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Research Article

Effectiveness of Emotion Regulation Therapy on Anger Rumination and Health-Related Quality of Life in Women with Primary Hypertension

Monirosadat Hosseini*[1], Hengameh Boloorsaz Mashhadi[2]

1. School of Educational Studies, Universiti Sains Malaysia.
2. Instructor, Department of Educational Sciences, Payame Noor University, Iran.

Correspondence:

Monirosadat Hosseini

Email:

ho.mahmonir@yahoo.com

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Abstract

Objective: Hypertension is one of the most prevalent chronic diseases, which, if not properly managed, can lead to numerous psychological and social consequences in addition to physical health issues, ultimately reducing quality of life. The present study aimed to investigate the effectiveness of emotion regulation-based therapy on anger rumination and health-related quality of life (HRQoL) in patients with primary hypertension.

Method: This semi-experimental study employed a pretest-posttest control group design with a two-month follow-up. The statistical population consisted of all women diagnosed with primary hypertension who were referred to Moheb Hospital in Tehran in 2025. Using convenience sampling, 30 participants were selected and randomly assigned to two equal groups (15 participants each). Data were collected using a demographic information checklist, the Anger Rumination Scale, the Health-Related Quality of Life Questionnaire, and a digital upper arm blood pressure monitor. The intervention group received emotion regulation-based therapy based on Gross's protocol, delivered in 8 sessions (twice weekly, each session lasting one hour). Data analysis was conducted using repeated measures ANOVA and Bonferroni post hoc tests. All ethical issues were addressed in this study, and the authors declare that they have no conflicts of interest.

Results: Emotion regulation-based therapy had a significant effect on reducing anger rumination ($F = 89.365$, $p < 0.015$), Reduction in systolic blood pressure ($F=22.621$ and $p<0.011$), Reduction in diastolic blood pressure ($F=40.076$ and $p<0.006$), and improving health-related quality of life ($F = 97.943$, $p < 0.002$) in patients with primary hypertension. The effect sizes for anger rumination and HRQoL were 0.36, Systolic blood pressure 0.40, diastolic blood pressure 0.38, and 0.47, respectively. These effects persisted at the two-month follow-up.

Conclusion: The findings indicate that emotion regulation-based therapy can effectively enhance behavioral outcomes, blood pressure, and improve quality of life in individuals with hypertension. It is recommended that such psychological interventions be integrated with pharmacological treatments in rehabilitation and care programs to enhance the psychological and behavioral functioning of these patients.

Keywords: Emotion Regulation Therapy, Anger Rumination, Quality of Life, Hypertension, Health.

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Extended Abstract

Background and Objectives

Hypertension is one of the most prevalent chronic diseases, which, if not properly managed, can lead to numerous psychological and social consequences in addition to physical health issues, ultimately reducing quality of life. Evidence suggests a significant correlation between anger rumination and higher perceived stress, emotional dysregulation in psychosomatic patients, as well as mood disturbances and physiological arousal in otherwise healthy individuals. Heightened anger and irritability are more likely to lead to cognitive distortions, physiological activation, and avoidance behaviors. Consequently, persistent anger-related emotional and behavioral responses can exacerbate dysfunction in cardiovascular, respiratory, and heart rate systems.

By definition, health-related quality of life (HRQoL) is a subdomain of overall quality of life that encompasses individuals' perceived mental, emotional, social, and physical well-being, reflecting their subjective evaluation and responses to illness. In chronic diseases, HRQoL captures patients' interpretations of how clinical conditions affect their lives, making it a critical parameter for assessing the impact of chronic diseases and their treatments. The present study aimed to investigate the effectiveness of emotion regulation-based therapy on anger rumination and health-related quality of life (HRQoL) in patients with primary hypertension.

Materials and Methods

This study employed a quasi-experimental design with pre-test, post-test, and a two-month follow-up, including experimental and control groups. The statistical population consisted of all female patients diagnosed with primary hypertension who attended the internal medicine clinic of Moheb Super-Specialty Hospital in Tehran in 2025. To control for gender as a variable and given the higher willingness of female patients to participate, only females were included. A total of 30 participants were selected using convenience sampling and then randomly assigned to three equal groups of 15. The sample size was determined based on the guideline reported by Gall et al. (2006), which recommends a minimum of 15 participants per group in experimental and quasi-experimental research.

Data were collected using a demographic information checklist, the Anger Rumination Scale, and the Health-Related Quality of Life Questionnaire. The intervention group received emotion regulation-based therapy based on Gross's protocol, delivered in 8 sessions (twice weekly, each session lasting one hour). Data analysis was conducted using repeated measures ANOVA and Bonferroni post hoc tests.

Results

Data analysis was conducted using repeated measures ANOVA, and Bonferroni post hoc tests were applied to compare the assessment phases between groups. The Shapiro–Wilk test confirmed the normality of data distribution ($p > 0.05$). Levene's test verified the assumption of homogeneity of variances for both anger rumination and health-related quality of life variables ($p > 0.05$), suggesting equal variance dispersion across groups. Additionally, Box's M test confirmed the assumption of homogeneity of variance–covariance matrices (Box's $M = 1.670$, $F = 0.513$, $p > 0.673$). Mauchly's test of sphericity was also conducted to assess the assumption of sphericity for the dependent variables. The significance level for each variable was $p = 0.001$, indicating a violation of the sphericity assumption. Therefore, the Greenhouse-Geisser correction was applied. Based on the calculation of all assumptions, the conditions for conducting repeated measures ANOVA were deemed satisfactory. Emotion regulation-based therapy had a significant effect on reducing anger rumination ($F = 89.365$, $p < 0.015$) and improving health-related quality of life ($F = 97.943$, $p <$

0.002) in patients with primary hypertension. The effect sizes for anger rumination and HRQoL were 0.36 and 0.47, respectively. These effects persisted at the two-month follow-up.

