

Hypertension and Anxiety: Comorbidity, Treatment, and Access to Resources

Stella Jacqueline Versteeg and Athena Stefanatou*

School of Graduate and Professional Studies, Graduate School, DERE: The American College of Greece, Athens, Greece.

Abstract

Hypertension and its comorbidity with anxiety disorders is a global concern even more prevalent in developing countries. There is limited data from low-income countries. Existing literature has consistently exhibited a positive association between hypertension and anxiety, although the directional dependency between the two conditions is difficult to be determined. Studies have suggested a reciprocal relationship between the two, with hypertension symptoms such as headaches, shortness of breath, fear of complications, and dizziness triggering feelings of anxiety. Similarly, the pre-existing presence of anxiety may induce temporary, yet dramatic spikes in blood pressure as well as long-term issues with hypertension. This paper provides a review of the widely investigated association between hypertension and anxiety and describes the impact that one condition has on the other in terms of psychological and physical functioning, and risk factors. Additionally, a discrepancy between prevalence, ability to control, and treatment between affluent and developing countries are discussed. The most common and effective pharmacological and psychotherapeutic treatments are presented and reviewed. Evidence-based interventions include mindfulness-based treatments such as MBSR and MBCT, ABBTs such as ACT, cognitive behavioral therapy (CBT), and motivational interviewing. Suggestions for future treatment options and management of both conditions are presented, with an emphasis on populations in developing countries. To address discrepancies in access to resources, urbanization, and high illiteracy rates, a global risk approach is presented.

Keywords

Hypertension, Anxiety, Comorbidity, Treatment, CBT, Mindfulness, Risk factors, Accessibility, Resources.

Corresponding Author Information

Athena Stefanatou

School of Graduate and Professional Studies, Graduate School, DERE: The American College of Greece, Athens, Greece, E-mail: astefanatou@acg.edu.

Received: September 18, 2022; **Accepted:** October 25, 2022; **Published:** October 30, 2022

Copyright: © 2022 ASRJS. This is an openaccess article distributed under the terms of the Creative Commons Attribution 4.0 International license.

Citation: Versteeg SJ, Stefanatou A. Hypertension and Anxiety: Comorbidity, Treatment, and Access to Resources. *Cardiol Cardiovasc Res.* 2022;1(1):1-6.

Introduction

Hypertension, otherwise referred to as high blood pressure, is a highly prevalent condition in which the force exerted by blood circulation against artery walls in the body is too high, resulting in an increased risk of cardiovascular disease, stroke, heart attack, and other life-threatening health complications [1]. Globally, this common condition has been the leading cause of premature death with some risk factors relating to age, sex, race, ethnicity,

socioeconomic status, geographical location, and lifestyle choices. A recently published pooled analysis with data from 1990-2019 and 104 million participants presented many comparative findings including improved control and treatment rates of hypertension in most countries since 1990, primarily observed in high-income countries due to access to analogous resources [2]. Additionally, hypertension-related health complications such as stroke, heart disease, and renal disease have been related to 8.5 million deaths

worldwide, disproportionately affecting developing countries [2]. Furthermore, the risk for hypertension increases with age, men have higher BP at younger ages while women have a higher risk after 60 years of age, and racial and ethnic minorities are at higher risk for hypertension compared to the Caucasian population [3]. The last finding, as reported, is believed to be attributed to sociodemographic and environmental factors, rather than genetic factors. High sodium intake, low potassium intake, lack of physical activity, obesity, an unhealthy diet, cigarette smoking, and sleep disorders are additional risk factors associated with the development of hypertension [3,4].

An analytic review by Ibrahim & Damasceno [4] demonstrated a strong correlation between urbanization and socioeconomic status and an increase in hypertension prevalence, such that patterns of food consumption, dietary changes, increased psychological stress, and disruption of “traditional family links” may be interrelated. Characteristically, urbanization affects food consumption with enhanced use of oils, fats, and animal products that were not previously consumed resulting in increased body weight, higher body-mass index (BMI), and higher blood pressure. According to another study, systolic blood pressure levels tend to be higher in low- and middle-income countries compared to North America [5]. Overall, in affluent countries, there is a greater prevalence of controlled hypertension, and this difference can be attributed to many factors, including but not limited to lack of awareness, scarce resources, and insufficient knowledge of health professionals about treatment in developing countries [4,6].

