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Research Article

EFFECT OF RELAXING MUSIC ON BLOOD PRESSURE AND HEART RATE IN HOSPITALIZED PRE-HYPERTENSIVE WOMEN IN THE THIRD TRIMESTER OF PREGNANCY: A RANDOMIZED CONTROL STUDY

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ABSTRACT

Objective: To observe effect of relaxing music on systolic blood pressure (BP), diastolic BP and heart rates in hospitalized pre-hypertensive pregnant women in the third trimester of pregnancy.

Methods: Sixty hospitalized pre-hypertensive pregnant women in the third trimester of pregnancy were included in the study. They were divided into experiment (n=30) and control (n=30) groups by randomization. Experiment group received three, 15 minutes sessions of receptive music therapy in form of non-rhythmic instrumental music. The control group did not receive music therapy intervention. BP and heart rates were measured before and after each session.

Results: Experiment group showed significant reduction in systolic BP, diastolic BP and heart rate after each session of receptive music therapy. In comparison between two groups, systolic BP showed significant reduction. No subject experienced any adverse effect.

Conclusion: Listening to relaxing music can reduce BP and heart rates in hospitalized pre-hypertensive pregnant women during third trimester. The BP lowering effect of relaxing music listening is more significant for systolic BP. Receptive music therapy seems to be safe in pregnant women.

Keywords: Music therapy, Music, Pre-hypertension, Pregnant women, Complementary therapies

INTRODUCTION

Pre-hypertension is defined as systolic blood pressure (BP) between 120 and 129 mmHg or diastolic BP between 80 and 89 mmHg; based on the average of two or more properly measured readings at each of two or more visits after an initial screen [1]. Pre-hypertension is more prevalent than hypertension. Prevalence of pre-hypertension in Indian adults is estimated to be between 40% and 60% [2,3].

Pathophysiologically, pre-hypertensive adults share many risk factors with hypertensive patients. Pre-hypertensive adults are also significantly more likely to develop hypertension as compared to normotensive adults; with higher rates of target organ damage and cardiovascular complications. Hence, pre-hypertension is considered an intermediate step during progression from "normal BP" to "hypertension" by many authorities. Management of pre-hypertensive is usually lifestyle modifications, including sodium-restricted diet, dietary approaches to stop hypertension diet, weight reduction, physical activity, alcohol moderation, tobacco abstinence, stress reduction, etc.

Music therapy is known to be effective for hypertensive and pre-hypertensive adults [4,5]. Music therapy is also known to be beneficial to pregnant women during pregnancy as well as during labor [6]. However, little is known about effects of music therapy on cardiovascular vitals (BP and pulse rates) in pre-hypertensive pregnant women. We decided to study effects of receptive music therapy on BP and pulse rate in hospitalized pre-hypertensive women in the third trimester of pregnancy.

METHODS

The study was conducted in the antenatal ward of Mahatma Gandhi Medical College and Research Institute (MGMCRI), Pondicherry, India. The study design was that of a randomized controlled trial without blinding. 60 hospitalized women in the third trimester of pregnancy with pre-hypertension were included in the study. They were divided into experiment and control group; each consisting of 30 subjects. Randomization was done by using sequential method; so that subjects with alternate registration numbers formed each group. Women with history of hypertension before or during pregnancy, taking antihypertensive medications or any other medications affecting BP, having other medical conditions or pregnancy-related complications, with hearing problems were excluded. Informed written consent was obtained from all the subjects, and the study was approved by Institutional Ethical Committee of the MGMCRI.

The experimental group received three sessions of receptive music therapy with relaxing music; the 1st session at 8:30 am on the 1st day of music therapy, the 2nd session at 3:00 pm on the same day and the last (3rd) session at 8:30 am on the next day. Duration of each session was 15 minutes. The relaxing music that we used for our study consisted of 4 soundtracks of instrumental music played over piano, guitar, and flute. The music was without lyrics and non-rhythmic. BP and heart rates were measured both before and after each session and recorded by the investigator. The control group did not receive music therapy. Their pre-session BP and heart rate were measured at 8:30 am on the 1st day, 4:00 pm on the same day and at 8:30 am on the next day. They were asked to lie down quietly for 15 minutes and then their post-session BP and heart rates were measured.

RESULTS

Out of total 60 subjects, 5 from experiment group and 3 from control group had withdrawn themselves from the study. Hence, 25 subjects in experiment group and 27 subjects from control groups were included for analysis.

