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General Medicine

STUDY OF C-REACTIVE PROTEIN LEVELS IN ASYMPTOMATIC AND SYMPTOMATIC COVID-19 PATIENTS

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ABSTRACT

INTRODUCTION: In December 2019 , a case of pneumonia was reported in Hubei Province, China. The causative agent was described as severe acute respiratory syndrome coronavirus -2 (SARS-CoV-2). The disease was named as COVID-19 (Coronavirus disease-2019). It had spread worldwide and W.H.O. declared it as pandemic. COVID-19 presentation is variable, from asymptomatic to mild symptomatic and severe form. To prevent morbidity and mortality from COVID-19, it is better to early identify the severity of the disease. For this purpose we are doing this study to know the c-reactive protein levels in COVID-19 patients. **AIMS AND OBJECTIVES:** To study correlation of C-reactive protein (CRP) levels and severity of the disease in COVID-19 patients. **MATERIALS AND METHODS: INCLUSION CRITERIA:** Patients positive for COVID-19 by RTPCR test. **EXCLUSION CRITERIA:** Patients who are suffering from chronic inflammatory diseases and malignancies. **RESULTS:** In our study among 50 of asymptomatic COVID-19 patients 41 patients had normal CRP and 9 patients had minimal elevation. Among 50 of symptomatic COVID-19 patients 38 patients had high elevation, 10 patients had moderate elevation and 2 patients had mild elevation of CRP. **CONCLUSION:** In our study CRP level is proportionately elevated with the severity of the disease in COVID-19 patients. Early identification of CRP levels will help the physicians to identify the severe cases and give effective treatment, to prevent morbidity and mortality from COVID-19.

KEYWORDS : C-reactive protein (CRP); COVID-19; SARS-CoV-2; Inflammatory markers; RTPCR test.

INTRODUCTION

In December 2019, a case of pneumonia of unknown origin was reported in Hubei Province, China.[1] The causative pathogen, isolated from human airway epithelial cells, was found to be a novel enveloped betacoronavirus,[2] now known as Severe acute respiratory syndrome corona virus-2 (SARS-CoV2). The disease was named COVID-19. Though it shares phylogenetic similarity with SARS-CoV, it is the seventh member of the family of coronaviridae to infect humans.[3] Given the rapid spread of COVID-19 and the steep rise in morbidity and mortality it caused, the World Health Organization (WHO) declared it as a pandemic on 11th March, 2020.[1,4-6] This illness ranges in severity from asymptomatic or mild to severe disease.

The Huanan sea food market in city of Wuhan of Hubei province in Central China suddenly emerged on world map as an epicentre of the origin of SARS-CoV-2 disease. With a mode of spread thought to be occurring through direct contact, aerosol and faeco-oral route, human-to-human transmission of SARS-CoV-2 occurred rapidly, and the atypical symptoms especially during the early stage of disease summoned further disadvantage. Till now worldwide 70.85 million people have been infected and 1.5 million people died due to COVID-19. Till now in India 9.79 million people have been infected and 1.42 lakh people have died due to COVID-19.

The most common complications in non-survivors of COVID-19 infected patients include acute respiratory distress syndrome, acute cardiac injury, acute kidney injury, shock, disseminated intravascular coagulation and a significant alteration in CRP levels have been observed in these patients.[7] A positive correlation between CRP concentration with lung lesion in COVID-19 infected patients has been demonstrated.[8] Furthermore, the induction of acute kidney damage[9] and the extent of cardiac injury[10] has been directly linked with the CRP concentrations. C-reactive protein is a substance produced by the liver in response to inflammation. A high level of CRP in the blood is a marker of inflammation. It can be caused by a wide variety of inflammations, from infections to cancers.

AIMS AND OBJECTIVES

- To study the c-reactive protein levels in asymptomatic COVID-19 patients.
- To study the CRP levels in symptomatic COVID-19 patients.
- To study the correlation between CRP levels and severity of the disease in COVID-19 patients.

MATERIALS AND METHODS
INCLUSION CRITERIA

- Patients positive for COVID-19 by RTPCR test.
- Age more than 18 years.
- Patients admitted in COVID-19 intensive care unit, S.V.R.R.G.G. Hospital, Tirupati.

EXCLUSION CRITERIA

- Patients age less than 18 years.
- Patients who are suffering from chronic inflammatory diseases like arthritis, malignancies.

RESULTS

In our study total 100 COVID-19 patients were included. Among these 50 were asymptomatic and 50 were symptomatic. All these patients were admitted in COVID-19 special ward and intensive care unit in S.V.R.R.G.G. Hospital , Tirupati. All these patients were tested positive for COVID-19 by RTPCR test. In asymptomatic group, 18 were females and 32 were males. Age of asymptomatic group patients varies from 20-50 years. In symptomatic group, 14 patients were females and 36 were males. Age of symptomatic group varies from 40-80 years. For all these patients routine investigations like complete blood count, blood sugar, liver function tests, renal function tests and chest X-ray PA view were done. For all these patients special investigations like C-reactive protein (CRP), d-dimer, LDH, Serum ferritin and CT scan chest were done.

Table.1: CRP levels in asymptomatic COVID-19 patients.

S. No.	CRP level	No. of patients	Percentage
1	Normal (<0.6 mg/l)	41	82%
2	Mild elevation (0.6-1mg/l)	9	18%

Table.2: CRP levels in symptomatic COVID-19 patients.