Hypertension and Anxiety

In addition to health consequences and health-related risk factors, the growing prevalence of hypertension has led to a wide array of psychiatric comorbidities and thus, impairment of quality of life [1]. One of the most commonly diagnosed comorbidities of hypertension are anxiety disorders, which is the primary focus of this paper. According to the Diagnostic and Statistical Manual v.5, there are multiple disorders under the bracket of ‘Anxiety Disorders’, many of them with the common diagnostic features of excessive worry, sleep disturbances, irritability, and restlessness [7]. Depending on the onset of the symptomatology, an analogous diagnosis can be provided. This reciprocal relationship can be illustrated as the following: hypertension symptoms such as headaches and dizziness can evoke anxiety symptoms while existing anxiety can result in physiological changes in the body and raise blood pressure [8]. The mechanism between hypertension and anxiety is multifaceted; anxiety has been shown to activate the sympathetic nervous system while constricting blood vessels and raising blood pressure [9]. Furthermore, although anxiety may increase blood pressure in the short term, it can also have long-term implications by affecting the renin angiotensin system and decrease vascular variability such that vascular resistance persists over time and leads to hypertension [8]. From a neurobiological perspective, it can be understood that the presence of stress in the body increases cortisol levels, which results in “deposition of arteriosclerotic deposits in the intima of blood vessels” [1]. Thus, these depositions narrow the blood vessels over time which can

lead to increased arterial pressure and hypertension. A literature review by Johnson [10] investigated the association between hypertension and anxiety and found a higher risk for developing hypertension after being diagnosed with an anxiety disorder. Additional literature has similarly exhibited a strong association between various mental health disorders including anxiety and a subsequent diagnosis of hypertension, highlighting the importance of early detection of physical and mental health problems [11]. A meta-analysis, pooling 59 related studies, demonstrated a significant anxiety-hypertension association while approximately 12% of hypertension patients reported anxiety symptoms [12]. A positive correlation between comorbid hypertension and anxiety has also been displayed in several other studies [10,13,14]. Another study investigating this association in an adult population in Hong Kong found that women and younger subjects with hypertension were more likely to report anxiety symptoms as compared to older subjects who were more likely to be depressed [15].

There are limited data from low-income countries; one study investigating hypertension and anxiety in South Africa and after adjusting for other variables demonstrated a strong association between the two conditions [16]. Furthermore, it was found that self-reported diagnosis of hypertension is commonly correlated with 12-month anxiety disorders and other comorbid mental disorders among South Africans as compared to those without hypertension. Delving further into socioeconomic and demographic risk factors, hypertension prevalence has been associated with low income, and specifically, the higher the income was in the cited study, the lower the prevalence of psychiatric comorbidity was in hypertension patients [1]. Thus, the risk of developing a mental disorder comorbid to hypertension appears to increase in low-income populations. Moreover, a study conducted by Hamrah and colleagues [17] found a high prevalence of comorbid anxiety disorders and symptoms among adult hypertensive outpatients in Afghanistan.

Treatment

Treatment options, both pharmacological and psychotherapeutic, will be presented for the two conditions, separately and combined. Firstly, in terms of pharmacological treatment, hypertension is usually managed with various antihypertensive drugs which aim to control blood pressure values. That being said, in a recently published article, a new anti-hypertensive medication has been developed to address various mechanisms involved in hypertension, including but not limited to: “a novel mineralocorticoid receptor antagonist, inhibitors of vasopeptidases, aldosterone synthase and soluble epoxide hydrolase, and agonists of natriuretic peptide A and vasoactive intestinal peptide receptor 2” [18]. Often, hypertension patients are prescribed diuretics which encourage the kidneys to get rid of excess water and salt in the body which in turn, lowers blood pressure [19]. Additionally, beta-blockers allow blood to flow through the patient’s vessels with less force, alpha-blockers relax the vessels to permit more room for blood to flow, and ACE (angiotensin-converting enzyme)-inhibitors hinder the formation of a hormone that tightens blood vessels, which allows them to remain open [20,21]. Thus, the main objective of antihypertensive

medication is to decrease blood pressure values short-term and ultimately, to prevent diseases induced by hypertension, a hypertensive emergency, and mortality in the future.

