

Psychological factors and atherosclerotic cardiovascular disease development in women: A narrative review

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ABSTRACT

Cardiovascular disease (CVD) is the leading cause of mortality, with rising evidence of differences between women and men, worldwide. Data from the literature indicate the presence of gender-specific differences both in biological responses and in lifestyle behaviors to psychological stress. There is evidence suggesting that women experience higher levels of psychological problems, such as anxiety and depression. The connection between psychological factors and CVD can be explained by behavioral and biological risk factors, as well as underlying mechanisms, such as the sympathetic nervous system overactivity and the hypothalamic-pituitary-adrenal function impairment. Moreover, some psychosocial factors may place women at particular risk of CVDs. Given these hypotheses, the present review summarizes the existing knowledge about psychological factors and CVD connection in women, highlighting the sex differences.

KEY WORDS: Cardiovascular disease risk, women, depression, anxiety, psychosocial factors

INTRODUCTION

Cardiovascular disease (CVD) is a group of heart and blood vessels disorders, including coronary heart disease (CHD), cerebrovascular disease, peripheral arterial disease, rheumatic heart disease, congenital heart disease, deep vein thrombosis and pulmonary embolism. Heart attacks and strokes are acute events and mostly occur by a blockage that prevents blood from flowing to the heart or brain¹.

CVD is the most common cause of mortality globally¹. In 2019, 17.9 million people died from CVD (32% of all global deaths)¹. Within CVD, ischemic heart disease (IHD) is the leading cause of mortality and morbidity, accounting for almost 25% of all CVD cases and 75% of all CVD deaths².

Unhealthy diet, physical inactivity, tobacco use and alcohol overconsumption are the most important behavioral CVD risk factors¹. The effects of behavioral risk factors may appear in individuals as increased blood pressure, blood glucose and blood lipids, as well as overweight and obesity¹. There are also many underlying determinants of CVD, such as globalization, urbanization, population aging, poverty, genetic predisposition, and psychological factors¹. Regarding the psychological factors, depression, anxiety, psychological stress, specific typology of personality (e.g.

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type A personality) and irrational beliefs are negatively linked to CVD incidence³⁻⁶. Specifically, there is a link between irrational beliefs and socioeconomically disadvantaged classes, as well as an association between low socioeconomic status and negative health outcomes, such as CVD⁷.

Chronic psychosocial stress, as well as anxiety and depression, can exacerbate coronary artery atherosclerosis and transient endothelial dysfunction through excessive sympathetic nervous system activation^{8,9}. Hyperresponsivity of the sympathetic nervous system, manifested by exaggerated heart rate and blood pressure responses to psychological stimuli, is considered an intrinsic characteristic in some individuals^{8,9}. There is evidence that sympathetic nervous system hyperresponsivity accelerates the development of carotid atherosclerosis. Data relate heart diseases with acute stress and individual differences in sympathetic nervous system responsivity⁸⁻¹⁰. For example, premenopausal women who experience psychosocial stress may develop ovarian dysfunction, hypercortisolemia, and excessive adrenergic activation resulting in accelerated atherosclerosis¹¹.

This narrative review aimed to provide an updated overview of the connection between psychological factors and atherosclerotic cardiovascular disease development in women.

METHODS

After comprehensively reviewing the existing literature in the scientific database PubMed (<https://pubmed.ncbi.nlm.nih.gov/>), the research studies chosen for the review were all published in English. Given the lack of more recent data, the literature review focused on studies published between 1996 and 2022. The keywords used during the search procedure were: cardiovascular disease risk/incidence / coronary heart disease risk/incidence AND women AND psychological factors/ depression/ anxiety/ behavioral factors/ psychosocial factors. Additionally, the reference lists of the retrieved articles were used to find additional relevant studies. Studies were considered eligible for inclusion in the present review provided that they were carried out in women with no established cardiovascular disease with an age ≥ 18 years old. Due to the limitation of the existing literature, all types of studies, such as cross-sectional, case-control, and observational studies, were included. The exclusion criteria included studies that were not written in English and those that included female cardiac patients.

