

ORIGINAL RESEARCH**Investigating the effectiveness of emotional regulation techniques along with drug therapy on reducing blood pressure, anxiety symptoms, depression and hostility in patients with hypertension compared to drug therapy alone**

Ali vafaei¹, Abbas Masjedi Arani¹, Maryam Bakhtiary^{1*}, Mohammad Hassan Ghadyani², Reza Karimi¹

1. *Department of Clinical Psychology, School of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran.*
2. *Department of Nephrology, School of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran.*

*Corresponding Author:

Address: Department of Clinical Psychology, School of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran.

Email: maryam_bakhtiyari@sbmu.ac.ir

Date Received: October, 2019

Date Accepted: December, 2019

Online Publication: February 15, 2020

Abstract

Objective: Blood pressure-related diseases are the most influenced by psychological factors. The present study was done with the aim of investigating the effectiveness of emotional regulation techniques along with drug therapy on blood pressure reduction, anxiety symptoms, depression and hostility in patients with hypertension compared to drug therapy alone.

Materials and Methods: The present study is a quasi-experimental study with pre-test design, post-test design and control group. The population of this study was men and women between the age of 20 to 70 years with hypertension and resident in Tehran province in 2019. Among patients with hypertension referred to Ayatollah Taleghani Training Center Clinic, 30 persons were selected accessibly and were randomly assigned to experimental and control groups. The intervention program of cognitive emotion regulation techniques training was done during 8 sessions in the experimental group. The instruments used in this research were Hospital Anxiety and Depression Scale (HADS) and Spielberger's State-Trait Anger Expression inventory (STAXI).

Results: Analysis of covariance showed that there was a significant difference between the experimental and control groups after the intervention in the level of blood pressure, anxiety, depression and total anger expression index at $p < 0.05$ level. Effect size was 0.39, 0.26, 0.21, and 0.21 in depression, anxiety, blood pressure, and total anger expression index, respectively.

Conclusion: Specialists in cardiovascular diseases and health psychology area can employ cognitive emotion regulation techniques to improve the physical and psychological problems of individuals with hypertension including blood pressure, anxiety, depression and anger.

Keywords: Emotion cognitive regulation techniques; Anxiety; Depression; Blood pressure

Introduction

Hypertension is the first leading cause of death worldwide (World Health Organization, 2018). The high prevalence of hypertension in the world has changed it a major health issue of all communities. Also, hypertension is the most common non-contagious disease and the main cause of cardiovascular disease in the world (Kerney et al., 2005; Potter et al., 2013). Studies in Iran show a high prevalence of hypertension; it was reported 19.4% in the study of Sarrafzadegan et al, 22% in the study of Azizi et al, and 35.4% in the study of Damirchi and Mehrabani (Bahramianzadeh et al., 2008; Damirchi et al., 2009).

The importance of identifying psychological factors that may influence the process of medical disorders has become (its role) more pronounced since the psychosomatic approach has emerged. In 1970, Engel's Bio-psycho-social model emphasized on beginning, process, and outcome of the disease that results from the interaction between medical factors and psycho-social factors (Guidy et al., 2013). In a study, psychological problems were investigated in people with controlled and uncontrolled hypertension who received antihypertensive drugs, the results showed that after controlling variables of sex, age, and variables related to poor blood pressure, uncontrolled hypertension group showed high scores in impulsivity, depression, anger expression, and stress with varying degrees between medium and high. These results support from the hypothesis of relationship between psychological factors and poor blood pressure control (Suns et al., 2010)

Various studies indicate a strong relation between psychological disorders and hypertension and express that psychological disorders cause to increase hypertension disease. One of the approaches that has proven its effectiveness in the treatment of psychosomatic diseases is cognitive-behavioral therapy. Cognitive-behavioral therapy is largely based on this assumption that reconstructing one's personal statements will lead to reconstructing one's behavior. This approach emphasizes on making change by using a variety of cognitive and behavioral strategies (Callus & Qaderi, 2016). The advantage of cognitive-behavioral therapy over drug-therapy is that it prevents recurrence of disease and has been suggested as an

elective treatment for psychological disorders, including depression. One of the cognitive-behavioral techniques used in the field of psychosomatic medicine is emotion regulation techniques (Beyazi, 2012).