Regarding pharmacological treatment for anxiety, the following medications are commonly administered: antidepressants (SSRIs, tricyclics, MAOIs), SNRIs, benzodiazepines, buspirone, beta-blockers, and pregabalin [22,23]. Moreover, pharmacological treatment to target anxiety symptoms can be administered concurrently with antihypertensive medication in patients with comorbidity [24,25]. Existing literature has demonstrated that in patients with hypertension and anxiety disorders, antihypertensive therapy was more effective in combination with anxiolytic medication compared to antihypertensive therapy alone [26]. Interestingly, another study found that anti-anxiety treatment is effective in reducing blood pressure in hypertension patients, suggesting that it may target similar mechanisms in the two conditions [27]. With this in mind, medication adherence can be poor and pose a challenge in hypertension patients, especially when medication elicits unpleasant side effects, and this remains a global problem [28]. A recent study investigating the association between anxiety and medication adherence in hypertension patients, demonstrated a positive correlation, suggesting that anxiety works maladaptively in treatment adherence [29]. Adherence can be addressed with a physician and selecting the right medication for the patient, producing the least side effects and decreasing the amount of pills per day, can subsequently improve rates of adherence [30].

Delving into psychotherapeutic treatment options, many approaches target both hypertension and anxiety symptomatology, simultaneously. Vast existing literature has demonstrated the efficacy of mindfulness-based treatments, ABBTs, and CBT in treating both conditions. Firstly, mindfulness-based treatments target anxiety symptoms by promoting awareness of the present moment, better emotion regulation, attention to the breath, and introspection [31,32]. Such techniques discourage maladaptive habits such as cognitive rumination which refers to uncontrolled patterns of thinking which are often self-referential and negative [33,34]. Mindfulness-based stress reduction (MBSR) is an 8-week, evidence-based, mindfulness intervention program founded by Jon Kabat-Zinn, which is highly experiential, and it focuses on stress management and individual mindfulness practice [35]. A comprehensive meta-analysis further examined mindfulness-based therapy (MBT) as an intervention for various psychological problems such as anxiety and depression; results from 209 studies similarly displayed high efficacy [36]. In addition to evidence supporting mindfulness as an effective treatment for anxiety, it has also been shown to address hypertension symptoms. A literature review published in 2012 exhibited clinically significant reductions in both systolic and diastolic blood pressure values as a result of mindfulness-based treatment [37]. The same review also found that MBSR, which was originally used in patients with chronic pain, has been consistently effective in lowering blood pressure. Another study by Lu and colleagues (2017) meta-analyzed the impact of meditation on blood pressure with results aligning with existing

findings and supporting its efficacy in treating hypertension.

With a similar underlying notion as mindfulness-based treatments, acceptance-based behavioral therapies (ABBTs) provide an umbrella term encompassing mindfulness-based cognitive therapy (MBCT), acceptance and commitment therapy (ACT), integrative behavioral couple therapy (IBCT), and dialectical behavioral therapy (DBT). The essence of these treatments is to increase awareness, increase acceptance, and attribute meaning to life by identifying one's core values [38]. Acceptance and commitment therapy has been revealed to be effective in improving patients' acceptance of their hypertension condition as well as their commitment to alleviating their anxiety symptoms [39]. Fundamentally, ABBTs are utilized to treat anxiety disorders by incorporating psychoeducation, mindfulness practices, values articulation, and self-monitoring, which have shown high efficacy in multiple studies [38, 40,41]. In terms of treating hypertension, acceptance and commitment therapy has been demonstrated as effective according to a semi-experiential study [42]. Specifically, the aforementioned study revealed a significant difference in hypertension and cognitive emotion regulation between the experimental and control groups after implementing acceptance and commitment therapy.

Another study revealed that illness acceptance was an important factor regarding adherence to non-pharmacological therapy of hypertension, with no influence on pharmacological treatment [43]. In addition to acceptance of one's condition, the previous study also noted the sociodemographic and psychosocial factors that may interfere with adherence to treatment such as geographical location, race, perception of illness, low quality of life, lack of knowledge, and lack of resources to address the condition. Thus, the effectiveness of acceptance-based treatments may vary in other countries, depending on the level of affluence, access to medical care, and cultural differences [44]. Along these lines, a recent study was conducted in Indonesia and showed that ACT, which promotes a healthy way to approach fear and anxiety, was indeed effective in reducing anxiety in hypertensive patients who were specifically anxious about their medical condition [45]. However, it can be argued that an acceptance-based approach is not always well-received in the face of adversity, especially in diverse populations with limited resources and if implemented, it must be carried out with caution and cultural sensitivity [46,47].