RESULTS

Sex-Specific Risk Factors

Even though women live longer than men due to a delayed onset of their CVD, heart diseases remain the

leading cause of death for women (35% of total deaths in women in 2019)¹²⁻¹³. Women have always had lower mortality rates of IHD compared to men until menopause as a result of estrogen's cardioprotective effect². Nevertheless, this delay in IHD appearance is decreasing because of the competing risk factors raising the prevalence of IHD in younger women².

Hypertension is the leading global risk factor for CVD morbidity and mortality¹⁴. Women appear to have a higher risk of acute myocardial infarction (MI) and stroke, associated with the prevalence of hypertension, than men¹⁴. Accordingly, blood pressure elevation increases more rapidly in women than in men, beginning as early as in their third decade of life¹⁵. Blood pressure increases during the may be related to the decline in blood estrogen levels, which lead to upregulation of the renin-angiotensin system, production of vasoconstrictive factors such as endothelin, and increased salt sensitivity¹⁶.

Elevated cholesterol is also a major risk factor for MI in women¹⁷. During the menopause transition, an increase in total cholesterol and LDL-cholesterol concentrations has been noticed, which were associated with a higher risk of carotid plaque¹⁸. Moreover, the prevalence of diabetes and obesity is rising globally¹⁷. A meta-analysis showed that the risk for incident CHD was 44% greater in women with diabetes than in men with the same condition¹⁹. Women are at higher risk of CVD when obese and insulin-resistant²⁰. Therefore, although hypertension, dyslipidemia, diabetes, and obesity affect both sexes in the incidence of CVD, they might affect women differently than men, by placing more burden on women.

Furthermore, some sex-specific factors can increase CVD risk, such as premature menopause, gestational diabetes, hypertensive disorders of pregnancy, preterm delivery and polycystic ovary syndrome (PCOS)¹⁴. It has been well established that during menopause, secretion of progesterone and estrogen hormones is reduced. That may result in weight gain, changes in body fat distribution, reduced glucose tolerance, and adverse changes in lipoprotein pattern resulting in an increased risk of CVD²¹. Also, premature menopause (i.e., age <40 years) was identified as a factor for increased CVD risk before age 60 years²². Complications, such as gestational hypertensive disorder (e.g., pre-eclampsia), gestational diabetes, or preterm delivery, are risk factors for the development of CVD later in life²³⁻²⁴. Additionally, a meta-analysis suggested that PCOS is significantly associated with increased CHD risk²⁵.

Behavioral Risk Factors

Unhealthy lifestyle behaviors are known modifiable risk factors for CVD. Particularly, decreased physical activity

levels and increased consumption of alcohol are associated with high CVD risk²⁶. Active smoking in women is associated with an increased risk of premature myocardial infarction, and a risk of stroke²⁷. That risk increases with the number of cigarettes consumed per day²⁷. Women have a 25% higher risk of coronary artery disease than men with similar use of tobacco²⁸.

It is well known that dyslipidemia and CVD are caused by fat mass accumulation²⁹. It is suggested that caloric intake should be reduced (caloric deficit of 300-500 kcal/day) and energy expenditure increased in people with excessive weight and/or abdominal adiposity³⁰. A recent prospective observational study in Italian women showed that a personalized Mediterranean diet therapy combined with a physical activity program lead to weight loss, body composition remodelling and risk indexes reduction³¹. Furthermore, dietary patterns that highlight the intake of fruits, vegetables, whole grains, nuts/seeds, legumes, a high unsaturated:saturated fat ratio, and emphasize the lower intake of red and processed meats, added sugars, and sodium are associated with lower CVD risk in postmenopausal women with type 2 diabetes mellitus³². On the other hand, a cross-sectional study suggested that there was no significant association between diet quality indices and CVD risk factors among diabetic women³³.

