depression have a 51% risk of coronary heart disease.

According to the World Health Organization, 300 million people suffer from depression and it is expected to become the leading cause of disability in 2030, with 14.3% of deaths worldwide associated with mental disorders such as depression, whose cardiovascular component becomes relevant.¹⁷

The six mechanisms proposed by Stapelberg, on the association between major depression and coronary heart disease, correspond to behavioural mechanisms, genetic mechanisms, immune mechanisms, coagulation disorders, endothelial dysfunction and autonomic mechanisms. In addition, the cardiotoxic effect of antidepressant medications has been reported, suggesting adverse cardiac events in this patient population.¹⁸

There is a strong association between depression and mortality from cardiovascular disease, although it is higher in men. In context, depression is associated with a 52% increase in the risk of mortality from all causes, in a 12-year follow-up.¹⁹

Therefore, it is clear that depression is a risk factor for cardiovascular disease due to its clinical and pathophysiological implications in humans. Therefore, it is considered that in the future, depression will cause disability in 2030, so current measures must be taken to promote mental health from children, adults and even the elderly population.

Pharmacological treatments are not the ideal measure to alleviate mortality from cardiovascular disease associated with depression since pharmacological toxicity has been reported with the consumption of these medications. Thus, preventive strategies must take center stage in maintaining good and improved mental health.

Pathophysiology of depression and cardiovascular disease

The relationship between cardiovascular disease and depression/anxiety has been investigated in multiple multicenter, randomized controlled studies such as Enrichd, Sadhart, Sadhart-Chf, Create, Upbeat, Premier, Copes, Eppi, Ephesus, Epese, Camiat, Oacis, Glas, Interheart and others, with a large data set that reach the same conclusion that there is a significant statistical relationship between cardiovascular disease and depression/anxiety due to multiple factors that we will clarify in this article.

As Hare et al 20 relates in their article, high medical costs, increased use of health services, decreased productivity and poor quality of life are important for any health system; these cause cardiovascular disease and depression. To date, there is no risk marker that correlates cardiovascular disease and depression. However, statistics

indicate that depression has a 70% increase with a highly significant prediction for an acute myocardial infarction. There are multiple causes for depression to lead to an increased risk of cardiovascular disease, as shown in Figure 1.

Alteration of the autonomic nervous system, platelet activation, alteration of coagulation factors (fibrinogen and plasminogen), proinflammatory cytokines, endothelial dysfunction, neurohumoral factors, genetic factors linked to alteration in serotonin transport are responsible for the increased cardiovascular risk in a patient with anxiety/depression. That is to say, the pathophysiology of depression and cardiovascular disease is closely linked to multifactorial factors as shown in Figure 2.

Depression activates the hypothalamus-pituitary-adrenal axis

Decrease in norepinephrine, serotonin and dopamine, which leads to an increase in the cortico-releasing hormone (Hypothalamus) values and acts on the hypophysis causing the release of adrenocorticotrophic hormone (ACTH), which acts at the adrenal cortex level, releasing glucocorticoids and negative counter-regulation. It is blocked because depression decreases the volume of the hippocampus, so cortisol does not activate negative counter-regulation, raising its values exponentially.²¹

Patho physiologically, stress translates into inflammation, which is evident in 3 findings. Increase in acute phase proteins (haptoglobin, alpha-1-antitrypsin, alpha-1-acid glycoprotein, ceruloplasmin, and alpha-1 and alpha-2 globulin fractions). Decrease in acute response proteins (albumin and elevated concentrations of C3 and C4).

Anxiety / depression produce chronic inflammation by the following pathophysiological mechanisms, overactivation of the hypothalamus pituitary adrenal axis. Increased sympathetic tone, release of proinflammatory cytokines (IL-1 TNF-alpha) that activate NFkB (activates the production of IL-6 and IL-8) produces Interferon gamma.

Increased proinflammatory cytokines, desensitization to glucocorticoid receptors, decreased neurotrophic factors and decreased monoaminergic neurotransmitters. Decreased availability of tryptophan in the brain, which forms tryptophan catabolites, which have an anxiogenic effect.

