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Prevalence of Carbapenem Resistant Enterobactericeae (CRE) in a Tertiary Care Hospital

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1. Introduction

- Enterobacteriaceae family is an important cause of urinary tract infections(UTIs), bloodstream infections, hospital acquired pneumonias.
- The prevalence of ESBLs producing Enterobacteriaceae made carbapenem a preffered drug in the treatment of MDR Enterobacteriaceae. But indiscriminate use of carbapenem to tackle the ESBL producing organism leads to carbapenem resistance in healthcare and community settings.
- Identifying carbapenem resistant organisms and implementing measures to prevent the spread is need of the hour.

2. Objective

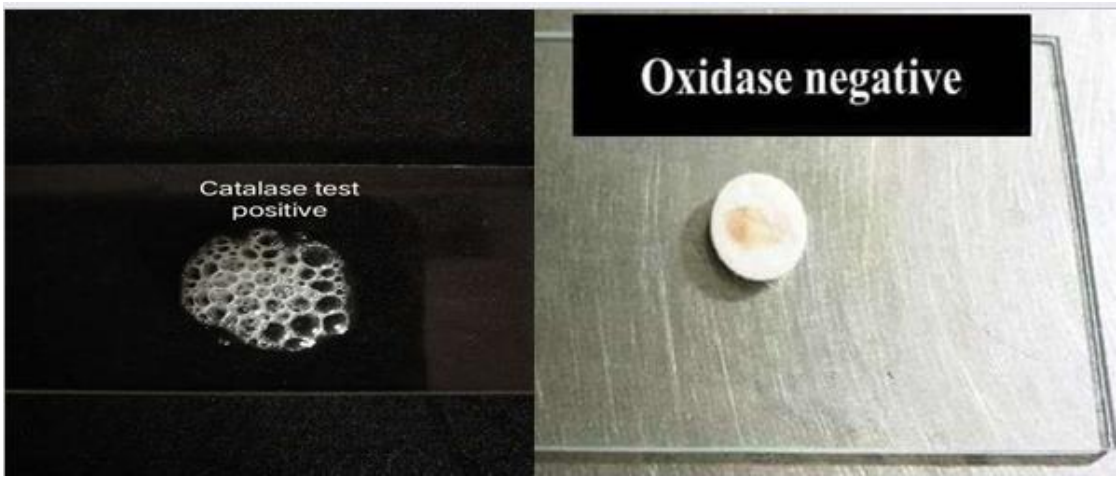
- To determine the prevalence and susceptibility pattern of Carbapenem resistant Enterobacteriaceae.

3. Material and Methods

- This is a descriptive study done from January 2023 to June 2023 at Department of Microbiology.
- All Enterobacteriaceae isolates recovered during the six months study period from January 2023 to June 2023 were included in the study.
- The isolates were identified using standard conventional methods. Antimicrobial susceptibility was performed using the Kirby-Bauer disc diffusion technique.
- Modified Hodge test were done for Carbapenamase activity.

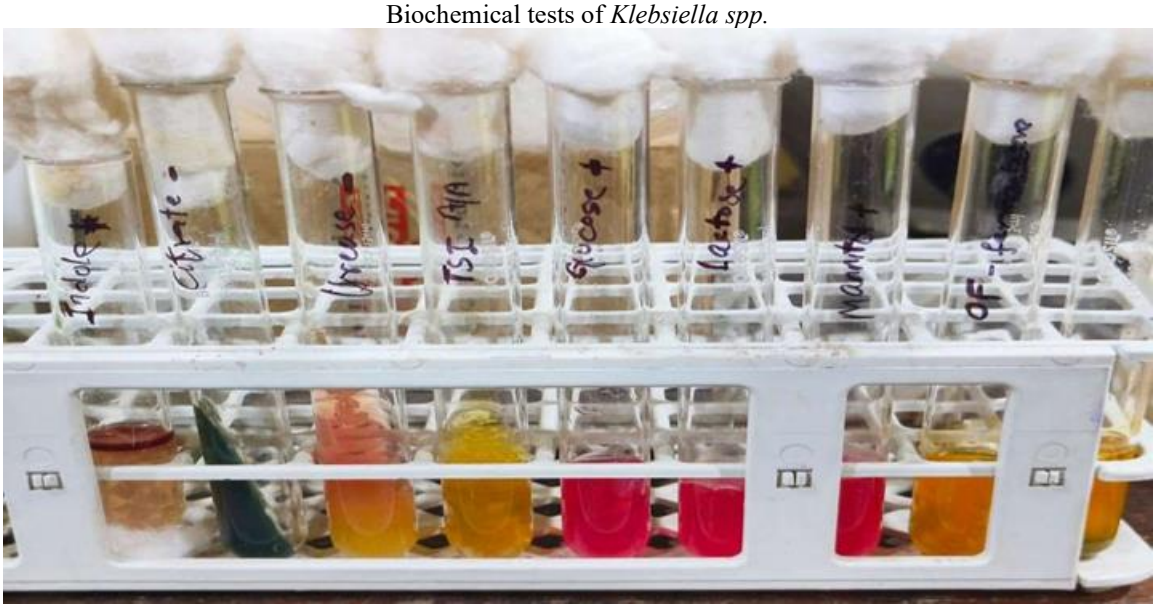
E.coli colonies(top) and *Klebsiella spp.* (down) grown on Mc Conkey agar

