

THE INFLUENCE OF UNIQUE MELODIES OF PRASHASTHI AND KAMATH SONGS IN SRI LANKAN FOLK MUSIC ON HEART RATE

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ABSTRACT

Music plays an important role in our day to day life as a source of entertainment. More importantly music can also affect the other aspects of physical, mental, social and spiritual wellbeing of a person. According to Western and Eastern literature, heart rate correlates with certain musical aspects including tempo, melody, and music genre. The present research studied the variation of heart rate while listening to sedative and excitative Sri Lankan folk melodies. Prashasthi and Kamath folk musical creations have been selected for this experiment. Forty-five men between the ages of 25-30 who had never studied music were used as samples in this research. The mean heart rates of the subjects have increased significantly while listening to the prashasthi song. The mean heart of the subjects three minutes after stopping the prashasthi song remained significantly increased compared to their baseline ($p < 0.01$). Listening to Kamath songs did not significantly change the mean heart rates of the subjects.

Keywords: *Heart Rate; Sri Lankan Folk Music; Sedative and Excitative Music; Prashasthi Songs; Kamath Songs*

INTRODUCTION

The heart rate amplitudes from mental and physical stimulation for every moment. 1741 A.D Gretry has researched how human biological aspects respond to the music. Thereafter, many researchers have started studying the correlation of heart rate while listening to music (Dainow, 1977). Scholars have stated that listening to music affects the autonomic nervous system. As a result, it also affects the sympathetic and parasympathetic nervous system that controls the cardiovascular system (Valenti *et al.*, 2012; Ferreira *et al.*, 2015; Regaçone *et al.*, 2014; Trappe & Voit, 2016; Watanabe *et al.*, 2017). Most of the researchers have found two common conclusions in general. First one, while listening to Excitative music, has possibly increased the heart rate. Second one, while listening to sedative music, has possibly decreased the heart rate (Iwanaga & Tsukamoto, 1997; Valenti *et al.*, 2012). But Hodges has summarized four contradictory results of the heart rate while listening to excitative and sedative music (Iwanaga & Moroki, 1999). If they are; Heart rate increased during excitative music and decreased sedative music, both excitative and sedative music increased heart rate, both excitative and sedative music decreased heart rate, Music had no effect on heart rate.

According to researcher Iwanaga Mokoto, a listener prefers musical tempo that simply harmonize with his or her heart rate. A person has an average heart rate ranging from 62.8 bpm to 92.1 bpm. Accordingly, the preferred musical tempo is between 70-100. However, a person will not prefer all musical tempos between 70-100. As an example, if the heart rate of a person was 70 bpm at a particular time, his preferred musical tempo will be 70 or second harmonic 105 or third harmonic 140. This density function indicated that preferred tempos were distributed mostly one, one and a half, and two times the heart rate (Iwanaga, 1995).

Current research has focused on the correlation between melodies of Sri Lankan folk music and heart rate. Many researchers in Western and Eastern music have studied the correlation between their musical tradition and human biological parameters. To date, a limited number of literatures are available regarding the effect of Sri Lankan music on biological parameters of a human.

METHODOLOGY

This research has mainly focused on the specifics of sedative and excitative Sri Lankan Folk melodies. Western researchers have classified specificities of

sedative and excitative music, Sedative music is characterized as melodious, delicate, harmonic and romantic while Excitative music characterized as loud, dynamic, rhythmic, elicited tension and excitement (Iwanaga *et al.*, 2005). I have studied two folk musical creations which have above mentioned specific points in my research, Sunil Rathnasekara's "chandanam yasa" prashasthi folk musical creation as the excitative music; this includes the elements of excitative musical specificity. C. De S Kulathilaka's "O Raire Oi Rama " kamath folk musical creation as a sedative music; this includes the elements of sedative musical specificity.

For this research I have used a sample of forty-five healthy males aged between 25-30 years. Person with

any mental and physical difficulties were excluded from the study. None of the subjects had acquired any form of higher education in music. The subjects were given headphones with noise cancellation and seated in a position of 90° in a silent environment. Their eyes were covered with blinds. Three minutes before listening, two minutes and forty-five seconds while listening and three minutes after listening the song were used as time frames for testing the heart rate. The heart rate was measured every fifteen seconds during each session, using a pulse-oxymeter. All tested people in the research were subjected to two musical experiences, prashasthi and kamath songs with a six to eight hours interval in between.

