Prospective study on bacterial isolates from pus sample and their antibiotic susceptibility pattern

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ABSTRACT

The study was conducted in the SRL diagnostic center, for a period of 4 months. The aim was to isolate and identify several bacterial pathogens commonly present in the pus sample and also to determine their antibiotic sensitivity and resistance pattern against the standard antibiotic. Out of 259 pus sample, 169 were collected from the male patients and 90 were collected from the female patients. Total 164 positive cases were found among 259 pus sample with male (114) and female (51) positive cases. Age group between 21 to 30 years, were the most sensitive age group for wound infection. From 164 bacterial isolates, 12 species were isolated that includes 3 of Gram positive and 9 of Gram negative bacteria. 75 Gram positive isolates and 89 Gram negative isolates were the total isolates among the 164 positive cases. Similarly, 151 cases were found to be of single growth and 13 of multiple growth. Bacterial pathogens isolated from pus sample were mostly Gram positive cocci, *Staphylococcus aureus*. The bacterial pathogen showed resistance to most of the antibiotics. In case of Gram negative, E. coli showed a high prevalence in pus sample.

Key words: Pathogen, Antibiotic, *Staphylococcus*, MDR

INTRODUCTION

Pus is a yellowish white, thick fluid formed during inflammatory response caused by invasion of foreign body (Mousa, 1997). Infection is the entry, and multiplication of disease producing agent in the host body that leads to harmful effects (Mordi & Momoh, 2009). Mucous membrane of respiratory, gastrointestinal linings, skin, etc. are the most common entry point of pathogenic bacteria (Brooks & CarrollK, 2007).

Skin, the largest organ in the human body, plays an important role in regulation of water and electrolyte balance and also acts as a first line of defense to the external pathogens. However when the epithelial layer gets disrupted, it leads to wound (Mehta & Ransjo, 2008). The most common cause for all wounds is trauma and it may be accidental or intentionally induced (Mangram et al., 1999). The exposed subcutaneous tissue provides a moist, warm, and nutritive environment that is favourable to microbial growth and colonisation (Kaplan, Smadi, Al Taani, & El Qudah, 2003). The presence of different types of microorganisms and there abundance in any wound depends upon the type of wound, location, depth and host immune response (Isibor, Oseni, Eyaufe, Osagie, & Turay, 2008).

There are different types of wound infections like surgical, bite wound, burn wound, ulcer, etc. Primary skin infections are majorly affected by *Streptococcus pyogenes* or *Staphylococcus aureus*, that gains entree through

abrasions or minor trauma to skin in everyday life (Giacometti et al., 2000). About 1 to 5% risk is associated with post-operative wound infections and 27% is due to dirty handling procedures that are more more susceptible to contamination (Ekrami & Kalantar, 2007). One third of nosocomial infections in patients is due to surgical wounds and skin infections. Thus becomes the major cause of mortality (Dhar, Saraf, Singh, & Raina, 2007).

Different types of microorganisms like bacteria, viruses, fungi, etc. are responsible for causing wounds and which may ultimately lead to chronic wounds (Brook & Frazier, 1999). Generally observed organisms in wound infections are *S. aureus, S. pyogenes, Proteus, Morganella, Providencia, E. coli, Bacteroides, Clostridium, Peptostreptococcus (Donovan, 1998) (Powlson & Coll, 2010).*

Wound infection is becoming a great cause of threat all over the world. India, being a developing country, the socioeconomic condition of the people is not so good and their knowledge regarding sanitation and hygiene is so poor (Rowley-Conwy, 2010) (Bowler, Duerden, & Armstrong, 2001). Due to the unawareness and lack of knowledge among people, the normal wound becomes chronic due to the inadequate management of wound during the starting stage (Cooper & Lawrence, 1996). Wound infection is not a big disease that cannot be treated, rather if proper preventive measures are taken like complete care of wound, cleaning, and good hygienic practices helps to reduce the problems associated with the wound infection (Cruse & Foord, 1973) (Scanlon, 2005). Proper treatment of wound is very essential for limiting the growth of microorganisms.

The present study was carried out at Super Religare Laboratories (SRL) diagnostic center. Objective of this study was to appraise bacteriological load in the pus sample with relation to age and gender. Also antimicrobial testing was done to know about the effective treatment of wound infection.

MATERIAL AND METHODS

This research was done in the Microbiology laboratory of SRL diagnostic center in order to isolate and identify organisms from pus sample and also to know their antibiotic susceptibility pattern. Pus samples were collected from 259 patients, of the age ranging from young (3 months) to old (84 years)

Sample was collected and processed for microscopic and macroscopic examination following the standard protocol.

