

Original Research Article

Comparative Study of Pulmonary Function Tests among Practitioners of Sudarshan Kriya Yoga and Sport Persons

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Abstract: Yoga and Sports are highly efficient method in improving pulmonary function parameters in all individuals. Hence the present study has been conducted to assess which among the two is better to improve lung function parameters. This study was carried upon 100 healthy males in the age group of 18-55 years. The subjects were divided into two groups on the basis of physical activities under taken i. e, Sports and Sudarshan Kriya Yoga. One group comprised 50 subjects in the sports group and other had 50 subjects in the SKY group. The parameters used as determinants of lung function were predicted percent of means of FVC, FEV₁, FEV₁/FVC ratio, FEF_{25-75%} and PEFR recorded as per standard procedure using RMS- Helios spirometer. In our study the sports group was having significantly higher mean value of FVC, FEV₁, FEV₁/FVC ratio, FEF_{25-75%} and PEFR as compared to SKY group.

Keywords: Sudarshan Kriya Yoga, Sports, Pulmonary Functions

INTRODUCTION:

Breathing is the most vital function for maintenance of life. It is thought by many cultures that the process of breathing is the essence of being. The goal of breathing exercises is to relax quickly and to improve the respiratory efficiency [1]. Breathing exercises help in balancing and harmonizing the body, mind, and emotions [2]. Pulmonary function tests are used to assess the functional status of the lungs.

The characteristic feature of abdominal or diaphragmatic breathing exercises are slow and deep inhalation through nose followed by a momentary pause and then forceful exhalation through mouth. Several studies had been conducted to prove the role of breathing exercises in the improvement of pulmonary functions in healthy individuals [3-6].

Regular forceful inspiration and expiration for prolonged periods during playing, leads to the strengthening of the respiratory muscles, both voluntary and involuntary. This helps the lungs to inflate and deflate maximally. This maximum inflation and deflation is an important physiological stimulus for the release of lung surfactant[7] and prostaglandin[8] into the alveolar spaces thereby increasing the lung

compliance and decreasing the bronchial smooth muscle tone respectively.

Yoga has demonstrated an improvement in respiratory function. Yoga consists of a number of different practices, the most common of which are the pranayama, the coordination of controlled ventilation and the asanas or stretching exercises. Pranayama requires breath holding which may result in increased parasympathetic control of respiratory centres [6].

Sports and yoga both improve pulmonary functions. So, I have conducted this study to find out which among Yoga (Sudarshan Kriya Yoga) and sports (football) has more beneficial effect on pulmonary functions.

MATERIAL AND METHODS:

The study has been undertaken to observe the effects of Sudarshan Kriya yoga and sports (football) on the pulmonary functions of Healthy male of age group 18-55 years. The pulmonary functions of Sudarshan Kriya yoga subjects were compared with the sports person who practicing it from last 3 years. This study was conducted in the department of physiology S. P. Medical College, Bikaner.

Type of Study: Cross-sectional study

Method: 100 subjects will be divided into two groups

Group I: 50 person practising Sudarshan Kriya Yoga

Group II: 50 sports persons who were playing sports.

The subjects of Sudarshan Kriya Yoga group were taken from Art of Living centre, Rani Bazar, Bikaner and subjects of sport group were taken from local sports academy. The readings were taken in sitting position using computerized spiro-meter (RMS- Helios 401 Transducer no 400-666)

Inclusion Criteria

Selection of subjects:

1. Healthy male.
2. Age group (18-55 years).
3. Physically and mentally capable of adequate co-operation during the performance of the tests.
4. Group I- practicing Sudarshan Kriya Yoga (SKY) from last three years.
5. Group II- playing sports (football) from last three years.

Exclusion Criteria:

Exclusion criteria include the patients suffering from chronic bronchitis, asthma tuberculosis, cardiovascular disease and smokers from the study.

Statistical Analysis:

The data were expressed as mean±SD. Statistical analysis were performed according to an intention to treat strategy. Quantitative data were presented as mean±SD and the student's unpaired 't' test was used to compare the differences. All p values were 2 tailed, p values <0.05 was considered significant. Analysis was performed by using SPSS version 6.0 computer software.

