



COMPARISON OF 2 CHAIR TEST WITH 6 MINUTE WALK TEST TO ASSESS POST EXERCISE RECOVERY IN PATIENTS WITH CHRONIC LUNG DISEASE

Dr. Rohith Meesa SRMMCH RC.

Dr. N. Nalini Jayanthi SRMMCH RC.

Dr. Sneha B SRMMCH RC.

Dr. Nagarjun.S SRMMCH RC.

Dr. Rahul Mittal SRMMCH RC.

Dr. Anitha E SRMMCH RC.

ABSTRACT

Introduction: Six minute walk test (6MWT) is cardiopulmonary exercise which is done for assessing severity of chronic respiratory diseases. The 6 Minute Walking Distance (6MWD) reflects the global physiological response to exercise. But this test has certain limitations as it requires space and more time to perform. In contrast to the 6minute walk test

(6MWT), that needs a 100foot corridor to be performed, 2 CHAIR TEST is a quick and effective exercise test that can be done in a small area.

Summary: Total 80 participants were included in study, out of which COPD were 48, asthma 22, Post TB fibrosis 6, bronchiectasis 2, ILD 2. Among the participants males were more affected than females with the values of 62.5% and 37.5% respectively. The mean age among the participants was 61.68 ± 7.01 years. The comparison between the mean pulse rate of the 6MWT before and end of the test was done. The mean pulse rate before the 6MWT was 94.73 ± 5.49 beats per minute and at the end it was 107.40 ± 7.56. The comparison between the mean SpO₂ before and end of the 6MWT was 96.20 ± 0.87% and 93.88 ± 0.96% respectively. These results were statistically significant. The lap score for the 6MWT was obtained which showed 375.50 ± 49.93 meters as mean. Same tests were done for the 2CT and the results were significant. When these tests were compared with the tests of the 6MWT, there was a strong positive correlation between pulse rate and Spo₂ at the end of 6MWT and 2 Chair TEST (2CT) respectively.

KEY WORDS : 6MWT, 2CT, COPD, asthma, bronchiectasis, Post TB fibrosis and ILD

INTRODUCTION

Patients with chronic respiratory diseases frequently show decreased exercise tolerance and peripheral muscular weakness, which lower their quality of life. To increase their level of physical activity, capacity for exercise, and muscle strength, these patients are advised to take part in pulmonary rehabilitation. It is necessary to evaluate individualized pulmonary rehabilitation program's (PRPs). One of the outdoor exercises indicated to gauge capacity of exercise is 6 minute walk test (6MWT). This has a substantial correlation with the risk of hospitalization and mortality. This test is valid and mainly shows response to the treatment and also helps in Pulmonary Rehabilitation. The peripheral muscle weakness in COPD patients is directly related to severity of disease which can also be assessed by 6MWT¹.

COPD patients are significantly less active in daily life than healthy older subjects. The strongest predictor of daily walking and standing time in COPD patients is the 6 Minute Walking Distance (6MWD). Patients whose 6MWD is substantially compromised are likely to engage in very little physical exercise on a daily basis². However, 6MWT needs a 30-meters distance corridor and time consuming, hence 6MWT is not implemented regularly at various clinical centers Thus, it is crucial to identify submaximal exercise response^{3,4}.

But this test has certain limitations as it requires space and all the monitors to help the patient if they get any cardiac/respiratory attack during the test. Thus, just to overcome this problem there is test known as two chair test (2CT) which requires less effort than the 6MWT and also less space in comparison with that of the 6MWT as it requires 100 feet corridor. Hence the present study aims to evaluate the efficacy and the efficiency of the 6MWT in comparison to that of the 2 Chair Test (2CT).⁷

METHODOLOGY

*Corresponding Author

Study Design:

The study is a prospective observational study.

