

# The Effect of Mindfulness Breathing-Exercise on Stress and Depression Symptoms in Patients with Chronic Diseases

## Kronik Hastalığı Olan Bireylerde Bilinçli Farkındalık Nefes Egzersizinin Stres ve Depresyon Belirtileri Üzerine Etkisi

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### ABSTRACT

**Aim:** The aim of this study is to assess the effect of mindfulness-based breathing-therapy on stress and well-being in individuals with chronic diseases.

**Methods:** The study was conducted with single-blind randomised-controlled trial design and conducted with patients with chronic disease. 100 patients were randomly assigned to experimental (n=50) and control groups (n=50). Breathing-therapy received on each patient individually for 20 minutes in the experimental group. The sole requirement for the patients in the control group was to sit in a relaxed position for 20 minutes in a place without sound. Experimental received 60 minutes of breathing-therapy once a week for a total of three sessions. "Personal Information Form, Perceived Stress Scale and Beck Depression Screening Scale for Primary Care" were used for data collection.

**Results:** Participant average age was 47.50 (SD, 18.79), with participants aged between 18 and 80 years. The number of female participants (62%) was higher than males (38%). Half of the participants had completed high school and university. Most of the participants were not working and their economic situation was middle. The number of years since chronic disease diagnosis ranged from 1 to 39 years. No statistically significant difference was found between the groups in terms of socio-demographic and clinical characteristics ( $p \geq .05$ ). The result of the study revealed that the therapy decreased the severity of stress (31.92 vs. 34.60) and depression (2.01 vs. 4.42) in patients with chronic diseases ( $p < .05$ ).

**Conclusion:** Mindfulness-based Breathing-therapy decreased stress level, depression in patients with chronic diseases. Our findings suggest regular mindfulness-based Breathing-therapy for stress and depression is important in the primary care of chronic diseases. We believe that these studies would contribute significantly to the management of chronic diseases.

**Keywords:** Mindfulness, breathing exercises, stress, psychological, depression, chronic disease, nursing care

### öz

**Amaç:** Kronik hastalığı olan bireylerde bilinçli farkındalık temelli nefes terapisinin stres ve iyi oluş üzerindeki etkisini değerlendirmektir.

**Yöntem:** Çalışma tek kör randomize kontrollü çalışma tasarımı ile yürütülmüş ve kronik hastalığı olan hastalarla gerçekleştirilmiştir. Toplam 100 hasta deney grubu (n=50) ve kontrol grubuna (n=50) rastgele atanmıştır. Deney grubundaki her hastaya 20 dakika boyunca bireysel olarak nefes terapisi uygulanmıştır. Kontrol grubundaki hastalardan yalnızca sessiz bir ortamda 20 dakika boyunca rahat bir pozisyonda oturması istenmiştir. Deney grubuna haftada bir kez toplam üç seans olmak üzere 60 dakika nefes terapisi uygulanmıştır. Veri toplamak için "Bireysel Bilgi Formu, Algılanan Stres Ölçeği ve Birinci Basamak için Beck Depresyon Tarama Ölçeği" kullanılmıştır.

**Bulgular:** Katılımcıların ortalama yaşı 47.50'di. olup, Kadınların oranı (%62) erkeklerden (%38) daha yüksekti. Katılımcıların çoğu çalışmıyordu ve ekonomik durumları orta düzeydeydi. Gruplar arasında sosyodemografik ve klinik özellikleri birbirine benzerdi ( $p \geq .05$ ). Farkındalık temelli nefes terapisinin kronik hastalığı olan hastalarda stres (31.92 vs. 34.60) ve depresyonun şiddetini (2.01 vs. 4.42) azalttığı belirlendi ( $p < .05$ ).

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**Sonuç:** Farkındalık temelli nefes terapisi, kronik hastalığı olan hastalarda stres ve depresyonun şiddetini azaltmıştır. Bulgular, stres ve depresyon için düzenli farkındalık temelli nefes terapisinin kronik hastalıkların birinci basamak tedavisinde önemli olduğunu göstermektedir.