RESULT

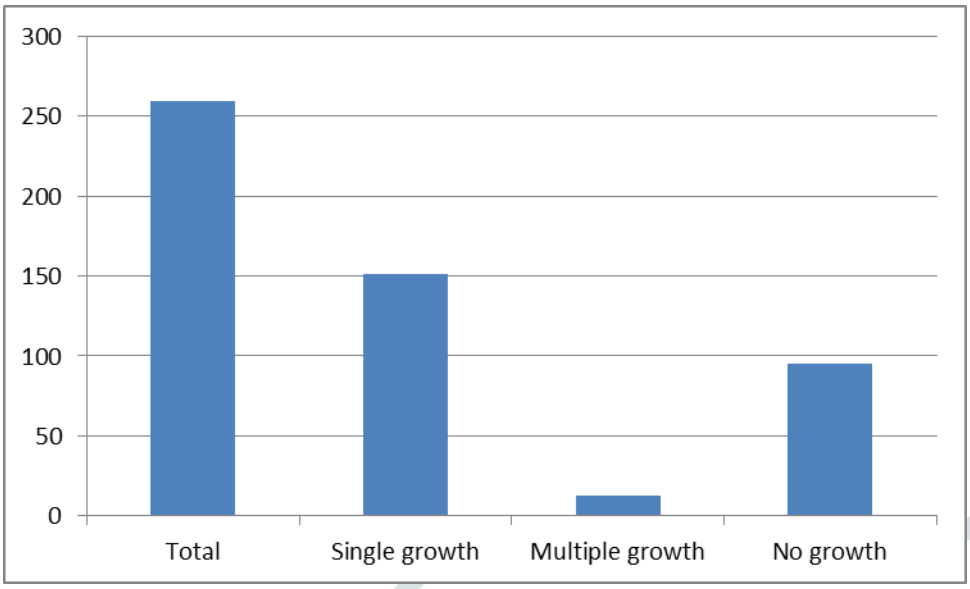

Fig. 1: Pattern of growth in the collected sample

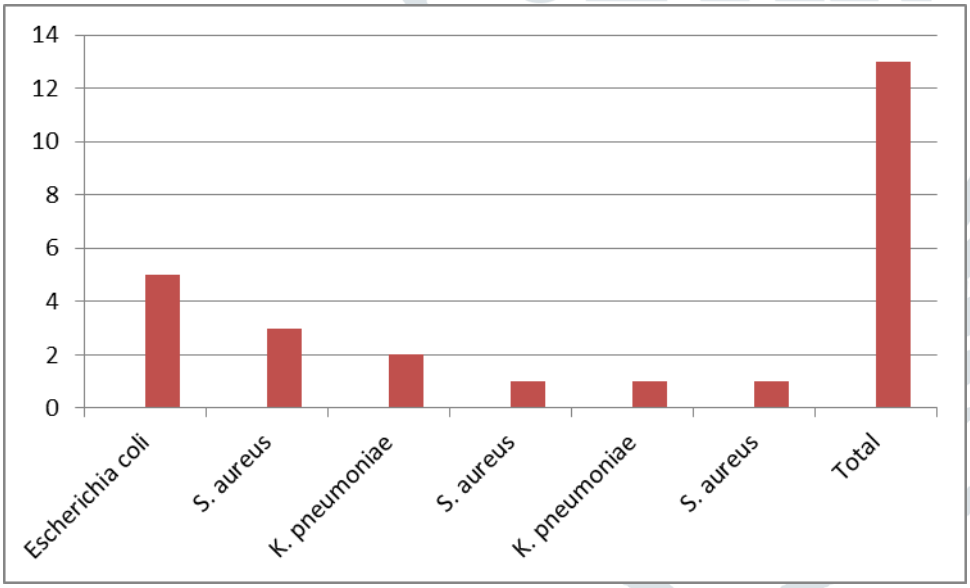

Fig. 2: Distribution of organisms isolated

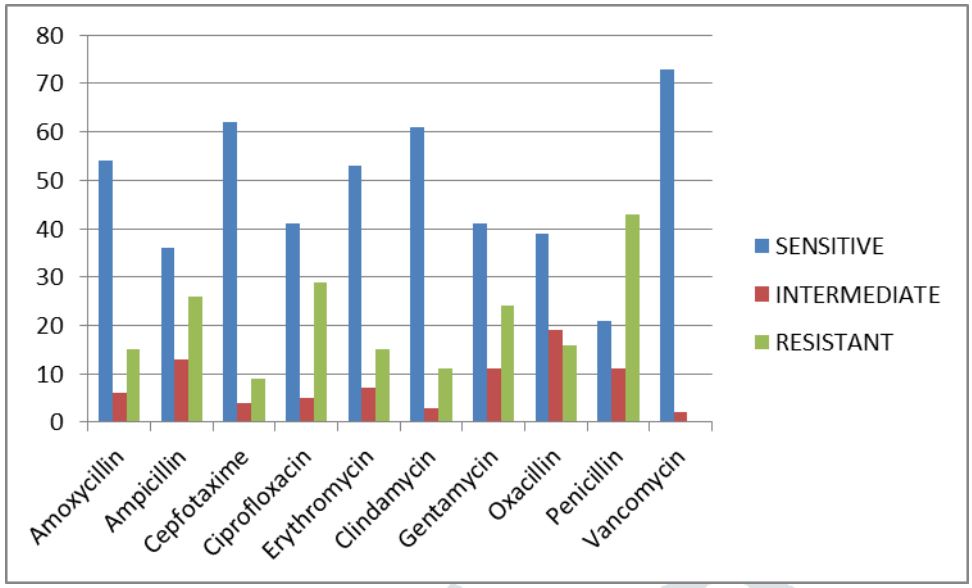

