DOI: http://dx.doi.org/10.22122/ijbmc.v10i3.568 Published by Vesnu Publications

International Journal of Body, Mind and Culture

The Effectiveness of Cognitive Therapy Intervention on the Mental Health of Patients with Hypertension

Shlyakhtunov Mikhail Andreevich[1], Ali Kamal[2], Israa Abed Jawad[3], Ameera Fares Hamed[4], Nada Sami Naser[5], Samar Hameed Laffta[6], Imad Ibrahim Dawood[7], Ali Abdul Razaq[8]

1 PhD in Historical Sciences, Associate Professor, Moscow Aviation Institute, Moscow, Russia
2 College of Medical Technology, Medical Lab Techniques, Al-Farahidi University, Baghdad, Iraq
3 Department of Medical Laboratories Technology, AL-Nisour University College, Baghdad, Iraq
4 English Department, Al-Noor University College, Nineveh, Iraq
5 Department of Arabic Language, College of Education, Sawa University, Almuthana, Iraq
6 College of Nursing, National University of Science and Technology, Dhi Qar, Iraq
7 Department of Education, Mazaya University College, Nasiriyah, Iraq
8 Medical Lab Techniques, Al-Hadi University College, Baghdad, Iraq

Corresponding Author: Shlyakhtunov Mikhail Andreevich; ***PhD in Historical Sciences, Associate Professor, Moscow Aviation Institute, Moscow, Russia***
Email: micha-the-best@mail.ru

Quantitative Study

Abstract

Background: Patients with hypertension (HTN) are likely to be threatened by mental health issues like anxiety and depression, which can limit their personal and social lives. Cognitive therapy is one of the proposed treatments for these issues. The present research aims to investigate the effectiveness of cognitive therapy intervention on the mental health of patients with HTN.

Methods: The current clinical trial study was examined by considering the pre- and post-test stages and the control group. In 2022, the statistical population contained 861 patients with HTN referred to Al-Yarmouk Teaching Hospital, Baghdad, Iraq. A simple random sampling procedure chose a statistical sample of 120 patients and separated them into two experimental and control groups (60 people per group). For data analysis, the independent t-test and the paired t-test were utilized in SPSS software; moreover, P-value was less than 0.05.

Results: No significant difference was observed between the both groups regarding general health and its subscales in the pre-test stage ($P > 0.05$), while in the post-test stage, there was a significant difference between the both groups ($P < 0.001$). In addition, there was a significant difference in general health in the experimental group between the pre-test (60.47 ± 9.17) and post-test (45.55 ± 8.43) ($P < 0.001$). In the control group, there was no significant difference between the pre- and post-test stages ($P > 0.05$).

Conclusion: Cognitive therapy intervention has appropriate effectiveness on the mental health of patients with HTN and reduces physical symptoms, anxiety, social dysfunction, and depression.

Keywords: Hypertension; Mental health; Cognitive therapy; Anxiety; Depression

Citation: Andreevich SM, Kamal A, Jawad IA, Hamed AF, Naser NS, Laffta SH, et al. **The Effectiveness of Cognitive Therapy Intervention on the Mental Health of Patients with Hypertension.** Int J Body Mind Culture 2023; 10(3): 374-83.

Received: 01 May 2023
Accepted: 14 June 2023

Introduction

Hypertension (HTN) is one of today's most pressing public health issues. This widespread disease is a significant risk factor for heart sickness, stroke, congestive heart failure, advanced kidney sickness, and peripheral vascular sickness (Scuteri et al., 2021). According to the World Health Organization (WHO), systolic blood pressure (SBP) above 115 mmHg can be responsible for 62% of cerebrovascular accidents (CVAs), 49% of ischemic heart diseases (IHDs), and the primary risk factor for all deaths worldwide (Lucas et al., 2022). Some patients with HTN have psychological conditions and disorders, such as anxiety and depression, which must be treated (Al-Sadi, Al-Haili, Alshukri, Alghazali, Sabti, & Jasim, 2022).

Hypertensive patients with chronic diseases have a long-term disease that causes many chronic physical disorders while also causing stress, anxiety, and depression (Yang, Luo, Ma, Si, & Zhao, 2021; Jasim et al., 2022). Treatment of conditions, including HTN, despite providing the possibility of more prolonged patient survival, affects the patient's physical and mental functioning and may cause him to suffer from various psychological disorders due to numerous complications and exposure of the patient to multiple stressors (Haring et al., 2016). The disease has impacted patients' lives, which in its advanced stages, causes disruptions in their functional status and changes in their quality of life. It also increases the patients' reliance on others and their self-confidence, health, and mental health (Dargahi-Kafshgari, Yaghoubi-Hasankola, & Habibzadeh-Ahangarkolaei, 2022).