Furthermore, cognitive behavioral therapy (CBT) is considered the "gold standard" of psychotherapeutic treatment for a wide array of disorders and maladaptive behaviors. The primary objectives of CBT are to promote self-awareness, change thinking and behavioral patterns, and acquire adaptive coping strategies [48]. Vast research has exhibited positive outcomes of CBT for anxiety patients, by targeting changes in maladaptive thinking and behaviors [49]. In addition to treating anxiety symptoms, CBT can be an effective and complementary therapy for hypertension, especially in patients with poor medication and treatment adherence [50,51]. To elaborate on this, a systematic review and meta-analysis on the efficacy of CBT demonstrated an overall positive effect of CBT interventions on health outcomes in hypertensive patients [51]. Specifically, results

showed a significant reduction in sleep disturbances, cholesterol levels, and improved values of systolic and diastolic blood pressure values. Other research has demonstrated similar findings [52,53]. Therefore, CBT appears to be an effective, short-term treatment option to address symptoms of both hypertension and anxiety in patients with comorbidity. Additionally, motivational interviewing is a psychotherapeutic approach that aims to enhance a patient's motivation to make positive behavior changes. Research has shown that this approach can be effective in improving blood pressure control, and adherence to treatment and medication in hypertension patients [54,55].

Global Risk Approach

As supported by existing studies stated in this paper, hypertension and its comorbidity with anxiety disorders is a global concern, and even more prevalent in developing countries. Primarily, means of assessment should be addressed, as one major constraint is the inability to assess patients' risk of hypertension [4]. In developing countries, measurements of blood glucose and cholesterol are often not possible to be obtained. The development of accessible tools must be prioritized, such as an affordable sphygmomanometer that can be distributed and utilized in primary healthcare settings. Educational programs and additional training must also be provided to healthcare professionals to assess, control, and appropriately care for their patients, as well as to detect signs of psychiatric comorbidities. Additionally, hypertension guidelines should be modified and specifically address resource-poor populations since guidelines for high-income countries may be impractical and non-applicable. Furthermore, anti-hypertensive drugs can become subsidized by the government or organizations and community-based programs can aim to inform the public, encourage self-referral, and provide psychoeducation. A study conducted in Cuba by Ordunez-Garcia and colleagues [56] attempted to control hypertension in a low-resource setting by improving detection and treatment, which was effective and deemed feasible in similar settings. Moreover, a comprehensive review revised data on control and strategies in developing countries in Asia with the objective of prevention. It was demonstrated that due to genetic and environmental factors that are unique to developing countries, there is a need for "cost-effective pharmacological treatment, accessibility to low-cost interventions, and counseling for lifestyle modifications" [57]. Anxiety can be addressed through counseling. Trained physicians on basic counseling techniques, ex. relaxation techniques and mindfulness, can improve the health awareness of their patients. Reducing anxiety is one of the first steps towards reducing the stress on the body. Blood pressure can either be lower due to hyperventilation or higher due to chronic anxiety and the experience of blood pressure spikes. Teaching a patient to recognize the connection of blood pressure and anxiety is the first step to wellness. Detecting resources (medical doctors, counsellors, and medication) is the second step when self-care is not enough. Dealing with hypertension remains a long-term goal as it is affected by multiple factors. The involvement of a multidisciplinary team (physician, nutritionist, counselor, trainer, nurse) might be impossible. Yet, training the first aid people in basic skills could be a solution.