The process of emotion regulation is based on a modal model and with based-emotional quality. The emotion-modal points that the process of creating emotion occurs in a particular sequence of time. This time sequence is as follows: 1) Situation: A process that begins with a situation that is emotionally related. 2) Attention: Attention is directed to the emotional situation. 3) Evaluation: An emotional situation that has been evaluated and interpreted. 4) Response: an emotional response is created that freely enhances the coordinated changes empirically, behaviorally, and physical reaction system. Since an emotional response (4) can cause changes in a situation (1), this model creates a feedback loop from response (4) to situation (1). This feedback loop points to this matter that the process of emotion regulation that can occur recursively is developing (continuous) and dynamic (Gross & Bart, 2011).

Evidence shows that there is a significant relationship between emotional dysregulation and symptoms of depression, anxiety, and other psychological factors, and high levels of emotion regulation are closely related to high level of social competence as well as expressing proper social emotions (Aldo et al., 2010). Xiao et al. (2011) in their study showed that high levels of self-blame, rumination, catastrophe-making, and other blames predict an increase in the follow-up score of depression symptoms, whereas acceptance and focus on planning predict a decrease in follow-up results of depression symptoms in patients with primary hypertension. Perichko et al. (2014) in their research concluded that patients with hypertension were reliably different from healthy individuals in terms of physical, mental and behavioral responses and respiratory level. 53% of hypertensive patients showed anxiety that disrupted behavior, which was accompanied with freely and varied emotional expression of behavioral manifestations. 47% of patients clearly used suppressive defence mechanisms and denial of situations that cause anxiety. Eisenberg (2014) showed that individuals' capability in cognitive-emotional regulation can play an

important role in individual compatibility with stressful life events. In a study on the relationship between anxiety and anger with chronic hypertension, the results showed that the level of anxiety and anger in patients with chronic hypertension was significantly higher than those without hypertension. In fact, it can be concluded that there is a relationship between anxiety and anger with chronic hypertension (*Faramarzi Nia & Basharat, 2012*). *Isa Zadegan et al. (2013)* express that the dimensions of self-blame and others have a positive effect on heart disease, and positive thinking, coping and acceptance have a negative effect on heart disease. The mediating role of these dimensions in the relationship between negative affect and social inhibition with heart disease was also supported, and in general this research emphasizes on the key role of non-biological factors (personality and emotion regulation) in coronary artery disease. According to the material expressed, the present study aimed to determine the effectiveness of cognitive emotion regulation techniques along with drug-therapy on reducing blood pressure, anxiety symptoms, depression and hostility in patients with hypertension compared to drug-therapy alone.

Materials and Methods

The present study is a quasi-experimental study with pre-test, post-test and control group. The population of this study was men and women aged 20-70 years with hypertension and resident in Tehran province in 1398. By considering the inclination criteria to the study, 30 persons were selected accessibly among male and female patients referred to the therapeutic training center clinic of Ayatollah-Taleghani and were randomly assigned to experimental and control groups. Inclination criteria were: 1) having DSM-5 diagnostic criteria for depression disorder caused by another medical disease 2) Age up to 70 years 3) Minimum education is elementary. 4) Score above 7 on the Hospital Anxiety and Depression scale, 5) Not having psychological disorders that require urgent treatment 6) No chronic physical disease or being unfavorable physically 7) No use of neurological drugs during the past 6 months. Exclusion criteria were: 1) No use of neurological drugs 2) Participation in other

treatments simultaneously 3) having neurological disease or addict-drug use. In this study, pre-test and post-test designs were used in two groups including experimental group "cognitive emotion regulation techniques training therapy group along with drug therapy" and control group "drug therapy alone". After selecting and assigning the subjects, the intervention program of cognitive emotion regulation techniques training was conducted during 8 sessions once a week as a group for 120 minutes in the experimental group. The following table present the content of this therapeutic method provided by *Gratz and Gunderson* (cited from *Narimani et al., 2012*).