Cognitive theories of emotional disorders are based on the idea that mental illnesses are associated with mental confusion (Ungvari et al., 2021). Anxiety and depression, in particular, are characterized by automatic negative thoughts and distortions in interpreting stimuli and events (Mahinrad, Sorond, & Gorelick, 2021). Negative thoughts or distorted interpretations are thought to arise from activating long-term memory and negative beliefs. The activation of dysfunctional schemas is linked to emotional disturbance (Santisteban, Iadecola, & Carnevale, 2023).

According to research, a negative cognitive structure increases susceptibility to mental illnesses such as anxiety and depression (Yuan et al., 2022). Cognitive therapy is a popular treatment option in this field. It is a type of therapy that assists patients in correcting incorrect personal beliefs that lead to certain behaviors. The fundamental principle of this treatment is that thinking comes first and is influenced by the person's environment, physical reaction, and subsequent behavior (Bakhtiari, Neshatdoost, Abedi, & Sadeghi, 2013). The therapist teaches the patient adaptive coping skills such as breaking significant problems down into smaller ones, taking more regular steps, and making decisions based on profitable analysis in this treatment method (Muela et al., 2017). In addition, at the start of treatment, active planning of self-review of skills and pleasurable tasks is used to help the patient overcome his stillness and potentially expose the patient to rewarding experiences (Zargar, Hakimzadeh, & Davodi, 2019).

Cognitive therapy has the potential to alter previously established negative cognitive structures and seeks to elicit from patients realistic and accurate assessments of the situations they face (Peters et al., 2008). It aims to improve mental health by teaching active coping skills and problem-solving techniques. As a result, patients' acquisition of skills in this category reduces ineffective thoughts (Schrader et al., 2020). Cognitive therapy aims to resolve episodes of psychological diseases such as depression and inhibit their recurrence by recognizing adverse cognitions, developing new, flexible, and positive manners of thinking, and doing cognitive and

behavioral responses over time (Iadecola et al., 2016). Because mental illnesses and disorders are not transient phenomena, if the underlying or perpetuating factors are not addressed, they tend to persist and have long-term and negative consequences (Mone et al., 2022).

Due to the prevalence of diseases and mental disorders caused by physical diseases, such as HTN, evaluating these patients' mental health is necessary. In this regard, it is crucial to research non-drug treatment methods. The present research aims to investigate the effectiveness of cognitive therapy intervention on the mental health of patients with HTN. Similar research was not conducted in Baghdad, Iraq, before this study, representing its novelty.

Methods

The current study was a type of clinical trial carried out by considering the pre- and post-test stages and the design of the control group. In 2022, the statistical population contained 861 patients with HTN referred to Al-Yarmouk Teaching Hospital in Baghdad. A simple random sampling procedure chose a statistical sample of 120 patients and separated them into two experimental and control groups (60 people per group).

The inclusion criteria were age of 30-70 years, blood pressure above 140 mmHg, literacy, no similar educational intervention in the previous year, and willingness to participate in the research. Exclusion criteria included missing more than two sessions, failing to complete the therapeutic intervention program, failing to complete questionnaires, having cognitive problems such as Alzheimer's or stroke, and having hearing and vision disorders that prevent communication. After explaining the goals and procedures of the research, patients were assured that their identities would be kept private, and written consent was obtained from them. The demographic variables questionnaire and the Goldberg General Health Questionnaire (GHQ-28) were utilized to collect data.

Goldberg GHQ-28: Goldberg (1972) developed the first GHQ. Although the original questionnaire contains 60 questions, shortened versions of 30 questions, 28 questions, and 12 questions have been utilized in multiple researches (Goldberg & Williams, 2000). The 28-question form of the GHQ was used in the current study. Goldberg and Hillier (1979) created the 28-question form of the questionnaire using the factor analysis method in its long form. GHQ-28 is divided into four subscales, each with seven questions. Questions 1 to 7 are related to the physical symptoms subscale, 8 to 14 are related to the anxiety and insomnia subscale, 15 to 21 are associated with the social dysfunction subscale, and 22 to 28 are related to the depression subscale. All of the items on the GHQ have four options that are scored using the Likert method, and the total value is from 0 to 84, with a lower score representing better mental health. The validity of the questionnaire in this study was 0.89, and its reliability using Cronbach's alpha was 0.86.