Means, standard errors and confidence intervals of pre-session and post-session systolic BPs, diastolic BPs and heart rates of subjects in experiment groups are shown in Table 1. Analysis of pre-session and post-session observations in experiment group indicates significant improvement in all three parameters (F=47.894; p<0.00; η=0.750); systolic BP (mean^2=1984.602; F=85.26; p<0.01; effect size=0.630), diastolic BP (mean^2=812.500; F=24.086; p<0.01; effect size=0.325), and heart rate (mean^2=679.892; F=53.451; p<0.01; effect size=0.515).

Means and standard deviations of pre-session and post-session observations for each of the three sessions for both groups are shown in Table 2.

As may be noted in the graph and descriptive data, post-treatment measures of systolic and diastolic BP are lower than pre-treatment measures for both the experiment group as well as control group. However, the systolic measure is much lower in the post-treatment for experiment group compared to the control group where no music treatment was given. This is further analyzed in the sections below. While systolic pressure in the pre-treatment condition seems to be marginally lower for the control group, the reduction of systolic pressure in the post-treatment condition is steeper in the experiment group. Diastolic pressure on the other hand is higher for the control group both pre-treatment as well as post-treatment. The reduction in diastolic pressure seems higher in the 1st music session than in the others.

The interaction effect of pre-session and post-session observations with the between subject factor of the two study groups is also significant (F=3.512; p=0.022 with an effect size=0.180). This indicates that the pre-treatment and post-treatment measure differences also vary across the experimental and control groups. In this condition only systolic measure was significant (mean^2=239.768; F=10.301; p<0.002; effect size=0.171).

The main effects of the within subjects factor - music sessions - was also significant indicating that there was variation on measures across the three sessions (F=2.464; p=0.038; η=0.247). The main effects was again significant only for the systolic pressure (mean^2=395.946; F=9.24; p<0.01; effect size=0.156).

Estimated marginal means of systolic BP, diastolic BP and heart rate in both experiment group and control groups are shown in Fig. 1. Reduction in all three parameters was seen in experiment group as compared to control group; however, significant reduction was seen in systolic BP only.

Table 1: Pre- and post-music therapy blood pressure and heart rate in experiment group

Measure	Mean	Standard error	95% confidence interval	
			Lower bound	Upper bound
Systolic BP				
Pre-treatment	123.895	0.762	122.364	125.425
Post-treatment	118.847	0.743	117.355	120.339
Diastolic BP				
Pre-treatment	86.564	2.307	81.930	91.198
Post-treatment	83.334	2.345	78.624	88.043
Heart rate				
Pre-treatment	93.090	0.793	91.496	94.683
Post-treatment	90.135	0.856	88.415	91.855

BP: Blood pressure

Table 2: Mean values of systolic and diastolic BP across treatment conditions and study groups*

Study groups	Study group	Mean	Standard deviation	N
Systolic BP				
Pre-S1	Experiment	127.52	5.53569	27
	Control	124.68	4.46953	25
	Total	126.1538	5.20326	52
Post-S1	Experiment	118.1111	7.69282	27
	Control	121.5200	6.90483	25
	Total	119.7500	7.45411	52
Pre-S1	Experiment	124.4074	8.26140	27
	Control	123.4000	7.61577	25
	Total	123.9231	7.89601	52
Post-S2	Experiment	119.3704	6.69183	27
	Control	120.6800	6.28305	25
	Total	120.0000	6.46863	52
Pre-S3	Experiment	121.4815	6.44724	27
	Control	121.8800	7.25328	25
	Total	121.6731	6.78152	52
Post-S3	Experiment	115.5185	7.32945	27
	Control	117.8800	7.80128	25
	Total	116.6538	7.57934	52
Diastolic BP				
Pre-S1	Experiment	85.0741	14.80365	27
	Control	88.0000	21.36976	25
	Total	86.4808	18.13294	52
Post-S1	Experiment	79.8519	15.31139	27
	Control	86.4400	22.82557	25
	Total	83.0192	19.38414	52
Pre-S1	Experiment	84.7778	12.21391	27
	Control	90.5200	20.21575	25
	Total	87.5385	16.63620	52
Post-S2	Experiment	82.7037	14.02145	27
	Control	85.9600	20.29261	25
	Total	84.2692	17.22528	52
Pre-S3	Experiment	84.3704	13.53954	27
	Control	86.6400	20.42645	25
	Total	85.4615	17.06213	52
Post-S3	Experiment	81.4074	13.22951	27
	Control	83.6400	20.64558	25
	Total	82.4808	17.06101	52

BP: Blood pressure, *S1: Session 1, S2: Session 2, S3: Session 3

DISCUSSION

Receptive music therapy is becoming more popular as a non-pharmacological management of hypertension. Various studies have shown that listening to music reduces BP. Some studies have shown that particular type of music (e.g., Mozart's classical music) is more effective for reducing BP, whereas some types of music (e.g., rock music) can elevate BP [7]. The same study by Crippa, *et al*. [7], has also shown that listening to classical music reduces heart rate significantly. Listening to music has also shown to reduce BP in various settings such as stress-induced increased BP in health adults, intra-operative patients, post-operative patients, etc. [8-10].