Discussion and Conclusion

In explaining the results, it is argued that ERT is associated with the enhancement of adaptive coping strategies as a therapeutic approach aimed at modifying the intensity and quality of maladaptive emotional behaviors. ERT includes various techniques such as emotion identification (e.g., content of session 2), problem-solving skills training (e.g., session 4, which focused on interpersonal communication, assertiveness, and conflict resolution), and emotional vulnerability reduction strategies (e.g., session 3, which covered emotional vulnerability assessments and regulation techniques). These techniques help reduce maladaptive cognitive and behavioral strategies like rumination, potentially leading to a decrease in the intensity and frequency of anger rumination among individuals with hypertension. Moreover, since emotion regulation inherently involves the modulation and management of emotions, and considering that a core component of anger rumination is immersion in negative emotions and repetitive discussions about problems, fostering these skills enhances emotional self-management and adaptive expression, thereby facilitating reduced rumination and better emotional control.

The findings of this study suggest that enhancing emotional self-regulation can significantly reduce stress, depression, and anxiety levels. Patients with hypertension often perceive their condition as uncontrollable and experience a range of physical and psychological symptoms, which contribute to heightened emotional distress. However, through emotional regulation training and the implementation of specific regulation strategies, hypertensive individuals become capable of recognizing their emotional responses and identifying anxiety-provoking situations. Rather than resorting to maladaptive reactions such as avoidance or impulsivity, these individuals learn to engage in adaptive responses like emotion labeling and emotional validation.

The findings indicate that emotion regulation-based therapy can effectively enhance behavioral outcomes and improve quality of life in individuals with hypertension. It is recommended that such psychological interventions be integrated with pharmacological treatments in rehabilitation and care programs to enhance the psychological and behavioral functioning of these patients. In summary, patients with hypertension who engage in ERT are better able to accept their condition and related circumstances, engage in muscle relaxation (thus reducing physiological feedback), and recognize maladaptive strategies, thereby interrupting the cycle of anxiety-driven physiological responses. Accordingly, emotional acceptance training through ERT contributes to improved management of negative emotions and enhancement of health-related quality of life.

Introduction

Hypertension is one of the most prominent public health concerns and a crucial risk factor for cardiovascular diseases (Laffin et al., 2025). In Iran, the prevalence of hypertension is estimated to be approximately 23% among individuals aged 30–40 years and 50% in those over the age of 55 (Daroudi et al., 2025). Hypertension is classified as a psychosomatic disorder. While secondary hypertension is typically treated through medical interventions, the majority of cases (over 90%) are primary hypertension, characterized by multifactorial etiology with significant contributions from psychosocial factors (Pop et al., 2025; Maulidya & Puspitasari, 2025). Personality traits associated with hypertension often include individuals who are predisposed to anger and aggression, exhibit low flexibility, and tend to engage in anger rumination (Maden

& , 2025).

Evidence suggests a significant correlation between anger rumination and higher perceived stress, emotional dysregulation in psychosomatic patients, as well as mood disturbances and physiological arousal in otherwise healthy individuals (Pop et al., 2025; Tenti et al., 2025). According to Contrada et al. (2025), heightened anger and irritability are more likely to result in cognitive distortions, physiological activation, and avoidant behaviors. Consequently, persistent anger-related emotional and behavioral responses can exacerbate dysfunction in cardiovascular, respiratory, and heart rate systems. In this context, Aggarwal (2025) demonstrated a strong association between elevated anger scores and various vulnerabilities, including reduced psychological well-being and poor self-regulation among cardiovascular patients.

Findings from a systematic review and meta-analysis indicate that if not appropriately and timely managed, hypertension can lead to the development of various diseases, significant disability, decreased productivity, and ultimately, a reduced quality of life (Calderone et al., 2025). Similarly, Zhang et al. (2025) found that individuals with hypertension report lower quality of life compared to those with normal blood pressure. Additionally, recent studies suggest that individuals with chronic hypertension experience considerable stress due to the need to cope with illness-related challenges, threats to well-being and bodily integrity, loss of independence, and disruptions to familial, social, and professional roles (Calderone et al., 2025; Kwek et al., 2025). Disease labeling, dietary restrictions, lifestyle changes, lack of definitive treatment, and complications from both the disease and its pharmacotherapy contribute to psychological distress and diminished health-related quality of life (HRQoL) (Aggarwal, 2025).