Initially, the experimental and control groups completed the GHQ-28 as a pre-test under the same conditions, and a nurse measured and recorded the patient's HTN. The experimental group was then given cognitive therapy, while the control group received standard care. A psychiatric and trained nurse carried out the cognitive therapy intervention in a hospital training class. In the current study, the educational content of cognitive therapy was based on Beck's cognitive therapy, and the experimental group had eight sessions of 60 minutes once a week (Table 1). Following the treatment sessions, the members of the two groups completed the questionnaire again as a post-test stage, and their blood pressure was measured and recorded.

Table 1. Description of cognitive therapy intervention sessions

Session	Description
1	Defining the symptoms of depression and anxiety and stating that psychological problems are common in patients with HTN, describing the relationship and consequences of mental disorders and disease
2	The relationship and impact of quality of life in the recovery or deterioration of disease-related symptoms, the positive effects of good news, and the negative impact of bad news on stress, anxiety, and depression are described.
3	The connection between thoughts, feelings, and behaviors is discussed. The patient tells two stories from his real life and is shown the link between a stressful reality and negative thoughts, feelings, and behaviors.
4	The patient begins by describing his recent stressful situation. Then, patient's thoughts and their effect on their emotions are identified, and their attention to the created emotions is assessed.
5	The patient is taught to stop thinking to eliminate painful emotions and negative thoughts.
6	Positive emotions are generated through positive affirmations in simple, brief phrases. In this phase, the patient is instructed on using positive statements, and their beliefs are incorporated into positive affirmations.
7	Several positive phrases are written clearly and transparently with the nurse's assistance, and the patient is taught to install them in places such as the home where the patient is frequently present.
8	Stopping thinking whenever the patient has a negative thought, using and installing positive expressions in places where the patient comes into contact with them, as well as at least two positive reviews for every negative thought

HTN: Hypertension

Descriptive statistics methods such as number, percentage, mean, and standard deviation (SD) were utilized for data analysis. The groups' similarity in terms of background variables was assessed using chi-square test and independent t-test. The independent t-test was utilized to evaluate the both groups in terms of the mean and SD of the mental health value and the paired t-test was utilized to compare the groups in pre-test and post-test stages in SPSS software (version 23, IBM Corporation, Armonk, NY, USA). The statistical significance level of the findings was less than 0.05.

Results

The findings of the demographic characteristics of the patients are shown in table 2. According to the findings, 36 (30%) were men, and 84 (70%) were women. 93 (77.5%) were more than 50 years old. In the experimental group, the mean age was 57.46 ± 6.83 years and 55.72 ± 6.27 years in the control group. 88 (73.3%) people had secondary education, 74 (61.7%) people were unemployed, and 91 (75.8%) people were non-smokers. Besides, the independent t-test findings showed no statistically significant difference between both groups' demographic characteristics ($P > 0.05$).

Tables 3 and 4 show the pre- and post-test results for general health and its subscales, such as physical symptoms, anxiety, social dysfunction, and depression.

Table 2. Demographic characteristics of patients

Variable		Experimental group [n (%)]	Control group [n (%)]	P-value
Gender	Men	17 (28.3)	19 (31.7)	0.19
	Women	43 (71.7)	41 (68.3)	
Age (year)	< 50	11 (18.3)	16 (26.7)	0.24
	> 50	49 (81.7)	44 (73.3)	
Education	Secondary	42 (70.0)	46 (76.7)	0.51
	College	18 (30.0)	140 (23.3)	
Job	Employed	21 (35.0)	25 (41.7)	0.67
	Unemployed	39 (65.0)	35 (58.3)	
Smoking	Yes	13 (21.7)	16 (26.7)	0.32
	No	47 (78.3)	44 (73.3)	

Table 3. Mean and standard deviation (SD) of general health subscales in pre-test and post-test

