Original Article

Effectiveness of subliminal audio messages on depression and anxiety in women with hypertension: a quasi-experimental study

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Abstract

Background: Subliminal messages (auditory sub-threshold stimuli) are hidden messages embedded within musical notes that the conscious mind cannot perceive. The aim of this study was to examine the effectiveness of subliminal audio in reducing depression and anxiety in women with hypertension, with the goal of providing a foundation for future interventions and physiological evidence supporting sub-threshold perception.

Methods: This quasi-experimental study was conducted using purposive sampling on 30 hypertensive female patients who referred to Seyed-al-Shohada Hospital in Urmia, Iran. Participants were randomly assigned to intervention and control groups. After the pre-test, the intervention group listened to a subliminal audio file for 20 minutes daily over a six-week period. Depression and anxiety levels were assessed and compared before and after the intervention in both groups using the Beck Depression Inventory (BDI; scores ranging from 13 to 63) and the Beck Anxiety Inventory (BAI; scores ranging from 7 to 63).

Results: The intervention group showed a significant reduction in depression and anxiety scores following the six-week exposure to subliminal audio messages. Depression scores decreased from a mean of 29.13 (SD = 6.82) in the pre-test to 23.73 (SD = 6.76) in the post-test. Similarly, anxiety scores reduced from 17.6 (SD = 6.04) to 15.6 (SD = 7.20). In contrast, the control group exhibited no significant changes in either variable. ANCOVA results confirmed that the reduction in depression ($F = 7.536$, $p = 0.011$, $\eta^2 = 0.218$) and anxiety ($F = 5.316$, $p = 0.029$, $\eta^2 = 0.165$) in the intervention group remained statistically significant even after controlling for pre-test scores, indicating a moderate and clinically meaningful effect of the intervention.

Conclusion: The findings suggest that subliminal audio messages can be an effective non-pharmacological intervention for reducing depression and anxiety in patients with cardiovascular diseases.

Keywords: Anxiety; Cardiovascular Diseases; Depression; Hypertension; Subliminal Stimulation.

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Introduction

Cardiovascular disease is considered one of the most important causes of mortality worldwide. This group of diseases includes various disorders in the heart and blood vessels. As one of the most common types, hypertension increases the risk of atherosclerosis, myocardial stroke, stroke, and kidney failure (1). Based on the World Health Organization, 33 percent of adults

worldwide suffer from hypertension. The rate of death caused by hypertension in Iran is reported to be 44.33 per 100,000 people. In this regard, it is ranked 67 in the world (2).

Several studies have reported a significant association between hypertension and mental health disorders, particularly depression and anxiety. However, this relationship is complex and bidirectional. On the one hand, chronic psychological stress, anxiety, and depressive symptoms can contribute to elevated blood pressure through neuroendocrine and behavioral pathways. On the other hand, being diagnosed with and managing a chronic condition such as hypertension can itself lead to emotional distress and psychological burden. Therefore, while hypertension may exacerbate symptoms of depression and anxiety, it can also be influenced by pre-existing mental health conditions. This study focuses on the psychological dimension, aiming to explore interventions that may help reduce psychological symptoms in hypertensive patients (2,3).

About 35 % of hypertension patients suffer from mental disorders such as anxiety and depression (3). These disorders are a common consequence of hypertension and contribute to the progression of the disease (4). Anxiety can increase hypertension and atherosclerosis by activating the sympathetic nervous system (5). Depression can lead to arterial damage and exacerbate hypertension by increasing steroid hormones (6). Anxiety makes one sensitive to internal and external stimuli by reducing concentration (7). Depression is associated with a feeling of sadness and anger that can disrupt daily function (8). Negative emotional experiences, even if they remain at the subconscious level, can affect mental health in the long run and lead to neurotic and psychotic disorders (9). The subconscious, controlling a large part of mental and physical behaviors, plays a key role in this regard. Subliminal audio files contain positive messages designed to influence the subconscious (10). Cognitive science studies have indicated that perception can also occur without consciousness and affect thoughts and behavior (11, 12).

Although subliminal audio messages have gained popularity in popular psychology and alternative therapies, strong empirical evidence for their effectiveness remains limited. Most existing studies have small sample sizes, lack rigorous controls, or report inconsistent findings. Despite this, some preliminary research suggests that auditory subliminal stimulation may influence emotional processing, motivation, and stress responses through subconscious pathways. Given the non-invasive and low-risk nature of such interventions, investigating their potential therapeutic role—especially in vulnerable populations such as hypertensive women experiencing depression and anxiety—may open new avenues for complementary care. This study aims to contribute to this underexplored area by applying a controlled quasi-experimental design.

