

## RELATIONSHIP BETWEEN PHYSICAL ACTIVITY AND PULMONARY FUNCTIONS AMONG UNDERGRADUATE STUDENTS OF UNIVERSITY OF KARACHI

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### ABSTRACT:

**Objectives:** To identify the relationship between physical activity and pulmonary function among undergraduate students of University of Karachi.

**Methodology:** The study design was cross sectional. Total 378 samples were selected by convenient sampling from university of Karachi. Physical activity was measured through International physical activity questionnaire (IPAQ) while pulmonary function parameters were measured through Spirometer. Data was analysis through SPSS 21 version and p-value were calculated through one way ANOVA. Descriptive statistics were used to calculate frequency and percentage.

**Result:** Mean $\pm$ SD of impact of low level of physical activity on Forced vital capacity was 61.60 $\pm$ 16.62, Mean $\pm$ SD of moderate level of physical activity on Forced vital capacity was 63.18 $\pm$ 16.2 while mean and standard deviation of high level of physical activity on Forced vital capacity was 66.95 $\pm$ 16.14 with p-value = .745. Mean $\pm$ SD of impact of low level of physical activity on Forced expiratory volume in one second was 59.08 $\pm$ 17.68, Mean $\pm$ SD of moderate level of physical activity on Forced expiratory volume in one second was 57.63 $\pm$ 18.85 while mean and Mean $\pm$ SD of high level of physical activity on Forced expiratory volume in one second was 62.68 $\pm$ 20.29 with p-value = .537.

Mean $\pm$ SD of low level of physical activity on Peak expiratory flow was 48.03 $\pm$ 20.25, Mean $\pm$ SD of moderate level of physical activity on Peak expiratory flow was 48.74 $\pm$ 23.41 while Mean $\pm$ SD of high level of physical activity on Peak expiratory flow was 52.43 $\pm$ 25.02 with p-value = .831, Mean $\pm$ SD of impact of low level of physical activity on ratio of forced expiratory volume in one second and forced vital capacity was 97.44 $\pm$ 16.26, Mean $\pm$ SD of moderate level of physical activity on forced expiratory volume in one second and forced vital capacity was 94.16 $\pm$ 21.98 while Mean $\pm$ SD of high level of physical activity on ratio of forced expiratory volume in one second and forced vital capacity was 95.84 $\pm$ 21.59 with p-value = .443

**Conclusion:** Majority of the student engage in moderate (41%) to high (37%) level of physical activity. Study showed differ significant effect of level of physical activity on pulmonary function.

## INTRODUCTION:

Physical activity is defined as any body movement carried out by the skeletal muscles to produce energy. (1) World health organization reported that 60% of world's population does not meet the recommended level of physical activity which is 30 minutes moderate intensity activity on daily basis. (2) Physical inactivity is fourth most important cause of death in world. Worldwide, lack of physical activity is common in women, elderly, non-whites and low socio-economic classes. (3) Now a day's physical inactivity is quite common among students due to busy academic schedule. Usually parents give more attention to their children academic success as compare to physical activity and fitness. (4) Physical inactivity is important factor which directly relate to morbidity and mortality from various diseases. (5) Different type of physical activity

during daily life helps to improve cardio respiratory fitness and reduce breathlessness.

(6) Skeletal muscles control important factors of aerobic conditioning including lung ventilation. Strength of respiratory muscles for prolong time can be improved through forceful inhalation and deflation of the lungs. (7) Cardio-pulmonary endurance itself is the pulmonary function. Lung function test in early age can predict airway obstruction in later 20 years. **(8)**

Lack of physical activity is one of the most important risk factor of respiratory problems. Body weight increases due to lack of physical activity which increases the risk of obesity and other associated problems with obesity. (9) Modernization and worldwide development has resulted in an improvement in people diet patterns. (10)

Several studies report a positive relationship between level of physical activities and pulmonary function in healthy adults. (11) Evidences show insufficient research on association between lung function and exercises. (12) Frequency and intensity of physical activity may also influence on respiratory parameters (13)