By definition, health-related quality of life is a subset of overall quality of life. It includes a sense of mental, emotional, social, and physical well-being. It reflects the patient's subjective assessment and response to the disease. Health-related quality of life is a crucial indicator in various aspects of patients' lives (Pournaghash-Tehrani & Abdoli-Bidhendi, 2018). In chronic and severe medical conditions, the quality of life is significantly affected, particularly due to the disease's duration and severity. For this reason, governments in most societies have increasingly focused their attention on improving the quality of life of people. They try to reduce the incidence of these diseases in society. They also attempt to mitigate the severity of symptoms for those affected by increasing the provision of health services and improving psychosocial and economic conditions (Jokar & Rahmanian, 2025; Abdoli-Arani & Tamannaeifar, 2025). Research findings suggest that HRQoL in hypertensive patients is frequently below desirable levels. For example, both anxiety and anger have been linked to elevated blood pressure, thus adversely affecting HRQoL (Li et al., 2025). Di Giacomo et al. (2024) found that approximately 35% of patients with hypertension experience emotional problems and anger, which are associated with lower quality of life. In chronic diseases, HRQoL captures patients' interpretations of how clinical conditions affect their lives, making it a critical parameter for assessing the impact of chronic diseases and their treatments (Salarrad et al., 2022; Khazaee, Sepahvandi, & Mirdarikvand, 2024). Research findings suggest that HRQoL in hypertensive patients is frequently below desirable levels. For example, both anxiety and anger have been linked to elevated blood pressure, thus adversely affecting HRQoL (Li et al., 2025). Di Giacomo et al. (2024) found that approximately 35% of patients with hypertension experience emotional problems and anger, which are associated with lower quality of life.

Given these findings, the need for effective and timely therapeutic interventions is evident. Li et al. (2025) noted that the effectiveness of pharmacological treatments (such as Lisinopril, Hydrochlorothiazide, Amlodipine, and Candesartan) for hypertension varies and often yields only moderate outcomes. Moreover, pharmacotherapy alone cannot address the full spectrum of patients' psychological and emotional needs and is frequently accompanied by side effects such as renal problems, skin irritation, insomnia, headaches, and poor treatment adherence (Taye et al., 2024). In recent years, psychological interventions have gained increasing attention for mitigating the physical and psychological complications of chronic medical conditions. Among these interventions, 'emotion regulation therapy' has emerged as a promising approach (Salarrad et al., 2022; Li et al., 2025).

Emotion regulation therapy involves the awareness and acceptance of emotions, the ability to control impulsive behaviors, acting in accordance with valued goals during negative emotional experiences, and utilizing emotional responses to fulfill situational demands (Sjöblom et al., 2025). Gross (2002), based on the modal model of emotion, proposed the emotion regulation process model, which consists of five stages: situation, attention, appraisal, response, and modulation. According to Gross, each stage in the emotional generation process presents an opportunity for regulation, and emotion regulation skills can be applied at various points within this sequence (Gross, 2002). In support of this view, Dehghan et al. (2024) found that difficulty in emotion regulation and reliance on maladaptive strategies significantly reduce cognitive flexibility in patients with cardiovascular disease. Furthermore, the study by Khazaee et al. (2024) demonstrated that training in emotion regulation can enhance hope and quality of life in patients with cardiovascular disease.

Therefore, in addition to pharmacological studies focusing on improving HRQoL among patients with hypertension, there is a pressing need to explore innovative strategies to enhance their psychological functioning and well-being. Considering the limited number of studies conducted in Iran on emotion-focused therapies targeting the psychological and behavioral functioning of hypertensive patients, the present study aimed to examine the effectiveness of 'emotion regulation-based therapy' on anger rumination and health-related quality of life in individuals diagnosed with primary hypertension.

Method

This study employed a quasi-experimental design with pre-test, post-test, and a two-month follow-up, including experimental and control groups. The statistical population consisted of all female patients diagnosed with primary hypertension who attended the internal medicine clinic of Moheb Super-Specialty Hospital in Tehran in 2025. To control for gender as a variable and given the higher willingness of female patients to participate, only females were included. A total of 30 participants were selected using convenience sampling and then randomly assigned to three equal groups of 15. The sample size was determined based on the guideline reported by Gall et al. (2006), which recommends a minimum of 15 participants per group in experimental and quasi-experimental research. The sample size was determined as 30 people (15 people for each group) based on previous studies (source sample 1 and sample 2) and considering an effect size of 0.5, a test power of 0.95, and a significance level of 0.05, using the G*Power sample size determination software (Lee et al., 2024).

Ethical Statement

This study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki. Before participation, all participants provided informed consent after being fully informed about the study's purpose, procedures, potential risks, and benefits. The confidentiality and anonymity of all participants were maintained throughout the research process. Participants were free to withdraw from the study at any time without any negative consequences.

Participants and Procedure

Inclusion criteria comprised informed consent to participate in the study, female gender, age between 25 and 45 years, literacy sufficient to respond to questionnaires, a confirmed diagnosis of primary hypertension by a medical specialist and under routine drug treatment (systolic blood pressure greater than 120 or diastolic blood pressure greater than 80 mmHg), a minimum of six months since diagnosis, no concurrent psychological therapy or involvement in any other psychological intervention, full participation in the intervention sessions, and compliance with the treatment schedule.

Exclusion criteria included a history of cerebrovascular diseases or other neurological disorders, secondary hypertension due to underlying diseases as diagnosed by a specialist, renal artery or tissue disorders, renal cysts, rheumatic and chronic obstructive pulmonary diseases, adrenal and endocrine disorders, pheochromocytoma, hyperaldosteronism, aortic coarctation, use of any steroidal or non-steroidal anti-inflammatory drugs, nasal decongestants, lipid disorders, missing more than two sessions, lack of cooperation due to worsening symptoms or exposure to major stressors (e.g., death of a close relative, divorce, infidelity), as well as suffering from other chronic physical (e.g., diabetes, cancer) or psychological illnesses or substance/alcohol use disorders.

