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Hypertension, emotions and happiness: A brief view from the biology to the positive psychology

Hipertensión, emociones y felicidad: una breve mirada desde la biología a la Psicología Positiva

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SUMMARY

High blood pressure (HBP) is a silent disease with an extremely high prevalence worldwide. It is considered the leading risk factor for cardiovascular (CVD) and neurovascular disorders. The etiology of hypertension is based on various genetic, environmental, and social factors. Currently, compelling evidence points to the link between HBP and certain psycho-emotional factors, such as mental stability, happiness, general well-being, and fulfillment, all consistently associated with better physical and psychological health. Clinical and epidemiological evidence supports their value as a novel target in HBP management despite the lack of clarity concerning how psycho-emotional and affective states affect cardiovascular health. Among the main psycho-emotional strategies implemented to treat HBP and other CVD patients, emphasis should be placed on psychosocial interventions and positive psychology, which have shown promising results in this regard thus far. Therefore, this review aims to comprehensively determine whether an individual's psychosocial and emotional state can be an HBP risk factor.

Keywords: *Hypertension, cardiovascular disease, happiness, psychosocial, health.*

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RESUMEN

La hipertensión arterial (HTA) es una enfermedad silenciosa con una prevalencia extremadamente alta a nivel mundial. Es considerada el principal factor de riesgo de enfermedades cardiovasculares (ECV) y neurovasculares. La etiología de la HTA se basa en diferentes factores genéticos, ambientales y sociales. Actualmente, la evidencia apunta al vínculo entre la HTA y ciertos factores psicoemocionales, como la estabilidad mental, la felicidad, el bienestar general y la realización, todos asociados consistentemente con una mejor salud física y psicológica. La evidencia clínica y epidemiológica respalda su valor como un objetivo novedoso en el manejo de la HTA a pesar de la falta de claridad sobre cómo los estados psicoemocionales y afectivos afectan la salud cardiovascular. Entre las principales estrategias psicoemocionales implementadas para el tratamiento de la HTA y otros pacientes con ECV, se encuentran las intervenciones psicosociales y la psicología positiva, que hasta el momento han mostrado resultados prometedores. Así, esta revisión tiene como objetivo determinar de manera integral si el estado psicosocial y emocional de un individuo puede ser un factor de riesgo de HTA.

Palabras clave*: Hipertensión, enfermedad cardiovascular, felicidad, psicosocial, salud.*

INTRODUCTION

High blood pressure (HBP) is the most common risk factor associated with cardiovascular disease (CVD), affecting approximately 1.39 billion people worldwide every year (1). Furthermore, HBP is considered the most influencing risk factor for the premature cardiovascular and neurovascular disease since 47 % of all acute coronary syndromes and 54 % of all strokes globally are a direct consequence of this clinical entity. Moreover, the latest data predicts that by 2025 about 1.5 billion adults will suffer from this condition, which is equivalent to 30 % of the world's population (2-5).

HBP is often a silent disease causing long-lasting neurovascular and cardiovascular damage such as coronary heart disease, congestive heart failure, retinopathy, stroke, intracerebral hemorrhage, and chronic kidney disease. In addition, the leading causes of morbidity after HBP onset are coronary artery disease in men and stroke in women (6-10).

The development and natural progression of HBP are determined by the complex interaction between certain non-modifiable and modifiable factors, ranging from polygenic determinants influenced by environmental and behavioral factors (11,12). In the last decades, high, middle, and low-income countries have experienced the so-called HBP epidemic, mainly attributable to various lifestyle changes and behavior, such as low energy expenditure due to physical inactivity and a high-calorie diet (3).

On the other hand, the possible role of emotional and subjective mental states as triggers or adjuvants in HBP perpetuation has been discussed. Consequently, the scientific community has shown some interest in the psychological and behavioral aspects of HBP management, which promotes well-being and mental wholeness characterized by the encouragement of positive emotions, such as happiness (4,13). Furthermore, it should be noted that an optimal psychosocial and emotional state could be directly related to physical health (14). For this reason, the objective of this review is to determine whether the psychosocial and emotional state can be considered an HBP risk factor.