These audio stimuli may help reduce pain, anxiety, and hypertension by increasing mental energy (13). For example, the manipulation of self-esteem through subliminal stimuli has caused significant changes in vagus nerve activity and blood pressure levels (14). Also, studies have confirmed the effect of these interventions on the performance of Ego, defense mechanisms, and clinical symptoms (15, 16). This study evaluated the effectiveness of this technique on anxiety and depression of women considering the side effects of chemical drugs and the importance of the unconscious role in psychoanalytic dimensions and due to the specific studies on the effect of subliminal audio files on patients with hypertension.

Methods

Research environment and population

This study was conducted at the Heart Hospital Clinic of Seyed al -Shohada Hospital in Urmia in 2021. The statistical population included all women with hypertension in the city. Among them, 30 women with cardiovascular disease and a history of hypertension that were eligible to participate were selected. Then, they were divided into two groups of intervention (n=15) and control (n=15) by random assignment.

Data collection method

After obtaining a code of ethics from the Tabriz University of Medical Sciences' Ethics Committee (IR.iau.tabriz.Rec.1400.021), participants were screened based on inclusion and exclusion criteria as follows:

Inclusion Criteria: Diagnosis of depression and anxiety based on DSM-IV-TR criteria, having reading and writing skills, and a tendency to participate through the signature of informed consent form. History of hypertention?

Exclusion Criteria: Diabetes, psychiatric drug use, or lack of informed consent to continue participating in the study.

After screening, the pre-test was first performed. Beck Depression Inventory (BDIs) and Beck Anxiety Inventory (BAI) were used for both groups. Then, the intervention group received subliminal audio files containing subsidiary messages for 6 weeks with specific instructions:

1- Playing the audio files regularly each week,

2- No need for conscious attention or mental concentration,

3- At least 5 days per week,

4- In order of as determined each week,

5- Special emphasis on fifth and sixth weeks.

During this period, the control group did not receive any intervention. At the end of the sixth week, the post-tests were performed using the same questionnaire for both and the data were collected.

Statistical analysis

Pre-test and post-test data were analyzed using statistical software. In the descriptive statistics section, the mean and standard deviation of the variables were reported. In the inferential statistics section, the ANCOVA and MANCOVA tests were used to compare the impact of interference between groups. To examine the assumptions of the analysis, the Levene's test was used to measure the equality of variances. The data distribution was also normalized. The data collection tools included the Beck Depression Inventory (BDI) and the Beck Anxiety Inventory (BAI).

Before conducting ANCOVA, key assumptions were tested. The homogeneity of regression slopes was examined by including an interaction term between the pre-test scores and group variable; the interaction was non-significant ($p > 0.05$), confirming the assumption. Additionally, the normality of residuals was assessed using the Shapiro–Wilk test and Q-Q plots, which indicated an approximately normal distribution. These findings validated the use of ANCOVA in this study.

Results

The study included 30 women with a history of hypertension, equally divided into intervention (n = 15) and control (n = 15) groups. The mean age of participants in both groups was approximately 49 years. Most participants were married and housewives. Educational levels varied, with the majority holding a high school diploma or lower. The duration of hypertension ranged from less than 5 years to over 10 years, with a relatively balanced distribution across both groups. No significant demographic differences were observed between the intervention and control groups, suggesting a reasonable baseline equivalence for comparative analysis.

Table 1: Demographic Characteristics of Participants (N = 30)

Variable	Category	Intervention Group (n = 15)	Control Group (n = 15)	Total (N = 30)
Age (Mean ± SD)	—	48.6 ± 5.7	49.2 ± 6.1	48.9 ± 5.9
. Marital Status	Married	10	11	21
	Single	3	2	5
	Widowed	2	2	4
Education Level	Below Diploma	4	5	9
	High School Diploma	6	5	11
	Bachelor's Degree	4	4	8
	Master's and above	1	1	2
Employment Status	Employed	5	6	11
	Housewife	10	9	19
Years with Hypertension	Less than 5 years	6	7	13
	5–10 years	5	4	9
	More than 10 years	4	4	8

To examine the effect of subliminal audio file on reducing symptoms of depression and anxiety in women with cardiovascular disease with history of hypertension, the mean and standard deviation of depression and anxiety scores in two stages of pre-test and post-test were calculated for intervention and control groups. They were reported in Table 2.