Table 1: Therapeutic protocol, cognitive emotion regulation training

Session No	Purpose	Summary of activity conducted
First session	Familiar with the patient and communicating early and providing therapeutic sessions preparations	Perform pre-test, communicate and conceptualize the problem.
Second session	Train awareness from positive emotions	Define positive emotions, train attention to positive emotions, and identify them in self
Third session	train awareness from negative emotions	Define negative emotions, train attention to negative emotions, and identify them in self
Fourth session	Train Positive Emotions acceptance	Train Positive Emotions acceptance by explaining the necessary reasons for accepting those emotions. It was taught to individuals in this session to accept these emotions unconditionally in themselves and also accept their negative and positive consequences.
Fifth session	Train negative Emotions acceptance	Train negative Emotions acceptance by explaining the necessary reasons for accepting those emotions. It was taught to individuals in this session to accept these emotions unconditionally in themselves and also accept their negative and positive consequences.
Sixth session	Training re-evaluation of positive emotions and their expression	I was taught in this session to modify and change experiences (subjective and behavioral) related to positive emotions through re-evaluating and expressing emotions.
Seventh session	Training re-evaluation of negative emotions and their expression	I was taught in this session to modify and change experiences (subjective and behavioral) related to negative emotions through re-evaluating and expressing emotions.
Eighth session	Evaluating the results and finishing the treatment	In this session to finish sessions and perform post-test, it was asked from subjects to employ techniques available in emotion regulation training in daily life and through this way to help improve their mental and social health

Measurement Tools

1. Hospital Anxiety and Depression Scale (HADS)

Sigmund has designed the Hospital Anxiety and Depression Scale *and Snayte* in 1983 to assess mood changes, especially anxiety and depression states. This scale has totally 14 questions, seven questions relating to anxiety symptoms (questions 12, 9, 8, 4, 5 1 and 13) and seven questions about depression symptoms (questions 10, 11, 7, 6, 3, 2 and 14). The questionnaire is scored based on a four-

score scale (0-3). Authors suggest score 11 as a cutting-point, which scores above it have clinical importance (*Sigmund & Snayte, 1983*). Kaviani et al (2009) involved 261 depressed and anxious patients in the study who referred to the outpatient department of Roozbeh Hospital as well as in parallel 261 persons from healthy general population that were matched in terms of gender for normalization and validation the HADS questionnaire in depressed and anxious individuals compared to the normal population. To obtain the validity coefficient, anxiety and depression rate of patients after clinical interview based on a DSM-5 checklist were quantified by a psychiatrist or psychologist based on a calibration scale (0 to 10). Evaluators were unaware from the scores resulted from the scales. Two parallel tests of BAI and BDI were used to obtain an objective criterion and its intervention in validity evaluation. The correlation coefficient of the mentioned test was 59% with clinical evaluation, 77% with BDI and 76% with BAI ($p > 0.001$). Also in this study, correlation coefficient of re-test reliably was 0.75 for anxiety scale and 0.71 for depression. Cronbach's alpha coefficient was 0.7 for anxiety subscale and 0.85 for depression subscale.

2. Spielberger's State-Trait Anger Expression Inventory (STAXI-2)

The 57-item STAXI-2 questionnaire consists of six scales, five subscales, and an anger expression index that provide an overall measurement of anger expression and control. This questionnaire is applicable for ages of 15 and over. When answering each of questionnaire's items, the subjects rank their condition on a four-degree scale, from almost never (1) to almost always (4), thereby measure severity of their anger feelings at a definite time and frequency of experience, expression, suppression, or control (102).

Navidi et.al administered the STAXI-2 questionnaire with the General Health and Adaptation Questionnaire (GHQ) on 170 high school male students and analyzed the collected data. The results of his study showed that Cronbach's alpha coefficients for scales of Anger situation (S. Ang) and Trait Anger (T. Ang) were 88% and 85%, respectively, for the subscales related two mentioned scales, on average equal to 76%, for the scales of anger expression and anger control, the total anger

expression index on average was equal to 71%. All these coefficients are statistically significant and indicate that internal harmony of the STAXI-2 scales and subscales is satisfactory (*Spielberger, 1999*). To assess the validity of the questionnaire, *Navidi and Berjali* (2008) administered the STAXI-2 questionnaire with General Health and Adaptation Questionnaire (GHQ)) on 170 high school male students. The results of his study showed that there is a positive and significant correlation between the scales size of the state, the trait and the anger expression of the questionnaire and the measures related to of incompatibility as well as measures related to disorder symptoms in general health. regarding that the STAXI-2 questionnaire has been widely used in researches related to behavioral medicine and health psychology and the effects of various anger components that are assessed by the scales of this questionnaire, has been tested on hypertension and stress, cardiovascular reactivity, heart disease, PTSD and other medical and psychological disorders, sufficient confidence has been obtained about the validity of this self-assessment tool.

