A comparative study of the effects of yoga and swimming on pulmonary function in sedentary subjects

Materials and Methods

100 volunteers were inducted into the study and randomly (block randomization) divided into two groups:

- 12 weeks training yogic exercises (41 people)
- 12 weeks training swimming (40 people)

They practised the same, 6 days/week for 60 min daily.

Pre training (at the start of study) and post training (after 12 weeks of training) lung function measurements were done.

- The lung function parameters
  
  * FVC
  * FEV1/FVC ratio
  * PEFR
  * FEF 0.2-1.2 L
  * FEF 25-75%
  * MVV

were recorded with computerized spirometer (Helios, Recorders and Medicare Systems Pvt. Ltd., Chandigrah, India)

Forced Vital Capacity (FVC)
Forced Expiratory Volume (FEV)
Peak Expiratory Flow Rate (PEFR)
Forced Expiratory Flow (FEF)
Maximal Ventilatory Volume (MVV)

Result
### The effects of exercise on lung functions

<table>
<thead>
<tr>
<th>parameter</th>
<th>Yogic Improvement</th>
<th>Swimming Improvement</th>
<th>Yogic Percentage Improvement</th>
<th>Swimming Percentage Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>FVC% predicted</td>
<td>4.786</td>
<td>6.258</td>
<td>6.26%</td>
<td>8.063%</td>
</tr>
<tr>
<td>FEV1/FVC</td>
<td>0.401</td>
<td>1.343</td>
<td>0.610%</td>
<td>1.539%</td>
</tr>
<tr>
<td>PEFR% predicted</td>
<td>4.119</td>
<td>4.238</td>
<td>5.84%</td>
<td>5.747%</td>
</tr>
<tr>
<td>FEF 25-75%</td>
<td>4.041</td>
<td>5.355</td>
<td>5.485%</td>
<td>6.962%</td>
</tr>
<tr>
<td>FEF 0.2-1.2L%</td>
<td>4.510</td>
<td>4.675</td>
<td>6.784%</td>
<td>6.548%</td>
</tr>
</tbody>
</table>

All Pulmonary Functions Test parameters except FEV1/FVC improved significantly (P<0.0001) in both yoga and swimming groups.

**Conclusion**

The ability of individual to inflate and deflate the lungs depends upon the strength of the thoracic and abdominal muscles, posture of individual and the elasticity of lungs. Swimming increases this ability because it is performed in horizontal position compared to the vertical position in other sports.

Ventilation is restricted during swimming which leads to intermittent hypoxia in every respiratory cycle for one moment or the other. This intermittent hypoxia sets up the anaerobic process by which lactic acid starts accumulating in the blood leading in "lactic oxygen deficit". This leads to the stimulation of respiratory center in the medulla therefore increasing respiration. The resultant alveolar hyperplasia may be responsible in increasing FVC, CV and number of alveoli.
The effects of exercise on lung functions