Subscale	Stage	Experimental group (mean ± SD)	Control group (mean ± SD)	P-value
Physical symptoms	Pre-test	15.26 ± 4.34	15.49 ± 4.46	0.470
	Post-test	12.67 ± 2.76	15.21 ± 4.53	< 0.001
Anxiety	Pre-test	16.35 ± 4.27	16.71 ± 4.62	0.390
	Post-test	11.48 ± 2.52	16.93 ± 4.86	< 0.001
Social dysfunction	Pre-test	14.78 ± 4.41	14.66 ± 4.28	0.180
	Post-test	11.59 ± 2.64	14.47 ± 4.36	< 0.001
Depression	Pre-test	14.08 ± 4.76	14.38 ± 4.89	0.560
	Post-test	9.81 ± 2.16	14.73 ± 5.04	< 0.001

SD: Standard deviation

The independent t-test did not reveal a significant difference between the both groups regarding general health and its subscales in the pre-test stage ($P > 0.05$). In the post-test stage, there was a significant difference between the both groups regarding general health and its subscales ($P < 0.001$).

The paired t-test revealed a significant difference in general health in the experimental group between the pre-test (60.47 ± 9.17) and post-test (45.55 ± 8.43) ($P < 0.001$). In the control group, there was no significant difference between the pre-test and post-test stages ($P = 0.380$) (Table 4).

Discussion

The present research aims to investigate the effectiveness of cognitive therapy intervention on the mental health of patients with HTN. According to the findings, cognitive therapy significantly impacts mental health and reduces physical symptoms, anxiety, social dysfunction, and depression. These findings are consistent with those of several researches (Hanon et al., 2008; Sung, Woo, Kim, Lim, & Chung, 2012; Li, Buys, Li, Li, Song, & Sun, 2021) but not with those of others (Amenta, Mignini, Rabbia, Tomassoni, & Veglio, 2002; Ma, Hua, Yang, Zhong, Yan, & Xie, 2021).

Multiple studies have demonstrated that psychotherapy interventions, including cognitive therapy, significantly reduce patients' anxiety and depression and that these effects persist for several months after the intervention has ended (Hughes & Sink, 2016). In addition, the effectiveness of cognitive therapy on patients' quality of life and self-confidence has been examined in numerous studies, revealing a significant improvement in self-confidence and mental health in the experimental group compared to the control group (Alamout, Rahmanian, Aghamohammadi, Mohammadi, & Nasiri, 2020; Erkinovna, 2021; Canavan & O'Donnell, 2022). Moreover, some studies have shown that cognitive therapy did not significantly affect patients, which may be due to differences in disease type, number of sessions, and severity of anxiety and depression among the subjects studied (Sotodeh Asl, Neshat Dost, Kalantery, Talebi, & Khosravi, 2010).

Cognitive therapy combined with lifestyle changes, accepting responsibility for care, changing roles, and changing social patterns significantly impacts people's psychological reactions.

Table 4. Mean and standard deviation (SD) of general health in pre-test and post-test

Scale	Stage	Experimental group (mean ± SD)	Control group (mean ± SD)	P-value
General health	Pre-test	60.47 ± 9.17	61.24 ± 9.64	0.380
	Post-test	45.55 ± 8.43	61.34 ± 10.56	< 0.001

SD: Standard deviation

Furthermore, cognitive therapy alters thoughts and attitudes and reduces faulty beliefs, contributing significantly to mental health (Canavan & O'Donnell, 2022). The inability to treat and control the disease may result in compromise issues such as emotional disturbances, increased sensitivity to external stimuli, anxiety, discomfort, mood changes, and depression. These confusions are frequently caused by an incorrect assessment of the environment, position, and ability; thus, when considering the effect of both approaches on improving mental health, it is worth noting that both emphasize cognition and that participating in cognitive therapy interventions can correct many cognitive distortions such as needs and requirements and replace them with appropriate behaviors (Li et al., 2021). It also leads people away from personal choice and individual inferences into a more flexible environment.

Accepting responsibility is especially important in theories of coping with psychological disorders and cognitive therapy (Lucas et al., 2022). People with a strong sense of responsibility believe that they have control over their affairs and life situations and can do so by accepting responsibility and engaging in activities. The purpose of sovereignty and mastery over one's life's affairs and the shift from external to internal control reduces people's feelings of hopelessness and despair in achieving their desires. As a result of such interventions, patients are helped not to dismiss their current circumstances as insignificant, and they are supported not to despair and fear the future that has not yet arrived (Mone et al., 2022). Participating in cognitive therapy sessions with an emphasis on self-compassion, changing the perspective of accepting unpleasant experiences and feelings, creating a different relationship through psychological therapy intervention sessions with a focus on cognitive errors, expressing the chain of cognition, and using emotional intelligence has been shown to influence people's mindset change (Alamout et al., 2020).