The maternal dietary intake of obese Hispanic women may modulate cardiometabolic risks and inflammatory profiles during pregnancy³⁴. Specifically, increased total fat and saturated fat intake showed positive associations with classic risk factors for metabolic complications in pregnancy and increased fiber, dairy, and vegetable intake appeared to be inversely related to these classic risk factors for metabolic complications³⁴. A recent systematic review of controlled clinical trials, suggests that diet may affect levels of some lipid profile markers, glycaemic indices, and blood pressure among postmenopausal women but the heterogeneity in the interventional studies is large and findings are still inconclusive²¹.

Psychological Factors

Emotional problems

Data from recent epidemiological studies emphasize the effect of psychological factors, such as depression, stress and anxiety, in a variety of chronic illnesses. Nevertheless, it is still unknown what triggers them as regards the development of cardio-metabolic diseases.

Patients with depression usually adopt habits that overlay cardiovascular risk factors, such as sleep deprivation, physical inactivity, smoking and alcohol overconsumption, poor hygiene and lower adherence to pharmacological treatments²⁸. Psychological stressors

are associated with CVD through mechanisms, such as inflammatory pathways and altered cardiac sympatho-vagal balance². However, many other pathophysiological mechanisms can cause atherothrombosis. The T- and B-lymphocytes are stimulated by estrogens, with a greater immune and inflammatory response in women and stress-related chronic adaptations in the hypothalamic-pituitary-adrenal axis activity and autonomic nervous system could affect both immune and hemostasis systems, causing increased inflammation, coagulation and platelet activation²⁸.

Regarding depression, a study found that depression is associated with fatal CHD in women without baseline CHD³⁵. Also, major depression imposes a high CHD risk in women with Type 1 and Type 2 diabetes³⁶. Another study showed that duration, hypertension, waist-hip ratio, physical activity, and depressive symptomatology are all significant independent predictors of coronary artery disease (CAD) in women³⁷. In addition, there is evidence that depression is more prevalent in women with CHD than in men³⁸. As far as anxiety is concerned, high levels of phobic anxiety have been associated with increased fatal CHD risk in women³⁹. Furthermore, comorbid depression and anxiety symptoms predict CVD events among women with suspected myocardial ischemia⁴⁰. Moreover, stress-induced cardiomyopathy, also termed Takotsubo or broken heart syndrome, mainly affects postmenopausal women and is typically preceded by extreme physical or emotional triggers⁴¹.

Irrational beliefs

Irrational beliefs are lasting constructs based on Rational Emotive Behaviour Therapy (REBT), an early cognitive-behavioral framework for the treatment of mental disorders according to the psychologist Albert Ellis⁴².

«There are four categories of irrational beliefs: *demandingness (i.e., absolutistic/inflexible requirements), awfulizing (or catastrophizing), frustration intolerance (or low frustration tolerance) and global evaluation of one's person (self-downing), other persons (other-downing) and/or the life situation (life downing)*»⁴².

Irrational beliefs are moderately associated with distress and favorably related to 10-year CVD risk⁴³⁻⁴⁴. They can trigger depression and anxiety symptomatology in healthy adults, while it seems that those who have high levels of irrational beliefs combined with anxiety and depression are predominantly women, which are more frequently affected by depression than men^{44,7}.

Irrational beliefs and anxiety may also induce inflammation and oxidative stress as an underlying mechanism involved in the abnormal activity of the nervous system (e.g., sympathetic over-activity vs. vagal dysfunction) and

the hypothalamic-pituitary-adrenal axis⁷. Chronic inflammation can trigger oxidative stress which can together promote the development of CVD, the number one cause of death globally⁴⁵.

Personality traits

A specific type of personality, type A personality, is characterized by hostility, impatience, and competitiveness dominance as well as some other traits, such as negative emotional states or negative affect, anxiety and anger are adversely related to the incidence of CVD³. Among Type A personality characteristics, competitiveness has been positively associated with CVD mortality risk and especially IHD mortality risk in women⁴⁶. Moreover, nervousness significantly increases the risk for incident MI among women compared to men⁴⁷. Type A personality in younger pregnant women under 30 years old increases the risk of developing obesity during pregnancy and a higher level of competitiveness indicates a risk factor of excessive weight gain during pregnancy regardless of age⁴⁸. A meta-analysis of observational studies indicates that excessive gestational weight gain is associated with the risk of hypertensive disorders of pregnancy (HDP)⁴⁹. Women with a history of HDP are at significantly greater risk for developing CVD in later life⁵⁰.

