https://doi.org/10.29309/TPMJ/2022.29.12.7296

The Professional Medical Journal
www.theprofesional.com
2022, Volume, 29 Issue, 12

ORIGINAL ARTICLE

For better or worse: Dexamethasone versus methylprednisolone among patients with COVID-19 pneumonia.

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Article Citation: Yaqoob A, Naz F, Gul Z, William S, Fazal O, Ahmad Z. For better or worse: Dexamethasone versus methylprednisolone among patients with COVID-19 pneumonia. Professional Med J 2022; 29(12):1760-1764. https://doi.org/10.29309/TPMJ/2022.29.12.7296

ABSTRACT… Objective: The aim of this study was to compare the outcome of dexamethasone and methylprednisolone among patients suffering with COVID-19 pneumonia. **Study Design:** Quantitative Retrospective Comparative study. **Setting:** Department of Medicine, Allied Hospital, Faisalabad. **Period:** February to September 2021. **Material & Methods:** Data included archival record of 120 diagnosed cases of COVID-19 pneumonia during July 2020 to December 2020. Data was retrospectively collected by researchers using a predesigned study proforma and analyzed through SPSS software 25.0. **Results:** Out of 120 reported cases of COVID-19 pneumonia, 76 (63.3%) were males, and 44(36.7%) were females (p= 0.097). There were 67 patients (55.8%) prescribed with dexamethasone treatment (Group A) and 53 patients (44.2%) with methylprednisolone treatment (Group B). Mean duration of hospital stay was 3.48 + 3.0 days in Group A and 3.45 + 3.0 days in Group B. Six patients were lost for follow-up Out of 114 patients, 63 patients (55.26%) had mortality within 30 days of study while 51 patients (44.74%) survived. **Conclusion:** There is no statistical difference in the outcomes of COVID-19 pneumonia when treated with dexamethasone as compared to methylprednisolone in terms of outcome related to duration of hospitalization, need for ICU admission and reported mortality within 30 days. More studies are warranted with larger sample size.

Key words: Covid-19 Pneumonia, Dexamethasone, Efficacy, Mortality, Prednisolone.

INTRODUCTION

The world has witnessed COVID-19 pandemic caused by a novel Coronavirus originating from Wuhan, China. The initial infection was called as Pandemic in December 2019 after its spread to different parts of the world. Only with in the first eight months there were 11,382,954 cases reported with 228,874 cases being in Pakistan.[1] The lung manifestations may range from mild degree of hypoxemia to severe pneumonia and acute respiratory distress syndrome (ARDS), depending upon the host response and inflammatory cascade.[2] These range from mild respiratory distress to severe pneumonia, warranting a need for having optimum therapy according to the presentation.

The treatment of COVID-19 infection is a big challenge for the clinicians and there has been no proven therapy yet available that provides any mortality benefit. The role of corticosteroids is also controversial with no clear mortality benefits yet.[3] A proposed mechanism for their beneficial effect is through suppression of various inflammatory markers. But on the other hand, they may prolong the clearance of virus from airways, blood, and faeces.[4]

Recently, the investigators of RECOVERY trial of severe COVID-19 infection revealed that 2104 patients who were given 6mg dexamethasone daily showed 8-26% reduced mortality than 4321 patients who were given standard treatment.[5,6]

To avoid the side effects of dexamethasone, prednisolone have been proposed to have a role

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Article received on: 28/07/2022
Accepted for publication: 01/10/2022

in treatment of patients with COVID-19 pneumonia as an adjuvant therapy. This intermediate acting steroid is postulated to have a fewer side effects and better penetration in the lungs.

Since the rise of COVID-19, health care providers has confronted remarkable pressure in dealing with Covid-19 patients with pneumonia.[7] With passage of almost two years now, and having witnessed multiple mutations in the virus, promising reports of immunizations have been introduced. Still the prevalent cases demand treatment regimens that may benefit to the diseased population, decrease the mortality rates and improve the health outcomes of these patients. This leaves treating physicians to come up with best possible evidence-based treatment options for Covid-19 pneumonia. The main objective of this study was to compare the outcome of dexamethasone versus methyl prednisolone among patients with COVID-19 pneumonia.

MATERIAL & METHODS

This was a quantitative retrospective comparative study done in the Department of Medicine, Allied Hospital, Faisalabad, Pakistan. Allied Hospital is one of the region's leading tertiary level hospitals with 1450 beds and a well-established COVID-19 ward.