RESULTS

Table 1: Average Heart Rates of Subjects at the Six Sessions Based on Prashasthi and Kamath Songs

Beats Per Minute (bpm)						
Number of Person	Before listening to prashasthi song	While listening to prashasthi song	After listening to prashasthi song	Before listening to kamath song	While listening to kamath song	After listening to kamath song
1	84.23	82.75	89.23	88.46	89.25	85.38
2	69.08	69.83	72.85	84.31	74.42	77.69
3	62.08	64.42	65.92	61.00	62.25	61.46
4	73.77	72.25	75.23	75.69	71.83	75.85
5	69.77	72.58	71.54	72.54	72.75	72.31
6	76.15	75.42	78.08	71.46	70.33	71.69
7	66.92	71.42	71.38	68.15	70.33	68.08
8	63.23	65.67	67.62	56.85	56.92	58.08
9	76.77	79.58	81.46	70.31	71.25	70.92
10	84.38	80.67	82.62	75.38	70.08	74.00
11	76.38	82.08	82.15	88.69	88.67	87.85
12	62.69	63.17	65.92	67.85	64.75	65.23
13	57.08	59.08	58.69	60.38	59.42	59.31
14	85.46	86.67	85.54	80.23	80.00	81.54
15	65.85	63.67	65.23	63.31	69.33	64.92
16	84.69	88.08	86.46	89.23	86.50	85.38
17	64.38	65.58	66.62	69.62	64.42	69.92

18	62.15	63.58	65.15	61.08	64.67	64.69
19	60.00	60.67	63.46	59.77	64.00	58.54
20	65.23	65.58	66.54	60.00	60.83	63.31
21	54.00	60.50	57.23	53.23	54.92	54.69
22	78.00	84.92	84.31	73.77	75.75	78.08
23	74.62	79.17	76.85	81.00	80.50	81.08
24	92.00	91.92	93.92	84.92	84.17	82.08
25	94.00	95.08	96.31	83.38	84.25	82.92
26	70.57	73.75	73.69	71.08	74.00	74.92
27	72.07	78.75	77.62	77.92	77.75	78.00
28	70.43	76.67	73.92	74.31	77.50	74.08
29	71.00	73.42	76.23	78.31	77.67	77.23
30	85.64	92.25	91.23	79.54	82.33	80.85
31	67.07	73.42	72.92	68.15	72.42	72.62
32	102.57	106.33	104.85	95.46	97.00	97.31
33	82.07	83.33	85.54	67.85	77.83	79.46
34	70.14	80.58	75.85	67.62	77.17	70.15
35	69.71	76.75	70.69	70.23	74.00	71.69
36	72.79	77.67	72.77	71.31	79.42	76.85
37	93.07	95.08	95.23	96.92	93.75	91.31
38	59.86	65.17	64.38	62.85	68.42	69.69
39	72.50	76.75	79.46	79.69	79.92	79.69
40	66.64	67.58	70.23	77.00	71.50	74.54
41	90.00	92.75	89.46	94.69	95.42	98.00
42	81.50	84.50	86.62	73.31	71.50	73.38
43	74.14	80.75	82.00	73.46	77.17	76.23
44	88.43	91.33	91.92	82.23	84.17	85.31
45	86.79	95.58	92.31	90.38	95.67	93.92

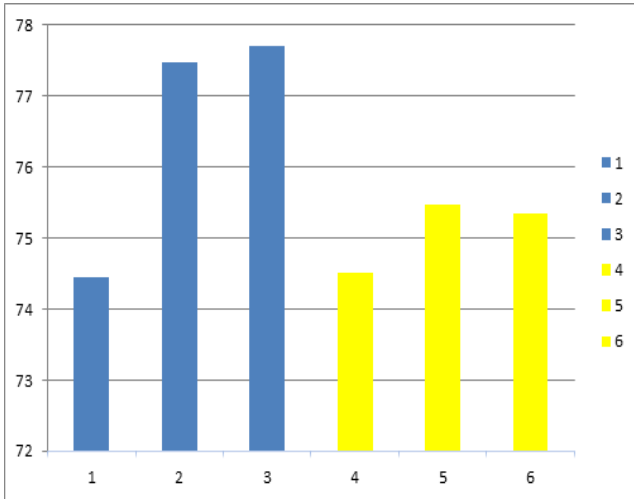


Figure 1: Final Averages of All Data

1. Before listening to prashasthi song- 74.44 bpm
2. While listening to prashasthi song- 77.48 bpm
3. After listening to prashasthi song- 77.72 bpm
4. Before listening to kamath song- 74.51 bpm
5. While listening to kamath song- 75.47 bpm
6. After listening to kamath song- 75.34 bpm

