

Effects Of Gym Workout On Pulmonary Function Tests In Healthy Adults

Dr. Rajendra Atmaram Amin*, Dr. Rahil Shah**

*Associate Professor, **Second Year Resident Doctor, Department Of Physiology, B.J. Medical College, Ahmedabad-380016

Abstract: Background: Physical and mental fitness are closely associated with quality of life and healthy lifestyle. Adequate amount of physical and mental fitness can be achieved by proper amount of physical activity. Due to Urbanization, sedentary lifestyle and unhealthy eating habits cardiovascular and respiratory diseases are increasing day by day. Exercise is the most important ailment that can be used to achieve health excellence. This study was done to elicit effect of gym workout on pulmonary function tests in healthy adults. Material And Methods: The present comparative study included 100 healthy individuals who newly joined gym and were willing to participate in the study and it was conducted at Life fitness, Ahmedabad. Age group of study participants was between 20-35 years. The same healthy adults were chosen as cases and controls to decrease biases and confounding factors. Pulmonary function tests were done by Spiro excel digital spirometer of Medicaid systems. Parameters like FVC, FEV1, FEV1/FVC, and PEFR were measured. Result: The study results revealed that pulmonary functions of healthy individuals who regularly did gym workout for 1 hour for 5 days a week for at least 3 months were improved. Better lung volumes, capacities and flow rates were achieved at the end of 3 months of workout period than it was before 3 months. Conclusion: This study suggests that for good respiratory and cardiovascular function regular physical activity should be part of daily routine. By the habit of doing exercise physiological, physical and mental wellbeing of individual and better quality of life can be achieved. [A R Natl J Integr Res Med, 2020; 11(4):19-21]

Key Words: Pulmonary function tests, Gym workout, Healthy adults

Author for correspondence: Dr. Rajendra A. Amin, M.D. , B/103, Sankalp Sandipani Flats, Opp. Abhay Ghat, Near Gandhi Ashram, RTO, Subhashbridge, Ahmedabad-380027. E-Mail: drraj_amin@yahoo.co.in

Introduction: Adequate amount of physical activity on daily basis is the principal of road to health. Blindfolded race for urbanization, industrialization and white collar jobs has made our body junk and abode for various cardiovascular and respiratory diseases. Regular physical exercise and good physical fitness is thoroughfare to nirvana.

Exercise and Physical activity can be classified into four main categories: endurance, strength, flexibility and balance. In Chronic respiratory disorders like chronic obstructive pulmonary disease, emphysema, chronic bronchitis rehabilitation of patients is achieved by physical exercise of various forms. Pulmonary function tests are non invasive tests that are the in general predictors of how well the lungs are working.

Aggravating pulmonary volumes and capacities are overall assessors of diminishing lung function. A gym or a fitness centre provides environment for workout and works as a training centre or rehabilitation centre to achieve required fitness goals. The present study was carried out to know association between daily physical exercise and improvement in lung function.

Material & Methods: A total of 100 newly gym joined normal healthy individuals in the age group of 20-35 years were taken for the study.

The same healthy adults were chosen as cases and controls to decrease biases and confounding factors. The study was done after approval from the institutional ethics committee. Permission from owner of Life fitness, Ahmedabad was also taken. An informed consent was taken from the individuals prior to inclusion in the study.

Inclusion Criteria: Healthy adults in the age group of 20-35 years willing to actively participate in 1 hour gym workout routine for 3 months 5 days a week.

Exclusion Criteria: Volunteers with the history of acute or chronic respiratory disorders like COPD, Asthma, TB etc. Volunteers with the history of hypertension, diabetes mellitus, hypothyroidism or any other major cardiovascular condition. Volunteers involved in heavy physical work occupation and athletes. Volunteers suffering from neuromuscular or skeletal disorders.

Volunteers having history of addiction to alcohol and/or smoking. 100 newly gym joined healthy adults in the age group of 20 to 35 years were taken for the study. 5 days a week 1 hour routine gym workout which included 10 mins of warm up exercise, 15 mins of treadmill jogging, 5 mins of rest followed by 10 mins of bench press, 10 mins of squats, followed by 10 mins of cool down exercise.

