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Research Article

Physiotherapy for Better Pain Management

Comparison of Flutter and Autogenic Drainage on Airway Clearance In Patients with Moderate Chronic Bronchitis.

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Abstract: Patients with COPD have large amount of secretions. Many conventional and advanced techniques are used to clear the respiratory secretions. Flutter device is a hand held device which works on principle of positive expiratory pressure to improve patient's ability to eliminate excessive secretions. Autogenic drainage is a self-drainage technique used for controlled breathing and moving excessive secretions. There is paucity of literature about this newer techniques used for chest clearance in moderate chronic bronchitis, so the present study is conducted with aim to find the effect of autogenic drainage and flutter device for airway clearance in individuals with moderate chronic bronchitis. A Comparative study was conducted on 30 subjects selected as per inclusion and exclusion criteria and divided into 2 groups by convenient sampling method. Group A was treated with flutter device and Group B by autogenic drainage technique. The treatment duration was 30 minutes per session, 2 sessions per day, 5 days/week for 1 week. The outcome measures used was oxygen saturation, peak expiratory flow rate and rate of perceived exertion on Borg scale. At the end of 1 week, both groups showed improvement in pre post values within group but between group comparison we found statistically significant improvement in group A (Flutter device) than Group B (autogenic drainage). The SpO2 value showed appreciable significant improvement in group A than group B ($p=0.0066$). The rate of perceived exertion showed extremely significant improvement in group A than group B ($p<0.0001$). The peak expiratory flow rate showed statistically significant improvement in group A than group B ($p=0.0004$).The study concluded that though both the techniques is better for airway clearance in chronic bronchitis but flutter device is more effective than autogenic drainage.

Keywords: Flutter device, autogenic drainage, chronic bronchitis, airway clearance, oxygen saturation, borg scale.

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1. INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is the most common heterogeneous collection of respiratory condition which is characterized by irreversible airflow obstruction affecting 10-15% of adults at an age of 45 years.[1-3] COPD, the fourth leading cause of death in world and encompasses spectrum of disease which has 2 terminal ends with chronic bronchitis at one end and emphysema at other end.[4,5] COPD more commonly affects more females than males. The male- female ratio is 1:6.[6] Chronic bronchitis is characterized by chronic cough and sputum production for at least 3 months per year for 2 consecutive years and also this condition has many consequences which includes increased exacerbation rate, accelerated decline in lung function, worsens health related quality of life and increased moratlity.[5,7-9] - Among the affected COPD cases, the prevalence rate of chronic bronchitis is 14% - 74%. [9] Since looking forward for the prevalence and functional status of individuals with chronic bronchitis chest, physiotherapy is one of the effective options in clearing the secretions from the lungs of affected individuals. One of the techniques which can be used for treating the chronic bronchitis patients includes flutter device.[9,17] The flutter is a respiratory device used for removal of secretions. It is a simple plastic device like a pipe which has two ends. One end has a mouthpiece and the other end has perforated cover with stainless steel ball resting in plastic cone inside. When expiration is carried out through flutter device the blown air causes steel ball up and down movement which creates oscillatory positive expiratory pressure. [10-12] Looking forward with advanced techniques for clearing the airway secretions, autogenic drainage can also be used for maintaining the bronchial hygiene in patients with COPD. Autogenic drainage is an anti dsypneoa technique introduced by Chevailler in Belgium in year 1967.[13] It is based on quiet expirations in relaxed state without using the postural drainage positions. This technique uses diaphragmatic breathing which helps in mobilizing the secretions by varying the expiratory airflow. It has 3 phases, the unsticking phase, the collecting phase and the evacuating phase. The treatment duration of autogenic drainage depends on location of secretions, the amount and viscosity of secretions. [14] The traditional techniques are been used in our day to day practice and their efficacy is also been proved in maintaining bronchial hygiene in various respiratory conditions. The newer techniques may also have some similar effects which may provide some benefits to the patients, hence it is important to find out the efficacy of newly arising techniques in reducing the pulmonary complications and thus can be used for treatment. The individual's regimes of flutter and autogenic drainage techniques in various chest conditions have been studied so far. But a comparative study of effect of the two techniques in chronic bronchitis is not studied so far clearly. Thus there is a need to study the effect of whether the above techniques are helpful in maintaining the bronchial hygiene in chronic bronchitis. Thus, the present study was conducted with an aim to compare the effect of flutter device and autogenic drainage technique on airway clearance in patients with moderate chronic bronchitis.

