



EFFECT OF ACTIVE COVID-19 DISEASES ON PEAK EXPIRATORY FLOW RATE

Dr. Apurva S. Shelke

MPT student, Department of Cardiovascular And Respiratory Physiotherapy Dr. Vithalrao Vikhe Patil Foundation's College Of Physiotherapy, Ahmednagar

Dr. Abhijit D. Diwate

MPT, Ph.D., Cardiovascular and Respiratory Physiotherapy, Professor And HOD, Department of Cardiovascular And Respiratory Physiotherapy, Dr. Vithalrao Vikhe Patil Foundation's College Of Physiotherapy, Ahmednagar

Dr. Arijit Kumar Das

MPT, Cardiovascular and Respiratory Physiotherapy Associate Professor, Department of Cardiovascular And Respiratory Physiotherapy, Dr. Vithalrao Vikhe Patil Foundation's College Of Physiotherapy, Ahmednagar.

ABSTRACT

Background and Objectives: The COVID-19 pandemic was first detected in China around the end of 2019. As the organ most significantly impacted by COVID -19 diseases, the lungs are bilaterally affected.

So aim of the study to observe COVID- 19 diseases on active COVID-19 patient's respiratory function at the time of admission with help of PEF. **Materials and Methods:** The study was conducted with 47 COVID-19 patients who met the inclusion criteria using a cross-sectional research design. After approval of ethical clearance informed consent from participants after explaining the purpose of the study. Data were collected after the confirmed diagnosis of RT-PCR positive report. Demographic data, and Baseline measures were recorded before starting the examination. The collected data were measured by open Epi software Instat version 3.06, 32-bit for windows statistical software. **Results-** The total of 47 patients included in this study we correlate these patients with age group and gender group we found a negative correlation statistically significant results and in gender, 27% reduction was observed in the female group as compared to the male group. **Conclusion-** The finding of the current study concluded that COVID-19 infection must be detected early on because it is extensively distributed around the world and have a significant impact on lung function. So PEFR value correlates with age and gender group we found highly significant due to decreased respiratory muscle strength and impaired diffusing capacity also depend on the biological immune response towards the diseases which poses the main finding of this study.

KEYWORDS : COVID-19 diseases, Respiratory function, PEFR, RMS

INTRODUCTION

At the end of 2019, the COVID-19 pandemic was first reported in China.¹ The lungs, as the most essential organ to be affected in COVID -19 diseases, are bilaterally involved, with symptoms including fever, shortness of breath, and death.^{2,3} COVID-19 confirmative analysis using rapid antigen and RT-PCR.³ There is concern regarding potential long-term pulmonary sequelae and associated reduction of functional capacity in covid-19 patients, therefore early recognition and evaluation of pulmonary function are essential. Once we determine if there is a restrictive or obstructive pattern, we may design a physiotherapy treatment plan around it. As a result, the therapist needs to evaluate active COVID-19 patients using a pulmonary function test and calculate their flow rates using PEFR. However, there is a lack of research done on PEFR in active COVID-19 patients. As a result, we aimed to observe active COVID-19 patient's respiratory function at the time of admission, and all the parameters in this study were screened on the same day. PEFR measurements were taken as soon as possible following the event. PEFR was taken as soon as the RT PCR positive result was confirmed and before any treatment was started for the patients, ensuring that these tests were not compromised by the effects of medications.

MATERIALS AND METHODS

The purposive sampling method was used to enroll 47 patients from a tertiary care hospital for this cross-sectional study. Inclusion criteria included having been diagnosed with COVID-19 by RTPCR positive, having between the ages of 21 and 60, and being able to correctly perform PEF using pulmonary function tests. Patients who did not receive any COVID-19 treatment were also included. Patients who have been diagnosed with a variety of respiratory illnesses and also have a musculoskeletal condition, neurological symptoms, or any medical or psychological disorders that

could interfere with PEF were excluded from the study. Demographic data, medical history, and baseline measures were recorded before starting the examination. All data were collected and statistically compared. After obtaining approval from the Institutional Ethical Committee, participants were informed about the study's proposed benefits, risks, and procedures in a language that they could understand. Before examining patients, all safety precautions should be done. The patient's Peak expiratory flow (PEF) was measured in the Laptop with a handheld portable spirometer with a USB cord (HELIOS 401 PC-based spirometer) and test quality was determined according to the ATS-ERS recommendations. PFT was used to determine the PEFR. The PEFR data was collected as a percent predicted using previously published reference equations. The data obtained were interpreted using the ATS-ERS guidelines. The difference in PEFR values was determined and analyzed with the help. Throughout the process, the therapist encouraged the patient by providing visual and verbal cues to ensure that they put up their best effort. The patient did three maneuvers, with the best of them being considered for further evaluation.^{4,5}

RESULTS

Overall, 47 patients enrolled in the study were aged (range 21-60 years) and the mean is (37.01 ± 10) and almost exclusively Men (25 patients 53.1%) than Female (22 patients 46.8%). The demographic of these selected patients is illustrated in Table 1. The Baseline Analysis for Outcome Measure was studied in Table 2. Correlation between PEFR parameters with age groups shown in Table -3. Comparison of predicted and performed value of PEFR with Genders shown in Table-4.

A statistical test was done using a Microsoft Excel sheet and open Epi software Instat version 3.06,32 bit for windows

statistical software. Descriptive data were presented as Mean ± SD for continuous variables for categorical ones. Wilcoxon –Signed rank tests were used within the group of predicted and performed of PEFR and Correlate with age and gender group we were used Spearman test.

