

Effect of Music Therapy on Serum Cortisol in Primigravida in Active Labour

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Abstract:

Background: Unrelieved labour pain can result in exaggerated stress response and can have an adverse effect on the physiologic status of women. 'Medicinal music' is a growing area of research and is an effective intervention across many medical problems. This research is an effort to study the effects of music therapy on the stress experienced by the labouring women.

Objective: To determine the effect of music therapy on serum cortisol in primigravida in active labour.

Methods: In this study 100 primigravida women in active labour were randomly divided into music group (n=50) and control group (n=50). The women in the music group received 3 music therapy sessions starting early in the active phase of labour. Serum cortisol was estimated to measure the stress levels in the labouring women. Data obtained was analyzed using descriptive and inferential statistics

Results: Student t-test analyses showed that there was no significant difference between both the groups in serum cortisol at pre-test [$t=0.08$, $p > 0.05$]. Whereas, the group differences after the music therapy sessions indicated that the music group had significant lower serum cortisol levels compared to the control group [$t = 7.46$, $p < .05$].

Conclusion: Music therapy is effective in reducing stress levels in the women during active labour.

Keywords: Music therapy, Labour pain, Active labour, Serum cortisol.

I. Introduction

Pain during labour involves the sensory component which is the unpleasant feeling of hurt related to the intensity of uterine contractions and the affective component which is the emotional distress related to the sensation of labour pain [1]. The bodily stress response to labour is triggered by the Hypothalamo- Pituitary-Adrenal axis, Adrenocorticotrophic hormone, thyroxine and vasopressin. Cortisol is the stress hormone released by the adrenal glands by the activation of HPA stress axis and it helps the body to combat stress. An exaggerated stress response due to unrelieved labour pain can induce many physiological and psychological bodily responses in the labouring woman. Increase in cardiac output, blood pressure, respiratory rate, oxygen consumption, and catecholamine, cortisol, glucagon levels have been noted and all of these can have harmful effects on the body [2].

In the light of these adverse effects, a challenge for every health care provider is to reduce the labour pain and make the childbirth process as pleasant as possible. Labour pain is a subjective multidimensional experience and not one specific technique or combination of interventions helps all women or even the same woman throughout the labour experience. The pharmacological approaches like spinal and epidural anesthesia are directed at elimination of the physical sensation of labour pain and bear side effects on the mother and the foetus [3]. Non-pharmacologic approaches like hydrotherapy, massage therapy, acupuncture, hypnosis, application of heat-cold, breathing techniques, aromatherapy and music therapy have gained popularity and are largely directed towards prevention of suffering caused by pain by enhancing the psycho-emotional component of care [4].

Music is a non-pharmacological modality which is non-invasive, non-medical, with no known side effects, cost effective and easily accessible to all socio-economic groups. Music heals the soul and also influences immune and endocrine function. History reveals that the traditional Indian healing systems integrated Vedic chants and music. In the last two decades the concept of "Medicinal music" has gained increasing popularity and one of the most widely known applications of music in the medical field has been audio-analgesia [5].

In the 20th century, the publication of articles describing scientifically oriented research into the therapeutic effectiveness of music in the field of Obstetrics has revealed that music during pregnancy promotes wellbeing of the mother and the foetus, increases relaxation and provides calming effect and alleviates stress and distress during labour [1].

In most of the maternity centers, especially in government hospitals, labouring women seldom receive any pharmacologic or non-pharmacologic management to reduce pain [6]. Thus, this study was conducted to determine the effect of music on the stress levels in the women during active labour. Hence it will be the basis to analyze the application of music therapy in a maternity centre.

II. Materials And Methods

The study was conducted in Vani Vilas Hospital, Bangalore. The study sample consisted of 100 primigravida women, 20 to 30 years of age, with singleton pregnancy, with cephalic presentation, 3 to 4 centimeters of cervical dilatation, uterine contractions of 30 to 60 seconds, 38 to 42 weeks of gestation and estimated foetal weight of 2,500 to 3,250 grams. Women were excluded if, before entering the study, they had received analgesic medication, had labour induced, had spontaneous rupture of membranes, or had history of psychiatric illness, difficulty in hearing, infections, or any medical or endocrinal disorders. The study sample was divided randomly into music group (50) and control group (50).