2. MATERIALS AND METHODS

The ethical clearance for the study was taken from the ethical committee of KIMSDU, karad. The ethical letter number was KIMSDU/IEC/03/15. An experimental study was conducted on 30 patients diagnosed with moderate chronic bronchitis by physician and referred to cardiopulmonary physiotherapy department of krishna hospital karad. An informed written consent was taken from the participants prior to commencement of the interventions. The participants were select as per the inclusion and exclusion criteria of the study.

2.1 Inclusion Criteria

Clinically diagnosed patients with moderate chronic bronchitis, moderate chronic bronchitis patients with dypnea grading with and above three on modified Borg's scale reference, both male and female participants with age group ranging from 40-60 years.

2.2 The exclusion criteria

Patients with cardiovascular, neurological diseases were excluded, any restrictive lung disease, recent surgeries were also excluded. A simple random sampling technique was used to divide the patients in two groups. Group A was treated with flutter device technique and Group B was divided with autogenic technique. The treatment protocol for both the groups was as follows: 2 sessions per day with 30 minutes duration of each session. The treatment was given for 5 days / week for 1 week. Nebulisation was given for both the groups. The pre intervention and post intervention outcome measures were taken with level of oxygen saturation, rate of perceived exertion on modified Borg's scale and peak expiratory flow rate (PEFR) reference.

3. STATISTICAL ANALYSIS

Statistical analysis for present study was done manually as well as using the statistics software INSTAT so as to verify the results obtained. Various statistical measures such as mean, standard deviation (SD) and paired and unpaired test of significance were utilized for this purpose. Probability values less than 0.05 were considered statistically significant and probability values less than 0.0001 were considered statistically extremely significant.

4. RESULTS AND INTERPRETATION

4.1 Mean age and gender distribution: (Table 1)

Group A consisted of 8 males and 7 females with mean age of 49.33 years. Group B consisted of 11 males and 4 females with mean age of 47.30 years. (Table 1.)

Table 1. Gender distribution and age

	Males	Females	Mean age
Group a	8	7	49.33 years
Group b	11	4	47.30 years

4.2 Comparison of oxygen saturation values in group a and group b (Table 2)

The pre interventional value of SpO2 for group A was 91.2±2.11 and the post interventional value was 95.06±2.25 the statistical analysis showed improvement in post interventional score which was statistically extremely significant. This was done using paired t' test.(P<0.0001) [Table 2] The pre interventional value of correct for group B was 91.13±3.09 and the post interventional value was 92.606±2.225 the statistical analysis showed improvement in post interventional score which was statistically very significant. This was done using paired't' test. The within group comparison showed improvement in both the groups. The between group analysis showed no significant difference in pre interventional value (p=0.9455). the post interventional comparison shows statistically very significant difference in oxygen saturation in group A than in Group B.(p=0.0066) [TABLE 2.]

Table 2. Comparison of SpO2 values in group A (Flutter device) and group B (Autogenic drainage)

Values / Groups	Pre intervention (mean±SD)	Post intervention (mean±SD)	'p' value	't' value	Significance
Group A (flutter device)	91.2±2.11	95.06±2.25	<0.0001	7.946	Extremely significant
Group B (AD)	91.13±3.09	92.66±2.225	0.0040	3.440	Very significant
'p' value	0.9455	0.0066			
't' value	0.0689	2.937			
Significance	Not significant	Very significant			

4.3 Comparison of rate of percieved exertion values in group A and group B. (Table 3)

Group A treated with flutter device showed statistically significant difference in post interventional value of rate of perceived exertion. The pre interventional value pf group A was2.87±0.48 and post interventional value was 1.05±0.38. The P value was <0.0001. The pre- interventional value of rate of perceived exertion for group B was 2.86±0.29 and the post interventional value was 1.98±0.49. T the statistical analysis showed improvement in post interventional score which was statistically very significant. This was done using paired't' test. The within group comparison showed improvement in both the groups. Between group analysis was done with unpaired 't' test which showed there was statistically no significant difference in pre -interventional values of rate of perceived exertion in both the groups but the post- interventional score showed statistically extremely significant difference with p<0.0001 at t= 5.791. This showed that group A was improved more than Group B. Thus flutter device showed greater effect on rate of perceived exertion on Borg scale than autogenic drainage.