Psychosocial factors

Women are still considered under-privileged in many aspects, and they are susceptible to psychological distress because of under-recognized psychological stressors, including educational status, domestic demands, caregiving responsibilities, gender discrimination in the workplace, sexual abuse and intimate partner violence^{14,2}.

Educational and socioeconomic status

Based on a recent study, low education status (i.e., <8 years) contributes to 4-fold risk for women to develop CHD over a 14-year follow-up period, compared with women with 12 and more years of education⁵¹. In addition, low socioeconomic status is reported as a risk factor for CHD incidence and mortality in women⁵². Particularly, the social gradient for CHD mortality seems to be even bigger for women than for men⁵².

Employment status and working conditions

Women with "active" job strain (high demands–high control) have a 2.8-fold risk of CHD compared with women with high job strain (high demands–low control)⁵¹. Physically fatiguing work is associated with smoking, while

mentally demanding work is associated with a healthy diet but also with higher alcohol consumption⁵³. On the contrary, women who are satisfied with the work-home interface report higher levels of physical activity⁵³. Moreover, women who are employed in male-dominated jobs, such as higher management or mechanical jobs have a 2-fold risk of MI compared with those in female-dominated jobs, such as nursing⁵¹. Furthermore, low social support at work and loneliness are significantly associated with CHD risk in women⁵⁴⁻⁵⁵. There are significant associations between CHD risk and low social support at work and loneliness for women only⁵⁶.

Social support

The presence of optimistic, favorable and collaborative social relationships may be more important for women than men. More frequent social interchanges signified bigger increases in thickness of the common carotid artery intima-media complex, leading to the hypothesis that the frequency of social interactions may reflect greater role overload among women⁵⁶. The absence of social support and social isolation have been confirmed to be major long-term predictors of mortality from all causes, including CHD⁵¹⁻⁵⁷.

Life events (Bereavement/Widowhood)

In the Framingham Study, conducting both work and family duties is associated with raised CHD incidence, particularly in working women who had raised three or more children⁵¹. Single mothers are at higher risk for CVD than mothers with partners^{51,58}. Widowhood seems to be associated with a more elevated mortality risk during the first months after bereavement and the case of increasing loneliness bereaved women encounter due to their more extended life expectancy is proposed as one reason for their higher mortality risk during early bereavement⁵².

Sense of coherence and spirituality

A higher score of sense of coherence seems to enhance quality of life related to health and is positively associated with religiosity/spirituality^{59,60}. Higher Sense of Coherence (SOC) scores is associated with a lower risk of all-cause mortality, but mainly among men⁶¹. Women and especially widows have lower scores of SOC⁶². Individuals with higher levels of religiosity and high SOC scores are less likely to score high in the depression scale (Beck Depression Inventory Scale)⁶³. Thereafter, there might be a positive impact of higher levels of sense of coherence and spirituality on depression and subsequently on CVD (Table 1).

TABLE 1. Characteristics of research studies ($n=11$) related to psychological factors & CVD risk in women.

