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RESEARCH ARTICLE

IMPACT OF SHORT TERM BREATHING EXERCISE ON BREATH HOLDING TIME

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Key words:-

BHT - Breath Holding Time, DBE - Deep Breathing Exercise

Abstract

Background: Breath holding time is the time taken by the subject to hold his breath as long as he can. During voluntary breath holding, tissues continue to utilize oxygen and liberate carbon dioxide. The point at which breathing can no longer be voluntarily inhibited is called the breaking point that is generally reached when alveolar pO_2 is 56 mm of Hg and alveolar pCO_2 is 49 mm of Hg.[1] According to Guinness World Records Aleix Segura Vendrell of Barcelona, Spain, set the bar high at 24 minutes and 3 seconds in February 2016. The practice of pranayama / slow and deep breathing exercise . reduces the dead space ventilation and renews air throughout the lungs in contrast to only base of the lung in case of shallow breathing. Pranayama also prolong BHT and ventilatory function of the lung. [2]

Aims& objective: to know the impact of short breathing exercise on breath holding time among persons of age between 18 to 40.

Study design: Cross sectional study

Methods: Among 45 subjects of age between 18 -40 years BHT Was measured before exercise and after short term practice of deep breathing exercise.

Result: Breath holding time was increased In maximum subjects. It was increased to 46 sec in male population and 44.3 sec increase in female subjects. Average increase in Breath holding time was 15.84 sec while it was 12.25 sec in male and 11.56 sec in female.

Conclusion: A regular practice of yoga /breathing exercise can be useful in increasing the ventilatory functions . However a short practice of deep breathing exercise can enhance the BHT so for the medical procedures where we need arrest of respiration for more time this practice can be advised to patient before commencing the procedure.

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Introduction:-

Atmospheric pressure is 760 mm of Hg. Concentration of Oxygen is only 21%, so the air that goes to lung have only 160 mm of Hg oxygen. The alveoli. Is surrounded by capillaries. and passive diffusion only works downhill so the partial pressure of oxygen in the lungs will never go below that in the blood. The venous blood returning to lung have pO_2 around 50 mm of Hg so have a potential to reduce oxygen in the lung to that level but the blood leaving

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the lungs to supply the body cannot have pO_2 higher than that of the air in the lungs and arterial pO_2 is around 100 mm of Hg.

There is no “ideal” lung capacity as it increases with height reduces with age. An average person use only one-fourth part of lungs & remaining 75% remains idle. [3]

Breath holding time is the time taken by the subject to hold his breath as long as he can. During voluntary breath holding, tissues continue to utilize oxygen and liberate carbon dioxide. Therefore during breath holding arterial pO_2 falls and pCO_2 rises. Since both these factors are powerful respiratory stimulants, a point is reached where the respiratory drive becomes so strong that the person cannot hold the breath any longer. [4]

The point at which breathing can no longer be voluntarily inhibited is called the breaking point that is generally reached when alveolar pO_2 is 56 mm of Hg and alveolar pCO_2 is 49 mm of Hg.[1]

Normal Breath holding time (BHT) is 45-55 seconds [5]. According to Guinness World Records Aleix Segura Vendrell of Barcelona, Spain, set the bar high at 24 minutes and 3 seconds in February 2016.

How long a person can hold his breath at a first attempt can be extended with successive breath holding. This is due to diving effect in the body. Due to shortage of non-essential bodily functions gradually shut down and one can hold the breath more longer time in successive attempt.

Patanjali says – pranayama is cessation of the movement of inhalation and exhalation. In certain exercise we inhale completely and hold the breath and in others we exhale completely and hold the breath.

The essence of practice is slow and deep breathing. Such practice reduces the dead space ventilation and renews air throughout the lungs in contrast to only base of the lung in case of shallow breathing. In deep breathing Exercise by taking in more air this would enter the uppermost part of the lung too.

Practice of force breathing involving only a phase of deep inhalation and forceful exhalation without a phase of breath holding as practice in pranayama also prolong BHT and ventilatory function of the lung. [2]

In The holy science, Sri Yukteshwar writes that holding the breath creates such a calm in the autonomic nervous system that the inner organs get a rest, which they otherwise never do neither during sleep nor during the waking state.

Aims & Objective:-

The study design aimed to find the effect of short breathing exercise on breath holding time among persons of age between 18 to 40.

Materials & Methods:-

After approval from the departmental research committee 48 person of age between 18 to 40 both male and female were selected randomly among medical students staffs and faculties of the department of Physiology RIMS Ranchi.

Subjects having known history of any respiratory or cardiac diseases were not included in the study

Only the normal healthy subjects having no previous regular practice of yoga /Pranayama was included in the study.