Informed and written consent explaining the objectives, purpose and the method of data collection was taken from the subjects. Socio-demographic data regarding area of residence, education, occupation, religion and language was documented. They were interviewed about their interest in music and their knowledge about music therapy. A fairly homogenous sample was recruited by keeping a check on these extraneous variables and minimizing the group differences.

The subjects were given a cot and a pillow in the labour room equipped with screens all around. The music group was given music therapy along with the routine nursing care. The music was played using audio players and headphones. The music used in this study was non-lyrical, instrumental, with lullabies and classical music, with 'Behag raga' as its main component. This raga is meant for celebration and also has an effect on pain relief. The women in the control group received the routine nursing care and were given ear plugs to ward-off the sounds from the environment. Both groups did not receive any analgesics.

There is a diurnal variation in the estimation of serum cortisol. To generalize this diurnal variation the study was scheduled from 4pm to 9pm. Three sessions of music therapy was scheduled for each woman in music group, with each music therapy session lasting for 40 minutes. All the women in the study sample were subjected to pre-test and post-test data collection. The pre-test blood sample for serum cortisol estimation was obtained at 4pm. The post-test blood sample for serum cortisol estimation was obtained at 9pm after completing the three music therapy sessions. The maternal blood was immediately centrifuged for 10 minutes and the supernatant plasma was kept at 80 °C for later assay. Total plasma cortisol was measured in micrograms per deciliter using Chemiluminescent Assay.

The data obtained from all the subjects in both the groups was tabulated into the master data sheet. Student t-test was used for the data analysis.

III. Results

The 100 women in the study sample were an average age of 20± 3 years. 70% of the women were Hindus, 28% were Muslims and 2% were Christians. 40% of women had high school education, 22% had primary schooling, 10% women had completed graduation and 28% had no formal schooling. Three-fourths of the women were housewives. Most (92%) were 38 to 40 weeks of gestation. All the women liked music and only 1 woman in the study sample is trained in music. 22% women in the study sample knew about music therapy during labour. The study sample did not receive analgesic medication.

In the current study, the intensity of stress during labour was estimated using serum cortisol as a biomarker for stress. The study showed that the mean serum cortisol in music group ranged from 29.71 µg/dl at pre-test to 30.12 µg/dl at post-test; a gain of 0.41 µg/dl. In the control group, mean serum cortisol ranged from 29.58 µg/dl at pre-test to 39.33 µg/dl at the post-test; a gain of 9.75 µg/dl (Fig. 1). Thus, although the music group started with slightly greater mean serum cortisol compared to the control group, the mean serum cortisol levels remained nearly the same at post-test in the music group. On the contrary, greater mean serum cortisol levels during the post-test and greater gains are reported in the control group.

Student t-test of group differences between the music and the control groups at pre-test showed no significant difference in the serum cortisol with $t=0.082$ and $p > 0.05$. Student t-test of group differences at post-test indicated that the music group had significantly lower serum cortisol compared to the control group: $t = 7.46$ at $p < 0.05$ level of significance (Table 1). Thus it can be inferred that the music therapy is effective in reducing the stress levels in the primigravida women in active labour.

Music therapy was given to 50 women in the music group. 94% of the women in the music group liked the music which was played during the music therapy sessions. Out of them, 96% women accepted that it triggered their imagination about their baby, 72% said that it kept them away from the noises around them, 63% women claimed that it relieved them from pain, 61% women said that music kept them occupied and enabled them to focus on themselves and 20% women said that they could sleep listening to the music.

IV. Figures And Tables

Table 1: Description of Serum Cortisol levels in the study sample (n=100)

Cortisol (in µg/dl)	Music group		Control group		t-value	p-value
	Mean	SD	Mean	SD		
Pre-test	29.74	7.86	29.58	7.96	0.082	0.93
Post-test	30.12	2.23	39.33	5.67	7.40	0.00001

