International Journal of Yoga, Physiotherapy and Physical Education
Online ISSN: 2456-5067; Impact Factor: RJIF 5.24
www.sportsjournal.in
Volume 2; Issue 4; July 2017; Page No. 14-18

Impact of 6 weeks training of anulom vilom pranayama with meditation by having controlled diet on mental health, blood pressure and blood glucose in healthy volunteers

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Abstract
Yoga is national heritage of India. Pranayama (breathing exercises) has been practiced in India for more than several centuries. Pranayama is the regulation of breath or control of prana which is the stoppage of inhalation and exhalation, which follows after securing that steadiness of posture or seat, Asana. It is spreading all over the world due to its benefits on structural and functional aspects of all tissues in the body, specifically on cardio-respiratory system. Keeping this in view, the present study designed to determine whether Anulom Vilom Pranayama with meditation having controlled diet has immediate effect on Mental Health, Blood Pressure, and Blood Glucose. The aim of our study is to find out the beneficial effects of 6 weeks of Anulom Vilom Pranayama training on healthy volunteers. Present study was conducted in Department of Chemistry, M. S. College, Saharanpur on 40 healthy volunteers of both genders. Currently, there is not enough research to provide evidence to show the structural and functional changes that may take place in the central nervous system by practicing pranayama. So it is worthwhile to examine the effect of Anulom Vilom Pranayama and study its impact on human behavior and health. Our study suggests that Pranayama regenerates the dead cells which develop the power of self-healing within ourselves and it provides deep relaxation to the body and mind, Strengthens the nervous system and respiratory system, Improves concentration and relieves stress, depression and hypertension. In addition regular practice of Anulom Vilom Pranayama with meditation having controlled diet could get better control over the heart. This study will help to create awareness among the citizens to understand the importance of yogic training.

Keywords: anulom vilom pranayama, meditation, mental health, blood glucose, blood pressure

Introduction

Pranayama has taught us to be punctual and disciplined despite hardships. Pranayama is the science of breath and the hub round which life revolves.

Prana is the vital life force that connects matter with energy and mind with consciousness. Pranayama is derived from 2 Sanskrit words – Prana (life force) and Ayama (control). Therefore, in its broadest description, Pranayama would mean the control of the flow of life force. To most, control of breath is Pranayama. For a rightful interpretation, it must be understood that 'prana' is an energy or life force that is universal in nature - it is omnipresent. A portion of that prana is also present in the human body. It flows at a superficial level to maintain the body and its organs. The goal of Pranayama is to increase the quantum of this life force (Prana) so that it can reach out to 'hidden' recesses of the brain. This helps in expanding the human faculties and retarding degeneration. Pranayama (breathing exercise), one of the yogic techniques can produce different physiological responses in healthy individuals (Upadhyay, 2008) [1]. Yoga appears to provide a comparable improvement in stress, anxiety and health status (Caroline, 2007) [2]. As a deep breathing technique, pranayama reduces dead space ventilation and decreases work of breathing. It also refreshes air throughout the lungs, in contrast with shallow breathing that refreshes air only at the base of the lungs (Bijilani, 2004) [3]. Practice yoga with patience is what that we need to do. Our body and mind complex can be totally tensed, but after doing yoga, something magical happens. The relaxed state is just the beginning and may virtues follow. Yogic practices can be used as psycho-physiologic stimuli to increase endogenous secretion of melatonin, which in turn, might be responsible for improved sense of well-being (Harinath, 2004)[4]. (Madanmohan, 2005) [5] evaluated short term effect of three weeks of pranayama practice on cardio-respiratory variables and reported an increase in sympathetic activity. Both fast and slow pranayamas are beneficial (Bhavanani 2003, Telles 2008 and Udupa 2003) [6-8] but their physiological responses are different in healthy participants. There is evidence that the practice of yoga improves cardio-respiratory efficiency (Gokal 2007) [9]. Yogic techniques, which aim at physical and mental self-culture, have convincing scientific bases and produce consistent physiological changes (Abe 2003 and Chen 2009) [10-11].