Results

In the control group, 30% of the participants had an elementary education, 20% a diploma, 40% a bachelor degree and 10% a master degree, and in the experimental group 10% of the participants had an elementary education, 40% a diploma, 30% a bachelor degree and 20% a master degree. Also in the control group 30% of the participants were female and 70% of participants were male and in the experimental group 30% of the participants were also female and 70% were male. The mean age of the experimental group was 52 years and the control group was 55.40. Descriptive data of the research variables are presented in the following table. The below table shows that in the experimental group, the mean of variables at post-test has changed compared to pre-test. Covariance analysis was used to investigate the research hypotheses based on that cognitive emotion regulation techniques along with drug therapy are more effective in reducing hypertension, anxiety symptoms, depression and anger control of patients with hypertension compared to drug therapy alone, which the results are present in the following table. To use the covariance

analysis test, the covariance analysis assumptions were first examined. *Levin test* showed that there is homogeneity of variances in all variables ($p > 0.05$). Also, *Kolmogorov-Smirnov test* showed that there is normal distribution in all variables ($p > 0.05$), so there is not any barrier to use covariance analysis.

Table 2: Descriptive Indicators of Research Variables

Groups	Variables	Mean	Standard deviation	Variance	Obliquity	Elongation
Pre-test of experimental group	Blood pressure	14.95	1.36	1.58	1.11	2.23
	Symptoms of depression	6.7	1.70	13.95	2.16	4.98
	Symptoms of anxiety	6.8	3.73	13.95	2.16	4.12
Pre-test of control group	Anger expression index	39.8	19.35	374.62	0.63	-1.12
	Blood pressure	14.55	1.01	1.02	-0.47	-0.78
	Symptoms of depression	7.9	3.07	9.43	1.58	2.50
	Symptoms of anxiety	6.4	2.83	8.04	1.86	2.80
Post-test of experimental group	Anger expression index	34.4	10.55	111.37	0.31	-0.99
	Blood pressure	13.38	1.29	1.68	0.13	-0.73
	Symptoms of depression	3.7	2.11	4.45	1.02	0.21
Pre-test of control group	Symptoms of anxiety	4.6	2.71	7.37	1.52	3.24
	Anger expression index	21.3	9.48	9.01	0.63	-0.64
	Blood pressure	13.95	1.38	1.91	0.09	-0.45
Post-test of control group	Symptoms of depression	7.6	2.98	8.93	1.14	0.93
	Symptoms of anxiety	6.7	3.02	9.12	1.78	3.51
	Anger expression index	28.09	8.43	71.21	0.04	-0.48

Table 3: Summary of Covariance Analysis of the Impact of Emotion Regulation Techniques and Drug Therapy on Symptoms of Anxiety, Depression and Anger Control of Patients with Hypertension

Sources of changes	The sum of the squares	Degrees of freedom	Mean squares	F ratio	The significance level	Effect size
Blood pressure	3.95	1	3.95	4.66	0.04	0.21
Symptoms of anxiety	27.34	1	27.34	6.17	0.024	0.26
Symptoms of depression	44.59	1	44.59	11	0.004	0.39
Anger expression	345.38	1	345.38	4.58	0.04	0.21

According to the above table, the results of covariance analysis show that in all four variables of hypertension, the variable of anxiety symptoms, depression and anger control providing cognitive emotion regulation techniques along with drug therapy are more effective on reducing anxiety symptoms of hypertensive patients compared to drug therapy alone ($p < 0.05$). The index of the obtained effects indicates that 26% anxiety symptoms reduction, 39% depression symptoms reduction and 21% anger control power in the experimental group can be attributed to cognitive emotion regulation techniques along with drug therapy.