Discussion

Worldwide, hypertension is a prevalent condition that affects millions of people and is often described as "the silent killer", often displaying minimal to no symptoms. There are serious health implications linked to hypertension such as cardiovascular disease, stroke, heart attack, and kidney disease. The most common psychiatric comorbidity consists of anxiety disorders, which can either contribute to the onset of hypertension, or develop concurrently. Nevertheless, the presence of this comorbidity can significantly increase health risks and ameliorate psychological distress. Various pharmacological and evidence-based psychotherapeutic treatments can target symptoms of the two conditions, separately and together. Mindfulness and acceptance-based treatments are commonly implemented as a combined approach. Motivational interviewing and CBT are also widely studied and tested treatment options to improve adherence, evoke internal motivation for change and provide psychoeducation to patients. However, it is important to note that acceptance and mindfulness-based treatments are not effective in all diverse populations, which suggests the need for clinical considerations. For instance, some studies have assessed the efficacy of such treatments in non-dominant and marginalized populations, and some elements may or may not be congruent [26,44,47]. Thus, more research must be conducted to further explore these discrepancies and develop treatment options tailored to diverse populations as well as provide access to such resources to patients in developing countries. To address this concern, a global risk approach must be considered, targeting accessibility, education, and cost-effective options.

References

1. Nkporbu AK, Stanley PC. Psychiatric comorbidity in essential hypertension. Update on Essential Hypertension. 2016.
2. Semplicini A. Faculty opinions recommendation of worldwide trends in hypertension prevalence and progress in treatment and control from 1990 to 2019: A pooled analysis of 1201 population-representative studies with 104 million participants. Faculty Opinions – Post-Publication Peer Review of the Biomedical Literature. 2021; 398: 957-980.
3. Mills KT, Stefanescu A, He J. The Global Epidemiology of Hypertension. *Nature Reviews Nephrology*. 2020; 16: 223–237.
4. Ibrahim MM, Damasceno A. Hypertension in developing countries. *The Lancet*. 2012; 380: 611-619.
5. Mbanya JC, Minkoulou EM, Salah JN, et al. The prevalence of hypertension in rural and urban Cameroon. *International journal of epidemiology*. 1998; 27: 181-185.
6. Pereira M, Lunet N, Azevedo A, et al. Differences in prevalence, awareness, treatment and control of hypertension between developing and developed countries. *Journal of hypertension*. 2009; 27: 963–975.
7. American Psychiatric Association. (2013). Diagnostic and statistical manual of mental disorders (5th ed.). <https://doi-org.ezproxy.frederick.edu/10.1176/appi.books.9780890425596>
8. Yan J, Pan Y, Cai W, et al. Association between anxiety and hypertension: A systematic review and meta-analysis of

