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Immediate effect of relaxation on hemodynamic parameters and pulmonary functions in normal individuals

Priti Rajak^{1,*}, Neesha Shinde¹, Subhash Khatri¹ and Nitesh Kathariya²

¹Department of Cardiorespiratory Sciences, College of Physiotherapy, PIMS, India.

²Department of Anaesthesiology, RMC, PIMS, India.

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ABSTRACT

The aim of this study is to know if relaxation has immediate effect on hemodynamic parameters and pulmonary functions in normal healthy individuals. 34 of 40 participants were selected after screening. These participants were divided in two groups, group A: music therapy, group B: Jacobson's progressive muscle relaxation. After an interval of 5 days, the participants were given the other intervention respectively. The participant's hemodynamic parameters and pulmonary functions were noted immediately before and after the session. The study was conducted in the department of Cardio respiratory physiotherapy, College of Physiotherapy, PIMS, Loni, India. 34 of 40 normal healthy participants entered the study and 30 completed it. Relaxation was given by two techniques, music therapy in which the participant was made to listen to Indian classical instrumental music for 20 minutes. Another technique used was Jacobson's progressive muscle relaxation for 20 minutes. Outcome measures were noted pre and post session. The primary outcome measures were hemodynamic parameters and pulmonary function. The secondary outcome measure was to find participant's preference of relaxation technique based on their experience. The hemodynamic parameters improved considerably after music therapy but the pulmonary functions improved better with Jacobson's progressive muscle relaxation. The participants rated music therapy more preferable than Jacobson's progressive muscle relaxation. Relaxation has immediate effect on hemodynamic parameters and pulmonary functions. Relaxation particularly music therapy (Classical Indian instrumental music) can be made a routine activity in normal healthy individuals.

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Introduction

Relaxation today is a word, known to cause surprising benefits worldwide, physical as well as psychological. Its benefits range from obvious psychological effects of relieving stress and mental tension, to strengthening of the immune system while producing a host of other medically valuable physiological changes. It also has profound effects on lung function in adults as well as children. However, the question remains, what is Relaxation? Is it just sitting quiet or taking a cat nap or is it meditation or hobby pursuit.¹⁻³

By definition, Relaxation is any method, process, procedure or activity that helps a person to relax; attain a state of increased calmness or reduced levels of anxiety, stress and anger. In other words, it is to rest from work or engage in recreational activity. This is a technique, which has been used since ancient times, to release muscle tension and obtain other physical and psychological benefits. These changes also make people less susceptible to viruses.² Relaxation causes a shift in the hormone levels, which are beneficial to the immune system giving rise to positive effects on conditions such as, Asthma, Diabetes especially Type II, Chronic unbearable Pain for example backache, chronic migraine, tension headache, cancer pain etc.¹⁻⁶

Many hospitals have investigated effects of relaxation on specific patient populations with Asthma, Cancer, Chronic pain, Metabolic syndrome, kidney dialysis, Irritable bowel syndrome, skin disorders etc. These studies have found a positive effect on

patient's physical, physiological and psychological well being which has led to inclusion of different relaxation programs to be a part of their treatment module. These modules are taught either by direct teaching or Television broadcasting.¹⁻¹⁴

But why do we need relaxation?

Humans are always in a hurry of events, running to get various jobs done at the same time. The end result is a phenomenon which is a common household name, stress. Medically stress is defined as "a state of mental or emotional strain or tension resulting from adverse or demanding conditions."^{2,6,10}

The events that provoke stress are called "Stressors", these stressors in enough quantity can be good, and refer to those experiences that are of limited duration which a person can master and leave a sense of accomplishment and exhilaration. Bad stress refers to experiences where a sense of control and mastery is lacking, are prolonged or recurrent, irritating, emotionally draining and physically exhausting or dangerous and harmful. Like, stressing out too much over the test can make it hard to concentrate on the material you need to learn. Stress arises when perceived demands outweigh perceived resources.¹⁰⁻¹⁶ When the stress response works properly, it allows a person to react quickly and effectively handle the pressure of the moment, if, it over reacts or fails to turn off and reset itself properly it will lead to various other problems.^{10,15}

Prolonged stress is harmful and needs to be controlled. In order to do so, the brain initiates another chain of events called

Tele:

E-mail addresses: dr.pritirajak@gmail.com

the “Relaxation Response”. Relaxation response is a hypothalamically mediated, inborn counter balancing mechanism to the stress response. Or it can be defined as a set of integrated physiological mechanisms and adjustments, elicited when a subject engages in repetitive mental or physical activity and passively ignores distracting thoughts. The relaxation response reduces the levels of stress hormones, slows down the brain activity which is measurable, affects organs by reducing pulse rate, breath rate, blood pressure, cholesterol and sugar levels and also helps recovering memory disturbances caused by stress.^{3,5,9,16-21}