Classic Risk Factors for Essential Hypertension

Cardiovascular risk factors can be classified into modifiable and non-modifiable factors. Modifiable risk factors are those that can be corrected or minimized with intervention. These include smoking, dyslipidemias, diabetes mellitus, obesity, physical inactivity, and excessive alcohol and high sodium consumption. On the other hand, non-modifiable risk factors cannot be subject to any intervention, as they involve an unchangeable personal and family history of CVD, namely, genetic and/or hereditary factors (15–19). In this sense, some authors claim that an individual's blood pressure (BP) is determined by the interaction between environmental and genetic factors, which generally refer to modifiable and non-modifiable factors, respectively (7,10).

a) Genetic factors

Regarding hereditary factors, studies carried out in the pre-molecular *era* have shown that these are responsible for 20 %-50 % of BP variations in humans (20). Multiple genes are potentially involved in BP control and regulation (21). However, it has been demonstrated that people with similar BP do not necessarily share the same genotype, just as people with the same genotype do not necessarily have the same BP (2,22).

Nevertheless, numerous studies point to genetic polymorphisms and their roles in HBP development. In this regard, Nunes et al. studied the associations between genetic polymorphisms of bradykinin B2 receptor (BDKRB2), alpha-adrenergic receptors (ADRA), and endothelial nitric oxide synthetase (eNOS) in the modulation of BP and left ventricular mass. Their findings suggest that the rs5810761 (DD genotype) BDKRB2 polymorphism is associated with higher systolic and diastolic BP, whereas the eNOS rs1799983 (T alleles) polymorphism is associated with a lower diastolic BP (22).

Similarly, the polymorphisms of some genes involved in reactive oxygen species (ROS) production regulation have been shown to modulate BP. Various mechanisms have been proposed to describe how ROS modulates BP, such as endothelial dysfunction, arterial stiffness, glomerular damage, NaCl retention, and inflammation (23). In summary, HBP is considered a hereditary disease, passed on from generation to generation, making individuals with a family history of HBP much more likely to suffer from HBP than other healthy individuals (24).

b) Environmental factors

Many environmental factors have been linked to BP regulation, including cold weather, higher altitude, noise, and air pollutants (25). In addition, some studies have shown that one or more of these factors can permanently change physiological cardiovascular functioning, predisposing individuals to a higher risk of developing CVD in the future (26,27).

Likewise, numerous researchers have studied the link between long-term exposure to noise and HBP over the years. This connection has been seen mainly in those individuals exposed to nocturnal noise, which can increase cortisol levels and vascular oxidative stress, leading to endothelial dysfunction and hypertension (28,29).

The specific mechanisms affecting BP have not been fully elucidated yet regarding factors like air pollution. However, it is suspected to cause endothelial dysfunction through increased oxidative stress and promoting systemic inflammation. In the same manner, air pollution can trigger an autonomic nervous system imbalance, with a subsequent dysregulation of the vasomodulatory mechanisms involved in BP regulation (30). Moreover, Wu et al. point out that certain metals such as V, Fe, Zn, Se, and Hg, could raise BP or increase the risk of developing HBP (31).

Furthermore, various environmental pollutants have been recently described as possible endocrine disruptors; that is, environmental substances with biological activity targeting endocrine system function, thus interfering in the physiological regulation of BP (32). One of the main endocrine disruptors is bisphenol A (BPA). Although the mechanisms involved in cardiovascular system dysregulation are still unknown, experimental studies suggest that BPA can induce liver cell damage and increase oxidative stress. Additionally, BPA can disrupt pancreatic β-cell function, promoting insulin resistance, one of the main risk factors for hypertension (33-35).

In this context, the possible toxic role of heavy metals like lead (Pb) in HBP development has been explored (36). While the cardiovascular system is not its primary target, researchers suggest that at high concentrations, Pb can alter the functioning of cardiac muscle cells and vascular smooth muscle through a rise in ROS production, resulting in an oxidative stress increase (37). On the other hand, high lead levels negatively correlate with nitric oxide synthesis (36,38).

c) Physical activity

Various studies have evidenced that physical activity is inversely correlated with HBP incidence (39). This fact could be explained by the positive effects of physical activity on health, commonly associated with beneficial effects resulting in hemodynamic and metabolic changes that enhance endothelial function and decrease oxidative stress in general (40,41). In contrast, physical inactivity is strongly associated with the development of obesity and overweight, which can lead to hypertension, therefore posing a higher risk of morbidity and mortality in sedentary individuals (42,43).