Author & Year published	Study Design	Sample	Instruments	Findings
Andre-Petersson et al. (2007)	Prospective cohort	N=7,770 4707 women (54.2 years old) and 3063 men (55.5 years old)	The MalmoDiet and Cancer Study (MDCS) questionnaire	At follow-up, social support at work was an independent predictor of MI and stroke among women RH:2.07 (CI: 1.00–4.27).
Albert et al. (2005)	Prospective cohort	N= 72,359 women with no history of CVD or cancer	The Crown-Crisp phobia index (CCI)	A higher score on the CCI was associated with an increased risk of sudden cardiac death and fatal CHD but not of nonfatal MI in age-adjusted (p , trend ≤ 0.008) and in multivariable models excluding possible biological intermediaries (p , trend ≤ 0.03).
Clouse et al. (2003)	Prospective cohort	N= 76 women with type 1 and type 2 diabetes ($n=16$ with and $n=60$ without active major depression)	The National Institute of Mental Health Diagnostic Interview Schedule—version 3 (DIS)	Development of CHD was significantly more rapid in women with depression ($p < 0.01$ between 10-year curves), an effect that persisted after controlling for baseline differences in BMI. Depression also was an independent predictor of CHD in the multivariate model with an age-adjusted HR of 5.2 (CI: 1.4–18.9; $p=0.01$).
Dahlén et al. (2022)	Prospective cohort	N= 502,594 participants (37–73 years old)	Personality proxies were created using self-reported data on psychological factors, mental health and social support, to match the facets of the Big Five traits.	Nervousness significantly increases the risk for incident MI among women (HR: 1.13; (CI:1.08–1.19)) compared to men (HR: 1.05; (CI:1.02–1.08)).
Gafarov et al. (2013)	Prospective cohort	N= 870 women (25–64 years old)	The Berkman-Sym test	Over a 16-year follow-up period, women with low indices of close contacts had 4.9 times higher RR for MI & 4.1- times higher risk for stroke. A low level of social network increased the MI risk by 2.9 times & the stroke risk by 2.7 times.
Lloyd et al. (1996)	Prospective cohort	N= 613, with insulin-dependent diabetes mellitus (IDDM)	The Beck Depression Inventory (BDI)	When depression was examined categorically, i.e., 67% of those developing CAD had BDI scores of 10 or more (mild depression), and 33% had scores of 16 or more (clinical depression) compared with 26% ($p < 0.001$) and 12% ($p < 0.05$), respectively, for those not developing CAD. Depression was a risk factor exclusively for women and fibrinogen was important only in men.
Lohse et al. (2017)	Prospective cohort	N= 9,921, 4839 men 5082 women, (≥ 18 years old)	The Bortner Scale	In women, competitiveness was positively associated with CVD mortality 1.39 (CI:1.07-1.81) & IHD mortality (intermediate category vs. the lowest, 1.46 (CI:1.02-2.10).
Rutledge et al. (2009)	Prospective cohort	N= 489 women	The Beck Depression Inventory (BDI) The State-Trait Anxiety Inventory (STAI)	A significant BDI * STAI interaction effect in the prediction of CVD events ($p=0.02$) after covariate adjustment.
Thurston et al. (2007)	Prospective cohort	N= 3003	Loneliness was derived from an item on the CES-D scale	Among women, high loneliness was associated with increased risk of incident CHD (high: HR: 1.76, (CI:1.17–2.63); medium: HR: 0.98, (CI:0.64 –1.49); reference: low), controlling for age, race, education, income, marital status, hypertension, diabetes, cholesterol, physical activity, smoking, alcohol use, systolic and diastolic blood pressures & BMI.

TABLE 1. Characteristics of research studies (n=11) related to psychological factors & CVD risk in women (continued).

Author & Year published	Study Design	Sample	Instruments	Findings
Whang et al. (2009)	Prospective cohort	N= 63,469 women without prior CHD/stroke	The Mental Health Index (MHI-5)	Depressive symptoms were associated with CHD events, and the relationship was strongest for fatal CHD, where the association remained significant even after controlling for CHD risk factors (HR: 1.49; (CI: 1.11-2.00) for MHI-5 score <53).
Young et al.(2005)	Cross-sectional	N= 1,446 women, (> 60 years old)	Sociodemographics	Comparing lone with partnered mothers, lone mothers were 3.3-times more likely than were partnered mothers to have had a CVD event.