Following coordination with the hospital's clinic management, an announcement was made to female patients with hypertension and clinic physicians regarding the therapy sessions and the initial registration process. From among 53 registered women diagnosed with hypertension, a preliminary interview and self-report measures were used to screen eligible participants based on the inclusion criteria. Among these individuals, 30 were selected using a convenience sample method, considering the inclusion criteria, and were randomly assigned to two equal groups: experimental (15 individuals) and control (15 individuals). Then, for the experimental group, in addition to receiving conventional drug treatment under the supervision of a relevant specialist and with these drugs being stable, emotion regulation therapy was implemented according to the protocol developed by Gross (2002) in 8 sessions (two sessions per week, each session lasting 60 minutes) by a specialist with experience in the desired therapeutic approach and at the Moheb Medical Center in Tehran. However, the control group received only drug treatment during this period, which was kept stable by a specialist physician throughout the research process, and they were not informed of any intervention. Post-test and two-month follow-up assessments were conducted for both groups. To adhere to ethical principles, all participants were fully informed about the study procedures. Control group participants were assured that they would be offered the therapeutic sessions free of charge after the study's completion. Table 1 presents a summary of the intervention sessions, organized by the therapeutic approach applied.

Digital brachial sphygmomanometer: Systolic and diastolic blood pressure were measured and calculated

using a digital brachial sphygmomanometer model UA-651, manufactured by A&D Company, Japan. The measurements were performed by the relevant specialist physician at Moheb Hospital, Tehran (in millimeters of mercury). To ensure valid measurements, the guidelines of the European Society of Cardiology and the European Society of Hypertension were followed (Mancia et al., 2024). Blood pressure was measured at three stages: pre-test, post-test, and follow-up. All measurements took place in the morning in a suitably heated examination room. The distance between the examinee and the blood pressure receiver was no more than one meter. The patient's arm was supported and positioned horizontally at heart level. The patient was not fasting and had not consumed tea or caffeine for at least 30 minutes before measurement. The patient had also not exercised vigorously. To ensure reliability, systolic and diastolic blood pressure were measured twice with a 5-minute rest interval, on the right arm and in a sitting position. The higher score (with a slight difference) was recorded.

Anger Rumination Scale (ARS): Developed by Sukhodolsky et al. (2001), this instrument comprises 19 items across four subscales: angry afterthoughts, thoughts of revenge, anger memories, and understanding causes. Items are rated on a 4-point Likert scale ranging from 1 (almost never) to 4 (almost always). The original version reported Cronbach's alpha of 0.93 for the total scale and between 0.83 and 0.95 for subscales. Item-total correlations for a sample of 214 individuals ranged from 0.74 to 0.83 (Sukhodolsky et al., 2001). In the study by Kamali et al. (2024), the reliability of the instrument was assessed using Cronbach's alpha, yielding a value of 0.85. In the present study, the Cronbach's alpha coefficient for the entire instrument was calculated to be 0.74, with coefficients ranging from 0.72 to 0.77 for its components.

Health-Related Quality of Life Questionnaire (SF-36): Originally developed by Ware and Sherbourne (1992), this 36-item questionnaire assesses two primary dimensions: physical health and mental health. Items are rated on a 5-point Likert scale ranging from 1 (very dissatisfied) to 5 (very satisfied). The reported Cronbach's alpha values are 0.85 for the total scale, with a range of 0.78 to 0.91 for the subscales (Saeidi et al., 2024). Bashiri et al. (2021) reported a reliability coefficient of 0.85 for their instrument, as measured by Cronbach's alpha. In the present study, the overall Cronbach's alpha was 0.82, with component values ranging from 0.71 to 0.83.

A two-way repeated measures analysis of variance (ANOVA) was conducted to examine the effects of the intervention over time across the groups. Before data analysis, the assumptions for parametric tests were assessed and confirmed. It is worth noting that this study did not identify any outliers.

Table 1 - Summary of Gross's emotion regulation therapy sessions

Session	Session content
1st	Familiarization and establishing rapport among group members; initiating reciprocal interactions within the group; conducting exercises aimed at interpersonal acquaintance; introducing the objectives, rationale, and stages of the intervention
2nd	Understanding emotions and triggering situations through training on the functional differences among various emotions; providing information about emotional dimensions and the short- and long-term effects of emotions; selecting a situation involving an emotional experience and breaking it down into the physical, cognitive, and affective components; completing a daily emotion log for one week.

3rd	Assessing emotional vulnerabilities and emotional skills through self-assessment to recognize personal emotional experiences; evaluating emotional vulnerability levels; identifying individual emotion regulation strategies; completing the Emotional Vulnerability Form and the Emotion Reaction Assessment Form
4th	Modifying emotionally triggering situations; listing individual, social, and relational goals; evaluating relationships with others; identifying personal and interpersonal situations requiring improvement; creating a list of positive activities; training in necessary interpersonal problem-solving skills, including communication, assertiveness, conflict resolution, and problem-solving techniques.
5th	Training in attention-shifting skills, including halting negative emotional and cognitive rumination and worry through thought-stopping exercises and positive thought substitution; expanding attentional focus and selective attention through visual and auditory exercises
6th	Modifying cognitive appraisals by identifying distorted appraisals and their emotional consequences; training in reappraisal strategies to restructure negative evaluations for improved emotion regulation and soothing negative emotional states
7th	Altering the behavioral and physiological outcomes of emotions; training in coping and emotional expression skills; behavioral modification; emotional catharsis; and physical relaxation techniques
8th	Summarizing learned material and evaluating progress toward individual and group goals; applying acquired skills in real-life settings outside the session context; identifying and addressing obstacles to homework completion