Study Period:

18 months

Inclusion Criteria

- Patients of age group >18 years.
- Patients diagnosed with Asthma GINA 2020 guidelines
- Patients diagnosed with COPD in line with GOLD 2020 guidelines.
- Patients diagnosed with Interstitial lung disease based on clinical and radiological pictures
- Patients with Post tb fibrosis.
- Patients diagnosed with Bronchiectasis based on HRCT

Exclusion Criteria:

- Age <18 years
- Patients with baseline hypoxemia at rest Spo₂<90%
- Patients with Pneumothorax and Pleural effusion
- Patients with Acute exacerbation of COPD and Asthma
- Patients with active infective aetiologies like TB
- Patients with Acute MI (<4weeks)
- Patients with Left ventricular dysfunction
- Patients with gross musculoskeletal problems like Osteoarthritis of Knee
- Patients with neurological problems affecting normal movement like Vertigo
- Patients on pacemaker.
- Patients with other systemic problems that can affect exercise adversely
- Patient not willing to give consent
- Pregnancy

SAMPLE SIZE

$$N=4pq/L^2$$

$$p=58 \quad q=42 \quad L=11$$

$$= \frac{(4)(58)(42)}{(11)^2}$$

$$N=80 \quad \text{SAMPLE SIZE: } 80$$

Study Procedure

All patients included in the study were investigated as followed

1. Detailed clinical history
2. Physical examination
3. Level of dyspnea (modified Medical Research Council Scale)
4. Cardiac evaluation - ECG and 2D ECHO
5. Spirometry for Lung assessment
6. 2 CHAIRTEST
7. 6 MINUTE WALK TEST

NOTE: 2 chair test and 6minute walk test were done at 24 hours interval apart.

Ethical Considerations:

Institutional Ethical Committee approval was obtained before the start of the study. Informed written consent was obtained from every participant.

Source Of Funding: Nil

Conflict of Interest: Nil

Statistical Analysis:

The data collected were entered into Microsoft excel 360 in order to create a master chart. The master chart was then loaded into statistical package for social sciences (SPSS) version 26 for further statistical analysis. Both quantitative and qualitative variables were present in the master chart. Both descriptive and inferential statistics were used for analysis.

RESULTS

In our study, 80 patients who were diagnosed with COPD, Bronchial Asthma, Bronchiectasis, Post tb fibrosis and ILD were included. Patient's data was recorded as per methodology mentioned above.

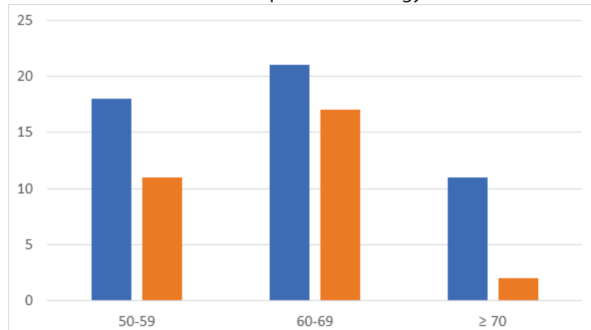


Figure 1: bar Chart Showing Age And Sex Wise Distribution Among The Participants.

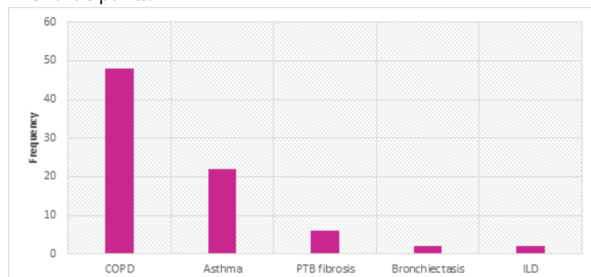


Figure 2: Bar Chart Showing Distribution According To Diagnosis.

Figure 1 shows that among the participants, 47.5% belonged to age group 60 to 69 years followed by 36.3% in the age group 50 to 59 years. The mean age among the participants was 61.68 ± 7.01 years. 37.5% participants were females and 62.5% were males.

Out of a total of 80 study participants with chronic lung diseases, 48 patients had COPD and 22 had asthma, 6 had post TB Fibrosis, 2 had Bronchiectasis and 2 patients had ILD.

