



EVALUATION OF COMPLETE BLOOD COUNT AND D-DIMER IN COVID 19 PATIENTS DURING SECOND WAVE AT A TERTIARY CARE HOSPITAL

Pathology

Dr. Pooja Khakhkhar

Resident doctor, Department of Pathology, Government medical college, Bhavnagar

Dr. Alpeshpuri Goswami*

Associate Professor, Department of Pathology, Government medical college, Bhavnagar

*Corresponding Author

ABSTRACT

Introduction: Coronavirus disease 2019 (COVID-19) pandemic represents a scientific and social crisis. Several haematological parameters, such as total leukocyte count, lymphocytes, neutrophils and platelets were described to be associated with COVID-19 infection and severity. The purpose of these study is to describe about complete blood count and d-dimer alterations during COVID-19 infection, and to summarize their crucial role during the course of the disease. Elevated d-dimer level ($>1 \mu\text{g/ml}$) on hospital admission have been identified as being associated with increased mortality [1], and levels greater than $2 \mu\text{g/ml}$ predict fatal outcomes in patients.[2] **Aims and Objectives:** To evaluate trend in complete blood count and d-dimer in COVID 19 hospitalized patients. To assess the correlation between abnormality of these parameters with severity of disease and clinical outcome. **Materials and method:** A Retrospective study on 500 COVID 19 positive patients was conducted by department of pathology, Government medical college and Sir. T. Hospital, Bhavnagar, Gujarat during period of 1st March 2021 to 31st May 2021. **Results:** The Odds ratio of increased d-dimer level, severe leukocytosis, and thrombocytopenia for severe COVID 19 cases showed significant correlation (OR- 7.2, 3.3 and 5 respectively). Out of 161 deceased patients, 148 (92%) had severe increase in d-dimer level on admission; 3 (2%) had severe increase in d-dimer level on 7 $\pm$ 2 day and 10 (6%) patients had severe increase in d-dimer level on 14 $\pm$ 3 day. **Conclusion:** Increased d-dimer level, leukocytosis and thrombocytopenia were found to be significant predictors of developing severe COVID-19 disease.

KEYWORDS

COVID 19, Complete blood count, d-dimer.

INTRODUCTION

Coronavirus disease 2019 (COVID-19) pandemic represents a scientific and social crisis. Several haematological parameters, such as total leukocyte count, lymphocytes, neutrophils and platelets were described to be associated with COVID-19 infection and severity. The purpose of these study is to describe about complete blood count and d-dimer alterations during COVID-19 infection, and to summarize their crucial role during the course of the disease. Elevated d-dimer level ($>1 \mu\text{g/ml}$) on hospital admission have been identified as being associated with increased mortality^[1], and levels greater than $2 \mu\text{g/ml}$ predict fatal outcomes in patients.^[2] In this study, we have assessed the role of d-dimer in relation to clinical course of patients with COVID-19.

MATERIAL AND METHODS

Inclusion Criteria:

A Retrospective study on 500 COVID 19 positive patients admitted in Sir T Hospital during 1st March, 2021 to 31st May, 2021 whose CBC and d-dimer reports are available in pathology department.

Exclusion Criteria:

Those records whose outcome and severity were not available.

OBSERVATION AND RESULTS

- Following conclusions were drawn from our study:

Table I: Comparison of platelet count at various time points according to COVID 19 severity score

COVID 19 Severity Score*	No. of patients	Day 1			3 $\pm$ 1 Days			7 $\pm$ 2 Days			14 $\pm$ 3 Days		
		Thrombocytopenia			Mild	Mod	Severe	Mild	Mod	Severe	Mild	Mod	Severe
		Mild	Mod	Severe									
Mild	125	125 100%	Nil	Nil	125 100%	Nil	Nil	125 100%	Nil	Nil	125 100%	Nil	Nil
Mod+	208	110 53%	95 46%	3 1%	148 71%	60 29%	Nil	160 77%	48 23%	Nil	202 97%	6 3%	Nil
Severe	167	Nil	132 79%	35 21%	Nil	145 87%	22 13%	35 21%	102 61%	30 18%	35 21%	100 60%	32 19%

*COVID 19 severity score on admission

+Mod=Moderate

- Mild thrombocytopenia – ($50,000/\mu\text{L}$ - $1,50,000 \text{ cells}/\text{mm}^3$)
- Moderate thrombocytopenia – ($50,000/\mu\text{L}$ - $99,000 \text{ cells}/\text{mm}^3$)
- Severe thrombocytopenia – ($<50,000 \text{ cells}/\text{mm}^3$)

