

# The Effect of Music Therapy on Clients' Vital Signs during Pulmonary Function Test: An Experimental Study

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## ABSTRACT

**Background:** The patient's vital signs must stay stable pre a pulmonary function test since the approach demands the patient to breathe slowly and deeply and exhale quickly. However, events that cause variations in normal vital signs may impact the patient. Many strategies can be utilized to stabilize vital signs, including music treatment. The purpose of this study is to compare the effectiveness of music therapy on the vital signs of client's pre a pulmonary function test.

**Methods:** An experimental design study with an application (pre-test, post-test), to determine the effectiveness of music therapy for clients pre pulmonary function test for 106 clients in Al-Diwaniyah, Al-Shamiya, and Al- Hamza public hospitals In Iraq. Participant's vital signs (pulse rate, respiratory rate, blood pressure and oxygen saturation) were measured before and after the intervention group. Two groups assigned as music interventions and a control group.

**Results:** The results showed the difference in Pulse rate between pre and post- test were decrease in Music therapy group 6.32 b/m. While Systolic blood pressure and Diastolic blood pressure were increased in Music therapy group 3.17/ 2.22 mm/hg respectively. Also the results showed the respiratory rate was decreased in Music therapy group 2.07 b/m. While oxygen saturation was increased in Music therapy group 2.20.

**Conclusions:** Listening to music pre pulmonary function test had a positive effect on the regulation or stability of vital signs. Age and body mass index have the most influence on the vital signs of the clients who listened to music pre pulmonary function test.

## INTRODUCTION

Asthma, Chronic Obstructive Pulmonary Disease (COPD), infections like influenza, pneumonia, and Tuberculosis (TB), pulmonary embolism, pulmonary hypertension, lung cancer, pleural effusion, pneumothorax, mesothelioma, chronic and acute bronchitis, and emphysema, among other breathing problems, are all examples of lung disease. Several lung diseases can induce respiratory failure (Matthew, 2020). Lung disease is classified into three types: The first is diseases of the airways, the tubes that transport oxygen and other gases into and out of the lungs. Second, lung tissue diseases alter the structure of lung tissue. Scarring or inflammation of the tissue prevents the lungs from expanding fully. Third, clotting and scarring or inflammation of the blood vessels in the lungs produces lung circulation illnesses, which affect the blood vessels in the lungs (Dempsey & Scanlon, 2018).

Spirometry is the most common pulmonary function test (Gallucci et al., 2019). It is frequently used to provide objective data for lung disease diagnosis and monitoring in the evaluation of lung function. In 2005, the American Thoracic Society and the European Respiratory Society partnered to produce spirometry technical standards (Graham et al., 2019).

Music therapy is an important nursing intervention because it helps patients regain their energy and reduces their physical, emotional, and psychological difficulties (Çitlk Sartaş & Demir, 2016).

According to the World Health Organization, 1.5 million individuals died from chronic respiratory disease, 1.2 million died from cancer (trachea, bronchi, and lung), and 600,000 died from respiratory infections (WHO, 2019). Chronic Obstructive Pulmonary Disease (COPD) affects around 200 million people globally, with 65 million having moderate or severe airway disease, according to most studies, and it is underdiagnosed 72 to 93 percent of the time (Roglic, 2016). A spirometry test is unlikely to aid a compromised patient; instead, it should be delayed until the patient develops a pneumothorax, hypo- or hypertension, or unstable arrhythmias. The vital signs of a patient receiving a pulmonary function test should be stable during the process, and the testing should take place in a well-lit and pleasant environment (Van Gaal et al., 2019). The patient must inhale slowly and deeply and exhale swiftly during the procedure (Cazzola et al., 2020). The patient may be affected by variables that cause changes in normal vital signs (Sapra et al., 2021). Music treatment is a method used

by researchers to stabilize vital signs and provide substantial lung function test results (Mansouri et al., 2017; Morris, 2019).

COPD is the third biggest cause of mortality globally, accounting for 3.23 million deaths in 2019. Over 80% of the fatalities occurred in LMICs (low and middle-income countries) (WHO, 2021). Therefore, this study concerns the effectiveness of music therapy on clients' vital signs during pulmonary function test in Al-Diwaniya Province/ Iraq.

## METHODOLOGY

An experimental design with an application (first /pre-test, second post-test), study group approach for 106 clients by used simple random sampling method to determine the effectiveness of music therapy for client's pre pulmonary function test in Al-Diwaniyah, Al-Shamiya, and Al- Hamza public hospitals In Iraq. Participant's vital signs (pulse rate, respiratory rate, blood pressure and oxygen saturation) were measured before and after the intervention group. Two groups assigned as music interventions and a control group.

Study instrument: Consists of the following:

Demographics questionnaire: This section contains the respondents' age, gender, marital status, educational level, body mass index, occupation.

Music Therapy: This section the patients listened to music (Istanbul Dreams with the sound of Turkish lounge music) for 15 minutes by using an Mp3 player and headphones.