Depression in women can be caused by increased risk of major depression due to serotonergic regulation and adaptation to hormonal changes in menarche, menstruation and menopause, estrogens and progestins increase 5HT and norepinephrine and decrease monoamine oxidases, increase tryptophan hydroxylase, increase neuronal firing of 5HT, increasing activity in the cerebral cortex, suppression of progesterone causes depression, increase in oxygen and nitrogen free radicals that increase inflammation.

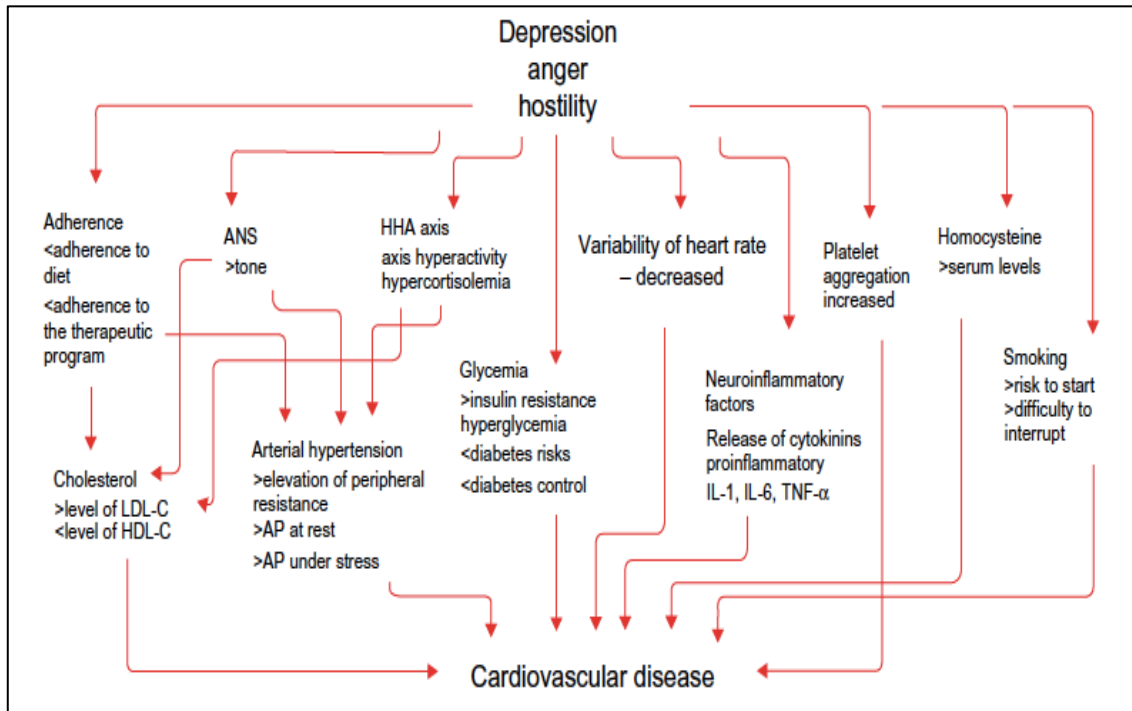


Figure 1: Pathophysiologic mechanisms between depression anger and hostility and cardiovascular disease.