CVD= Cardiovascular Diseases, MI= Myocardial Infraction, RH= Relative Hazard, CI= Confidence interval, CHD= Coronary Heart Disease, BMI= Body Mass Index, HR= Hazard Ratio, RR= Relative Risk, CAD= Coronary Artery Diseases, IHD= Ischemic Heart Disease

DISCUSSION

In general, based on the findings of the review, psychological factors (e.g., depression, anxiety, personality traits, irrational beliefs, social isolation, and chronic life stress) play an important role in the pathogenesis and manifestation of CVD⁶⁴. These psychological conditions contribute to a higher frequency of negative health behaviors, such as malnutrition, smoking and a sedentary lifestyle⁶⁴. Consequently, associated psychological, psychosocial and behavioral factors may influence pathophysiological mechanisms, such as platelet function, plasminogen activator inhibitor and fibrinogen, inflammatory cytokines, serotonin transporter (SERT) and endothelial function, and result in CVD^{44,64}.

Particularly in women, research studies have shown that they have higher rates of stress and depression and among midlife women, anxiety and depression symptoms are associated with a less healthy lifestyle (i.e., lower physical activity, higher BMI, poor diet quality, higher alcohol, and tobacco consumption) at a 20-year follow-up period^{65,66}. There is also a relationship between poor mental health (stress, anxiety, and/or depression) and excess weight for women via the increased habit of snacking⁶⁷. Furthermore, depressive symptomatology is significantly associated with obesity in low-income, minority women, while stress, eating and sleep disturbance are significant independent mediators of this relationship, with sleep disturbance being a stronger mediator⁶⁸. Moreover, women with prenatal depression are at a higher risk of poor diet quality compared with women without prenatal depression⁶⁹. Symptoms of depression and anxiety are associated with a diagnosis of hypertension assessed 5 years later⁷⁰.

Dysfunctional personality traits such as neuroticism and alexithymia are associated with unhealthy dietary habits, such as higher salt intake and sweets consumption

and also high neuroticism is a risk factor for cardiovascular mortality in women with low socioeconomic status^{71,72}. Greater cynical hostility predicts lower smoking termination over time in postmenopausal women⁷³. Abnormal lipid levels are important etiological factors associated with the development of atherosclerosis and with increased cardiovascular morbidity and mortality⁷⁴. Women with low HDL cholesterol levels are like to be more neurotic and hyperglycemic women are prone to lower extraversion and openness⁷⁴.

Therefore, there is a possible connection of psychological and psychopathological features with a less healthy lifestyle (lower physical activity, higher BMI, lower quality of diet, higher alcohol and tobacco consumption) resulting in obesity, type 2 diabetes, dyslipidemia and hypertension which when combined with sex-specific risk factors (premature menopause, gestational diabetes, hypertensive disorders of pregnancy, preterm delivery and polycystic ovary syndrome (PCOS) they can potentially lead to an increased risk of CVD in women. A synopsis of risk factors leading to the development of CVDs in women is shown in Figure 1.

Future Directions

Women are less likely than men to get cardiovascular therapies recommended by guidelines so far, especially young women¹⁴. Nevertheless, the ESC/EAS guidelines for the management of dyslipidaemias from 2019, mention that statin treatment is recommended for the primary prevention of atherosclerotic cardiovascular disease (ASCVD) in high-risk women (age >_ 65 years, hypertriglyceridemia, increased LDL cholesterol, increased blood pressure levels, familial hypercholesterolemia, diabetes, obesity and smoking)³⁰.

