29.03.2025

THE EFFECT OF MUSIC DURING NON-STRESS TESTING ON WOMEN'S COMFORT, VITAL SIGNS AND ANXIETY: A RANDOMİZED CONTROLLED STUDY

Music has direct and indirect positive effects on the mother and fetus during pregnancy and perinatal period. This study was aimed at investigating effects of music played during the Non-Stress Test (NST) procedure on the mother's comfort, vital signs and anxiety.

The present study is a randomized controlled experimental study. Pregnant women who presented to the NST outpatient clinic of a research hospital in the Central Anatolia region of Türkiye between June 2025 and August 2025 comprised the population of the study. The study's sample size was calculated using the G*Power 3.1.9.2 software based on data from a study by Başkurt and Yılmaz [1]. The mean anxiety scores and standard deviation values from that study were used, and the effect size was calculated as 0.79. The minimum number of pregnant women to be included in the sample of this study was calculated as 70 pregnant women, 35 in each group, using the G*Power 3.1.9.2 software, based on an effect size of 0.79, an alpha value of 0.05, and a power value of 0.95. To increase the analysis power of the study, the study sample consisted of 173 pregnant women (music group= 93 and control group= 80).

The inclusion criteria of the study were as follows: being between the ages of 18 and 45 years, having completed the 32nd week of gestation, not having any risk factors in their pregnancy (such as premature rupture of membranes, preeclampsia, gestational diabetes), not having multiple pregnancies, not having low (80/60 mmHg and below) or high (140/90 mmHg) blood pressure levels, having eaten at least two hours before the NST procedure, not smoking or consuming alcohol at least two hours before the NST procedure, being able to communicate, not having any hearing problems, and volunteering to participate in the study.

The exclusion criteria of the study were as follows: Pregnant women who had a fetus with fetal distress, for whom emergency intervention was considered by the physician, who had impaired NST and required immediate intervention, who had a psychiatric disease diagnosis and hearing impairment were not included in the study (Figure 1).

