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Original Research Article

## Comparison of efficacy of methylprednisolone with dexamethasone in moderate to severe COVID-19 patients in a tertiary care hospital

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### ABSTRACT

**Background:** The aim was to compare efficacy of methylprednisolone with dexamethasone in moderate to severe COVID-19 patients in a tertiary care hospital.

**Method:** A retrospective observational study was conducted by collecting data of moderate to severe COVID-19 patients admitted to covid wards of a tertiary care hospital for a period of six months. Demographic data, information about SpO<sub>2</sub> changes, duration of hospitalization, marker status and ventilation status were parameters collected and used to compare between two groups.

**Results:** Total number of patients in this study were 130. Out of which 65 patients who were on Methylprednisolone belonged to group A and 65 patients taking dexamethasone belonged to group B. In group A 56 (86.2%) were males and 9 (13.8%) were females. In group B 51 (78.5%) were males and 14 (21.5%) were females. Mean age in group A was 54.75±14.96 (age range b/w 25-80 years) and in group B was 55.43±15.83 (age range between 23-84 years). Patients in group A showed more presence of comorbidity (44.6%) as compared to group B (32.3%). Mean SpO<sub>2</sub> level on day 1 in group A was 86.37±7.58 and in group B was 88.11±4.38. On day of discharge mean SpO<sub>2</sub> level was 95.05±1.54 in group A and 94.63±2.09 in group B. Mean length of hospital stay in group A was 9.78±7.38 and in group B was 7.88±4.76. Improvement in marker status for group A was 100% and for group B 95.4%. Ventilation status in both groups showed 100% improvement.

**Conclusions:** Both steroids are effective in management of moderate to severe COVID-19 patients.

**Keywords:** COVID-19, Methylprednisolone, Dexamethasone, Moderate to severe

### INTRODUCTION

Coronavirus disease-19 or COVID-19 was declared a pandemic by WHO on March 11, 2020. COVID-19 infected patients often develop atypical pneumonia, acute lung injury and acute respiratory distress syndrome thus increasing morbidity and mortality globally.<sup>1</sup>

Pathophysiology is mainly due to involvement of excessive inflammatory markers like interleukins, tumour necrosis factors, interferons, macrophages.<sup>2</sup>

Clinical spectrum disease presents in the form of mild, moderate and severe illness. Moderate and severe cases with oxygen saturation < 92% require hospitalization, ventilation, and steroids.<sup>3</sup>

Among steroids methylprednisolone and dexamethasone are the most commonly used drugs in the patients who show progressive deterioration of oxygen saturation and rapid worsening of chest imaging findings.<sup>4,5</sup>

Many studies have shown that methylprednisolone is the clinically preferred steroid for its anti-inflammatory

action, because of its superior efficacy.<sup>6,7</sup> Hence in this study intend to compare outcomes with methylprednisolone and dexamethasone, in management of COVID-19.

## METHODS

This retrospective observational study was conducted over a period of six months (April to September 2021) in covid ward at KIMS, Hubli, tertiary care hospital. The study was approved by institutional ethics committee.

### Inclusion and exclusion criteria

All moderate to severe COVID-19 patients aged more than 18 years of either sex admitted to covid ward with or without comorbid condition receiving either methylprednisolone or dexamethasone were included in the study.

Patients with immunodeficiency disorders and those not willing to participate in this study were excluded.

The record of patients with moderate to severe COVID-19 was obtained and the data was collected. Demographic data, information about SpO<sub>2</sub> changes, duration of hospitalization, marker status and ventilation status were the parameters collected and used to compare the efficacy of methylprednisolone with dexamethasone.

### Statistical analysis

Data for study parameters were entered in Microsoft-excel and analysis was done using, IBM SPSS statistics (version 23.0). Demographic characteristics and other parameters between study groups compared by Mann Whitney test and Chi square test. Independent student T test was used for comparison of mean SpO<sub>2</sub> levels between 2 groups.

## RESULTS

Among 130 patients included in this study, 65 patients who were treated with Methylprednisolone belonged to group A and other 65 patients who received dexamethasone belonged to group B.

The mean age in group A was 54.75±14.96 (with age range b/w 25-80 years) and in group B was 55.43±15.83 (with age range between 23-84 years). There was no significant difference in the mean age between 2 groups (p=0.72).

In both study groups, males were predominantly distributed (86.2% in group A and 78.5% in group B) as compared to their female counterparts (13.8% in group A and 21.5% in group B). There was no significant difference in the gender distribution between 2 groups (p=0.25) (Table 1).

Patients in group A showed relatively more presence of comorbidity (44.6%) as compared to group B (32.3%). However, the difference in presence of comorbidity between 2 groups was not statistically significant (p=0.15) (Table 2).