Discussion

The results of present study showed that performing emotion regulation techniques along with drug therapy were more effective in improving hypertension, anxiety symptoms, depression symptoms and anger in hypertensive patients than drug therapy alone and the difference between these two intervention designs is significant. The results of this study are in line with the findings of *Xiao et al. (2011)*, *Perichko et al. (2014)*, *Faramarzi & Besharat (2012)*, *Isa Zadegan et al.* Researches show that there is a relationship between difficulty in emotion regulation and hypertension and that people with hypertension have failure in regulating their emotions (*Grab et al., 2010; Maria et al., 2015*). *Jarin et al (2006)* in their study showed that anger rumination and inability to control anger play an important role in maintaining or activating cardiovascular responses to psychological stress and lead to a continuous increase in blood pressure. It is also thought that the inability to adjust emotional leads to an increase of negative emotions incidence such as anger and anxiety, which this matter can lead to increased sympathetic system activity including hypertension (*Biardini et al., 2011*). Emotional inhibition as a negative strategy in emotion regulation leads to cardiovascular disease (*Beth Man & Fonagi, 2010*) and cognitive re-assessment of emotions as a positive emotion regulation strategy leads to reduce hypotension (*Polizer et al., 2007*). This is also a confirmatory result on the finding by *Rezwan et al. (2006)* which showed that suppressing emotion expression not only causes rumination incidence but also effects on happiness reduction. Emotional responses provide important information about one's experience in relation to others. With these information, humans learn how to behave in confronting with emotions, how to express emotional experiences verbally, what strategies employ to respond emotions, and how to treat others in the context of specific emotions. (*Narimani et al., 2012*).

Emotion regulation training can play an important role in reducing physical symptoms, anxiety, depression and aggression control (mental health levels) by informing the person from positive and negative emotions, acceptance and timely expression of them

(Roy, Rily, and Sinha, 2018). The inability of emotion regulation in heart patients predicts that individual's psychological injury in the future is a key factor in the emergence of anxiety, stress, and depression (Long & Carles, 2014). Emotion regulation involves numerous regulatory processes and strategies that include cognitive, physical, social, and behavioral dimensions. Of these strategies can point to intellectual rumination, self-expression, avoidance, and inhibition. In fact, cognitive aspects of emotion regulation, like other behavioral and social dimensions of it, are used to manage emotions for enhancing adaptation and compatibility and they are part of the adaptive strategies that are associated with the experience and treatment of emotional and physical discomforts (Orjula, 2019). Therefore, emotion regulation and especially positive emotion regulation strategies lead to promote health level in different biological, psychological, social and ethical dimensions and as a result experience less physiological and emotional disorders and consequently have higher quality of life (Davoodi et al., 2019).

Emotion regulation training in people with hypertension causes that they reduce their negative emotions by awareness of emotions and proper use, their acceptance and expression of emotions, especially positive emotions in life situations, Which consequently the rate of anxiety and the depression caused by these negative feelings will decrease inside them (Jones et al., 2018). People who use emotion regulation method of emotion expression suppression-type, are always monitoring their behavior to correct their behavioral manifestations when emerging emotion. This process requires spending a lot of energy that can analyze cognitive and physical resources and lead to anxiety, depression, and inability to control anger as well as incidence of physical symptoms (Keener et al., 2014).

Robertson, Daphren, and Box (2012) also express that over-regulation of emotion may lead to aggressive behavior by increasing negative affect, reducing inhibitions against aggression, submitting to decision-making processes, degrading social networks, and increasing physiological arousal. Anger is one

of the important emotions and effective on human behavior and it places in the negative emotions category due to the creation of negative and unpleasant emotions; however, it is considered as one of the essential emotions and behaviors in human and if properly managed can play constructive and very useful roles in maintaining and sustaining one's life and social relationships. (Zhang et al., 2017). Now, with regard to the crucial role that this emotion plays in human life, it can also cause many personal and social problems if not properly controlled. For this reason, expressing this emotion requires a form of proper management and control that, if realized, can have beneficial effects on modifying one's behavior (Sika et al., 2019). Emotion regulation is an important factor in determining health and having successful performance in social interactions and its deficiency is related to endocrine and extrinsic disorders. The results of this study showed that emotion regulation training leads to decrease of blood pressure, anxiety and depression as well as improvement of anger control in hypertensive patients. With regard to this matter that some psychological problems are high in hypertensive patients and require the attention of cardiovascular diseases specialists and psychologists, so recognizing these psychological problems in hypertensive patients and timely interventions in this context with proper trainings such as emotion regulation training, can be a very important step in providing mental and spiritual health and helping to physical health of these patients.