Relaxation includes various techniques, like Deep breathing, Music therapy, Jacobson’s progressive muscle relaxation, Imagery method of relaxation, Mindfulness training, Meditation, Yoga etc.²²⁻²⁷

Researchers advocate use of either one or multiple techniques to obtain various valuable benefits in diseased and healthy individuals. But the most important question is, how to choose, a relaxation technique? Which method will yield maximum positive effect? Will the participant be able to do it regularly or it will be a burden or a compulsory task.^{5,1,14}

These are a few questions which pop up immediately when a person tries to relax adding more restlessness to its already disturbed state. The answer to all these questions is a simple technique which breaks the train of everyday thoughts and thus decreases the sympathetic nervous system activity helping the mind and body to relax.^{5,10}

Many studies have been conducted over the years leading to many positive benefits obtained over variable periods by various methods. Of these, some age to world war one and two and some have existed even before that. In the earliest era of relaxation, it was believed meditation is the best method to relax and calm a soul but recent experimental evidence is much stronger for any form of deep relaxation with regular practice. Among these various techniques, the soothing power of music is well established. It has also been recognized as a unique link to ones emotions. The idea of music as a healing influence which could affect the health and behavior in all is as least as old as the writings of Aristotle and Plato. Its roots originate from the World wars I and II, when, community musicians of all types, amateur and professionals went to the veterans hospital around the country to play for the thousands of veterans suffering trauma from the wars.^{28,29}

Earliest known reference to music therapy, being used as a scientific tool, appeared in 1789 in an unsigned article in a Columbian Magazine titled, “Music Physically Considered”. Followed by this, in the early 1800’s two medical Dissertations were established. The first dissertation was published by Sir Edwin Atlee (1804) and the second by Samuel Mathews. Both these researchers were students of Dr. Benjamin Rush a physician and psychiatrist, who was a strong proponent of Music therapy to treat medical diseases.¹

The 1800’s also saw, the, first recorded music therapy intervention in an institutional setting (Blackwell’s Island New York). It was also the time when, the first recorded systematic experiment in Music therapy was conducted.³⁰

Listening to music can have a tremendous relaxing effect on our mind and body, especially slow quiet classical music. This type of music can have a beneficial effect on our physiological functions.¹⁵ Music therapy is known to produce and affect the “Relaxation Response”; a physical state of deep rest that changes the physical and emotional responses to stress... the opposite of the flight and fright response.³¹

Music therapy has a relationship with the Autonomic Nervous System. This relation enhances and produces various physiologically and medically important effects in the human body.³²

Hippocampus is where differentiation between types of Music is done to elicit a response.

These effects are seen with long term practice.^{30,31}

Similarly, another particular form of relaxation, the Jacobson’s relaxation technique or Progressive Muscle Relaxation, is an easy and an effective technique. It was developed by Dr. Edmund Jacobson during the early 1920’s. This approach was developed from the idea, that, the stimulant responses are the driving factors for muscular tension³³.

This technique requires the participant to work with the therapist in gradually learning the technique. Its main aim is to enable the participant to monitor and control the state of muscular tension. In Jacobson’s relaxation technique, a deliberate muscle tension is induced and released with attention paid to the contrast between tension and relaxation.³⁴

Jacobson’s progressive Muscle Relaxation includes, recognizing subtle signals of tension in the major muscles of the body and then systematically releasing it, leaving the whole body in a state of deep relaxation. The original protocol consisted of 200 exercises and techniques which taken together relax the entire body. Jacobson’s progressive muscle relaxation was always claimed to cure not only tight muscles and cramps but also reduce the intensity of pain, relieve stress and anxiety. Today these exercises have been reduced to 15 – 20 exercises from the previous 200 exercises. Jacobson’s progressive muscle relaxation needs physical assistance till the person has mastered or successfully learnt the art of relaxation via this technique. Music therapy on the other hand, is the easiest technique of relaxation and can be performed in any environment, with or without assistance. It advocates use of soothing music depending on an individual’s preference and listening to it. The duration of Jacobson’s relaxation as said by him, is 20 minutes every day at the same time in a quiet and comfortable place.³³⁻³⁵

Progressive muscle relaxation since then has shown various beneficial effects on regular practice. Its benefits are realized in patients suffering from anxiety, Myocardial infarction, post CABG, chronic obstructive pulmonary disease, in outpatient rehabilitation, on depression, in Asthmatic children etc. It has shown significant effects on quality of life.³⁶⁻³⁹

However, this technique seems a bit familiar to meditation, but it is not. Edmund Jacobson, taught the concept of “feel the tension” in various muscle groups at one time and then suddenly let them loose while feeling how it felt. This method till date is successful in eliminating all the muscle contractions and producing a feeling of deep relaxation. In progressive muscle relaxation there are specific encouraging phrases used in a soothing voice. These phrases get registered in the practioners mind and are repeated often when relaxing. This phenomenon makes relaxation a more active form of relaxation. Meditation on the other hand, does not need any phrases but just a quiet room, dim lighting, a comfortable position, and an easy receptive attitude. These are the requisites for Jacobson’s progressive muscle relaxation too thus making the two seem similar again.^{33,40}

Previous studies in this field have proved effects of different relaxation techniques on Pulse rate, Respiratory rate, Blood Pressure and on Pulmonary Function Tests.