The mean SpO<sub>2</sub> level on day 1 in group A was 86.37±7.58 and in group B was 88.11±4.38. There was no significant difference in the mean SpO<sub>2</sub> levels between 2 groups on day 1 (p=0.11). Similarly, the mean SpO<sub>2</sub> level on day of discharge in group A was 95.05±1.54 and in group B was 94.63±2.09. However, there was no significant difference in the mean SpO<sub>2</sub> levels between 2 groups on the day of discharge of patients (p=0.20) (Table 3).

The mean SpO<sub>2</sub> level in group A on the day of discharge was significantly higher (95.05±1.54) as compared to the mean SpO<sub>2</sub> level at day 1 (86.37±7.58). The mean difference in the SpO<sub>2</sub> levels between 2-time intervals in group A was statistically significant at p<0.001.

Similarly, the mean SpO<sub>2</sub> level in group B on the day of discharge was significantly higher (94.63±2.09) as compared to the mean SpO<sub>2</sub> level at day 1 (88.11±4.38). The mean difference in SpO<sub>2</sub> levels between 2-time intervals in Group B was statistically significant at p<0.001 (Table 4).

The mean length of hospital stay in group A was 9.78±7.38 and in group B was 7.88±4.76. However, the mean difference in the length of hospital stay between 2 groups was not statistically significant (p=0.22) (Table 5).

Group A showed 100 % improvement in the marker status and group B showed 95.4% improvement. However, 4.6% patients in group B the marker status evaluation was not done. The difference in improvement of marker status between 2 groups was not statistically significant (p=0.08) (Table 6).

The ventilation status in both group A and group B showed a marked 100% improvement with no case reported with worsening of the ventilation condition (Table 7).

**Table 1: Age and gender distribution among 2 groups.**

Variables	Category	Group A		Group B		P value
		Mean	SD	Mean	SD	
Age (Years)	Mean	54.75	14.96	55.43	15.83	0.72 <sup>a</sup>
	Range	25-80		23-84		
Sex, n (%)	Males	56	86.2	51	78.5	0.25 <sup>b</sup>
	Females	9	13.8	14	21.5	

**Note:** a. Mann Whitney test; b. Chi square test.

**Table 2: Comparison of presence of comorbidity among study patients between 2 groups using Chi square test.**

Variables	Category	Group A		Group B,		P value
		Mean	SD (%)	Mean	SD (%)	
Comorbidity	Yes	29	44.6	21	32.3	0.15
	No	36	55.4	44	67.7	

**Table 3: Comparison of mean SpO<sub>2</sub> levels between 2 groups on day 1 and last day using independent student t test.**

Time	Group	N	Mean	SD	Mean diff.	P value
Day 1	Group A	65	86.37	7.58	-1.74	0.11
	Group B	65	88.11	4.38		
Last day	Group A	65	95.05	1.54	0.42	0.20
	Group B	65	94.63	2.09		

**Table 4: Comparison of mean SpO<sub>2</sub> levels between day 1 and last day in each group using student paired t test.**

Groups	Time	N	Mean	SD	Mean diff.	P value
Group A	Day 1	65	86.37	7.58	-8.68	<0.001
	Last day	65	95.05	1.54		
Group B	Day 1	65	88.11	4.38	-6.52	<0.001
	Last day	65	94.63	2.09		

**Table 5: Comparison of mean length of hospital stay between 2 groups using Mann Whitney test.**

Time	Group	N	Mean	SD	Mean diff.	P value
Hospital stays	Group A	65	9.78	7.38	1.90	0.22
	Group B	65	7.88	4.76		

**Table 6: Comparison of marker status among study patients between 2 groups using Chi square test.**

Variables	Category	Group A		Group B		P value
		Mean	SD (%)	Mean	SD (%)	
Marker status	Improved	65	100	62	95.4	0.08
	Not done	0	0	3	4.6	

**Table 7: Comparison of ventilation status among study patients between 2 groups using Chi square test.**

Variables	Category	Group A		Group B		P value
		Mean	SD (%)	Mean	SD (%)	
Ventilation	Improved	65	100	65	100	..

