



Evaluation of renal function when using dexamethasone therapy in Patients with Covid-19 in Najaf City

Hanan Diekan Abbas^{1*}, Ahmed Hassan Kudhair²

¹Department of Physiology, Faculty of Medicine, Jabir ibn Hayyan Medical University, Najaf City, Iraq

²Department of biochemistry, Faculty of Medicine., Jabir ibn Hayyan Medical University, Najaf City, Iraq

***Corresponding author:** Hanan Diekan Abbas, Department of Physiology, Faculty of Medicine, Jabir ibn Hayyan Medical University, Najaf City, Iraq, Email: hanan.deccan@jmu.edu.iq

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ABSTRACT

Background: The COVID-19 is the one of the most reason that induce the renal problems and could even attack so many organs that might ends with increase the mortality and morbidity rate in the worldwide. One of its common cases is the chronic renal impairment that may be worse and increase the death rate in complete impair renal function. On the other hand the treatment or restoring of the renal abnormality could be occurred in hospital monitoring with a steroid treatment. A regular steroid intake with assessment of renal function base on a urea, creatinine and glucose levels is a good road path to improve the renal function and so shorten the time required for the patient to stay in the hospital.

Aim: to predict if the steroid treatment (dexamethasone) could improve the renal function and facilitate the curing rate of the patients.

Materials and Method: a case control study was conducted from sixty individuals, one half take the dexamethasone and suffer from COVID with the renal impairment and the other thirty patient was also have the COVID and renal abnormality but without this steroid drug, the blood sample and serum glucose, creatinine and urea measurement was performed.

Results: data showed that the level of urea, creatinine and glucose concentrations is lower in those COVID patient with renal abnormalities and take a steroid treatment compared to those didn't take the course of this drug.

Conclusion: steroid treatment is one of the drugs that might improve the case of the patient and might participate in faster the curing rate of the patient and resorting the renal function to the normal level.

Keywords: renal physiology, dexamethasone, COVID-19, renal abnormalities, glomerular filtration rate

INTRODUCTION

The search for treatment options for Covid-19 has been the goal of researchers and healthcare providers since the emergence of the novel virus in the late 2019 [1]. From 1960 till 2018 this disease was a zoonotic origin from bats or monkeys with the majority of cases ranging from being asymptomatic to mild cases of persistent fever, malaise, dyspnea, dry cough, headache, chills, myalgia, and loss of smell/taste. However, some patients develop acute respiratory symptoms which require hospitalization with prolonged ventilator support [2]. Dexamethasone is the first drug of choice that known to have life-saving potency in patients with Covid-19 [3]. Some sharing data of large recovery trials from UK showed that dexamethasone (6 mg once daily for up to 10 days) reduced 28-day mortality of severe intubated covid-19 patients by about 30% and shortened hospitalization [4-5]. Dexamethasone belongs to corticosteroids treatments and it has been used for decades to obtain better outcomes in patients with acute respiratory distress syndrome (ARDS) and septic shock due to its anti-inflammatory, anti-fibrotic, and vaso-constrictive effects [6]. Dexamethasone has been given to minimize the degree of lung injury and alveolar damage which come second after ARDS in patients with covid-19 by inhibiting the formation of cytokines storm [7]. Some other Recovery trials suggest using dexamethasone only in patients with hypoxemia and undergoing respiratory support while they are in the symptomatic illness which usually occurs 8-14 days after first exposure. These trials recommend not using it in patients with mild symptoms or those who are not admitted to hospital [8-9]. Although those recovery trials outweigh the use of corticosteroid such as dexamethasone in severely-ill Covid-19 patients, many guidelines for using corticosteroids for the management of Covid-19 treatment stated it as controversial or not recommended [5]. However, dexamethasone is a double-edge sword treatment as many adverse effects have been addressed by lots of studies. About 65% of Dexamethasone is excreted unchanged in the urine after 24h of intake which might cause fluid retention especially in elderly and patients with kidney failure [10]. Although some studies suggest that dexamethasone could reduce the risk of acute kidney injury [11], but adverse effects are still

controversial. The aim of this study was evaluating the alteration in kidney functions (by measuring blood urea and serum creatinine) and also the alteration in the glycemic status (by measuring blood glucose) in patients with COVID-19 while being on dexamethasone and compare the results to a control group.