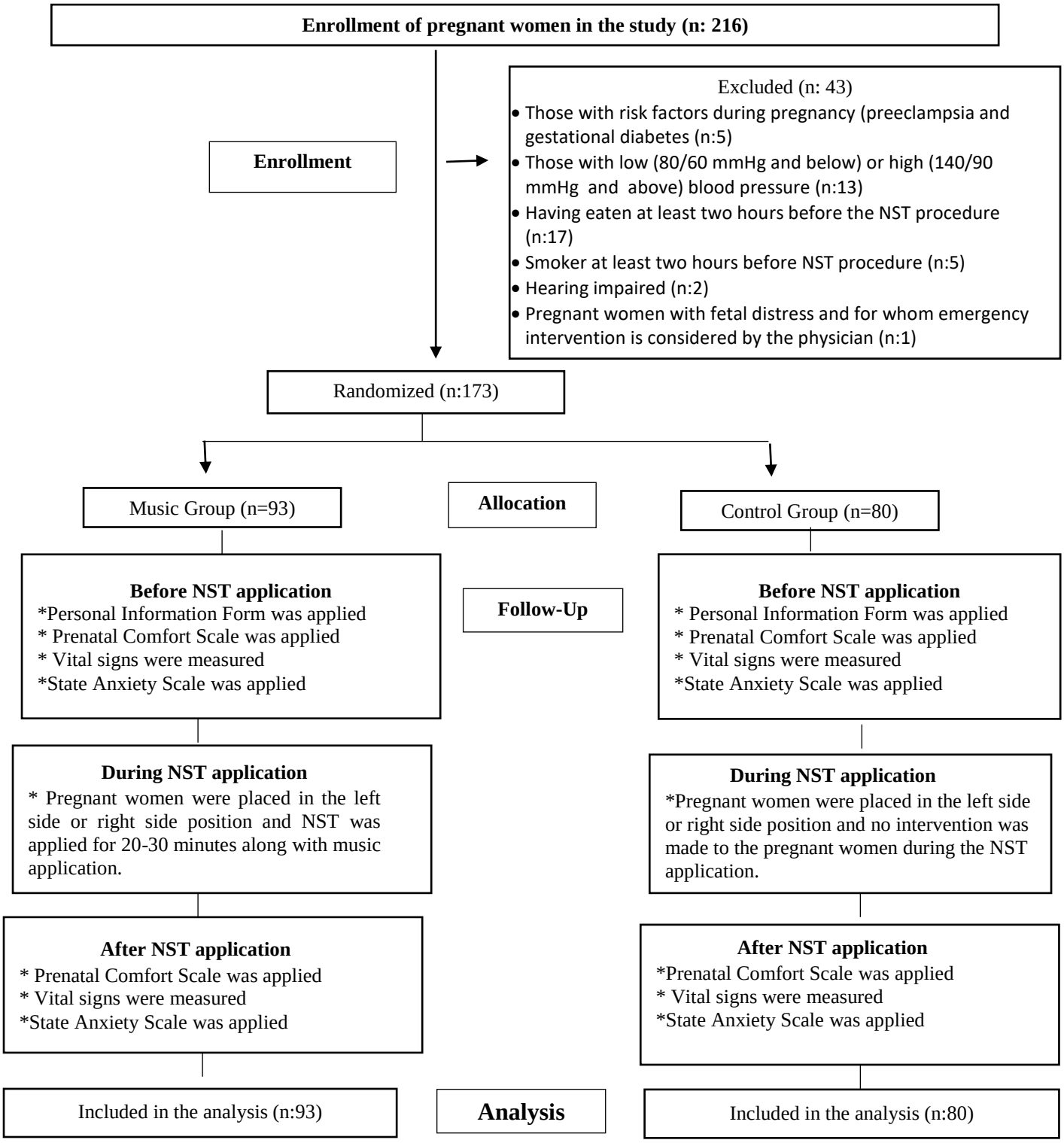

Figure 1. CONSORT flowchart

Procedure

Selection of music: The music played to the pregnant women was selected by the researchers in accordance with the definition of relaxing music made in the literature. Before the music selection, the researchers communicated with the TÜMATA (Turkish acronym for the "Research and Promotion of Turkish Music Association). After the meeting held with the association, it was decided to use the 'Acemaşiran' (a musical mode in traditional Turkish music). In the study, music prepared by the TÜMATA in the Acemaşiran mode was played. It is stated that Acemaşiran mode helps balance the body, helps the listener relax, facilitates birth, helps correct the wrong position of the fetus in the womb, and has a pain and spasm relieving effect [2,3].

Randomization:

Simple randomization method was used in this study. Pregnant women who met the study criteria were randomly assigned to the music or control group with equal probability, independently of any previous assignments, on the day they came to the hospital for their physical examination. The total number of pregnant women determined by the G*Power analysis was entered into the program at "https://www.randomizer.org," and randomization was conducted using the program. The assignment of the groups was performed on the computer, and the pregnant women were randomly assigned to the music and control groups.

Data collection:

The data of the study were collected from the pregnant women using the face-to-face interview technique at the NST outpatient clinic on the days and hours when the researcher was present in the hospital. The participating pregnant women were not informed of the group they belonged to. Since only the researcher knew the participants' groups, single-blindness was achieved in the study.

Music Group: The purpose of the study was explained to the pregnant women who met the inclusion criteria. After their written consent was obtained, they were administered the Personal Information Form, Prenatal Comfort Scale, Vital Signs Form, and State Anxiety Scale used to measure their anxiety level before the NST procedure. They were asked to lie on their left or right side. After the pregnant women were positioned, while the NST procedure was implemented they listened to music for 20-30 minutes. The pregnant women listened to the music on an MP3 player during the application. The duration of the music recorded on the

MP3 player was 30 minutes. To avoid hygiene problems, each pregnant woman was provided with individual headphones, which were given to them as a gift after the procedure. The volume of the music was adjusted by the pregnant women. After the procedure was completed, the Prenatal Comfort Scale, Vital Signs Form and State Anxiety Scale were administered again.

Control Group: The purpose of the study was explained to pregnant women who met the inclusion criteria. After their written consent was obtained, they were administered the Personal Information Form, Prenatal Comfort Scale, Vital Signs Form, and State Anxiety Scale used to measure their anxiety level before NST. They were asked to lie on their left or right side. They underwent no other intervention during the NST procedure. After the procedure was completed, the Prenatal Comfort Scale, Vital Signs Form and State Anxiety Scale were administered again.

Data Collection Tools

Personal Information Form: The form was administered to determine the participant's socio-demographic characteristics such as age, education level, employment status, family type, income level, and her obstetric characteristics such as whether her pregnancy was planned, what her gestational age was and whether she had undergone NST before.

Prenatal Comfort Scale (PCS): Takeishi et al. developed the PCS to determine the prenatal comfort level of the woman in Japan in 2011 [4]. In the first version, the PCS had 34 items, but then they revised it and shortened to 15 items [5]. The short version of the PCS consists of 15 items and the following 5 subscales: "The impact of developing relations with the spouse on the paternity role - Husband" (3,4,7,9), "Interacting with the movements of the fetus - Fetus" (13,14), "Social support received from the people around - People" (11,12,15), "Acceptance of the maternal role and attachment to the baby-Mother" (1,5,8), "Realizing the changes in oneself during pregnancy-Myself" (2,6,10). Response given to the items are rated on a six-point Likert type scale ranging from 0 to 5 (0 = Strongly disagree, 1 = Disagree, 2 = Undecided, 3 = Somewhat agree, 4 = Agree, 5 = Strongly agree). The minimum and maximum possible scores that can be obtained from the PCS are 0 and 75, respectively. The higher the score is the higher the comfort level is. Şenol, Özkan and Aslan performed the validity and reliability study of the Turkish version of the PCS (2020), the Cronbach's alpha value of the PCS was 0.815 in Şenol, Özkan and Aslan's study [6].

