

Significance of six minute walk test (6MWT) in COPD patients

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Abstract

Background: The aim of present study was to evaluate the effect of 6 minute walk test in patients suffering with COPD. The study was conducted in 120 male and female subjects between 40- 80 years of age (30 subjects were taken as control and 90 subjects were patients suffering from COPD). Then COPD subjects were further subdivided on basis of Gold classification (3). Subjects taking current chronic treatment with steroids or history of cystic fibrosis or any respiratory tract infection were excluded from study.

Material and method: A structured proforma was given to subject to elicit lifestyle and systemic diseases. Then assessment of anthropometric parameters, cardiovascular parameters and exercise capacity by 6 minute walk test was done as per ATS guidelines 2002 (1). VO_2 max was calculated and was compared with normal values (2). Dyspnea and fatigue levels were assessed using Borg dyspneic scale.

Result: Study confirms the reliability of 6 minute walk test in clinical follow up and rehabilitation in patients of COPD and with reduced physical activity and thus it is proved that this test helps to reduce dyspnea and improves survival.

Conclusion: From this study it is concluded that there is decrease in oxygen uptake in COPD patients and person is not able to cover total walk path. But continuous follow up of this 6MWT help to revert the physical activity in patients with mild to moderate COPD as per Gold classification (3).

Keywords: Six minute walk test (6MWT), chronic obstructive pulmonary disease (COPD), Borg dyspneic scale

I. Introduction

Chronic obstructive pulmonary disease (COPD) is syndrome used to describe slow progressive airway obstruction mainly associated with increased frequency of smoking which is not reversible (4). Patients with COPD have varying degree of three pathological processes each related with smoking, mainly chronic bronchitis, small airways obstruction and emphysema. In each study COPD increases with age and the data available indicate the morbidity due to increase with age (5) Surveys in several parts of world had documented that the prevalence of COPD among nonsmokers is 3 to 11 % (6). Physical activity is an important clinical parameter related to mortality and morbidity in many chronic diseases. Along with chronic obstruction of lung airflow COPD has detrimental extra pulmonary effect such as weight loss and skeletal muscle dysfunction. The relationship between physical activity and COPD was studied (7) and general practitioners were advised to improve patient's physical condition by expanding pulmonary rehabilitation programme. Relationship between physical activity, disease severity wealth state and prognosis in patients with COPD was also studied (8). The six minute walk test is widely employed to assess changes in functional exercise capacity in patients following pulmonary rehabilitation. It was observed that 6 minute walk test need to differ to signify noticeable difference in walking ability for patients. This smallest difference in walking distance noticeable in patients may help the clinician to interpret the effect of symptomatic treatment for COPD (9). This 6 minute walk test is a potentially useful biomarker of disease severity (10). The COPD stage at which physical activity is restricted was also studied (11). A population base study found that all levels of regular physical activity was associated with an adjust to reduce risk of all causes of mortality and respiratory mortality.

II. Material And Method

The present study was conducted in Department of Physiology NIMS Medical College Jaipur. The subjects were taken from NIMS hospital and NIMS medical college. Sample size consisted of 120 male and females subjects of whom 30 were taken as control group and remaining 90 were subjects suffering from COPD. These were further subdivided following Gold classification. Subjects on steroid, asthmatic or having cystic fibrosis or upper and lower respiratory tract infection were excluded from study and detailed history and physical examination was carried out for every subject. An approval was taken from ethical committee of NIMS medical college and hospital and consent was taken from all subjects. The parameters analyzed was 1. anthropometric parameters like height, weight, BMI (calculated using Quetelets formula $\text{weight}/\text{height}^2$ (Kg/m^2), waist and hip circumference was also observed. 2. Cardiovascular parameters like blood pressure, pulse rate, and respiratory rate was also observed. 3. Six minute walk test (6MWT) as per ATS guidelines 2002 was performed in both control and COPD subjects. 4. Post test parameters like dyspnoea and fatigue (Borg

scale), distance covered (6MWT), walk work and VO_2 max was calculated and compared with normal values (2). The data and results were compiled and subjected to statistically analysis.

Observation tables:

Table 1: Comparative anthropometric parameters among control group I, COPD group II, III and IV.

S. no	Parameter	Group I (Control)	Group II (Mild)	Group III (Moderate)	Group IV (Severe)	p-Value
1	Age (year)	54.67±10.95	54.63±3.33	64.73±3.30	73.6±3.30	<0.0001
2	Weight (kg)	66.97±5.58	67.53±7.49	67.23±3.35	67.03±3.35	0.976
3	Height(Cm.)	165.2±11.001	154.9±9.23	155.9±8.83	153.03±5.51	<0.0001
4	BMI (kg/m ²)	24.90±4.25	28.52±3.34	27.84±2.12	28.69±2.12	0.001
5	WHR	0.8990±0.083	0.84±0.07	0.874±0.088	0.86±0.088	0.132

All values are mean±SD

Table 2: Comparative Cardiovascular parameters among control group I, COPD group I, II and IV

S. no	Parameter	Group I (Control)	Group II (Mild)	Group III (Moderate)	Group IV (Severe)	P Value
1	PR (Beat/min.)	74.2 ± 5.76	112.63 ± 7.52	118 ± 8.29	127.86 ± 5.3	<0.0001
2	Baseline SBP (mmHg)	129.31 ± 3.37	136.2 ± 2.36	137.9 ± 4.01	143.06 ± 1.78	<0.0001
3	Baseline DBP (mmHg)	84 ± 2.63	87 ± 2.4	89.26 ± 2.55	92.13 ± 1.98	<0.0001

