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COMPARISON OF OXYGEN SATURATION, PULMONARY FUNCTION AND QUALITY OF LIFE BETWEEN HILL AND PLAIN AMONG COPD PATIENTS

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ABSTRACT

Background: Chronic obstructive pulmonary disease is a progressive disease characterized by airflow limitation or obstruction that is either not reversible at all or only partially reversible. The purpose of the present study was to compare oxygen saturation, pulmonary function and quality of life in the sample population from hill and plain area.

Methods: A survey study, total sample size was of 100 patients of COPD (age between 40-70years) in which 50 each from hill and plain area. To find out desired result Oxygen saturation with pulse oximeter, pulmonary function test with spirometer and HRQOL with the SF-36 questionnaire was assessed.

Result: Analysis using independent t- test to evaluate the significance of difference between means of two quantitative variables. The cut off level of significance was set at $\alpha = 0.05$. And it has been found that the influence of COPD in hill and plain on oxygen saturation and HRQOL was significant for physical component score (4.08). There was minor and not significant for pulmonary function (1.77).

Conclusion: From the results we concluded that COPD patients residing at hill has greater decline in SpO₂ but the HRQOL in COPD patients residing at hill was better than patients residing at plain. There was little or no difference in pulmonary function by FEV₁ among COPD patients of hill and plain.

Keywords: COPD, HRQOL, SpO₂, FEV₁, SF-36 questionnaire, Pulse oximeter, Spirometer.

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INTRODUCTION

Chronic bronchitis and emphysema which are the types of chronic obstructive pulmonary disease (COPD), is a progressive disease characterized by airflow limitation or obstruction that is either not reversible at all or only partially reversible. Airway obstruction in COPD is often leads to exertional breathlessness. It slowly progresses to marked disability and respiratory failure to limit the daily activities of an individual suffered from COPD therefore; it is an important cause of loss of work or much other daily activity. Prevalence of lung obstructive diseases is commonly seen in the hilly states possibly due to higher indoor air pollution [1]. Presenting complaint in COPD is cough, sputum production, dyspnea or breathlessness.

There are also some regional and geographical differences in occurrence of COPD [1,2]

In India there is a wide range in geographical and climatic conditions. Due to this wide range there are a number of environmental changes due to altitude, which includes falls in humidity, falls or rise in temperature; change in atmospheric pressure and partial pressure of oxygen [3]. Some studies shows altitude above sea level may be a significant factor that influences the prevalence of COPD [4]. COPD in India varying from about 2 to 22% in men and from 1.2 to 19% in women [5].

The oxygen saturation of arterial hemoglobin of people residing in hilly areas varies due to difference in ventilation and transfer of oxygen from air to the blood [6]. Chronic obstructive pulmonary diseased (COPD) Patients suffering from progressively develop arterial hypoxemia leading to pulmonary hypertension, cor pulmonale and death [7]. In lung obstructive diseases lung function test is also affected. Differences in pulmonary function may be due to factors like ethnic origin, physical activity, environmental conditions, altitude, tobacco smoking, age, height, sex, and socioeconomic status. Due to the wide range of geographical and climatic conditions in a large country such as India may be associated with regional differences in lung function [8]. To assess the severity of COPD on the basis of lung function test, GOLD give the 4 classifications Stage I ($FEV_1 \geq 80\%$), Stage II ($50\% \leq FEV_1 < 80\%$), Stage III ($30\% \leq FEV_1 < 50\%$) and Stage IV ($FEV_1 < 30\%$) [9].

In chronic obstructive pulmonary disease the health-related quality of life (QL) of patients with chronic disorders is frequently impaired which largely affects the day to day activities [10]. One-half of all chronic obstructive pulmonary disease (COPD) patients are affected from mental health conditions, such as depression and anxiety [11].

COPD is very common in both male and females now days. Environmental changes also exert an effect on the health of COPD patients. Thus the present study has been carried out to compare oxygen saturation, pulmonary function and quality of life among COPD patients of hill and plain.