Vital signs: It consists of pulse rate, oxygen saturation, systolic blood pressure, diastolic blood pressure, and respiratory rate. The tools were used a digital pulse oximeter (Pulse Oximeter Jumper 500 E) to measure pulse rate, oxygen saturation. A digital sphygmomanometer was used (Omron model code: M6 comfort HEM-7360-E) to measure systolic and diastolic blood pressure. While the respiratory rate was measured by manual observation, and surgical alcohol (Valera surgical spirit 70% made in U.A.E) was used to sterilize the instruments.

The data were analyzed First, the mean and standard deviation, frequency and percentage then, paired sample t- test, person correlation and two ways ANOVA. The statistical package for social sciences (SPSS) version 2021 and a descriptive statistic method for 106 Samples for clients' pre pulmonary function test. The Significance level is at  $p < 0.05$ .

## RESULTS

Table 1 reveals that age of participant's for control group with Mean  $\pm$  SD 37.94  $\pm$  15.105 years while the music therapy group

was 44.71 ± 18.323 years. According to the gender, the female was 56.6% in control while the music therapy group the male was 60.4% respectively. In the marital status the most of participants was married in the two groups 64.2% in control and 81.1% in the music therapy group. According to educational levels the high percentage of the participants in control group had diploma 37.7%, while the high percentage in the music therapy group was illiterate 30.2%. Regarding to the Body Mass Index of the participants were overweight with Mean ± SD 28.20 ± 4.377 kg/m<sup>2</sup> in control group and 29.21 ± 5.024 kg/m<sup>2</sup> in music therapy group, according to the occupation the most of the participants 37.7% housewife in control group and 35.8% in music therapy group.

Table 1: Participants Characteristics

Demographics	Control group		Music group	
	f.	%	f.	%
Age				
Mean ± SD	37.94 ± 15.105		44.71 ± 18.323	
Total	53	100.0	53	100.0
Gender				
Male	23	43.4	32	60.4
Female	30	56.6	21	39.6
Total	53	100.0	53	100.0
Marital status				
Single	16	30.2	9	17.0
Married	34	64.2	43	81.1
Divorce	1	1.9	1	1.9
Widow/ Widower	2	3.8	0	0
Total	53	100.0	53	100.0
Educational levels				
Illiterate	11	20.8	16	30.2
Primary school	11	20.8	7	13.2
Secondary school	11	20.8	15	28.3
Diploma	20	37.7	15	28.3
High degree	0	0	0	0
Total	53	100.0	53	100.0
Body Mass Index				
Mean ± SD	28.20 ± 4.377		29.21 ± 5.024	
Total	53	100.0	53	100.0
Occupation				
Employee	5	9.4	6	11.3
Earnar	15	28.3	16	30.2
Retired	4	7.5	4	7.5
Unemployed	9	17.0	8	15.1
Housewife	20	37.7	19	35.8
Total	53	100.0	53	100.0

M = mean of score, S.D=Standard Deviation, f.: Frequency, %: Percentage

Table 2: The Difference in mean between pre and post-test among study groups with regard to participant's vital sings

Pulse rate	Pre-test	Post-test	The difference
	Mean	Mean	
Control group	92.9811	94.0566	1.07↑
Music therapy group	85.6981	79.3774	6.32↓
Systolic blood pressure			
	Before test	Post-test	The difference
	Mean	Mean	
Control group	118.3774	116.9623	1.41↓
Music therapy group	121.5472	124.7170	3.17↑
Diastolic blood pressure			
	Pre-test	Post-test	The difference
	Mean	Mean	
Control group	78.6415	78.0566	0.59↓
Music therapy group	79.1321	81.3585	2.22↑
Respiratory rate			
	Pre-test	Post-test	The difference
	Mean	Mean	
Control group	18.0189	18.8113	0.80↑
Music therapy group	18.5660	16.4906	2.07↓
Oxygen saturation			
	Pre-test	Post-test	The difference
	Mean	Mean	

Control group	96.9811	95.0377	1.95↓
Music therapy group	94.9623	97.1698	2.20↑

In Table 2 the results showed the difference in Pulse rate between pre and post- test in the control group were increase 1.07 b/m, while decrease in Music therapy group 6.32 b/m. The results showed the difference in Systolic blood pressure between pre and post- test in the control group were increase 1.41 mm, while decrease in Music therapy group 3.17mm. The results showed the difference in Diastolic blood pressure between pre and post- test in the control group were decrease 0.59 Hg, while increase in Music therapy group 2.22Hg. The results showed the difference in Respiratory rate between pre and post- test in the control group were increase 0.80 b/m, while decrease in Music therapy group 2.07 b/m. The results showed the difference in Oxygen saturation between pre and post- test in the control group were decrease 1.95, while increase in Music therapy group 2.20.

Table 3 showed there were significant statistical correlations between ages with pulse rate and oxygen saturation. There were significant statistical differences between genders with pulse rate. There were significant statistical correlations between BMI with pulse rate, respiratory rate and oxygen saturation.