All values are mean±SD

Table 3: Comparative Exercise Capacity parameters among control group I, COPD group II, II and IV

S. no	Parameter	Group I (Control)	Group II (Mild)	Group III (Moderate)	Group IV (Severe)	P Value
1	Mean 6MWT distance (m)	518.36 ± 53.94	387.53 ± 72.99	319.06 ± 42.12	218.96 ± 32.85	<0.0001
2	Work Done (Kcal/min.)	5780.2 ± 723.65	4326.06 ± 785.31	3549.25 ± 442.45	2452.46 ± 411.72	<0.0001
3	Mean Peak VO ₂ (ml/kg/min.)	39.74 ± 4.13	29.71 ± 5.59	24.46 ± 3.23	16.78 ± 2.52	<0.0001

All values are mean±SD

Table 4: Comparative dyspneic scale values among control group I, COPD II, III and IV

S. no	Parameter	Group I (Control)	Group II (Mild)	Group III (Moderate)	Group IV (Severe)	P Value
1	Dyspnoea score	2.7 ± 0.73	4.46 ± 1.05	5.33 ± 1.27	8.13 ± 0.81	<0.0001

All values are mean±SD

III. Result And Conclusion

Table 1 shows comparison of anthropometric parameters between control group I and patients suffering with COPD divided into group II, III, IV according to Gold classification (n=120). The mean ±SD in group I for age (years) was observed to be 54.67 ±10.95 and 54.63±3.33, 64.73±3.30 and 73.6±3.30 in group II, III and IV respectively which is statistically significant (p<0.0001). Similarly the mean ±SD in group I for weight (Kg) was observed to be 66.97±5.58 and 67.53±7.49, 67.23±3.35, 67.03±3.35 for group II, III and IV respectively which is statistically non significant. Thus for height the mean ±SD for group I, II, III,IV was 165.2±11.001, 154.9±9.23, 155.9±8.83, 153.03±5.51 respectively which are statically significant. BMI (Kg/m²) values observed in group I, II, III, and IV were 24.90±4.25, 28.52±3.34, 27.84±2.12, 28.69±1.2 which are statistically significant. Similarly for waist hip ratio (WHR) the values observed in group I, II, III, IV were 0.89±0.083, 0.84±0.07, 0.87±0.088 and 0.86±0.088 which are statistically non significant.

Table 2 shows comparative cardiovascular parameters among (n=120). For group I mean pulse rate was 74.2±5.76 beats/minute and 112.63±7.5, 118±8.29, 127.86±5.3 for group II, III, and IV indicating significant values (p<0.0001). Similarly baseline systolic blood pressure (mmHg) observed in group I,II, III, IV was 129.3±3.37, 136.2±2.36, 137.9±4.01 and 143.06±1.78 which is also significant (p<0.0001). The baseline diastolic blood pressure (mmHg) was 84±2.63, 87±2.4, 89.26±2.55, 92.13±1.93 which is also significant (p<0.0001) statistically.

Table 3 shows comparative exercise capacity parameters (n=120). For group I mean 6MWT distance (m) was 518.36±53.94, and 387.53±72.99, 319.06±42.12 and 218.99±32.85 in group II, III, IV respectively which is significant (p<0.0001). Work done (Kcal/minute) observed in group I, II, III, IV WAS 5780.2±723.65, 4326.06±785.31, 3549.25±442.45 and 2452.46±411.72 which is also significant. The mean peak Vo₂ max

(ml/Kg/minute) observed in group I, II, III, IV was 39.74 ± 4.13 , 29.71 ± 5.59 , 24.46 ± 3.23 , 16.78 ± 2.52 showing a significant value with $p < 0.0001$. Table 4 shows the Borg dyspneic scale values observed among group I and COPD group II, III, IV show significant p value ($p < 0.0001$) with 2.7 ± 0.73 , 4.46 ± 1.05 , 5.33 ± 1.27 , 8.13 ± 0.81 values respectively. From present study it can be concluded that six minute walk distance and oxygen uptake in COPD patients decreases with severity of disease also after post walk the intensity of breathing decrease and dyspnea levels increase and subject is no longer able to cover total walk path but when applied to daily routine this six minute walk test is rewarding for life.

IV. Discussion

There has been great interest in evaluating the role of exercise testing in patients with COPD. Role of respiratory muscle function and cardiopulmonary response to exercise in COPD has been proved (13). VO_2 max proved to be a better predictor of mortality than FEV_1 (14) but it is expensive, as such 6 MWT has been standardized and has gained acceptance (15). VO_2 max and BMI value using six minute walk test examined and was found as good predictor of death rate as compared to spirometry measurement (16). It was proved that there is decrease in walk distance and increase in energy expenditure as disease progresses (17). Six minute walk distance is associated with increase in subjective sign with dyspnea (18) this supports our study where with the progress of disease oxygen saturation declines due to air flow limitation and Borg dyspnea scale scores high. Study showed VO_2 max after aerobic exercise training was better and statistically significant with p value < 0.0001 as compared before undergoing aerobic exercise training which supports our observation (19).

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