Vital Signs Form: The form was used to record the pregnant women's body temperature, pulse rate, respiration rate and blood pressure values.

State Anxiety Scale (SAS): Spielberger et al. developed the SAS to determine how an individual feels at a certain moment and under certain conditions (1983). Öner and Le Compte performed the validity and reliability study of the Turkish version of the SAS (1998) [7,8]. Some of the items are reverse scored. While the reverse scored items question positive emotions, the other items question negative emotions. Responses given to the items are as follows: "not at all" (1), "somewhat" (2), "moderately" (3), "very much" (4), which indicate the degree of severity of the feelings, thoughts or behaviors. In this section, items 1, 2, 5, 8, 10, 11, 15, 16, 19 and 20 are reverse scored. To calculate the total score of the SAS, the total score of the reversed items is subtracted from the total score of the non-reversed items. Then, 50 points, which is the constant value of the state anxiety scale, are added to this score. The result is the score for the overall SAS. The total score varies between 20 and 80. The higher the score is the higher the level of the anxiety is. While a score ranging between 0 and 19 indicates “no anxiety”, a score ranging between 20 and 39 indicates mild anxiety, a score ranging between 40 and 59 indicates moderate anxiety, a score ranging between 60 and 79 indicates severe anxiety, and a score of 80 indicates very severe anxiety (Panic) [8].

Statistical Analysis of the Data

The data obtained in the present study were analyzed using the SPSS (Statistical Package for Social Sciences) 25.0. In the analysis of the data, to compare the homogeneity between the groups, cross tables were created for categorical variables, and the Chi square (X^2) and Fisher's exact test were used. Numerical variables were given as mean±standard deviation ($\bar{X}$±SD) whereas categorical variables were given as number (n) and percentage (%). For non-parametric data that were not normally distributed, the Mann-Whitney U test was used to evaluate the difference between two groups, and the Kruskal-Wallis H test was used to find differences between the variables with three or more categories. Spearman correlation analysis was performed to reveal the relationship between the dependent variables. The Wilcoxon test (significance test of the difference between two paired groups) was used to test the difference in the dependent groups at two different measurement times. The significance level was accepted as $p<0.05$. The confidence interval was 95%.

Reference

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Informed Consent Form

A text explaining the purpose of the study, that participation in the study is voluntary, that no personal information such as name, surname, or school number should be included, and that the survey should be completed, was placed at the beginning of the survey form developed for the collection of research data as a consent text.

Dear Participant,

This study, titled " The Effect Of Music During Non-Stress Testing on Women's Comfort, Vital Signs and Anxıety: A Randomized Controlled Study" is being conducted by Dr. Gamze GÖKE ARSLAN, Assistant Professor of Nursing at Karamanoğlu Mehmetbey University, Faculty of Health Sciences; Assoc. Prof. Dr. Yasemin ŞANLI, Assistant Professor of Midwifery at Karamanoğlu Mehmetbey University; Dr. Nuran Nur AYPAR AKBAĞ, Assistant Professor of Midwifery at Sinop University; Assoc. Prof. Dr. Eda ERGİN, Associate Professor of Nursing at Bakırçay University; and Prof. Dr. Şebnem ÇINAR YÜCEL, Assistant Professor of Nursing at Ege University. The study aimed to evaluate the effect of music played during NST on maternal comfort, vital signs, and anxiety. Therefore, it is crucial that you answer all questions sincerely.

Your participation in the study is voluntary. The information obtained through this form will remain confidential and will be used only for research purposes (or "scientific purposes"). You may choose not to participate in the study or discontinue the survey if you do not wish to participate.

Do not write your first and last name on the survey form.

Our survey consists of four sections. This 48-question survey, which will take approximately 40 minutes, will require you to complete the survey. Please indicate your answers by circling the appropriate option below the questions or, for open-ended questions, by writing in the space provided below the question. For questions where you can select more than one option, select all the options that apply to you. If the answer to the question is "other" and your answer is not among the available options, please write your answer in the space provided next to "other."

Thank you for completing the survey. If you have any questions about the study, you can contact the following person(s):

Gamze GÖKE ARSLAN

Karamanoğlu Mehmetbey University, Faculty of Health Sciences,

Department of Fundamentals of Nursing

Phone:+905064941982 mail: gamzegoke@kmu.edu.tr

Research Team

Gamze GÖKE ARSLAN & Yasemin ŞANLI & Nuran Nur AYPAR AKBA & Eda Ergin & Şebnem ÇINAR YÜCEL

If you agree to participate in the study, please mark the box below with an X and continue.

☐ I accept.