Cognitive therapy intervention emphasizes the principle of change and acceptance. It requires a person to maintain emotional stability and not pay too much attention to disturbing thoughts but to watch them passing through his mind when confronting with ideas of his future self, which can lead to depression and mental distress if they are emotionally charged. This ability generates spontaneous thoughts that do not cause the person's excessive intellectual preoccupation and do not lead to depression (Rawlings, Beail, Armstrong, & Thompson, 2022). Instead of acting on thoughts and feelings, the person using cognitive therapy intervention observes and pays attention to them, not attempting to evaluate the logic of the observed ideas or examine or change their content.

Among the limitations of the current research is that it was conducted on patients referred to a treatment center. Another limitation of the study is the need for more follow-up. Similar studies should be performed on other diseases in the future. In addition, studies should be conducted on patients based on gender and age. Further studies on the effect of other interventional methods on patients with HTN should be conducted. Furthermore, studies on other communities with varying levels of anxiety and depression should be completed, and the results should be compared.

Conclusion

Cognitive therapy significantly affects mental health and reduces its subscales, containing physical symptoms, anxiety, social dysfunction, and depression. As a result, cognitive therapy can be used as a complementary treatment by nurses in conjunction with other nursing interventions to improve the mental health of patients with HTN. Given the positive effect of cognitive therapy on patient's mental health,

universities should organize training courses for nurses, so that they can use this intervention in conjunction with other nursing care. Hospital administrators should consider creating an environment conducive to non-pharmacological interventions such as cognitive therapy.

Conflict of Interests

Authors have no conflict of interests.

Acknowledgements

Special thanks to.the respected director of Al-Yarmouk Teaching Hospital

References

AI-Sadi, H., Al-Haili, T., Alshukri, A., Alghazali, T., Sabti, A. A., & Jasim, S. A. (2022). Effects of a continuous and periodic aerobic exercise rehabilitation program on depression and anxiety in hypertension patients. *Int J Body Mind Culture, 9*(4), 323-334. doi: 10.22122/ijbmc.v9i4.404 [doi].

Alamout, M. M., Rahmanian, M., Aghamohammadi, V., Mohammadi, E., & Nasiri, K. (2020). Effectiveness of mindfulness based cognitive therapy on weight loss, improvement of hypertension and attentional bias to eating cues in overweight people. *Int.J Nurs.Sci, 7*(1), 35-40. doi:S2352-0132(19)30503-4 [pii];10.1016/j.ijnss.2019.12.010 [doi]. Retrieved from PM:32099857

Amenta, F., Mignini, F., Rabbia, F., Tomassoni, D., & Veglio, F. (2002). Protective effect of anti-hypertensive treatment on cognitive function in essential hypertension: Analysis of published clinical data. *J Neurol.Sci, 203-204*, 147-151. doi:S0022510X02002812 [pii];10.1016/s0022-510x(02)00281-2 [doi]. Retrieved from PM:12417374

Bakhtiari, A., Neshatdoost, H. T., Abedi, A., & Sadeghi, M. (2013). Effectiveness of group therapy based on detached mindfulness meta-cognitive model on hypertension-suffering female patien'ts hypertension and anxiety. *Clinical Psychology and Personality, 11*(1), 47-62.

Canavan, M., & O'Donnell, M. J. (2022). Hypertension and cognitive impairment: A review of mechanisms and key concepts. *Front Neurol., 13*, 821135. doi:10.3389/fneur.2022.821135 [doi]. Retrieved from PM:35185772

Dargahi-Kafshgari, H., Yaghoubi-Hasankola, G., & Habibzadeh-Ahangarkolaei, Z. (2022). The effectiveness of cognitive-behavioral therapy on psychological distress and self-efficacy in patients with irritable bowel syndrome. *Int J Body Mind Culture, 9*(1), 22-28. doi: 10.22122/ijbmc.v9i1.297 [doi].

Erkinovna, T. D. (2021). Modern understanding of the occurrence of cognitive impairments in arterial hypertension and their correction. *Asian Journal of Pharmaceutical and Biological Research, 10*(3), 1-10.

Goldberg, D., & Williams, P. (2000). *General health questionnaire (GHQ)*. Swindon, Wiltshire, UK: nferNelson.

