

## EFFECTS OF HATHA YOGA PRACTICES ON MAXIMUM OXYGEN CONSUMPTION AND VITAL CAPACITY OF UNIVERSITY YOGIS

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### ABSTRACT

The present study aimed at assessing the effect of hatha yoga practices on maximum oxygen consumption and vital capacity of university yogis. The subjects for the study were selected on the basis of random group design. For this study twenty (N=20) yogis were included (Mean  $\pm$  SD: weight 52.5 $\pm$ 4.2 kg, height 1.53 $\pm$  0.04m, age 21.5 $\pm$  1.5 years) of Lakshmibai National Institute of Physical Education, NERC, Guwahati, Assam (India). They were purposively assigned into hatha yoga practice group (P) and control (C) groups, N=10 each. The P group was subjected to hatha yoga training programme (Matyasana (fish pose), Hal asana (Plough pose), Noukasana (Boat pose), Ardhachakrasana and Bhujangasana (Cobra poses)) and the control group participated in the routine training not containing the hatha yoga mentioned. The level of  $p < 0.05$  was considered significant. The hatha yoga practices brought about significant improvement in Maximum oxygen consumption ( $t=5.029$ ) and vital capacity ( $t= 6.195$ ) in hatha yoga practice group (p) as compared with maximum oxygen consumption ( $t= 1.413$ ) and vital capacity ( $t= 1.440$ ) of control group (c). The hatha yoga practices had significant effect on maximum oxygen consumption and vital capacity of university yogis

**Keywords:** Hatha Yoga, Maximum Oxygen Consumption, Vital Capacity, University Yogis

### INTRODUCTION

Hatha yoga has become increasingly popular in western countries as a method for coping with stress and as a means of exercise and fitness training, however, little is known about the physiological and psychological effects of Hatha yoga practice. The school of hatha yoga attaches a lot of importance to the perfect physical form, believing it to be a way of attaining spiritual perfection and to this end it takes the help of pranayama (breath-control exercises) and mudras (hand gestures) to attain self-realization. Often seen as part of raja yoga, the origins of hatha yoga can be traced to Gorakhnath, the 12th-century founder of the Kanphata yogis. The word 'hatha' is derived from the two root terms, 'ha' meaning 'the sun' and 'tha' meaning 'the moon'. Taken together, the term stands for 'union of force'. Hence, central to hatha yoga disciplines is the harmonizing of its positive (sun) and negative (moon) currents. Hatha yoga is the most popular branch of yoga. It is known as a branch of yoga that unites pairs of opposites, and its goal is to achieve balance between body & mind by:

- Postures (Physical tone & awareness);
- Breathing Techniques (controlled breathing);
- Meditation (controlled concentration).

The three main elements used in hatha yoga to attain its purposes are the body, the physical part of man; the mind, the subtle part; and the element that relates the body with the mind in a special way, the breath.

Over the last 10 years, a growing number of research studies have shown that the practice of hatha yoga can improve strength and flexibility, and may help control such physiological variables as blood pressure, respiration and heart rate, and metabolic rate to improve overall exercise capacity.

There have been many studies on yoga and its effects on physical function but with the phenomenal and ever increasing popularity of hatha yoga in the past few years, there is a surprising lack of research on this particular discipline and as a result the present study had been undertaken to examine the effects of selected asanas in hatha yoga on maximum oxygen consumption and vital capacity.

### METHODOLOGY

#### Subjects

For this study twenty (N=20) yogis were included (Mean  $\pm$  SD: weight 52.5 $\pm$ 4.2 kg, height 1.53 $\pm$  0.04m, age 21.5 $\pm$  1.5 years) of Lakshmibai National Institute of Physical Education, NERC, Guwahati, Assam (India)

#### Study tools

Maximum oxygen consumption ( $VO_2$  max):  $VO_2$  max. Was determined by the Rockport walking test.

Vital capacity: maximum volume of air expired after forced inspiration corrected to 1/10<sup>th</sup> of a liter. It obtained by the help of wet spirometer.

Procedure for administration of test

Maximum oxygen consumption (Vo<sub>2</sub> max)

Administration:Vo<sub>2</sub> max. was determined by the rockportwalking test. The test involves walking as fast as possible for one4 mile and then measuring the exercise heart rate and one mile time at the end of the walk. To measure maximum oxygen consumption the formula was as follows:-

$$Vo_2 \text{ max.} = 132.85 - (.0769) \times \text{wt} - (.3877) \times \text{age} + (6.315) \times \text{gv} - (3.2469) \times \text{1ml walk time} - (.1565) \times \text{heart rate.}$$

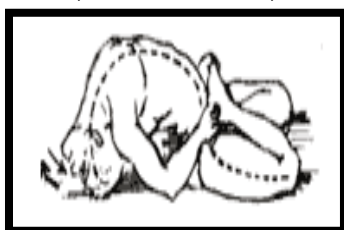
Weight measured in pounds, -mile walk time measured to 1/100<sup>th</sup> of a second, -exercise heart rate (beats. Min<sup>-1</sup>) measured immediately at the conclusion of the walk, -gv-gender value, men=0, women=1, -age measured to the last year completed.

Vital capacity

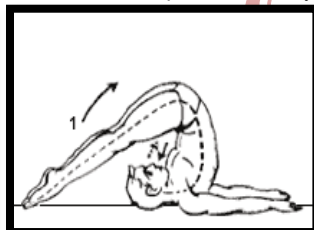
Administration:Spiro meter was used to check the vital capacity of the subjects. Peak flow meter put in the mouth for checking the vital capacity of the subjects and asked to expire the maximum air out. By using the scale of wet spirometer and calculate the vital capacity of the subjects.

