

Original paper

Correlation of the use of corticosteroid in male patients with COVID-19 and serum level of D-dimer

Ali Mansoor Al Ameri^{^*}

[^] College of Medicine University of Kerbala.

Abstract

Background: The Global pandemic, COVID-19, represents an emotional challenge for medical institutions because of unpredictable complications and the rapidity of its spread. One of the critical complications associated with COVID-19 insult is cardiovascular coagulopathy which can be fatal. This life-threatening sequel could be predicted by estimating the serum level of D-dimer. The latter is a well-known diagnostic marker of COVID-19 infection. Besides, D dimer is a fibrin metabolite and is directly related to the overall coagulation process in the body. Corticosteroid is the mainstay of treatment of moderate and severe cases of COVID-19 infection, especially those with significant hypoxia.

Aim of the study: to evaluate whether using corticosteroids minimizes the occurrence of coagulopathy, an effect marked by a reduction of the level of D-dimer during the course of the disease.

Patients and Methods: A total of 152 male patients infected with COVID-19 were selected randomly. A specialist Physician diagnosed them according to standard guidelines. Patients were non-diabetic and non-hypertensive; 72 of them received dexamethasone for 5 days from the start of treatment of COVID-19. Serum level of D- dimer was estimated after seven days of starting treatment then statistical analysis was done.

Results: Data of the current study revealed a significant reduction in the serum level of D-dimer in patients who received dexamethasone treatment compared to the other group who did not receive dexamethasone.

Conclusion: It was concluded that using dexamethasone significantly decreases the serum level of D-dimer and thus may minimize the possibility of coagulopathy induced as a result of COVID-19 infection.

Keyword: D-dimer, COVID-19, dexamethasone.

Introduction

Globally, as of 5:45 pm CEST, 22 October 2021, there have been 242,348,657 confirmed cases of COVID-19, including 4,927,723 deaths, reported to WHO. As of 21 October 2021, a total of 6,655,399,359 vaccine doses have been administered (1). Infection with COVID-19 is still one of the most challenging, health-threatening diseases, with many morbidity and mortality rates worldwide (2). The complexity of COVID-19 infection came from variable presentations and

unpredictable sequel of the disease that, in some instances independent of the patient's age or concomitant diseases(3). One of the unpredicted complications of COVID-19 infection is coagulopathy, which has a crucial impact on mortality (4,5). This complication causes a variety of presentations like a cardiovascular accident and acute ischemic heart attack, and, in some cases reported in many centers, retinal ischemia may be induced by the thromboembolic phenomenon(6,7). Estimation of serum level of D- dimer is used in laboratories as a simple and highly representative test to detect the possibility

of coagulopathy (8) due to initially COVID-19 resulting in a significant raising in D-dimer, fibrin/fibrinogen degradation products (FDP) (9,10).

Corticosteroids are regarded as anti-inflammatory drugs with heterogeneous metabolic activity (11). This group has been used successfully for the treatment of a wide range of coagulopathic disorders like congenital Kasabach–Merritt syndrome (12), idiopathic thrombocytopenic purpura(13), and many other disorder(14). Dexamethasone is one of the most commonly used members of corticosteroid drugs. It is widely used as a major element in COVID-19 treatment protocol, especially in the case of associated hypoxia. A significant reduction in the mortality rate of severe COVID-19 infection after using corticosteroids highlighted it as life-saving therapy (15,16).

The study investigates the role of dexamethasone therapy in reducing the serum level of d-dimer in patients with covid 19 infection.

Patients and methods

This cross-sectional study was performed from August 2020 through March 2021. Herein, 160 male adults' patient (age range 35-43 years). Informed consent was taken from each participant in addition to the institutional consent represented by approval of the bioethical committee of the College of Medicine, University of Kerbala. Males were selected as they are more prone to thrombotic complications of covid 19 infection. Patients with preexisting diseases that lead to high serum D dimers, such as diabetes mellitus, cancer,

and stroke, were excluded (17). Eight patients were excluded because they were detected later on as diabetic patients. The remainders (152 patients) were divided on the bases of either receiving dexamethasone during initial therapy of COVID-19 (Group A n=72 patients) or not (Group B n=80 patients). Group A received the exactly similar regimen of drugs as group B, except that group A received dexamethasone eight mg twice daily for seven days. As indicated by the treatment guidelines, the steroid was given to patients with less than 94% oxygen saturation. Venous blood samples were taken from patients, and sera were collected and kept in a plain tube until the D-dimer test was undertaken. D-dimer was estimated (using Cobas-C311 D-dimer test kit from Roche) seven and 14 days after initiation of drug therapy for COVID-19. Results were collected, and statistical analysis was done to estimate the difference between the two sample means using the student's t-test. Standard package of social science (SPSS) Version 23 was implemented for this purpose. Readings were represented as mean plus/ minus standard deviation of the mean. The level of significance was set at a P-value of less than 0.05.

Results

It was found that serum levels of D-dimer were reduced in COVID-19 patients after seven days of initiation of dexamethasone treatment. However, the reduction was not statistically significant, as shown in table 1. On the other hand, there was a significant reduction in the serum level of D-dimer 14 days after initiation of medications, as shown in table 2.

Table 1. Expression of serum level of D-dimer (ng/mL) as mean \pm SD after 7 days of initiation of anti- COVID-19 regimens.

After 7 days	With dexamethasone (mean \pm SD)	Without dexamethasone (mean \pm SD)	P value
D-dimer level ng/mL	203.25 \pm 41.54	322.25 \pm 55.14	0.110

Table 2. Expression of serum level of D-dimer (ng/mL) as mean \pm SD after 14 days of initiation of anti- COVID-19 regimens

After 14 days	With dexamethasone (mean \pm SD)	Without dexamethasone (mean \pm SD)	P value
D-dimer level ng/mL	266.504 \pm 39.24	766.561 \pm 69.234	0.005*

Discussion

One of the crucial therapy targets for patients with COVID-19 infection is to monitor and prevent the occurrence of coagulopathy because of its high risk of mortality(18). In this study, corticosteroid was shown to effectively reduce the serum level of D-dimer 14 days after starting the recommended regimen for this infection. This finding parallels the results of a previous study in this regard. It was stated that steroid use could limit endothelial damage and release the intrinsic coagulation pathway, thus reducing the d-dimer level. (19) Reduced serum level of D-dimer is a known measure of lower coagulability status. Corticosteroids are attributed to many mechanisms, including the anti-inflammatory effect. Corticosteroids minimize the recruitment of inflammatory mediators that potentiate the coagulation cascade(20). Another mechanism of corticosteroid action is its direct effect on platelet, by which platelet adhesion and aggregation are inhibited(21). The other role of corticosteroids is to reduce the possibility of vasculitis noticed in many cases of COVID-19 infection that eventually induces thromboembolic complications (22).

In conclusion, the use of dexamethasone significantly reduces the serum level of D-dimer in male patients with covid 19 infection, thus reducing the possible thrombotic complication of the disease.

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