- epidemiological studies. *Neuropsychiatric Disease and Treatment*. 2015; 11: 1121-1130
9. Rozanski A, Blumenthal JA, Kaplan J. Impact of psychological factors on the pathogenesis of cardiovascular disease and implications for therapy. *Circulation*. 1999; 99: 2192–2217.
 10. Johnson HM. Anxiety and hypertension: Is there a link? A literature review of the comorbidity relationship between anxiety and hypertension. *Current Hypertension Reports*. 2019; 21: 66.
 11. Stein DJ, Aguilar-Gaxiola S, Alonso J, et al. Associations between mental disorders and subsequent onset of hypertension. *General Hospital Psychiatry*. 2014; 36: 142-149.
 12. Lim LF, Solmi M, Cortese S. Association between anxiety and hypertension in adults: A systematic review and meta-analysis. *Neuroscience & Biobehavioral Reviews*. 2021; 131: 96-119.
 13. Byrd JB, Brook RD. Anxiety in the “age of hypertension.” *Current Hypertension Reports*. 2014; 16.
 14. Wei TM, Wang L. Anxiety symptoms in patients with hypertension: A community-based study. *The International Journal of Psychiatry in Medicine*. 2006; 36: 315-322.
 15. Bernard My Cheung, Thy Au, Sy Chan, et al. The relationship between hypertension and anxiety or depression in Hong Kong Chinese. *Experimental and clinical cardiology*. 2005; 10: 21-24.
 16. Grimsrud A, Stein DJ, Seedat S, et al. The association between hypertension and depression and anxiety disorders: Results from a nationally-representative sample of South African adults. *PLoS ONE*. 2009; 4: e5552.
 17. Hamrah MS, Hamrah MH, Ishii H, et al. Anxiety and depression among hypertensive outpatients in Afghanistan: A cross-sectional study in Andkhoy City. *International Journal of Hypertension*, 2018; 1-8.
 18. Diaconu CC, Dracoi CM, Bratu OG, et al. New approaches and perspectives for the pharmacological treatment of arterial hypertension. *FARMACIA*. 2018; 66: 408-415.
 19. Roush GC, Sica DA. Diuretics for hypertension: A review and update. *American Journal of Hypertension*. 2016; 29: 1130-1137.
 20. Aronow WS. Current role of beta-blockers in the treatment of hypertension. *Expert Opinion on Pharmacotherapy*. 2010; 11: 2599-2607.
 21. Hermida RC, Ayala DE, Fernandez JR, et al. Circadian rhythms in blood pressure regulation and optimization of hypertension treatment with ACE inhibitor and ARB Medications. *American Journal of Hypertension*. 2011; 24: 383-391.
 22. Baldwin DS. Pharmacological treatment of generalized anxiety disorder (GAD). *Generalized Anxiety Disorder and Worrying*. 2020; 297-318.
 23. Farach FJ, Pruitt LD, Jun JJ, et al. Pharmacological treatment of anxiety disorders: Current treatments and Future Directions. *Journal of Anxiety Disorders*. 2012; 26: 833-843.
 24. McLaughlin T, Geissler EC, Wan GJ. Comorbidities and associated treatment charges in patients with anxiety disorders. *Pharmacotherapy*. 2003; 23: 1251-1256.
 25. Meuret AE, Tunnell N, Roque A. Anxiety disorders and medical comorbidity: Treatment implications. *Advances in Experimental Medicine and Biology*. 2020; 1191: 237–261.
 26. Skibitskii VV, Skibitskii AV, Fendrikova AV. Arterial hypertension and depressive disorders: Combination treatment with antihypertensive and psychotropic therapy. “Arterial’Naya Gipertenziya” (“Arterial Hypertension”). 2016; 22: 505-518.
 27. Grossman E, Nadler M, Sharabi Y, et al. Antianxiety treatment in patients with excessive hypertension. *American Journal of Hypertension*. 2005; 18: 1174-1177.
 28. Vrijens B, Antoniou S, Burnier M, et al. Current situation of medication adherence in hypertension. *Frontiers in Pharmacology*. 2017; 8: 100.
 29. Dyussenova L, Pivina L, Semenova Y, et al. Associations between depression, anxiety and medication adherence among patients with arterial hypertension: Comparison between persons exposed and non-exposed to radiation from the Semipalatinsk Nuclear Test Site. *Journal of Environmental Radioactivity*. 2018; 195: 33-39.
 30. Matthes J, Albus C. Improving adherence with medication. *Deutsches Ärzteblatt International*. 2014; 111: 41-47.
 31. Hofmann SG, Sawyer AT, Witt AA, et al. The effect of mindfulness-based therapy on anxiety and depression: A meta-analytic review. *Journal of Consulting and Clinical Psychology*. 2010; 78: 169-183.
 32. Hofmann SG, Gómez AF. Mindfulness-based interventions for anxiety and depression. *Psychiatric Clinics of North America* 2017; 40: 739-749.
 33. Desrosiers A, Vine V, Curtiss J, et al. Observing nonreactively: A conditional process model linking mindfulness facets, cognitive emotion regulation strategies, and depression and anxiety symptoms. *Journal of Affective Disorders*. 2014; 165: 31-37.
 34. Parmentier FB, García-Toro M, García-Campayo J, et al. Mindfulness and symptoms of depression and anxiety in the general population: The mediating roles of worry, rumination, reappraisal and suppression. *Frontiers in Psychology*. 2019; 10: 506.
 35. Ludwig DS, Kabat-Zinn J. Mindfulness in medicine. *JAMA*. 2008; 300: 1350-1352.
 36. Khoury B, Lecomte T, Fortin G, et al. Mindfulness-based therapy: A comprehensive meta-analysis. *Clinical Psychology Review*. 2013; 33: 763-771.
 37. Goldstein CM, Josephson R, Xie S, et al. Current perspectives on the use of meditation to reduce blood pressure. *International Journal of Hypertension*. 2012; 1-11.
 38. Roemer L, Graham JR, Morgan L, et al. Mindfulness and acceptance-based behavioral therapies. *The Wiley Handbook of Anxiety Disorders*. 2014; 24: 804-823.
 39. Rasmawati R, Keliat BA, Susanti H. Improvement in patients’ ability to care for anxiety and impaired body image: A case report of acceptance and commitment therapy and family psychoeducation. *Jurnal Keperawatan Indonesia*. 2020; 23.
 40. Twohig MP, Masuda A, Varra AA, et al. Acceptance and commitment therapy as a treatment for anxiety disorders. *Acceptance and Mindfulness-Based Approaches to Anxiety*. 2017; 101-129.