These studies also contemplate long term effects of relaxation on human mind and body. However, there is a scarcity of data in context of comparison between two

completely different relaxation approaches and their immediate effects on the human body. The reason to perform this study is to provide this data of comparison of immediate effect of two different relaxation approaches in Normal participants. For the above purpose, this study was designed as a cross over trial; wherein each participant will be subjected to both the approaches with a gap of 5 days.

Materials And Methods

Research Design

The research design used for the study was a cross – over study.

Source of Data

The source of the data was collected from the College of physiotherapy, Pravara rural hospital, Loni (Bk), Taluka-Rahata, Dist- Ahmednagar, Maharashtra, India. 413 736

Type of Data

The data was primary collected by the Principal Investigator.

Place of Study

The study was conducted at Dept. of Cardio-Respiratory Physiotherapy, Pravara rural hospital, Loni (Bk), Tal- Rahata, Dist- Ahmednagar, Maharashtra, India - 413 736

Duration

The study was conducted during the time period from March 2013-December 2013.

Intervention Period

Each participant chose one intervention via lottery and was subjected through it. The same participant was then given the other intervention after 5 days. Thus, each participant took both the interventions in one week at an interval of 5 days.

Participants

The participants in the study were students of first year of College of Physiotherapy, individuals with no clinical diagnosis of any respiratory, cardiac, physical or psychological diagnosis.

Sample

The sample was selected from 40 participants. 34 Participants (30 Male and 4 Female) healthy normal individuals aged 18-25 years. They were screened based on the inclusion and exclusion criteria. However, as the study progressed the number changed to 30 (26 Females and 4 Males).

Sample Size

The sample size for the study calculated was 30.

Sampling Design

The method used for the sampling was convenient sampling.

Sampling Method

The sampling method used for study was lottery method.

Equipment

The following equipment was used for the study

- **Spirometer (Helios 401)** (Fig. 3.1)

The spirometer was used in the study for measuring parameters of pulmonary function such as FEV₁, FVC, PEF_R.

Materials

Materials used for the study were as follows

- Consent form
- Screening form
- Data collection sheet
- Pen
- Music player
- Bed
- Calibrated Spirometer
- Calibrated Sphygmomanometer
- Calibrated Pulse oximeter
- Wrist watch

Inclusion Criteria

This study included both male and female participants, age between 18 – 25 years, those willing to participate in the study, participants with no clinical diagnosis of any cardiac, respiratory, physical or psychological condition which can affect the results of the study. All the participants were untrained and unaware of, how to perform pulmonary function test.

Exclusion Criteria

The exclusion criteria for the study were participants with diagnosis of any respiratory, cardiac, physical, and psychological condition which could affect the results. The participants who had previously been exposed of how to conduct pulmonary function test or experienced pulmonary function testing.

Outcome Measures

The outcome measures of this study were Pulse rate, Respiratory rate, Blood Pressure, Pulmonary Function test - FEV₁, FVC and PEF_R.

Procedure

For measuring the Pulse rate, the participant was made to sit in a quiet place with no distraction. Pulse rate can be measured anywhere an artery comes close to the skin, such as in your wrist. To measure the respiratory rate, the investigator counted the chest movement without making the participant aware of it, in the sitting position. Blood pressure was measured over the brachial artery, occluding it by a cuff placed around the upper arm and inflated to above systolic pressure. The Korotkoff sound method tends to give values for systolic pressure that are lower than the true intra-arterial pressure, and diastolic values that are higher. For measuring lung functions spirometry was performed before and after the intervention in the sitting position, he/she is asked to breathe into a mouthpiece that is connected to an instrument called a spirometer. The spirometer records the participants efforts. For FVC and FEV₁, he/she must first inhale deeply and then do a forceful deep exhalation with maximum sustainance followed by inhalation. For PEF_R, he/she must do two normal breaths followed by a third deep inhalation and exhalation with no sustainance and end by a normal breath. After noting down the above parameters, the participant is asked to lie down on a bed. A portable pulse oximeter is used for constant monitoring of pulse rate. The laptop is set near the head end of the bed. Once the participant is comfortable, the lights are dimmed and music is started. The physiotherapist is near the bed throughout the twenty minute session. In order to avoid disturbance the participant is requested to switch off the mobile phone and remove any accessory that can be a disturbance. Once the session is over the participant again will go through the preliminary examination and give a rating of relaxation on the numerical rating scale as well as speak his/ her thoughts after the session to the physiotherapist. During the session of Jacobson's progressive muscle relaxation technique the same procedure and requests are followed. Once the participant is comfortable, in bed and all the disturbances reduced the lights are dimmed. After this the participant is asked to listen to the physiotherapist's voice and do as dictated by her. In case if the instructions cannot be followed, kindly do it as your comfort and report it after the session. Do not get disturbed or attempt to speak during the session. The physiotherapist will then personally provide Jacobson's progressive muscle relaxation by saying, Close both eyes, take two deep breaths, and feel yourself "let go", extend both arms straight out and clench your fists... gradually increase the tension level until all the muscles in your fingers and hands are fully tight... then relax... let your arms drop naturally. Be aware of the difference between feeling