Results

Demographic analysis indicated that the mean age (±SD) of participants in the Emotion Regulation Therapy group was 40.34 (±3.16) years, while the mean age in the control group was 40.29 (±2.54) years. Furthermore, results from Chi-square tests assessing educational level, marital status, employment status, medications used, and duration of medication use, as well as duration of illness, showed no statistically significant differences between the two groups ($p > 0.05$). Table 2 presents the means and standard deviations of the dependent variables and their components by group and assessment phase. The data show that, compared to the control group, the experimental group exhibited reductions in mean scores of anger rumination, health-related quality of life, and their respective subcomponents during both the post-test and two-month follow-up phases.

Table 2 - Mean and standard deviation of dependent variables and their components by group and different stages of measurement

Dependent variable	Group	Number	Pre-test		Post-test		Follow-up	
			M	SD	M	SD	M	SD
Systolic blood pressure	Experimental	15	148.26	6.66	141.66	4.63	140.72	4.54
	Control	15	147.46	5.95	148.06	5.43	148.06	5.43
Diastolic blood pressure	Experimental	15	95.80	2.39	91.94	1.75	91.46	1.76
	Control	15	94.80	2.36	95.26	2.37	95.26	2.37
Angry Afterthoughts	Experimental	15	16.60	1.68	15.33	1.54	14.80	1.56
	Control	15	17.13	1.95	17.26	1.86	17.26	1.86
Revenge-related Thoughts	Experimental	15	14.40	1.12	12.20	1.08	11.93	1.22
	Control	15	13.66	1.39	13.86	1.12	13.86	1.12
Angry Memories	Experimental	15	15.00	1.69	12.46	1.45	12.13	1.59
	Control	15	14.33	1.75	14.46	1.76	14.53	1.68

Understanding the Cause	Experimental	15	12.60	1.54	11.80	1.56	11.53	1.40
	Control	15	13.00	1.77	13.20	1.47	13.20	1.47
Anger Rumination – Total Score	Experimental	15	58.60	6.03	51.79	5.63	50.39	5.77
	Control	15	58.12	6.86	58.78	6.21	58.85	6.13
Physical Health	Experimental	15	34.80	3.91	41.66	4.89	42.33	6.06
	Control	15	36.13	5.86	35.33	4.62	35.26	4.55
Mental Health	Experimental	15	27.06	6.07	34.13	2.99	34.66	3.10
	Control	15	28.46	6.90	27.73	5.73	27.66	5.71
Health-Related Quality of Life – Total Score	Experimental	15	61.86	9.98	75.79	7.88	76.99	9.16
	Control	15	64.59	12.76	63.06	10.35	62.92	10.26

Table 2 presents the mean and standard deviation of the scores of the dependent variables and their components by group and measurement stage. The table shows that, in the experimental group, the mean scores of blood pressure (systolic-diastolic), anger rumination, and its components decreased in the post-test and follow-up stages compared to the control group. Additionally, in the experimental group, the mean scores for health-related quality of life, physical health, and mental health increased from the pre-test to the post-test and follow-up periods, compared to the control group.

Data analysis was conducted using repeated measures ANOVA, and Bonferroni post hoc tests were applied to compare the assessment phases between groups. The Shapiro–Wilk test confirmed the normality of data distribution ($p > 0.05$). Levene's test verified the assumption of homogeneity of variances for Systolic-diastolic blood pressure, anger rumination, and health-related quality of life variables ($p > 0.05$), suggesting equal variance dispersion across groups. Additionally, Box's M test confirmed the assumption of homogeneity of variance–covariance matrices (Box's $M = 1.670$, $F = 0.513$, $p > 0.673$). Mauchly's test of sphericity was also conducted to assess the assumption of sphericity for the dependent variables. The significance level for each variable was $p = 0.001$, indicating a violation of the sphericity assumption. Therefore, the Greenhouse-Geisser correction was applied. Based on the calculation of all assumptions, the conditions for conducting repeated measures ANOVA were deemed satisfactory.

As shown in Table 3, the significance level for the main effect of time was below 0.05, indicating that there were statistically significant differences in the mean scores of anger rumination and its components, as well as health-related quality of life and its components, across the different assessment stages (pre-test, post-test, and follow-up). Moreover, significant interaction effects were observed between time and group, along with a significant main effect of group. These findings suggest that the changes in anger rumination and health-related quality of life scores over time differed significantly between the experimental and control groups, with the experimental group showing greater improvement. Effect size estimates indicated that 36% of the variance in changes in anger rumination scores and 47% of the variance in changes in health-related quality of life scores across the assessment phases could be attributed to participation in Emotion Regulation Therapy sessions.

