

The Evaluation of Ochratoxin A in Patients Suffer from Renal Failure

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Abstract

The study is conducted on 94 patients (54 male and 40 female) and 15 healthy people (10 male and 5 female) as the control group. All these cases were suffers from renal failure ,when attended to AL-Sader hospital in AL-Najaf province from February till May 2019. we make qualitative diagnosis by using TLC (thin layer chromatography) 29 cases have an ochratoxin A in serum and 65 cases without ochratoxin A and quantitative diagnosis by using HPLC (high-performance liquid chromatography) for 25 cases from positive results (15 male and 10 female)and detects of WBCs count for 29 cases with ochratoxin A and 15 with out ochratoxin A .

Keywords: ochratoxin, renal failure , TLC, HPLC ,Iraq.

Introduction

Cutaneous failure is a medical condition in which the renals no longer work. Cutaneous failure can also be classified into two types of acute renal failure and chronic renal failure¹². Ochratoxin A (OTA) is a secondary metabolism mycotoxin produced by a number of filamentous species of the *Aspergillus* and *Penicillium* genera,². It is a nephrotoxic mycotoxin that has been regarded as a part of the etiology of Balkan nephropathy (BEN). The blood OTA is higher than that of healthy people in patients with chronic renal insufficiency diagnosed with dialysis; and OTA is not less with this treatment⁸. The risk of OTA for human renal disease because it is widely distributed around the world and the rarity of reported cases that show its role in chronic renal disease is paradoxical.⁸

Aim: In this study, Ochratoxin A patients are recognized as having a relationship with renal failure.

Material and methods

Study design and patients

Serum collection

In healthy and infected patients, five ml of blood were collected. In sterile, plain tubes blood samples were drawn and left for 30 minutes at room temperature.

Five minutes of centrifugation (Memmert, Germany) at 3000 rpm were performed. Serum was collected and kept under deep freeze at -20 in sterile tubes until use.

Thin-layer chromatography (TLC):

TLC is a simple and reliable method that is reasonably expensive to implement in a research laboratory. Most laboratories have considerable experience and expertise in developing countries¹³.

Detection of ochratoxin A in serum blood by TLC

In patients suffering from kidney failure (94) person . The ochratoxin A was recognized after the examinations of the serum samples by using the TLC plate, twenty nine out of 29 (31%) , while renal failure patients without ochratoxin A was 65 (69%) .

This result is agree with study in Karbala government of Iraq (16) revealed that the main cause of infection agent acute kidney disease that caused renal failure in patients was ochratoxin A . high ratio of renal failure with OTA was (14.4%) .

This result illustrated the present ochratoxin A in the blood serum in renal failure patients may be due to higher toxicity of OTA and its ability to kidney damage (direct effect) and the occurrence chronic kidney disease.

Table 1: Detecting of OTA in renal failure patients.

Patient population	NO.	%
renal failure with OTA	29	31
renal failure without OTA	65	69
Total	94	100

Detection of OTA with renal failure patients according to gender:

In patients suffering from kidney failure with OTA (29) . OTA was recognized by TLC method to 17 male (59%) and female were 12 (41%) the incidence of males' injury increases because the males are more susceptible to contact with the cause through continuous exit from their homes for the purpose of working and eating from shops and streets that lack cleanliness or play sports. This results disagreement with study of (16) in Karbala government revealed that renal failure with OTA in both female and male were (54.5%) and (45.5%) respectively.

In the study group, men had a higher proportion (59%) than women (41%) of renal failure due to weak immunity and chronic chronic kidney disease. More than women in OTA renal failure are caused by the regular action of males compared with female due to the causes of male injury. ¹⁷.

Table 2: Detecting of OTA according to gender.

Gender	NO.	%
Male	17	59
Female	12	41
Total	29	100

Detection of OTA with renal failure according to age:

This study showed that the highest prevalence of patients aged 17% (62%) and 21% (15-34) and (35-54) were diagnosed with RDA at age 55-74, as opposed to other patient age groups.

