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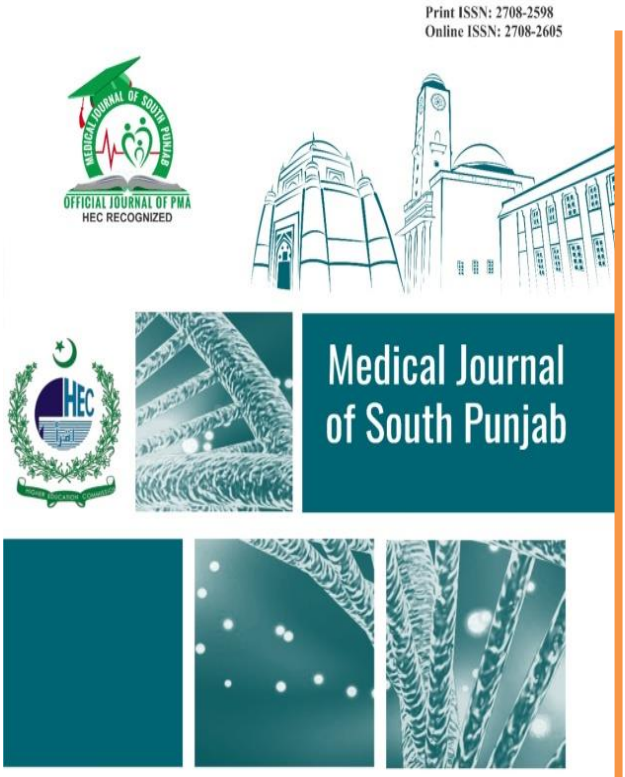

Efficacy of adjunctive corticosteroid therapy in severe community acquired pneumonia (SCAP) at a tertiary care hospital

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Original Article

Efficacy of adjunctive corticosteroid therapy in severe community acquired pneumonia (SCAP) at a Tertiary Care Hospital in Pakistan

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ABSTRACT

Objective: To determine the adjunctive corticosteroid therapy in severe community acquired pneumonia (SCAP) at a tertiary care hospital in Pakistan.
Study Design: A randomized controlled trial.

Methods: Sixty patients admitted in the department of pulmonology were selected and divided into two groups. Group-A received only antimicrobial therapy and group-S received antimicrobial and 40 mg/day prednisone for 7 days as adjunctive therapy. Baseline data was recorded. Duration of antibiotics and hospital stay were also documented. Re-evaluation was done at seventh day of treatment and efficacy was assessed. Data was analyzed through SPSS version 25. Student t-test, chi square test or Fisher's Exact test were applied. P ≤0.05 was taken as statistically significant..

Results: Duration of antibiotics therapy and hospitalization were significantly shorter in the steroid group (10.60±1.59 vs. 14.83±3.79 days, p<0.001; 11.43±2.03 days vs. 13.93±3.77 days, p=0.003, respectively). The outcome was better in the steroids group as compared to the antibiotics alone group (70% vs. 43.3%, p= 0.037).

Conclusion: The use of corticosteroids has a beneficial role in improving the outcome and reducing the hospital stay among the elderly patients of severe community acquired pneumonia.

Keywords: corticosteroids, severe community acquired pneumonia (SCAP), efficacy.

1. INTRODUCTION

Pneumonia is a condition in which inflammation of air sacs of the lungs occurs along with accumulation of reactionary fluid or pus, resulting in productive cough [1]. Community acquired pneumonia (CAP) mostly affects those who are in extremes of age [2] i.e., infants, children under 5 years of age and adults more than 65 years of age; immunocompromised; or those having some chronic underlying health condition [3]. CAP can be viral, bacterial or fungal in etiology and severe affected patients require hospitalization [4]. In response to the pathogen, increased number of cytokines are released locally as well as systematically [5, 6]. Corticosteroids halt the production of inflammatory mediators and have vasoconstrictive and anti-inflammatory effects [7].

The most commonly used antibiotic in CAP patients is amoxicillin[1], however, the utilization of corticosteroids has been the point of discussion for quite some time [8]. The adherence to the management according to the guidelines is a challenging task in third world countries like Pakistan, due to limited resources and increased disease burden[9-11].

There are several RCTs, cohort studies and meta-analysis in regard to efficacy of steroids as an adjunct to antimicrobial therapy in CAP patients [1, 11] The major pool of evidence based scientific studies in this regard belongs to western world and there is a lack of local relevant data. Wafy S et al. [12] observed that the time take to clinical improvement was 4.35±1.24 days with steroids vs. 6.54±1.99 days without steroids. Another point of concern is the adverse effects of steroid usage versus its benefits in terms of effects on morbidity, mortality, length of hospital stays and overall disease burden.

For the sake of advancement in treatment modalities and improved patient outcome, scientific data from underdeveloped regions of the world is needed. The aim of our study is to observe the clinical outcomes of utilizing steroids as an adjunct to antibiotics in patients diagnosed with SCAP.