Aim of the study

The study aimed to answer a crucial question: could dexamethasone administration improve or even restore the renal function in those patient how suffered from COVID-19 that ends in to a renal impairment?

MATERIAL AND METHOD

A case-control study was made from sixty hospitalized individual how are admitted to Al-Haheem hospital for the time from March 2021 to May 2021. They were divided in to two groups: thirty patient how suffered from renal impairment with COVID-19 viral infection and on a dexamethasone drug and another 30 individual how suffered also from renal impairment and COVID-19 infection but without a dexamethasone treatment. The venous blood sample had been taken and sample analysis was made for blood urea, glucose and serum creatinine concentration. Those patient how are not on dexamethasone were further divided according to the age in to two groups: from twenty two to forty five years old was about sixteen individual and those from forty five years old to about sixty five was about fourteen patient.

Statistical analysis

A student t-test was used to compare the two groups according to our variables and also to compare the results of the two age groups using Statistical package for social sciences (SPSS) program version 20. Mean, standard deviation were calculated and $P \leq 0.05$ was considered to be significant.

RESULTS

Date showed that significant difference between those patient with renal impairment and on dexamethasone test and those with renal abnormality without dexamethasone test. The P-value show a significant improvement of the renal function in those how take this treatment, table (1).

TABLE 1: Urea Concentration in Those Patient Not Take the Steroid Treatment And Those How Take the 0.5 Mg of Dexamethasone Drug

Group Statistics					P-value
	group	N	Mean ± SD	T-test	
Urea (mg/dl)	Patients	30	33.24± 8.96	2.847	0.006
	Controls	30	26.03±10.57		

The mean creatinine level was higher in those patient with a COVID-19 and renal impairment with no dexamethasone drug compared with those who take a regular dose of this steroid. The

P value was significant which indicate that the steroid improve the renal function and so revealed a lower creatinine level on those how take the drug, table (2).

TABLE 2: creatinine concentration in those patient not take the steroid treatment and those how take the 0.5 mg of Dexamethasone drug

Group Statistics					
	group	N	Mean± SD	T-test	P-value
creatinine (mg/dl)	Patients	30	0.76±0.116	2.023	0.0329
	Controls	30	0.17±0.179		

The level of glucose is severally elevated in to a sever hyperglycemia level in those of COBVID-19 with a renal impairment without steroid treatment compared to those intake a steroid

drug, P-value is significant indicating a sever effect of this viral on the pancreas function and so on the glucose concentration compared to those a normal individual, table (3).

TABLE 3: Glucose level renal impairment patients and not take the steroid compared to those take this drug.

Group Statistics					
	group	N	Mean ± SD	T-test	P-value
Glucose (mg/dl)	Patients	30	268.28 ± 148.25	6.724	0.000
	Controls	30	85.80 ± 10.82		

There is a non-significant relation in the level of urea, creatinine and glucose level between young and the old individuals and the P-value showed

that no difference in the level of these three parameters between the two subgroups, tables (4-6).

