An evaluation of pulmonary parameters in two groups of subjects during Yoga practice

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ABSTRACT

The purpose of the present study was to investigate how far the short term practice of yoga (30 and 60 days) for an hour daily can improve the respiratory function. Male subjects (n=50, age 30-50 years) were randomly selected. Respiratory parameters (FVC, FEV1, PEFR, FEF 25-75% and MVV) were determined by using a multifunctional computerized spirometer. Yoga (posture and pranayamas) practice for a month produced no significant improvement in pulmonary parameters. Nevertheless, when the subjects continued it for next 30 days, i.e., after 60 days significant changes were noted in FVC (p<0.001), FEV1 (p<0.01) and PEFR (p<0.05). The result also revealed that amongst them 30 days yoga training resulted in a significant increase in FVC in elder group of people (age 41-50 yrs) where as in younger group (age 30-40 yrs) the changes were not so prominent. Result indicated that short term (30 days) yoga practice quickly improves respiratory functions in relatively elder people (age 41-50 yrs), when many of them in our tropical country suffer from primary level of respiratory problem. Regular practice of Yoga (posture and pranayamas) can prevent it by increasing the efficacy of respiratory muscles.

Keywords: Yoga, pranayama, breathing exercises, FVC, FEV1, PEFR.

INTRODUCTION

Yoga is popular all over the world nowadays. It increases longevity,1 and has therapeutic and rehabilitative effects.2-5 Yoga techniques include the practice of meditation, a variety of breathing exercises, and the practice of a number of physical exercises and postures, in which the focus is more on isometric exercise and stretching than on aerobic fitness.6

Pranayama is an important component of yoga training. Pranayama (controlled breathing exercise) improves the air way reactivity in the asthmatic individuals.7 It was noted that high frequency breathing exercise resulted in more than 10 fold increase in expired minute ventilation.8 Many reports supported the beneficial effect of long-term yoga training on pulmonary functions.9-11

It has been reported that yoga practice an hour/day, for 12 weeks resulted significant increment in the forced vital capacity (FVC), forced expiratory volume in 1st second (FEV1) and peak expiratory flow rate (PEFR).12 Yoga was proved to be helpful for bronchial asthma.13 In a study with subjects between the ages of 40 to 60 years with no previous yoga experience, 80.0% showed improvement in breath holding time after the completion of an intensive yoga program.14

The purpose of the present investigation was to determine how far yoga practice over a short duration of 60 days for an hour daily can improve respiratory function.

SUBJECTS AND METHODS

The present study was conducted in Department of Physiology of Rohilkhand Medical College and Hospital with the collaboration of Yoga center of Bareilly, U.P., India.

New comer male subjects (age 30-50 years) were selected randomly from the yoga center of Bareilly, practicing yoga regularly. The subjects were priorly informed about the study and the consents were taken. They were divided into two age groups: Gr.- A (30-40 yrs, n=25) and Gr.- B (41-50 yrs, n=25).

The pulmonary function tests or respiratory capacity of the subjects were determined using a multifunctional computerized spirometer (Sl. No. A-23-050.0883). Forced Vital Capacity (FVC), Forced Expiratory Volume in 1st sec. (FEV1), Peak Expiratory Flow Rate (PEFR), Forced Expiratory Flow (FEF 25-75%) and Maximum Voluntary Ventilation (MVV) were measured.

The subjects were asked to take a deep breath and blow it into the mouth piece of the spirometer. A nasal clip was
used to close the nose to prevent the air flow through the nostrils. Before taking the reading they were instructed to do the same 2 - 3 times for the better expiration. They were asked to practice the yoga (posture and pranayamas) regularly and the data on the same parameters were collected after 30 days and 60 days interval.

Data were analyzed with the help of a software package on ‘Statistical’ (Version 6.0). The ‘t’-test and ‘p’ values among different groups of parameters were done.

Results

The all pulmonary parameters which were taken before and after 30 days and 60 days of yoga practice of the all subjects are presented in the Table-1 which indicated that 30 days of yoga practice produced no significant change in pulmonary parameters. Nevertheless, when the subjects continued it for next 30 days, i.e., after 60 days significant changes were noted in FVC (p<0.001), FEV₁ (p<0.01) and PEFR (p<0.05).

The results also revealed a significant increase in FVC (p<0.001) in Group B (age 41-50 yrs) after 30 days training as well as after 60 days whereas in Group A (age 30-40 yrs) the significant changes were noted only after 60 days of Yoga (posture and pranayamas) practice.

Discussion

Yoga practice causes betterment of pulmonary functions. Studies revealed the beneficial effect the yoga on cardio respiratory function of school children but the increase in FVC and FEV₁ in the group was statistically insignificant. PEFR increased significantly in the Yoga and fast and slow ‘Suryanamaskar’ groups.

Our findings are consistent with those studies which noted an increase in FVC, FEV₁ and PEFR after yoga training. Short term ‘pranayama’ (six week course) resulted in increased FVC and FEV₁, which might be due to strengthening of the respiratory musculature with the regular practice of the Yoga.