2. METHODOLOGY

This randomized controlled trial was conducted at the department of Pulmonology, Gujranwala Medical College / DHQ Gujranwala from 07-11-2024 to 06-05-2025. Sample size was calculated using OpenEpi software, taking into account the time for clinical stability in both the groups (4.35 ± 1.24 days with steroids vs. 6.54 ± 1.99 days without steroids) [12], calculated sample size was 18. However, we included 60 patients in our study. who were selected via the nonprobability consecutive sampling technique.

All the patients of both male and female gender, 60-90 years of age, diagnosed with SCAP and CURB-65 score>2 were selected for the study. CAP was defined as pneumonia developing outside of a health care setting or in the general community. Diagnosis was made as per following criteria: (a) Clinical evaluation: at least two compatible clinical symptoms (body temperature >38°C, productive cough, chest pain, shortness of breath, or crackles on auscultation); (b) Chest radiograph: showing lung infiltrate either unilateral or bilateral; (c) Chest ultrasonography: showing consolidation with or without pleural effusion. Patients with concomitant cardiovascular conditions, those who had taken treatment within past one week for same disease and those who lost follow up were excluded from the study.

After approval from the Hospital Ethical Review Board, sixty patients admitted in the department of pulmonology were selected for this study. Informed consent was signed by every patient and detailed history was taken. All the study participants were divided into two groups by lottery method. Group-A received only antimicrobial therapy

and group-S received antimicrobial and 40 mg/day prednisone for 7 days as adjunctive therapy. Age and gender were documented. Blood samples were sent for pre-treatment Hb and TLC. CURB-65 score (Confusion=1, BUN >7mmol/l, Respiratory rate >30b/m, SBP <90mmhg or DBP <60mmhg, age >65) was calculated for each patient. X-ray chest was done. Findings were documented as extent of consolidation and associated findings such as effusion or lymphadenopathy. Duration of antibiotics and hospital stay was also documented. Re-evaluation was done at seventh day of treatment and efficacy was assessed as per following criteria: (a) Clinically: temperature ≤370°C, HR ≤100 bpm, respiratory rate ≤24 breaths/min, SBP ≥90 mmHg, SPO_2 ≥90% or PO_2 ≥60 on room air, ability to maintain oral intake, normal mental status; (b) Chest ultrasonography: if there is improvement of consolidation/effusion or not; (c) Chest radiograph: to exclude progression of pneumonia and if there is any improvement. All the data was collected by the researcher himself on a proforma.

Data was analyzed through SPSS version 25. Numerical variables such as age, CURB-65 scores, Hb, TLC, duration of antibiotics and length of hospital stay were expressed as mean and standard deviation. Categorical variables such as gender, extent of consolidation, associated findings on chest x-ray, and efficacy were presented as frequency and percentage. Confounding variables were controlled through stratification of data with regard to age, gender, extent of consolidation and associated findings on chest x-ray. Post stratification student t-test, chi square test or Fisher's Exact test were applied. P ≤0.05 was taken as statistically significant.

3. RESULTS

Results of this study showed that both antibiotics and steroid groups were comparable for mean age, gender distribution, CURB-65 score, extent of consolidation, pulmonary effusion and lymphadenopathy (p value 0.373, 0.573, 0.380, 0.549, 0.559 and 0.602, respectively). Pretreatment Hb and TLC count were also comparable (p value 0.551 and 0.603). Duration of antibiotics therapy and hospitalization were significantly shorter in the steroid group (10.60 ± 1.59 vs. 14.83 ± 3.79 days, p<0.001; 11.43 ± 2.03 days vs. 13.93 ± 3.77 days, p=0.003, respectively). The outcome was better in the steroids group as compared to the antibiotics alone group (70% vs. 43.3%, p= 0.037). Table-I

Data was stratified in the basis of age, gender, extent of consolidation, pulmonary effusion and lymphadenopathy, and outcome was again compared between the subgroups. The outcome was significantly different in 60-75 years age group, females, patients with bilobar consolidation of the lungs and in those without pulmonary effusion (p value 0.044, 0.032, 0.005, and 0.016, respectively). Table-II

Table-I: Demographic, clinical and outcome data

Variable	Group A (N=30)	Group B (N=30)	P value
Age, years	71.03 ± 6.12	69.57 ± 6.53	0.373
Gender, N (%)			
Male	10 (33.3 %)	8 (26.7 %)	0.573
Female	20 (66.7 %)	22 (73.3 %)	
CURB-65 score	3.83 ± 0.79	3.67 ± 0.66	0.380
Hb, g/dl	11.23 ± 1.94	10.93 ± 1.93	0.551
TLC, $\times 10^3/\mu l$	18.53 ± 3.35	18.97 ± 3.07	0.603
Antibiotics duration, days	14.83 ± 3.79	10.60 ± 1.59	<0.001
Duration of hospital stay, days	13.93 ± 3.77	11.43 ± 2.03	0.003
Extent of consolidation, N (%)			
Unilobar	11 (36.7 %)	9 (30.0 %)	0.549
Bilobar	8 (26.7 %)	12 (40.0 %)	
Multilobar	11 (36.7 %)	9 (30.0 %)	
Effusion, N (%)	9 (30.0 %)	7 (23.3 %)	0.559
Lymphadenopathy, N (%)	12 (40.0 %)	14 (46.7 %)	0.602
Efficacy, N (%)	13 (43.3 %)	21 (70.0 %)	0.037