Fig. 3: Antibiotic susceptibility pattern of Gram positive isolates

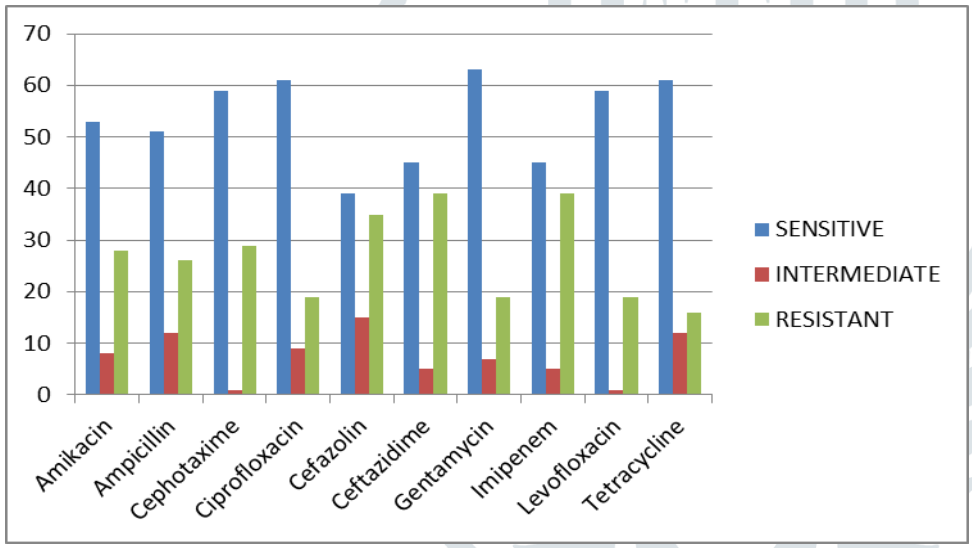

Fig. 4: Antibiotic susceptibility pattern of Gram negative isolates

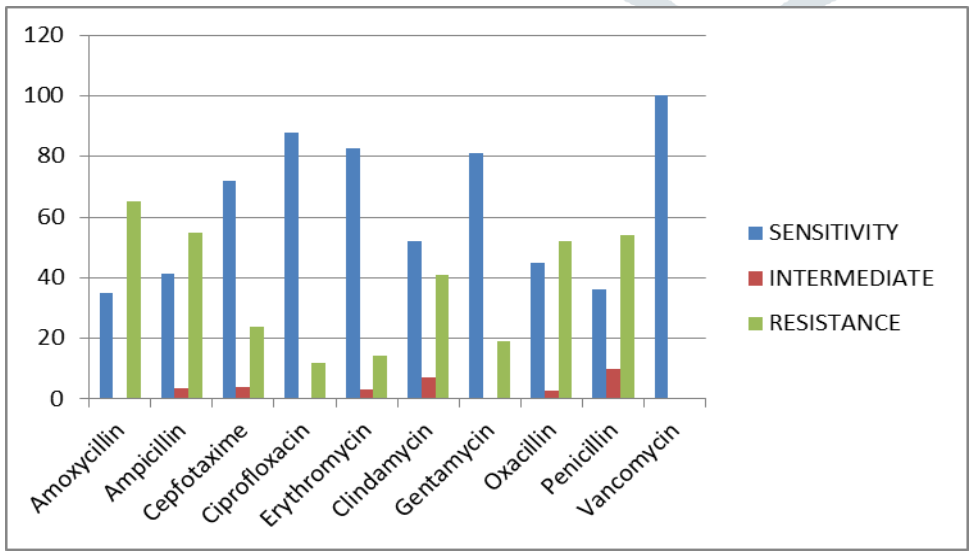

Fig. 5: Antibiotic susceptibility pattern of *Staphylococcus aureus*

