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"TO STUDY THE CHANGES IN BLOOD PRESSURE INDICES BEFORE AND AFTER PRANAYAMA PRACTICE AMONG YOUNG VOLUNTEERS"

[1]Mrs. Patil Smita V*, [2]Mr. Gaikwad Pandurang B, [3]Dr.Ulhas S. Mali, [4]Dr. Suvarna T. Jadhav, [5]Mr. Vinayak B. Gaikwad and [6]Dr. Umesh Wadagave

[1]Ph.D registered. Assistant Professor, Dept. of Physiology, Bharati Vidyapeeth University Dental college & Hospital, Sangli.

[2]M.Sc. (Medical) Physiology, Assistant Professor. Dept. of Physiology, Prakash Institute of Medical Science and Research Islampur. Dist. Sangli (MS)

[3]Associate professor, Dept of pathology Bharati Vidyapeeth University Dental college & Hospital, Sangli

[4]Assistant Professor , Dept of Biochemistry Bharati Vidyapeeth University Dental college & Hospital, Sangli

[5]Statistician cum tutor, Dept. of community Medicine. B.K.L Walawalkar, Rural Medical Collage, Kasarwadi, Sawarde.

[6]Assistant Professor, Dept. of Public health dentistry Bharati Vidyapeeth University Dental college & Hospital, Sangli

***Correspondence for Author: Mrs. Patil Smita V**
Ph.D registered. Assistant Professor, Dept. of Physiology, Bharati Vidyapeeth University Dental college & Hospital, Sangli.

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ABSTRACT

BACKGROUND- Yoga is an ancient science established in India. Those who are practicing yoga and pranayama can lead to healthy life. Pranayama (breathing exercise) can produce different physiological responses in young healthy individuals. Various blood pressure indices especially Rate Pressure Product (RPP) are used as indices of myocardial oxygen consumption. AIM- "So this work was undertaken to study various blood pressure indices before and after pranayama among young volunteers". **MATERIALS & METHODS**: - The study was conducted on 60 healthy 1st year M.B.B.S. students about the effects of pranayama on heart rate, blood pressure & blood pressure indices before and after 4th, 8th & 12th week of pranayama practice. Blood pressure was measured with the help of Sphygmomanometer. Heart rate was measured clinically with stop watch. **RESULTS** : There was significant decrease (p=0.001) in heart rate, systolic Blood Pressure, pulse pressure, mean arterial pressure, Rate Pressure Product & double pressure product after pranayama practice. There was decrease in diastolic BP also after pranayama practice but this change was not statistically significant. **CONCLUSION**: Regular practice of Pranayama has potential to enhance the beneficial effects by decreasing blood pressure indices & increasing cardiac efficiency in an individual.

KEY WORDS: Pranayama, Heart Rate, Systolic Blood pressure, Diastolic Blood Pressure, Rate Pressure Product.

INTRODUCTION

Now a day's Pranayama and yogasanas are considered to be an important part of modern medicine. Yoga is the best lifestyle. Its main aim is to attain the unity of mind, body and spirit through asanas (muscle exercises), pranayama (breathing exercises), and meditation.[1] Pranayama is the fourth step of astang yoga. Now a day's Many physicians recommend yoga and pranayama to the patients at risk for heart diseases, as well as for back pain, arthritis, depression and many other chronic diseases.[2] The beneficial effects of pranayama are well reported and have a sound scientific basis. Different types of pranayama produce different physiological responses in healthy young volunteers Pranayama is a method of breathing and chest expansion exercise which.[3] has been reported to improve cardio respiratory function in health and disease.[4,5]

The rate pressure product (RPP) is a reliable index of the myocardial oxygen consumption and the cardiac work and it correlates well with the myocardial oxygen consumption of normal subjects as well as of patients with angina pectoris.[6]

Ancient Indian vedic literature, says that breathing exercise with cautions improves the mental and physical health. There are different types of pranayamas that are specially advised for the treatment of various cardiorespiratory disorders. There are evidences that pranayama training produces a deep psychosomatic relaxation[7,8] and an increase in the cardiorespiratory efficiency[9] and improvement in the autonomic functions.[10]

Taking into account all above things, we had planned to study the changes in heart rate & blood pressure indices

before and after pranayama practice among young volunteers.