Similarly, substantial evidence reveals that moderate or vigorous physical activity reduces BP by approximately 5-7 mmHg, whereas performing dynamic resistance training is associated with a decrease of only 2-3 mmHg (44,45). In regards to the HBP-related cardiovascular complications, it has been found that resistance exercise is associated with a general cardiovascular risk reduction, lowering the risk of stroke by 8 %-14 %, cardiac morbidity by 5 %, and all-cause mortality by 4 % in the average population (45,46). Although these types of physical activity are related to a lower incidence of hypertension, it is worthy to emphasize that they are contraindicated in those with unstable heart conditions, including severe uncontrolled hypertension (44,47-49).

d) Tobacco and alcohol consumption

Smoking is known to be one of the main CVD risk factors (50). Acute cigarette consumption is capable of raising BP, as its components stimulate the sympathetic nervous system, subsequently leading to peripheral vasoconstriction and increased heart rate (51). Additionally, smoking also induces mitochondrial dysfunction in cardiovascular system cells due to a decrease in mitochondrial deacetylase sirtuin-3 and hyperacetylation of superoxide dismutase 2, which contributes to the development of endothelial dysfunction, and later to HBP (52).

Andriani et al. conducted a 15-year population-based cohort study to evaluate the relationship between smoking status and BP. The authors concluded that there is a strong association between smoking and the incidence of HBP since smokers have been consistently shown to have a higher prevalence than non-smokers or those who quit smoking (53). Paradoxically, in studies assessing the effect of chronic smoking on BP, there has been no evidence of a direct causal link between smoking and HBP. However, it is necessary to bear in mind that chronic and hypertensive smokers could develop severe forms of HBP, including malignant and renovascular HBP (50,54).

Conversely, alcohol has a biphasic effect on BP regulation, as it lowers BP in the first 12 hours after consumption but increases it after this period ends. In addition, heart rate also increases in the following 24 hours after alcohol intake (55). In this sense, a study by Stranges et al. in a sample of 2 609 individuals from New York, aged 35 to 80 years, stated that alcohol consumption (regardless of the amount of alcohol consumed) outside of meals increases the risk of HBP (56).

e) Obesity and Diabetes Mellitus

Obesity and diabetes are both metabolic disorders that directly influence CVD incidence. Multiple epidemiological studies have found a significant positive correlation between obesity and the risk of diabetes and HBP, suggesting that diabetic patients have a higher risk of suffering from hypertension (57-60). The underlying mechanisms of this phenomenon are possibly based on the functionality, distribution, and quantity of the adipose tissue, together with the cell population within it (61,62). Indeed, the endocrine secretion profile of healthy adipose tissue is well known and is characterized by the secretion of vasoactive adipokines and anti-inflammatory cytokines. However, during the adipose tissue expansion seen in obesity, mature adipocytes undergo dramatic functional and morphological changes characterized by a proinflammatory metabolomic profile promoting the pathogenesis of BPH and other CVD.

The rise in adipose tissue increases systemic vascular resistance, increasing cardiac effort in compensation to work against said resistance. Similarly, the metabolic changes heralded by obesity can cause sympathetic hyperactivity resulting in kidney damage. Ultimately, all these events will lead to cardiovascular functioning changes that will promote BP alterations (63).

Additionally, perivascular adipose tissue (PVAT) surrounding most blood vessels has certain endocrine qualities that regulate their functioning. When the PVAT is healthy, it serves as an anti-contractile, anti-inflammatory, and antioxidant tissue. However, in obese and diabetic patients, PVAT becomes unhealthy, and so its secretory profile is altered, resulting in increased vascular inflammation, oxidative stress, and arterial remodeling instead (64).

Moreover, obesity is related to developing cardiometabolic diseases at an early age. Obesity is of great clinical relevance during childhood, given its strong link to hypertension and diabetes mellitus (65,66). Likewise, studies have proven that being overweight or obese increases the likelihood of developing HBP by five-fold compared to healthy individuals (67,68).

f) Dietary factors

Proteins, fats, and carbohydrates are among the main macronutrients in any diet. A balanced diet typically entails a specific macronutrient composition range; that is, 45 %-65 % carbohydrates, 20 %-35 % fats, and 15 %-25 % proteins. Dietary imbalance stems from changes in these percentages and their proportions. It should be noted that processed foods are the key source of the said imbalance, as their main components include fats, simple carbohydrates, and excessive salt. This dietary imbalance can lead to metabolic diseases and HBP (69).