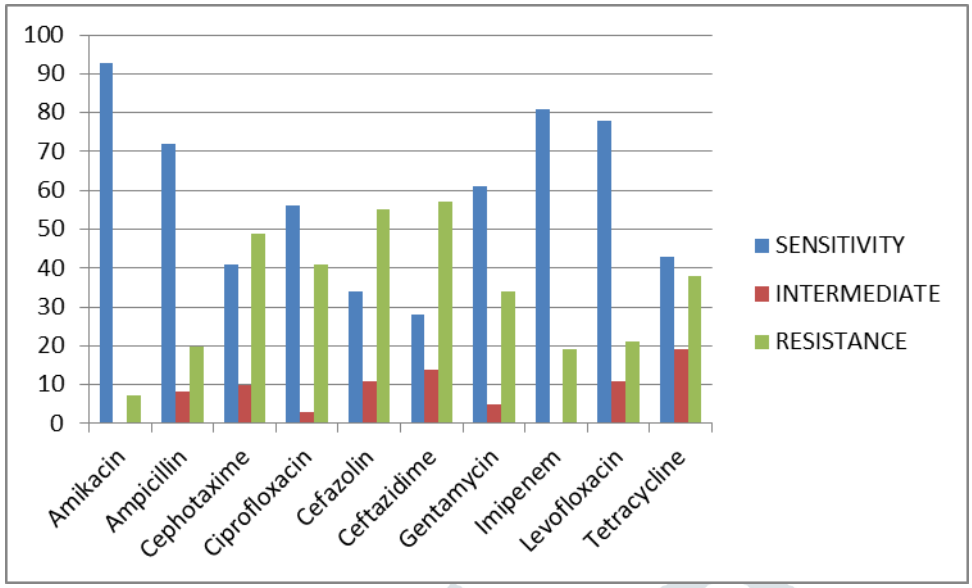

Fig. 6: Antibiotic susceptibility pattern among isolates of *Escherichia coli*

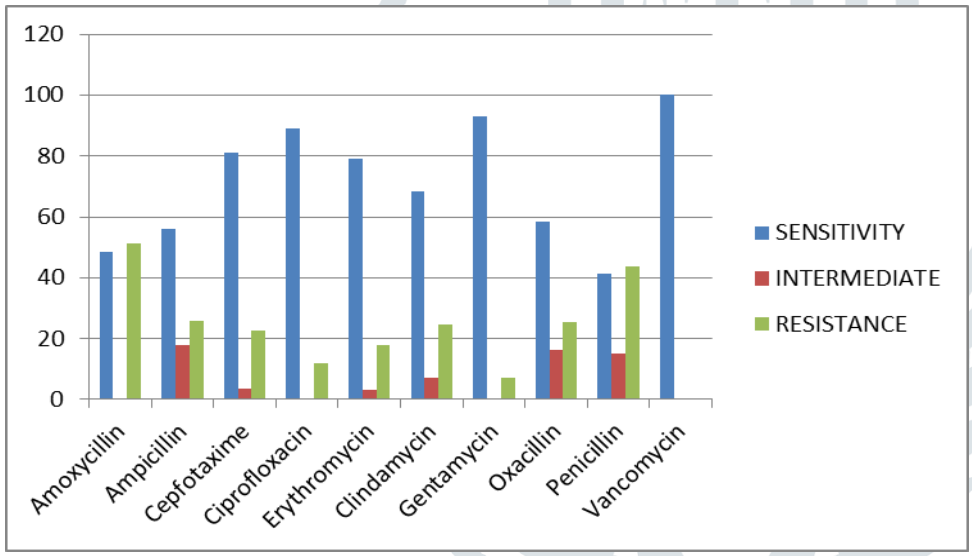

Fig. 7: Antibiotic susceptibility pattern for isolates of *Staphylococcus epidermis*