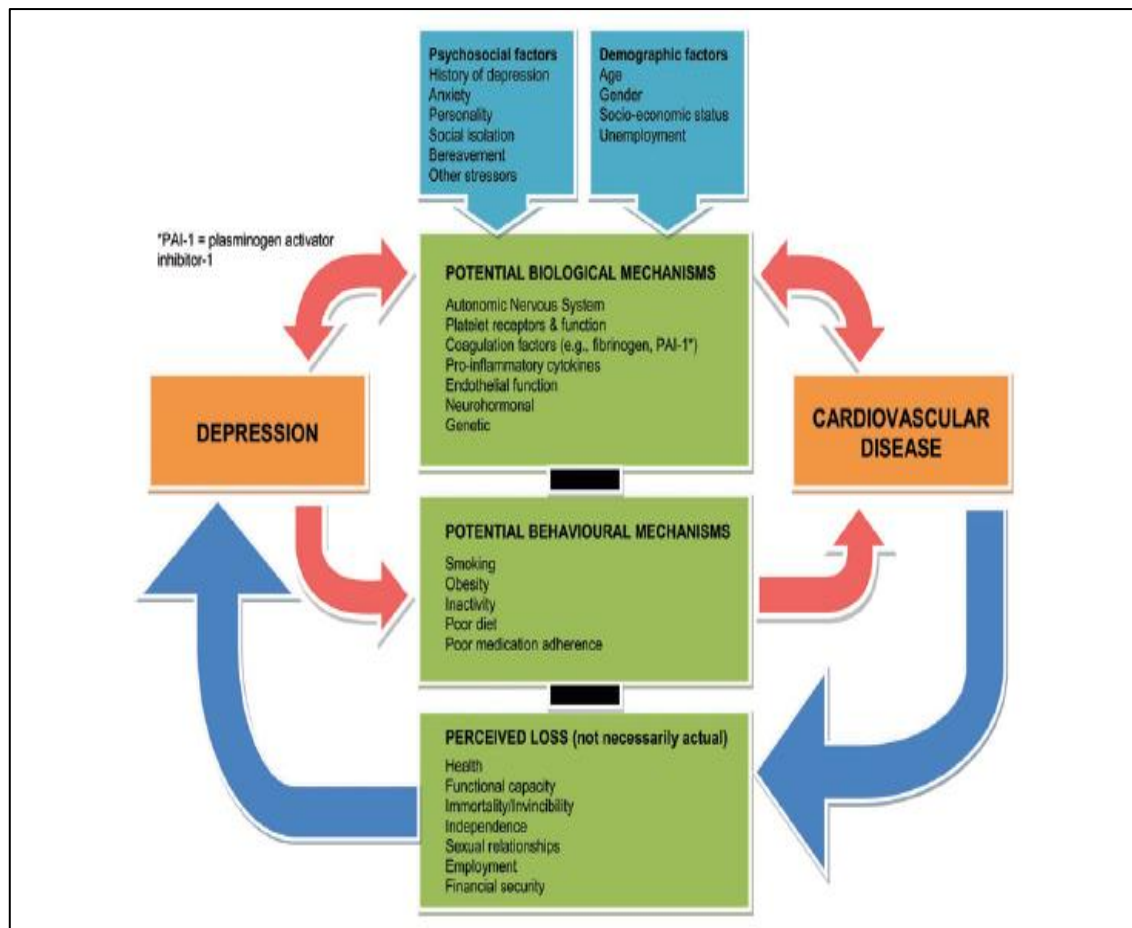


Figure 2: Depression and cardiovascular disease.