The main mechanism for BP lowering effect of music has been postulated to be stress-reducing effect of music [11]. However, the physiology of chronic stress response is very complex; involving multiple interactions between psychology, neurology, and hormonal system. Hence, BP lowering effect of music seems to be multi-factorial.

Our study shows that listening to relaxing music can reduce BP and heart rate in pre-hypertensive pregnant women during third trimester of pregnancy. Most of the studies in male and female adults have shown that BP lowering effect of music listening is more on systolic BP as compared to diastolic BP. Our study in pregnant women also has reflected similar findings. This could be due to the fact that systolic BP is more affected by stress response and sympathetic nervous system arousal, while factors affecting diastolic BP are multiple.

Limitations of our study were inclusion of only hospitalized pregnant women during third trimester, use of digital sphygmomanometer, and

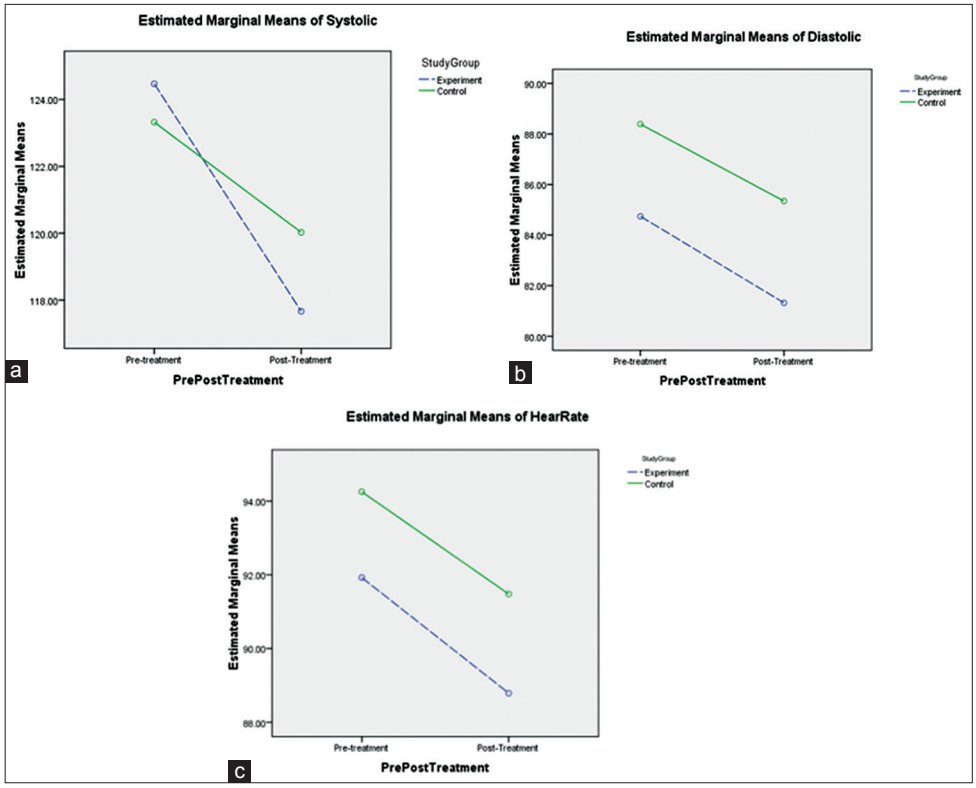

Fig. 1: Combined marginal mean for pre- and post-treatment systolic and diastolic measures in the two study groups. (a) We can see from the figure that systolic for the experiment group falls more steeply than for the control group. This indicates an interaction effect between the study groups and treatment levels. This means that there is a significant effect of the treatment on the measures in the two groups. (b) We can see from the figure that the experimental group is lower in the pre-treatment and post-treatment diastolic measures. (c) The mean values of the heart rate for the experimental group are also lower than that of the control group. The heart rate indicates a reduction in the post-treatment measurement in both groups. None of the subjects reported any adverse effect during the study

non-blinding. The study also did not record long-term effect of music therapy on BP and heart rates.

CONCLUSION

Listening to relaxing music can reduce BP and heart rates in hospitalized pre-hypertensive pregnant women during third trimester. The BP lowering effect of relaxing music listening is more significant for systolic BP. Receptive music therapy seems to be safe in pregnant women.

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