ESC Guidelines on cardiovascular disease prevention

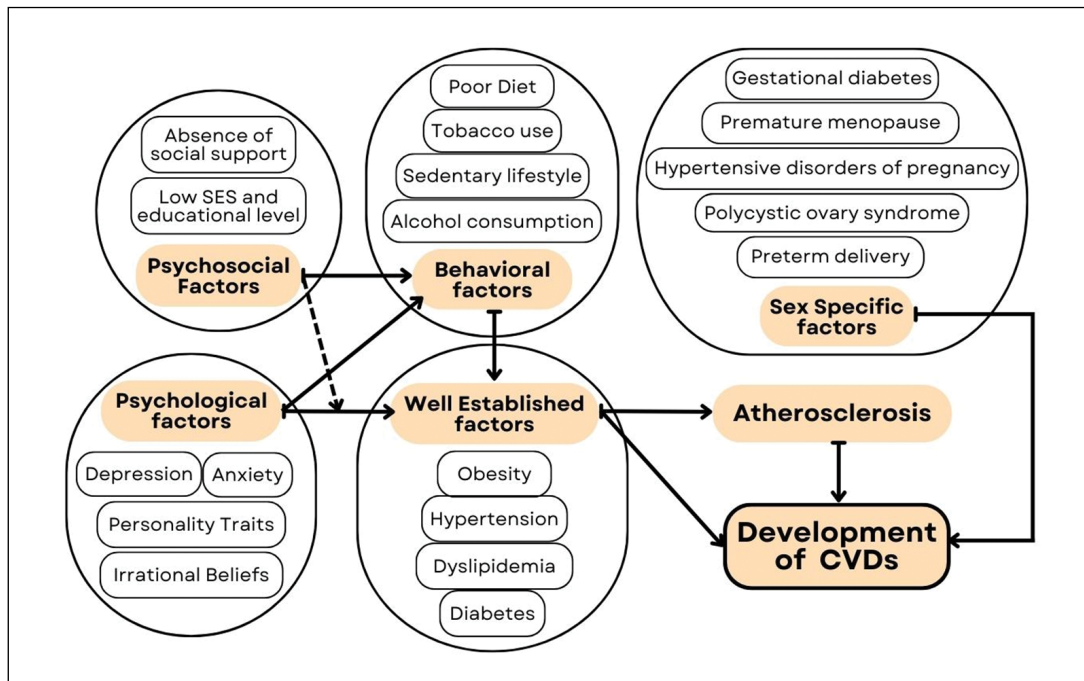


FIGURE 1. A figure summarizing the risk factors leading to the development of CVDs in women.

in clinical practice from 2021 mention that the proportional reductions per mmol/L reduction in LDL-C in major vascular events, major coronary events, coronary revascularization, and stroke, and the relative effects of non-statin drugs that lower LDL-C are similar in women and men⁷⁵.

Statins are also recommended by ESC/EAS for secondary prevention in women with the same indications and goals as in men³⁰. Lipid-lowering drugs should not be given when pregnancy is planned, during pregnancy, or during the breastfeeding period, except for patients with severe familial hypercholesterolemia (bile acid sequestrants and/or LDL apheresis may be considered)³⁰. Also, the effect of oral contraceptive pills on the risk of developing or worsening hypertension should be considered⁷⁵.

Although MI and CVD mortality are increasing in young women, there are not any recommendations for the early detection and prevention of CVD in them¹⁴. Unfortunately, the adherence of the physicians to the guidelines is poor regarding therapy for lipid control in primary and secondary prevention of CVD in women and a diabetes diagnosis tends to occur at a higher body-mass index, older age, and more advanced stage of disease progression in women than in men indicating the need for increasingly vigorous screening earlier detection of diabetes in women, which is one of the most common well-established risk factors for CVD^{76,77}. Since 2004 a case-control study, that was conducted in 52 countries (the INTERHEART Study), suggested that there is a gender modulated impact on

CVD and that approaches to prevention should be based on similar principles worldwide between sexes⁷⁸. Despite that, female patients are still more likely to be treated less aggressively, and a lower rate of diagnostic and interventional procedures is performed in women than in men⁷⁹.

Consequently, there is a high importance in studying women and CVD because heart diseases remain understudied, under-recognized, underdiagnosed and undertreated in women. Women have been underrepresented in or excluded from, cardiovascular clinical trials. Specifically, the proportion of women enrolled in Heart Failure (HF) clinical trials has remained still at approximately 20–30% over the past 4 decades and HF trial participants have not been representative of real-world HF populations⁸⁰. This might be explained by some barriers to the enrolment of women in clinical trials such as the failure to screen an adequate number of potential women participants and the fact that trial leadership by men is independently associated with a decreased enrolment of women participants⁸⁰. Moreover, as women include a bigger proportion of older patients with HF, the non-inclusion of elderly participants may influence their enrolment⁸⁰. Except for the clinical trials of HF, women are underrepresented in coronary artery disease and acute coronary syndrome clinical trials as well⁸¹.