Klebsiella *spp.* grown on *CLED* agar

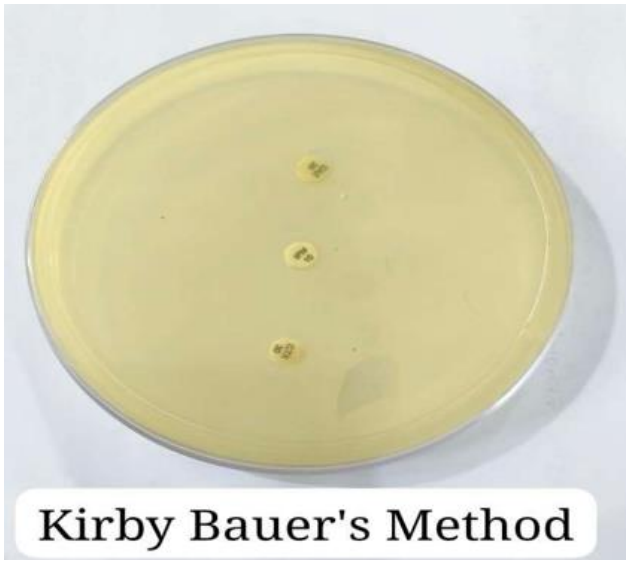


Biochemical tests for *Klebsiella spp*

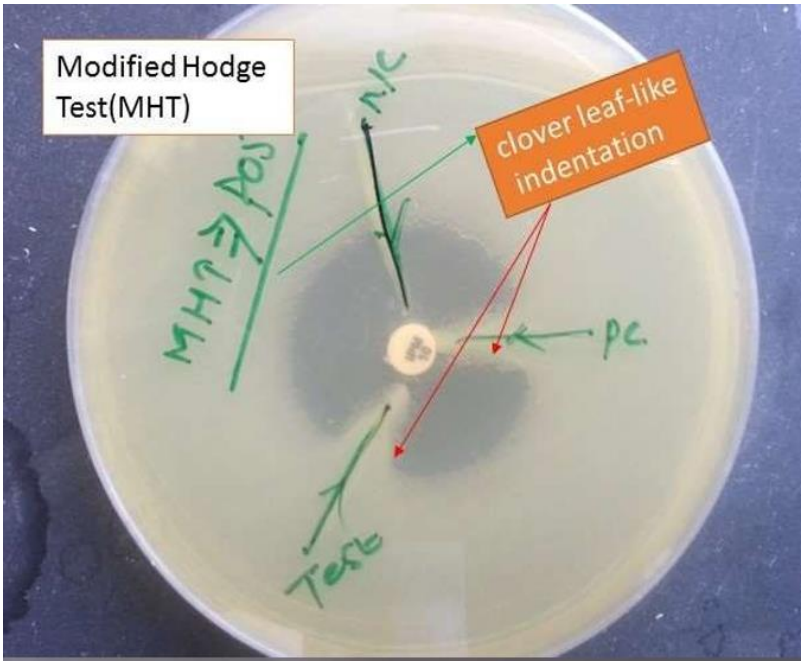
Biochemical tests of *Klebsiella spp.*



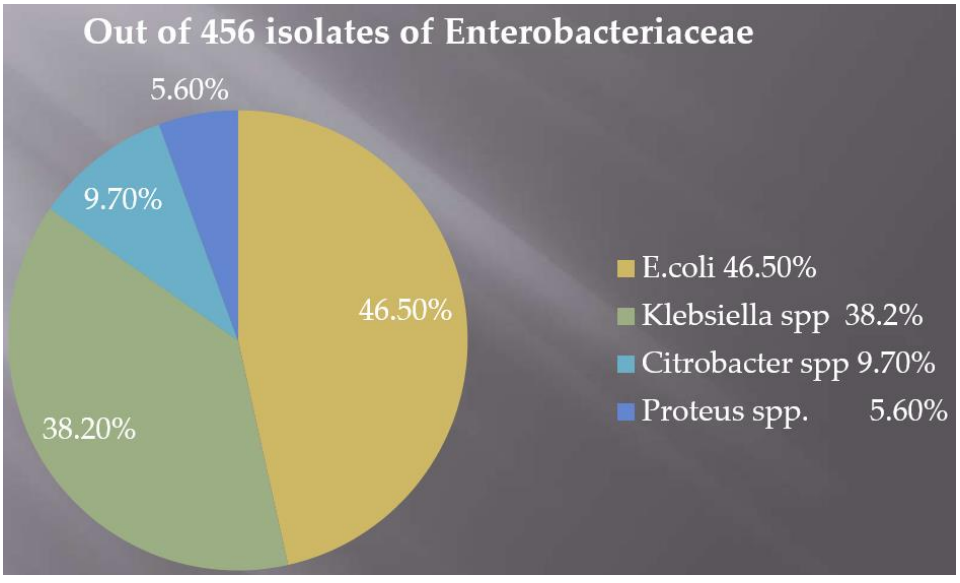
Biochemical tests of *Escherichia coli*



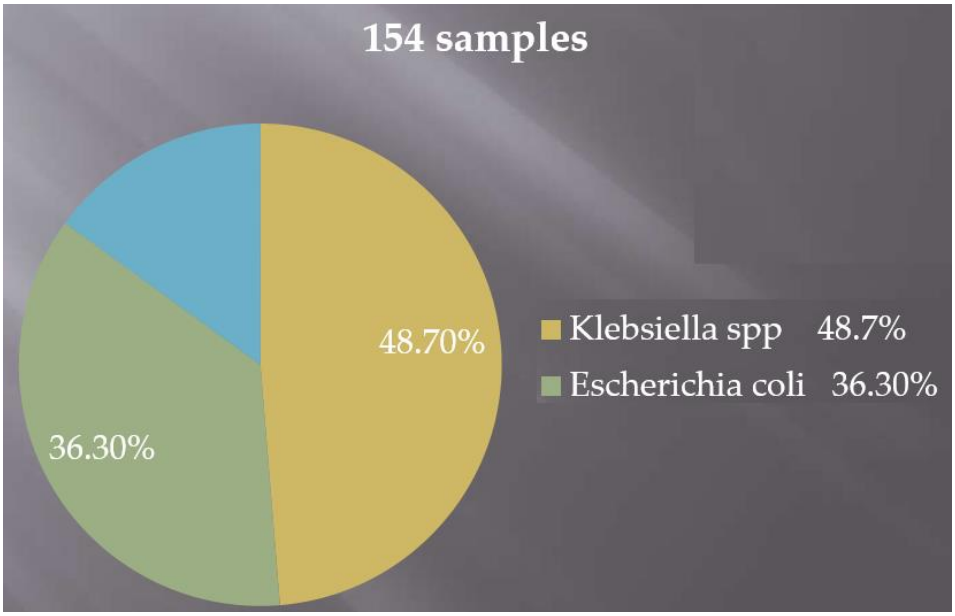
Antibiotic Susceptibility of *E.coli* demonstrated in MHA



4. Results



Out of 456 samples, 154 were carbapenem resistant.



5. Discussion

- Carbapenem resistance in Gram-negative bacteria is increasingly encountered in healthcare-associated infections in India.
- Bacteremic episodes due to these organisms carry a high mortality as shown by previous studies from other countries.
- From India various studies have found different rates of carbapenem resistance. In August 2004 and July 2005 a study was conducted in Aligarh. In this study overall Imipenem resistance was 12% for *Klebsiella species*.
- In July 2011 to January 2013 a study was conducted in Meerut which showed 5-6% carbapenem resistant in *Enterobacteriaceae*.
- In other developing countries from African continent, the prevalence of carbapenemase producing bacteria ranged from 2.3% to 6.7% in North Africa and from 9% to 60% in Sub - Saharan Africa.
- In the present study, the overall resistance to carbapenems was 14.6% which is in comparison with the study of Manhoaran and Premalatha who reported 17% resistance to carbapenems in *Enterobacteriaceae*. Also, Priya dutta Wattal C and Gupta showed 7.87%, 13-57% and 17-22% resistance to carbapenems respectively.
- The MHT screening test for carbapenemases is currently proposed by the Clinical and Laboratory Standards Institute (CLSI) for phenotypic screening of Carbapenemase producers (Table)

Bacterial Strains isolated	Total no. of isolates	Carbapenemase production by:		Percentage of Carbapenemase producers (%)
		Disc diffusion method	Modified Hodge Method	
Klebsiella spp.	212	14	14	6.6
E.coli	174	7	7	5
Citrobacter spp.	44	1	1	2
Proteus spp.	25	1	1	4

6. Conclusion

- Carbapenem resistance in Gram-negative bacteria is increasingly encountered in healthcare-associated infections in our settings.
- But, active surveillance, hand hygiene, contact precautions, and appropriate antibiotic usage form an effective approach in reducing the incidence of infections caused by these life threatning microorganisms.

References

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