**Anahtar kelimeler:** Farkındalık, nefes egzersizleri, stres, psikolojik, depresyon, kronik hastalık, hemşirelik bakımı

## INTRODUCTION

Chronic diseases are among the major causes of death around the world. WHO reports that 41 million people die each year and chronic diseases account for 71% of all deaths worldwide. Particularly, cardiovascular diseases account for the majority of deaths, followed by cancer, respiratory disorders, and diabetes <sup>(1)</sup>. Chronic diseases also have an adverse effect on patients' quality of life, impair their well-being, and result in consequences, such as stress, depression, and anxiety <sup>(2)</sup>. Psychological stress is an important risk factor in the development and progression of cardiovascular diseases and other chronic diseases (such as cancer, major depression) <sup>(3)</sup>. Emotions cause changes in functional processes related to the nervous, endocrine, and immune systems, which are influenced by stress <sup>(4)</sup>. A similar study on COPD patients reported that patients suffer high anxiety, which resulted in more acute exacerbations, shortness of breath, as well as frequent hospitalisations <sup>(5)</sup>.

Based on the mindfulness interventions have been demonstrated to beneficial for management of many psychological and social problems, such as anxiety, distress, depression, and impaired quality of life particularly related to chronic diseases <sup>(2)</sup>. Mindfulness-based Breathing-therapy is one of these practices. This technique is used to alleviate stress by relaxing the body's muscles, as well as to control our emotions and balance the energy in our body. While breathing, try to feel that you are breathing and focus on breathing. The focus on the breath is the basis of mindfulness-based practices, which are employed to raise individual awareness and self-control, reduce the effect of stress factors on individuals and facilitate pain control and recovery <sup>(6,7)</sup>. Deep breathing positively affects patients by alleviating their tension and anxiety. Deep breathing is one of the methods often employed in Japan to reduce stress and improve mood <sup>(8)</sup>. Studies have reported that deep-breathing relaxation techniques are effective in controlling emotions<sup>(9)</sup>, and alleviating preoperative anxiety in reducing tension, anxiety and fatigue in tuberculosis patients<sup>(10)</sup> as well as in patients with gynaecological cancer and those receiving adjuvant chemotherapy. Similarly, it is effective in reducing heart rate in the control of essential hypertension.

It is also effective in managing pain and improving quality of life after abdominal surgery in chronic obstructive pulmonary diseases (COPD) <sup>(9-12)</sup>. The aim of this study is to evaluate the effect of mindfulness-based Breathing-therapy on stress and well-being of individuals with chronic diseases.

## MATERIALS AND METHODS

### Study Design

This single-blind randomised-controlled study was completed with patients with chronic disease who were registered to a Primary Care Centre in Istanbul between January 2021 and September 2022. The study was conducted in accordance with the guidelines of the Consolidated Standards of Reporting Trials (CONSORT) Checklist (Figure 1). The participants were a total of 100 patients (50 in the experimental group and 50 in the control group).

### Sample

Patients aged 18 and above, who were voluntary, had no communication impairments, had no psychiatric disorder, and had never previously trained on Breathing-therapy, were included in the study.

The sample size was calculated by using GPower 3.1.9 software based on the data of a similar study. According to the sample effect size of 0.5 and margin of error of 0.05, the sample size was determined as 42 patients in each group. The analysis based on this sample size was determined to have a power of 92.1%. Taking into account the possibility of loss throughout the course of the study, totally 100 patients were determined, 50 for each group. The patients who met the inclusion criteria were randomly assigned to the Breathing-therapy group or the control group at a 1:1 ratio by using a computer-generated randomisation list prepared by the researcher.

### Data Collection

The 'Patient Information Form, Perceived Stress Scale, and Beck Depression Screening Scale for Primary Care' were employed in this study.