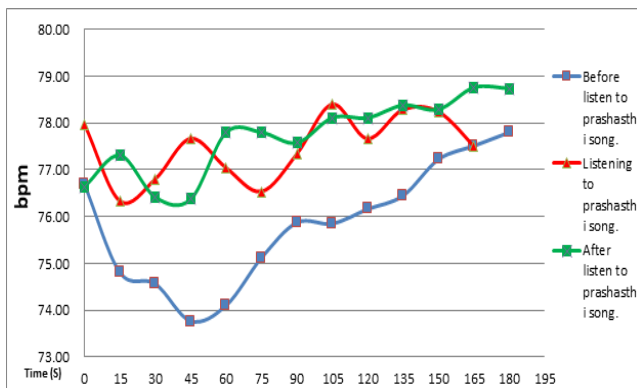


Figure 2: Three Situations Related to the Prashasthi Song

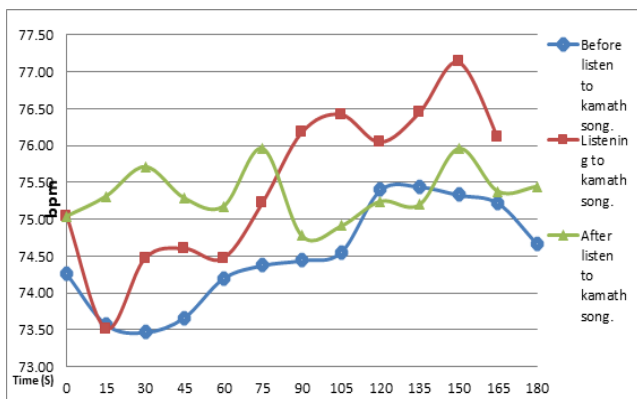


Figure 3: Three Situations Related to the Kamath Song

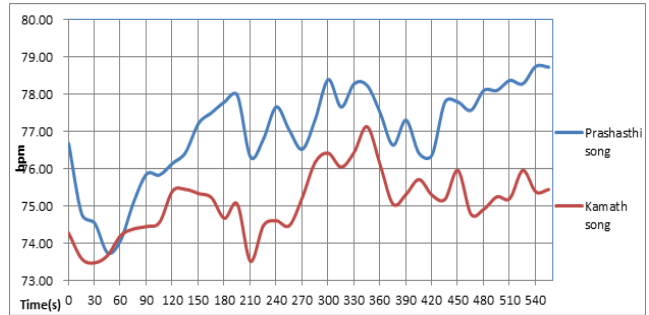


Figure 4: Three Situations Related to the Prashasthi Song and Kamath Song

Table 2: SPSS Software Analyzing.

		Paired Samples Test							
		Paired Differences			99% Confidence Interval of the Difference		T	Sig. (2-tailed)	
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Pair 1	Before prashasthi - with prashasthi	-3.041	2.981	0.440	-4.223	-1.858	-6.917	45	0.000
Pair 2	Before prashasthi - after prashasthi	-3.274	2.110	0.311	-4.110	-2.437	-4.522	45	0.000
Pair 3	before kamath song - with kamath song	-0.961	3.855	0.568	-2.490	0.568	-1.691	45	0.098
Pair 4	before kamath song - after kamath song	-0.829	3.159	0.466	-2.082	0.424	-1.780	45	0.082

DISCUSSION

Heart rate is mainly controlled by the sympathetic nervous system and parasympathetic nervous system, which are parts of the autonomic nervous system (ANS). The sympathetic nervous system secretes catecholamine, epinephrine, norepinephrine hormones that increase the heart rate, while the parasympathetic nervous system secretes acetylcholine hormone that slows down the heart rate. Researchers Stefan Koelsch and Lutz Jancke have mentioned a valuable explanation as to how the heart rate and music are interconnected.