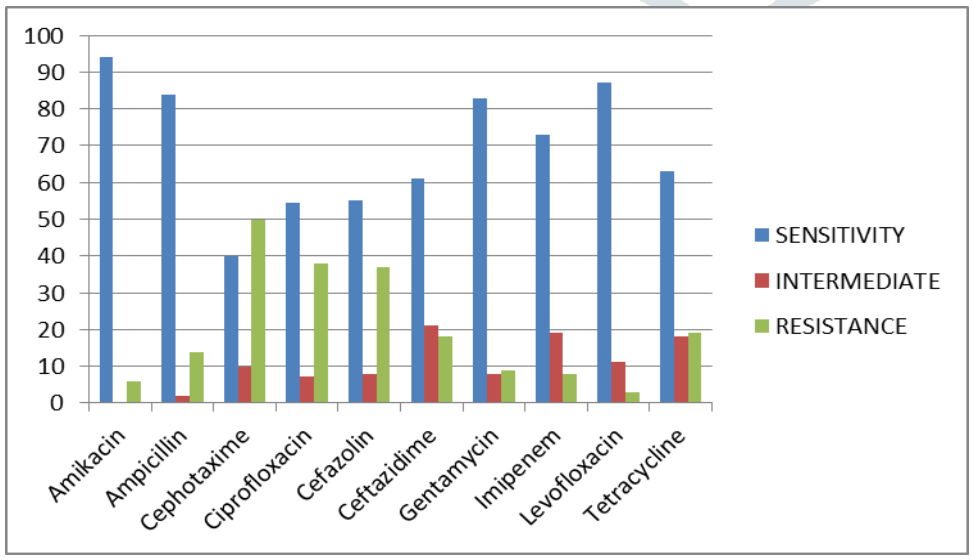

Fig. 8: Antibiotic susceptibility pattern for isolates of *Klebsella oxytoca*

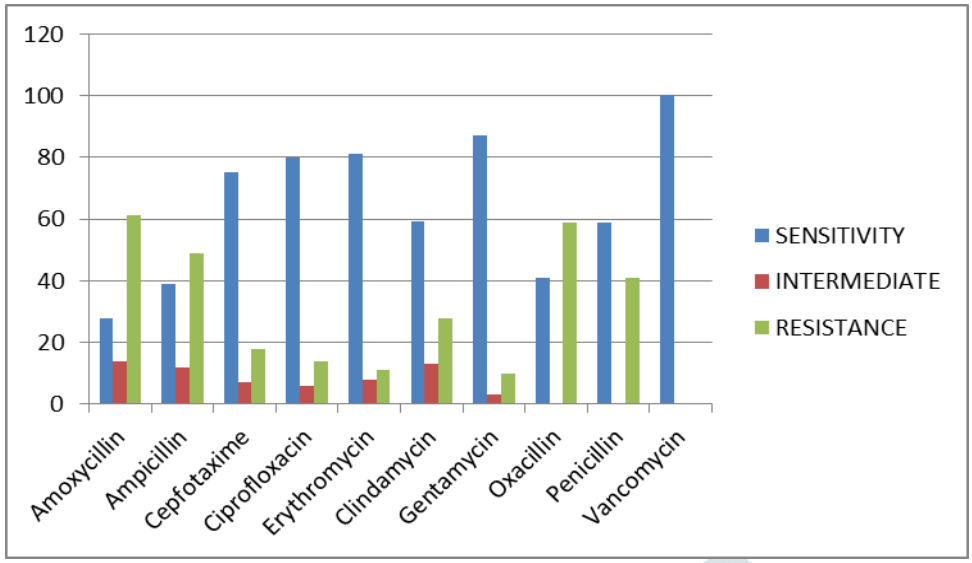

Fig. 9: Antibiotic susceptibility pattern for the isolates of *S. pyogen*

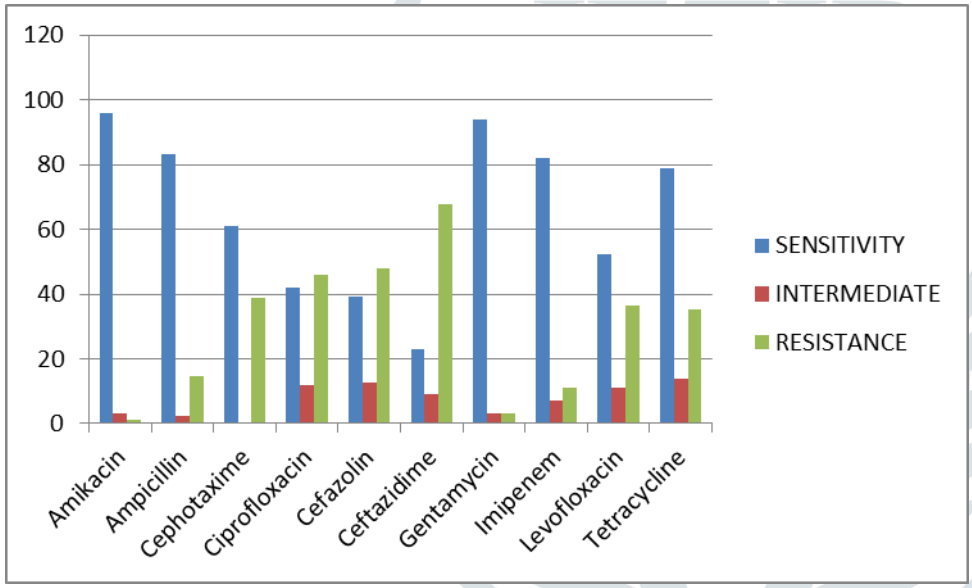

Fig. 10: Antibiotic Susceptibility pattern for isolates of *Citrobacter ferundii*