### Personal Information Form

It was prepared by the researchers in accordance with the literature and contains questions on

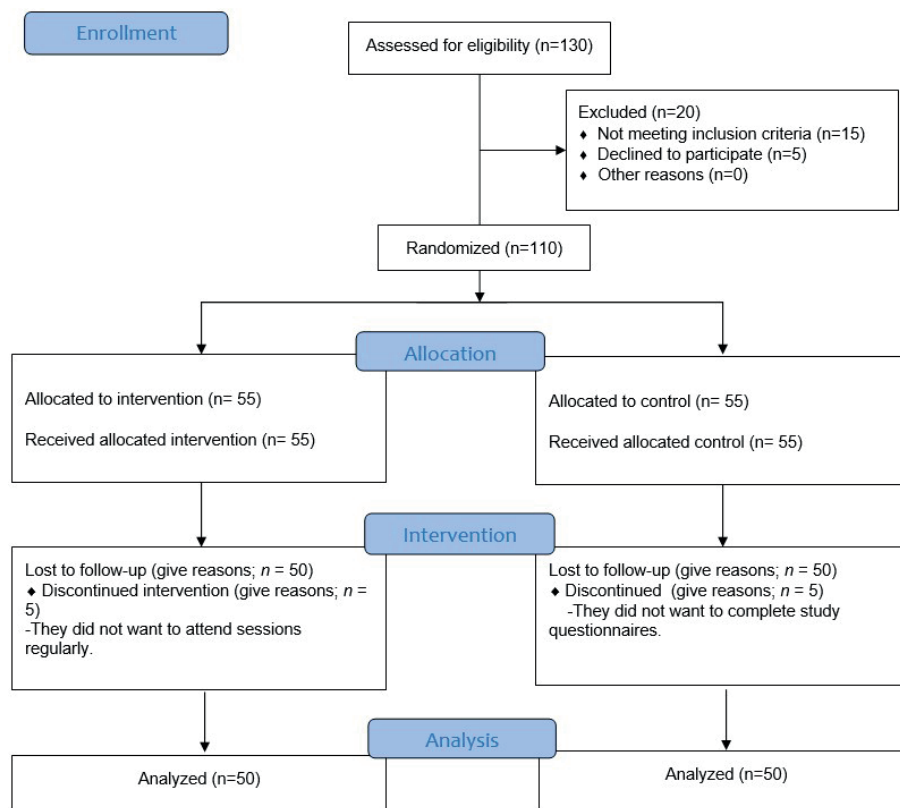


Figure 1. Consort flow diagram

demographic characteristics of patients (age, sex, educational level, marital status, place of residence, working status, and type of chronic disease).

### The Perceived Stress Scale

The scale consists of 10 items to assess how individuals evaluate stressful life circumstances as unpredictable, uncontrollable, and difficult to cope with in the last month. It was developed by Cohen et al. (1983)<sup>(13)</sup>. The items on the scale are rated using a 5-point Likert scale ranging from “0=never” to “4=often.” The lowest and highest scores of the scale are 0 and 40, respectively. A high score signifies an excessive perception of stress. Eskin et al., adapted the scale to Turkish<sup>(14)</sup>. It has two sub-dimensions: inadequate self-efficacy and stress/discomfort perception. The reliability values of the two factors were determined to be .69 and .80. The overall reliability of the scale was determined to be .82, while the test-retest reliability was .88. In this study, its internal validity coefficient was found to be .828.

### The Beck Depression Screening Scale for Primary Care

The Beck Depression Inventory is employed as a screening test for primary care to lower the false

positive rate for depression<sup>(15,16)</sup>. It screens for depression by inquiring about symptoms of sadness, pessimism, past failures, self-dislike, self-blame, loss of interest, and suicidal ideation or desire under seven headings. Each item contains a four-point rating from 0 to 3. The highest score of the scale is 21. Despite lack of a reported cut-off score, the probability of depression is above 90% for scores above 4. In this study, its internal validity coefficient was found to be .86.

### Procedure

First of all, written informed consent was obtained from the participants after they were informed about the study. They were assigned to the Breathing therapy group or the control group using the randomisation list in the computer. All patients were provided with the ‘Patient Information Form, the Perceived Stress Scale, and the Beck Depression Screening Scale for Primary Care’ prior to the practice. A certified therapist practised Breathing-therapy on each patient individually for 20 minutes in the experimental group. All patients in experimental received 60 minutes of Breathing-therapy once a week for a total of three sessions. All patients completed the ‘Perceived Stress Scale and Beck

Depression Screening Scale for Primary Care' again following the third session. The sole requirement for the patients in the control group was to sit in a relaxed position for 20 minutes in a place without sound.