The Sanskrit word prana means ‘vital force’ or ‘cosmic energy’. It also signifies ‘life’ or ‘breath’, Ayama means the control of the prana. Hence pranayama means control of the vital force by concentration and regulated breathing. It is physical, mental, spiritual and cosmic energy. All forms of energy are prana. The science of pranayama teaches us how to reduce the respiratory and heart rate, while increasing the quantum of oxygen drawn in and decreasing the outflow of breath. This can be as minimal as two or three cycles per minute. When the respiratory rate is thus lowered, the metabolic rate of the body also reduces. The body is brought to a state of temporary hibernation. All the cells are rested, and relaxation is ensued. The sympathetic overdrive is reduced, with consequent energy conservation. In pranayama, the mind is kept attentive so that the rhythm of breathing is regulated. The frontal brain, which is the seat of intellectual activity, is

made quiet. Complete neuro – physiological relaxation occurs. Pranayama can be used for therapy. The problem of low and high blood pressure, allergic rhinitis, vasomotor rhinitis, sinusitis, recurrent infections of the upper respiratory tract, chronic headaches, migraine, peptic ulcers, anxiety states, can all be treated by the many kinds of pranayama, without the need for asanas. Meditation is a process that anyone can use to calm oneself, cope with stress, and for those with spiritual inclinations, feels as one with God or the universe. Meditation can be practiced individually or in groups and is easy to learn.

Objectives

The objectives of the present study are:

- To see the effect of Anulom Vilom Pranayama with meditation on Mental Health.
- To observe the change in Systolic Blood Pressure and Diastolic Blood Pressure.
- To observe the change in Blood Glucose.

Materials and Methods

Selection of Subjects

After getting written consent, subjects were randomized into pranayama group (n=20) and control group (n=20). Supervised training was given to the study group by a certified yoga instructor and they were guided to do Anulom Vilom Pranayama as prayer along with meditation for 6 weeks.

Parameters Studied

- Mental Health
- Systolic Blood Pressure
- Diastolic Blood Pressure
- Blood Glucose

Observation and Results

Table 1: Showing Distribution of Control Cases According To Age Group and Sex

Age Groups (Years)	Number of cases		Total
	Males	Females	
10-30	6	6	12(60.0%)
31-50	4	3	7(35.0%)
51-70	1	--	1(5.0%)
Total	11(55.0%)	9(45.0%)	20(100.0%)

Out of 20 control cases, 11 (55.0%) cases were males and 9 (45.0%) were females. 60.0% were found in the age group 10-30 years, 35.0% were in the age group 31-50 and 5.0% were 51-37 years age group.

Table 2: Showing Distribution of Experimental Cases According to Age Group and Sex

Age Groups (Years)	Number of cases		Total
	Males	Females	
10-30	6	4	10(50.0%)
31-50	7	2	9(45.0%)
51-70	1	--	1(5.0%)
Total	14(70.0%)	6(30.0%)	20(100.0%)

Out of 20 individuals, 14 (70%) cases were male's individuals and rest 6 (30%) were females. The maximum number of cases 10 (50.0%), were observed in the age group of 10-30 years followed by 9 (45.0%) cases in the age group of 31-50 years and 1(5.0%) cases in the age group of 51- 70 years.

Table 3: Name, Age, Mental Health, Systolic Blood Pressure, Diastolic Blood Pressure and Blood Glucose of Control Group

S. No.	Name	Age	Mental health		Systolic Blood Pressure (mm Hg)		Diastolic Blood Pressure (mm Hg)		Blood Glucose	
			Pre Test	Post Test	Pre Test	Post Test	Pre Test	Post Test	Pre Test	Post Test
1	Arjun Tomar	21	56	59	115	118	72	72	84	80
2	Anu Gupta	19	59	61	123	126	76	80	88	83
3	Abhay Malik	12	55	54	128	124	83	74	90	87
4	Akarsha Malik	14	62	63	132	130	85	82	96	89
5	Reet Mhandiratta	38	57	59	126	124	81	81	76	79
6	Shruti Grover	26	65	63	134	130	90	74	78	84
7	Navdeep Arora	25	63	66	130	126	88	90	80	78
8	Babita Malik	40	61	64	142	134	94	92	88	79
9	Sheetal Malhotra	36	70	72	126	128	78	80	90	84
10	Vaibhav Sharma	22	66	65	130	134	86	86	96	93
11	Sumit Malhotra	40	58	61	142	138	93	76	90	88
12	Hemant Choudhary	19	61	62	136	130	92	88	89	83
13	T S Chauhan	64	59	64	112	118	76	82	87	79
14	Rahul Kumar	23	67	71	128	140	86	86	80	84
15	Kajal Tyagi	21	71	70	130	134	78	84	79	82
16	Neha Nagar	22	56	60	132	132	85	74	78	77
17	Riya Tomar	25	64	67	144	140	90	70	80	76
18	Sandeep Kumar	40	68	70	106	110	68	72	77	79
19	Rajesh Kumar	32	60	63	110	130	70	72	90	84
20	Sanjay Choudhary	47	59	64	136	128	92	90	79	76