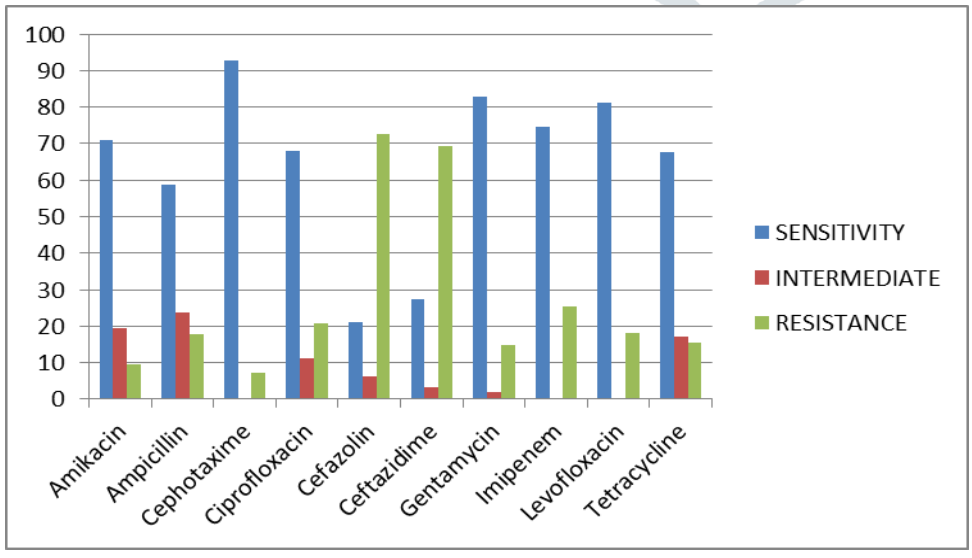

Fig. 11: Antibiotic Susceptibility pattern for isolates of *Pseudomanas aeruginosa*

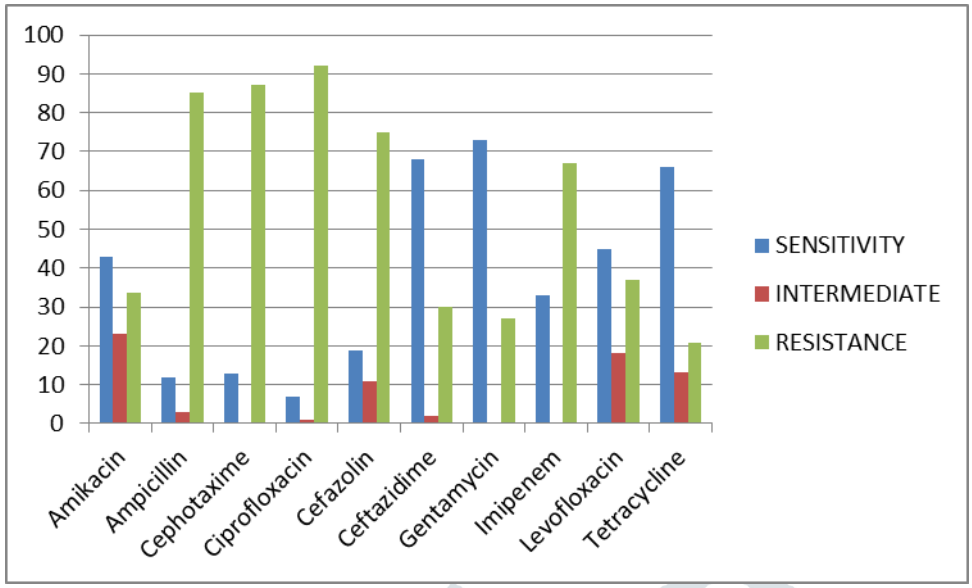

Fig. 12: Antibiotic Susceptibility pattern for isolates of *Acinitobacter baumanii*