In age > 55, the high incidence of OTA renal failure can be due to low immunity and extremely toxicity of significant kidney damage than other classes. OTA ¹⁸.

This results agree with study of ¹⁶ that showed higher ratio with renal failure patients with OTA was 60% in (51-70) years old in Karbala government.

Table 3: Detecting of OTA according to age

Age	NO.	%
15-34 years	5	17
35-54 years	6	21
55-74 years	18	62
Total	29	100

B.HPLC

High-pressure fluids (HPLCs) is used to identify, quantitize, separate and purify compounds that are present in a mixture and are now known as high-performance fluid chromatography (HPLCs) ¹⁴. For determining ochratoxin A, we identify a high-performance chromatographic liquid (HPLC) system with fluorescent detector.)1).

Table(4-4): Detection of OTA in the blood serum by HPLC .

Sex	Age	Concentration of OTA ng/ml
M	20	0.99
M	29	2.00
M	30	0.85
M	35	0.59
M	45	0.76
M	50	1.37
M	55	1.06
M	60	2.56
M	60	1.15
M	61	0.91
M	62	1.39
M	64	1.59
M	65	1.10
M	65	1.92
M	70	1.08
F	70	2.06
F	18	2.61
F	35	1.16
F	35	1.35
F	45	1.33
F	45	1.12
F	63	0.83
F	64	0.92
F	65	0.75
F	65	1.01

*M=Male, **F=Female

Statistical Analysis

In this analysis T-test was used to compare samples using the 10 program graph pad prism. ¹¹.

Results and Discssion

The results of the study revealed a significant increase ($P < 0.05$) to (1.298 ng/ml) and (0.543 ng/ml) respectively in the concentrations of (OTA) in the total number patients suffering from renal failure with OTA and the control group , Also they revealed that the concentration of (OTA) in male and female patients suffering from kidney failure were significantly increased to (1.136 ng/ml)and (1.231ng/ml) respectively compared with the control group (0.573 ng/ml) and (0.48 ng/ml),respectively. it also revealed avariation depending on ages (15-34),(35-54) and(55-74) years old was the concentration of OTA (1,613ng/ml) , (1,097 ng/ml) and (1.309ng/ml) respectively (1,613ng/ml) , (1,097 ng/ml) and (1.309ng/ml) respectively compared with the control group (0.444 ng/ml), (0.618 ng/ml)and (0.7 ng/ml) , as seen in Fig (1) , (2) and (3).

In the current study used the thin layer chromatography (TLC) to detect the presence of OTA in serum of patients suffer from kidney failaur and used HPLC to mesure the concentration of it in the province Al-Najaf. Ochratoxin is a group of mycotoxins produced by some Aspergillus species and some Penicillium species ³. Kidney damage is the most vulnerable and prominent effect but toxin can affect the development of the fetus and the immune system. This association in

humans is unclear, contrary to the clear proof of kidney and kidney toxicity due to exposure of ochratoxin A in the animals ¹⁶. To order to prevent infectious diseases to commercially valuable animals, maintenance of a competent immune system is necessary. Mycotoxin OTA induces immunosufficiency, and prolonged low dose exposure to OTA is more significant than acute high-dosage exposure ⁴. The findings of this trials showed no significant improvements in the frequency of male and female infection In the kidney OTA results in high nephrotoxicity, with a higher incidence of upper urinary tract malignancy ¹⁵. The study shows that this rise in OTA is significantly increased due to low dose exposure to OTA; OTA induces specific changes in the function and physiology of renal cells at nanomolar concentration. ⁵, Therefore, Very low OTA levels administered for a prolonged duration (up to 14 days), in the human tubular proximal, affect the cell destiny, and in addition they do not only function in the target organ, e.g., the kidney, but also in previously unsuspecting cells, e.g. fibroblast;. ^{6,7}. In all ages of kidney-insufficient patients, OTA concentrations increased compared with control groups particularly at age 15-35 because of a size decrease in vital immune species, including thymus, spleen and lymphatic kernels, antibody response depression, number and functional alters, The study revealed an increase in OTA concentration in every age group ⁴. ⁹ It was shown that immunosuppressive mycotoxin, such as OTA inhibits humoral and cell immunity and lymphoid organ works at various levels of the immune system.