Spirometry is one of the best techniques to monitoring respiratory health. It is easy to apply and have high reproducibility. (14) Physical activity rehabilitation is widely used in patients with cardiovascular and respiratory diseases. Exploration of the relation between physical activity and cardiovascular and respiratory functions will aid in understanding the mechanisms of how physical activity improves patients' quality of life and in finding a better way to evaluate effects of rehabilitation (15) airflow limitation resulting from sedentary lifestyle is an independent predictor of future cardiovascular events in patients with various cardiovascular risk factors (16). To measure the volume and capacities of pulmonary function, pulmonary function test is an important tool

through which peak expiratory flow, forced expiratory volume and forced vital capacity were measured. (17) Diet, obesity, air pollution and physical activity level affects pulmonary function test. (10) Forced vital capacity and forced expiratory volume in one second help to indicate lung function. (18) Respiratory function decreases due to obesity and physical inactivity. (19) Forced vital capacity helps to predicts different compliance related to lungs and chest wall (20) and peak expiratory flow rate test is measured to evaluate the airways function and tell us how effectively individuals can breathe out. (21)

### **OBJECTIVE OF THE STUDY:**

Aim of the study is to identify the relationship between physical activity and pulmonary function among undergraduate students of University of Karachi.

### **MATERIAL AND METHODS:**

The study design was cross sectional. Total 378 samples were selected from different departments of University of Karachi. Physical activity was measured through International physical activity questionnaire (IPAQ) (22) while pulmonary function parameters were measured through Spirometer. The participants were given a letter of informed consent in which we describe the purpose of study and significance of the contribution made by the participant then questionnaire was distributed among the students to identify the level of physical activity. Body composition analyzed was done. Lastly pulmonary function test was performed. Data was analyzed by the use of software Statistical Packages of Social Sciences (SPSS) version 21 (23) and p-value

was calculated through one way ANOVA. Descriptive statistics were used to calculate frequency and percentage.

## RESULTS:

In present study 378 students were participated in which 156 were male and 222 were female. Figure 1 demonstrates that 22% students were engaged in low intensity physical activity, 41% students were engaged in moderate level while 37% students were engaged in high level physical activity.

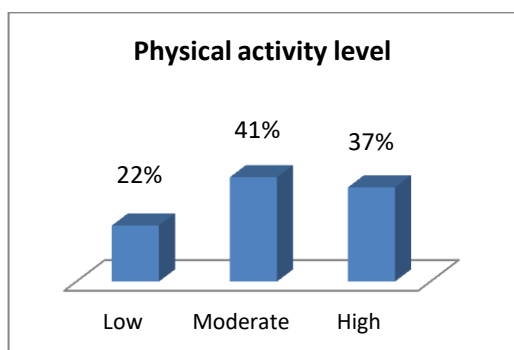


Figure 1 Level of physical activity

| Pulmonary Function Parameters            | Mean±SD     |
|--|-------------|
| Forced Vital Capacity                    | 64.23±16.39 |
| Forced Expiratory Volume (in one second) | 61.97±19.32 |
| Peak Expiratory Flow                     | 52.10±23.47 |
| FEV1/FVC ratio                           | 97.65±20.70 |

Table 1 Mean and Standard Deviation of pulmonary function parameters

Table 1 demonstrates that Mean $\pm$ SD of forced vital capacity was 64.23 $\pm$ 16.39, Mean $\pm$ SD of forced expiratory volume in one second was 61.97 $\pm$ 19.32, Mean $\pm$ SD of peak expiratory flow was 52.10 $\pm$ 23.47 while Mean $\pm$ SD of FEV1/FVC ratio was 97.65 $\pm$ 20.70.

| Physical Activity level | FVC* (Mean $\pm$ SD) | FEV1* (Mean $\pm$ SD) | PEF* (Mean $\pm$ SD) | FEV1 /FVC ratio (Mean $\pm$ SD) |
|-------------------------|----------------------|-----------------------|----------------------|---------------------------------|
| Low                     | 61.60 $\pm$ 16.62    | 59.08 $\pm$ 17.68     | 48.03 $\pm$ 20.25    | 97.44 $\pm$ 16.26               |
| Moderate                | 63.18 $\pm$ 16.25    | 57.63 $\pm$ 18.85     | 48.74 $\pm$ 23.41    | 94.16 $\pm$ 21.98               |
| High                    | 66.95 $\pm$ 16.14    | 62.68 $\pm$ 20.29     | 52.43 $\pm$ 25.02    | 95.84 $\pm$ 21.59               |
| P-value                 | .745                 | .537                  | .831                 | .443                            |

Table 2 Measurement of pulmonary function and values of physical activity level (P-value <0.05)

Abbreviation; FVC= Forced vital capacity, FEV1= Forced expiratory volume in one second, PEF, Peak expiratory flow

