



Impact assessment of musical vibrations on lipid and hormonal parameters of Human volunteers and albino rats related with Coronary Artery Diseases (CAD).

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Article Information	Abstract
<p>Article history: <i>Received:</i> 20.03.2012 <i>Revised:</i> 28.08.2012 <i>Accepted:</i> 20.09.2012</p>	<p>Music is formed of a series of sounds (tones) of a definite pitch and pattern that the brain could process into something beautiful and meaningful. Music is woven around an aesthetically-sounding pitch with its dynamic notes that move through in an ascending and descending scale, lifting our mind along with it wherever it goes, while its rhythms unconsciously make us respond to its tilts and turns, making us nod our head and move our body and limbs. The musical process, when synchronised with the mental process, promises an elevated state of consciousness, termed as brain wave patterns. Each music is characterised by the wavelengths of sound, perceptible to human vocal range. There is a Music-Mind nexus so that every bit of musical experience presupposes mind's presence or involvement. As music and mind exhibit identical polarity or pattern, it is considered analogous to the human psyche. Our body and mind are blessed with healthy resonance and rhythms. It is the disharmony in them, is the major cause for all our ailments- both physiological and psychological. Music thus connects us to our own rhythms and also with the world around, which follow the same pattern. The body recognizes and responds to the pulse of the music in no time. It is an established fact that brain controls entire metabolism, biochemistry, haematology, physiology etc. of the body, So anything which is capable to influence the brain also influences the entire metabolism and physiology of body. No doubt this can be done by sound vibrations in form of music. Music therapy which is being used since time immemorial has remedial capacity in this direction.</p>
<p>Keywords: Music Therapy, Lipids, Adrenalin, Cortisol, Lipoproteins</p>	<p>In the present study the effect of specific musical sound vibrations is analysed through biochemical analysis of Adrenalin, Cortisol, Low Density Lipoproteins (LDL), Very Low Density Lipoproteins (VLDL) and High Density Lipoproteins (HDL) level in the blood of albino rat (lab condition) and Humans (volunteers) for a three months (30, 60 and 90 days protocol) treatment period. Observations are so surprising. The biochemical parameters altered significantly in rats, while in humans most parameters altered none significant to very highly significant. The difference in significance level of humans and rats shows that there is factor which is responsible to affect the result in lab and field condition, but it is clear from the present findings that music has the power to affect the biochemistry of livings and it needs more investigations from different aspects.</p>

1. INTRODUCTION:

Music is formed of a series of sounds (tones) of a definite pitch and pattern that the brain could process into something beautiful and meaningful. Music is woven around an aesthetically-sounding pitch with its dynamic notes that move through in an ascending and descending scale, lifting our mind along with it wherever it goes, while its rhythms unconsciously make us respond to its tilts and turns, making us nod our head and move our body and limbs. The musical process, when synchronised with the mental process, promises an elevated state of consciousness, termed as brain wave patterns. Each music is characterised by the wavelengths of sound, perceptible to human vocal range. There is a Music-Mind nexus so that every bit of musical experience presupposes mind's presence or involvement. As music and mind exhibit identical polarity or pattern, it is considered analogous to the human psyche. Our body and mind are blessed with healthy resonance and rhythms. It is the disharmony in them, is the major cause for all our ailments- both physiological and psychological. Music thus connects us to our own rhythms and also with the world around, which follow the same pattern. The body recognizes and responds to the pulse of the music in no time.

Music therapy is being used since time immemorial and it is an established fact that brain controls entire metabolism, biochemistry, haematology, physiology etc. of the body, So anything which is capable to influence the brain also influences the entire metabolism and physiology of body. No doubt this can be done by sound vibrations in the form of music. Music therapy since ancient time has the remedial capacity in this direction.

In the present study the effect of specific sounds is analysed through biochemical analysis of **Adrenalin, Cortisol, Low Density Lipoproteins (LDL), Very Low**

Density Lipoproteins (VLDL) and High Density Lipoproteins (HDL) levels in the blood of albino rat (lab condition) and Humans (volunteers) for a three months (30, 60 and 90 days protocol) treatment period. Observations are so surprising. The biochemical parameters altered significantly in rats, while in humans most parameters altered none significant to very highly significant. The difference in significance level of humans and rats shows that there is factor which is responsible to affect the result in lab and field condition, but it is clear from the present findings that music has the power to affect the biochemistry of livings and it needs more investigations from different aspects.

Music can be used as non-pharmacological aids to the patients of various disorders which are related with the imbalance of various bio chemicals studied during the present study. Music therapy is an allied health profession and a field of scientific research, which studies the correlations between the process of clinical therapy and bio-musicology. The ancient systems such as shamanism, religious chants, African drumming rhythms, the Nada Yoga practices involving concentration on sound vibrations etc have in fact, for long, employed profitably for altering the levels of consciousness, towards what is called a "healing state" which promotes relaxation and rest.