METHODS

Nature of the present study is survey. In this study, population from hill area; Shimla (8500 feet from sea level) dis-

trict of Himachal Pradesh and plain area; Patiala (820 feet from sea level) district of Punjab, who had diagnosed with COPD, was included. Both populations have variations in geographical and climatic conditions.

The method of sampling was random sampling. 100 subjects diagnosed with COPD between ages 40-70 year were screened. We determined the total random sample of $n=100$ (hill, $n=50$; plain, $n=50$), considering the following Inclusion criteria:

1. Patients suffering from COPD.
2. Both males and females are included.
3. Patients within age group of 40-70 years.
4. Absence of other pulmonary conditions (Tuberculosis etc.)
5. Patients with stable parameters.

Exclusion criteria:

1. Age less than 40 years and more than 70 years.
2. Patients suffering with other pulmonary disorders.
3. Patients who were not co-operative for performing Lung function test.

Individuals were invited to participate voluntarily in this study after attaining their interest; a written consent was signed from every participant. The protocol and research methodology was approved by the department of physiotherapy Punjabi university Patiala, Punjab.

Testing procedure is non-invasive and harmless to the patients. An ISO (9001:2000) certified SPIROEXCEL spirometer of Medicaid Company was used to find out the Lung function values. FEV₁ accumulate all test data. SPIRO-EXCEL was used to calculate the above parameter.



Figure 1: Spirometer



Figure 2: Patient is performing Spirometry to test the lung function.

Oxygen saturation was assessed by the pulse Oximeter Fingertip Oximeter model PC-60B.



Figure 3: Pulse Oximeter

And physical and mental health was assessed by the SF-36v2[®] HEALTH SURVEY Questionnaire. The SF-36v2 (4-week recall) was developed to be brief, broad generic measure of domains or aspects of health status that are considered important in describing and monitoring individual's suffering from disease and impact on health status or difficulty facing in past 4 weeks. It includes eight domains to measure health status- physical functioning, role participation with physical health problems (role physical), bodily pain, general health, vitality, social functioning, role participation with mental health problems (role emotion) and mental health.

RESULT

Data was analysed with appropriate statistical tool using the SPSS version 20.0 (SPSS Inc., Chicago, IL, USA) for Windows 7 Professional. The independent t- test used to evaluate the significance of difference between means of two quantitative variables. The cut off level of significance was set at $\alpha = 0.05$.

A total of 100 patients of COPD (hill, n=50; plain, n=50) participated in the study, out of which 70% were males (70) and 30% were female (30). After performing PFT Maximum number of subjects lies in GOLD Stage II 23 (23%), followed by stage III 16 (16%), Stage I 6 (6%) and minimum number of subjects belonged to stage IV 5 (5%).

After calculating the measured values of SpO₂ it has been observed that mean Oxygen saturation was maximum in COPD patients of plain than patients of hill (Table 1). And there was little or no difference in mean value of FEV1 in patients of hill and plain (Table 2).

The data shows there are significant difference in Physical Component Score between the COPD patients of hill and plain at significant level ($p=0.05$) (Table 3).

Table 1: Comparison between mean values of Oxygen saturation among COPD patient of Hill and Plain.

Parameter	Mean	Standard Deviation	t value	P value
Oxygen saturation	Hills	91.64	2.80	0.006*
	Plains	94.88		

* $p < 0.05$ = significant

Table 1- Show Mean Oxygen saturation of subjects from Hill is 91.64 ± 6.42 . Mean Oxygen saturation of subjects from Plain is 94.88 ± 5.04 . An equal variances t test reveal a statistically difference $t(98) = 2.80$, $p = 0.006$; $\alpha = 0.05$ between the mean numbers of Oxygen Saturation among COPD patients of Hill and Plain. Data graphically shown in figure 4.