Table 4: Name, Age, Mental Health, Systolic Blood Pressure, Diastolic Blood Pressure and Blood Glucose of Experimental Group

S. No.	Name	Age	Mental health		Systolic Blood Pressure (mm Hg)		Diastolic Blood Pressure (mm Hg)		Blood Glucose	
			Pre Test	Post Test	Pre Test	Post Test	Pre Test	Post Test	Pre Test	Post Test
1	Mamta	21	62	68	114	112	76	76	74	82
2	Akansha Singh	24	64	71	125	120	78	82	78	83
3	Arti Saini	20	59	66	127	123	83	78	73	76
4	Ravi Kumar	22	60	69	130	128	84	82	79	78
5	Navin Kumar	17	64	72	126	124	84	86	73	74
6	Kaleb Massey	45	58	66	130	124	86	76	89	80
7	Gautam	20	61	66	128	126	88	88	79	82
8	Himani Pundir	21	65	72	138	130	90	87	81	75
9	Pankaj Kumar	32	68	75	118	122	76	83	87	81
10	Ashish Massey	26	63	69	126	126	86	83	89	84
11	Dharam Pal Singh	65	58	67	136	128	90	78	92	76
12	Shekhar Kumar	33	60	67	128	128	88	86	89	67
13	Vikas Kumar	36	65	74	116	118	76	84	85	68
14	Vishal Rana	22	63	70	134	126	84	82	75	66
15	Nikhil Singh	32	64	66	130	122	78	82	79	67
16	Madan Lal	24	57	64	126	128	88	78	84	66
17	Rakesh Dhama	48	68	73	132	128	90	74	85	72
18	Nutan Dhama	43	61	67	110	118	74	82	82	71
19	Rajeev Kumar	36	60	65	128	126	90	86	91	73
20	Seema Chaudhary	41	63	70	116	124	76	86	75	76

Table 5: Analysis of Covariance for Pre and Post Test Data on Mental Health of Control Group and Experimental Group

	Control Group	Experimental Group	Source of Variance	Sum of Squares (SSB/SSW)	df	Mean Squares	F Ratio
Pre Test Mean	61.85	62.15	Between	0.90	1	0.90	0.055
SD	4.760	3.116	Within	615.1	38	16.186	
Post Test Mean	63.9	68.85	Between	245.02	1	245.02	16.043
SD	4.529	3.166	Within	580.35	38	15.27	

* Significant at 0.05 level.

Required table value at 0.05 level of significance for 1 & 38 degrees of freedom = 4.096

From table - 5 it is clear that the pre test means on Mental Health of the control and the experimental groups are 61.85 and 62.15 respectively. The obtained 'F' ratio value 0.055 for the pre test mean is lesser than the required table value 4.096 for significance at 0.05 level. Hence, it is not significant and it reveals that there is statistically no significant difference between control and experimental groups on Mental Health before the commencement of experimental period. It is inferred that the random selection of the subjects for the two groups are successful. The post test means on Mental Health of the control and the experimental groups are 63.9 and 68.85 respectively. The obtained 'F' ratio value 16.043 for the post-test data is greater than the required table value 4.096 for 1 & 38 degrees of freedom at 0.05 level of significance. It shows that there is significant change on the Mental Health as a result of the experimental period. Since the result has revealed that there is significance difference, the hypothesis given is accepted.

Table 6: Analysis of Covariance for Pre and Post Test Data on Systolic Blood Pressure (mm Hg) of Control Group and Experimental Group

	Control Group	Experimental Group	Source of Variance	Sum of Squares (SSB/SSW)	df	Mean Squares	F Ratio
Pre Test Mean	128.1	125.9	Between	48.4	1	48.4	0.576
SD	10.567	7.503	Within	3191.6	38	83.98	
Post Test Mean	128.7	123.85	Between	235.22	1	235.22	6.144
SD	7.547	4.428	Within	1454.75	38	38.282	

* Significant at 0.05 level.

Required table value at 0.05 level of significance for 1 & 38 degrees of freedom = 4.096

From table - 6 it is clear that the pre test means on Systolic Blood Pressure of the control and the experimental groups are 128.1 and 125.9 respectively. The obtained 'F' ratio value 0.576 for the pretest mean is lesser than the required table value 4.096 for significance at 0.05 level. Hence, it is not significant and it reveals that there is statistically no significant difference between control and experimental groups on systolic blood pressure before the commencement of experimental period. It is inferred that the random selection of the subjects for the two groups are successful. The post test means on Systolic Blood Pressure of the control and the experimental groups are 128.7 and 123.85 respectively. The obtained 'F' ratio value 6.144 for the post-test data is greater than the required table value 4.096 for 1 & 38 degrees of

freedom at 0.05 level of significance. It shows that there is significant change on the Systolic Blood Pressure as a result of the experimental period. Since the result has revealed that there is significance difference, the hypothesis given is accepted.