Equipment: Computerized Spiro excel digital spirometer of Medicaid systems was used to assess pulmonary functions of healthy individuals. Different parameters like FVC, FEV₁, FEV₁/FVC, and PEFR were taken into account to evaluate lung function.

Statistical analysis was done by using Microsoft excel 2019 and was analysed using SPSS v26. Paired 't' test was used for statistical analysis. P value <0.05 is considered as significant.

Results: The present study included 100 normal healthy individuals aged between 20-35 years and was conducted at Life fitness, Ahmedabad.

AFTER 3 Months of 5 days a week 1 hour workout,

- Mean FVC was found to be 4.48 litres compared to 3.98 litres before 3 months.
- Mean FEV₁ was found to be 3.80 litres compared to 3.35 litres before 3 months.
- Mean FEV₁/FVC was found to be 84.82% compared to 84.17% before 3 months.
- Mean PEFR in litre per minute was found to be 508.6 compared to 445.8 before 3 months.

Where FVC is Forced Vital Capacity, Here p value is less than 0.05 so by paired 't' test' it is significant (Table 1).

Table: 1 Comparison Of FVC (Litres) Before And After Workout Training

Parameter	Before Gym Workout		After Gym Workout		P Value
	Mean	±SD	Mean	±SD	
FVC	3.98	0.66	4.48	0.69	<0.05

Where FEV₁ is Forced Expiratory Volume in 1 second, Here p value is less than 0.05 so by paired 't' test' it is significant (Table 2).

Table: 2 Comparison Of FEV₁ (Litres) Before And After Workout Training

Parameter	Before Gym Workout		After Gym Workout		P Value
	Mean	±SD	Mean	±SD	
FEV ₁	3.35	0.57	3.80	0.59	<0.05

Where FVC is Forced Vital Capacity and FEV₁ is Forced Expiratory Volume in 1 second, Here p

value is more than 0.05 so by paired 't' test' it is not significant (Table 3).

Table: 3 Comparison Of FEV₁/FVC Before And After Workout Training (In Percentage)

Parameter	Before Gym Workout		After Gym Workout		P Value
	Mean	±SD	Mean	±SD	
FEV ₁ /FVC	84.17	3.84	84.82	2.89	>0.05

Where PEFR is peak expiratory flow rate, Here p value is less than 0.05 so by paired 't' test' it is significant (Table 4).

Table: 4 Comparison Of PEFR Before And After Workout Training (In Litre/Min)

Parameter	Before Gym Workout		After Gym Workout		P Value
	Mean	±SD	Mean	±SD	
PEFR	445.8	63.4	508.6	59.5	<0.05

Discussion: In this present study results indicate that lung function of normal adult healthy individuals improve after they undergo gym workout training schedule for 3 months as compared to before. In our study mean values of FVC and FEV₁ were compared by paired 't' test and p value of all of them have been found less than 0.05. So, it is statistically significant. Similar results were also found in Cheng YJ et al¹ and A Rawashdeh et al studies². Mean values of PEFR when compared by paired 't' test, p value of them also came less than 0.05. So, it is statistically significant. Similar results were also found in Chaitra et al studies³. So, there is a clear relation between gym workout training and improvement in lung function. Thus, physical exercise regularly can improve efficiency of lungs in normal healthy individuals. Mean values of FEV₁/FVC were almost similar and when compared p value comes above 0.05 thus, statistically not significant. Similar results were found in Angane et al studies⁴.

Physiological Basis: There are multiple reasons associated with improvement in lung function after workout training. Due to physical inactivity there occurs muscular imbalance that causes thoracic movement restriction. Due to exercise auxiliary group of muscles gets strengthened. Physical exercise can increase the residual air flow and decrease the ventilation by reinforcement of bronchi expansion in asthmatic

patients. Improved pulmonary function can be due to many reasons like decreased airway resistance, increased airway calibre, strengthened principal as well as accessory respiratory muscles, increased lung and thoracic elasticity etc. These all factors may be responsible for improved PEF_r, FVC and FEV₁. Activation of adrenaline system during exercise training in which vasodilation of pulmonary vessels cause a decreased airway resistance and an enhanced FVC and FEV₁ through increasing airflow.