Following parameters were measured:

1. **Body Mass Index**
2. **Blood Pressure**
3. **Pulmonary Function Tests:**
 - FVC- Forced vital capacity.
 - FEV₁- Forced expiratory volume in 1 second.
 - FEV₁/FVC -Ratio
 - FEF_{25-75%} Forced expiratory flow between 25% and 75% of vital capacity.
 - PEFR- Peak Expiratory Flow rate.

RESULT:

Comparison of BMI and Blood Pressure across activities is shown in TABLE-1. The difference of mean BMI of sports and SKY is statistically insignificant (p=0.099). The difference of mean systolic blood pressure and mean diastolic blood pressure of sports and SKY is statistically insignificant (p=0.085, p=0.375 respectively).

Comparison of lung function parameters across activities is shown in TABLE-2.

Forced Vital Capacity (FVC):

The mean value of FVC of sports group (88.84) is higher than the mean value of SKY group (81.12). The difference of mean of FVC was significant between the subjects of Sports group and SKY group (p=0.0011).

Forced expiratory volume in 1 second (FEV₁):

The mean value of FEV₁ of sports group (103.7) is higher than the mean value of SKY group (91.80). The difference of mean of FEV₁ was significant between the subjects of Sports group and SKY group (p=0.0001).

FEV₁/FVC Ratio:

The mean value of FEV₁/FVC of sports group (116.9) is higher than the mean value of SKY group (113.3). The difference of mean of FEV₁/FVC was significant between the subjects of Sports group and SKY group (p=0.0006).

Forced Expiratory Flow (FEF_{25-75%}):

The mean value of FEF_{25-75%} of sports group (99.00) is higher than the mean value of SKY group (92.20). The difference of mean of FEF_{25-75%} was significant between the subjects of Sports group and SKY group (p=0.0449).

Peak Expiratory Flow Rate (PEFR):

The mean value of PEFR of sports group (93.76) is higher than the mean value of SKY group (87.18). The difference of mean of PEFR was significant between the subjects of Sports group and SKY group (p=0.0143).

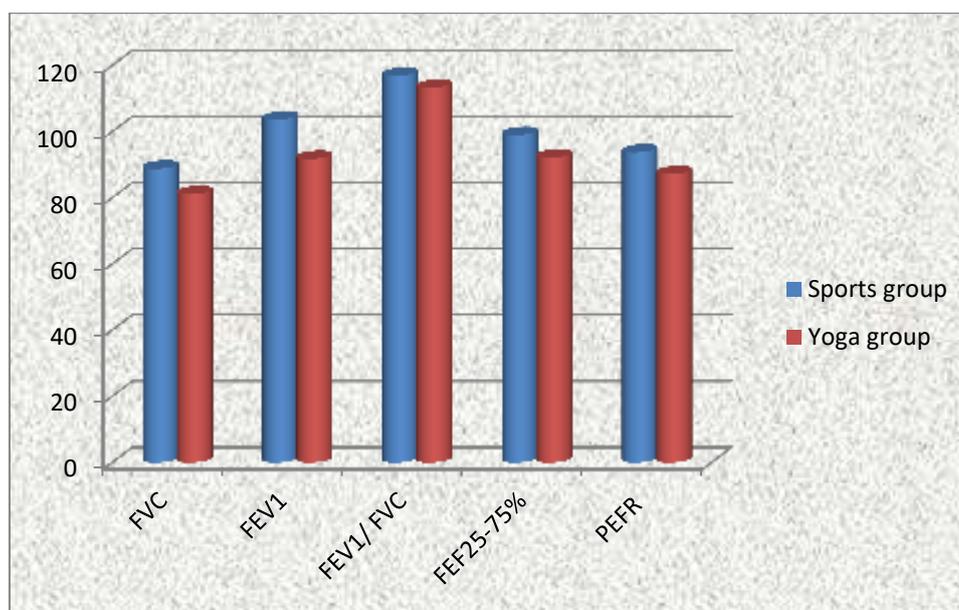
This study showed that Forced Vital Capacity (FVC), Forced Expiratory Volume in 1 second (FEV₁), FEV₁/FVC Ratio, Forced Expiratory Flow (FEF_{25-75%}), and Peak Expiratory Flow Rate (PEFR) value were significantly higher in sports group as compared to that of subjects in Sudarshan Kriya Yoga group.