With the advancement of the age the strength of the respiratory musculature decreases and the normal expansion of the chest does not occur. Result revealed that the respiratory parameters are significantly increased in Gr.-B after 30 days of yoga practice and the significant difference also noted in Gr.-B after 60 days. Earlier studies also supported that short term yoga practice (ten weeks course) recorded improved respiratory functions in the form of lowered respiratory rate, increased forced vital capacity, maximum breathing capacity and breath holding time, while tidal volume and FEV₁, did not reveal any significant change.

Table-1: Pulmonary parameters before and after Yoga

<table>
<thead>
<tr>
<th>Pulmonary Parameters</th>
<th>All Subjects (n=50)</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Before Yoga (Mean± SD)</td>
<td>After 30 days Yoga (Mean± SD)</td>
<td>After 60 days Yoga (Mean± SD)</td>
<td>Before Yoga (Mean± SD)</td>
<td>After 30 days Yoga (Mean± SD)</td>
</tr>
<tr>
<td>FVC (l)</td>
<td>2.33 ±0.73</td>
<td>2.58 ±0.56</td>
<td>2.79 ±0.53*</td>
<td>1.89^ ±0.54</td>
<td>2.24### ±0.48</td>
</tr>
<tr>
<td>FEV₁ (l)</td>
<td>1.92 ±0.36</td>
<td>2.00 ±0.37</td>
<td>2.14 ±0.35**</td>
<td>1.75^ ±0.36</td>
<td>1.75^ ±0.29</td>
</tr>
<tr>
<td>FEV₁/FVC (%)</td>
<td>77.72 ±12.33</td>
<td>82.22 ±15.81</td>
<td>82.51 ±15.39</td>
<td>83.00^ ±11.19</td>
<td>86.53 ±18.29</td>
</tr>
<tr>
<td>PEFR (l min⁻¹)</td>
<td>4.82 ±1.73</td>
<td>5.31 ±1.44</td>
<td>5.59 ±1.59***</td>
<td>6.62* ±1.22</td>
<td>4.62### ±0.91</td>
</tr>
<tr>
<td>FEF₂₅₋₇₅ (l)</td>
<td>2.66 ±0.98</td>
<td>2.85 ±0.84</td>
<td>2.89 ±0.77</td>
<td>3.25 ±0.81</td>
<td>2.45## ±0.56</td>
</tr>
<tr>
<td>MVV (l min⁻¹)</td>
<td>88.92 ±30.65</td>
<td>90.10 ±27.05</td>
<td>93.77 ±26.85</td>
<td>102.59 ±25.75</td>
<td>104.38 ±24.58</td>
</tr>
</tbody>
</table>

* P<0.001 ** P<0.01 *** P<0.05
^ Indicate within group w.r.t. before yoga
^ Indicate between groups with respect to before yoga
$ Indicate between groups with respect to after 30 days yoga
# Indicate between groups with respect to after 60 days yoga

Table-2: Pulmonary parameters before and after yoga between two age groups

<table>
<thead>
<tr>
<th>Age Gr. (yrs)</th>
<th>Gr.-A (30-40 yrs, n=25)</th>
<th>Gr.-B (41-50 yrs, n=25)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulmonary Parameters</td>
<td>Before Yoga (Mean± SD)</td>
<td>After 30 days Yoga (Mean± SD)</td>
</tr>
<tr>
<td>FVC (l)</td>
<td>2.77 ±0.62</td>
<td>2.93 ±0.41</td>
</tr>
<tr>
<td>FEV₁ (l)</td>
<td>2.10 ±0.28</td>
<td>2.25 ±0.26</td>
</tr>
<tr>
<td>FEV₁/FVC (%)</td>
<td>72.44 ±11.27</td>
<td>77.91 ±11.72</td>
</tr>
<tr>
<td>PEFR (l min⁻¹)</td>
<td>5.66 ±1.77</td>
<td>6.00 ±1.55</td>
</tr>
<tr>
<td>FEF₂₅₋₇₅ (l)</td>
<td>3.08 ±1.01</td>
<td>3.25 ±0.89</td>
</tr>
<tr>
<td>MVV (l min⁻¹)</td>
<td>102.59 ±25.75</td>
<td>104.38 ±24.58</td>
</tr>
</tbody>
</table>

* Indicate within group w.r.t. before yoga
^ Indicate between groups with respect to before yoga
$ Indicate between groups with respect to after 30 days yoga
# Indicate between groups with respect to after 60 days yoga

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Study of Pathak et al. indicated subjects performing ‘Pranayama’ though a little older in age than matched control group, preserved their body in better frame, remained more proportionate with respiratory functions and exhibited stronger grip strength.\(^\text{19}\)

Present study indicated that short term (30 days) Yoga practice (posture and pranayamas) is beneficial mainly in elder group of people (age 41-50 yrs) when many people in our tropical country suffer from primary level of respiratory problems. Regular practice of Yoga can prevent it by increasing the efficacy of respiratory muscles.

**REFERENCES**