Twelve week of Hatha Yogasanas training programme

First stage in hath yoga is asana. The aim of asanas is to strengthen the body, clearing the impurities of nadis and to make the body fit for sitting comfortably in meditation for long hours. The present study had been undertaken to examine the effect of selected asanas in hatha yoga on maximum oxygen consumption and vital capacity. The experimental group received training in physical postures (asanas, 90 minutes). The asanas which were practiced every day included:



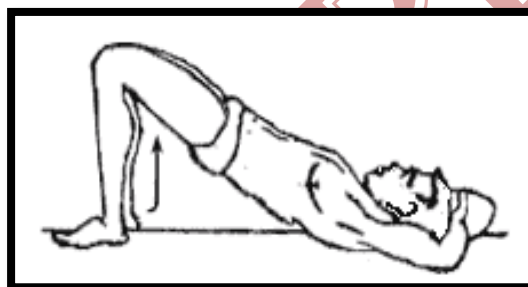
Matyasana (Fish Pose)



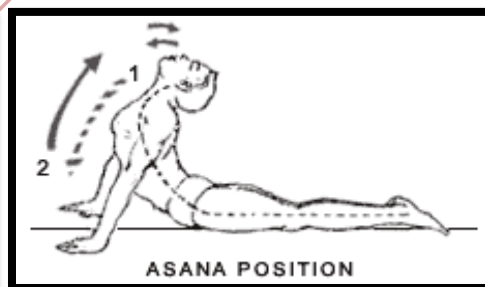
Hal asana (Plough Pose)



Noukasana (Boat Pose)



Ardhachakrasana Bhujangasana (Cobra poses)



Statistical Analysis

The difference in the mean of each group for selected variable was tested for the significance of difference by “t” test. The level of significance was set at 0.05.

Hypothesis

h<sub>0</sub>:  $\mu_y = \mu_x$

h<sub>1</sub>:  $\mu_y \geq \mu_x$

Level of significance: 0.05

**RESULTS**

The study was conducted to find out the effects of selected asanas in hatha yoga on maximum oxygen consumption and vital capacity. The statistical analysis of data collected on twenty (n=20) subjects. For each of the chosen variable, the results



pertaining to significant difference between experimental and control groups were assessed by “t” test and are presented in following tables:

TABLE No. 1  
MEAN AND ‘T’ VALUE OF MAXIMUM OXYGEN CONSUMPTION OF EXPERIMENTAL GROUP

	Pre test	Post test
Sample Size	10	10
Arithmetic Mean	72.72	73.10
Variance	10.67	11.44
Test Statistic t		5.03
Degrees of Freedom (df)		9

\*significant at 0.05 level of significance “t” .05 (09) = 2.26

TABLE No. 2  
MEAN AND ‘T’ VALUE OF MAXIMUM OXYGEN CONSUMPTION OF CONTROLGROUP

	Pre test	Post test
Sample Size	10	10
Arithmetic Mean	72.54	72.55
Variance	11.09	11.10
Test Statistic t		1.413
Degrees of Freedom (df)		9

\*significant at 0.05 level of significance “t” 0.05 (09) = 2.26

Table-1 shows that the mean of maximum oxygen consumption of pretest and posttest of experimental group was 72.72 and 73.10 respectively, whereas the mean of maximum oxygen consumption of pretest and posttest of control group was 72.54 and 72.55. The “t” value in case of experimental group was 5.029 and in table 2 shows that the control group it was 1.413. Since cal. T (=5.029) > tab t .05 (09) (=2.26), Ho (null hypothesis) is rejected at 0.05 level of significance.

TABLE 3  
MEAN AND ‘T’ VALUE OF VITAL CAPACITY OF EXPERIMENTAL GROUP

	Pre test	Post test
Sample size	10	10
Arithmetic mean	439	402
Variance	3232.22	2595.56
Test statistic t		6.19
Degrees of freedom (df)		9

TABLE 4  
MEAN AND ‘T’ VALUE OF VITAL CAPACITY OF EXPERIMENTAL GROUP

	Pre test	Post test
Sample size	10	10
Arithmetic mean	365	396
Variance	285583.33	283404.44
Test statistic t		-1.44035
Degrees of freedom (df)		9



Table-3 shows that the mean of vital capacity of pretest and posttest of experimental group was 439 and 402 respectively, whereas the mean of vital capacity of pretest and posttest of control group was 365 and 396 in table 4. The “t” value in case of experimental group was 6.195 and for control group it was 1.440. Since  $\text{cal. } T (=6.195) > \text{tab } t_{.05 (09)} (=2.26)$ ,  $H_0$  (null hypothesis) is rejected at .05 level of significance.

#### DISCUSSION OF FINDING

From the results it is evident that the 12-week of hatha yoga training programme showed significant improvement in maximum oxygen consumption and vital capacity. The findings are supported by the study conducted by M. A. Descamps (Paris) where he found that asanas-yoga postures are generators of dynamic action when there is an extension of the spinal column, whilst they lead to quiet states when there is a flexion of it. Nussbaum (France) studied several parameters concerning hatha-yoga and concluded that it provides a regular functioning of the main bodily functions fostering thus a psycho-physical balance. Wallace and Benson (U.S.A) proved that transcendental meditation increases aerobic metabolism, counteracting anaerobic metabolism which is related to mental distress.

#### CONCLUSIONS

Findings of this exploratory study suggest that the treatment of 12-week of hatha yoga training programme showed significant improvement in maximum oxygen consumption and vital capacity of University yogis.

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