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**D-DIMER AS A BIOMARKER FOR DISEASE SEVERITY IN COVID-19 PATIENTS: SOME  
 PHYSIOLOGICAL ASPECTS**

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Doi: <https://doi.org/10.52340/jecm.2023.01.09>

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**დ-დიმერი როგორც დაავადების სიმძიმის ბიომარკერი კოვიდ-19 პაციენტებში:  
 ზოგიერთი ფიზიოლოგიური ასპექტი**  
 ბათუმის შოთა რუსთაველის სახელმწიფო უნივერსიტეტი, ბათუმი, საქართველო

### რეზიუმე

სწრაფი გავრცელებისა და მაღალი სიკვდილიანობის გამო კოვიდ-19 გლობალურ პრობლემას წარმოადგენს. ლიტერატურის მიხედვით დ-დიმერის დონის მატება ასოცირდება როგორც დაავადების მიმდინარეობის სიმძიმესთან, ასევე სიკვდილიანობასთან. ზემოაღნიშნულიდან გამომდინარე, ჩვენ შევისწავლეთ დ-დიმერის დონე კოვიდ-19 დაავადებულ პაციენტებში. სულ შესწავლილი იქნა 40 კოვიდ-ინფიცირებული პაციენტი. კვლევის მასალად გამოყენებული იქნა სისხლი. კვლევის შედეგებმა აჩვენეს, რომ დ-დიმერის დონე მნიშვნელოვნად არის გაზრდილი კოვიდ-19-ით ინფიცირებულ პაციენტებში და მისი დონე მნიშვნელოვნად მატულობს დაავადების დამძიმებასთან ერთად ( $p < 0,0001$ ). D-დიმერის მაღალი დონე ნაჩვენებია პაციენტებში, რომლებიც გარდაიცვალნენ ჰოსპიტალში.

### Introduction

Biomarkers are biological molecule found in blood, other body fluids, or tissues that is a sign of a normal or abnormal process. Corona virus infectious disease 2019 (COVID-19) infections, a highly coagulative and inflammatory state, predispose patients to be arterial and venous thrombotic events due to platelet activation, endothelial dysfunction, and stasis. Recent evidence of a highly inflammatory condition during severe COVID-19 infection has encouraged investigations for specific biomarkers and their relationship with disease evolution. The D-dimer molecule consists of 2 cross-linked D fragments from fibrinogen. As already well known, Determining the D-dimer level is very important to assess the risk of thrombosis. There are several reasons why elevated levels of D-dimer indicate the severity of the disease [2]. 58% of COVID-19 patients' autopsy have shown death due to pulmonary embolism or venous thrombosis, while 70% of patients died due to DIC [3,4]. In current clinical practice, dimer levels are used as a biomarker for DIC and for estimation and early diagnosis of Deep Vein Thrombosis (DVT). Average D-dimer levels in infected patients are 0.9 mg/l, and 36% of COVID-19-infected patients have a value greater than mentioned [1]. Timely assessment of D-dimer levels and coagulation parameters, especially at the initial stage of the disease, can be vital in disease control and management. In this article we investigated D dimer levels in covid-19 patients.

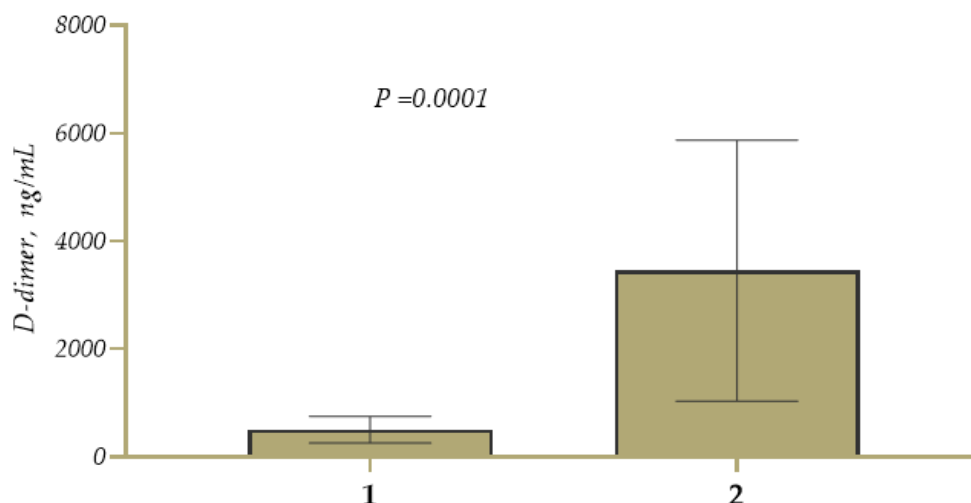
**Materials and methods:** We investigated 40 Covid-19 patients. The average age of the patients in each group - is 61-70. The polymerase chain reaction (PCR) test was used to reveal the Covid-19 infection. The determination of plasma D-dimer levels was used in the ELISA method.