"Heart rate is regulated by numerous reflex-like circuits involving both brainstem structures and intra-thoracic cardiac ganglia, which are in turn under the influence of cortical forebrain structures involved in emotion such as the hypothalamus, amygdala, insular cortex, and orbitofrontal cortex. The activity of these forebrain structures can be modulated by music-evoked emotions. Generally, emotional arousal is associated with a predominance of sympathetic ANS activity, thus leading to an increase in Heart Rate, whereas a predominance of parasympathetic ANS activity leads

to a decrease of Heart Rate." (Koelsch & Jäncke, 2015)

Samangi and Sumanthri have studied stress reduction capability from the Sri Lankan Nalawili folk melody and other music genres. Accordingly, the heart rate has decreased in the sample as 87.5% for the Nalawili folk melody, 62.5% of the people for the weightless relaxation music, and 37.5% of the people for the Purwadanashri raga. Accordingly, there is a high tendency for the heart rate to decrease while listening to Nelawili songs in Sri Lankan folk music (Arachchi & Samarawickrama, 2018). In this way, there is no additional research data to make a comparative discussion of the effect of listening to folk music in Sri Lanka on heart rate. But it can examine how to affect the heart rate while listening to different music genres in the world. For that should discuss of each one as western classical music, popular music, and Indian classical music.

According to the researchers, the music of the musicians Bach, Vivaldi, Mozart can significantly affect to the heart rate (Escher & Evequoz, 1999). Researcher Hans-Joachim has studied the effects on the Cardiovascular System, based on four selected works in musician Mozart, five selected works in musician Strauss, and seven selected works in band ABBA. The Music of Mozart and Strauss have been shown to significantly reduce heart rate and blood pressure. But there has been no statistical response to the ABBA music. In particular, Hans-Joachim points out the musician Mozart's No. 40 in g minor (KV 550) symphony can have a powerful influence. Researcher Hans-Joachim Trappe who reviews the content of all the pieces of music that have been researched presents the characteristics of a piece of music that can have a positive effect on the Cardiovascular System such as a high degree of periodicity, a catchy melody line, a key that is experienced as pleasant, skillful composition, few changes in volume or rhythm, harmony sequences that are not rousing, the absence of sung words, a certain degree of prominence/fame and popularity of the musical genre (Trappe & Voit, 2016). So also, Researcher Luciano Bernardi and his group, says that Vocal and orchestral crescendos have a significant correlation with the cardiovascular or respiratory compared to a monotonous piece of music (Bernardi *et al.*, 2009).

According to a researcher named R Armon, the heart rate has increased significantly after listening to rock

music genre (Armon *et al.*, 2011). So also, David Sills, a researcher, has been examined musical genres under the tempo such as Classical- 125 bpm, Electronic- 119 bpm, Jazz- 154 bpm, World- 124 bpm, RNB- 99 bpm, and Rock- 79 bpm. But significant influences have been shown only in the genres of Classical and Rock. Also, the heart rate increased significantly when listening to the subjects' favourite musical selection (Sills & Todd, 2015). Researcher Palakanis has among genres of classical, country/western, popular, Jazz/rhythm and blues, and gospel music to give the sample people in their most enjoyable music to listen. There, the heart rate decreased significantly (Palakanis *et al.*, 1994). Samitha Siritunga and their team have studied the effects of listening for the raga called Darbarikanda on the Cardiovascular System. There, averages of blood pressure, heart rate, and the respiratory rate decreased significantly (Siritunga *et al.*, 2013). According to Chatterjee, a researcher, Todi Raga significantly reduced blood pressure, pulse rate, and respiratory rate before hearing (Chatterjee & Mukherjee, 2020). Also, according to a long-term study by a researcher named Gururaj, listening to Indian classical music has a significant effect on blood pressure (Kulkarni & Chittapur, 2017). Researcher Nagarajan analyzed the heart rate before and after hearing Bhupali Raga. There, the Bhupali Raga can significantly decrease the heart rate (Nagarajan *et al.*, 2015). In this way, elements of music can be clearly affected in the autonomic nervous system and the cardiovascular system, when listening to music in the various social samples of the world. Thus, the current research shows that the elements of folk music in Sri Lanka affect the heart rate.

CONCLUSION

The mean heart rates of the subjects have increased significantly while listening to the prashasthi song (the mean difference of the heart rate was 3.041 with 99% confidence interval of 4.22 to 1.86 ($p < 0.01$). The mean heart of the subjects three minutes after stopping the prashasthi song remained significantly increased compared to their baseline ($p < 0.01$). Listening to Kamath songs did not significantly change the mean heart rates of the subjects.

Conflicts of Interest:

The authors declare that the research review was conducted in the absence of any commercial or economic associations that could be construed as a potential conflict of interest.

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