“tense” and “relaxed” extend both arms again, straight out, and tense the muscles of your lower arm and elbow... hold it, become aware of the feeling... now relax... let your arms drop naturally to your side tense the muscles in your forehead by frowning... hold it, become aware of the feeling... now relax... let all the muscles in your forehead become smoother and smoother. Tense the muscles in your face... grimace... hold it, become aware of the feeling...now relax. Tense the muscles in your neck... hold it, become aware of the feeling... now relax. Tense the muscles of the shoulders... hold it, become aware of the feeling... now relax. Tense the muscles of the back, first the upper back and then the lower... hold it, become aware of the feeling... now relax. Tense the muscles of your chest... hold it, become aware of the feeling... now relax. Tense the muscles of your stomach... hold it, become aware of the feeling... now relax. Tense the muscles of your abdomen... hold it, become aware of the feeling... now relax. Tense the muscles of your upper leg - all the muscles of the thigh... hold it, become aware of the feeling... now relax. Tense the muscles of your lower leg - all the muscles of the knee and calf... hold it, become aware of the feeling... now relax. Tense the muscles of your feet and toes... hold it, become aware of the feeling...now relax. Now concentrate on relaxing all the muscles of your body. Become aware of any areas that might still be tense in any way, and relax them. Maintain this state of total muscle relaxation for at least two to three minutes. Open your eyes, stretch, and feel refreshed.... At the end of this session again the baseline parameters, pulmonary functions and numerical scale rating and any verbal acknowledgement of the participant was taken. Each participant had to undergo both the relaxation session each of 20mins. at an interval of 5 days. Which session would be first was decided by the lottery method.

Data Analysis And Results

The objective of the present study was to find the immediate effectiveness of music therapy versus Jacobson’s progressive muscle relaxation on pulse rate, respiratory rate, blood pressure, forced expiratory volume in one second (FEV₁), forced vital capacity (FVC) and peak expiratory flow rate (PEFR) in normal healthy individuals. All the 30 participants completed two sessions of relaxation intervention in one week at an interval of 5 days. There were no statistical differences in anthropometrics and physiological data between the participants. All the participants were screened and evaluated for baseline measurements and all the values were recorded. Participants were evaluated and data was recorded immediately before and after the relaxation session. Statistical analysis was carried out utilizing the trial version of SPSS 17.0 and p<0.0001 is considered as level of significance. Statistical measures such as mean, standard deviation (S.D.) were calculated and Student’s Paired‘t’ test and Unpaired‘t’ test was applied to analyze the data. The results were concluded to be statistically significant with p<0.0001.

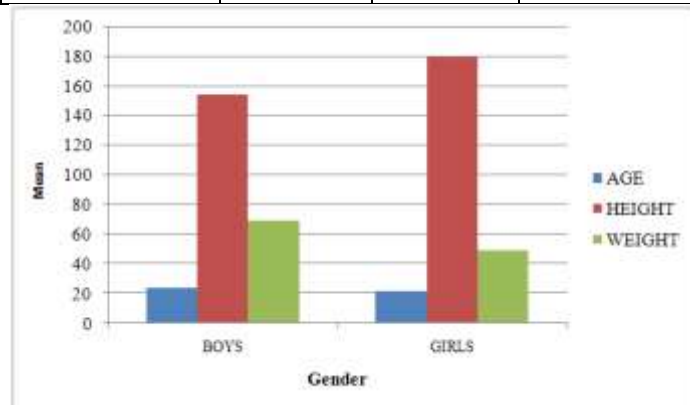
Demographics

The total number of participants selected for study were thirty (n=30, 26 Females and 4 Males) age between 18 - 25 years after fulfilling the inclusion and exclusion criteria. Participants were assigned into two groups by lottery method as either music therapy group (Group A) or Jacobson’s progressive muscle relaxation group (Group B). Each participant in the study was made to go through both the interventions. The lottery selected which intervention would be first and then the other follows after a gap of five days. In both the groups, mean age of the participants was 21.60 years age ranging from 18 to 25Years. The mean weight of participant in both the groups was

51.73±5.87 kilograms. Gender wise the mean weight for boys is 69.5Kgs.+/- 8.21 and for girls it is 49.00Kgs.+/- 7.95. Similarly the mean height for boys is 179.25 Cm. +/- 7.5 and for girls it is 153.62Cm. +/- 5. Since this is a cross over trial the demographic data between two groups cannot vary.