**The result and discussion.** The D-dimer level was increased ~ 6,8-times in severe patients compared to the first group. The first group was 503,0±247,2 ng/ml; the second group was 3451±2420 ng/ml ( $p=0.0001$ ). It should be noted that the C-reactive protein level was also elevated ~2-fold ( $p=0.0002$ ).

D-Dimer is a fibrin degradation product used as a biomarker for the pro-thrombotic state. Its levels were not used as a biomarker previously for bacterial or viral infections. Since the outbreak of Covid 19, D dimer has been used as a potential biomarker for prognosis and treatment management in clinical settings. D dimer levels are significantly increased in critical or severe patients compared to mild/moderate patients indicating markedly high inflammation and consumptive coagulation state [5]. The elevated D-dimer levels have now become a common feature that can be correlated with the

severity and mortality associated with the disease and could be used as a marker to differentiate between COVID-19 patients.

Thus, it can be concluded that D dimer's levels were significantly associated with the severity of disease of Covid-19 ( $P=0.0001$ ).



**Picture 1.** The study of D-Dimer levels in covid-19 patients  
1. Survival patient (n=20); 2. Non-survival patients (n=20);

#### References:

1. Guan, W. J., Ni, Z. Y., Hu, Y., Liang, W. H., Ou, C. Q., He, J. X., et al. (2020). Clinical characteristics of coronavirus disease 2019 in China. *New England journal of medicine*, 382(18):1708-20.
2. Wong, J. P., Viswanathan, S., Wang, M., et al. (2017). Current and future developments in the treatment of virus-induced hypercytokinemia. *Future medicinal chemistry*, 9(2):169-178.
3. Tang, N., Bai, H., Chen, X., Gong, J., Li, D., Sun, Z. (2020). Anticoagulant treatment is associated with decreased mortality in severe coronavirus disease 2019 patients with coagulopathy. *Journal of thrombosis and hemostasis: JTH*, 18(5):1094-1099.
4. Wichmann, D., Sperhake, J. P., Lütgehetmann, M., Steurer, S., Edler, C., Heinemann, A., Kluge, S. (2020). Autopsy findings and venous thromboembolism in patients with COVID-19: a prospective cohort study. *Annals of internal medicine*, 173(4):268-277.
5. Zhang, J. J., Dong, X., Cao, Y. Y., Yuan, Y. D., Yang, Y. B., Yan, Y. Q., Gao, Y. D. (2020). Clinical characteristics of 140 patients infected with SARS-CoV-2 in Wuhan, China. *Allergy*, 75(7):1730-1741.

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#### **SUMMARY**

Because of the rapid spreading and high mortality of Covid-19, it represents a global problem. According to the literature, an increase in the level of D-dimer was indicated during complications of disease and mortality. To the above-mentioned, we studied the D-dimer level in patients with Covid-19. In total, we investigated 40 Covid infected patients. As research material, we used blood. The research results showed that the level of D-dimer increases significantly in Covid-19 infected patients. And, its increasing level is associated with the severity of patients ( $p<0,0001$ ). In particular, a high level of D-dimer was shown in the patients that died in the hospital. Therefore D-dimer could be used as a biomarker during Covid disease in Covid-19 patients and for prognosis and treatment management in clinical practice.

**Keywords:** D-dimer, COVID-19, blood