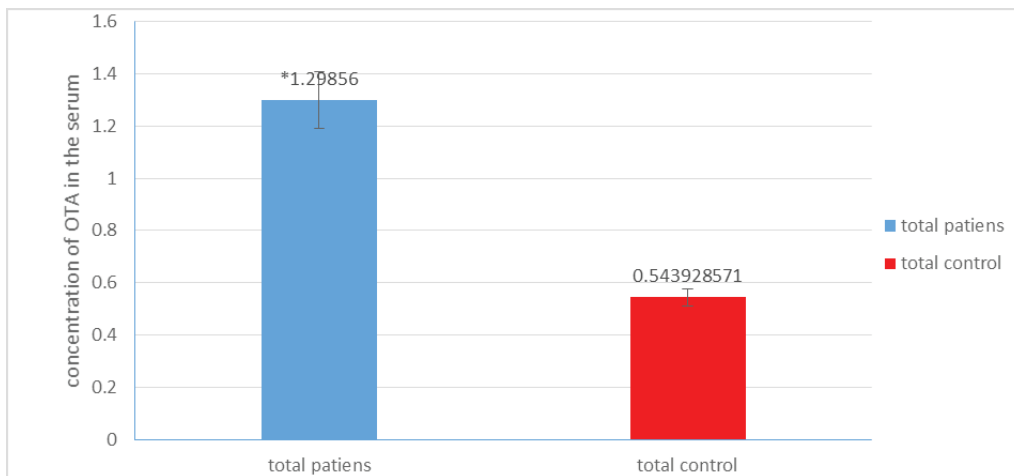


Figure 1: Comparison between Concentration of OTA (ng /ml) in total patients suffering from renal failure and total control. This different letter refers to significant differences at $p > 0.05$ according to T test.