The present study also had some limitations including this study evaluated only the immediate results after the intervention and the long-term effect of the treatment remains unknown and it is necessary to perform long-term follow-up. Another limitation is non-matching of subjects in terms of age, education and marital status in the two experimental and control groups, which mentioned variables might affect the results of the study.

Conflict of interest

Authors declare no conflict of interest.

References:

1. Aldao, A., Nolen-Hoeksema, S., & Schweizer, S. (2010). Emotion-regulation strategies across psychopathology: A meta-analytic review. *Clinical psychology review*, 30(2), 217-237.
2. BAHRAMINEZHAD, N., Hanifi, N., & MOUSAVINASAB, S. (2008). Comparing the effect of two family- and individual-based interventions on blood pressure and lifestyle.
3. Baiardini, I., Abbà, S., Ballauri, M., Vuillermoz, G., & Braido, F. (2011). Alexithymia and chronic diseases: the state of the art. *Giornale Italiano di Medicina del Lavoro ed Ergonomia*, 33(1), 47-52.
4. Bateman, A., & Fonagy, P. (2010). Mentalization based treatment for borderline personality disorder. *World psychiatry*, 9(1), 11.
5. BAYAZI, M. H., AHADI, H., FATA, L., & DANESH, S. S. H. (2012). The effectiveness of a short cognitive behavioral group intervention on depression, anxiety and stress in patients with chronic coronary heart disease: a randomized controlled trial.
6. Callus, E., & Quadri, E. (2016). *Clinical Psychology and Congenital Heart Disease*. Springer Verlag.
7. Damirchi, A., & Mehrabani, J. (2009). Prevalence of obesity, overweight and hypertension and related-risk factors in adults men.
8. Davoodi, E., Wen, A., Dobson, K. S., Noorbala, A. A., Mohammadi, A., & Farahmand, Z. (2019). Emotion Regulation Strategies in Depression and Somatization Disorder. *Psychological reports*, 122(6), 2119-2136.
9. Eisenberg, N. (2014). Emotion-related regulation and its relation to quality of social functioning. In *Child psychology in retrospect and prospect* (pp. 133-171). Psychology Press.
10. Faramarzi nia E, Besharat MA. (2012). The relationship between anxiety and anger with chronic hypertension. *Journal of Medical Sciences, Islamic Azad University*. 20(4):136-41.
11. Gerin, W., Davidson, K. W., Christenfeld, N. J. S. Goyal, T., & Schwartz, J. E. (2006). The role of angry rumination and distraction in blood pressure recovery from emotional arousal. *Journal of Psychosomatic Medicine*, 68(1), 64-72.
12. Grabe, H. J., Schwahn, C., Barnow, S., Spitzer, C., John, U., Freyberger, H. J., Schminkef, U., Felix, S., & Völzke, H. (2010). Alexithymia, hypertension, and subclinical atherosclerosis in the general population. *Journal of Psychosomatic Research*, 68, 139°147.
13. Gross, J. J., & Feldman Barrett, L. (2011). Emotion generation and emotion regulation: One or two depends on your point of view. *Emotion review*, 3(1), 8-16.
14. Guidi, J., Rafanelli, C., Roncuzzi, R., Sirri, L., & Fava, G. A. (2013). Assessing psychological factors affecting medical conditions: comparison between different proposals. *General hospital psychiatry*, 35(2), 141-146.
15. Isazadegan A, Amani Sari Beglo J, Mamodi H, Ahmadian L. (2013). The structural pattern of relationships between morphological character D, cognitive emotion regulation strategies and coronary heart disease. *Journal of Psychology*. 17(3):310-29.
16. Jones, E. J., Lam, P. H., Hoffer, L. C., Chen, E., & Schreier, H. M. (2018). Chronic Family Stress and Adolescent Health: The Moderating Role of Emotion Regulation. *Psychosomatic medicine*, 80(8), 764-773.
17. Kaviani, H., Seyfourian, H., Sharifi, V., & Ebrahimkhani, N. (2009). Reliability and validity of anxiety and depression hospital scales (HADS): Iranian patients with anxiety and depression disorders. *Tehran University Medical Journal*, 67(5), 379-385.
18. Kearney, P. M., Whelton, M., Reynolds, K., Muntner, P., Whelton, P. K., & He, J. (2005). Global burden