Data is entered as mean ± S.D. unless mentioned otherwise

Table-II: Assessment of efficacy of corticosteroids after stratification of data

Subgroup	Group A	Group S	P value
60-75years	11 (47.8 %)	19 (76.0 %)	0.044
76-90years	2 (28.6 %)	2 (40.0 %)	1.000
Male	5 (50.0 %)	5 (62.5 %)	0.664
Female	8 (40.0 %)	16 (72.7 %)	0.032
Extent of consolidation			
Unilobar	7 (63.6 %)	5 (55.6 %)	1.000
Bilobar	1 (12.5 %)	10 (83.3 %)	0.005
Multilobar	5 (45.5 %)	6 (66.7 %)	0.406
Effusion			
Yes	4 (44.4 %)	3 (42.9 %)	1.000
No	9 (42.9 %)	18 (78.3 %)	0.016
Lymphadenopathy			
Yes	5 (41.7 %)	9 (64.3 %)	0.249
No	8 (44.4 %)	12 (75.0 %)	0.071

Data is entered as number and percentage, *Fisher's exact test applied.

4. DISCUSSION

Patients included in current study were elderly from 60 to 90 years age. Patients in both groups were comparable in terms of age, gender distribution. Baseline CURB-65 score, Hb and TLC counts were also comparable between both the groups. No significant difference in the extent of consolidation or associated x-ray findings was observed between the groups. The use of corticosteroids as adjunctive therapy led to significant decrease in the duration of antibiotics administration and subsequently decreasing the length of hospital stay. The overall efficacy of steroids addition to the treatment plan was significantly better than with antibiotics alone (p= 0.037).

Garcia-Vidal C et al.[13] conducted a retrospective study and analyzed hospitalized patients with SCAP. Among the 308 patients assessed, 77% were given standard antibiotics, while 23% were treated with both antibiotics and systemic corticosteroids. The use of systemic steroids was independently linked to a reduction in mortality (OR: 0.287; 95% CI: 0.113–0.732). In contrast, disease severity (OR: 2.923; 95% CI: 1.262–6.770) was the only independent predictor of increased mortality among the patients. Their findings suggested that the concurrent administration of systemic corticosteroids with antibiotic therapy may reduce mortality in patients with SCAP. However, disease severity remains the primary independent risk factor for increased mortality.

Dequin PF et al.[14] analyzed the data from 795 patients. By day 28, mortality was 6.2% in the hydrocortisone group, compared to 11.9% in the placebo group, yielding an absolute risk reduction of 5.6 percentage points (95% CI, 9.6−1.7; P=0.006). Among patients not requiring mechanical ventilation at presentation, endotracheal intubation was performed in 40 of 222 (18%) in the hydrocortisone group versus 65 of 220 (29.5%) in the placebo group (HR, 0.59; 95% CI, 0.40–0.86). Similarly, among those not receiving vasopressors at admission, vasopressor therapy was initiated by day 28 in 15.3% patients in the hydrocortisone group, compared to 25% in the placebo group (hazard ratio, 0.59; 95% CI, 0.43–0.82). These findings suggested that in ICU patients with SCAP, hydrocortisone treatment was related to significantly lower risk of death by day 28 compared to placebo.

Another study was published in 2021.[15] Between December 2012 and November 2018, a total of 401 patients were randomized to receive either dexamethasone or placebo. The median length of stay was shorter in dexamethasone group compared to the placebo group (p=0.033). The admissions to ICU were less in the dexamethasone group (3%) than in the placebo group (7%; p=0.030). These findings suggested that oral dexamethasone reduces hospital LOS and ICU admission rates in adult patients with CAP.

Another study[16] determined that a 7-day course of adjunctive low-dose steroids in patients with CAP accelerates clinical

recovery and reduces the risk of sepsis-related complications. It significantly decreases the duration of mechanical ventilation, intravenous antibiotic use, and hospital stay, leading to improved hospital outcomes and enhanced weaning success from mechanical ventilation. The findings of this study are in agreement with those of current study.

A meta-analysis[17] of various clinical trials concluded that glucocorticoids can reduce mortality in patients with SCAP, with their effectiveness potentially influenced by the specific type used and whether the treatment is tapered. Moreover, glucocorticoid therapy may shorten the duration of mechanical ventilation. Various other similar meta-analyses[18-21] have been conducted and all of them have observed the benefits of corticosteroids in the patients of CAP in terms of decreasing the duration of antibiotics administration and hospital LOS. The observed benefits were more pronounced among the patients who had severe disease. And the finding of those meta-analyses is similar to those we observed in current study. In short, a 7-day course of adjunctive corticosteroids therapy can significantly improve prognosis and decrease morbidity and mortality among the patients of SCAP.

5. CONCLUSION

The use of corticosteroids has a beneficial role in improving the outcome and reducing the hospital stay among the elderly patients of severe community acquired pneumonia.

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