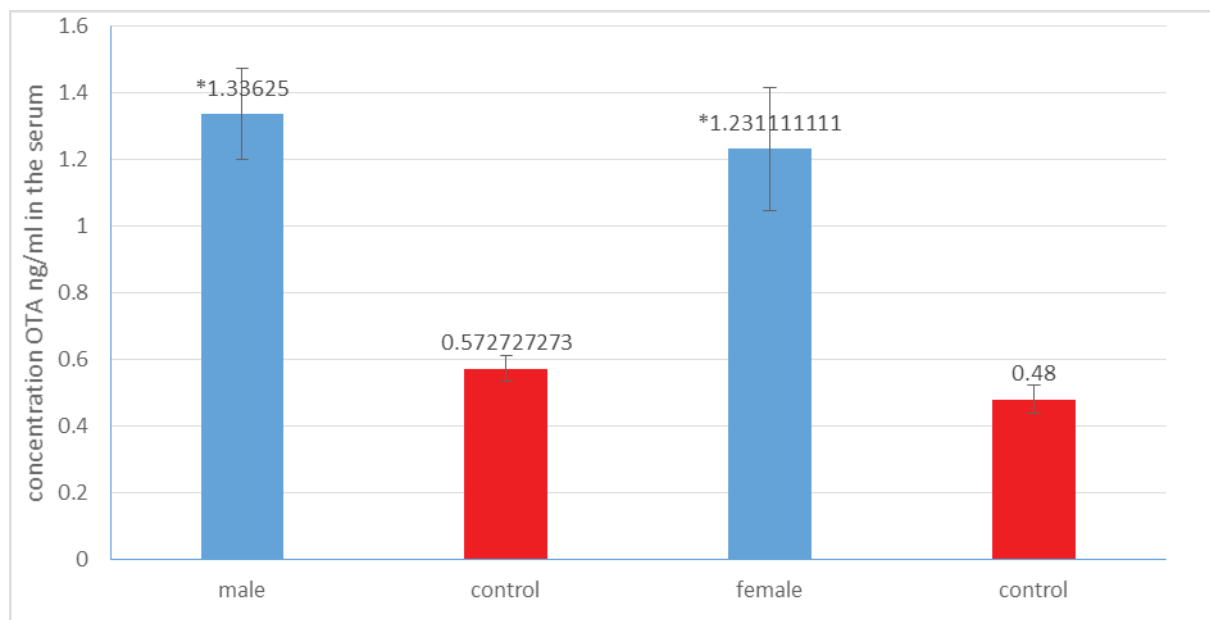


Figure 2: Concentration of Ochratoxin A (ng/ml) Comparison between Patients Suffering from renal failure and control Group. This different letter refers to significant differences at $p > 0.05$ according to T test.

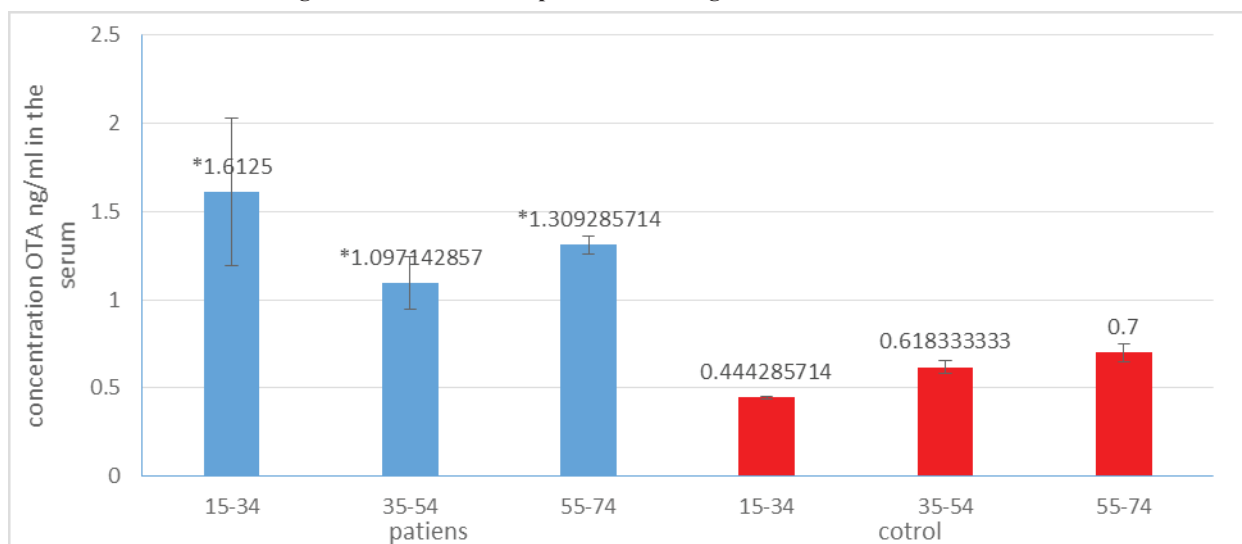


Figure (3) :Level of OTA in renal failure patients infected with OTA compare with control. This different letter refers to significant differences at $P < 0.05$ according to LSD.

Conclusion

OTA has a role in changing the human immune response. OTA has an effect on some immunological biomarkers.

Financial Disclosure: There is no financial disclosure.

Conflict of Interest: None to declare.

Ethical Clearance: All experimental protocols were approved under the University of Kufa College

of Science and all experiments were carried out in accordance with approved guidelines.

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