Table 1: Shows the mean of demographic data of the participants according to Sex

GENDER/ DATA	AGE (Years)	HEIGHT (Cms)	WEIGHT (Kgs)
MALE	24	179.25	69.50
FEMALE	21.23	153.62	49.00



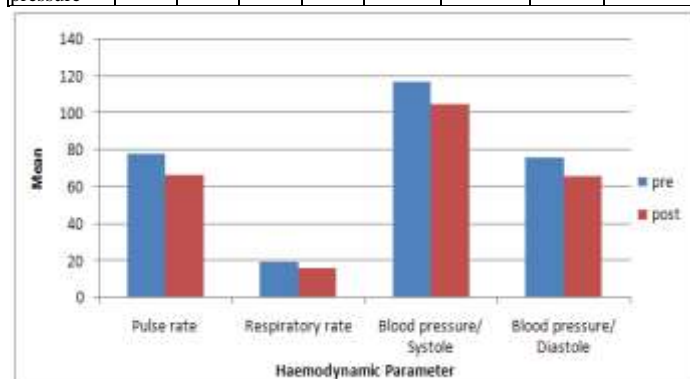
Graph 1: Shows the mean of demographic data of the participants according to Sex

Baseline Comparisons

All the participants completed both pre and post-test measurements. The statistically analysed values of outcome measures, pulse rate, respiratory rate, blood pressure, Forced expiratory volume in one second (FEV₁), forced vital capacity (FVC) and peak expiratory flow rate(PEFR) are given in tables below along with a graphical representation respectively. Paired t test was performed in order to check baseline measurements for both the groups.

Table 2: Represents the statistical data of pulse rate, respiratory rate and blood pressure obtained before and after music therapy session.

DATA	MEAN		Standard Deviation		T Value	Degree of Freedom	P Value	Significance
	Pre	Post	Pre	Post				
Pulse rate	78.26	66.50	5.93	4.95	17.367	29	<0.0001	Highly significant
Respiratory rate	19.53	16.46	1.61	1.30	17.135	29	<0.0001	Highly significant
Systolic blood pressure	117.20	104.93	12.667	10.869	14.509	29	<0.001	Highly significant
Diastolic blood pressure	76.00	66.06	9.145	6.507	7.373	29	<0.001	Highly significant

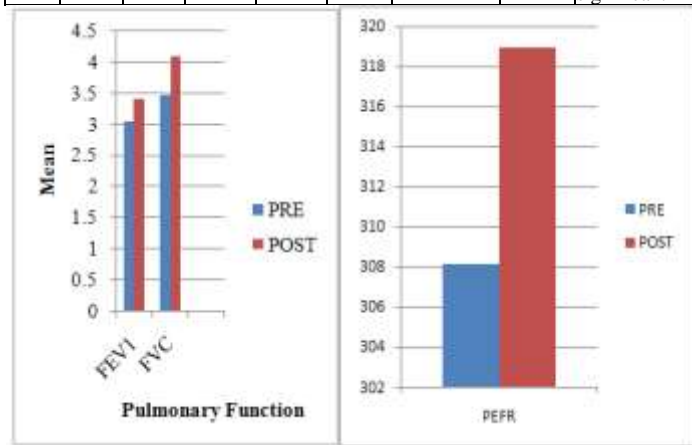


Graph 2: Variations of pulse rate, respiratory rate and blood pressure before and after music therapy

The values of pulse rate, respiratory rate and blood pressure are affected positively. There is a reduction in the values within the normal reference range.

Table 3: Represents statistical analysis of Pulmonary function test values of forced expiratory volume in 1 second (FEV1), forced vital capacity (FVC) and peak expiratory flow rate (PEFR) before and after music therapy:

Data	Mean		Standard Deviation		T value	Degree of freedom	P value	Significance
	Pre	Post	Pre	Post				
FEV1	3.03	3.40	0.4437	0.6464	5.728	29	<0.0001	Highly significant
FVC	3.46	4.07	0.7586	0.8271	10.223	29	<0.0001	Highly significant
PEFR	308.10	318.93	82.83	97.05	1.523	29	0.1387	Not significant

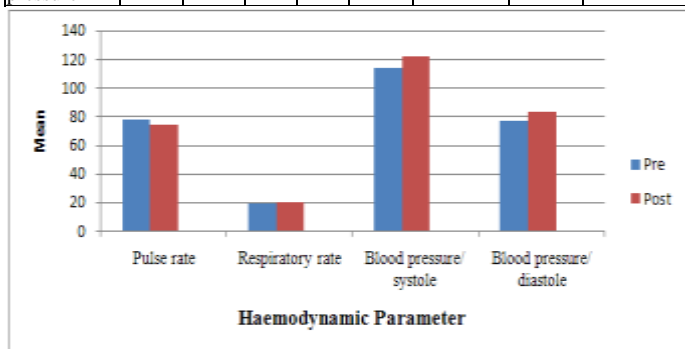


Graph 3: Pulmonary function values obtained before and after Music therapy

The pulmonary function value of FEV1 and PEFR show a decline after the relaxation session. This indicates that music therapy does not give a positive effect. The FVC values remain almost unaffected after giving music therapy.