## DISCUSSION

Corticosteroids have been used previously for various respiratory illnesses. They have role in reducing inflammation in asthma and acute exacerbation of COPD.<sup>6</sup>

Clinical studies suggested that dysregulation of immune response, especially T cells, might be highly involved in the pathological process of COVID-19<sup>7</sup>. Corticosteroids have immune suppression property therefore studies were conducted to observe their role in improvement of COVID-19 infection. Corticosteroids are the treatment of choice for acute respiratory distress syndrome due to COVID-19 pneumonia.<sup>8</sup>

Syeda et al had compared between the both steroids in the management of moderate and severe COVID-19, and had

noted that oxygen requirement was reduced more in patient receiving dexamethasone.<sup>9</sup>

Study by Mezzeoui showed shorter duration of hospitalization (7.21 days) in methylprednisolone group versus 8.29 days in dexamethasone group.<sup>9</sup> Another study conducted by Keivan Ranjbar found the same results.<sup>10,11</sup>

Study by Ko showed that in patients requiring mechanical ventilation mortality was 42% lower in methylprednisolone group than in dexamethasone group.<sup>12</sup>

Study by Pinzon showed that high dose of methylprednisolone decreased significantly compared with dexamethasone, the recovery time, the need for transfer to intensive care, and severity markers.<sup>13</sup>

Our results didn't show any significant difference in outcome in both groups.

## CONCLUSION

From our study it is evident that both corticosteroids methylprednisolone and dexamethasone are effective in management of moderate to severe COVID-19 patients. Both drugs improved clinical outcome, SpO<sub>2</sub> level, marker status and ventilation status thus decreased the duration of hospitalization. However, the overall difference in outcome between the two groups was not statistically significant. Hence in COVID-19 patients requiring mechanical ventilation sufficiently dosed methylprednisolone or dexamethasone can lead to decreased mortality. Limitation of our study was sample size which restricted the generalization of the findings.

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## REFERENCES

1. Coronavirus Disease 2019 (COVID-19). Situation Report-58. World Health Organisation. 2020. Available at: <https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200318-sitrep-58-covid-19.pdf>. Accessed on 12<sup>th</sup> April 2023.
2. Yuki K, Fujiogi M, Koutsogiannaki S. COVID-19 pathophysiology: a review. *Clin Immunol.* 2020;215:108427.
3. Xu Z, Shi L, Wang Y. Pathological findings of COVID-19 associated with acute respiratory distress syndrome. *Lancet Respir Med.* 2020;8:420-2.
4. Arabi YM, Mandourah Y, Al-Hameed F. Corticosteroid therapy for critically ill patients with Middle East respiratory syndrome. *Am J Respir Crit Care Med.* 2018;197:757-67.
5. Lee N, Allen Chan KC, Hui DS. Effects of early corticosteroid treatment on plasma SARS-associated Coronavirus RNA concentrations in adult patients. *J Clin Virol.* 2004;31:304-9.
6. Meduri GU, Siemieniuk RAC, Ness RA, Seyler SJ. Prolonged low-dose methylprednisolone treatment is highly effective in reducing duration of mechanical ventilation and mortality in patients with ARDS. *J Intensive Care.* 2018;6:53.
7. Edalatfard M, Akhtari M, Salehi M, Naderi Z, Jamshidi A, Mostafaei S et al. Intravenous methylprednisolone pulse as a treatment for hospitalised severe COVID-19 patients; results from a randomised controlled clinical trial. *Eur Respir J.* 2020;56(6):2002808.
8. Sethi GR, Singhal KK. Pulmonary diseases and corticosteroids. *Indian J. Pediatr.* 2008;75(10):1045-56.
9. Marik PE. Steroids for sepsis: yes, no or maybe. *J Thorac Dis.* 2018;10(9):1070-7.
10. Kellog D, Gutierrez GC, Small CE, Stephens B, Sanchez P, Beg M et al. Safety and efficacy of methylprednisolone versus dexamethasone in critically ill patients with COVID-19 acute respiratory distress syndrome: a retrospective study. *Ther Adv Infect Dis.* 2023;546.
11. Fatima SA, Asif M, Khan KA, Siddique N, Khan AZ. Comparison of efficacy of dexamethasone and methylprednisolone in moderate to severe COVID-19 disease. *Ann Med Surg.* 2020;60:413-6.
12. El Mezzeoul, El Aldouni G, Merbouh M, El Kaouini A, Aftiss F Z, Berrichi S et al. Dexamethasone or methylprednisolone therapy in COVID-19 pneumonia: A retrospective and comparative study of 513 cases. *Ann Med Surg.* 2021;70:102858.
13. Ranjbar K, Moghadami M, Mirahmadizadeh A. Methylprednisolone or dexamethasone, which one is superior corticosteroid in the treatment of hospitalized COVID-19 patients: a triple-blinded randomized controlled trial. *BMC Infect Dis.* 2021;21.
14. Ko JJ, Wu C, Mehta N, Wald Dicler N, Yang W, Qiao R. A comparison of methylprednisolone and dexamethasone in intensive care patients with COVID-19. *J Intensive Care Med.* 2021;36(6):673-80.
15. Pinzon MA, Holguin H, Betancur JF, Crdona Arango D, Laniado H, Arias C et al. Dexamethasone vs methylprednisolone high dose for COVID-19 pneumonia. *PLoS One.* 2021;16(5).

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