Table 2 demonstrate the relationship between physical activity and pulmonary function results revealed that Mean $\pm$ SD of impact of low level of physical activity on Forced vital capacity was 61.60 $\pm$ 16.62, Mean $\pm$ SD of moderate level of physical activity on Forced vital capacity was 63.18 $\pm$ 16.2 while mean and standard deviation of high level of physical activity on Forced vital capacity was 66.95 $\pm$ 16.14 with p-value = .745. Mean $\pm$ SD of impact of low level of physical activity on Forced expiratory volume in one second was 59.08 $\pm$ 17.68, Mean $\pm$ SD of moderate level of physical activity on Forced expiratory volume in one second was 57.63 $\pm$ 18.85 while mean and Mean $\pm$ SD of high level of physical activity on Forced expiratory volume in one second was 62.68 $\pm$ 20.29

with p-value = .537. Mean $\pm$ SD of low level of physical activity on Peak expiratory flow was 48.03 $\pm$ 20.25, Mean $\pm$ SD of moderate level of physical activity on Peak expiratory flow was 48.74 $\pm$ 23.41 while Mean $\pm$ SD of high level of physical activity on Peak expiratory flow was 52.43 $\pm$ 25.02 with p-value = .831, Mean $\pm$ SD of impact of low level of physical activity on ratio of forced expiratory volume in one second and forced vital capacity was 97.44 $\pm$ 16.26, Mean $\pm$ SD of moderate level of physical activity on forced expiratory volume in one second and forced vital capacity was 94.16 $\pm$ 21.98 while Mean $\pm$ SD of high level of physical activity on ratio of forced expiratory volume in one second and forced vital capacity was 95.84 $\pm$ 21.59 with p-value = .443

## DISCUSSION:

The study aimed to determine the relationship between physical activity and pulmonary function among students of University of Karachi. Present research identifies the relationship between self reported last seven days physical activity level and pulmonary function parameters.

Khashaba AS., in 2015 reported that more than half of the college students had low level of physical activity and results of pulmonary function test are differing according to their physical activity level. Furthermore predict predicted value of mean is least in FVC and FEV1 group with low level of physical activity and highest FEV1/FVC ratio is higher among students with high level of physical activity. (9) Results of present study is similar to above study, Mean value of FVC and PEF is least among those students who engage in low level of physical activity while mean value is FEV1 is least

among the students who engage in moderate level of activity and measurement of FEV1/FVC ratio is higher among students with high level of physical activity.

Menezes AMB. et al in 2012, reported that physical activity was not strongly associated with pulmonary function as compare to the group who engage in leisure time physical activity. (10) Nia BS., et al in 2012 reported that cardio-respiratory fitness can be achieved through change in physical activity habits but there is a minor association between respiratory function and change in exercising habits. (29) Ferreira MS. et al in 2014 reported no relationship between physical activity level and pulmonary function. Poor physical performance can be results from damaged pulmonary function (30) Silva PR., in 2016, reported that regular participation in physical activity and results of spirometric results showed that long term physical activity does not promotes significant changes on lung function. (14) Present study had similar results to above studies, there is no significant relationship among level of physical activity and pulmonary function.

Chaitra B., in 2012 discussed that aerobic exercises lead to improvement in pulmonary function among healthy subjects. (21) Bae JY. In 2015 reported that FEV1 and PEF was significant improve through physical activity while other parameters showed no significantly variation. (12) Paranjape SM., in 2012 concluded that peak expiratory flow rate increases after aerobic exercises depend on time duration of exercise because aerobic exercise enhances strength and endurance power of the respiratory muscles. (25) In present study mean values of FVC and FEV1 is no significant associated with total physical activity level and Mean of peak expiratory flow is higher among those participants who involves in high level of physical activity.



Fatima SS. et al in 2103 reported that pulmonary function was enhanced in the results of physical fitness. (7) Barboza ML. et al, in 2016 reported that there is no significant relationship in between physical inactivity and pulmonary function. (26) Irandoust K., in 2015 and Ji J in 2013 reported positive effect of physical activity and aerobic exercises on pulmonary function. (19, 27) Result of present study is totally different from all above studies.

### **CONCLUSION AND RECOMMENDATION:**

Study concluded that physical activity level is moderate to high among university of Karachi. Students want more opportunities so that they involved in physical activity. More research should be conducted to examine the short and long term effect of exercises with different intensity and frequency for proper examination of effect of exercise among pulmonary function.

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