

“Carbapenem resistant bacteria on hand-held and hand-free electronic devices of CCU health care workers in tertiary care hospital, Kanpur.”

Arpita Tripathi¹, Suneet Kumar Yadav², R Sujatha³

1. PG student at Rama Medical College Hospital & Research Centre, Kanpur
2. Associate Professor of Microbiology Rama Medical College Hospital & Research Center, Kanpur
3. Professor & HOD Dept. of Microbiology Rama Medical College Hospital & Research Centre, Kanpur.

ABSTRACT :

INTRODUCTION: Monitoring sensitivity profile of hospital strain is a key of a hospital infection control policy. The hospital environment and equipment may be reservoirs for Carbapenem resistant bacteria. Electronic devices were seen to be potential source for the transmission of bacteria. **AIM:** To study the Carbapenem resistant bacteria on hand-held and hand-free electronic devices of CCU health care workers in tertiary care hospital Kanpur. **MATERIAL AND METHODS:** This is the Prospective Observational study conducted in department of CCU from November 2023 to October 2024 at Rama Medical College Hospital and Research Centre Kanpur. Bacteria were cultured from electronic devices like mobile phones, electric watches, ear pods, laptop, mouse, keyboard etc. of health care workers. Growth was evaluated as Gram positive cocci and Gram Negative Bacilli. Multidrug resistant GNB with carbapenem resistance were further analysed by Modified Hodge Test. **RESULT:** Out of 70 samples, growth was seen in **56**, **34** showed growth of **Gram-negative bacilli** and **22** were **Gram positive cocci**. Among **34 Gram negative bacilli** samples, **26** were **carbapenem resistant** which means both the drugs **Imipenem** as well as **Meropenem** were found to be resistant (according to their zone sizes). **22** samples among carbapenem resistant showed **positive Modified Hodge Test (MHT) by forming clover – leaf like pattern**.

CONCLUSION: Electronic devices are a potential vehicle for the transmission of Carbapenem Resistant Bacteria in our study, hence proper infection control practices and hygiene should be followed to reduce the carbapenem resistant

KEYWORDS: -Carbapenem, Electronic devices, Mobile phones, Modified Hodge Test.

INTRODUCTION:-

Electronic devices such as mobile phones, chargers, touch screens, digital wristwatches, laptops, computer mice and hands-free mobile devices such as headphones/microphones are now routinely used by healthcare workers (HCWs) both on and off duty, in hospital and at home.¹

It has been shown that mobile phones are a potential source for the transmission of bacteria such as *Staphylococcus aureus*, coagulase-negative *Staphylococcus*, Gram-positive spore bearers, *Pseudomonas aeruginosa*, *Acinetobacter baumannii*, *Klebsiella pneumoniae*, *Citrobacter* spp., *Escherichia coli*, and diphtheroid, among HCWs.⁽²⁾⁽³⁾ The hands of HCWs, microflora emitted from the mouth while talking and nasal bacteria in exhaled breath have been postulated to be common sources of these bacteria⁽⁴⁾. Moreover, the heat generated by constant handling of the phone and by the handset itself creates a suitable environment for bacterial growth. The presence of these bacteria and preventing their spread is a key issue in controlling healthcare associated infections⁽⁵⁾.

HAIs caused by carbapenem-resistant bacteria have become a global threat and the incidence is increasing.⁽⁶⁾ Carbapenemase-producing bacteria are resistant not only to the carbapenem

antibiotics such as , meropenem, imipenem, but can also be resistant to other groups of antibiotics⁽⁷⁾ Characterising carbapenem resistance requires the consideration of both carbapenemase production as well as other resistance mechanisms. This can enable clinicians to select the most appropriate antibiotics for treatment. Although testing for carbapenemase production is not always routinely carried out, healthcare infection control procedures or epidemiological investigations often require the identification of these enzymes in Gram-negative bacteria^{(8) (9)}

Studies on the bacteria present on hand-held and hands-free electronic devices are required given the widespread use of these devices and the rising incidence of infections caused by multidrug resistant bacteria⁽¹⁰⁾

AIM:

Carbapenem-resistant bacteria on hand-held and hand-free electronic devices of CCU healthcare workers in a tertiary care hospital.

OBJECTIVE:

- 1) To isolate Gram negative bacilli from electronic devise of HCW
- 2) To perform the gram staining and biochemical test for species confirmation.
- 3) To perform the Kirby Bauer disk diffusion method for AST.
- 4) To perform the Modified Hodge test for Carbapenem resistance.
- 5) To study the prevalence of carbapenem resistant in HCW
- 6) To study demographic profile and its risk factor.