### Intervention

In all Breathing-therapy sessions, the researcher informed patients about the therapy program process and content. The soft piano music was turned on. The use of piano sound was preferred in the study, as it was typically considered relaxing. Information was presented on how breathing may alleviate stress with its soothing effect on the body and mind. To begin breathing exercises, they were asked to close their eyes and sit comfortably (loosen their belt, buttons, and shoes). They were advised to leave aside their anxieties about the future and their self-judgments and concentrate on the existing time and space. The patients were then instructed to concentrate on their breathing and to feel it in every part of their bodies. During breathing exercises, they were instructed to concentrate, feel, and be aware of their feelings. The metaphor of the "TV screen" was used to allow group members to extract themselves from their thoughts. They were asked to visualise a circumstance that had upset them and caused them stress and tension recently. When participants felt that negative thoughts were producing negative emotions, stress, and tension, they were asked to envision a TV screen and imagine that they were witnessing the event they were experiencing at that moment on TV. They were asked to open their eyes by taking three deep breaths.

### Ethical approval

Approval was obtained from the Ethics Committee of the University (Approval Number: 2020/12). Firstly, the participants were informed about the study, its purpose, and data collection tools. Informed consent was then obtained from the participants who agreed to participate in the study. The study was conducted in accordance with the principles of the "Declaration of Helsinki".

### Data Analysis

Percentages, frequencies, and mean values (min-max) were calculated during the statistical analysis. To determine the difference between groups, the Chi-square, Student-T, and Paired Sample tests were applied. All results were considered significant

at  $p < .05$  and a confidence interval of 95%. All measurement readings were obtained by another researcher who was blinded to group allocation.

## RESULTS

### Demographic and Clinical Characteristics

Any statistically significant difference was not found between the groups in terms of socio-demographic and clinical characteristics ( $p \geq .05$ ) (Table 1).

Participant average age was 47.50 (SD, 18.79), with participants aged between 18 and 80 years. The number of female participants (62%) was higher than males (38%). Half of the participants had completed high school and university. Most of the participants were not working and their economic situation was middle. The number of years since chronic disease diagnosis ranged from 1 to 39 years.

### Stress Scores

Table 2 summarises the means and standard deviations in the Perceived Stress Scale scores at before and after than breath therapy program. Accordingly, although the pretest the Perceived Stress Scale scores of the experimental ( $35.26 \pm 5.09$ ) and the control groups ( $35.48 \pm 5.31$ ) were similar ( $p = 0.833$ ), posttest Perceived Stress Scale score of the experimental group ( $31.92 \pm 4.75$ ) was significantly lower than the score of the control group ( $34.60 \pm 4.35$ ) ( $p = 0.004$ ).

When the measurement results of the experimental group before and after the breathing program were compared, it was determined that the stress scores significantly decreased ( $p = 0.003$ ). However, no statistically significant difference was found in the control group ( $p = 0.336$ ) (Table 2).

### Depression Scores

Table 3 summarises the means and standard deviations in "Beck Depression Screening Scale for Primary Care" Scores at before and after than breath therapy program. Accordingly, although the pretest the "Beck Depression Screening Scale" scores of the experimental ( $3.48 \pm 3.96$ ) and the control groups ( $4.93 \pm 4.39$ ) were similar ( $p = 0.086$ ), posttest "Beck Depression Screening Scale" score of the experimental group ( $2.01 \pm 4.01$ ) was significantly lower than the score of the control group ( $4.42 \pm 5.66$ ) ( $p = 0.016$ ).