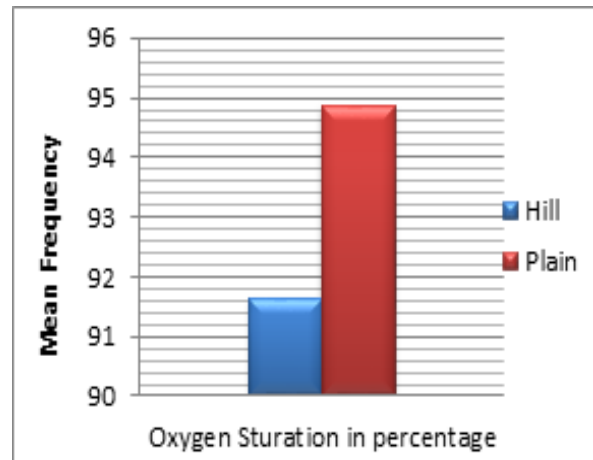


Figure 4: Mean Frequency value of Oxygen Saturation among COPD patient from Hill and Plain.

Table 2: Comparison between mean values of FEV1 among COPD patient of Hill and Plain

Parameter	Mean	Standard Deviation	t value	P value
FEV1	Hills	48.51	1.77	0.079
	Plains	42.29		

* $p < 0.05$ = significant

Table 2 -Show comparison of FEV1 values among COPD patients of Hill and Plain. Mean value of FEV1 among subjects of Hill is 48.51 ± 19.08 . Mean value of FEV1 among subjects of Plain is 42.29 ± 15.75 . An equal variances t test reveal statistically no difference $t(98) = 1.77$, $p = 0.079$; $\alpha = 0.05$ between the mean numbers of FEV1 among COPD patients of Hill and Plain. Data graphically shown in figure 5.

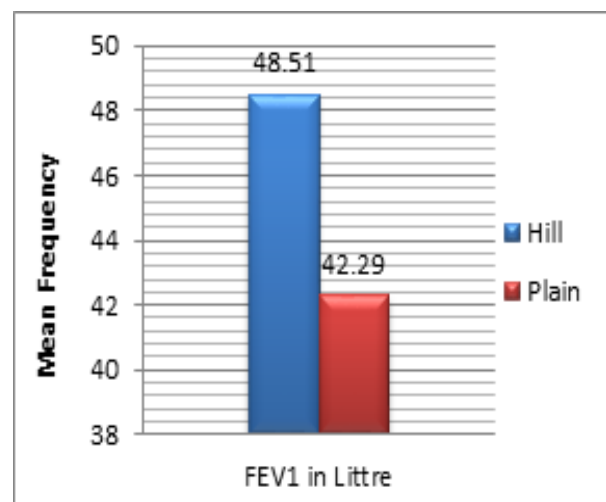


Figure 5: Mean Frequency value of FEV1 among COPD patient of Hill and Plain.

Table 3: Comparison of mean value of PCS and MCS among COPD patient of Hill and Plain

Variables (SF-36v2 Components scores)	Hill (Mean±SD)	Plain (Mean±SD)	t value	p value
PCS (Physical Component Score)	37.30±7.4	31.02±7.90	4.08	0.000*
MCS (Mental Component Score)	43.62±6.9	41.00±7.95	1.75	0.082

*p<0.05=significant

Table 3 shows mean and standard deviation values of physical component score (37.30±7.4, 31.02±7.90) and mental component score (43.62±6.9, 41.00±7.95) among COPD patients between Hill and Plain respectively. An equal variance t test reveal statistically difference $t(98) = 4.08$; $p = 0.000$; $\alpha = 0.05$ between the mean values of PCS among COPD patients of Hill and Plain. An equal variance t test reveal statistically no difference $t(98) = 1.75$; $p = 0.082$; $\alpha = 0.05$ between the mean values of MCS among COPD patients of Hill and Plain. Data graphically shown in figure 6.