Incidentally, it has been established that a healthy diet lowers BP. As a result, diet plans such as the Dietary Approaches to Stop Hypertension (DASH) have been created, proving effective in reducing BP. The DASH diet is rich in fruits, vegetables, whole grains, nuts, legumes, lean proteins, and low-fat dairy products and has scarce to no refined sugar, saturated fats, and cholesterol (70).

Regarding sodium consumption, there is a well-documented connection between sodium intake and HBP, which is why it is considered one of the main direct and indirect risk factors for HBP development (71). Some studies have also shown that sodium consumption leads to a rapid increase in BP when accompanied by certain genetic factors (2). However, high sodium intake alone is not nearly enough for HBP to appear, considering how not all individuals with high-sodium diets suffer from HBP. This phenomenon has been termed sodium sensitivity and is more evident in obese, elderly patients with severe HBP, of African descent, with a family history of HBP, and/or with hyperaldosteronism (72,73).

Similarly, various authors suggest that low potassium intake may influence the pathogenesis of HBP. In this sense, Poorolaja et al. determined that adequate potassium supplementation can significantly reduce BP in hypertensive elderly adults, those of African descent, and those with a high-sodium diet (74). Furthermore, Vinceti et al. conducted a meta-analysis that included 16 cohort studies assessing the relationship between potassium supplementation and the risk of stroke. This study suggests that 3.5 grams of potassium per day can reduce the risk of stroke by 13 %. As such, the authors concluded that these results could be owed to the therapeutic properties of potassium concerning BP regulation (75). Of interest, patients affected by renal diseases must reduce potassium intake since there are at risk of fatal arrhythmias and other cardiovascular conditions.

HBP: Psychosocial and Emotional Factors

Thus, the risk factors leading to hypertension have been addressed from a medical/clinical perspective. Nevertheless, there are other biopsychosocial factors to be taken into consideration, such as stress, anxiety, depression, and other emotional problems that can also contribute to the development of HBP (14). In this sense, Redondo-Sedina et al. carried out a study that sought to describe the effect of a social support network on HBP in 3483 Spanish subjects over 60 years old. The findings suggest that married individuals who live with other people have a lower HBP risk; whereas those who were not married or lived alone exhibited opposite results (76). These results point to social isolation as a possible risk factor for the appearance and development of HBP (77).

On the other hand, depression and sleep disorders are psychobiological factors known to trigger and exacerbate CVD (78). On the subject of sleep disorders, Lavie et al. conducted a prospective study to assess HBP incidence in 2 677 adults aged 20-85 with possible obstructive sleep apnea (OSA). Multiple regression analysis verified that OSA is a significant independent predictor of HBP in this study. In addition, it was reported that for each apnea event per hour, the risk for HBP increased by 1 % (79).

Concerning depression, Maatouk et al. conducted an 8-year prospective study to evaluate the possible association between depressive symptoms, generalized anxiety, and HBP in 3 124 individuals. HBP prevalence was 53.1 % (1 659 individuals), whereas depressive symptoms were found in 5.2 % of the population (163 individuals) and anxiety in 13.9 % (434 individuals). Subsequent statistical analysis employing logistic regressions revealed that individuals with depressive symptoms were more susceptible to developing HBP; in contrast, no significant results were found in those with generalized anxiety symptoms. The authors concluded that due to the connection between HBP and depression, it could be considered a possible risk factor for CVD (80). Similarly, one study reported that cardiac rehabilitation programs significantly improved anxiety and depression levels in patients with CVD (81).

Stress has proven to be a critical element among the better-known psycho-emotional factors related to hypertension. Various mechanisms involving stress have been described, such as 1) cardiovascular reactivity, 2) sympathetic responses to acute stress resulting in an increased heart rate, cardiac output, and BP, and 3) sustained sympathetic system hyperactivation that fails to return to a resting state after a stressful event (82). Therefore, the usual physiological responses that allow the body to maintain homeostasis during a stressful event can become noxious when they persist well after the initial sympathetic activation. For example, Ming et al. carried out a 20-year follow-up study on air traffic controllers focusing on their cardiovascular health status, revealing that those under great stress at work had consistently higher BP and an increased risk of developing HBP in the long term (83).