Table 2. Describing the pre-test and post-test scores of depression and anxiety separately based on group

Measurement	Intervention		Control	
	Mean	SD	Mean	SD
Pre-test of depression	29.13	6.82	27.67	7.75
Post-test depression	23.73	6.76	27.27	6.46
Pre-test of anxiety	17.6	6.04	16.40	7.74
Post-test of anxiety	15.6	7.20	16.93	7.57

Based on the Table 1 results, the mean depression score was 29.13 in the intervention group in the pre-test stage and 23.73 in the post-test stage. This significant reduction (about 5.4 points) in depression scores indicates a reduction in the symptoms of depression in the intervention group after receiving audio intervention. However, depression scores in the control group changed from 27.67 to 27.27 in the pre-test, indicating a relative stability in the symptoms of depression in this group and the lack of significant change in the absence of intervention. The similar pattern was reported for anxiety. The mean anxiety score in the intervention group reduced from 17.6 stage in the pre-test to 15.6 in the post-test stage. This reduction of about 2 scores indicates a slight but significant reduction in the level of anxiety of people's intervention group. However, the control group showed a slight increase in this variable and mean anxiety score changed from 16.4 in the pre-test stage to 16.93 in the post-test stage.

Comparison of pre-test scores in both variables indicated that using subliminal audio file in the intervention group was associated with reduced symptoms of depression and anxiety. However, in the control group, which did not receive any intervention, a significant decrease in these symptoms was not seen and even an increase was seen in anxiety. These results support the relative effectiveness of the intervention in improving the mental state of women with hypertension.

The ANCOVA test was used to investigate the impact of intervention (subliminal audio file) on reducing the symptoms of depression after controlling the initial scores. Table 3 presents the results of this analysis.

Table 3. Results of COVARIANCE analysis of post-test depression after pre-test adjustment

Source of variations	Mean of squares	df	Mean of squares	F value	sig	Impact size
Pre-test	681.692	1	681.692	33.823	0.000	-
Group	151.883	1	151.883	7.536	0.011	0.218
Error	92.478	27	5.440	-	-	-

Based on the results, the effect of pre-test on depression scores was significant (f=33.823, p<0.001), indicating that the initial depression score significantly predicts the post-test score. This conclusion confirms that it was necessary to control the impact of the pre-test to investigate the actual role of the group (intervention) in the analysis. The effect of the group on depression scores in the post-test stage was reported to be significant (f=7.536, p=0.011). This result indicates that after adjusting the pre-test scores, there is a significant difference between the two groups (intervention and control) in the level of depression. In other words, the intervention (subliminal audio file) could significantly reduce the symptoms of depression in the intervention group compared to the control group.

The impact size was 0.218, which is in the moderate range according to Cohen's criteria (1988). This indicates that about 22 % of the changes observed in the post-test scores can be attributed to the difference between groups, which is also clinically significant. Generally, the results of covariance analysis confirm the descriptive results and indicate that the use of subliminal audio file in this study has led to a significant reduction in the severity of the symptoms of depression in women with hypertension.

To investigate the effect of subliminal audio intervention on reducing anxiety of women with hypertension, after controlling the effect of initial anxiety scores, the analysis of COVARIANCE (ANCOVA) was used. Table 4 presents the results of this analysis.

The results indicate that anxiety pre-test scores significantly affect the post-test scores (f=147.259, p<0.001), indicating the strong effect of the initial level of anxiety on its final level after intervention. Additionally, the group variable also shows a significant impact on anxiety scores after adjusting the pre-test effect (f=5.316, p=0.029). This result indicates a significant statistical difference between the intervention group (the recipient of the subliminal audio file) and the control group regarding the anxiety variable. In other words, the use of subliminal audio file significantly reduced the anxiety of the intervention group participants.

The impact size for the group variable is 0.165, which is moderate according to Cohen's criteria. This means that about 17 % of the variance of the changes in post-test anxiety scores can be attributed to difference in grouping (intervention versus control) that is clinically significant. Generally, the results of the analysis of COVARIANCE indicate that the subliminal audio file could effectively reduce the anxiety of the intervention group participants. This effect is beyond what was merely due to the initial differences in participants in the level of anxiety.

Table 4. The Results of COVARIANCE Analysis of Depression after adjusting the pre-test

Source of variations	Mean of squares	df	Mean of squares	F value	sig	Impact size
Pretest	1293.164	1	1293.164	147.259	0.000	-
Group	46.683	1	46.683	5. 316	0.029	0.165
Error	237.102	27	8.782	-	-	-
Total	9513.000	30	-	-	-	-

Discussion

The results revealed that the use of subliminal audio messages significantly reduced depression and anxiety in women with hypertension. A significant difference was observed between the intervention and control groups in post-test scores after controlling for pre-test values. The effect sizes were moderate ($\eta^2 = 0.218$ for depression and $\eta^2 = 0.165$ for anxiety), indicating a meaningful clinical impact of this intervention. These findings are consistent with Ölçücü et al. perspective, who argues that subconscious mental processes and beliefs can influence biological structures in the body, including blood chemistry and gene expression (17). Thus, changes in underlying perceptions can produce significant bio psychological effects.

