

A Comparative Study on Bacterial Profile and Antibiotic Resistance Patterns of Pus Isolates Before and During Second Wave of COVID 19 in a Tertiary Care Hospital in Bengaluru

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Conflict of interest: Nil

Abstract:

Background: SARS-CoV-2 infection has predisposed affected individuals to bacterial coinfections, which is a common complication of viral infections, with increasing morbidity and mortality and more burden on healthcare resources.

Objective: To determine antibiotic resistance pattern of pus isolates before and during second wave of COVID 19

Materials and Methods: This is a retrospective type of cross-sectional study conducted from January 2021 to June 2021, by collecting data of 542 pus samples which were collected from patients admitted in ICU and wards of Victoria hospital and processed in Infosys Central Laboratory, Department of Microbiology, BMCRI. The bacterial profile and antibiogram was analysed.

Results: Out of total 542 pus samples, 356 were collected during pre-Covid second wave (January 2021 to March 2021) and 186 pus samples were collected during Covid second wave (April 2021 to June 2021).

Gram negative bacilli were predominant namely *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*, *Acinetobacter baumannii*, *Escherichia coli*, *Staphylococcus aureus*, were the top organisms before and also during second wave of COVID 19.

Enterobacterales group of organisms had increased resistance to beta lactam and aminoglycoside drugs during second wave period, *Staphylococcus aureus* showed increased MRSA from 78.08% (pre-Covid second wave) to 87.5% (Covid second wave).

Conclusion: Resistance pattern has increased significantly in *K. pneumoniae*, *P. aeruginosa*, *S. aureus* and it is more or less same in *E. coli* and *A. baumannii* during second wave when compared with pre-covid second wave, emphasizing the need for implementing antimicrobial stewardship. The practice of empirical antimicrobial treatment has led to the emergence of antimicrobial resistance among clinical isolates.

Keyword: COVID-19, SARS-COV- 2, bacterial profile, antimicrobial resistance (AMR), antibiogram

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Introduction

SARS-CoV-2 infection has predisposed affected individuals to bacterial coinfections, which is a common complication of viral infections, with increasing morbidity and mortality and more burden on healthcare resources.

Hospitalization is necessary for critically ill coronavirus disease 2019 (COVID-19) patients, which raises their risk of developing secondary bacterial and fungal infections. Due to many hospitals' poor diagnostic capabilities, the practice of empiric antibiotic prescription has the potential to

worsen India's already concerning antimicrobial resistance (AMR) issue [1].

A frequent consequence of viral infections namely bacterial co-infection increases morbidity and death while placing a greater strain on medical resources. Serious bacterial infections may be missed when all attention focuses on COVID-19. Therefore, recognition of co-infection in patients with COVID-19 is of utmost importance which makes possible for us to effectively administer antimicrobial stewardship while managing and controlling the usage of antibiotics [2].

Objective

To determine antibiotic resistance pattern of pus isolates before and during second wave of COVID 19

Material and Methods

This is a retrospective type of cross-sectional study conducted from January 2021 to June 2021, by collecting data of 542 pus samples which were collected from patients admitted in ICU and wards of Victoria hospital and processed in Infosys Central Laboratory, Department of Microbiology, BMCRI.

Isolation and identification:

The specimens were inoculated on MacConkey and blood agar and incubated at 37°C aerobically for 24 hours. Pure isolated colonies grown on MacConkey and blood agar were processed according to standard Microbiological³ and CLSI guidelines [4]

Identification and antibiotic sensitivity test was done by automated ID and AST system (Vitek-2 compact, Biomeriux). The bacterial profile and antibiogram was analysed.

Statistical analysis:

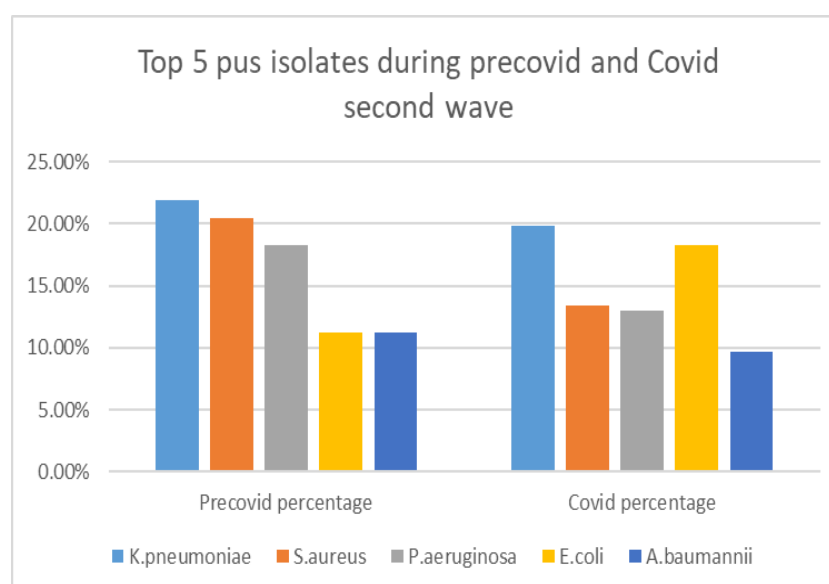
Statistical analysis was done with SPSS 26.0 version and it was presented in the form of tables and charts.

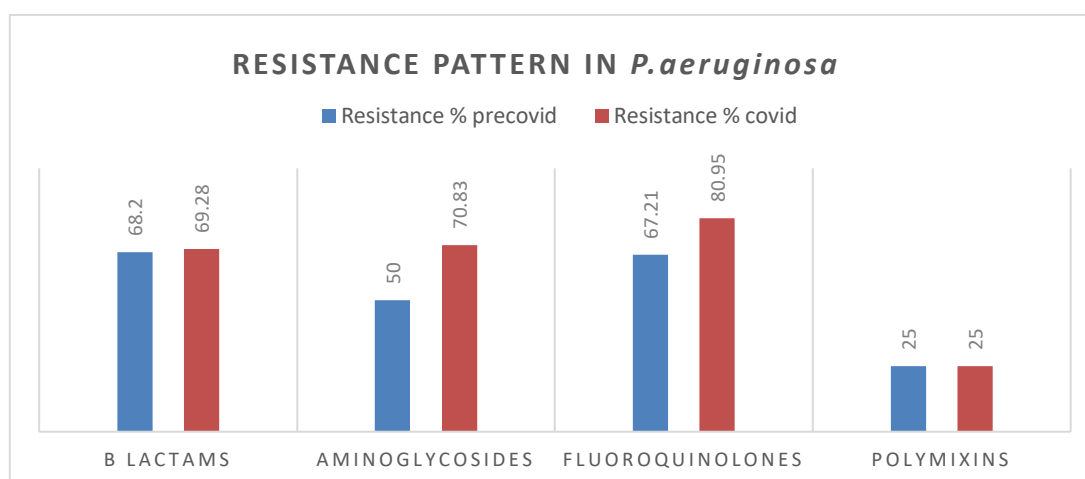
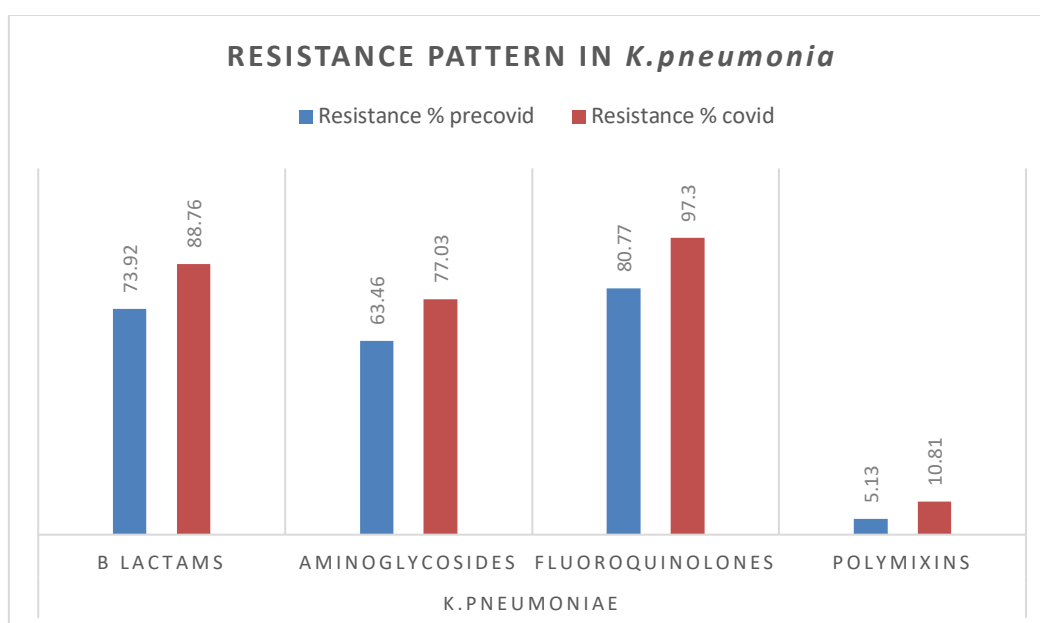
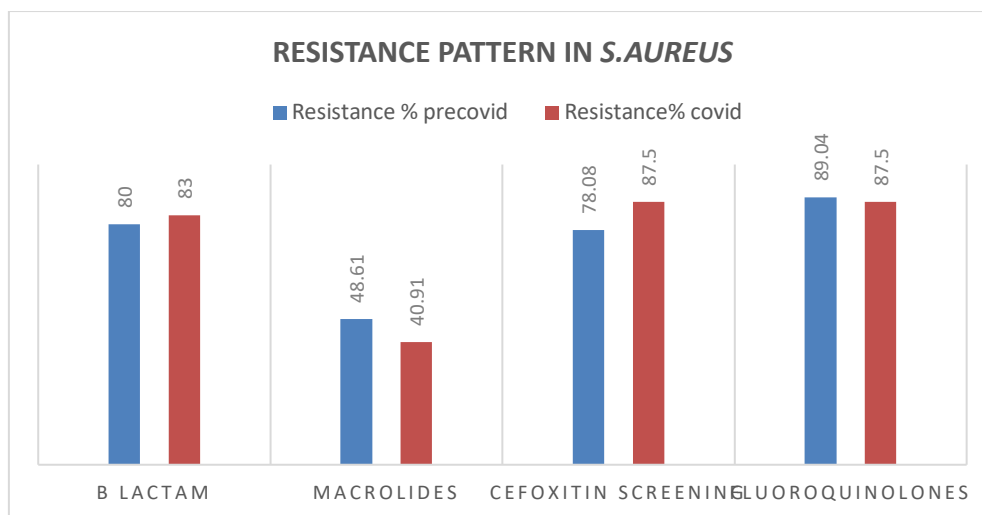
Results