This study was conducted between July 2020 to December 2020. After getting ethical approval from the ethical committee of the institution, approval letter from the concerned department (Ethical Approval letter no: 1008), study began collecting data from the archival record of the Medical Department dealing with COVID-19 pneumonia. Sampling was non-probability purposive and sample size was based on inclusion of data of all the patients with COVID-19 admitted at the study settings. Inclusion criteria included data of all adult patients (more than 18 years of age) being admitted in High dependency Unit of the hospital with clinical signs of COVID pneumonia (fever, cough, dyspnea, fast breathing) plus one of the following: (1) Respiratory rate more than 30 breath/min, (2) severe respiratory distress or SpO2 less than 90% on room air. COVID-19 infection was taken in the patients having any two of the symptoms (fever, cough, shortness of breath, body aches) and one of the following positive investigations (positive PCR for covid-19 or chest x-ray PA view/HRCT chest findings suggestive of COVID-19).

The patients were identified to be into two groups. Group A patients had received Injection Dexamethasone 6 mg once daily for five days whereas Group B patients had received methyl prednisolone 2 mg per kg per day, in three divided doses a day for five days, along with other treatments for COVID-19 pneumonia.

All the data was collected by researchers using a predesigned study proforma for their progress and outcome in terms of respiratory rate, SpO2, need for supplemental oxygen with amount, need for ICU admission, and duration of hospitalization along with 30-day follow-up for any mortality. The identity of each patient was kept confidential. Regular consistency checks ensured that any missing data was tracked by our team.

All obtained data was organized and analyzed through SPSS version 25.0. Continuous data like age, duration of hospitalization was represented by Means and Standard deviation and categorical data like gender, ICU admissions, and reported mortality identified were represented in frequency and proportions. Test of significance were applied after checking the normality of data.

RESULTS

Demographic data of the participants

A total of 120 patients participated in the study. There were 67 patients (55.8%) included in Group A (dexamethasone), while group B (methylprednisolone) had 53 participants (444.2%).

Table-I represents the demographic details of the patients included in the study. The mean age of patients in Group A was 58.48 + 15.4 years while that in Group B was 58.41 + 15.43 years. The median age for Group A Group B was 60 years each. Both groups were comparable in terms of age distribution (p= 1.000) Out of

120 participants, 76 (63.3%) were males, and 44(36.7%) were females (p= 0.097) (Figure-1).

	Group A (n= 67)	Group B (n= 53)	Normality (P-Value)
Age (years)			
21-30	5	2	1.00
31-40	8	2	
41-50	14	5	
51-60	17	14	
61-70	11	16	
71-80	8	12	
81-90	3	3	
>91	1	0	
Gender			
Male	38	38	0.0907
Female	29	15	

Table-I. Demographic status of the patients included in the study

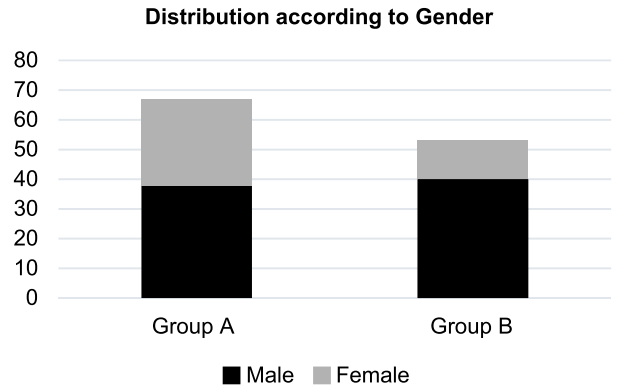

Figure-1. Distribution according to gender

Figure-2 represents the outcome of patients in our study based on pre-decided criteria. Among the admitted patients, mean duration of hospital stay was 3.48 + 3.0 days in Group A and 3.45 + 3.0 days in Group B. The median duration of hospitalization for Group A and Group B was 2 days each which was not significant according to our study (p=0.9978). (Table-II)

Figure-3 represents reported mortality within 30 days of study for the two groups. Six patients were lost for follow-up Out of 114 patients, 63 patients (55.26%) had mortality within 30 days of study while 51 patients (44.74%) survived.