MATERIALS AND METHODS

After the approval by institutional ethical committee, a cross sectional study was carried out on 60 healthy 1st year M.B.B.S. students in the Dept. of Physiology G.M.C. Miraj (Maharastra). Students were evaluated as per standard proforma, which included a questionnaire regarding health. The students with, past or present history suggestive of cardiovascular or respiratory illness or any other systemic illness, any family history of asthma or allergic diseases, were not included in the study. Only nonsmoker students were enrolled. Subjects performing any type of yoga or pranayama and other physical exercises like resistance training, sports and athletics were excluded from the study. 60 students were eligible to whom the experimental protocol was explained and written informed consent was obtained from them.

Heart rate of each student was measured clinically for one minute, after 5 min. of rest in supine position. Blood pressure was measured in supine position with the help of Riva Rocci Mercury Sphygmomanometer by auscultatory method. Various blood pressure indices were calculated as follows.

Pulse pressure was calculated as (PP = SP – DP), the mean arterial pressure was calculated as (MAP=DP+PP/3). The rate pressure product (RPP = HR x SP)/100[18].. Double pressure product was calculated as (Do P = HR × MAP)/100[18] RPP & Do P are consider as indices of myocardial oxygen consumption. All the tests were recorded at noon before lunch.

After recording the above parameters, students were trained by yoga instructor. They Performed the Pranayama practice daily in the evening for one hour (5.15 pm - 6.15 pm), Six days in a week for three months under expert's supervision. The Pranayama practice consisted of prayer, Nadishuddhi, Anulom-vilom, Savitri, Sitakari, Sadanta, shawasan, Bhastrika, & Omkar recitation, each done for a period of 5 min followed by Bhramari, Kapalbhati for a period of 10 minutes.

All the parameters were recorded After 4 weeks, 8 weeks and 12 weeks of Pranayama practice & Results were presented as Mean & SD. Repeated measure ANOVA test was used to find the significance of study parameters by using SPSS 16.0 version. P =0.001 was considered as statistically significant.

OBESERVATIONS & RESULTS

TABLE NO. I: Comparison of Mean ± SD Values of Heart Rate & Blood pressure indices before and after 4th, 8th & 12th week of Pranayama practice using Repeated measure ANOVA.

PARAMETERS	Before pranayama Mean ± SD	After 4th week of pranayama Mean ± SD	After 8th week of pranayama Mean ± SD	After 12th week of pranayama Mean ± SD	F value	'P' Value
HR/Min	79.98 ± 6.286	78.20±5.921	75.85±6.985	74.28±7.984	31.01	.001*
Systolic B.P. (mmHg)	120 ± 8.19	116.95 ± 8.291	115.05±7.88	115.08±9.44	35.456	.001*
Diastolic B.P. (mmHg)	77.11 ±7.937	76.82 ±7.945	76.79 ±6.940	76.75 ±7.511	0.274	0.602 (NS)
Pulse Pressure (mmHg)	42.93 ±9.525	38.33 ±10.90	38.26±9.190	38.33±10.901	7.945	0.001*
Mean B.P (mmHg)	91.42 ±6.64	89.53 ±6.39	89.541±5.83	89.53±6.39	6.940	0.002*
Rate pressure Product (units)	96.0 ±10.26	87.47 ±11.57	85.292±10.21	85.47±11.57	7.511	0.001*
Double Product (units)	73.22 ± 8.61	67.96± 7.99	66.53 ± 8.96	66.53± 8.95	44.241	0.001*

*Significant, NS- Not significant
^Repeated Measure ANOVA

Table No. II: Comparison of Heart Rate & Blood pressure indices with 4th, 8th & 12th week of Pranayama practice using Post hoc tukeys' test.