Additionally, stressful events can lead to a negative mood, resulting in depression, anxiety, and anger. These affective states can precede intrusive and negative thoughts about future and past stressful events, which could, in turn, prolong a persistent sympathetic physiological arousal, thus increasing BP (84,85). A study seeking to determine the effect of anxiety and depression as manifestations of chronic stress (CS) on patients with resistant HBP, reported a higher percentage of depression in the group of patients with CS + resistant HBP, as well as a positive correlation between the degree of anxiety and BP. These results suggest that CS influences the origin and persistence of HBP (86).

It is essential to highlight that stress, in addition, to contributing to the pathogenesis of depression and anxiety, can also be a crucial risk factor for certain CVDs other than HBP (87,88). Two of these cardiovascular entities are stress cardiomyopathy (or Takotsubo syndrome), and transient cardiomyopathy, both associated with an increase in sympathetic tone caused by acute emotional stress (89).

Furthermore, emotions have been associated with coronary heart disease in recent years. The central hypothesis states that an area of the cerebral cortex linked to emotions is activated in stressful conditions and generates cardiovascular responses such as HBP and acute myocardial infarction (87). Regarding this issue, Vaccarino et al. reported that myocardial ischemia due to emotional stress is more common in young women after a myocardial infarction than in age-matched men. Therefore, they conclude that medical interventions specifically designed to address stressors and treat risk factors in women could help in reducing cardiovascular mortality risk. In addition, some studies have explored anxiolytic drug effects in patients with resistant BPH and frequent hypertensive crises, showing blood pressure restoration after anxiolytic administration, suggesting that the emotional component could be an essential factor in this group of patients (90).

Emotions and HBP: the role of happiness in health

Scientific research concerning health and cardiovascular risk factors has focused mainly on physiological, biological, and genetic factors and their relationship with psychosocial factors related to an individual's lifestyle (diet and physical activity), but less attention has been paid to the impact of emotional and subjective aspects such as happiness as an integral part of the whole health construct.

It is clear for medical and social sciences to understand how emotions interplay with the health-disease process. In fact, there is bulk evidence supporting those negative emotions are intimately related to CVD, cancer, HIV, autoimmune disorders appearance, and progression (91-95). Conversely, happy people tend to have better physical and mental health and lead healthier lifestyles (96).

In this context, happy people are generally young, healthy, well-mannered, outgoing, optimistic, free of worries, religious, married, with high self-esteem, strong work morale, modest aspirations, stable economic situations, and a wide range of intelligence (97). For this reason, happiness can be identified as a psycho-emotional component that brings a series of positive life implications with it, not only from a personal, social or work-related angle but also from a biological point of view.

Moreover, altruistic emotions and behaviors (including happiness) have been positively correlated with mental and physical health, along with greater longevity (91). In turn, the personal perception of health is an essential element that promotes well-being and life satisfaction. Some studies suggest that the better a patient perceives their health, the happier they will be (94). In this sense, three factors are frequently included when asked to list the characteristics of a 'good life': happiness, health, and longevity (98). Although the latter has not been recognized to yield significant gains for individuals, it can be considered a psychologically positive experience. This fact is congruent to the fact that longevity would imply a person has almost entirely achieved the goals set in each of the spheres of their life, resulting in psychological well-being and fulfillment, and consequently, good health (99-101).

The link between happiness and hypertension has been thoroughly studied. Trudel-Fitzgerald et al. conducted a prospective study focused on the association between happiness, psychological well-being, and the incidence of HBP in 6 384 individuals. During the follow-up period, there was an incidence of 2 024 cases of HBP. Additionally, the authors also reported that the levels of high emotional vitality were significantly related to a 9 %-11 % reduction in HBP risk (102).

On the other hand, Steptoe et al. conducted a study revealing how positive affective states are associated with a decrease in inflammatory, endocrine, and cardiovascular activity patterns. Higher happiness levels were inversely correlated with heart rate and cortisol production during the day, regardless of psychological distress levels and other variables. Similarly, a lower response to stress led by plasma fibrinogen was reported in those individuals with higher happiness levels. The authors concluded that mental well-being is directly related to critical psychobiological processes involved in the physical health of individuals by reducing plasma levels of cardiovascular risk biomarkers related to HBP (103).