	Group A (n= 67)	Group B (n= 53)	P-Value
Duration of hospital stay (days)			
1-3	44	37	0.9978
4-6	14	9	
7-9	4	3	
10-12	3	2	
13-15	1	2	
Blank	1	0	
Shifted to ICU			
Yes	2	5	0.134
No	63	48	
Mortality reported (on 30th day of presentation)			
Yes	33	30	0.369
No	31	20	
Lost for follow-up	3	3	

Table-II. Detail of study outcome variables

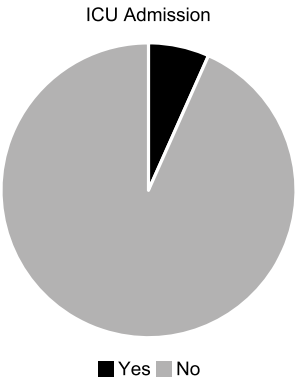

Figure-2. ICU Admission in our study

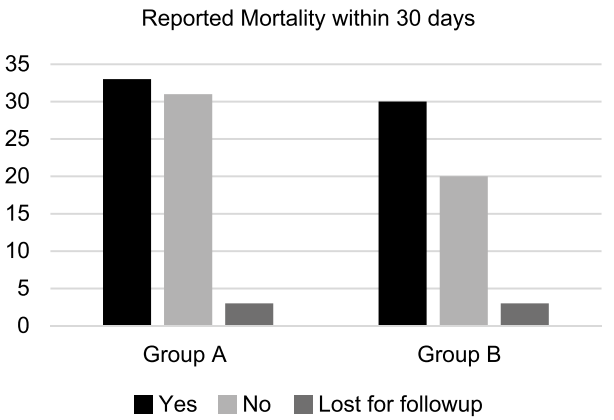

Figure-3. Reported mortality within in 30 days

DISCUSSION

This study aimed to compare the outcome of dexamethasone and methylprednisolone among

patients diagnosed with COVID-19 pneumonia, being admitted in High Dependency Unit of Allied Hospital, Faisalabad. As seen from the results, there is no statistical difference between the patient outcomes in terms of duration of hospitalization, need for ICU admission and reported mortality within 30 days of the study.

Our data results are comparable to a previously accepted corticosteroid treatment which compared dexamethasone with prednisolone, considering the higher penetration rate of the drug in the lungs.[7,8] Prednisolone has proven to be safe with fewer side effects as compared to dexamethasone, and this gives an advantage to the treating physicians to use prednisolone in place of dexamethasone as adjuvant therapy in patients with COVID-19 pneumonia.[9] In another study by Ranjbar et al, the group receiving methylprednisolone demonstrated better outcome than the group receiving dexamethasone in terms of need of ventilatory support. This may reflect the better penetration of methylprednisolone into the lungs.[10]

Our study revealed the same mortality rates in both the groups. However previous studies have demonstrated a lower mortality rate in patients receiving prednisolone in comparison to dexamethasone, though the results have been insignificant.[8] However, another study showed that methylprednisolone can lead to shorter hospital stay, and lower need for ventilatory support, however, there was no change in mortality rate.[10] Hence in the place of conflicting data, more studies are warranted with a larger sample size to measure the mortality rates in both the drug groups.

Another emerging data on literature review revealed studies on achieving the minimum effective dose for both the above steroids to achieve best possible outcome for patients in COVID-19 infection. However, use of high dose steroids for COVID-19 infection is not without its complications which themselves will be another dilemma to treat.[11] Hence, other studies on low dose steroids usage for COVID-19 infection have been conducted to find out the optimum dose required.[12,13]

This study was limited by its small sample size and having a retrospective design. Further studies can be performed on a larger sample size, in multiple centers as a prospective study ranging from quasi experimental to randomized controlled trial. The drug safety profiles of each drug especially in the different groups with medical disabilities (hypertension, diabetes etc.) needs to be determined in future studies. More studies are warranted with larger sample size and prospective design.

CONCLUSION

The study concluded that the outcomes of treating COVID-19 pneumonia with dexamethasone and methylprednisolone are comparable in terms of duration of hospital stay, need for ICU admission and mortality within 30 days.

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3	Zakia Gul	Data collection and analysis.	
4	Sonia William	Data collection and analysis.	
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6	Zaheer Ahmad	Data collection and analysis.	