**Table 1. The Socio-Demographic Characteristics of Groups**

| Characteristics    | Experimental Group (n = 50) |           | Control Group (n = 50) |           | Test           | p     |      |
|--------------------|-----------------------------|-----------|------------------------|-----------|----------------|-------|------|
|                    | Mean ± SD                   | Mean ± SD | Mean ± SD              | Mean ± SD |                |       |      |
| Age                | 43.98 ± 17.50               |           | 47.50 ± 18.79          |           | t: -0.969      | .335  |      |
| Disease Duration   | 10.12 ± 8.90                |           | 12.68 ± 9.81           |           | t: -1.366      | .175  |      |
|                    | n                           | %         | n                      | %         | χ <sup>2</sup> | p     |      |
| Gender             | Female                      | 30        | 60.0                   | 31        | 62.0           | .042  | .838 |
|                    | Male                        | 20        | 40.0                   | 19        | 38.0           |       |      |
| Economic Condition | Good                        | 7         | 14.0                   | 6         | 12.0           | .182  | .913 |
|                    | Middle                      | 25        | 50.0                   | 27        | 54.0           |       |      |
|                    | Low                         | 18        | 36.0                   | 17        | 34.0           |       |      |
| Employment Status  | Working                     | 13        | 26.0                   | 19        | 38.0           | 1.796 | .407 |
|                    | Not working                 | 21        | 42.0                   | 19        | 38.0           |       |      |
|                    | Retired                     | 16        | 32.0                   | 12        | 24.0           |       |      |
| Education          | Literate                    | 14        | 28.0                   | 16        | 32.0           | 3.150 | .533 |
|                    | Primary School              | 7         | 7.0                    | 6         | 12.0           |       |      |
|                    | Secondary school            | 8         | 16.0                   | 3         | 6.0            |       |      |
|                    | High School                 | 11        | 22.0                   | 11        | 22.0           |       |      |
|                    | University                  | 10        | 20.0                   | 14        | 28.0           |       |      |
| Disease type       | Diabetes                    | 10        | 20.0                   | 6         | 12.0           | 2.567 | .922 |
|                    | Heart Failure               | 6         | 12.0                   | 5         | 10.0           |       |      |
|                    | Hypertension                | 15        | 30.0                   | 12        | 24.0           |       |      |
|                    | Asthma                      | 9         | 18.0                   | 12        | 24.0           |       |      |
|                    | Epilepsy                    | 1         | 2.0                    | 3         | 6.0            |       |      |
|                    | KOAH                        | 1         | 2.0                    | 1         | 2.0            |       |      |
|                    | Renal Failure               | 3         | 6.0                    | 4         | 8.0            |       |      |
|                    | Cancer                      | 5         | 10.0                   | 7         | 14.0           |       |      |

t: t test in independent groups, χ<sup>2</sup>: Pearson Chi-square test

**Table 2. The The Perceived Stress Scale Scores of Experimental and Control Groups**

| Measurements                  | Experimental Group (n=50) | Control Group (n=50) | t*        | p           |
|-------------------------------|---------------------------|----------------------|-----------|-------------|
|                               | Mean±SD                   | Mean±SD              |           |             |
| Before                        | 35.26±5.09                | 35.48±5.31           | t: -.211  | .833        |
| After                         | 31.92±4.75                | 34.60±4.35           | t: -2.937 | <b>.004</b> |
| Stress before-last scores t** | 3.328                     | .972                 |           |             |
| p                             | <b>.002</b>               | .336                 |           |             |

t \*: t test in independent groups, t \*\*: t test in paired samples, p < 0.05.

**Table 3. The Beck Depression Screening Scale for Primary Care Scores of Experimental and Control Groups**

| Measurements                  | Experimental Group (n=50) | Control Group (n=50) | t*        | p           |
|-------------------------------|---------------------------|----------------------|-----------|-------------|
|                               | Mean±SD                   | Mean±SD              |           |             |
| Before                        | 3.48±3.96                 | 4.93±4.39            | t: -1.735 | .086        |
| After                         | 2.00±4.01                 | 4.42±5.66            | t: -2.447 | <b>.016</b> |
| Stress before-last scores t** | 1.837                     | .506                 |           |             |
| p                             | .072                      | .616                 |           |             |

t \*: t test in independent groups, t \*\*: t test in paired samples, p < 0.05.

When the measurement results of the groups before and after the breathing program were compared, there was no statistically significant difference between the groups (p>0.05) (Table 3).