In the patients with mild severity score of COVID 19, thrombocytopenia remains mild at the time of admission and even thereafter. In patients with moderate severity score of COVID 19,

- Age wise distribution shows that the incidence of COVID 19 among hospitalized patients was highest among adults (57%) and mortality was more in elderly (59%).
- Gender wise distribution shows that incidence, severity as well as mortality was more among male.
- Severity wise distribution shows that majority of cases had moderate score (42%) of COVID 19 on admission and mortality was more among those with severe COVID 19 disease (74%).
- Distribution of patient outcome shows that 32 % of hospitalized COVID 19 patients were deceased.
- Distribution of patient outcome among comorbid COVID 19 patients shows that out of 208 comorbid patients, 56 % were deceased.
- In the patients with mild severity score of COVID 19, anemia remains mild at the time of admission and thereafter. In patients with moderate and severe severity score of COVID 19, we observed improved haemoglobin levels at subsequent follow up.
- In patients with mild and moderate severity score of COVID 19, there is improvement in total leukocyte count at subsequent follow up. In patients with severe severity score of COVID 19, the percentage of patients with severe leukocytosis increases at the end of hospitalization. Out of 208 comorbid patients, 77 (64%) had severe leukocytosis. The Odds ratio of severe leukocytosis for severe COVID 19 cases showed significant correlation (OR- 3.3).

initially there was thrombocytopenia and on subsequent follow up, it was observed that the platelet count had increased.

Whereas in patients with severe severity score of COVID 19, initially there was thrombocytopenia which improved on subsequent follow up although 19 % patients showed no improvement. Out of 500 Hospitalized patients, 227 (45.4%) had thrombocytopenia and 83 (17%) had severe thrombocytopenia.

Table II: Comparison of d-dimer level at various time points according to

COVID 19 Severity score*	No of Patients	Day 1			3±1 Days			7±2 Days			14±3 Days		
		D-dimer level											
		Mild	Mod	Severe	Mild	Mod	Severe	Mild	Mod	Severe	Mild	Mod	Severe
Mild	125	86 69%	39 31%	Nil	93 74%	32 26%	Nil	109 87%	16 13%	Nil	125 100%	Nil	Nil
Mod+	208	69 33%	132 63%	7 3%	70 34%	129 62%	9 4%	89 43%	106 51%	13 6%	105 50%	99 48%	4 2%
Severe	167	Nil	71 43%	96 57%	Nil	79 47%	88 53%	6 4%	93 56%	68 41%	11 7%	99 59%	57 34%

COVID 19 severity score

*COVID 19 severity score on admission

+Mod=Moderate

- Mild increase in d-dimer level – (<1000 ng/ml)
- Moderate increase in d-dimer level – (1000-2000 ng/ml)
- Severe increase in d-dimer level – (>2000 ng/ml)

In patients with mild severity score of COVID 19, there is improvement in d- dimer level with all the patients having mild increase in d-dimer level at the end of hospitalization. In patients with moderate severity score of COVID 19 also, there is improvement in d-dimer level at the end of hospitalization. Whereas in patients with severe severity score of COVID 19, d-dimer level does improve at the end of hospitalization, still >50 % had moderate increase in d-dimer level and 34% patients had severe d-dimer level.

DISCUSSION

The following observations have been obtained from other studies:-

- Jakhmola et al.^[5] after collecting data from eight distinct countries got maximum incidence of COVID 19 in the age group of 20-49 years (62.2%) and in our study it was (57%). Maximum mortality in Jakhmola et al. was in age of 50 years and above was (73.7%), which in our study was (59%).
- Studies of Tahir ahmad margay et al.^[4] and Budhiraja, S. et al.^[5] showed increased incidence of COVID 19 in male with 58.7% and 64% respectively and in our study it was 59% which is similar. Also among deceased, male were more than female in both these studies with 61.7% in Tahir ahmad margay et al. study, 66% in Budhiraja, S. et al study and 55% in our study, which is similar.
- Our study as well as study by Hu L et al.^[6] shows higher percentage of male among severe cases of COVID 19 i.e. 59% and 52.7% respectively.
- Study by Budhiraja, S. et al^[5] shows maximum cases having severe score of COVID 19 with 39.3% compared to our study were maximum cases were having moderate score of COVID 19 with 42%.
- In a study by Zhou F et al, 72% cases got cured and 28% cases were deceased. In our study 68% cases got cured and 32% cases were deceased which is similar to Zhou F et al study. Our study and study by Zhou F et al.^[7] have 42% and 48% of comorbid patients respectively, which is similar.
- Our study and study by Zhao K et al.^[8] have 64% and 71.2% of comorbid patients with severe leukocytosis respectively, which is similar.
- A study by Jiang SQ et al.^[9] got an Odds ratio of 3.4 and 11.7 for correlation of thrombocytopenia with severe cases and deceased cases of COVID 19 respectively, which in our study were 5 and 7 respectively and is thus similar.
- Our study and study by Kanakaraju K et al.^[10] showed 74% and 85% of severe cases of COVID 19 having increased d-dimer level respectively, which is similar.
- In a study by Poudel A et al.^[11] 43% of deceased patients had increased d-dimer level whereas in our study 92% of deceased patients had increased d-dimer level.