Table 3 - Results of analysis of variance with repeated measurements of dependent variables in three stages

Dependent variable	Effects	SS	df	MS	F Statistics	P	η2
Systolic blood pressure	Group	418178	1	418.178	5.500	0.026	0.164
	Time	212.359	1.126	188.543	16.165	0.012	0.366
	group×Time	297.156	1.126	263.834	22.621	0.011	0.407
Diastolic blood pressure	Group	94.044	1	94.044	7.983	0.009	0.222
	Time	66.822	1.201	55.638	25.483	0.010	0.476
	group×Time	105.089	1.201	87.500	40.076	0.006	0.389
Angry Afterthoughts	Group	60.844	1	60.844	7.491	0.011	0.211
	Time	10.867	1.375	7.905	9.656	0.001	0.256
	group×Time	14.956	1.375	10.879	13.289	0.006	0.322
Revenge-related Thoughts	Group	20.544	1	20.544	6.314	0.018	0.184
	Time	23.022	1.101	20.916	24.214	0.002	0.464
	group×Time	32.356	1.101	29.396	34.030	0.007	0.549
Angry Memories	Group	34.844	1	34.844	5.127	0.031	0.155
	Time	32.356	1.187	27.267	21.593	0.005	0.435
	group×Time	41.689	1.187	35.133	27.822	0.010	0.498
Understanding the Cause	Group	30.044	1	30.044	4.635	0.040	0.142
	Time	2.956	1.424	2.075	4.350	0.031	0.134
	group×Time	6.689	1.424	4.696	9.846	0.001	0.260
Anger Rumination – Total Score	Group	562.500	1	562.500	23.522	0.007	0.257
	Time	237.867	1.289	184.576	61.745	0.020	0.488
	group×Time	344.267	1.289	267.139	89.365	0.015	0.361
Physical Health	Group	364.011	1	364.011	5.159	0.031	0.156
	Time	204.022	1.254	162.650	35.419	0.012	0.458
	group×Time	324.689	1.254	258.847	56.366	0.017	0.608
Mental Health	Group	360.000	1	360.000	4.589	0.041	0.141
	Time	216.422	1.184	182.802	36.176	0.010	0.364
	group×Time	329.400	1.184	278.229	55.060	0.008	0.463
Health-Related Quality of Life – Total Score	Group	1448.011	1	1448.011	15.325	0.001	0.354
	Time	840.622	1.122	749.485	62.942	0.005	0.592
	group×Time	1308.089	1.122	1166.270	97.943	0.002	0.478

Table 3 presents both between- and within-subject comparisons for the dependent variables in the experimental and control groups. The main effect of time was statistically significant for systolic-diastolic blood pressure, total anger rumination, and its four components, indicating significant differences in these variables across pre-test, post-test, and follow-up phases. The percentage changes across the three phases were 36.6% for systolic-diastolic blood pressure, 47.6% for total anger rumination, 48.8% for angry afterthoughts, 25.6% for revenge fantasies, 46.4% for angry memories, 43.5% for understanding the causes, and 13.4% for recognizing the causes, all of which were statistically significant. The main effect of group was significant for all variables ($p < .05$), suggesting significant differences in mean scores between the experimental and control groups for systolic-diastolic blood pressure, total anger rumination, and its subcomponents. Group membership explained 16.4% of systolic blood pressure, 22.2% of diastolic blood pressure, 25.7% of total anger rumination, 21.1% of angry afterthoughts, 18.4% of revenge fantasies, 15.5% of angry memories,

and 14.2% of understanding the causes of variance. A significant interaction effect between time and group was found for all the above variables ($p < .05$), indicating the pattern of changes across the three time points differed between groups. The variance attributed to this interaction was 40.7% for systolic blood pressure, 38.9% for diastolic blood pressure, 36.1% for total anger rumination, 32.2% for angry afterthoughts, 54.9% for revenge fantasies, 49.8% for angry memories, and 26% for understanding causes.

Table 3 also shows a significant main effect of time for health-related quality of life (HRQoL) and its two components, physical and mental health, indicating differences in mean scores across pre-test, post-test, and follow-up phases. Percentage changes were 59.2% for HRQoL, 45.8% for physical health, and 36.4% for mental health, all of which were statistically significant. The main effect of the group was significant for HRQoL and its components ($p < .05$), indicating that the experimental and control groups differed significantly. Variance due to group was 35.4% for HRQoL, 15.6% for physical health, and 14.1% for mental health. The interaction effect between time and group was also significant for HRQoL and its components ($p < .05$), showing the pattern of change across phases differed between groups. The explained variance was 47.8% for HRQoL, 60.8% for physical health, and 46.3% for mental health.

Table 4 - Results of the Bonferroni post hoc test for comparing the measurement stages of groups in dependent variables

Dependent variable	Stages		Mean difference	Error	P
Systolic blood pressure	Pre-test	Post-test	*3.000	0.839	0.004
	Pre-test	Follow-up	*3.467	0.739	0.001
	Post-test	Follow-up	0.467	0.251	0.221
Diastolic blood pressure	Pre-test	Post-test	*1.700	0.358	0.003
	Pre-test	Follow-up	*1.933	0.343	0.001
	Post-test	Follow-up	0.233	0.128	0.336
Anger Rumination – Total Score	Pre-test	Post-test	3.067*	0.405	0.002
	Pre-test	Follow-up	3.733*	0.433	0.0011
	Post-test	Follow-up	0.667	0.184	0.303
Health-Related Quality of Life – Total Score	Pre-test	Post-test	-6.200*	0.761	0.005
	Pre-test	Follow-up	-6.733*	0.836	0.004
	Post-test	Follow-up	-0.533	0.239	0.102

In Table 4, the Bonferroni post hoc test was used to compare the different measurement stages between the two groups. The results show a significant difference between the mean scores of systolic and diastolic blood pressure, anger rumination, and health-related quality of life in the pre-test and post-test. There is also a significant difference between the pre-test and follow-up ($p<0.05$). However, there is no significant difference between mean scores in the post-test and follow-up ($p<0.05$).