Table 1-Demographic characteristics of participant

Variable	Value (n=47) Mean ± SD
Age (21-60 years)	37.01 ± 10
Gender	
Male	25 (53.1%)
Female	22 (46.8%)
Height (in cm)	162 ± 7
Weight (in kg)	68.52 ± 12.88

Interpretation:

This table shows baseline demographic characteristics of participant data represented in MEAN ± SD or number (percentage) of participants Age, Gender, Heights, Weights.

Table-2- Baseline Analysis for Outcome Measure

Outcome		Mean ± SD	p value	Results
PEFR (liters/min)	Predicted	7.39 ± 1.26	<0.0001	ES
	Performed	5.16 ± 1.79		

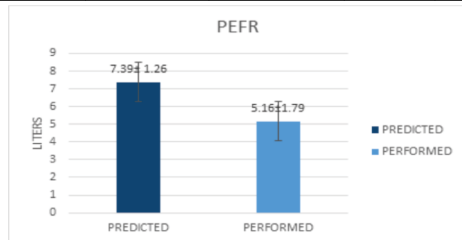


Fig 1- Comparison of Predicted and Performed value of PEFR

Interpretation:

In this table data hasn't passed normality test so we used Wilcoxon –Signed rank test for analysis and indicate that baseline parameters showing statistically Extremely significant (ES).

Table-3- Correlation between PEFR parameters with age and gender groups

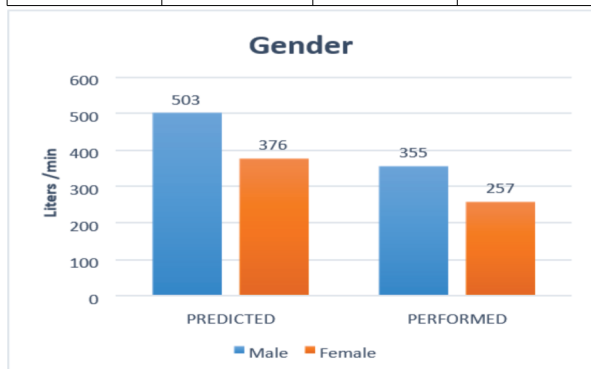
	Mean ± SD	N	Correlation r	P value	results
PEFR	5.16 ± 1.79	47			
Age	37.01 ± 10	47	-0.3907	0.0066	S

Interpretation:

This graph indicate comparing predicted and performed value with age group and it shows that statistically significant result.

Table-4 -Comparison of predicted and performed value of PEFR with Gender

	PREDICTED	PERFORMED	REDUCTION
MALE	503	376	25%
FEMALE	355	257	27%



Interpretation:

This graph indicate comparing predicted and performed value with gender group and it shows that female group having 27% reduction as compare male group.

DISCUSSION

The respiratory diseases community has made significant efforts to undertake a physiological assessment in patients following COVID-19 infection to describe and understand the impact of this disease on functional outcomes and its effect on the quality of life. COVID-19 is more common in people aged 21 to 60. The symptoms are mostly associated with pulmonary function therefore early recognition and evaluation are essential. Once we determine patterns we may design a physiotherapy treatment protocol. As a result, the therapist needs to evaluate active COVID-19 patients using a pulmonary function test and calculate their flow rates using PEFR at the time of admission. PEFR was compared for performed with predicted values with age, and gender for each patient.

In our study of 47 patients mean age group was 37.01 ± 10 and Male to Female is (25/22), Height (162±7), and Weight (68.52±12.88). In this study when we compared performed value with the predicted value we found that extremely statistically significant results (Table- 2 and Fig-1). This PEFR primarily shows the larger airway flow but it is dependent on the voluntary effort and expiratory muscle strength of patients. According to ATS/ERS, maximum expiratory flow at high lung volume is generally decreased in both intrathoracic and extrathoracic lesions so during diagnosis of airway obstruction along with endoscopic or radiological findings hence in COVID-19 where there is an intrathoracic lesion. PEFR should be taken into consideration to estimate the severity of the condition due to internal and abdominal muscle weakening the expiratory muscle's ability to contract efficiently is reduced which further decreases lung compliance and reduce lung function. Regarding the intimate relationship between risk of death in COVID-19 patients and pulmonary involvement when we correlated the PEFR value with the age group in our study, we found that the PEFR value is reduce in older patients with (r=-0.3907) with statistically significant results.

In china study conducted by lei li et. al, (2021) concluded that PEFR reduction in this age group at the time of 1st day of physical therapy in ICU setup in COVID-19 patients because of poor airway clearance ability⁷ as a result of PEFR, MIP and functional mobility remained poor in some patients at discharge suggesting that long term pulmonary and functional rehabilitation is required.

The secondary objective of the study was to compare the variable of PEFR value with the gender group, and our findings suggest that PEFR reduction was seen in mostly female group as compared to the male group

This aimed to investigate gender disparities in mortality from COVID-19 in the global cohort. The characteristics used to compare the male and female population is not equal so additional research is needed. When compared to other physiological tests, the use of PEFR as a health status measure for elderly people has various advantages. PEFR also explains the measurement of the maximum expiratory effort of that patient, which is a much more difficult undertaking for much older or debilitated individuals.⁸

CONCLUSION

In conclusion, COVID-19 infection must be detected early on because it is extensively distributed around the world and have a significant impact on lung function. PEFR value correlates with age and gender group we found highly

significant due to decreased respiratory muscle strength and impaired diffusing capacity also depend on the biological immune response towards the diseases which poses the main finding of this study. So our study showed the evidence that diagnosis made at an early stage can help the therapist make a treatment plan and assist patients in overcoming COVID-19 adverse effect.

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