Table 3: Pretest and posttest of vital sings differences among participant's music therapy group demographics

Demographics	Group	Statistics	
		Analysis	Sig.
Age	Pulse rate	Cc= -.320-	.020
	Systolic blood pressure	Cc= .077	.585
	Diastolic blood pressure	Cc= -.006-	.967
	Respiratory rate	Cc= -.097-	.491
	Oxygen saturation	Cc= -.694-	.000
Gender	Pulse rate	F= 5.210	.030
	Systolic blood pressure	F= 1.044	.315
	Diastolic blood pressure	F= 1.641	.210
	Respiratory rate	F= .138	.713
	Oxygen saturation	F=.818	.373
Marital status	Pulse rate	F= 2.427	.105
	Systolic blood pressure	F= 1.234	.306
	Diastolic blood pressure	F= .463	.634
	Respiratory rate	F= 1.340	.277
	Oxygen saturation	F= 6.154	.056
Level of education	Pulse rate	F= 2.121	.118
	Systolic blood pressure	F=.244	.865
	Diastolic blood pressure	F=.111	.953
	Respiratory rate	F= 3.049	.054
	Oxygen saturation	F= 3.681	.120
Body Mass Index	Pulse rate	Cc= -.613-	.000
	Systolic blood pressure	Cc= -.118-	.401
	Diastolic blood pressure	Cc= -.136-	.330
	Respiratory rate	Cc= -.462-	.001
	Oxygen saturation	Cc= -.424-	.002
Occupation	Pulse rate	F= 1.834	.148
	Systolic blood pressure	F=.661	.624
	Diastolic blood pressure	F= .503	.734
	Respiratory rate	F= 1.102	.374
	Oxygen saturation	F= 2.965	.038

P=probability value, NS: Non-Significant at P > 0.05, S: Significant at P < 0.05

## DISCUSSION

The current study population consisted of 106 clients who were randomly assigned to two groups: Control (n=53) and Music (n=53). The mean of participant's was 41.81 years old in the study. The results consistent with Boussaid et al., 2020 undertook a research in Tunisia that found the mean age of 44.45 years (26-72).

The participants were females 51.6% more than males 48.4% in the study groups. The results consistent with Antoniazza et al., 2018 that conducted a study in Italy and found the sample comprised men (46%), and women (54%).

Concerning to levels of education, 34% of clients had diploma. The current study consistent with a study Arab, et al (2016) that aimed to see if music therapy may improve vital signs in patients with acute coronary syndrome and found the most of participant 56.52% had diploma.

The majority of clients 74% in the study groups were married. The current study consistent with a study for Arslan and Ozer (2016) in Turkey to see how music therapy affected the pulse rates, blood pressure values, and respiratory rate rates of Intensive Care Unit patients (ICU) and found in the results 77.8% were married.

Regarding to the Body Mass Index, the participants was overweight with mean 29 k/m2. The current study consistent with a study that conducted in 2017, Seo performed a research in Korea that found the body mass index in female was overweight.

According to the occupation, the participants 38% were housewife. Arab, et al (2016) that aimed to see if music therapy may improve vital signs in patients with acute coronary syndrome and found majority of participant (82.61%) was Housekeeper.

The results showed the difference in pulse rate between pre and post- test decrease in Music therapy group by 9.23 beats. The current study consistent with study for Lee (2015) that found music interventions reduced heart rate by 4.25 beats per minute.

The results showed the difference in Systolic blood pressure between pre and post- test increase in Music therapy group. The results showed the difference in Diastolic blood pressure between pre and post- test increase in Music therapy group. The current study consistent with study for Antoniazza et al., 2018 that found the music intervention had increased both Systolic (SBP) and Diastolic (DBP) Blood Pressure.

The results showed the difference in Respiratory rate between pre and post- test decrease in Music therapy group. The results showed the difference in oxygen saturation between pre and post- test increase in Music therapy group. The current study also supported by Giordano, et al. (2022) conducted a study in Italy to assess the feasibility of implementing music therapy on-site with Covid-19 patients, as well as to investigate the immediate effects of a single session on oxygen saturation (O2Sat), and satisfaction when compared to standard care, that found in comparison to control and treatment had substantially higher O2Sat values (96.25–99.00) versus (96.00–98.00) at  $p = 0.026$ . A single session of music therapy increases O2Sat, according to the findings.

Shuman, et al (2016) that aimed to examine whether group music therapy affects vital signs and found there were no significant associations between age, gender, and other specific demographics that were tested.

## CONCLUSION

At the conclusion of this study, the listening to music pre pulmonary function test had a positive effect on the regulation or stability of vital signs. The listening to music decreased the heart rate and respiratory rate and increased the blood oxygen saturation and blood pressure pre and post pulmonary function test.

The age and body mass index have the most influence on the vital signs of the clients who listen to music pre pulmonary function test.

**Financial Disclosure:** There was no financial disclosure.

**Conflict of Interest:** None to declare

**Ethical Clearance:** All experimental protocols were approved by the Al-Diwaniya Health Directorate in Iraq, and all experiments followed the permitted procedures.

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