Discussion

This study examined the effect of emotion regulation-based therapy on anger rumination and health-related quality of life in people with primary hypertension. The results showed a significant difference between groups in reducing anger rumination. The intervention reduced anger rumination by 36% in the experimental group, and this effect remained stable at follow-up. No previous studies directly examined emotion regulation-based therapy and anger rumination in hypertension or cardiovascular patients, limiting

direct comparison. However, these results align with earlier research. For example, Pop et al. (2025) and Contrada (2025) found that emotion regulation interventions reduced negative emotions and anger rumination, consistent with the current findings. Similarly, Dehghan et al. (2024) found that eight sessions of emotion-focused therapy lowered mental rumination and physical symptom severity in cardiovascular patients, supporting these results. Maulidya and Puspitasari (2025) conducted a single-case study showing that eight emotional management sessions (45–60 minutes each) for people with schizophrenia increased self-regulation and reduced anger. These results further suggest the potential of emotion regulation-based interventions in various clinical populations.

In explaining these findings, emotion regulation training, incorporating techniques such as mindfulness, distress tolerance, interpersonal effectiveness, problem-solving, and modifying the impact of distressing situations, helps individuals better cope with their illness and the emotions associated with it. Use of emotion regulation skills allows individuals with hypertension to more accurately identify their emotions and examine them without becoming overwhelmed. The goal is to modulate emotional responses without resorting to rumination or impulsive reactions. Practices based on emotion regulation are believed to enhance the activity of key prefrontal brain regions. These include the medial prefrontal cortex, orbitofrontal cortex, and anterior cingulate cortex, which are involved in stress management and self-control. These practices may contribute to the inhibition of neural pathways that mediate automatic reactivity and anger rumination in response to distressing life experiences or chronic illness. For example, when individuals are confronted with an incurable illness and experience feelings of despair, anxiety, or anger, these techniques allow them to acknowledge and experience these emotions without engaging in maladaptive cognitive rumination. The ability to recognize, label, and accept emotions, and to confront rather than avoid negative emotions when necessary, represents a core aspect of emotion regulation. These skills contribute to improved self-regulation and help in reducing anger rumination over time.

A novel aspect of the intervention was its emphasis on the relationship between motivational systems and emotions, as well as educating participants on this dynamic and reinforcing it across sessions. This element significantly contributed to the reduction of negative emotions, including anger and rumination.

In explaining these results, we can argue that ERT is associated with the enhancement of adaptive coping strategies as a therapeutic approach aimed at modifying the intensity and quality of maladaptive emotional behaviors. ERT includes various techniques such as emotion identification (e.g., content of session 2), problem-solving skills training (e.g., session 4, which focused on interpersonal communication, assertiveness, and conflict resolution), and emotional vulnerability reduction strategies (e.g., session 3, which covered emotional vulnerability assessments and regulation techniques). These techniques help reduce maladaptive cognitive and behavioral strategies like rumination, potentially leading to a decrease in the intensity and frequency of anger rumination among individuals with hypertension. Moreover, since emotion regulation inherently involves the modulation and management of emotions, and considering that a core component of anger rumination is immersion in negative emotions and repetitive discussions about problems, fostering these skills enhances emotional self-management and adaptive expression, thereby facilitating reduced rumination and better emotional control.

Another significant finding of this study, consistent with previous research by Khazaee et al. (2024), Calderone et al. (2025), Kwek et al. (2025), and Salarrad et al. (2022), showed a significant difference

between the experimental and control groups in health-related quality of life. It suggests that ERT was effective in improving the quality of life in participants with hypertension. This finding shows emotion regulation-based therapy in the experimental group led to a 0.47% increase in health-related quality of life, and this effect remained stable during follow-up. Calderone et al. (2025) found that emotion management programs and breathing exercises for cardiovascular and hypertensive patients reduced stress, anxiety, and blood pressure, and improved quality of life, consistent with these findings. Similarly, Salar-Rad et al. (2022) found that twelve 50-minute sessions of emotion-focused therapy reduced anxiety severity and increased quality of life in women with breast cancer, aligning with the current results.

The findings of this study suggest that enhancing emotional self-regulation can significantly reduce stress, depression, and anxiety levels. Patients with hypertension often perceive their condition as uncontrollable and experience a range of physical and psychological symptoms, which contribute to heightened emotional distress. However, through emotional regulation training and the implementation of specific regulation strategies, hypertensive individuals become capable of recognizing their emotional responses and identifying anxiety-provoking situations. Rather than resorting to maladaptive reactions such as avoidance or impulsivity, these individuals learn to engage in adaptive responses like emotion labeling and emotional validation. By participating in various cognitive and behavioral exercises that regulate emotions, patients develop a heightened awareness of their internal experiences, including thoughts, emotions, and reactions, within specific contexts. This awareness, both verbal and nonverbal, enhances their ability to respond intentionally and adaptively to emotional situations. Emotional regulation involves the effective management of both positive and negative emotions in oneself and others, tailored to situational demands. The ability to regulate emotional responses to internal and external stimuli fosters psychological well-being and promotes optimal functioning across the lifespan. Consequently, individuals learn to identify not only their emotional states but also those of others, enabling them to anticipate likely reactions and respond appropriately in interpersonal situations. In this way, patients with hypertension—through acceptance of their condition and related circumstances, as well as through muscle relaxation techniques (reducing physiological feedback loops) and the identification of maladaptive coping strategies—can interrupt the physiological manifestations of anxiety triggered by dysfunctional thoughts. Therefore, emotional regulation training, particularly when centered on emotional acceptance, can effectively contribute to the management of negative emotions and enhance health-related quality of life.