41. Vøllestad J, Nielsen MB, Nielsen GH. Mindfulness- and acceptance-based interventions for anxiety disorders: A systematic review and meta-analysis. *British Journal of Clinical Psychology*. 2011; 51: 239-260.
42. Zargar Y, Hakimzadeh G, Davodi I. The effectiveness of acceptance and commitment-based treatment to hypertension and emotion cognitive regulation in people with hypertension in Ahvaz. *Jundishapur Journal of Chronic Disease Care*, In Press (In Press).
43. Jankowska-Polańska B, Blicharska K, Uchmanowicz I, et al. The influence of illness acceptance on the adherence to pharmacological and non-pharmacological therapy in patients with hypertension. *European Journal of Cardiovascular Nursing*. 2016; 15: 559–568.
44. Fuchs C, Lee JK, Roemer L, et al. Using mindfulness- and acceptance-based treatments with clients from nondominant cultural and/or marginalized backgrounds: Clinical considerations, meta-analysis findings, and introduction to the Special Series. *Cognitive and Behavioral Practice*. 2013; 20: 1-12.
45. Utami TW, Astuti YS. Effectiveness of acceptance and commitment therapy on anxiety in hypertensive patient. *Indonesian Journal of Global Health Research*. 2020; 2: 7-14.
46. La Roche M, Lustig K. Being mindful about the assessment of culture: A cultural analysis of culturally adapted acceptance-based behavior therapy approaches. *Cognitive and Behavioral Practice*. 2013; 20: 60-63.
47. Sobczak, LTR, West LM. Clinical considerations in using mindfulness- and acceptance-based approaches with diverse populations: Addressing challenges in service delivery in diverse community settings. *Cognitive and Behavioral Practice*. 2013; 20: 13-22.
48. Fenn K, Byrne M. The key principles of cognitive behavioural therapy. *InnovAiT: Education and Inspiration for General Practice*. 2013; 6: 579-585.
49. DiMauro J, Domingues J, Fernandez G, et al. Long-term effectiveness of CBT for anxiety disorders in an adult outpatient clinic sample: A follow-up study. *Behaviour Research and Therapy*. 2013; 51: 82-86.
50. Lee K. Using Cognitive Behaviour Therapy in counselling non-adherent hypertensive patients: A nurse counsellor perspective. *International Journal of Public Health and Clinical Sciences*. 2016; 3.
51. Li Y, Buys N, Li Z, et al. The efficacy of cognitive behavioral therapy-based interventions on patients with hypertension: A systematic review and meta-analysis. *Preventive Medicine Reports*. 2021; 23: 101477.
52. Moreno BM, Contreras RD, Martínez SN, et al. Evaluación del efecto de una intervención cognitivo-conductual sobre los niveles de presión arterial en adultos mayores hipertensos bajo tratamiento médico [Effects of a cognitive-behavioral intervention on blood pressure of hypertensive elderly subjects]. *Revista medica de Chile*. 2006; 134: 433–440.
53. Rawlings GH, Beail N, Armstrong I, et al. Self-help cognitive behavioural therapy for anxiety in Pulmonary hypertension: Pilot randomised controlled trial. *ERJ Open Research*. 2022; 8: 00526–2021.
54. Ma C, Zhou Y, Zhou W, et al. Evaluation of the effect of motivational interviewing counselling on Hypertension Care. *Patient Education and Counseling*. 2014; 95: 231-237.
55. Mirkarimi K, Honarvar M, Ariaie M, et al. Effect of Motivational Interviewing on Adherence to Treatment in Patients with Hypertension. *Intern Med Today*. 2015; 21: 213-222
56. Orduñez-García P, Muñoz JL, Pedraza D, et al. Success in control of hypertension in a low-resource setting: The Cuban experience. *Journal of Hypertension*. 2006; 24: 845–849.
57. Singh RB, Suh IL, Singh VP, et al. Hypertension and stroke in Asia: Prevalence, control and strategies in developing countries for prevention. *Journal of Human Hypertension*. 2000; 14: 749-763.