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Research Article

EFFECT OF PRANAYAMA ON PERIPHERAL OXYGEN SATURATION

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ABSTRACT

Background: Pranayama is an art and has techniques to make the respiratory organs to move and expend intentionally, rhythmically and intensively. Pranayama brings several physiological changes in the body.
Aim: The aim of the present study is to investigate the effects of ten weeks pranayama training on peripheral oxygen saturation of pre adolescent boys.
Method: For the purpose of the study 30 male students were selected randomly as subjects from Jawahar Navodaya Vidyalaya, Banipur, North 24 Parganas, West Bengal, India. Age of the students ranges from 11 to 13 years. All the subjects were divided randomly in to experimental and control groups equally. Experimental group received pranayama training for ten weeks. Data were collected before and after ten weeks of training. Peripheral oxygen saturation was measured by pulse oximeter and values were recorded in percentage.
Result: ANCOVA was applied as statistical procedure and the level of significance was set at 0.05 levels. Significant difference was observed between experimental and control group in pre test and post test scores.
Discussion: After ten weeks of pranayama training experimental group improved significantly on peripheral oxygen saturation.
Conclusion: From the above result it was concluded that ten weeks of pranayama training had a significant positive effect on peripheral oxygen saturation of pre adolescent boys.

INTRODUCTION

Yoga is the science of right living and such is intended to be incorporated in to daily life. Yoga focuses on harmony between mind and body. The main aim of yoga is control over the mind. A happy man is who knows how to distinguish the real from the unreal, the eternal from the transient and the good from the bad by his discrimination and wisdom.

When people talk about pranayama they generally mean those yogic practices which involve some kind of manipulation of breathing activity. But when one looks at the tradition of yoga, one finds that the concept of pranayama has a much greater depth and width and its techniques include vast array of very suitable elements apart from simple manipulation of breathing activity.

Pranayama is a Sanskrit word alternately translated as "extension of prana or breath control". The word pranayama is composed from two Sanskrit words Prana and Ayama. When we deal with concept of pranayama the term Prana refers breathing activity and Ayama means restrain, control or conscious manipulation. But if we study pranayama in its more essential and deeper aspect, the term Prana indicates the energy responsible for all the life activities in the human being, pranic energy responsible life or life force. The term Ayama means the expansion, stretch, regulation of these pranic activities. Thus the word pranayama in this context meaning the process through one can get acquainted with the whole field of pranic activity with a view to gain a complete control over it.

It has been proven beyond doubt that pranayama is very important means for preventing and curing many ailments. Pranayama brings several physiological changes in the body.

During pranayama we are literally drinking in gallons and gallons of vitality and immunity. We supercharge the blood with extra oxygen. Oxygen is life, so that means we are enriching our blood with the life force.

Oxygen saturation measures the percentage of haemoglobin binding sites in the blood stream occupied by oxygen. Normal blood oxygen levels in humans are considered 95 to 100 percent. Good blood oxygenation is necessary to supply the

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energy to the muscles, which are increases during sports and activity. If the value is below 95% that could be a sign of poor blood oxygenation, also called hypoxia.

Pulse oximetry is a method used to estimate the percentage of oxygen bound to the haemoglobin in the blood.

The pulse oximeter, based on all digital technology, is intended for non invasive (means it does not involve the introduction of instruments into the body) spot-check measurement of functional oxygen saturation of arterial haemoglobin. (SPO_2) Advanced DSP (Digital Signal Processor) algorithm can minimize the influence of low perfusion. The oximeter can be used to measure human haemoglobin saturation and heart rate through finger.

Based on previous literature the present study is an attempted to find out the effect of pranayama on peripheral oxygen saturation of pre adolescent boys.

METHODOLOGY

Subject

For the purpose of the study 30 boys were selected randomly as subject from Jawahar Navodaya Vidyalaya (JNV), Banipur, North 24 Parganas, West Bengal, India. Age of the subjects ranges between 11 to 13 years.

Design of the study

For the experimental procedure all the subjects were divided in to two equal groups, experimental and control group (15 subjects in each group). Experimental group received specific pranayama training for 10 weeks, and control did not receive any treatment.

Variables Studied

Peripheral oxygen saturation (SPO_2).

Criterion Measures

Peripheral Oxygen Saturation (SPO_2) was recorded by using Fingertip Pulse Oximeter manufactured by Dr. Trust (Nureca Inc. USA Model No: SS 01 USFDA and CE approved). SPO_2 values were recorded in percentage using dominant hand index finger of all the subjects, when at rest.

Figure 1 Recording of SPO_2

Training Programme

The training programme was included three pranayama i.e. Nadi Sodhana, Chandra Bhedana and Bhramari. The training was given for ten weeks (weekly five days).The duration of training period was 45 minutes per day.

Collection of Data

Data were collected twice, immediately before the commencement of training programme and after the termination of training programme.