- of hypertension: analysis of worldwide data. *The lancet*, 365(9455), 217-223.
19. Kinner, V. L., Het, S., & Wolf, O. T. (2014). Emotion regulation: exploring the impact of stress and sex. *Frontiers in behavioral neuroscience*, 8, 397.
 20. Luong, G., & Charles, S. T. (2014). Age differences in affective and cardiovascular responses to a negative social interaction: The role of goals, appraisals, and emotion regulation. *Developmental Psychology*, 50(7), 1919.
 21. Maria, O., & Chuwumeka, O. (2015). The contribution of alexithymia, body mass index, age and gender to essential hypertension in South East Nigeria. *International Journal of English Language, Literature and Humanities*, 2, 538-557.
 22. Narimani, M., Ariapooran, S., Abolghasemi, A., & Ahadi, B. (2012). Effectiveness of mindfulness-based stress reduction and emotion regulation training in the affect and mood of chemical weapons victims.
 23. Navidi, A., & Borjali, A. (2008). Effects of an anger management training on anger self-regulation skills among high school boys.
 24. Orejuela-Dávila, A. I., Levens, S. M., Sagui-Henson, S. J., Tedeschi, R. G., & Sheppes, G. (2019). The relation between emotion regulation choice and posttraumatic growth. *Cognition and Emotion*, 1-9.
 25. Organization WH. mortality and burden of disease attributable to selected major risks. WHO; 2009. Global health risks www.who.int/healthinfo/global_burden_disease/GlobalHealthRisks_report_full.pdf.
 26. Perry, A. G., Potter, P. A., & Ostendorf, W. (2013). *Clinical nursing skills and techniques*. Elsevier Health Sciences.
 27. Pervichko, E., Zinchenko, Y., & Ostroumova, O. (2014). Emotion regulation in patients with essential hypertension: subjective-evaluative, physiological, and behavioral aspects. *Procedia-Social and Behavioral Sciences*, 127, 686-690.
 28. Plaisier, I., de Bruijn, J. G., de Graaf, R., ten Have, M., Beekman, A. T., & Penninx, B. W. (2007). The contribution of working conditions and social support to the onset of depressive and anxiety disorders among male and female employees. *Social science & medicine*, 64(2), 401-410.
 29. Rezvan, S., Bahrami, F., & Abedi, M. (2006). The effect of emotional regulation on happiness and mental rumination of students. *Iranian Journal of Psychiatry and Clinical Psychology*, 12(3), 251-257.
 30. Roy, B., Riley, C., & Sinha, R. (2018). Emotion regulation moderates the association between chronic stress and cardiovascular disease risk in humans: a cross-sectional study. *Stress*, 21(6), 548-555.
 31. Sanz, J., García-Vera, M. P., Espinosa, R., Fortún, M., Magán, I., & Segura, J. (2010). Psychological factors associated with poor hypertension control: differences in personality and stress between patients with controlled and uncontrolled hypertension. *Psychological reports*, 107(3), 923-938.
 32. Sikka, N., Shu, L., Ritchie, B., Amdur, R. L., & Pourmand, A. (2019). Virtual Reality-Assisted Pain, Anxiety, and Anger Management in the Emergency Department. *Telemedicine and e-Health*.
 33. Spielberger, C. D. (1999). State-trait anger expression inventory-2: professional manual. *Odessa, FL: Psychological Assessment Resources*.
 34. Xiao, J., Yao, S., Zhu, X., Abela, J. R., Chen, X., Duan, S., & Zhao, S. (2011). A prospective study of cognitive emotion regulation strategies and depressive symptoms in patients with essential hypertension. *Clinical and Experimental Hypertension*, 33(1), 63-68.
 35. Zhang, J., Lipp, O. V., & Hu, P. (2017). Individual differences in automatic emotion regulation interact with primed emotion regulation during an anger provocation. *Frontiers in psychology*, 8, 614.

36. Zigmond, A. S., & Snaith, R. P. (1983). The hospital anxiety and depression scale. *Acta psychiatrica scandinavica*, 67(6), 361-370.