Material Method:-

TYPE OF STUDY:

Prospective Observational study.

DURATION OF STUDY: -

This study will be conducted from December 2023 to November2024.

VENUE OF STUDY:-

Department of microbiology.

INCLUSION CRITERIA:

All health care workers who work in hospital.

EXCLUSION CRITERIA:

Non health care workers like patient and attendants of the patients

METHODOLOGY:

Samples will be processed using standard procedure on -

- 1) MacConkey agar
- 2) Blood agar
- 3) Biochemical test
- 4) Muller hinton agar

OUTCOME MEASURES:

This study will help to find out the incidence of Carbapenem resistant bacteria on hand held and hand free electronic device and hospital infection control practices .

STATISTICAL METHOD:

A suitable statistical test will be carried out according to study.

ETHICAL CLEARENCE:

The ethical clearance will be obtained from the Institutional ethical committee of Rama Medical College and Research Centre, Mandhana Kanpur.

RESULT: -

Out of 70 samples, growth was seen in **56**, **34** showed growth of **Gram-negative bacilli** and **22** were **Gram positive cocci**. Among **34 Gram negative bacilli** samples, **26** were **carbapenem resistant** which means both the drugs **Imipenem** as well as **Meropenem** were found to be resistant (according to their zone sizes). **22** samples among carbapenem resistant showed **positive Modified Hodge Test by forming clover – leaf like pattern**.

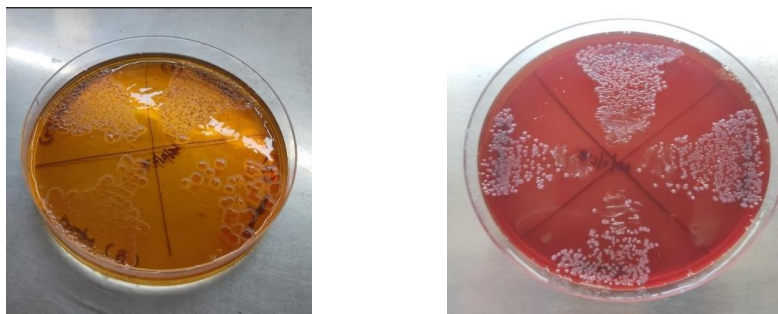


Fig1 shows:- Growth on MacConkey and Blood Agar

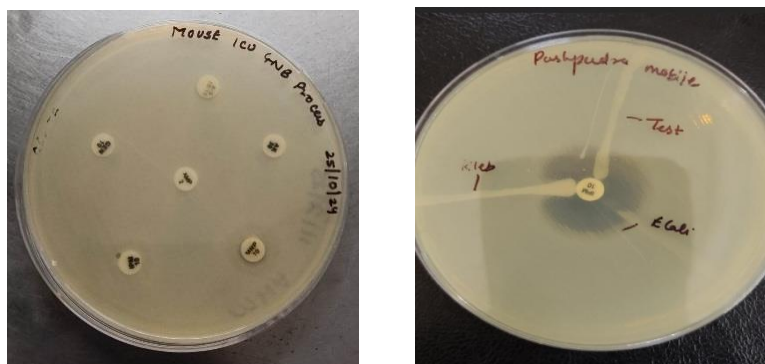


Fig 2:- Carbapenem Resistant and Positive Modified hodge test

DISCUSSION-

A reduction rate of healthcare associated infection is one of the most important measurable outcome of infection control policy.

In this study, Mobile phones had highest number of isolated bacteria ,whereas hand-free/microphones were least contaminated . This observation could be explained by Gram positive bacteria being common skin contaminants hence, frequently transferred .

In this study Gram negative were carbapenem resistant were 48.5% from hew similar to study by Ain N etal the presence of imipenem resistant was around 56.5 % . The presence of such a high proportion of resistant bacteria of hand held electronic device could be due to sharing devices may be a potential risk not only for HCWs and family members . Infection caused by antibiotic resistant bacteria can be difficult to treat and can cause morbidity and mortality.

CONCLUSION-

The results of this study highlight the importance of antimicrobial resistance surveillance studies and the need to develop a surveillance policy. It provides an insight into the load of carbapenem-resistant bacteria on hand-held electronic devices used by HCWs and non-HCWs comprising the family members of HCWs and patient carers. The study supports the hypothesis that electronic devices are a potential vehicle of the transmission of carbapenem-resistant bacteria. Hands-free mobile devices were less likely to be contaminated with carbapenem-resistant bacteria than mobile phones and other electronic devices. Promoting the use of hands-free devices use may reduce the transfer of multidrug-resistant bacteria in the healthcare setting and could help to reduce HAIs.

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