Table 4: Represents statistical analysis of Pre and post values of pulse rate, respiratory rate and blood pressure obtained by Jacobson's progressive muscle relaxation.

Data	Mean		Standard Deviation		T Value	Degree of Freedom	P Value	Significance
	Pre	Post	Pre	Post				
Pulse rate	77.66	73.73	7.043	6.034	8.699	29	<0.0001	Highly significant
Respiratory rate	19.40	19.93	1.831	1.484	1.067	29	0.2949	Not significant
Systolic blood pressure	113.47	121.93	9.413	7.620	10.374	29	<0.0001	Very significant
Diastolic blood pressure	76.60	82.80	9.145	7.364	8.613	29	<0.0001	Highly significant

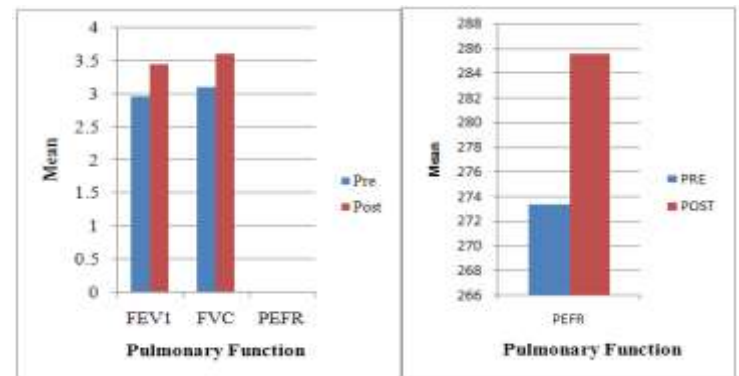


Graph 4: Shows values of pulse rate, respiratory rate and blood pressure obtained before and after Jacobson's progressive muscle relaxation

The values of pulse rate, respiratory rate and blood pressure show a rise after Jacobson's progressive muscle relaxation within the normal reference range. This indicates that Jacobson's progressive muscle relaxation has a negative effect on these parameters.

Table 5: Represents statistically analysed values of pulmonary function tests obtained before and after Jacobson's progressive muscle relaxation.

Data	Mean		Standard Deviation		T Value	Degree of Freedom	P Value	Significance
	Pre	Post	Pre	Post				
FEV1	2.95	3.44	0.4609	0.4556	13.244	29	<0.0001	Highly significant
FVC	3.10	3.59	0.7550	0.8026	13.244	29	<0.0001	Highly significant
PEFR	273.37	285.57	59.985	60.264	13.600	29	<0.0001	Highly significant

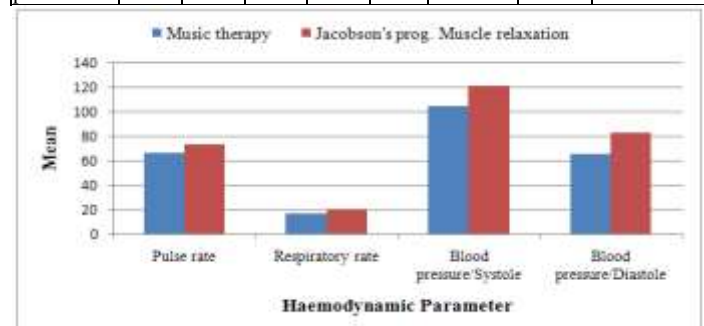


Graph 5: Shows pulmonary function test values of forced expiratory volume in one second (FEV1), forced vital capacity (FVC), peak expiratory flow rate (PEFR) before and after Jacobson's progressive muscle relaxation

All the pulmonary function test values show an increase after Jacobson's progressive muscle relaxation. This indicates that Jacobson's progressive muscle relaxation has a positive effect on them.

Table 6: Represents comparison of Statistical data obtained after music therapy and Jacobson's progressive muscle relaxation.

Data	Mean		Standard Deviation		T Value	Degree of Freedom	P Value	Significance
	Music	JPMR	Music	JPMR				
Pulse rate	66.50	73.73	4.953	6.034	6.910	29	<0.0001	Highly significant
Respiratory rate	16.46	19.93	1.306	1.484	9.773	29	<0.0001	Highly significant
Systolic blood pressure	104.93	121.93	10.869	7.620	6.316	29	<0.0001	Highly significant
Diastolic blood pressure	66.06	82.80	6.507	7.364	8.865	29	<0.0001	Highly significant