The subject were asked to remain in sitting position on a chair. They were asked to take a deep inhale and hold the breath by closing their nostril by fore finger and thumb BHT was noted by stop watch. Then the subjects were asked to go for deep breathing exercise for Five minutes and again the BHT was measured by the same procedure. The study was done in fixed time in morning to avoid any diurnal variation

Result & Discussion:-

Table 1:-

Number	BHT Before	BHT After	Change	Variance	STD	t Value	p value
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of subject (61)	Exercise (Seconds)	DBE (Seconds)	In BHT		Deviation		
Total (61)	33.56	44.3	10.74	15.84	3.98	11.45	0.00001
Male (44)	33.75	46	12.25	18.5	4.13	7.43	0.00001
Female (17)	33.17	44.23	11.06	9.8	3.13	6.87	0.00001

In the study it was observed that average breath holding time was 33.56 .in average population.while it was 33.75 sec in male and 33.17 sec in female with a standard deviation of 3.98 4.13, and ,3.13 respectively.

Breath holding time was increased In maximum subjects. It was increased to 46 sec in male population and 44.3 sec Increase in female subjects. Average increase in Breath holding time was 15.84 sec while it was 12.25sec in male and 11.56 sec in female.

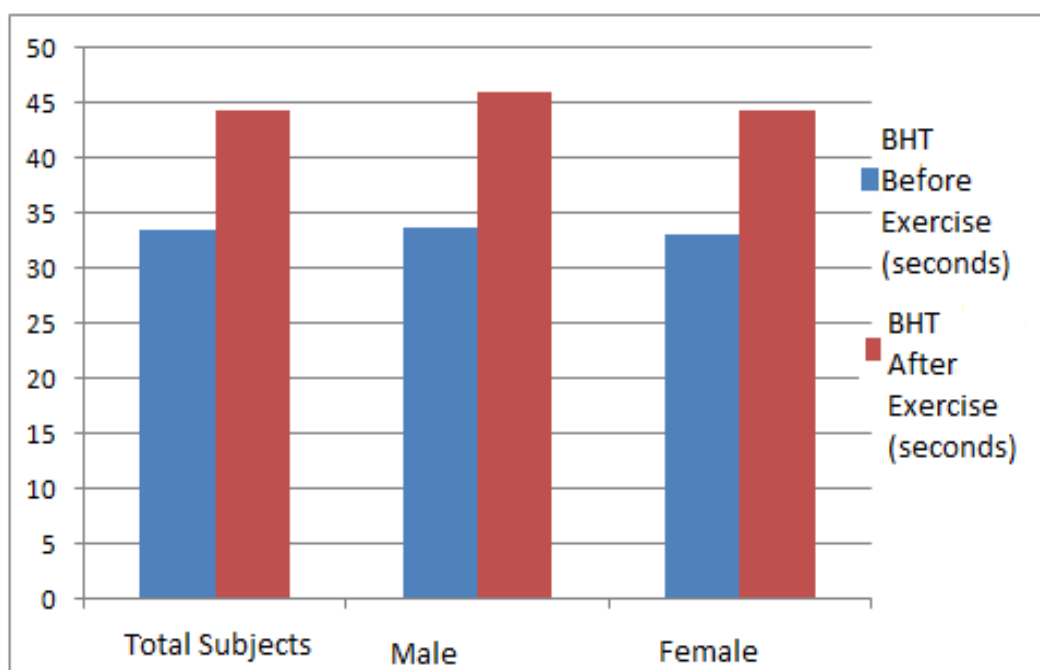
The p value for both the female and male subjects were < .05 that shows a significant change in BHT in all subjects .in the study we observed that there was a remarkable change in BHT even after the short term breathing exercise.

Makwana et el in 1988 also observed the increase in breath holding time ,vital ccapacity and improvement in tidal volume after short term of yoga practices. [6]

Austin have also observed increase in breath holding time and decrease in both systolic and diastolic blood pressure after yoga practices. [7]

Vyasa R dikshit 19 2002 also observed that the Short term practices of pranayam significantly improves the ventilatory function and increases BHT. [8]

Breath holding/'voluntary apnea' which is an instructive laboratory exercise is variable for different individuals depending on the functional status of the lungs, development of respiratory muscles, practice, age and sex. [9]



Conclusion:-

Since a long time yoga and pranayam has been considered as a tool of increasing the strength of lung. In the study it was observed that even after the short term breathing exercise there is significant change in the breath holding time. Whether the improvement is more and sustainable after a regular practice of yoga /breathing exercise can be established only after the study on large group of people and after a long practice of Breathing exercise. However a short practice of deep breathing exercise can enhance the breath holding time so for the medical procedures where we need arrest of respiration for more time this practice can be advised to patient before commencing the procedure.

Limitation of The Study:

The limitation of the present study is small group of subjects and other lung functioning parameters were not measured.

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