Table 3. Comparison of rate of percieved exertion values in group A and group B.

Values / Groups	Pre intervention (mean ± SD)	Post intervention (mean ± SD)	'p' value	't' value	Significance
Group A (flutter device)	2.87±0.48	1.05±0.38	<0.0001	13.383	Extremely significant
Group B (AD)	2.86±0.29	1.98±0.49	<0.0001	6.625	Very significant
'p' value	0.9281	<0.0001			
't' value	0.0910	5.791			
Significance	Not significant	Extremely Significant			

5. DISCUSSION

The present study was conducted with the aim to compare the effect of flutter device and autogenic drainage technique on airway clearance in patients with moderate chronic bronchitis. The study was conducted on 30 patients divided into two groups as per inclusion and exclusion criteria. Group A was treated with flutter device and Group B was treated with Autogenic drainage for a period of 1 week with 2 sessions per day. Nebulization was given for both the groups prior to actual therapy. The pre and post interventional outcome measures were oxygen saturation level (SpO2) and rate of perceived exertion on modified Borg scale. Statistical analysis for present study was done manually as well as using the statistics software INSTAT so as to verify the results obtained. Various statistical measures such as mean, standard deviation (SD) and paired and unpaired test of significance were utilized for this purpose. Probability values less than 0.05 were considered statistically significant and probability values less than 0.0001 were considered statistically extremely significant. The results found in group A (flutter device) showed that there was improvement in bronchial hygiene of the patients with significant reduction in sputum and improvement in mucous clearance. These findings are supported by the study done by Kostan and co-workers who found that large amount of sputum was expectorated by patients who were treated with flutter device than conventional physiotherapy approaches. [15] . The findings of present study also correlates with a study done by Bellone Aand coworkers , who have studied effectiveness of flutter device with postural drainage on oxygen saturation in chronic bronchitis. They have concluded from their studies that flutter device was more effective in secretion removal in chronic bronchitis and also the oxygen saturation was increased more in individuals treated with flutter device.[16] The improvement seen in group A treated with Flutter device is due to the effect created by the device. It creates a fluctuating positive expiratory pressure at the mouth and oscillations in the intrathoracic region which mobilizes airway secretions facilitating airway clearance and improving airflow. The flutter device helps in decreasing the rigidity factor of mucus samples and mucus viscosity. [18,19] The study outcome shows that flutter device is more effective than autodenic drainage in moderate chronic bronchitis. This results match up with the findings of study done by Savci S,

Ince DI, Arikan H who found autogenic drainage to be least efficient to ACBT in a cohort of 30 patients with COPD.[20]
From the present study we could find that both the treatment methods were effective in terms of outcome measures, but there was more improvement in group using flutter device than in group treated with autogenic drainage.

6. CONCLUSION

From the present study conducted in moderate chronic bronchitis it is concluded that both the techniques i.e. autogenic drainage and flutter device were effective in improving oxygen saturation and rate of perceived exertion. But flutter device showed statistically significant improvement in moderate chronic bronchitis individuals than autogenic drainage. So it is concluded that flutter device should be more preferred than autogenic drainage in treatment of individuals with chronic bronchitis. The study sample size implemented in the study is too small; hence further studies should be carried out on large sample size.

7. AUTHORS CONTRIBUTION STATEMENT

Chandrakant Patil: Study concept and design, Acquisition of data, Analysis and interpretation of data, Drafting of the manuscript, Statistical analysis. Javid Sagar: Critical revision of the manuscript for important intellectual content, Administrative, technical, and material support, Study supervision

8. CONFLICT OF INTEREST

Conflict of interest declared none.

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