

## Effects Of Short Term Yoga Training On Pulmonary & Reaction Time In Students Of Rural Medical Institution.

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**Abstract:** The present cross sectional study was conducted on 42 medical students, representing three groups. First group performing only Pranayam (N=12), Second group only yogic Asanas (N=13) & third group only Rajyoga Meditation (N=17). Each subject served as their own control. The training was imparted by experts in evening with 1 hr / session/ day for a total period of 4 wks, after which the pulmonary & reaction time parameters were repeated. The result of pre- post (paired sample ) test with ANOVA revealed that significant reduction in auditory reaction time (ART) & visual reaction time (VRT) occurs in subject practicing yoga in all groups. The mean post EFV1 increased in both Pranayam & Asana group & post ratio of FEV1/FVC% showed a decrease in all the three groups. **Conclusion :** The significant decrease in reaction time shows that regular practice of yoga will increase the attention & concentration ability of students.

### INTRODUCTION

The need of the hour is holistic health. Health as defined by WHO encompasses not only physical but also mental & social well being. The paradigm has now shifted from curative to preventive measures. Anand<sup>1</sup> has stated that "The ultimate aim of medical sciences is the attainment of optimum physical & mental health for the individual. The ultimate aim of yogic practices is also same namely - physical & mental well being." Yoga therapy is a relatively novel and its emerging clinical description falls within the broad category of *mind body medicine*, whose growth is consistent with the burgeoning popularity of yoga in the west and the increasing world wide use of Alternative medicine. Yoga practice, due to its psychophysiological effects, has become an effective primary or adjunct therapeutic intervention. Numerous studies are available on yogic asanas & pranayam, but comparatively few on Rajyoga meditation. Rajyoga, which is the ancient yoga of India, had gone into oblivion in the recent past, and is now once again being revived experiencing its wonderful healing result of body and mind. It subsumes within itself the fundamentals of all methods of yoga and confers the achievement of all of them naturally and easily, Using one very simple method which anyone can learn.

Classical yoga includes pranayam, yogic asanas & meditation - Pranayam is rhythmic controlled breathing, or a breathing exercise; Asanas are easy & comfortable postural exercises and Rajyoga is a mental exercise.

Yoga training helps in prevention, control and rehabilitation of many respiratory diseases; FEV1 & FEV1/FEV% (FEV1) are the most sensitive parameters. Though much work has been done on pulmonary functions but very few studies are available on short term effect (one month) of yoga training on pulmonary and reaction time changes. Hence this study was taken up.

### MATERIAL & METHODS

**a) Selection of Subjects :** A total of 120 1st year medical students were selected for the study. Three groups were made of 40 each by random selection. 1st group performing only 'pranayam', 2nd group only 'asanas' & 3rd group only 'Rajyoga meditation'. Permission from Institutional ethical committee was obtained, before the start of the study. The details of the study was explained to the subjects; their signed informed consent was taken, They were assessed, using a pre-designed questionnaire before the onset of the study.

However, as the subjects participated in the institutional co-curricular activities, we could get post exercise data of only a few of them; hence the sample size become less. Post data of 'Pranayam group'

was 12, Meditation group was 17 & Asana was 13. Hence, statistical analysis of only 42 subjects could be done.

**b) Design of study:** Each subject served as their own control. Detailed history was taken to rule out smoking or other chronic diseases; physical characteristics such as age, height and weight were record training was given by 3 separate yoga experts. i) Pranayam or breathing exercise included *Saral & Kapalbhati*. ii) Yoga Asanas which are simple postural *Tadasana, Utanasan, Pawanmukth asanas, Vajrasana, Bhujangasana, Shalabhasan, Makrasan & Shavasana*. iii) Rajyoga which is a mental exercise, is done in 4 steps namely - initiation, meditation, concentration & realization.

**c) Parameters studied:** The ventilatory function tests include FEV1 & FEV1/FVC%. The study was carried out with RMS Medspiror. The subject was asked to take a deep breath till the lungs were apparently fully inflated; the subject was then told to blow into the spirometer as forcibly as possible followed by inspiration. The reaction time namely 'visual reaction time' (VRT) and auditory visual reaction time (ART), was found out using response analyzer of Yantra Shilpa make; average of 3 readings was taken as the final reading.

All parameters were recorded prior to start of training and at the end of 4 weeks course. The students were called to the department of physiology for yoga training at 5.00 p.m. every day.