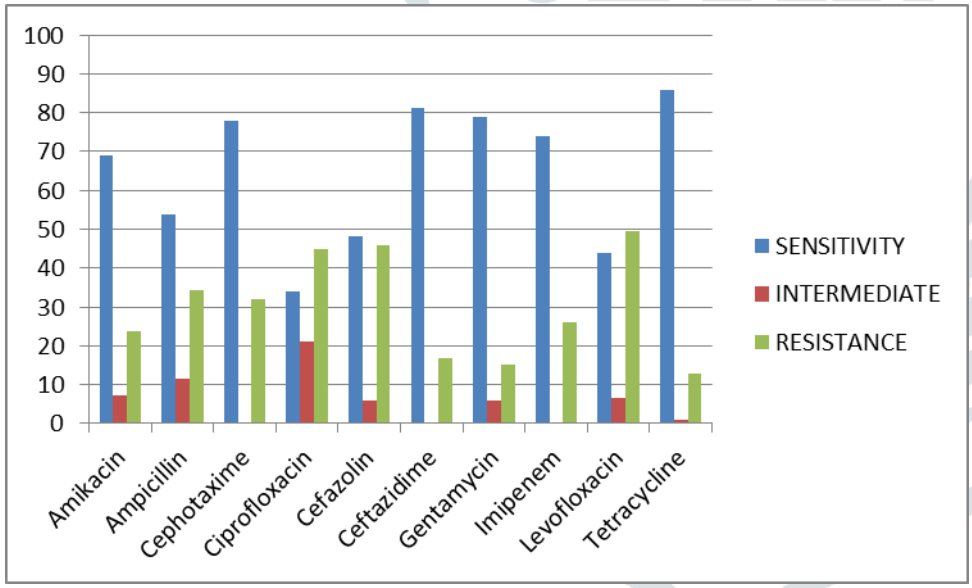

Fig. 13: Antibiotic Susceptibility pattern for isolates of *Proteus vulgaris*

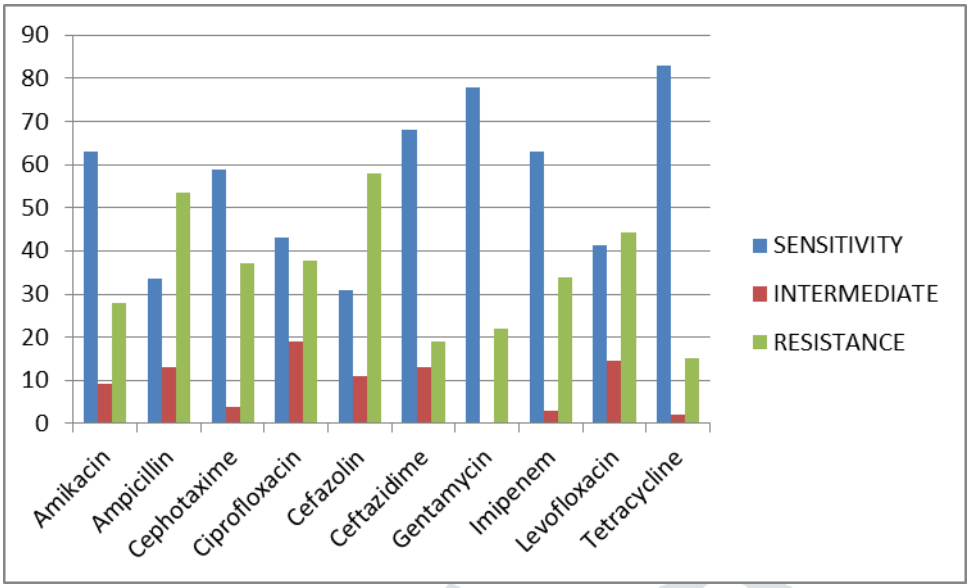

Fig. 14: Antibiotic Susceptibility pattern for isolates of *Proteus mirabalis*

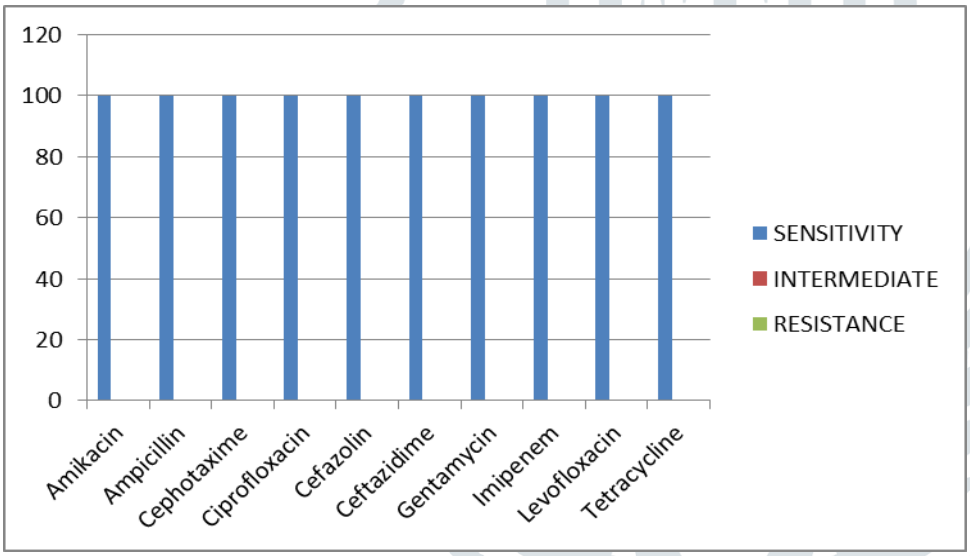

Fig. 15: Antibiotic Susceptibility pattern for isolates of *Morganella morganii*

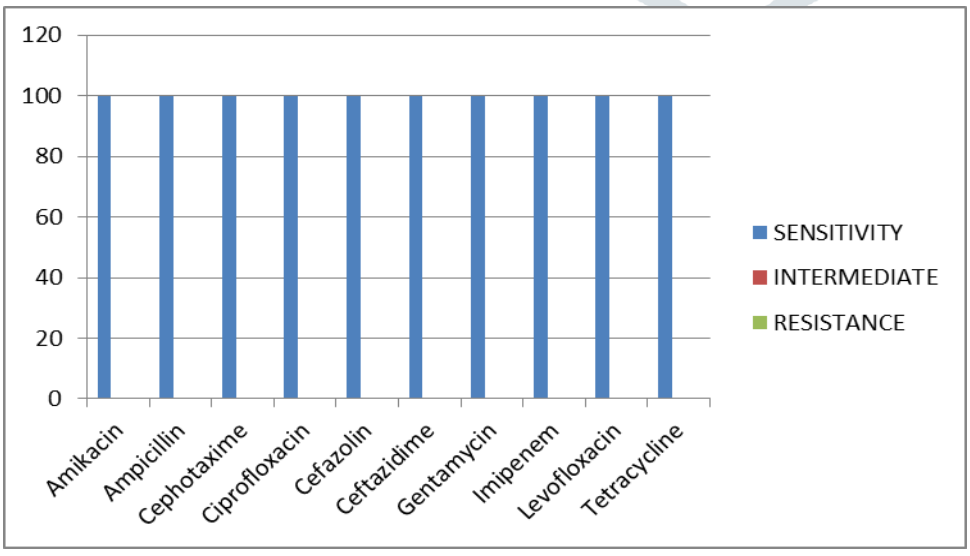

Fig. 16: Antibiotic Susceptibility pattern for isolates of *Enterobacter cloacae*

DISCUSSION

Wound infection is becoming a major threat cause in both developed and developing countries. Wound can cause great distress in terms of associated death rate, extends hospital stay, and increases overall price attributable to infection (Cope, 1944). Imprudent and overuse of antibiotics has lead to the drug resistance problem and which can be reduced by the judicious use of antibiotic prophylaxis (Chia, Tan, & Tay, 1993). Total 259 samples were collected, processed and analyzed through standard microbiological technique and relatively higher growth in male patients was observed than in female patients. It was found that age group between 21-30 is likely more affected. All together 12 different species of bacteria were isolated, among those, Gram positive bacteria: *S. aureus* was found to be the most predominant isolate representing 31.09% of total bacterial isolates and *E. coli*, a Gram negative bacteria represents 26.21% of total bacterial isolates. Vancomycin (97.33%) and Gentamycin (70.78%) was found to be the most sensitive antibiotic for Gram positive and Gram negative isolates respectively. For *S. aureus*, the utmost sensitive antibiotic was Vancomycin (100%) while the least effective antibiotic was Amoxcillin (35%) and Penicillin (36%) respectively.

CONCLUSION

S. aureus and *E. coli*, were the most isolated organism from Gram positive and Gram negative bacteria respectively. So both the organisms should be taken as a cause for serious problem. Though wound infection is a not a untreatable problem so good antiseptics, treatment protocols, and thus appropriate care of wounds may help to curtail the incidence of the wound infections. Very careful use of antibiotic should be done for controlling antibiotic resistant problems. The results of antibiotic susceptibility test, suggests that some antibiotics have very less utility for the prophylaxis of wound infection. The result provides an insight to establish new therapeutic approaches for effective wound management. Since, anaerobes are also involved in wound infection, anaerobic culture should also be performed to obtain the real data. Since, *Mycobacterium tuberculosis* are also involved in wound infection, culture for *M. tuberculosis* should be done. This study does not represent the scenario of the whole country and this type of study should be done in other health care institutions for national level.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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