Indian classical 'Ragas' have been acclaimed by Vedic science to have healing effects. Music has frequently been used as a therapeutic agent from the ancient times. In India, music is a kind of yoga system through the medium of sonorous sound, which acts upon the human organism and awakens and develops their proper functions to the extent of self-realization, which is the ultimate goal of Philosophy of all religion. Melody is the keynote of Indian Music. There are countless 'Ragas' each with countless characteristic peculiarities

and a particular pattern (melodic, rhythmic or harmonic) with given properties of prominence in a given set of musical material. That is why we cannot establish a particular Raga for a particular disease. Different types of Ragas are applied in each different case. When the term Music Therapy is used, we think world-wide system of therapy. Literature of Vocal part of Indian Classical Music is not sufficient in that case. Classical music with its unique swara/note structure ensures calm and cozy mind by exposure which subdues the emotion provoking situations. Music plays an effective role in subduing the so-called emotional imbalance. Present study is planned to evaluate the effect of different type of sound on biochemical parameters related with the cardiovascular disorders.

2. MATERIALS AND METHODS

2.1 SELECTION OF MUSIC (TEST COMPOUND)

Music is selected on the basis of their property. Specific Indian ragas are selected for the treatment of Albino rat, whereas for human volunteers specific songs are selected from the list they have been provided in questionnaire, based on specific Indian Ragas. Three sets of pre-recorded Indian classical sound are selected on the basis of trial and error methods. They are given to the experimental animals for a period of 90 days. The biochemical analysis of blood samples are carried at 30 days, 60 days and 90 days. The results were analysed and after that the similar sound treatment are given to volunteers for a period of 90 days. The biochemical analysis of blood samples are carried at 30 days, 60 days and 90 days interval. The blood samples of volunteers are collected by a physician hired for the purpose, whereas the blood of albino rats was taken in lab from treated and control groups. Sound of specific Indian ragas at a 60-80 db (controlled by sound meter) are given to albino rat for two hours (9-10 AM and 3-4 PM) daily by speakers attached to the wall

of their cage for 30, 60, 90 days, whereas human volunteers are allowed to listen a specific songs based on ragas through head phones provided them at home (for the same time period as to rats) after training them in workshops organized in department on Sundays and holidays. Control groups of both rats and humans are also assigned to listen to taped "white noise" ("White noise" or "synthetic silence" is an attempt to block out environmental noise. In this case it was a pre nature sound such as sea sounds, which themselves are rhythmic) through headphones, or to a control group.

2.2 MAINTENANCE AND FEEDING OF EXPERIMENTAL ALBINO RATS-

The experimental albino rats (*Rattus norvegicus* [Berkenhout]), procured from inbred colony were acclimated for one month to the laboratory conditions (temperature. $25\pm 0.50^{\circ}\text{C}$, relative humidity $60\pm 5\%$ and photoperiod 12 hr/day) before using them for the experiment. Adult male and female rats of almost equal size and weight were kept in the polypropylene cages and cleaned regularly to avoid any infection or undesirable odour in the laboratory. Each cage was equipped with a metallic food plate and water bottle. The albino rats were offered fresh feed daily throughout the experimentation on Gold Mohar rat and mice feed, manufactured by Hindustan Lever Ltd., India at regular interval and water was provided *ad libitum*.

2.3 SELECTION OF INDIVIDUALS-

Albino Rats: For the experimentation individuals selected randomly irrespective of sex. Five healthy adult albino rats (6-8 weeks of age, with average body weight of 150-200 g) were selected randomly for test and control studies their blood was collected after 30, 60 and 90 days for the present investigation. Each rat was assigned a number for convenience prior to experimentation.

Volunteers-The Volunteers were selected through a wide publicity (Newspaper, SMS and TV Programmes) from Agra, Noida, Delhi, Ghaziabad, Gurgaon region. They are provided to fill a questionnaire. On the basis of a questionnaire they are provide a recorded CD of selected songs and sounds.

2.4 COLLECTION OF BLOOD SAMPLES

The blood from rats collected in the early morning hours (7-8 AM) in lab on the

scheduled date. The blood samples were obtained with the help of 2.0 ml disposable syringe from the tail of albino rats, whereas the blood samples of human were collected by a physician hired for the purpose. The various biochemical parameters of rats were analyzed with the help of a standard kit methods in departmental lab, while human blood tests were conducted in authorized labs of a respective city.

3. RESULTS

Table-I: Showing the impact of various sounds on human and albino rat:

Albino Rat (In Lab)			Parameters	Human Volunteers (NCR)		
Sound A	Sound B	Sound C		Sound A	Sound B	Sound C
↑NS	↑NS	↑NS	Adrenalin	↑S	↓S	↑S
↓VHS	↓NS	↓VHS	Cholesterol	↓HS	↓NS	↓S
↓S	↓NS	↓S	Cortisol	↓S	↓NS	↓S
↑HS	↑S	↑NS	HDL	↑S	↑S	↑NS
↓NS	↓NS	↓S	LDL	↓NS	↓NS	↓S
↓NS	↓NS	↓S	TG	↓NS	↓NS	↓S
↓NS	↓NS	↓S	VLDL	↓NS	↓NS	↓S

Significant Level: P < 0.01 (HS=Highly Significant increase ↑ or decrease ↓), P < 0.05 (↑=Significant increase or decrease ↓), P > 0.05 (↑=Non significant increase or decrease ↓).

