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Research Article

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Antimicrobial resistance pattern of bacterial foodborne pathogens

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ABSTRACT

The aim of the present study was to determine the antimicrobial resistance pattern of bacterial foodborne pathogens and to know the suitable antibiotic in controlling of foodborne pathogens. Escherichia coli, Salmonella typhimurium, Staphylococcus aureus, Bacillus cereus, Pseudomonas Sps were tested with twelve antibiotics by disc diffusion method. Among all antibiotic streptomycin, cefpodoxeme, Clindamycin and Kanamycin; clindamycin and streptomycin; nalidixic acid and clindamycin; kanamycin, gentamycin and tetracycline and norfloxacilin, streptomycin and kanamycin were shown greater inhibition of Escherichia coli, Salmonella typhimurium, Staphylococcus aureus, Bacillus cereus and Pseudomonas Sps. respectively. Ampicillin, nalidixic acid and gentamycin; ampicillin, tetracycline and gentamycin; ampicillin, norfloxicin, cefpodoxeme and nitrofurontaine; and ampicillin, cotrimaxzole and nitrofurontaine were not inhibiting the growth of Escherichia coli, Salmonella typhimurium, Staphylococcus aureus and Bacillus cereus respectively. Pseudomonas Sps. growth was not controlled by any one antibiotic disc used in the study.

Keywords: Antimicrobial resistance pattern-foodborne pathogens-disc diffusion method

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INTRODUCTION

The antimicrobial agents are of great value for devising curative measures against bacterial infections. The indiscriminate use of antibiotics has led to the emergence of antimicrobial resistance in various isolates of bacteria [1]. It is well documented that drug resistance could be transferred between related bacteria, such as *E. coli* and *Salmonella* [2]. Evolution of such resistant bacteria may create problem in treatment of acute infections in man and animals. Antibiotic use preferentially eliminates nonresistant bacteria and increases the proportion of resistant bacteria that remains. Therefore, resistance of bacteria impacts the public health in such a way that it increases morbidity and mortality from treatment failures and increases healthcare costs as newer and more expensive antibiotics are needed to treat infections [3]. Therefore, this study was carried out to determine the antimicrobial resistance pattern of bacterial foodborne pathogens and determine the suitable antibiotic in controlling foodborne pathogens like *Escherichia coli, Salmonella typhimurium, Staphylococcus aureus, Bacillus cereus and Pseudomonas Sps*.

EXPERIMENTAL SECTION

The bacterial cultures used in the present study were maintained in the department of veterinary public health, college of veterinary science, Hyderabad. Twelve antibiotics namely Ampicillin (10µg), Nalidixic acid (30µg), Tetracyclin (10µg), Kanamycin (5µg), Gentamycin (10µg), Streptomycin (10µg), Norfloxicin (10µg), Cotrimaxzole (25µg), Cefpodoxeme (10µg), Nitrofurontaine (300µg), Ciprofloxacin (10µg) and Clindamycin (2µg) were obtained from Himedia and stored in refrigerator until use.

Antibiotics susceptibility test

Sterile nutrient agar medium was poured into sterile petridishes and allowed to solidify. A suspension of the organisms from pure cultures was transferred into petridishes and swab over the entire plate, it was then incubated for 1 h at 37^{o}C and a forcep was used to transfer each antibiotic disc on the plate, these plates were kept in refrigerator at 4^{o}c for easy diffusion of disc and later incubated for 24 h at 37^{o}C.

RESULTS AND DISCUSSION

The zone of inhibition of different antibiotics used in the against foodborne pathogens was given in Table 1. Among all antibiotics used in the present study streptomycin, cefpodoxeme, clindamycin and kanamycin; clindamycin and streptomycin; nalidixic acid and clindamycin; kanamycin, gentamycin and tetracycline: norfloxacilin, streptomycin and kanamycin were shown greater zone of inhibition against *Escherichia coli, Salmonella typhimurium, Staphylococcus aureus, Bacillus cereus* and *Pseudomonas sps* respectively. Ampicillin, nalidixic acid and gentamycin; ampicillin, tetracycline and gentamycin; ampicillin, norfloxicin, cefpodoxeme and nitrofurontaine; and ampicillin, cotrimaxazole and nitrofurontaine were not inhibiting the growth of *Escherichia coli, Salmonella typhimurium, Staphylococcus aureus and Bacillus cereus* respectively. *Pseudomonas Sps*. susceptible to all antibiotic discs used the in the present study.

Table 1: Zone of inhibition (diameter in mm) of antibiotics against foodborne pathogens

Disc name (μg)	***Escherichia coli***	***Salmonella typhimurium***	***Staphylococcus aureus***	***Bacillus cereus***	***Pseudomonas***
Ampicillin (10)	R	R	R	R	15mm
Nalidixic acid (30)	R	16mm	21mm	18mm	19mm
Tetracyclin (10)	14mm	R	16mm	20mm	17mm
Kanamycin (5)	21mm	15mm	11mm	22mm	20mm
Gentamycin (10)	R	R	17mm	21mm	15mm
Streptomycin (10)	23mm	20mm	12mm	13mm	21mm
Norfloxicin (10)	19	13mm	R	15mm	24mm
Cotrimaxazole (25)	12mm	18mm	13mm	R	17mm
Cefpodoxeme (10)	22mm	12mm	R	19mm	19mm
Nitrofurontaine (300)	15mm	17mm	R	R	15mm
Ciprofloxicin (10)	14mm	17mm	14mm	16mm	14mm
Clindamycin (2)	21mm	21mm	20mm	15mm	17mm

[4] reported that *E. coli* isolates were resistant to ampicillin, tetracycline, cotrimaxazole, chloramphenical and gentamycin while *S. typhimurium* isolates exhibited resistance to ampicillin, tetracycline, and cotrimaxazole. These findings were almost similar to our results in the present study except cotrimaxazole incase of *S. typhimurium* whereas contrast findings were noticed incase of *E.coli* except ampicillin. [5] studied that antibiogram of isolates of *Escherichia coli* and found that 26.67% isolates were resistant norfloxacin which is near to our findings. [6] reported that *Escherichia coli* found resistant to ampicillin, nalidixic acid and Kanamycin which was almost similar to our findings except that the kanamycin was sensitive. They also found that salmonella was resistant to ampicillin, kanamycin and nalidixic acid which in contrast with our results in the present study except ampicillin. In the present study *Salmonella typhimurium* showed resistant to ampicillin, tetracycline and gentamycin which was contrast to the findings of [7] who gave that the salmonella species were resistant to ciprofloxacin and norfloxacin. *Salmonella typhi* strains resistant to streptomycin and tetracycline have previously been reported in Indonesia [8]. Multiple antibiotic resistant enteric pathogens have been reported in many developing countries, especially Pakistan, India, Bangladesh, and The Philippines.

Bacillus cereus was sensitive to gentamycin with inhibitory zone of 18mm [9]. It was also noticed that Bacillus cereus was sensitive to ciprofloxacin. Bacillus cereus was resistant to tetracycline, ampicillin and nitrofurantoin. [10] Pseudomonas was sensitive to tetracycline with inhibitory zone 13 mm. [11] found that staphylococcus aureus sensitive to the flouroquinolones, tetracycline and cotrimoxazole; resistant to the clindamycin which were far to findings of the present study.

The use of antibiotics after the intake of the organisms may not be effective as the organisms may be susceptible or resistant to it. Resistance to antibiotics in foodborne pathogens may create problems for disease or illness treatment while antibiotic susceptibility leads to healing of the illness which the organisms caused.

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