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SUMMARY

Escherichia coli (E.coli) affect poultry industry causing major economic losses achieved by high morbidity and mortality, loss of body weight, and low egg production. Control of this microbe is an important for poultry industry which depend primarily on the use of certain antimicrobials such as ceftiofur and cefepime.

Ceftiofur sodium is β-lactamase resistant broad-spectrum cephalosporin antibiotic which has bactericidal activity against Gram-negative and Gram-positive bacteria.

Cefepime hydrochloride is a parentral fourth generation cephalosporin antibiotic with an extended spectrum of antimicrobial activity against many Gram-negative and Gram-positive bacteria.

The present work was carried out to evaluate *in vitro* antibacterial activity of ceftiofur sodium or cefepime HCl on *E.coli* strain and the effects of therapeutic dose of ceftiofur sodium (1mg/ kg b.wt. once daily) or cefepime hydrochloride(90mg/kg b.wt. twice daily) for five successive days on male fertility of rats. Moreover, the effects of therapeutic dose of the drugs on haematological picture, liver and kidney functions as well as histopathological changes were studied.

I-Antibacterial activity *in vitro:*

The present study showed that MIC of ceftiofur sodium was 1.0 ug/ml against *E.coli* and MIC of cefepime HCl was 0.12 ug/ml against E.coli.

The sensitivity *E.coli* to commercial discs of antibiotics namely ceftiofur, cefepime, ciprofloxacin, gentamicin, doxycycline, ampicillin, sulbactam and cefotaxime was determined. The order of antibacterial potency was as follows: cefepime > ceftiofur > gentamicin > cefotaxim > ampicillin - sulbactam > ciprofloxacin > doxycycline.

II-Effect on male fertility:

Sixty male albino rats were divided into 3 equal groups each of 20 rats.

- Group I, control group receive no medication.
- Group II, treated with ceftiofur sodium (1mg/ kg b.wt. once daily) I/M for 5 successive days.
- Group III, treated with cefepime HCl (90mg/kg b.wt. twice daily) I/M for 5 successive days.

Five rats from each group were sacrificed after 1,2,4 and 8 weeks from drug administration to cover all spermatogenic cycle.

The comparison between groups depends on:

1) Weight of sexual organs.

2) Epididymal spermatozoal examination.

3) Histopathological studies.

1) Weight of sexual organs.

Intramuscular injection of ceftiofur sodium or cefepime hydrochloride in mature male rats showed no changes in testes and seminal vesicles weights when compared with control group.

2) Epididymal spermatozoal examination.

The groups which were treated with ceftiofur sodium or cefcpime hydrochloride revealed non significant changes in progressive sperm motility, epididymal sperm count, sperm life percentage and sperm abnormalities percent when compared with control group.

3) Histopathological studies.

Macroscopically, in both groups which were treated with ceftiofur sodium or cefepime hydrochloride, the testes and epididymis were apparently normal along the period of experiment in all sacrificed rats.

Microscopically, the testes showed edema in the interstitial tissue among the seminiferous tubules and mild degeneration in spermatogonial cells on both groups.

III- Studies on some other effects of the drugs:

Sixty male albino rats were divided into 3 equal groups each of 20 rats.

- Group I, control group receive no medication.

- Group II, treated with ceftiofur sodium (1mg/ kg b.wt. once daily) I/M for 5 successive days.
- Group III, treated with cefepime HCl (90mg/kg b.wt. twice daily) I/M for 5 successive days.

Blood samples were taken on 1st , 7th, 14th and 21st days post-treatment for haematological studies and another blood samples were collected to separate serum for investigation of liver and kidney functions.

Kidney and liver biopsy were collected in formaline 10% for hsitopatholgocial examination.

The comparison between groups depends on:

1] Effect on haematolgoical picture.

2] Effect on serum biochemical parameters.

3] Histopathological examination.

1-Effect on haematological parameters:

The groups which were treated with ceftiofur sodium or cefepime hydrochloride for 5 successive days reveale non significant changes in erythrocytic count leucocytic count packed cell volume, haemoglobin concentration, leucocytic count, mean corpuscular volume, mean corpuscular haemoglboin and mean corpuscular haemoglboin concenration.

2-Effect on serum biochemical parameters:

The groups which were treated with ceftiofur sodium or cefepime hydrochloride produced non significant changes in (AST, ALT, ALP) activity, serum total proteins, creatinine or uric acid when compared with control group.

3- Histopathological studies:

A) Liver:

Macroscopically, no detectable gross changes were seen in both groups which were treated with ceftiofur sodium or cefepime hydrochloride.

Microscopically, cloudy swelling and hydropic degeneration of some hepatocyte, moderate congestion of the hepatic blood vessels and perivascular lymphocytic aggregation were detected in both treated groups.

B) Kidney:

Macroscopically, no detectable gross changes were seen in both groups which were treated with ceftiofur sodium or cefepime hydrochloride.

Microscopically, in both treated groups there were mild congestion of the renal blood vessels and degenerative changes of some renal tubular epithelium. Meanwhile cystic dilatation of some renal tubules and regeneration of other tubules beside the former lesions were detected.

CONCLUSION

In the light of our present study, the findings obtained allow us to draw certain conclusion about the safely use of both ceftiofur sodium and cefepime hydrochloride in their therapeutic doses.

In addition to that cefepime hydrochloride has more activety than ceftiofur sodium against *E.coli.*

Both drugs are safe and have no adverse effects on male fertility, blood picture, and liver and kidney functions when used at therapeutic doses. This indicates That the improved spectrum of activity of cephalosporins from third generation (ceftiofur sodium) to fourth generation (cefepime hydrochloride) not come at the cost of increase toxicity or side effects. The safety of cefepime is excellent and comparable to that of ceftiofur and those reported for other cephalosporins.