## DISCUSSION

Psychological therapies have been found to have an important role in coping with illness in those with chronic disease<sup>(2)</sup>. Studies in the literature show that deep-breathing has a significantly positive impact on an individual’s emotional, physical and psychological well-being<sup>(17-19)</sup>. The practice of deep-breathing with mindfulness techniques reveals significant psychological effects on mood, stress, positive affect, emotional regulation and cognitive control<sup>(4,20,21)</sup>. In addition to these effects, it has been shown to have a significant impact on the improvement of medical conditions such as hypertension, COPD, cardiac rehabilitation and diabetes<sup>(18,22)</sup>.

It was observed that the patients included in this study were diagnosed and treated for chronic diseases such as hypertension, asthma, heart failure, cancer, diabetes, kidney failure, epilepsy and COPD, respectively. There has been a range of 1 to 39 years as of the diagnosis of chronic disease. Long-term treatment of patients negatively affects patients’ quality of life, impairs their well-being, and results in consequences, such as stress, depression, and anxiety<sup>(2)</sup>. Niazi and Niazi<sup>(21)</sup> reported that individuals with diabetes suffered 20% more anxiety and 25% more depression than those without diabetes. Nonetheless, in addition to treatment, mindfulness-based Breathing-therapy practices that are affordable, safe, and easy to apply help alleviate these patients’ stress and depression. In this study, when the measurement readings of the experimental group before and after the mindfulness Breathing-therapy program were compared, it was determined that the stress scores decreased significantly. There was a statistically significant difference between

the experimental and control groups. Likewise, there was a statistically significant difference between the experimental and control groups on the “Beck Depression Screening Scale” score of the experimental group. Results of the present study are compatible with those of the studies conducted with hypertensive<sup>(23)</sup> and diabetic individuals<sup>(22)</sup>. Therefore, mindfulness breathing exercise, which is a nursing intervention, can be used as a non-pharmacological approach to lower stress levels in individuals with chronic diseases. Similarly, the study assessing the effect of yoga breathing on chemotherapy-related symptoms and quality of life in cancer patients by Dhruva et al.<sup>(24)</sup>, discovered that it diminished sleep disruption and anxiety and enhanced quality of life. Another study examining the effects of yoga on quality of life and depression in elderly breast cancer patients indicated that yoga practice, which incorporates breathing therapy, relieved depression, pain, and fatigue, and enhanced the quality of life<sup>(25)</sup>. Likewise, another randomised, controlled study with women treated for breast cancer reported that the mindfulness stress reduction program lowered anxiety and depression levels and improved psychological well-being compared to the control group<sup>(26)</sup>.

## CONCLUSIONS

This randomised controlled study demonstrated that Breathing-therapy reduced the levels of stress and depression in individuals with chronic diseases. This non-pharmacological Breathing-therapy could be recommended for patients with chronic diseases. Mindfulness Breathing-therapy can be considered as an application that positively aids the treatment of individuals with chronic diseases when applied by healthcare professionals and adapted to the individual’s needs. In the future, empirical research should be conducted on the efficacy of mindfulness Breathing-therapy programs on the course of diseases and how patients cope with



chronic diseases. We believe that these studies would contribute significantly to the management of chronic diseases.

#### Author contribution

Study conception and design: ÖA and DY; data collection: ÖA and DY; analysis and interpretation of results: ÖA and DY; draft manuscript preparation: ÖA and DY. All authors reviewed the results and approved the final version of the manuscript.

#### Ethical approval

The study was approved by the Istanbul Sabahattin Zaim University Ethics Committee (Protocol no. 2020/12/30.12.2020).

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The authors declare that the study received no funding.

#### Conflict of interest

The authors declare that there is no conflict of interest.

#### Yazar katkısı

Araştırma fikri ve tasarımı: ÖA ve DY; veri toplama: ÖA ve DY; sonuçların analizi ve yorumlanması: ÖA ve DY; araştırma metnini hazırlama: ÖA ve DY. Tüm yazarlar araştırma sonuçlarını gözden geçirdi ve araştırmanın son halini onayladı.

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