At the end of 4 weeks course, subject wise reactions of volunteers/ subjects to the training were also assessed by a questionnaire. Statistical analysis of data was done by paired 't' test & ANOVA.

### RESULTS

**Demographic data -** Amongst 42 subjects, there were 12 in 'pranayam' group; 17 in 'meditation' and 13 in 'asanas' group

**Anthropometric parameters** are summarized in table1 showing a mean age of 18 years, height 165 cms & weight 62 kgs when both males (n=30) and females (n=12) are compared.

Comparing the pre and post values of all the parameters; in the **Pranayam group**, mean VRT pre values of 200 declined to 193 post value; this was statistically significant (P<0.01). The ART value also significantly changed (P<0.05); FEV1 increased from 113 to 118.

In the **Meditation group**, VRT declined significantly (P<0.01) FEV1 also decreased from 108 to 106 Table 2 shows a statistically significant change of VRT (P<0.05). In **Asana group**, the ART value was not statistically significant, mean decrease was from 184 to 170, FEV1 also increased from 112 to 116. (Table 3)

### DISCUSSION

The anthropometric values in males and female of the 3 group were comparable. In the 'Pranayam group', FEV1 increased from 113 to

**Table 1: Pranayam – Paired sample statistic & test**

Parameter	Mean	S.Error Mean	t	Sig(2 tailed)
FEV1 & Post	113 118	5.7 6.1		
Pair test	-4.1	4.0	-1.0	.331
FEV1 & Post	109 107	2.5 2.9		
Pair test	1.8	2.1	.87	.402
ART & Post	167 156	8.0 7.4		
Pair test	10.4	3.9	2.5	.025*
VRT & Post	200 193	7.0 7.9		
Pair test	6.9	2.1	3.2	.008**

**Table 2: Meditation - Paired sample statistic & test**

Parameter	Mean	S.Error Mean	t	Sig(2 tailed)
FEV1 & Post	108 106	5.9 5.0		
Pair test	2.3	4.0	.543	.610
%FEV1 & Post	108 106	1.0 3.2		
Pair test	2.3	2.7	.863	.428
ART & Post	173 157	6.1 5.8		
Pair test	15.9	7.9	2.00	.063
VRT & Post	206 186	3.3 3.4		
Pair test	20.5	4.2	4.8	.000**

118 2, probably due to efficient use of abdomen and diaphragm muscles. In the 'Meditation group' FEV1 decreased from 108 to 106 only it works by causing mental relaxation. In the 'Asana group', FEV1 increased from 112 to 116, which could be due to efficient use of abdominal wall which helps in moving diaphragm better, than by helping, the lungs to empty efficiently. These findings are in line with work of many investigators<sup>2,4,5</sup>. Visual and auditory reaction time showed a significant increase in all the 3 groups<sup>3</sup>, except ART in the Asana group. This finding is consistent with the findings of other

**Table 3: Asanas - Paired sample statistic & test**

Parameter	Mean	S.Error Mean	t	Sig(2 tailed)
FEV1 & Post	112 116	10.7	9.4	
Pair test	-3.8	1.8	-2.0	.071
%FEV1 & Post	111 107	2.2 2.8		
Pair test	4.7	2.7	1.7	.123
ART & Post	184 170	16.1 10.6		
Pair test	14.3	8.3	1.7	.113
VRT & Post	205 191	7.0 9.6		
Pair test	13.9	5.1	2.7	.019*

workers<sup>6,7</sup>.

It is known that the effect on reaction time by the reticular formation is primarily upon "central integrative time" (C.I.T.) Quick reaction time in young adults, was possibly be due to fast C.I.T. caused by relatively more experiences in young adults as compared to children and older age group. As seen from table 1, 2, & 3 the VRT is possibly more, because of a longer reflex pathway than the auditory pathway. Yogic exercise involves physical, mental and spiritual task in a comprehensive manner. It brings about the behavioral changes. Yoga of long duration affects the hypothalamus, which leads to reduction in sympathetic tone and peripheral resistance<sup>8</sup>. With regard to the central nervous system as seen by 'effective reaction time', the RR(Relaxation Response) activates areas in the brain responsible for emotion, attention, motivation and memory(eg. anterior cingulate, hippocampal formation, amygdala) and may also control the autonomic nervous system<sup>9,10</sup>.

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