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Research Article

AN EXPERIMENTAL STUDY TO DETERMINE THE EFFECT OF INHALED CORTICOSTEROIDS ON ARTERIAL BLOOD GASES IN CHRONIC OBSTRUCTIVE PULMONARY DISEASE PATIENTS

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Abstract:

Pulmonary diseases are of two types, obstructive and restrictive. COPD is chronic obstructive pulmonary disease which is defined as progressively decreased airflow along with inflammation of airways as a result of harmful gases or tobacco smoking. Acute exacerbation of COPD is defined as severely compromised respiratory function, more than usual respiratory variations, which most of the time require change in usual medication and hospital admission and sometimes mechanical ventilation in severe cases.

***Objective:** The purpose of study is to determine the alteration in arterial blood gases values in patients with acute COPD exacerbation after using corticosteroids.*

***Methods:** This is quasi experimental study, conducted in a period of 2 months from March to April, 2019 at District hospital Jhang.*

***Results:** 45.5±11.1 years is the mean age of patients. Mean paO₂ and PaCO₂ are 59±4.4 mmHg and 57.3±2.8 mmHg. The difference between values in beginning and end of treatment was recorded, which was highly significant.*

***Conclusion:** A significant improvement in PaO₂ was noted after inhaled corticosteroid use in patients with acute exacerbation of COPD, meanwhile a significant reduction in PaCO₂ was also noted.*

***Key Words:** Chronic obstructive pulmonary disease (COPD), Acute exacerbation of COPD (AECOPD), forced expiratory volume in first second (FEV₁), Peak expiratory flow rate (PEFR), St. George respiratory questionnaire score (SGRQ), Forced vital capacity (FVC).*

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INTRODUCTION:

Pulmonary diseases are of two types, obstructive and restrictive. COPD is chronic obstructive pulmonary disease which is defined as progressively decreased airflow along with inflammation of airways as a result of harmful gases or tobacco smoking. Acute exacerbation of COPD is defined as severely compromised respiratory function, more than usual respiratory variations, which most of the time require change in usual medication and hospital admission and sometimes mechanical ventilation in severe cases [1].

Exacerbations lead to high mortality risk, severity of symptoms. 20% cases of AECOPD require hospital admission and management through corticosteroids and beta agonists' nebulization along with oxygen inhalation. Nasal intermittent positive pressure ventilation is a useful treatment option available for patients with acute exacerbation of COPD, as cited by RM Angus, et al [2].

The data that was already published regarding management, risk stratification and diagnostic evaluation of patients of AECOPD was analyzed by Bach PB, et al [3].

Methodology: This Quasi experimental study was conducted during of 2 months from March to April, 2019 at District hospital Jhang. Total 403 patients whether male or females were studied, all of them fulfilled the AECOPD criteria and were from age group 18 to 60 years. Patients suffering from severe disease like sepsis, unconsciousness, trauma, those who required intubation, PH less than 7.26 at time of admission, vitally unstable or having cor-pulmonale were excluded from study.

A predesigned questionnaire was used to collect demographic details of all patients. 2ml arterial blood was collected on admission day in pre heparinized syringe and analysis was done within 15 minutes on blood gas analyzer. pO₂, PCO₂ and PH was measured. Each test was repeated twice in order to reduce error. Beclomethasone 400 micrograms nebulization every 6 hours, salbutamol 0.5ml in 3ml normal saline was done every 4 hourly.

Ipratropium bromide 400 micrograms in 3ml normal saline every 6 hours, moxifloxacin 400mg IV OD was given and continuous oxygen inhalation at 2 to 4 liters per minutes was advised for 7 days. pO₂, PCO₂ and PH levels were measured on day 7 and values were recorded on questionnaire, comparison between both values was done. Laboratory cost was supported by researchers.

SPSS version 17 was used for data analysis. Mean and SD of mean were calculated. Pair t-test was applied and pre and post treatment ABGs were compared. Variations were controlled by age and gender stratification. P value < 0.05 was considered normal.

RESULTS:

45.5±11.1 years is the mean age of patients. Mean paO₂ and PaCO₂ are 59±4.4 mmHg and 57.3±2.8 mmHg. Table 1 shows pre and post treatment values of pO₂ and PCO₂, 59±4.4 mmHg and 69.4±4.07 mmHg. The difference between pre and post treatment values was highly significant.

Table 1: PaO₂ comparison before and after treatment.

	Mean	SD	P value
Pre treatment	59.05	4.4	0.0001
Post treatment	69.44	4.0	

Pretreatment mean pCO₂ was 57.3±2.8 mmHg and post treatment value was 47.6±2.7 mmHg P value 0.0001 showed a significant difference in beginning and end of treatment as shown in table 2.

Table 2: Pre and post treatment PaCO₂ comparison.

	Mean	SD	P value
Pre treatment	57.3	2.8	0.0001
Post treatment	47.6	2.7	

In 271 male patients the paO₂ value was 59±14 mmHg in beginning of treatment and it was 69±14 after treatment. The difference between both values was highly significant. P value was 0.0001. Amongst

female patients paO₂ values in beginning and end of treatment was 58±4 mmHg and 69.3±3.9 mmHg. The comparison between both values depicted highly

significant results, p value was 0.0001 as shown in table 3.

Table 3: Comparison of PaO₂ between male and female patients.