PARAMETERS	After 4th week of pranayama		After 8th week of pranayama		After 12th week of pranayama	
	Mean difference	'P' Value	Mean difference	'P' Value	Mean difference	'P' Value
HR/Min	1.787	0.004*	4.131	0.001*	5.705	0.001*
Systolic B.P. (mmHg)	3.098	0.002*	5.000	0.001*	4.967	0.001*
Diastolic B.P. (mmHg)	0.295	0.768	0.328	0.719	0.361	0.586
Pulse Pressure (mmHg)	4.607	0.001*	4.672	0.001*	4.607	0.001*
Mean B.P (mmHg)	1.896	0.001*	1.885	0.017*	1.896	0.001*
Rate pressure Product (units)	10.587	0.001*	10.587	0.001*	8.771	0.001*
Double Product (units)	6.684	0.001*	6.684	0.001*	5.267	0.001*

RESULTS

The purpose of this study is to determine whether the pranayama training can modulate the cardiovascular response or not by studying heart rate and various blood pressure indices. The observed mean values of HR & blood pressure indices before and after 4 weeks, 8 weeks and 12 weeks of Pranayama practice are given in Table No. I and comparison between group are given in Table No. II. All the data in table I is expressed as Mean ± SD.

There was significant (p=0.001) decrease in HR, SBP, PP, MAP, RPP & D_0P after 12th week of pranayama practice the mean values are given in Table No. I.

In present study we observed that there was gradual decrease in HR after 4th, 8th and 12th week of pranayama but there was no much change observed in SBP, DBP, PP, MAP, RPP & D_0P after 8th & 12th weeks as compared to 4th week of pranayama practice.

In our study we also observed that there was decrease in diastolic BP, but this change was not found to be statistically significant (p=0.602).

DISCUSSION

Medical science tries to achieve optimum physical and mental health of the individual through preventive, curative and promotive means. During recent years there has been world-wide interest in Yoga and Pranayama. Scientists are interested in knowing what are the results of Yoga and Pranayama on the human health, so that medicine and Yoga together can achieve optimum functioning of, not only the body, but also the mind, as ultimate aim of Yoga practice is attainment of 'Total Health'[11]

In our study we have compared heart rate (HR), Systolic B.P, Diastolic B.P, mean pressure, PP, RPP & double product before and after 4th, 8th and 12th week of Pranayama practice.

In this work, as shown in table no. I, mean HR was decreased and it was found to be statistically significant before and after 12th week of Pranayama practice. It is also seen from table no. II that the decrease in HR was gradual from before pranayama to 4th week to 8th week and 12th week of pranayama practice.

Our results coincide with findings of other workers, Shirely Telles et al.1993[12], Shirely Telles et al.1995[13], K. Makwana et al.[14], Joytsana Bharshankar[15], Kaviraja Udupa et al.[16], Pradnya Waghmare.[17] Madanmohan et.al.[18]

This highly significant decrease in HR may be due to, increased vagal tone, decreased sympathetic activity & decrease release of catecholamine in the blood.

In present study there was statistically significant decrease in blood pressure indices like SBP, MAP and pulse pressure after 4th week which remained same at 8th and 12th week of Pranayama practice. Changes in diastolic BP are not significant which as shown in table no. I, II.

Findings of our study coincide with the findings of other studies done by K. Makwana et al.[14], Jyotsana Bharshankar et al.[15], Shirely Telles et al.1993.[12], K. S. Gopal et al.[19], Kalawale P. K.[20] & Madanmohan et.al.[18]

Thus decrease in HR, systolic, pulse and mean pressure may be due to, modulation of autonomic activity showing parasympathetic predominance with relatively reduced sympathetic activity (sympathetic tone).This autonomic modulation in yoga is mediated through modification of breathing patterns which triggers various central and autonomic mechanisms as well as mechanical and hemodynamic adjustments causing both tonic and phasic changes in cardiovascular functioning.[21]

Statistically significant reduction in RPP and Do P (Table I, II) after pranayama practice implies a reduced load on the heart due to reduced oxygen consumption[22] and this correlates with a previous study, that reported a consistent and significant reduction in oxygen consumption and psychosomatic relaxation with shavasan and savitri pranayama[23] that is one of the practices used in our programme.

CONCLUSION

From present study it can be concluded that, regular practice of Pranayama is extremely beneficial to the health and shows significant decrease in cardiovascular parameters of the individual indicating better autonomic regulation of the heart with decreased oxygen consumption and load on the heart. This study provides a scientific basis for further applied research on the effects of pranayama on rate pressure product as it is a reliable index of the myocardial oxygen consumption and the cardiac work load.

- **All the students who participated in this study reported a feeling of well being at the end of the study**.

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