Goldberg, D. P., & Hillier, V. F. (1979). A scaled version of the General Health Questionnaire. *Psychol Med., 9*(1), 139-145. doi:10.1017/s0033291700021644 [doi]. Retrieved from PM:424481

Hanon, O., Berrou, J. P., Negre-Pages, L., Goch, J. H., Nadhazi, Z., Petrella, R. et al. (2008). Effects of hypertension therapy based on eprosartan on systolic arterial blood pressure and cognitive function: Primary results of the Observational Study on Cognitive function And Systolic Blood Pressure Reduction open-label study. *J Hypertens., 26*(8), 1642-1650. doi:00004872-200808000-00022 [pii];10.1097/HJH.0b013e328301a280 [doi]. Retrieved from PM:18622244

Haring, B., Wu, C., Coker, L. H., Seth, A., Snetselaar, L., Manson, J. E. et al. (2016). Hypertension, Dietary Sodium, and Cognitive Decline: Results From the Women's Health

Initiative Memory Study. *American Journal of Hypertension, 29*(2), 202-216. https://doi.org/10.1093/ajh/hpv081 PMID: 26137952.

Hughes, T. M., & Sink, K. M. (2016). Hypertension and its role in cognitive function: Current evidence and challenges for the future. *Am J Hypertens, 29*(2), 149-157. doi:hpv180 [pii];10.1093/ajh/hpv180 [doi]. Retrieved from PM:26563965

Iadecola, C., Yaffe, K., Biller, J., Bratzke, L. C., Faraci, F. M., Gorelick, P. B. et al. (2016). Impact of hypertension on cognitive function: A scientific statement from the American Heart Association. *Hypertension, 68*(6), e67-e94. doi:HYP.0000000000000053 [pii];10.1161/HYP.0000000000000053 [doi]. Retrieved from PM:27977393

Jasim, S. A., Kzar, H. H., Alwan, A. S., Gustina Zainal, A., Chupradit, S., Ali Sharhan Al-Sudani, A. Q. et al. (2022). Comparison of emotion regulation strategies in individuals with migraine, tension, and normal headaches. *Int J Body Mind Culture, 9*(2), 106-114. doi:10.22122/ijbmc.v9i2.388 [doi].

Li, Y., Buys, N., Li, Z., Li, L., Song, Q., & Sun, J. (2021). The efficacy of cognitive behavioral therapy-based interventions on patients with hypertension: A systematic review and meta-analysis. *Prev Med.Rep., 23*, 101477. doi:S2211-3355(21)00167-4 [pii];101477 [pii];10.1016/j.pmedr.2021.101477 [doi]. Retrieved from PM:34285871

Lucas, I., Puteikis, K., Sinha, M. D., Litwin, M., Merkevicius, K., Azukaitis, K. et al. (2022). Knowledge gaps and future directions in cognitive functions in children and adolescents with primary arterial hypertension: A systematic review. *Front Cardiovasc.Med., 9*, 973793. doi:10.3389/fcvm.2022.973793 [doi]. Retrieved from PM:36337900

Ma, Y., Hua, R., Yang, Z., Zhong, B., Yan, L., & Xie, W. (2021). Different hypertension thresholds and cognitive decline: A pooled analysis of three ageing cohorts. *BMC.Med., 19*(1), 287. doi:10.1186/s12916-021-02165-4 [pii];2165 [pii];10.1186/s12916-021-02165-4 [doi]. Retrieved from PM:34724953

Mahinrad, S., Sorond, F. A., & Gorelick, P. B. (2021). Hypertension and cognitive dysfunction: A review of mechanisms, life-course observational studies and clinical trial results. *Rev.Cardiovasc.Med., 22*(4), 1429-1449. doi:S1530-6550(21)00252-0 [pii];10.31083/j.rcm2204148 [doi]. Retrieved from PM:34957783

Mone, P., Pansini, A., Calabro, F., De, G. S., Esposito, M., Rinaldi, P. et al. (2022). Global cognitive function correlates with P-wave dispersion in frail hypertensive older adults. *J Clin Hypertens (Greenwich.), 24*(5), 638-643. doi:JCH14439 [pii];10.1111/jch.14439 [doi]. Retrieved from PM:35229449

Muela, H. C. S., Costa-Hong, V. A., Yassuda, M. S., Machado, M. F., Nogueira, R. C., Moraes, N. C. et al. (2017). Impact of hypertension severity on arterial stiffness, cerebral vasoreactivity, and cognitive performance. *Dement.Neuropsychol., 11*(4), 389-397. doi:10.1590/1980-57642016dn11-040008 [doi]. Retrieved from PM:29354219