Furthermore, Waldstein et al. assessed the electro-cortical and cardiovascular reactivity when experiencing positive and negative emotions in 30 university students. Greater left frontal lobe activity was observed irrespective of emotional state. However, the frontal cortical response to anger was significantly related to higher heart rate reactivity and BP, whereas happiness only changed BP. These findings illustrate how emotions can play a fundamental role in cardiovascular physiological processes (104).

Psychosocial Approach to Hypertension: Beyond Antihypertensive Medication

Given the solid link between HBP and certain psycho-emotional factors, psychological, psychiatric, and/or psychosocial intervention could be considered promising strategies to be studied in hypertension management. Therefore, therapies aimed at emotional and mental disorders control in patients with high blood pressure should be further explored to consider their inclusion in Primary Care guidelines (87,105).

a) Psychosocial intervention

Implementing psychosocial intervention as a complement to medical treatment is one of the main psychological strategies used in hypertensive patients (6). Thus, Flynn et al. proposed a comprehensive approach based on precision medicine, which includes the appraisal of a patient's risk factors, particular characteristics, and expectations, along with assessing various psychiatric symptoms that contribute to CVD risk. On the other hand, it is crucial to encourage patients to be actively involved in the decision-making aspect of the psychosocial approach while also carrying out continuous monitoring of results to gauge treatment adherence and effectiveness (7). These have been shown to reinforce medication adherence and compliance in hypertensive patients concerning social support networks. It should be noted that the beneficial effect of this strategy rises together with the increase in perceived social support by said individuals (17).

b) Positive Psychology

Positive psychology is a recently emerged branch of psychology focusing on the study of psychological and subjective well-being, conscious human life experiences, and happiness cultivation. In the medical field, positive psychology aims to a paradigm shift to further consider the importance of positive emotions, such as happiness, in healing and disease management. However, positive psychology does not disregard or undermine the weight of medical practice on this issue. Instead, it emphasizes unearthing, highlighting, and putting human potentialities into motion resulting in daily-life wellness and happiness (106,107).

Consequently, positive psychology has been associated with physical health since happiness and positive mood influence health, and vice versa (108). In this sense, happiness and positive mood are an essential part of the causal chain that results in an individual's physical health, working together with particular social and personality factors to achieve wellness. Additionally, an intrinsic connection has been found between happiness, life satisfaction, and positive mental health (109).

Positive psychology interventions have shown promising results regarding CVD, claiming to deepen the understanding of a patient's well-being after a cardiovascular event (110). In addition, perceived well-being and its implications (including positive affect) are associated with a lower incidence of cardiovascular events and rehospitalizations (107), proving how psychological resources significantly improve physical health while underlining their various benefits over other strategies. Similarly, positive psychology interventions have been systematically linked to enhanced well-being and a significant decrease in depressive symptoms in individuals with HBP (106).

In this sense, Nikrahan et al. conducted a randomized clinical study to analyze the effects of positive psychology on the hypothalamic-pituitary-adrenal axis functioning and specific cardiovascular risk markers in 69 coronary patients. The authors reported that after seven weeks of positive psychology intervention, the patients had lower C-reactive protein (CRP) and a lower cortisol awakening response, both biomarkers related to acute coronary events and the development of HBP (111).

Conversely, Mohammadi et al. described the effect of optimism-promoting psychological therapy in 64 patients with heart disease aged 35 to 60 years old. After 8-16 weeks of treatment, patients showed a more optimistic approach to their condition, in addition to a marked improvement in other psychological spheres, such as hope, life satisfaction, and anxiety. These results could lead to greater psychological well-being and promote adherence to treatment (112).