CONCLUSION

- In this study we have assessed the trend and alterations in laboratory markers and have observed that there is significant correlation of these parameters in predicting disease severity and outcome.
- Accordingly, increased d-dimer level, leukocytosis and thrombocytopenia were found to be significant predictors of developing severe COVID-19 disease.
- In addition, increasing age, male gender and presence of comorbidities were also associated with poor outcome of disease.

REFERENCES

1. Zhu, N., Zhang, D., Wang, W., Li, X., Yang, B., Song, J., ... & Tan, W. (2020). A novel

coronavirus from patients with pneumonia in China, 2019. *New England journal of medicine*.

2. NS, Z., BJ, Z., YM, L., ZH, X., KH, C., PH, L., & SY, T. (2003). Epidemiology and cause of severe acute respiratory syndrome (SARS) in Guangdong, People's Republic of China, in February, 2003. *The Lancet*, 362(9393), 1353-1358.
3. Jakhmola, S., Baral, B., & Jha, H. C. (2021). A comparative analysis of COVID-19 outbreak on age groups and both the sexes of population from India and other countries. *The Journal of Infection in Developing Countries*, 15(03), 333-341.
4. Magray, T. A., Nazir, U., Rather, R. H., & Wani, F. A. (2022). Demographic and Mortality Trends across three COVID-19 waves in Kashmir Division, India. *Asian Journal of Medical Sciences*, 13(10), 23-28.
5. Budhiraja, S., Indrayan, A., Aggarwal, M., Jha, V., Jain, D., Tarai, B., ... & Sharma, S. (2021). Differentials in the characteristics of COVID-19 cases in Wave-1 and Wave-2 admitted to a network of hospitals in North India. *Medrxiv*, 2021-06.
6. Hu L, Chen S, Fu Y, Gao Z, Long H, Ren HW, et al. Risk factors associated with clinical outcomes in 323 coronavirus disease 2019 (COVID-19) hospitalized patients in Wuhan, China. *Clinical infectious diseases*. 2020 Oct 15;71(16):2089-98.
7. Zhou, F., Yu, T., Du, R., Fan, G., Liu, Y., Liu, Z., ... & Cao, B. (2020). Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study. *The lancet*, 395(10229), 1054-1062.
8. Zhao, K., Li, R., Wu, X., Zhao, Y., Wang, T., Zheng, Z., ... & Nie, H. (2020). Clinical features in 52 patients with COVID-19 who have increased leukocyte count: a retrospective analysis. *European Journal of Clinical Microbiology & Infectious Diseases*, 39, 2279-2287.
9. Jiang SQ, Huang QF, Xie WM, Lv C, Quan XQ. The association between severe COVID 19 and low platelet count: evidence from 31 observational studies involving 7613 participants. *British journal of haematology*. 2020 Jul;190(1):e29-33.
10. Kanakaraju, K., Pandiyan, M. S., Ranganathan, R. S., & Asokan, A. (2021). Prevalence and outcomes of D dimer elevation among the COVID-19 patients in tertiary care hospital, Salem. *Journal of Family Medicine and Primary Care*, 10(12), 4478.
11. Poudel, A., Poudel, Y., Adhikari, A., Aryal, B. B., Dangol, D., Bajracharya, T., ... & Gautam, R. (2021). D-dimer as a biomarker for assessment of COVID-19 prognosis: D-dimer levels on admission and its role in predicting disease outcome in hospitalized patients with COVID-19. *Plos one*, 16(8), e0256744.