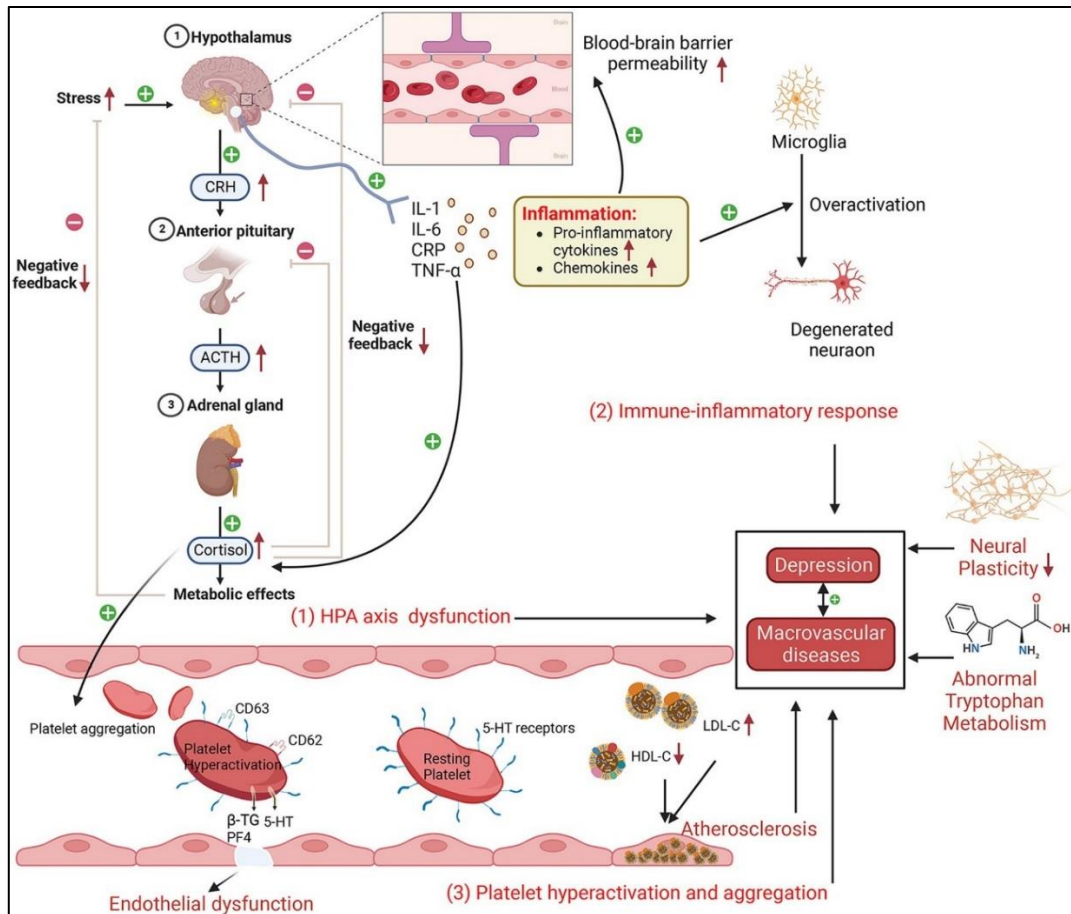


Figure 3: Pathophysiological mechanism and relationship between depression and CVD.

DISCUSSION

Mechanism of action of depression in relation to cardiovascular diseases

Studies show that depression has risk factors in common with cardiovascular diseases (CVD) such as obesity, sedentary lifestyle, diabetes and inflammatory processes. The relationship between these pathologies is bidirectional, which means that they can contribute to the development of the diseases as well as the other.^{22,23} A person with depression may present behaviours that affect health such as inadequate eating habits, sedentary lifestyle, harmful habits such as tobacco and/or alcohol, poor adherence to medical treatments, which contribute to the development of CVD.²⁴

Furthermore, studies have shown that patients with depression present inflammatory processes, hormonal imbalances, endothelial dysfunction, platelet activation and alteration of the sympathetic nervous system, which contribute to the progression of CVD.²⁴⁻²⁶ Another contributing factor is stress. The latter has been associated with the development of pathologies contributing to CVD, such as diabetes and high blood pressure (HBP). This is due to the development of the present inflammatory

process and also the dysfunctionality of the autonomic nervous system.²⁷

People with CVD suffer a considerable psychological impact affecting their emotions when having to deal with a chronic disease. The limitation of activities, the anguish of future conditions and complications, and daily limitations lead to sadness and alteration of the patients' mood.²³ Increased body weight is a risk factor for developing hypertension, dyslipidemia, and type II diabetes mellitus (DM2), which contribute to the development of cardiovascular disease. On the other hand, inflammation develops through mechanisms such as insulin resistance, obesity, and metabolic disorders.²³

Evidence has shown that depressed individuals presented increased proinflammatory cytokines such as C-reactive protein (CRP), interleukin-6 (IL-6), and tumor necrosis factor alpha (TNF-alpha). Inflammatory processes cause dysfunction of neurotransmitters such as serotonin that regulate mood, causing and maintaining depressive symptoms.²³ There are underlying conditions to CVD such as atherosclerosis that contribute to inflammatory processes causing the aforementioned in addition to increasing the risk of CVD.²⁸ The connection between depression and CVD is not entirely clear. An accepted proposal is the deregulation of the autonomic nervous

system with increased sympathetic activity and decreased parasympathetic activity, which leads to the development of depression and CVD. Due to the mechanism involved and the alterations mentioned, depression has been associated with a poor prognosis for patients with CVD. Studies have shown that severe depression increases the risk of hospitalization and even death in patients due to cardiac reasons, the main ones being myocardial infarction and congestive heart failure.^{29,30}

CONCLUSION

To date, there are no tools that allow us to quantify the relationship between psychological diseases or conditions, especially anxiety and depression, and the relationship, appearance or complications of cardiovascular effects. However, new evidence appears every day that indicates a broad relationship and need to directly and indirectly link these diseases with cardiovascular complications and to put emphasis on achieving a multifactorial treatment of the different diseases and not only focusing on the metabolic part, leaving aside the psychological area.

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