S.No.	CRP level	No. of Patients	Percentage
1	Mild elevation (0.6-1mg/l)	2	4%
2	Moderate elevation (1-3mg/l)	10	20%
3	Severe elevation (>3mg/l)	38	76%

In this study normal CRP level was taken as <0.6 mg/l. Elevated levels of CRP graded into 3 categories - Mild elevation (0.6 -1mg/l), Moderate elevation (1-3mg/l) and severe elevation (>3mg/l). In asymptomatic group, 41 patients(82%) had normal CRP levels and 9 patients(18%) had minimal elevation of CRP levels. In symptomatic COVID-19 patients, 2 patients (4%) had mild elevation and 10 patients (20%) had moderate elevation of CRP. Among the remaining 38 symptomatic patients (76%) had high elevation of CRP.

DISCUSSION

COVID-19 infection has wide variety of presentation. In majority of infected patients, it manifests as asymptomatic to mildly symptomatic. But few percentage of patients will develop severe disease. To prevent morbidity and mortality from COVID-19, it is better to early identify the disease severity and give effective treatment. Scientists have found five medical indicators in the blood of COVID-19 patients which are associated with high rates of death due to the disease, finding that can help physician better predict clinical outcome of those infected with the novel corona virus. These are IL-6, d-dimer, CRP, LDH and serum ferritin.

Early monitoring of key indicators was an important basis to guide treatment strategies, and early assessment of the severity of patients' condition was of great value.[11] The main pathological changes of COVID-19 are lung and immune system damage.[12] CRP levels are correlated with the level of inflammation and its concentration level is not affected by factors such as age, sex and physical condition.[13] We have selected this study to know the role of CRP levels for early detection of severe COVID-19 infection. In this study total 100 patients of COVID-19 were included. Among these 50 were asymptomatic and 50 were symptomatic. In asymptomatic group majority of patients had normal CRP levels. In symptomatic group majority of patients (76%) had severe elevation of CRP. In symptomatic group 20% had moderate elevation and 4% had mild elevation of CRP. Our study indicates CRP levels are correlating with the severity of the disease in COVID-19 patients. These findings are comparable with the study of Wang Ling, which reported that at the early stage of COVID-1 CRP levels were positively correlated with lung lesion and CRP levels could reflect disease severity and should be used as a key indicator for disease monitoring.[8]

CONCLUSION

Covid-19 patients have wide range of presentations to the hospitals. Majority of infected people are asymptomatic to mildly symptomatic. But few percentage of COVID-19 infected patients are developing severe form of disease. To prevent morbidity and mortality from COVID-19, it is better to early identify the severity of the disease. One of the best investigations to know the severity of the disease is c-reactive protein level. CRP levels are correlating with the severity of the disease. For all COVID-19 patients, it is better to investigate CRP levels and patients who have high CRP levels have to be admitted in COVID-19 ICU ward, for better treatment, to prevent morbidity and mortality.

REFERENCES

1. Huang C, Wang Y, Li X, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. Lancet 2020; 395: 497-506.
2. Lu R, Zhao X, Li J, et al. Genomic characterisation and epidemiology of 2019 novel coronavirus: implications for virus origins and receptor binding. Lancet 2020; 395:565-574.
3. Zhu N, Zhang D, Wang W, et al. A novel coronavirus from patients with pneumonia in China, 2019. N Engl J Med 2020; 382:727-733.
4. World Health Organization. Coronavirus disease (COVID-19) outbreak (https://www.who.int).
5. Chen N, Zhou M, Dong X, et al. Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. Lancet 2020;395:507-513.
6. Wang D, Hu B, Hu C, et al. Clinical characteristics of 138 hospitalized patients with 2019 novel coronavirus – infected pneumonia in Wuhan, China. JAMA 2020 February 7.
7. Deng Y., Liu W., Liu K., Fang Y.-Y., Shang J., Zhou L., Wang K., Leng F., Wei S., Chen L., Liu H.-G. Clinical characteristics of fatal and recovered cases of coronavirus disease 2019 (COVID-19) in Wuhan, China: a retrospective study. Chin. Med. J. (Engl.) 2020
8. Wang L. C-reactive protein levels in the early stage of COVID-19. Medecine et maladies infectieuses. 2020
9. Y. Tang, X.R. Huang, J. Lv, A.C. Chung, Y. Zhang, J.Z. Chen, A.J. Szalai, A. Xu, H.Y. Lan, C-reactive protein promotes acute kidney injury by impairing G1/S-dependent tubular epithelial cell regeneration, Clinical science (London, England : 1979) 126(9) (2014) 645-59.
10. Orn S., Manhenke C., Ueland T., Damas J.K., Mollnes T.E., Edvardsen T., Aukrust P., Dickstein K. C-reactive protein, infarct size, microvascular obstruction, and left-ventricular remodelling following acute myocardial infarction. Eur. Heart J. 2009;30(10):1180–1186.
11. Li G., De Clercq E. Therapeutic options for the 2019 novel coronavirus (2019-nCoV) Nat Rev Drug Discov. 2020;19(3):149–150. doi: 10.1038/d41573-020-00016-0.
12. General office of the national health commission of China Covid-19 diagnostic and therapeutic regimen (trial 7th, edition) J Cardiopulm Rehabil Prev. 2020;39(02):103–107.
13. Bilgir O., Bilgir F., Calan M. Comparison of pre-and post-levothyroxine high-sensitivity C-reactive protein and fetuin-A levels in subclinical hypothyroidism. Clinics. 2015;70(2):97–101. doi: 10.6061/clinics/2015(02)05.