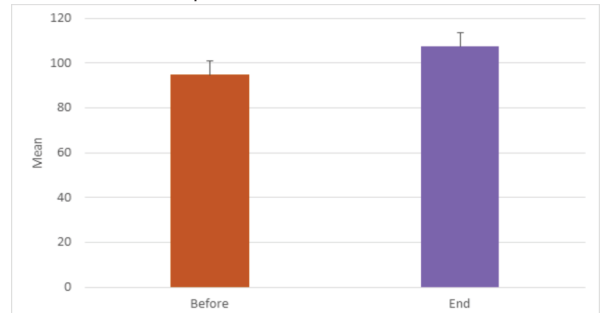


Figure 3: Comparison Of Mean Pulse Rate Before And At The End Of 6MWT.

figure 3showed that the mean pulse rate before the 6MWT was 94.73 ± 5.49 beats per minute and at the end it was 107.40 ± 7.56 . The increase was statistically significant with P value of less than 0.05.

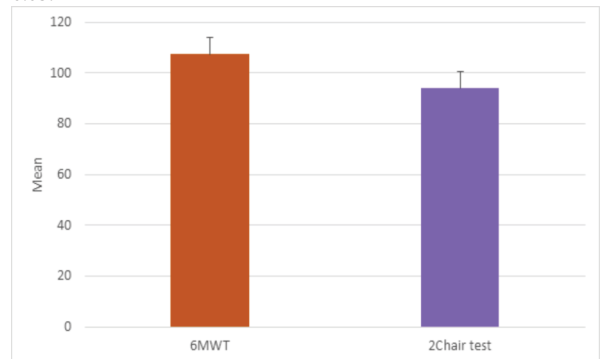


Figure 4: Bar Chart Showing Difference In Mean Pulse Rate Between 6MWT And 2CT.

The mean pulse rate of 6MWT was significantly more than the 10s mean pulse rate of two chair tests with P value of less than 0.05.

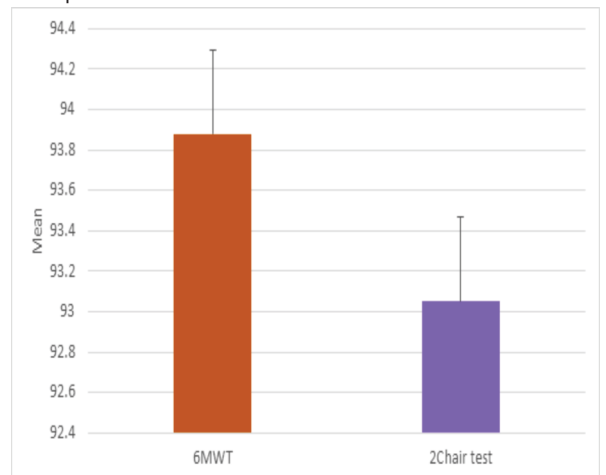
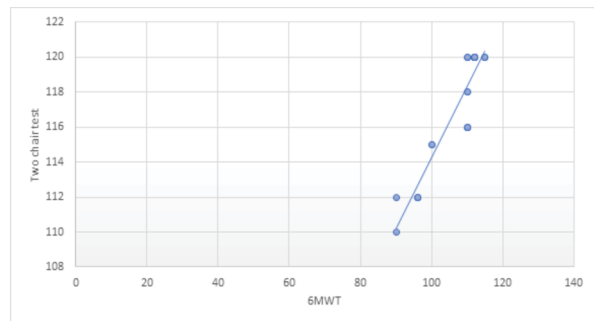


Figure 5: Comparison Of Mean SpO2 Between 6MWT And 2CT.