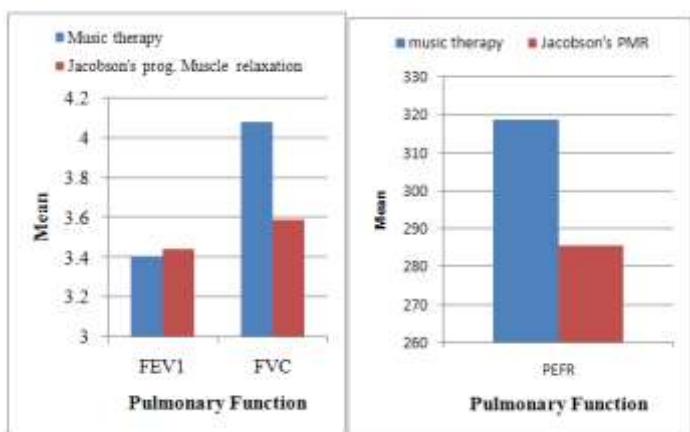


Graph 6: Shows comparison of pulse rate, respiratory rate and blood pressure between music therapy and Jacobson's progressive muscle relaxation.

The comparative analysis of both the techniques shows, music therapy has a better effect on pulse rate, respiratory rate and blood pressure than Jacobson’s progressive muscle relaxation as it allows a steady decline within normal reference ranges.

Table 7: Shows comparison between statistically analysed values of pulmonary function test between music therapy and Jacobson’s progressive muscle relaxation.

Data	Mean		Standard Deviation		T Value	Degree of Freedom	P Value	Significance
	Music	JPMR	Music	JPMR				
FEV1	3.409	3.442	0.6464	0.4556	0.2274	29	0.8217	Not significant
FVC	4.079	3.591	0.8271	0.8026	2.264	29	0.0312	Significant
PEFR	318.93	285.57	97.058	60.264	1.599	29	0.1206	Not significant

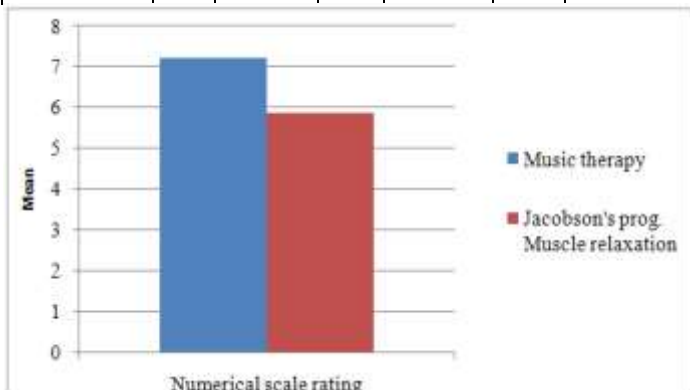


Graph 7: Shows comparison between pulmonary function test values of music therapy and Jacobson’s progressive muscle relaxation

Comparative analysis of pulmonary function test values shows Jacobson’s progressive muscle relaxation having more profound effect as it causes an increase in their value after the session. Music therapy causes a reduction in the pulmonary function capacity after the session.

Table 8: Shows numerical scale rating taken after the session. This rating depicts participants experience after the session.

Data	Mean	Standard Deviation	T Value	Degree of Freedom	P Value	Significance
Music Therapy	7.23	2.161	3.281	29	0.0027	Highly significant
Jacobson’s progressive muscle relaxation	5.86	1.358				



Graph 8: Shows numerical scale rating depicting participants experience after music therapy and Jacobson’s progressive muscle relaxation

The numerical rating scale was used to analyse which of the two techniques the participants prefer. They rated on a scale of 0 to 10 with 0 not preferable, 5 can prefer, 10 Most preferable. In this rating most of the participants preferred music therapy in comparison to Jacobson’s progressive muscle relaxation

Discussion

This study titled, “Immediate effect of relaxation on haemodynamic parameters and pulmonary functions in normal individuals” shows that relaxation has not only long term but immediate effect on the mind and body. Most of the studies indicate a long term effect of relaxation. As concluded by Janice Kiecolt glaser based on their study on medical students in 1986, that relaxation obtained from meditation when practiced regularly for 8 weeks, improved immunity as well as other psychosocial factors². Another study conducted in 1979 by Dr. Barney in children suffering from asthma, also provides positive evidence of improvement in anxiety and reduction of asthma attacks when they practiced, physical form of relaxation along with mental form like reading , a bit of exercise for a couple of weeks. There are numerous studies which seal the long term benefits of relaxation but these long term effects must start at some level. This study tried to find out which is that level. The level is immediate, thus proving one does not have to wait for days to feel relaxed; it is experienced immediately after you try to relax. In this study, two effective and commonly used techniques: Music therapy and Jacobson’s progressive muscle relaxation were under consideration. Previous studies on Music therapy like, the effect of music amplitude on the relaxation response conducted by Myra Staum and her colleagues in 2000, proves soft soothing music provides better relaxation than songs or loud music. They also concluded the physiological changes are observed with all forms of music but soft music provides the best. This positive finding became the guideline for this study as soft soothing music was used. Another study conducted by L. Bernardi in 2006 on music therapy shows, its effect on cardiovascular, cerebrovascular and respiratory changes induced by music. They concluded that pulse rate, rate of breathing, and cerebral blood flow increased with a faster tempo and slow tempo music reduced these parameters considerably and increased the gap between two breaths. Thus, proving music therapy does provide good relaxation on long term basis and affects the vital signs variably. In this study, the effects of music therapy as seen in the immediate period also show, changes induced in haemodynamic parameters and pulmonary functions. In music therapy, the post pulse rate showed a mean 66.50 beats/min in comparison to pre session value of 78.26beats/min. The p value calculated was <0.0001 citing a significant change. The values show a reduced number of beats which goes with the thought of relaxation. Thus it can be said that relaxation has a positive effect on pulse rate. Similarly, respiratory rate and blood pressure also follow a downward trend in comparison to their values before music therapy. The mean respiratory rate post session was 16.46 breaths/min than 19.53 at the start with a p value <0.0001 making the change highly significant. Blood pressure values changed from a mean of 117.20/76.60mmHg to 104.93/66.06mmHg post session. It also has a p value of <0.0001 making the change extremely significant like its two co parameters. Thus, music therapy in the immediate period causes a downfall of pulse rate, respiratory rate and blood pressure within normal reference values prescribed. Its effects go in sync with the theory of relaxation and practical observations of many long term studies like the one conducted by, Russell E. Hilliard in June 2005 in a hospital set up and found a decrease in pulse rate among the patients