Statistical Procedure

ANCOVA was applied as a statistical tool to analyze the collected data at 0.05 level of significance and in case of existence of significant difference, the Post Hoc test was used in order to investigate the existence of significant difference between the paired group's means.

RESULT AND DISCUSSION

Table 1 Descriptive Statistics on Peripheral Oxygen Saturation of Experimental & Control Group in Pre Test and Post Test

	Experimental Group		Control Group	
	Pre Test	Post Test	Pre Test	Post Test
Sample Size	15	15	15	15
Mean	98.1333	99.0000	98.6000	98.3333
Variance	0.4095	0.2666	0.9714	0.2381
SD	0.6399	0.5163	0.9856	0.4880
SEM	0.1652	0.0688	0.2545	0.1260

There was no significant difference observed ($p>0.05$) on peripheral oxygen saturation between experimental and control group in pre test phase (table-2). However a significant difference observed ($p<0.05$) on peripheral oxygen saturation between experimental and control group in post test adjusted post test means (table-2 & 3) and further this result also supported by the post hoc test result as the mean difference was found greater than the critical difference (table-4).

Table 2 Analysis of Variance of Experimental and Control Group on Peripheral Oxygen Saturation

Group	Source of Variance	Sum of Squares	DF	Mean Squares	F-ratio	P value
Pre Test	Between	1.633	1	1.633	2.366	P=0.135
	Within	19.600	28	0.700		
Post Test	Between	3.333	1	3.333	12.721*	P=0.001
	Within	7.333	28	0.262		

*Significant at 0.05 level of confidence

The table value required for significance at 0.05 level of confidence for df (1, 28) = 4.20

Table 3 Analysis of Covariance of Experimental and Control Group on Peripheral Oxygen Saturation

Adjusted Post Test Means		Source of Variance	Sum of Squares	DF	Mean Squares	F-ratio	P value
Experimental Group	Control Group						
99	98.333	Between	3.074	1	3.074	11.301*	0.002
		Within	7.333	27	0.272		

*Significant at 0.05 level of confidence

The table value required for significance at 0.05 level of confidence for df (1, 27) = 4.21

Table 4 Fisher's Least Significance Difference (LSD) Post Hoc Test for the Difference between the Adjusted Post Test Means on Peripheral Oxygen Saturation

Group	Adjusted Means	Mean difference	Critical difference
Experimental Group	99		
Control Group	98.3333	0.6667*	0.3918

*Significant at 0.05 level

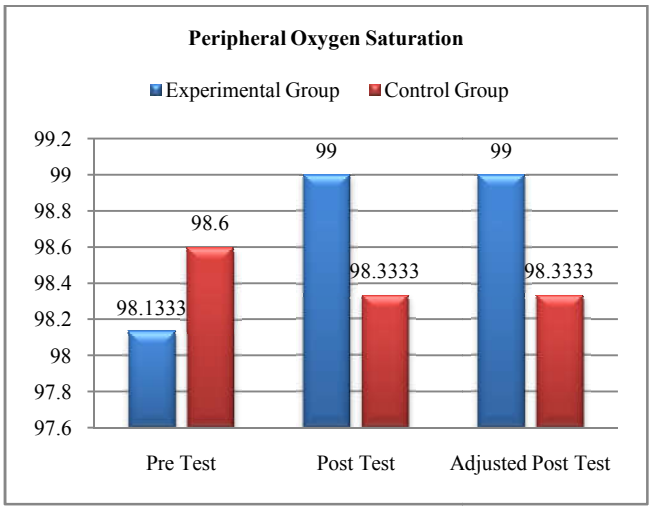

Figure 2 Comparison of means of peripheral oxygen saturation values between experimental and control group in pre test, post test and adjusted post test phases.

Discussion on Peripheral Oxygen Saturation (SPO_2)

Result of the present study clearly shows that spo_2 percentage significantly improved after ten weeks of pranayama training. This result strongly supported by the identical findings of Pant & Dhapola (2017) they found that forty days of yogic training improved oxygen saturation of secondary school students. Gokhale *et al* (2018) also supported current findings. They concluded oxygen saturation significantly improved after immediate kapalbhati pranayama practice.

Sharma *et al* (2014) found similar results. They concluded thirty six days of yogic practices (included yogasana & pranayama) improved oxygen saturation.

Findings of Tyagi & Cohen (2013) supported this current finding also, they concluded from their review article "oxygen consumption changes with yoga practices: a systematic review" that oxygen consumption increased after pranayama practices.

Pranayama practices are expected to deliver the results through promoting the production of lung surfactants (Joshi *et al*. 1992), reduce the surface tension and promote exchange of gases in alveolar membrane and enhancing the oxygen carrying capacity of RBCs(Parshad *et al*. 2011).

CONCLUSIONS

These findings are in accordance with earlier findings suggest that pranayama training improve the peripheral oxygen saturation of pre adolescent boys.

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