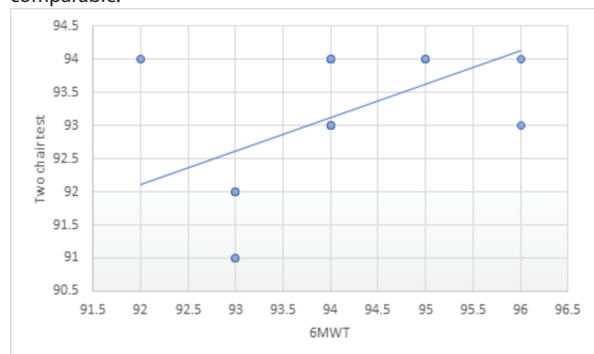
The mean SpO2at the end of 6MWT was $93.88 \pm 0.96\%$ and at 10s of two chair test was $93.05 \pm 1.03\%$. The mean SpO2 was significantly lesser in the two-chair test than the 6MWT.



r value = -0.922 P value < 0.05.

Figure 6: Correlation Between Pulse Rate Recorded At End Of 6MWT And 2CT.

There was a strong positive correlation between pulse rate at the end 6MWT and 2 CT. The above indicate both the test values are comparable.



r value = -0.54 P value = 0.01

Fig 7: Correlation Between SpO2 Recorded At End Of 6MWT And 2CT.

SpO2 recorded at the end of 6MWT and 2CT was found to have a strong positive correlation with P value of less than 0.05 and r value of 0.54.

CONCLUSION

The present study showed that 2 chair test is more comfortable, less exerting to the patients in comparison with the 6MWT in the chronic respiratory disease patients. There are many limitations in the 6MWT but the 2 chair test has shown good results and can be conducted easily. Continuous monitoring is required in 6MWT but 2 chair test does not require much effort and monitoring. The 2CT can be performed even in moderate to severely restricted patients as it does not exert the patients much. The present study supports that 2CT can be adopted as a supportive lung exercise testing. However, further studies are required to assess reproducibility of the test on a large scale population.

REFERENCES

- Bernard S, LeBlanc P, Whittom F, Carrier G, Jobin J, Belleau R, et al. Peripheral muscle weakness in patients with chronic obstructive pulmonary disease. *Am J Respir Crit Care Med.* 1998;158(2):629-34. doi: 10.1164/ajrccm.158.2.9711023, PMID 9700144.
- Pitta F, Troosters T, Spruit MA, Probst VS, Decramer M, Gosselink R. Characteristics of physical activities in daily life in chronic obstructive pulmonary disease. *Am J Respir Crit Care Med.* 2005;171(9):972-7. doi: 10.1164/rccm.200407-855OC, PMID 15665324.
- Man WDC, Hopkinson NS, Harraf F, Nikolettou D, Polkey MI, Moxham J. Abdominal muscle and quadriceps strength in chronic obstructive pulmonary disease. *Thorax.* 2005;60(9):718-22. doi: 10.1136/thx.2005.040709, PMID 15923239.
- Peripheral muscle weakness contributes to exercise limitation in COPD. *Am J Respir Crit Care Med.* 1996;153(3):976-80. doi: 10.1164/ajrccm.153.3.8630582, PMID 8630582.
- Gloeckl R, Teschler S, Jarosch I, Christle JW, Hitzl W, Kenn K. Comparison of two- and six-minute walk tests in detecting oxygen desaturation in patients with severe chronic obstructive pulmonary disease--a randomized crossover trial. *Chron Respir Dis.* 2016;13(3):256-63. doi: 10.1177/1479972316636991, PMID 26961775.
- Dal Corso S, Duarte SR, Neder JA, Malaguti C, de Fuccio MB, de Castro Pereira CA, et al. A step test to assess exercise-related oxygen desaturation in interstitial lung disease. *Eur Respir J.* 2007;29(2):330-6. doi: 10.1183/09031936.00094006, PMID 17050559.

- Bhattacharyya P, Saha D, Paul M, Ganguly D, Mukherjee B, Roy Chowdhury S et al. Two chair test: a substitute of 6 min walk test appear cardiopulmonary reserve specific. *BMJ Open Respir Res.* 2020 Sep 1;7(1):e000447. doi: 10.1136/bmjresp-2019-000447, PMID 32963026.