Table 7: Analysis of Covariance for Pre and Post Test Data on Diastolic Blood Pressure (mm Hg) of Control Group and Experimental Group

	Control Group	Experimental Group	Source of Variance	Sum of Squares (SSB/SSW)	df	Mean Squares	F Ratio
Pre Test Mean	83.15	83.25	Between	0.10	1	0.10	
SD	7.942	5.702	Within	1816.3	38	47.797	0.002
Post Test Mean	80.25	81.95	Between	28.9	1	28.9	
SD	6.957	4.071	Within	1234.7	38	32.492	0.889

* Significant at 0.05 level.

Required table value at 0.05 level of significance for 1 & 38 degrees of freedom = 4.096

From table - 7 it is clear that the pre test means on Diastolic Blood Pressure of the control and the experimental groups are 83.15 and 83.25 respectively. The obtained 'F' ratio value 0.002 for the pre test mean is lesser than the required table value 4.096 for significance at 0.05 level. Hence, it is not significant and it reveals that there is statistically no significant difference between control and experimental groups on Diastolic Blood Pressure before the commencement of experimental period. It is inferred that the random selection of the subjects for the two groups are successful. The post test means on Diastolic Blood Pressure of the control and the experimental groups are 80.25 and 81.95 respectively. The obtained 'F' ratio value 0.889 for the post-test data is greater than the required table value 4.096 for 1 & 38 degrees of freedom at 0.05 level of significance. It discloses that there is no statistically significant difference between the control and the experimental groups on Diastolic Blood Pressure after the experimental training.

Table 8: Analysis of Covariance for Pre and Post Test Data on Blood Glucose of Control Group and Experimental Group

	Control Group	Experimental Group	Source of Variance	Sum of Squares (SSB/SSW)	df	Mean Squares	F Ratio
Pre Test Mean	84.75	81.95	Between	78.4	1	78.4	1.969
SD	6.364	6.253	Within	1512.7	38	39.807	
Post Test Mean	82.2	74.85	Between	540.225	1	540.225	18.907
SD	4.595	6.002	Within	1085.75	38	28.572	

* Significant at 0.05 level.

Required table value at 0.05 level of significance for 1 & 38 degrees of freedom = 4.096

From table - 8 it is clear that the pre test means on Blood Glucose of the control and the experimental groups are 84.75 and 81.95 respectively. The obtained 'F' ratio value 1.969 for the pre test mean is lesser than the required table value 4.096 for significance at 0.05 level. Hence, it is not significant and it reveals that there is statistically no significant difference between control and experimental groups on Blood Glucose before the commencement of experimental period. It is inferred that the random selection of the subjects for the two groups are successful. The post test means on Blood Glucose of the control and the experimental groups are 82.2 and 74.85 respectively. The obtained 'F' ratio value 18.907 for the post-test data is greater than the required table value 4.096 for 1 & 38 degrees of freedom at 0.05 level of significance. It shows that there is significant change on the Blood Glucose as a result of the experimental period. Since the result has revealed that there is significance difference, the hypothesis given is accepted.

Our results were consistent with those of previous studies, which found significant improvement in various cognitive domains with the practice of different yoga breathing techniques (Jella 1993 and Joshi 2008) [12-13].

Result and Discussion

Pranayama has immense therapeutic potential in a wide range of psychosomatic disorders and can be used either as an immunotherapy or in combination with Asanas and other aspects of Yoga. Importance must also be placed on right diet and right attitude while practicing Pranayama, as the body needs raw materials such as vitamins, minerals and water to heal itself through Pranayama. Summing up, the 6-week pranayama training programme had significant effect on mental health. Blood pressure is related with cardio vascular system. Therefore, the significant decline in Systolic Blood Pressure in most of the cases in the Anulom-Vilom Pranayama practice could be largely due to better parasympathetic control over the heart. Diastolic Blood Pressure mainly varies with the degree of peripheral resistance and heart rate. The change is not observed to be significant in the present study suggests that Anulom-Vilom Pranayama might have no immediate effect on peripheral resistance and heart rate but it may need practice for prolong period. Anulom-Vilom Pranayama is also effective in normalizing the blood glucose levels. Thus, such training may be recommended to maintain better physical and mental health and to improve fitness-based performance.

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