	Mean	SD	P value
Males			0.0001
Pre treatment	59.1	4.4	
Post treatment	69.4	4.2	
Females			0.0001
Pre treatment	58.8	4.3	
Post treatment	69.3	3.7	

PaCO₂ values were compared among male patients, start of treatment value was 57.4±2.9 mmHg and end of treatment value was 47.4±2.6 mmHg, p value was 0.0001 as shown in table 04. Among females the values were 57.1±6.2 mmHg and 48±2.8 mmHg,

respectively. P value is 0.0001. Stratification into two age groups was done, 18 to 40 and 41 to 60 years. Each group had 103 patients. In 18 to 40 years age group, mean PaO₂ value was 59.8±9.3 and 69.5±4 respectively. P value of 0.0001 was noted.

Table 4: Comparison of PaCO₂ between male and female patients.

	Mean	SD	P value
Males			0.0001
Pre treatment	57.4	2.9	
Post treatment	47.4	2.6	
Females			0.0001
Pre treatment	57.1	2.6	
Post treatment	48	2.8	

In 41 to 60 years age group, paO₂ value before and after treatment was 58±4.8 and 69.4±4 mmHg, p value was 0.0001[table 5].

Table 5: PaO₂ comparison between age groups.

	Mean	SD	P value
18 to 40 years			0.0001
Pre treatment	59.8	4.3	
Post treatment	69.5	4.0	
41 to 60 years			0.0001
Pre treatment	58.7	4.4	
Post treatment	69.4	4.0	

PaCO₂ values were also compared between the age groups, 18 to 40 years age group patients had paCO₂ 57±3 and 47±2.5 mmHg in beginning and end of treatment, respectively. Among 300 patients from 41

to 60 years age group, paCO₂ value before and after treatment was 57.3±2.1 and 47.6±2.7 mmHg, respectively. P value was 0.0001 which was highly significant [table 6].

Table 6: comparison of paCO₂ between both age groups.

	Mean	SD	P value
18 to 40 years			0.0001
Pre treatment	57.3	3.0	
Post treatment	47.5	2.5	
41 to 60 years			0.0001
Pre treatment	57.3	2.4	
Post treatment	47.9	2.7	

DISCUSSION:

Nasal ventilation of corticosteroids use in exacerbation of COPD was approved in a study conducted by Cazzole M, et al. in which the effect of formoterol or budesonide was studied in 2006. Results were improved arterial blood gases in patients who were regularly ventilated with corticosteroids [4]. Previously, mechanical ventilation, CPAP, volume cycled NIPPV and pressure support were considered the first line management protocols for AECOPD patients, even then the results assessed by improvement in arterial blood gases were not statistically significant [5]. The results obtained from previous management protocols gave the need to look for other management options. Multiple clinical trials were conducted by scientists over past two decades to look for better and effective management protocols for patients with AECOPD. The effect of steroids only inhalational treatment was studied by Snow V, et al. Hunter M, et al. and Gunen H, et al. and results were in favor of use of steroids in improving the arterial blood gases [6.7.8].

The effect of theophylline and steroids combination treatment for management of AECOPD was studied Casio BG, et al. it was concluded that results obtained by using combination protocols were better as compared to steroids only treated patients [9.10]. The understudy title was conducted in light of abovementioned details in order to find better management option and early recovery for patients with AECOPD which can lower mortality rate and improve living standard.

CONCLUSION:

A significant improvement in PaO₂ was noted after inhaled corticosteroid use in patients with acute exacerbation of COPD, meanwhile a significant reduction in PaCO₂ was also noted.

REFERENCES:

1. Rafiq M, Waseem M, Hassan R. Changes in arterial blood gases before and after corticosteroid use in acute exacerbation of COPD. IJABR 2018; 9 (3): 24-29.
2. RM Angus, et al. comparison of acute effects on gas exchange of nasal ventilation and doxapram in exacerbations of chronic obstructive pulmonary disease. Thorax 51 (10); 1048-1050: 1996.
3. 1996.
4. Bach PB, et al. Management of acute exacerbation of chronic obstructive pulmonary disease: a summary and appraisal of published evidence. Annals of Internal Medicine 2001; 134 (7): 600-602.
5. Cazzole M, et al. Effect of formoterol/budesonide combination on arterial blood gases in patients with acute exacerbation of COPD. Respiratory Medicine 2006; 100 (2): 212-217.
6. Jones DJM, et al. Nasal ventilation in acute exacerbation of chronic obstructive pulmonary disease: effect of ventilator mode on arterial blood gas tensions. Thorax 1994; 49 (12): 1222-1224.
7. Snow V, et al. Management of acute exacerbation of COPD: clinical practice guidelines, part 1. Chest 2001; 119(4): 1185-1189.
8. Hunter MH, et al. COPD: management of acute exacerbations and chronic stable disease. American Family Physician 2001; 64 (4): 603-622.
9. Gunen H, et al. The role of nebulized budesonide in the treatment of exacerbations of COPD. European Respiratory Journal 2007.
10. Dimopoulou I, et al. Effects of severity of chronic obstructive pulmonary disease on thyroid function. Metabolism Clinical and Experimental 2001; 50 (12): 1397-1401.
11. Casio BG, et al. Low dose theophylline enhances the anti-inflammatory effects of steroids during exacerbations of chronic obstructive pulmonary disease. Thorax 2009.