Likewise, Ostir et al. conducted a cross-sectional study to demonstrate the influence of positive emotions on the BP of 2 564 individuals over 65 years of age. In those who were not undergoing antihypertensive treatment, positive emotions were associated with lower systolic and diastolic BP. In contrast, in hypertensive patients, positive emotions were only associated with lower diastolic BP. In conclusion, implementing positive psychology interventions as part of multimodal treatment in patients with CVD could promote the development of positive emotions (e.g. happiness), which have been consistently associated with lower BP in both healthy and hypertensive individuals (13).

c) Hypertension and happiness: a take on positive prevention

Happiness is a personal and collective construct involving an individual's immediate environment, marking individual well-being as a particular subject to collective well-being. For this reason, an individual's living situation and environment must be taken into consideration when faced with a disease such as HBP. Given the ever-rising prevalence of HBP, active prevention is the logical path to follow. This goal can be achieved by taking positive measures to tackle medical illness or simply implementing a healthy lifestyle (113).

Consequently, the personal perception of suffering from a disease negatively impacts and worsens an individual's health and well-being. However, some studies stated that the concern surrounding disorders generally leads patients to implement healthier behaviors in their daily lives (114). Thus, the proposal and execution of public policies concerning prevention and awareness of the growing HBP phenomenon have become a necessity. In fact, Europeans hailing from Ireland, Sweden, Denmark, and the Netherlands have reported better mental stability, well-being, and happiness, all of which have been linked to lower BP levels and lower hypertension prevalence. Furthermore, it should be noted that the countries with better BP levels exhibit better social, political, and economic stability for their inhabitants, factors intricately involved in the psycho-emotional and behavioral state of individuals (115).

Therefore, the design and implementation of HBP prevention and control programs from a psychosocial and emotional standpoint are imperative and indeed necessary (116). As a result, awareness of prevention and possible complications related to hypertension management would become common knowledge. Likewise, this approach added to all current strategies to either avoid or manage the disease at a pharmacological level and regarding patients as biopsychosocial entities (117). In this context, the prevention of hypertension must involve healthy lifestyle habits such as a balanced diet, exercise, sensible consumption of alcohol and tobacco, and playing sports (117). A healthy lifestyle is directly related to an optimal mental state, seeing as good eating habits and physical activity improve health and happiness levels (118). Likewise, Roche determined that practicing yoga has some effect on the origin of the physiological imbalances that lead to HBP and improves individuals' emotional state, perception of happiness, and life satisfaction. Similarly, the study reported that practicing yoga results in decreased cardiovascular reactivity, coupled with a positive effect on cardiovascular parameters related to HBP (119).

Finally, prevention as a concept must contemplate and involve the community in general, since being aware of the causes and consequences of this phenomenon would affect the actions taken by the individual and society as a whole. For that reason, a culture of happiness and mental well-being must be born from prevention to uncover a path towards the best form of health in the various spheres that make an individual (120).

CONCLUSION

BP is influenced by multiple environmental, biological, and genetic factors interacting with others. In recent years, the scientific community has taken an interest in studying the role of psychosocial and emotional factors in individuals' physical and mental health. In this sense, scientific evidence has determined that psychopathologies and negative emotions are intimately involved in the development and/or progression of CVDs such as hypertension. Although their underlying mechanisms are not fully elucidated yet, they cause cardiovascular hyperactivity, endothelial dysfunction, and repeated activation of a sympathetic system that fails to return to its resting state. On the contrary, studies show how happy people are prone to have better physical and mental health. Additionally, they tend to lead healthier lifestyles from personal, social, work-related, and biological perspectives.

Various psycho-emotional strategies such as psychosocial intervention and positive psychology have been implemented as HBP therapy, decreasing plasma levels of cardiovascular risk-related biomarkers. Therefore, it is necessary to promote research on this topic to understand better the mechanisms by which positive emotions affect HBP. In this vein, psychological intervention in primary care should be enabled alongside prevention programs to allow individuals to be aware of the impact of psycho-emotional elements during life, encouraging a positive affective state hand-in-hand with physical and mental well-being.

LIST OF ABBREVIATIONS

HBP: High Blood Pressure

CVD: Cardiovascular Disease

BP: Blood Pressure

CS: Chronic Stress

CRP: C Reactive Protein

HIV: Human Immunodeficiency Virus

OSA: Obstructive Sleep Apnea

DASH: Dietary Approaches to Stop Hypertension

PVAT: Perivascular Adipose Tissue

BDKRB2: bradykinin receptor B2

ADRA: alpha-adrenergic receptors

eNOS: endothelial nitric oxide synthetase

ROS: Reactive Oxygen Species

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