exposed to music along with other benefits than the ones who did not volunteer to be a part of the study. Similar results have been found in many studies. Likewise, respiratory rate and blood pressure have also been seen to have lowered after being exposed to music. This lowering effect is more profound on the type of music and thus after a pilot study and reviewing several articles soothing Indian classical instrumental music was used in this study. The pulmonary functions, post music therapy session showed an increase in FVC and FEV1 but not in PEFr. The probable reason for this was found in the review given by the participants post session, that majority of them went into deep relaxation but did not sleep. They said their experience was as good as a sleep but they could hear the music throughout and even make out the looping break. Thus, the body was completely relaxed as if asleep and the mind fresh after the session. This helped in a better understanding of the procedure and performance from the participant. The second technique under consideration, Jacobson's progressive muscle relaxation, is a renowned technique providing positive and significant changes in haemodynamic and pulmonary functions in the long run. Studies conducted with this technique of relaxation, by Nisha Shinde and colleagues in hypertensive patients in 2013 over a period of one year showed, highly significant changes in pre and post session values of systolic blood pressure ($p < 0.01$), diastolic blood pressure ($p = 0.05$) and pulse rate ($p < 0.05$). Thus, stating significant long term changes. Similar, results are found in this study, in the immediate period. Here, pulse rate change was highly significant (pre = 77.66bpm post = 73.73bpm; $p = 0.0001$), respiratory rate change was not significant ($p = 0.2949$), Change in systolic and diastolic blood pressure is very and highly significant respectively (pre = 113.47/76.6 post = 121.93/82.8; $p < 0.0001$). The pulmonary functions improved after a session of Jacobson's progressive muscle relaxation and showed highly significant values for FEV1 (pre = 3.104 post = 3.591; $p < 0.0001$) and FVC (pre = 2.955 post = 3.442; $p < 0.0001$) and PEFr post sessions (pre = 273.37 post = 285.57; $p < 0.0001$). Thus, both the techniques provide individual changes towards the haemodynamic parameters and pulmonary functions. On comparison of these two techniques, it is found that Music therapy provides a better reduction of pulse rate ($p < 0.0001$), respiratory rate ($p < 0.0001$), systolic and diastolic blood pressure ($p < 0.0001$) showed significant difference between them. Thus, proving music therapy reduces the haemodynamic parameters better than Jacobson's progressive muscle relaxation. This when correlated with theoretical aspect of relaxation, shows music therapy is more relaxing. The comparison of the pulmonary function reports significant difference in only FVC between the two with Jacobson's progressive muscle relaxation giving more improvement than music therapy. The last comparison was of numerical rating scale which was taken after each session. This rating showed highly significant difference between the two techniques ($p = 0.0027$) proving music therapy was better acknowledged by the participants.

Conclusion

Thus it can be concluded that, music therapy is more preferable and relaxing method than Jacobson's progressive muscle relaxation. However, if one wants an improvement in lung functions with relaxation, Jacobson's progressive muscle relaxation is a better choice.

Clinical Implication for practice:

Relaxation can be used as a routine activity in normal individuals.

Limitation of Study: This study was conducted in a medical college, hence, little disturbance during the relaxation sessions was evident. The individual variations due to personal preferences especially for the choice of music and response toward the author's voice were also prevalent. The duration for which, the relaxation effect lasted could not be studied due to the nature of the study.

Suggestion for future research: The study can be conducted in a calm, secluded peaceful environment for better results. Electroencephalography could be used to obtain more scientific proof of relaxation. Wash out period and individual preferences could also be considered for further research.

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