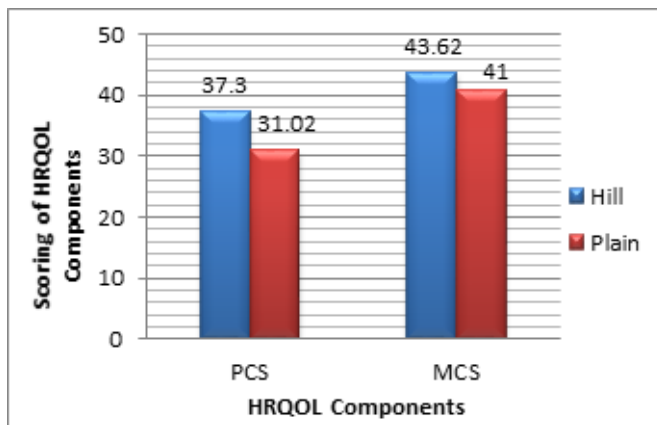


Figure 6: Mean frequency value of PCS and MCS among COPD patients between Hill and Plain.

DISCUSSION

Chronic obstructive pulmonary disease (COPD) is an important cause of morbidity and mortality throughout the world that is frequently under diagnosed and undertreated. The incidence of COPD has been increasing worldwide. The important precipitating factors include smoking habit, dust, occupational factors, cold air etc. There are different environmental conditions which can also affect pulmonary function, oxygen saturation and quality of life. Presently there are limited studies which show these differences. Therefore, the present study was done to find the comparison of oxygen saturation, pulmonary function and quality of life between hill and plain. Data collection of hill was from Shimla (8500 feet from sea level) and in plain was from Patiala (820 feet from sea level) among COPD patients. The oxygen saturation was assessed using fingertip pulse oximeter, pulmonary function was assessed using spirometer. Health related quality of life of COPD patients of hill and plain was assessed by using SF-36v2 Questionnaire.

In this study finding from the analysis found that significant decline in SpO₂ among COPD patients of Hill than patients of Plain. Moreno and Navarro in their study also reported that Oxygen saturation shows a significant decrease in the population residing in high altitude from Putre versus the population residing in low altitude from Azapa (79±4/93±2). Many other studies also states that the oxygen saturation (SpO₂) in high altitude populations is significantly lower ($p < 0.05$) than that observed in the population from sea level locations.

Gupta *et al.*, in their study reported an association between COPD stages measured by lung function test and oxygen saturation. They concluded an inverse association between the severity of the disease and SpO₂ and were observed oxygen saturation value decreased in a progressive value as the COPD stage increased [12]. Results of the current study suggested there was little or no difference in value of FEV₁ among COPD patients of hill and plain. After performing lung function test on COPD patients Moreno and Navarro in their study reported that FEV₁ and FEV₁/FVC showed no significant difference between high and low altitude population. Because morpho-anthropometric characteristics such as height, weight and BMI and physiological characteristics of population residing at sea level (Azapa) versus high altitude (Putre) shows no significant differences between populations [5].

In chronic obstructive disease the quality of life of the patients also affected. From the result of present study shows better quality of life among COPD patients of hill than the patients of plain. Zamzam *et al* also reported impaired Quality of life in patients with COPD and it deteriorates considerably with increasing severity of disease. Increasing severity of COPD is associated with a significant increase in SGRQ-C score [13]. Manen *et al* also reported that COPD patients can be impaired in all domains of HRQL, i.e. their physical, as well as social and emotional functioning can be affected [14].

LIMITATION OF THE STUDY

1. The sample size was relatively small.
2. Male and female ratio was not equal.
3. FVC & FEV₁/FVC ratio was not considered.

CONCLUSION

From the results it is concluded that there is significant difference in oxygen saturation and health related quality of life among COPD patients living in different environment but no or little difference in pulmonary function. Therefore, viewing the consequences of the decreased quality of life among the patients of plain. Physiotherapist and other practioners should formulate and incorporate suitable regimes to improve the quality of life among COPD patients of plain.