This fact has decreased the capability to measure the safety and efficacy of therapies for women, the likelihood of identifying differences between sexes in outcomes,

and the development of sex-specific strategies that could lead to enhanced guideline recommendations for the prevention and management of CVD¹⁴. Especially after the COVID-19 pandemic, an increase in cardiovascular risk burden in women is expected. The cardiovascular risk in women has to be re-evaluated and a healthy lifestyle should be promoted⁸².

To sum up, CVD is the most common cause of mortality for women globally. Well-established risk factors for CVD, such as hypertension, elevated cholesterol levels, diabetes, and obesity in combination with sex-specific risk factors including premature menopause, gestational diabetes, hypertensive disorders of pregnancy, preterm delivery and polycystic ovary syndrome (PCOS) affect women, placing more burden on them. Psychological conditions (such as anxiety and depression) and some personality traits (such as hostility and neuroticism) which are more common in women, can lead to both unhealthy lifestyle behaviors (poor diet, decreased physical activity levels, increased consumption of alcohol, smoking) and to greater immune

and inflammatory responses leading to even higher risk of CVD. Low socioeconomic status, working conditions, social support and specific life events also increase the incidence of CVD in women.

CONCLUSION

Future research should focus on better understanding the link between psychological factors and CVD risk, especially in women. Also, psychological, psychosocial, or lifestyle interventions should be carried out as primary prevention of cardiovascular disease, especially focusing on women with specific psychological characteristics, burdened with social stressors and following adverse lifestyle behaviors. These interventions will incorporate a change in specific psychological processes but also the modification of other CVD risk factors, such as diet, exercise, and smoking.

Conflict of interest

None to declare.

ΠΕΡΙΛΗΨΗ

Ψυχολογικοί παράγοντες και εμφάνιση αθηροσκληρωτικής καρδιαγγειακής νόσου στις γυναίκες: Μια αφηγηματική ανασκόπηση

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Η καρδιαγγειακή νόσος (CVD) είναι η κύρια αιτία θνησιμότητας, με αυξανόμενες ενδείξεις που αναδεικνύουν τις διαφορές μεταξύ γυναικών και ανδρών, παγκοσμίως. Δεδομένα από τη βιβλιογραφία υποδεικνύουν την παρουσία διαφορών ανάλογα με το φύλο, τόσο στις βιολογικές αντιδράσεις όσο και στις συμπεριφορές στον τρόπο ζωής ως απάντηση στο ψυχολογικό στρες. Υπάρχουν στοιχεία που υποδηλώνουν ότι οι γυναίκες αντιμετωπίζουν υψηλότερα επίπεδα ψυχολογικών προβλημάτων, όπως το άγχος και η κατάθλιψη. Η σύνδεση μεταξύ ψυχολογικών παραγόντων και καρδιαγγειακής νόσου μπορεί να εξηγηθεί από συμπεριφορικούς και βιολογικούς παράγοντες κινδύνου, καθώς και από υποκείμενους μηχανισμούς, όπως η υπερδραστηριότητα του συμπαθητικού νευρικού συστήματος και η διαταραχή της λειτουργίας του υποθαλάμου-υπόφυσης και των επινεφριδίων. Επιπλέον, ορισμένοι ψυχοκοινωνικοί παράγοντες μπορεί να θέτουν τις γυναίκες σε ιδιαίτερο κίνδυνο για καρδιαγγειακά νοσήματα. Λαμβάνοντας υπόψη αυτές τις υποθέσεις, η παρούσα ανασκόπηση συνοψίζει τα δεδομένα που αφορούν τους ψυχολογικούς παράγοντες και τη σύνδεση της καρδιαγγειακής νόσου στις γυναίκες, τονίζοντας τις διαφορές μεταξύ των φύλων.

ΛΕΞΕΙΣ ΚΛΕΙΔΙΑ: Κίνδυνος καρδιαγγειακών παθήσεων, γυναίκες, κατάθλιψη, άγχος, ψυχοκοινωνικοί παράγοντες

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