Effects of E. Coli Infection on Kidney Function Tests in Experimentally Inoculated Rats

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Abstracts

The aim of this study was to evaluate the kidney function tests in rats experimentally infected with E. coli with monitoring signs of UTI. Forty female rats were divided into two groups, infected (20 rats) and control (20 rats). The infected group were inoculated intraurethral by 10^8 suspension of E. coli. The animals were monitored for presence of signs. E. coli urine bacterial demonstration were done at 1 week before infection and 24hrs., 48hrs, 96hrs, 6 days, 12 days and 24 days after infection. Blood samples were collected at zero, 24hrs, 3 days, 6 days, 14 days and 24 days. Blood samples for serum BUN and creatinine were collected. The findings suggested that the E.coli isolation has been continuous 24 days since experimentation started. After 24 hrs. post infection, infected rats were suffering from UTIs sings, including frequent urination, pain on urination, foul smelling, diarrhea, poor appetite, and fever. Also, the current results showed that at zero time, all rats present normal value of serum urea and creatinine, Post-infection with E. coli, A significant increase in BUN and creatinine was shown by the infected group at 24 hours, 3 days, 6 days, 14 days and 24 days, as opposed to the control group.

In conclusion, *E. coli* can induce UTI in rats manifested by increase BUN and Creatinine.

Keywords: *Rat, BUN, Creatinine, E. coli, Kidney, UTI.*

Introduction

Escherichia coli has been implicated to causes disease in human(1) as well as animals (2,3,4,5,6,7,8).

In addition to gastrointestinal effects, it can cause UTI, meningitis in neonates and humanssepticemia(9).

The presence of a specific virulence factors, adaptations of the microbial, encouraging urinal tract achievement, distinguishes *E.coli* which is a source of UTI and another uropathogens from associated memberships of their genus and species(10). *Escherichia coli* are the most common organism causing Lower (UTI). Although not all strains of *E. coli* are pathogenic to the urinary tract which suggested that the infective *E. coli* strains are a selected group with special properties enabling them to survive and multiply in the host tissue(11).

Creatinine is generated as the final result of muscle metabolism, creatinephosphate is excreted primarily by the kidneys and then mostly through glomerular filtration. Blood creatinine assays are most specific clinically important renal function calculation(12).

The Urea of Blood Nitrogen (BUN) is the protein breakdown product cause acute kidney dysfunction and kidney hypoperfusion incidence(13,14).

An experimental infection of EHEC conducted on New Zealand rabbits by(15) they showed an increase in

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BUN level on the eighth day after infection as compared with control group.

Mohawk *et al.*[16]Managed *E.coli* O157: H7 was found to have elevated blood urea nitrogen levels in moribund animals, for mice orally.

This study aimed to estimate the kidney function tests in rats experimentally infected with *E. coli* with monitoring signs of UTI.

Materials and Method

Forty female rats were classified into two groups, infected (20 rats) and control (20 rats). The infected group were inoculated intraurethral by 10^8 suspension of E. coli according to[17].

The animals were monitored for presence of signs. *E. coli* urinebacterial demonstration were done at 1 week before infection and 24hrs., 48hrs, 96hrs, 6 days, 12 days and 24 days after infection.

Blood samples were collected at zero, 24hrs, 3 days, 6 days, 14 days and 24 days. The blood samples were collected for estimation the serum BUN and creatinine which were done according to manufacturer instructions.

All data were analyzed statistically as described by[18].

Results and Discussion

The isolation of the *E. coli* was continuous for 24 days from starting the experiment, while no bacterial isolation was appeared before infection (Table 1).

Table (1): The bacterial isolation from urine at different periods

Period	Status
1 week before infection	-
24 hrs.	+
48 hrs.	+
96hrs.	+
6days	+
12 days	+
24 days	+

Theseresult in agreements with[19,20]who indicated that before the outbreak was triggered there had been a large rise in bacterial counts of infectious groups relative to their bacterial counts.

All rats included in this study had normal yellow urine before the infection was induced, after 24 hrs. post infection, infected rats were suffering from UTIs sings, including frequent urination, pain on urination, foul smelling, diarrhea, poor appetite, and fever.

Infection led to a strong loss-related anorexia body weight in both categories contaminated[21]. The renal excretions of arginine vasopressin byendotoxin of *E.coli* as well as IL-1recovery. Bacterial endotoxin injections or IL-1 can induce fluid intake changes indicating increasing of fluid and water intake[22]. The increased consumption of water in an infected group can contribute to body temperature increasing and diarrhea, resulting in loss of fluid as well as dehydration[23]. Anorexia occurrence with an infection indicates that anorexia may be an integral part of the process reaction. It seems like the diet, the intake of food might be suppressed when the metabolic rates for each body temperature degree can go up by 10 - 13 percent. Anorexia caused by infections is believed to be the major factor in the negative balance between nitrogen and weight loss of the body[10]. This theory has been tested by injection *E.coli*. Endotoxin bacteria in rodents, culminating in a rise in body temperature and a decrease in the consumption of food[24].

Appetite loss in infected rats is a vital factor for the hosts defence in the deliberate redistribution during infection of nutrients that contribute to “nutritional immunity.” Evidence now shows that suppression of food consumption in both E and fasted rabbits can be due to endogenous cytokines. *E.coli* and interleukin-1 have been shown to inhibit the consumption of food.

Also, the current results showed that at zero time, all rats present normal value of serum urea and creatinine, Post-infection with *E. coli*, the infected group displayed a significant increase ($P<0.05$) in BUNas well as creatinine at days 24 hrs, 3 days, 6 days, 14 days and 24 days as relating with control group (Table 2).

BUN’s and creatinin’s increased may be attributable to the consequence of micro-organisms and their toxins on the kidneys, also the results is completely agreed with[25,26,27] have all decided thoroughly to disclose this development. Increased amounts of creatinine and urea for kidney failure, the results of the present research in agreement with [28] who noticed that serum creatinine was higher in contaminated rabbits with pathogenic E. Coli and the animal found in many kidney areas that

suffered severe destruction. Al-Taae[29] reported a substantial rise (P<0.05) in serum creatinine and urea on day 30 after *E. coli* infection. In comparison with the control group, *E. coli* O157: H7 in rabbits.

Table (2): BUN and Creatinine concentrations in infected and control groups.

Creatinine (mg/dl)		BUN (mg/dl)		
Infected group	**Control group**	**Infected group**	**Control group**	**Time**
0.58±0.03Ab	0.59±0.06Aa	37.23±0.6Ab	38.4±0.29Aa	Zero day
0.69±0.01Aa	0.55±0.02Ba	42.66±0.92Aa	36.74±0.52Ba	24hrs
0.72±0.05Aa	0.58±0.01Ba	45.78±0.79Aa	39.26±0.17Ba	Day 3rd
0.72±0.02Aa	0.56±0.02Ba	44.6±0.38Aa	36.45±0.81Ba	Day 6th
0.70±0.1Aa	0.58±0.05Ba	45.24±0.41Aa	39.94±0.58Ba	Day 14th
0.68±0.02Aa	0.54±0.04Ba	45.2±0.2Aa	38.82±0.22Ba	Day 24th

Capital letters denote significant (p<0.05) differences among infected & control

Small letters denote significant (p<0.05) differences among times

In conclusion, *E. coli* can cause signs of UTI manifested by increase in BUN and Creatinine.

Ethical Clearance: The Research Ethical Committee at scientific research by ethical approval of both environmental and health and higher education and scientific research ministries in Iraq.

Conflict of Interest: The authors declare that they have no conflict of interest.

Funding: Self-funding

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