Table 1: Showing the Mean value of BMI, SBP and DBP between sports and Sudarshan Kriya Yoga groups.

S. No.	Parameters	Sports group	SKY group	T Value	P Value
1	BMI (Mean±S.D)	20.28±1.701	20.82±1.549	1.665	0.0992
2	SBP (Mean±S.D)	125.4±7.197	128.1±8.201	1.737	0.0856
3.	DBP (Mean±S.D)	81.60±5.284	82.56±5.496	0.8903	0.3755

Table 2: Showing the Mean value of pulmonary function tests between sports and Sudarshan Kriya Yoga groups

S. No.	Pulmonary functions parameters	Sports group (Mean±S.D)	SKY group (Mean±S.D)	t Value	p Value
1	FVC	88.84±9.937	81.12±12.85	3.361	0.0011
2	FEV ₁	103.7±10.25	91.80±13.24	5.016	0.0001
3	FEV ₁ / FVC	116.9±4.940	113.3±5.192	3.552	0.0006
4	FEF _{25-75%}	99.00±15.85	92.20±17.57	2.032	0.0449
5	PEFR	93.76±12.79	87.18±13.60	2.493	0.0143



Graph 1: Show the Mean value pulmonary functions in sports and yoga group

DISCUSSION:

Pulmonary Function Profile was analysed and compared among the study groups by Peter *et al.*; their study showed the athletic group was having higher predicted percentage of mean value of FVC, FEV₁, FEV₃, PEFR, and MVV as compared to yogis [9].

Physical inactivity and low cardiorespiratory fitness are recognized as important causes of morbidity and mortality. It is generally accepted that people with higher levels of physical activity tends to have higher levels of fitness and that physical activity can improve cardiorespiratory fitness. Bufferalo health study revealed that FEV₁ as an independent predictor of overall long term survival rates and could be used as a tool in general health assessment [10]. Pursuing a physical activity or sport which could help in achieving efficient lung function especially FEV₁ is an essential preventive strategy in this busy life style.

The result of the present study showed that those performing yoga and sports activity regularly, Sports had higher lung function parameters as compared to yoga. Significantly higher values were observed for Forced Vital Capacity (FVC), Forced Expiratory Volume in 1 second (FEV₁), FEV₁/FVC

Ratio, Forced Expiratory Flow (FEF_{25-75%}), and Peak Expiratory Flow Rate (PEFR).

The possible explanation for this could be that regular forceful inspiration and expiration for prolonged periods during running may leads to the strengthening of the respiratory muscles, both voluntary and involuntary. This helps the lungs to inflate and deflate maximally. This maximum inflation and deflation is an important physiological stimulus for the release of lung surfactant and prostaglandin into the alveolar spaces thereby increasing the lung compliance and decreasing the bronchial smooth muscle tone respectively [7, 8, 11]. Ringqvist suggested that changes in airway resistance serves as a major stimulus for respiratory muscle hypertrophy. Since airway resistance is related inversely and curvilinearly to lung volumes, then airway resistance will be reduced when subjects breathe at high lung volumes [12]. Breathing through one nostril in Anulom vilom pranayama further increases the resistance. The effects of resistance training on skeletal muscle are well documented [13]. Higher peak expiratory flow rates and FEV₁ could be explained due to better strengthening of respiratory muscles in yogis. Skeletal muscle control many crucial elements of aerobic conditioning including lung ventilation.

Pyorala *et al.*; pointed out that endurance athlete maintain lower and deeper rhythms of breathing, both at rest and at exercise than compared to normals [12]. It has been shown in previous studies that beneficial effects of yoga become established between 6 to 12 weeks [13].

CONCLUSION:

In our study we found that significantly higher values of pulmonary functions in subjects who were engaged in Sports activity as compared to practitioners of Sudarshan Kriya yoga.

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