Peters, R., Beckett, N., Forette, F., Tuomilehto, J., Clarke, R., Ritchie, C. et al. (2008). Incident dementia and blood pressure lowering in the Hypertension in the Very Elderly Trial cognitive function assessment (HYVET-COG): A double-blind, placebo controlled trial. *Lancet.Neurol., 7*(8), 683-689. doi:S1474-4422(08)70143-1 [pii];10.1016/S1474-4422(08)70143-1 [doi]. Retrieved from PM:18614402

Rawlings, G. H., Beail, N., Armstrong, I., & Thompson, A. R. (2022). Self-help cognitive behavioural therapy for anxiety in pulmonary hypertension: Pilot randomised controlled trial. *ERJ.Open.Res, 8*(1). doi:00526-2021 [pii];10.1183/23120541.00526-2021 [doi]. Retrieved from PM:35265707

Santisteban, M. M., Iadecola, C., & Carnevale, D. (2023). Hypertension, neurovascular dysfunction, and cognitive impairment. *Hypertension, 80*(1), 22-34. doi:10.1161/HYPERTENSIONAHA.122.18085 [doi]. Retrieved from PM:36129176

Schrader, B., Schrader, J., Elsasser, A., Bunker, A. M., Hillmann, B., Vaske, B. et al. (2020). Influence of cardiovascular risk factors on arterial hypertension and mild cognitive impairment in 4602 participants of the ELITE study. *J Hypertens, 38*(12), 2475-2481. doi:00004872-202012000-00021 [pii];10.1097/HJH.0000000000002588 [doi]. Retrieved from PM:32947477

Scuteri, A., Benetos, A., Sierra, C., Coca, A., Chicherio, C., Frisoni, G. B. et al. (2021). Routine assessment of cognitive function in older patients with hypertension seen by primary care physicians: Why and how-a decision-making support from the working group on 'hypertension and the brain' of the European Society of Hypertension and from the European Geriatric Medicine Society. *J Hypertens, 39*(1), 90-100. doi:00004872-202101000-00014 [pii];10.1097/HJH.0000000000002621 [doi]. Retrieved from PM:33273363

Sotodeh Asl, N., Neshat Dost, H., Kalantery, M., Talebi, H., & Khosravi, A. (1389). Comparison of the effectiveness of cognitive behavioral therapy and medication on the quality of life in the patients with essential hypertension. *Koomesh, 11*(4), 294-301.

Sung, J., Woo, J. M., Kim, W., Lim, S. K., & Chung, E. J. (2012). The effect of cognitive behavior therapy-based "forest therapy" program on blood pressure, salivary cortisol level, and quality of life in elderly hypertensive patients. *Clin Exp.Hypertens, 34*(1), 1-7. doi:10.3109/10641963.2011.618195 [doi]. Retrieved from PM:22007608

Ungvari, Z., Toth, P., Tarantini, S., Prodan, C. I., Sorond, F., Merkely, B. et al. (2021). Hypertension-induced cognitive impairment: From pathophysiology to public health. *Nat.Rev.Nephrol., 17*(10), 639-654. doi:10.1038/s41581-021-00430-6 [pii];430 [pii];10.1038/s41581-021-00430-6 [doi]. Retrieved from PM:34127835

Yang, W., Luo, H., Ma, Y., Si, S., & Zhao, H. (2021). Effects of antihypertensive drugs on cognitive function in elderly patients with hypertension: A review. *Aging.Dis., 12*(3), 841-851. doi:ad-12-3-841 [pii];10.14336/AD.2020.1111 [doi]. Retrieved from PM:34094646

Yuan, P., Li, J., Liu, J., Liu, H., Gong, S., Wang, L. et al. (2022). Cognitive dysfunction in patients with pulmonary hypertension. *Am J Respir.Crit.Care Med., 206*(10), 1289-1293. doi:10.1164/rccm.202204-0726LE [doi]. Retrieved from PM:35904426

Zargar, Y., Hakimzadeh, G., & Davodi, I. (2019). The effectiveness of acceptance and commitment therapy on hypertension and emotion cognitive regulation in people with hypertension: A semi-experiential study. *Jundishapur J Chronic Dis Care, 8*(2), e79347. doi: 10.5812/jjcdc.79347 [doi].