4. DISCUSSION :

Lipid bound proteins are called lipoproteins. Lipoproteins are found in plasma and their function is to transport lipids. Lipoprotein includes VLDL, LDL and HDL. In the present study VLDL and LDL are decrease Non significantly except in case of sound "C". The HDL significantly increased in most cases. The decrease of serum LDL and VLDL will lead to the decrease of triglycerides and cholesterol which means favourable lipid concentration in body and a healthy heart. In the present study sound vibrations found to increase the adrenalin level in both humans and albino rats while decreasing the level of cortisol. The decreases of various lipids are indicative of good health. And support the view that sound can be

used as a drug to control various lipid parameters.

Most of the above biochemical findings of present investigation are helpful to establish the doctrine that music can be used for various cardiovascular disorders. The effect of music on the cardiovascular disorders has been initially evident in "Lancet"(medical journal), In which Vincent and Thompson (1929) made an attempt to discover the influence of listening to gramophone, and radio, music on blood pressure and he observed that listening to music was accompanied by a slight rise in blood pressure in the listener. Bason and Celler (1972) observed that the human heart rate could be varied over a certain range by entrainment of the sinus rhythm with external auditory stimulus. Bason`s

paper is important for supporting the proposition often made by music therapists that meeting the tempo of the patient influences their musical playing and is the initial key to therapeutic change. An extension of this premise, that musical rhythm is a pacemaker, was investigated by Haas et al. (1986) in terms of the effects of perceived rhythm on respiratory pattern, a pattern that serves both metabolic and behavioural functions. He hypothesized an external rhythmical musical activity, in this case listening to taped music.

Several authors have investigated this relationship in the setting of hospital care (Bonny 1983; Davis et al. 1987; Zimmerman et al. 1988; Guzzetta 1989; Philip 1989; Elliott 1994) often with the intent of reducing anxiety in chronically ill patients (Gross and Swartz 1982; Standley 1986), for treating anxiety in general (Robb 2000), or specifically in musicians (Brodsky and Sloboda 1997). Bonny (1978, 1983) has suggested a series of musical selections for tape recordings which can be chosen for their sedative effects and according to other mood criteria, associative imagery and relaxation potential, none of which have been empirically confirmed. For this Updike (1990) conducted an experiment and confirms Bonny's impression that there is a decreased systolic blood pressure, and a beneficial mood change from anxiety to relaxed calm, when sedative music is played. Rider (1985a,b) explained that disease related stress was caused by the desynchronization of circadian oscillators and that listening to sedative music, with a guided imagery induction, would promote the entrainment of circadian rhythms as expressed in temperature and corticosteroid levels of nursing staff. This study found no conclusive results, mainly because there was no control group. Guzzetta (1989) conducted a study to determine whether relaxation and music therapy were effective in reducing stress in patients admitted to a coronary care unit

with the presumptive diagnosis of acute myocardial infarction. In this experimental study, 80 patients were randomly assigned to a relaxation, music therapy, or control group. Music therapy was comprised of a relaxation induction and listening to a 20 minute musical cassette tape selected from three alternative musical styles; soothing classical music, soothing popular music and non-traditional music. Stress was evaluated by apical heart rates, peripheral temperatures, cardiac complications, and qualitative patient evaluative data. Data analysis revealed that lowering apical heart rates and raising peripheral temperatures were more successful in the relaxation and music therapy groups than in the control group. The incidence of cardiac complications was found to be lower in the intervention groups, and most intervention subjects believed that such therapy was helpful. Both relaxation and music therapy were found to be effective modalities of reducing stress in these patients, and music listening was more effective than relaxation alone. Furthermore, apical heart rates were lowered in response to music over a series of sessions thus supporting the argument that the assessment of music therapy on physiological parameters is dependent upon adaptation over time. Further research strategies may wish to make longitudinal studies of the influence of music on physiological parameters.

Bason's (1972) study could influence heart rate by matching the heart rate of the patient, then we must conclude that studies of the influence of music on heart rate must match the music to the individual patient. This also makes psychological sense as different people have varied reactions to the same music. Furthermore, improvised music playing which takes meeting the tempo of the patient as one of its main principles may have an impact other than the passive listening to music. In addition, the work of Haas (Haas et al. 1986) mentioned above showed that listening,

coupled with tapping, synchronizes respiration pattern with musical rhythm, further emphasizing that active music playing can be used to influence physiological parameters and that this synchronization can be learned.

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