From a theoretical standpoint, these results can be interpreted within the framework of psychoneuroimmunology (PNI), which studies the interaction between psychological processes and the nervous, endocrine, and immune systems. According to PNI, psychological interventions that affect subconscious mental schemas may modulate neuroendocrine responses, reduce stress hormones, and subsequently improve mood and physiological health. This framework offers a plausible explanation for how subliminal audio messages might exert both psychological and physiological effects on patients with hypertension.

Although direct research on subliminal messages' effects on depression and anxiety is limited, related studies provide supportive evidence. Borgeat et al. (18) demonstrated that subliminal auditory stimuli can influence heart rate, suggesting activation of autonomic nervous system pathways, even if skin conductance responses remained unchanged. Similarly, Farrar et al. (19) and Lewis (20) reported that subconscious self-esteem conditioning via subliminal cues can regulate emotional states, motivation, mood, self-conception, and overall mental health. These findings highlight the power of subconscious processes in emotional regulation.

Moreover, Borsook et al. (12) showed that subliminal methods could reduce pain perception, underscoring the role of subconscious stimuli in modulating sensory and affective experiences. Maleki & Khajei (13) found that subliminally induced emotional experiences influenced moral judgment and prosocial decision-making, further demonstrating the reach of subliminal perception in complex cognitive-emotional functions. Kaewlue et al. (14) explored the effects of subliminal audio and hypnosis on ego function and defensive mechanisms, reporting enhanced ego strength and reductions in maladaptive defenses, which are crucial for emotional resilience and psychological well-being. Additionally, Shabahang et al. (21) suggested that subliminal perception techniques could be incorporated in the treatment of mood disorders and other clinical conditions.

Given the non-invasive nature and minimal side effects of subliminal audio interventions, these findings support its potential as an alternative or complementary treatment for psychological symptoms, especially among hypertensive women who may avoid pharmacotherapy due to adverse effects such as drowsiness, insomnia, dizziness, appetite changes, and sexual dysfunction (22-24). Furthermore, subliminal interventions offer an accessible option for individuals reluctant to engage in traditional psychotherapy, enhancing treatment adherence and broadening therapeutic reach.

This study adds to the emerging body of evidence supporting the efficacy of subliminal audio stimulation as a psychologically and physiologically impactful intervention. Further research with larger samples and neurobiological measures is warranted to elucidate

underlying mechanisms and optimize clinical applications.

Limitations

The present study suffered from some limitations. The statistical population of the study included only women with hypertension and the sample size was limited, limiting the generalization of results. Failure to follow long -term follow -up to investigate the stability of the intervention was also another limitation of the study.

Recommendations

It is recommended for future studies to examine the effectiveness of subliminal files on other psychological disorders, including obsessive-compulsive disorder (OCD). Moreover, the use of larger and more diverse samples in terms of gender and age group and long -term follow -up can increase the generalizability of the results.

Conclusion

The results revealed that the use of subliminal audio file as a non-pharmacological psychological intervention can effectively reduce depression and anxiety in women with cardiovascular disease (hypertension). Due to the significant mean difference of group scores after controlling the pre-test effect, it can be concluded that subliminal intervention has played a positive role in improving the mental state of these patients. Thanks to the non -invasive nature, low cost, independence of the drug and lack of serious side effects, this treatment can be considered a complementary or alternative option for drug therapy and psychotherapy especially for patients who avoid attending psychotherapy sessions.

Despite the effectiveness of this intervention, limitations such as small sample size, using only one gender (only women), and lack of investigating the sustainability of the effects over time limit the generalizability of the results. Thus, further studies with a larger sample size, demographical diversity, and design of follow-up studies are essential to investigate the sustainability of subliminal effects. Generally, the results of this study promise more extensive use of modern psychological interventions, such as subliminal files in the field of psychotherapy, especially in patients with chronic physical diseases. These results can pave the way for conducting further studies and developing non-traditional therapeutic solutions in the field of mental health.

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Author's contribution

Saba Khalilpour and Seyed Davoud Hosseininasab developed the study concept and design. Saba Khalilpour and Seyed Davoud Hosseininasab acquired the data. Saba Khalilpour and Seyed Davoud Hosseininasab analyzed and interpreted the data, and wrote the first draft of the manuscript. All authors contributed to the intellectual content, manuscript editing and read and approved the final manuscript.

Informed consent

Questionnaires were filled with the participants' satisfaction and written consent was obtained from the participants in this study.

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Conflict of interest

The authors declare that they have no conflict of interests.

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