Conclusion: The present study suggests that efficiency of lungs can be improved by regular workout training and physical exercise. Therefore in patients with respiratory disorders as well as even in healthy adult individuals regular daily physical exercise should be promoted in order to gain health excellence.

Acknowledgment: We hereby acknowledge:- The Head, department of Physiology, The Dean, B.J. Medical college and The Superintendent, Civil hospital, Ahmedabad for their kind support to carry out the research work.

References:

- Cheng YJ, Macera CA, Addy CL, Sy F, Wieland D, Blair S. Effects of physical activity on exercise tests and respiratory function. *Br.J. Sports Med.* 2003; 37:521-8.
- Rawashdeh A, Alnawaiseh N. The Effect of High-Intensity Aerobic Exercise on the Pulmonary Function among Inactive Male Individuals. *Biomed Pharmacol J* 2018; 11(2).
- Chaitra B, Vijay Maitri. Effect of Aerobic Exercise training on Peak expiratory flow rate: a Pragmatic RCT. *Int J Biol Med Res.* 2011;2(3): 789-792
- Angane EY, Navare AA. Effects of aerobic exercise on pulmonary function tests in healthy adults. *Int J Res Med Sci* 2016; 4: 2059-63.
- Maryam Khosravi, Seyed Morteza Tayebi and Hamed Safari. Single and concurrent effects of endurance and resistance training on pulmonary function. *Iran J basic Med sci.* 2013 Apr; 16(4): 628-634.
- Shapiro W, Johnson CE, Damerson RA, Patterson JL. Maximum ventilator performance and its limiting factors. *J Appl Physiol.*1964; 19:199-203.
- Park J, Han D. Effects of high intensity aerobic exercise on treadmill on maximum-expiratory lung capacity of elderly women. *J Phys Ther Sci.* 2017;29(8):1454-1457.
- Courteix D, Obert P, Lecoq A.M, Guenon P, Koch G. Effect of intensive swimming training on lung volumes, airway resistance and on the maximal expiratory flow-volume relationship in prepubertal girls. *Eur J Appl Physiol Occup Physiol.* 1997;76(3):264-9.
- Cicek G, Gullu A, Gullu E, Yamaner F. The effect of aerobic and core exercises on forced vital capacity. *Physical culture and sport.* Turkey. 2018.
- Azad A, Gharakhanlou R, Niknam A, Ghanbari A. Effects of aerobic exercise on lung function in overweight and obese students. *National Research Institute of Tuberculosis and Lung Disease.* Iran. 2011; 10(3):24-31.
- Miyahara N, Eda R, Takeyama H, Kunichika N, Moriyama M, Aoe K, Kohara H, Chikamori K, Maeda T, Harada, M. Effects of short-term pulmonary rehabilitation on exercise capacity and quality of life in patients with COPD. *Acta Med Okayama.* 2000; 54(4):179-84.
- Radovanovic D, Aleksandrovic M, Stojiljkovic N.D.J, Ignjatovic A, Popovic T, Marinkovic M. Influence of physical training on cardio respiratory endurance in preadolescent age. *Acta Medica Medianae.* 2009; 48:37-40.
- Haas F, Pasiński S, Levine N. Effect of aerobic training on forced expiratory airflow in exercising asthmatic humans. *J Appl Physiol.* 1987; 63:1230-5.
- Lee B, Park S, Han D. Analysis of the influential factors of maximal-effort expiratory capacity of elderly women. *J Phys Ther Sci.* 2016; 28:2924-2928.

Conflict of interest: None

Funding: None

Cite this Article as: Amin R, Shah R. Effects Of Gym Workout On Pulmonary Function Tests In Healthy Adults. *Natl J Integr Res Med* 2020; Vol.11(4): 19-21