In summary, patients with hypertension who engage in ERT are better able to accept their condition and related circumstances, engage in muscle relaxation (thus reducing physiological feedback), and recognize maladaptive strategies, thereby interrupting the cycle of anxiety-driven physiological responses. Accordingly, emotional acceptance training through ERT contributes to improved management of negative emotions and enhancement of health-related quality of life.

In light of the above, the researchers posit that deficits in emotion regulation strategies adversely affect behaviors such as goal setting, selection of appropriate strategies, and self-monitoring of thought and learning processes, potentially leading to avoidance and failure to cope with daily life challenges. In contrast, proper use of emotion regulation strategies promotes constructive coping, adaptive emotional responses, and psychological flexibility. Emotionally competent individuals, when facing stress and anxiety, can regulate the intensity of negative emotions through cognitive reappraisal. This therapeutic

model emphasizes emotional awareness, control, and the regulation of negative emotions arising from interpersonal relationships, utilizing hands-on and group-based interventions. It also encourages individuals to assign positive meaning to various life events while minimizing the impact of negative experiences. As a result, these strategies help decrease negative emotions and enhance positive emotions by improving cognitive and emotional functioning, thereby improving health-related quality of life in individuals with hypertension.

The first limitation of this study was the use of convenience sampling and the inclusion of only patients with primary hypertension referred to Moheb Hospital in Tehran, which limits the generalizability of the findings. Furthermore, data collection was conducted through self-report questionnaires, which may be subject to response bias and distortion. Future studies are recommended to replicate this research in other populations, including patients with secondary hypertension or cardiovascular disease, and to incorporate clinical interviews alongside questionnaires for a more comprehensive assessment. Additionally, it is suggested to compare the effectiveness of this therapeutic approach in patients with other chronic medical conditions and to examine its impact on broader psychosocial dimensions and quality of life in patients with diabetes, cardiovascular disorders, and secondary hypertension.

The final finding of the present study showed a significant difference between the experimental and control groups in blood pressure indices. Emotion regulation–based therapy in the experimental group led to a 0.40% reduction in systolic and a 0.38% reduction in diastolic blood pressure. This therapeutic effect remained stable during the follow-up phase. These results align with findings from Calderone et al. (2025) and DiGiacomo et al. (2024). Leaviss et al. (2020) also demonstrated that a behavioral–emotional modification program helped regulate blood pressure and reduce hyperarousal. Similarly, Kusko et al. (2024) found that emotion regulation training with mindfulness for patients with hypertension reduced both systolic and diastolic blood pressure and improved sleep quality. It supports the current findings.

Conclusion

From an explanatory perspective, emotion regulation exercises are designed to enhance acceptance (the ability to acknowledge emotions without resistance) and differentiated awareness (the capacity to identify and distinguish between different feelings and bodily sensations). These exercises focus on psychophysiological distress, which refers to the discomfort that arises from the interaction between the mind and body, encompassing both physical and psychological aspects. The exercises teach individuals to observe and reappraise emotional, physical, and psychological aspects of illness without judgment or automatic reactions. Continuous exposure to living with illness during therapy—without rumination (repetitive negative thinking), catastrophizing (expecting the worst outcome), or magnification (exaggerating symptoms)—may weaken maladaptive responses. This process can reduce the activity of the hypothalamic–pituitary–adrenal (HPA) axis, also known as the stress perception axis, which is linked to increased secretion of cortisol and adrenaline (the main stress hormones). Although cortisol regulates HPA axis activity within the brain, excessive circulation of cortisol and adrenaline may cause abnormal stimulation of cardiac beta-receptors (proteins in heart cells that respond to stress hormones). This situation

can disrupt the natural rate and strength of myocardial contractions (how the heart muscle squeezes to pump blood) and heighten vascular sensitivity to hormones (making blood vessels more reactive to stress chemicals). Ultimately, these factors can lead to elevated blood pressure levels.

The first limitation of this study is the use of convenience sampling, which limits the study population to female patients with primary hypertension referred to Mahab Hospital in Tehran. Generalizing the results to other populations with chronic medical conditions, especially those with hypertension, requires caution. Relying on self-report quantitative questionnaires may have caused response fatigue, bias, or distortion. Future research should include both male and female patients with hypertension or cardiovascular diseases. Researchers should also use clinical interviews with questionnaires to obtain more reliable data. Future studies should compare the effectiveness of this therapeutic approach across chronic medical conditions and its impact on psychosocial functioning and quality of life for individuals with diabetes, cardiovascular diseases, and secondary hypertension. To improve accuracy and reliability, future research should include more extended follow-up periods (e.g., six months to one year) and recruit participants from multiple healthcare centers in diverse cities with varying socio-cultural backgrounds and lifestyles, thereby enhancing generalizability. Mental health professionals should be integrated into public health centers and cardiovascular clinics. They should help develop and implement emotion-focused therapeutic interventions and other psychological support programs in conjunction with conventional medical treatments.

Ethical Considerations

To ensure ethical compliance, informed consent was obtained from subjects, and the confidentiality of personal data was ensured. The results were reported anonymously without identifying any participants.

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Conflict of Interest

The authors declare no conflicts of interest regarding the publication of this study.

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