TABLE 4: Urea level in both young and adult patients suffer from COVID and renal impairment without steroid treatment

Group Statistics					
	Age	N	Mean ± SD	T-test	P-value
Urea (mg/dl)	25-44 y	16	32.27 ± 9.03	-0.614	0.535
	45-65 y	14	34.35 ± 9.09		

TABLE 5: Creatinine level in both young and adult patients

Group Statistics					
	Age	N	Mean ± SD	T-test	P-value
Creatinine (mg/dl)	25-44 y	16	0.76 ± 0.109	0.417	0.680
	45-65 y	14	0.74 ± 0.127		

TABLE 6: Mean glucose concentration in both young and adult patients

Group Statistics					
	Age	N	Mean± SD	T-test	P-value
Glucose (mg/dl)	25-44 y	16	291.86 ± 147.39	0.929	0.321
	45-65 y	14	241.33 ± 149.98		

DISCUSSION

One of the most urgent and unexpected diseases is COVID-19 viral infection. From the day of its official discovery at Wuhan city in china till now, there is a thousand of diagnosed organ abnormalities had been reported due to this viral secondary complication. The problem with this virus is not only a respiratory problems but mostly due to its unpredictable behavior of the virus. Many articles that had been written proved the bad complication of the virus on many organ inside the human body that sometimes ends with organic failure and finally could kill the patients. It could attach so many organs without a role and without a clear strategy and that is why some scientist called this virus the unpredictable stigma. Many papers had been written about the secondary complications of this virus, some of them talked about its effect on the renal function and proved the result induced by it which is a renal failure, other showed a hepatic failure, blood infections, WBC unexplained increment, thrombosis, respiratory failure, diabetes, cardiovascular disease and even a brain damage [12]. We conduct this paper to see if the renal impairment induced by this viral infection could be improved and the renal outcome could be return to its normal value if a patient take a regular course of dexamethasone treatment due to that it is known that corticosteroid could improve the renal function. Table one and two both revealed that the urea and creatinine concentrations (as a markers of renal function tests) were lower in those individual how suffer from COVID with renal impairment and take the steroid treatment compared to those how refuse or didn't take this treatment, it means that the regular regimen of the steroid intake improve the renal function and the glomerular filtration rate is improved and so the creatinine levels was lower in those individual compare to those didn't take this drug [13]. A big issue had been seen in this study, the level of glucose is severely elevated,

here we have to discuss it in more detail, as we know that COVID-19 viral might attach the pancreas and so may induce an abnormal level insulin or abnormal function of it. In these patient a cases of hyperglycemia and so a diabetes mellitus should be reported. If the diabetes in occurred it could be ends with a renal impairment and a nephropathy could be reported and so a renal failure is seen. In this case the renal abnormality is not a direct result of the viral itself but due to the diabetes that caused by the COVID. On the other hand renal abnormality might be a direct result of the viral infection [14]. Another point had been seen; the hyperglycemia could be reported in those take a steroid for a long time and in this case those patient with renal impairment and COVID with steroid intake should be showed an increment of the level of glucose not a decrement and this increment is due to the long intake of steroid not due to the complication of the virus and so the viral infection her is not the reason of the increased glucose level [15-16]. In our result the patient of COVID and impaired renal function with steroid showed a normal glucose level, this means that the prolong steroid therapy not induce the hyperglycemia and also the viral infection don't effect on the pancreas function but only attack the renal system. On the other hand, in our result about thirty patient of COVID infection with renal abnormality and not take the steroid showed a hyperglycemia and here we have to discriminate between hyperglycemia due to diabetes induced by viral itself and hyperglycemia caused by impairment of renal excretory function of the glucose due to the renal impairment induced by the virus. To solve this problem a further analysis of the renal function and beta cells of the pancreas should be made like the HbA1c and GFR and others and so a further studies should be made with a larger sample size. We didn't find a direct effect of the age progress on the health state of the patient and so on the normal function of the renal system.

Usually the age is one of the prognostic factors that may impaired the renal function and the presence of the viral infect might worsen the renal function with increase age of the people but here although the both age and viral infection could act together as a synergistic factor that supposed to increase the rate of incidence of the renal abnormality to a double than the result when each factor works alone, our unexpected result of no difference in renal function between old and young people might be due to a low sample size

CONCLUSION

COVID is one of the main causative factor that might induce the renal abnormality and this risk could be increase with a double risk factor but the rate of improvement might be increase during the steroid intake.

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