SEROTYPING OF ESCHERICHIA COLI IN INFECTED URINE AND ITS ANTIBIOTIC SENSITIVITY

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Mohammad Khalid Ijaz, Hameed Afzal, Manzoor Hussain, Mohammad Ashfaq (Department of Microbiology, Faculty of Vaterinary Science, University of Agriculture, Faisalabad.)

Abstract

Sixty five urine samples of patients suffering from bacteriuria were studied to determine the frequency of occurrence of Escherichia coli (E. coli) serotypes as a causative organism. The later was detected in 100 percent samples. The "OK" antigenic groups encountered were: 0111:K58 (52 strains); 055:K59 (7 strains); 0119:K69 (3 strains); 0128 :K67 (2 strains) and 020a 020c:L61 (1 strain). Colony count revealed more than 10s bacteria in most of the cases. Pathogenicity trials of randomly selected 10 strains of coli were carried out in mice and rabbits.

The in vitro antibiotic sensitivity test of E. coli against 16 antibiotics revealed nalidi-xan and gentamycin to be the most effective drugs against the isolated strains of E. coli (JPMA 30:206,1980).

Introduction

The importance of Escherichia coli (E. coli) in urinary tract infections has long been known and the relationship of urinary retention in elderly males and stasis in pregnancy has been the predisposing factors to this infection. The role of indwelling catheter under unsterilized conditions also predisposes to the development of bacteriuria, which is most frequently accompanied by E. coli. The problems created by E. coli are increasing day by day due to indiscriminate use of antibiotics, prior to their sensitivity test, resulting in the emergence of resistant strains. Since different strains of coli differ in sensitivity to various antibiotics, the choice of antibiotics in treatment of a patient should base on the results of sensitivity test.

This study was, therefore undertaken to elucidate the incidence of E. coli serotypes and to find out the most effective antibiotic against the isolates in vitro.

Material and Methods

Samples were collected from sixty five patients suffering from urinary tract infections attending District Head Quarter Hospital, Faisal-abad. They were cultured on different laboratory media for the primary isolation, the media used included MacConkey's agar. For total counts, pour plate method was used. The isolates were than characterized and identified by performing morpho-logical, biochemical and other bacteriological tests (Cruickshank et al., 1975).

For serological identification of the isolated strains of E. coli 16 "OK" Antisera (DIFCO) were employed. They were as follows:-

026:K60 055:K59
0111:K58 0127a:K63
086a:K61 0119:K69
0124:K72 0125 :K70
0126:K71 0128:K67
018a 018c:K77 020a 020c :K61
020a 0207 :K84 028.-K73
044:K74 0112a 0112c:K66

Pathogenicity of 10 randomly selected strains of E. coli, were carried out in rabbits and mice (Wilson and Miles, 1975).
The in vitro antibiotic sensitivity test of all the isolates of E. coli was performed on blood agar using sixteen antibiotics, Viz ampiclox, com-biotics, cephaloridine, streptomycin, tetracycline, kanamycin, gentamycin, carbenicillin, erythro-mycine, Nalidixan, neomycin, penicillin (low), penicillin (high), septran, linocomycin and sul-phonamide. The method recommended by Barry (1976) and Casals and Pedersen (1977) was followed.

Results

Studies on the sixty five samples taken from patients suffering from urinary tract infections revealed E. coli to be in 100 percent cases. Most of the strains produced haemolysis on blood agar. Total count as more than 105 bacteria in all the cases studied.
Serotyping of all the isolates indicated that the more frequently encountered "20K" antigenic groups were as follows :-
0111 :K58 (52 strains) 055K:59 (7 strains)
0J19:K69 (3 strains) 0128:K67 (2 strains)
020a020c:K61 (1 strain)
Ten strains of E. coli which were selected randomly, proved pathogenic for 20 mice and four rabbits inoculated intravenously. The death of mice and rabbits was recorded between 6-30 hours post inoculation (PPI) and 18-30 HPI respectively. The details of the mortality rates are shown in table 1.

Table I: Pathogenicity Trials in Mice and Rabbits

Species	*No of Animals*	*Mortality rate (HPI)**						
		6-12	12-18	18-24	24-30	30-36	36-42	42-48
Mice	20	4	6	9	1	—	—	—
Rabbits	4	—	—	3	1	—	—	—

*H.P.I. Hours Post Inoculations.

The in vitro antibiotic sensitivity results of all the isolates of E. coli revealed that the most effective antibiotics were nalidixan and gentamycin (70 percent each). Next in order was carbenicillin (25 per cent) whereas cephaloridine exhibited five per cent effectiveness. The remaining antibiotics appeared to be ineffective.

Discussion

Since in the infected urine, a number of microorganisms is suspected, it was thus important to use a differential medium which could inhibit the growth of unrequired microorganisms. Therefore, for the primary isolation, MacConkey's agar was used. Blood agar was used because it facilitates the growth of certain fastidious strains of E. coli and at the same time gives information about the haemolysis produced by each isolate BBL (1973) and Difco (1976).
In all the 65 urine samples, E. coli was isolated. Serological groupings of the isolates indicated

0111:K58 (52 strains), 055:K59 (7 strains), 0119:K69 (3 strains), 0128:K67 (2 strains) and 020a 020c:K61 (1 strain). Similar findings have been reported by Dubes and Birsch (1965), Sojka (1965), Boyd (1970), Macleod (1974), Robbins (1974), Cruickshank, et al (1975) and Wilson and Miles (1975), who described that E. coli is present in more than 80 per cent cases of urinary infections. Colony count revealed more than 10s bacteria in most of the cases. These results are in total agreement with those described by Collins and Lyne (1976) who also reported that 10s or more bacteria indicate bacteriuria.

The results of pathogenicity trials i.e. the death of 20 mice within 6-30 H.P.I. inoculated with E. coli are in agreement with Wilson andMiles (1975) who described the E. coli to be pathogenic for mice.

The in vitro antibiotic sensitivity results of all the isolates of E. coli revealed that the most effective antibiotics were nalidixan and gen-tamycin (70 percent each). The E. coli infection of urine is becoming sensitive to higher antibiotics only due to indiscriminate use of these in the medical practice. Such reports have also been given by Holt and Newman (1971), Mac-leod (1974) Kucers and Bennett (1975).

In the present study, the history revealed that most of the patients had previously been catheterized for urine retention, later on developed bacteriuria. The most frequently encountered E. coli serotype was 0111:K58, which commonly causes infantile diarrhoea. Therefore, it is evident that it was the nosocomial strain which might have been introduced during catheterization due to incomplete sterilization and hence it may be responsible for dual infection. This fact has also been supported by several workers (Macleod, 1974; Robbins, 1974; Wilson and Miles, 1975) who reported that catheterization under unsterilized conditions is mostly the predisposing factor in the ascending urinary tract infection. So catheterization under strict sterilized conditions is emphasized for the control of such infections.

It is not possible to further discuss here this important problem; however, it should be kept in mind that infectious drug resistance poses considerable epidemiologic and clinical problems and emphasizes the need for constant surveillance of the antibiotic sensitivity patterns of organisms in a given locality and also in the patients receiving antibiotic treatment.

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