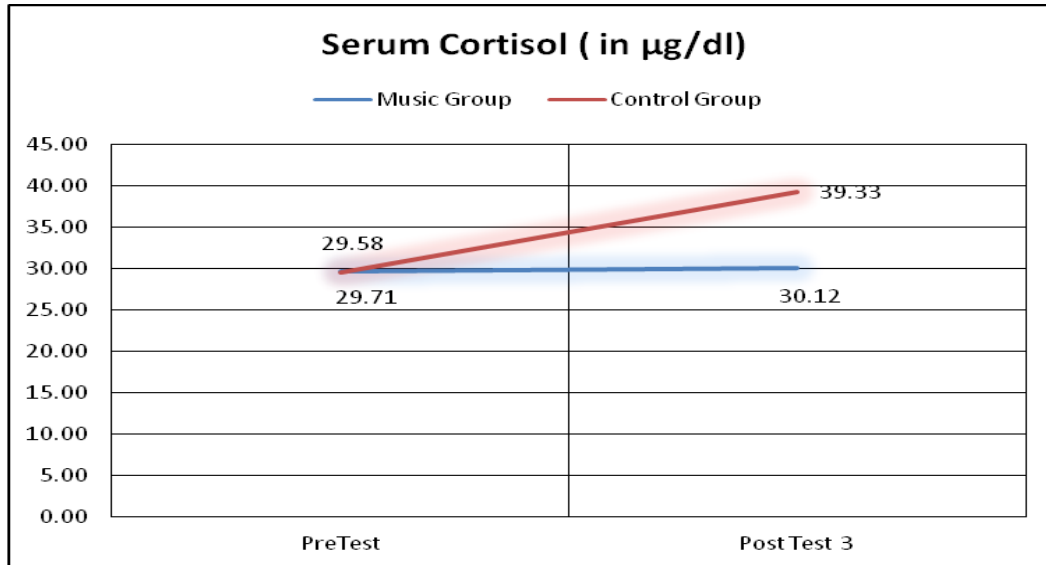


Figure 1: Music group with higher mean serum cortisol at pre-test and significantly lower mean serum cortisol at post-test compared to the control group (n = 100)

III. Discussion

Stress, anxiety and pain influence the process of labour and are universal experience for every labouring woman. Cortisol is the hormone released by the adrenal glands by the activation of Hypothalamo-Pituitary- Adrenal axis to prepare the body to combat stress. It is well established that cortisol levels increase throughout pregnancy and continue to increase with advancing labour. This physiological change is viewed as a necessity for maintaining feto-maternal wellbeing and promoting normal labour progression [7].

In the current study, the intensity of psycho-physiological stress during labour was estimated using serum cortisol as a biomarker for stress. There is a diurnal variation in the estimation of serum cortisol [8]. To generalize this diurnal variation the study was scheduled from 4pm to 9pm. With regard to the stress levels in the labouring women serum cortisol estimation showed that the music and the control groups started with nearly the same mean serum cortisol at pre-test. At post-test greater mean serum cortisol was noted in the control group compared to the music group and it was statistically significant. This denotes that music therapy is found to be effective in reducing the serum cortisol-a biomarker for stress during labour. Our findings corroborate with the findings in a previous study conducted by Ventura et al on 154 pregnant women awaiting amniocentesis which showed decrease in cortisol in the music group [9]. To the best of our knowledge no study so far has investigated the effects of music therapy on the serum cortisol during active labour.

The Gate control theory is the theoretical basis for this study which explains that the descending nerve impulses from the brain triggered by hearing music close the gate to the sensation of pain and distress located in the dorsal horn of the spinal cord and thus helps in alleviating the sensation of pain and distress [6]. Music influences health through neurochemical changes in the domains like reward, motivation, pleasure, stress, immunity and social affiliation [10]. Women who received music therapy in the study found music therapy helpful as it played a multidimensional role by keeping them occupied, enabling them to focus on themselves, triggering their imagination about their baby to be born and helping them to get distracted from the increasingly severe labour pain. These findings in the study are consistent with the study by Sasistorn Phumdoung et al which states that (92%) women reported that they liked the music they heard and nearly all women in the music group reported at the end of the study that the music was helpful (98%) [1].

IV. Conclusion

Music is an age old technique for relaxation and has a tremendous positive impact on the mind and the body. Music therapy is one of the repertoires of the non-pharmacologic techniques for the management of pain and distress during labour. The results of the study provide evidence that the music therapy has a positive effect

in reducing the stress of labour. Health care providers can use music therapy as a strategy to help the labouring women to cope up with the labour pain.

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