RECOMMENDATION FOR FUTURE RESEARCH

In future comparison of oxygen saturation, pulmonary function with BMI or socio-economic status will be helpful to find out the more effective data about COPD patients

between hill and plain. Our findings suggest that pulmonary function and health related quality of life is better in COPD patients of hill whereas oxygen saturation is low in patients of hill than patients of plain.

REFERENCES

- [1] Jindal, S.K. COPD: The Unrecognized Epidemic in India. *J Assoc Physicians India*. 2012;60: 14-16.
- [2] Romain, A., Pauwels, A., Buist, S., Peter, M. A., Jenkins, C.R. and Hurd, S.S. Global Strategy for the Diagnosis, Management, and Prevention of Chronic Obstructive Pulmonary Disease. *Am J Respir Crit Care Med*. 2006;163: 1256-1276.
- [3] Samuels, M.P. The effects of flight and altitude. *BMJ*.2003; 448-455.
- [4] Laborin, R.L., Rendón, A., Batiz, F., Schramm, J.M. and Bauerle, O. High Altitude and Chronic Obstructive Pulmonary Disease Prevalence: A Casual or Causal Correlation? *Arch Bronconeumol*. 2012;48(5):156-160.
- [5] Moreno, A. and Navarro, O.E. COPD in non-smoking elderly men at sea level and high altitude: Comparing anthropometric characteristics and physiological responses.2013; *Int. J. Morphol*. 31(2): 618-622.
- [6] Beall, C. Oxygen Saturation Increases during Childhood and Decreases during Adulthood Among High Altitude Native Tibetans Residing at 3800- 4200 m. *High altitude medicine & biology*. 2000;1(1):25-32.
- [7] Schenkel, N.S., Burdet, L., Murali, B.D. and Fitting, J.W. Oxygen saturation during daily activities in chronic obstructive pulmonary disease. *Eur Respir J*. 1996;9(12): 2584-2589.
- [8] Vijayan, V.K., Kuppurao, K.V., Venkatesan, P., Sankaran, K. and Prabhakar, P. Pulmonary function in healthy young adult Indians in Madras. *Thorax*. 1990;45(8):611-615.
- [9] Huijsmans, R.J., Haan, A.D., Ten, N.H. , Straver, R.V. and Hul, A.J. The clinical utility of the GOLD classification of COPD disease severity in pulmonary rehabilitation. *Respiratory Medicine*2008;102: 162-171.
- [10] Sprangersa, M.A., Regt, E.B., Andries, F., Agt, H.M., Bijl, R.V., Boer, J.B., Foets, M., Hoeymans, N., Jacobs, A.E., Kempeni, G.I., Miedema, H.S., Tjhuis, M.A. and Haes, H.C. Which chronic conditions are associated with better or poorer quality of life? *Journal of Clinical Epidemiology*. 2000;53(9): 895-907.
- [11] Cully J.A., Graham, D.P., Stanley, M.A., Ferguson, C.J., Sharafkhaneh, A., Soucek, J. and Kunik, M. Quality of Life in Patients with Chronic Obstructive Pulmonary Disease and Comorbid Anxiety or Depression. *Psychosomatics*. 2006; 47(4): 312-319.
- [12] Gupta, S.S., Gothi, D., Narula, G. and Sircar, J. Correlation of BMI and oxygen saturation in stable COPD in northern India. *Lung India*. 2014; 31(1): 29-34.
- [13] Zamzama, M.A., Azab, N.Y., Wahsh, R.A., Ragab, A.Z. and Allam, E.M. Quality of life in COPD patients. *Egyptian Journal of Chest Diseases and Tuberculosis*. 2012; 61(4): 281-289.
- [14] Manen, J.G., Bindels, P.J., Dekke, F.W., Bottema, B.J., Zee, J.S., Ijzermans, C.J. and Schade. E. The influence of COPD on health-related quality of life independent of the influence of comorbidity. *Journal of Clinical Epidemiology*. 2003; 56(12): 1177-1184.

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