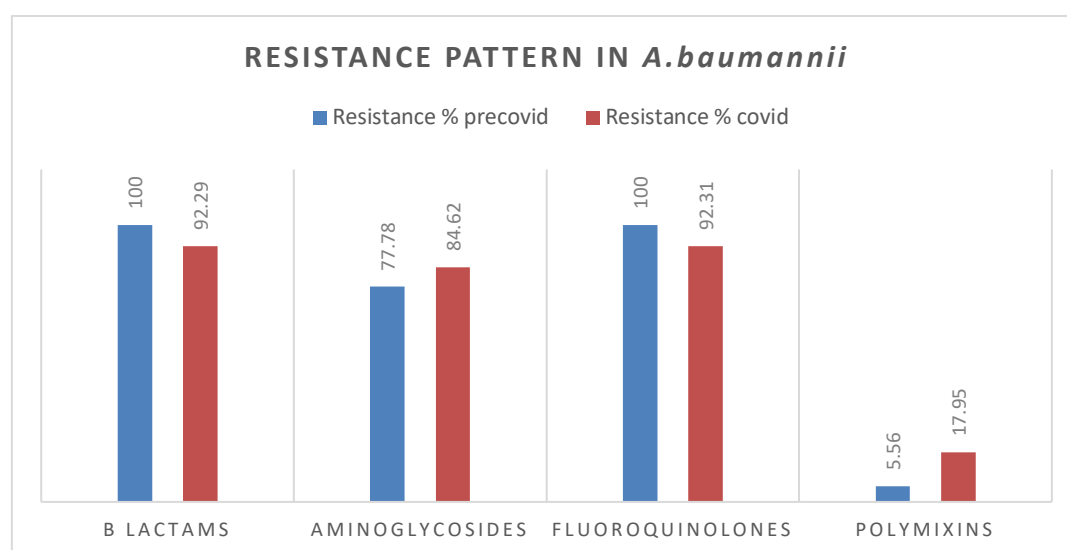
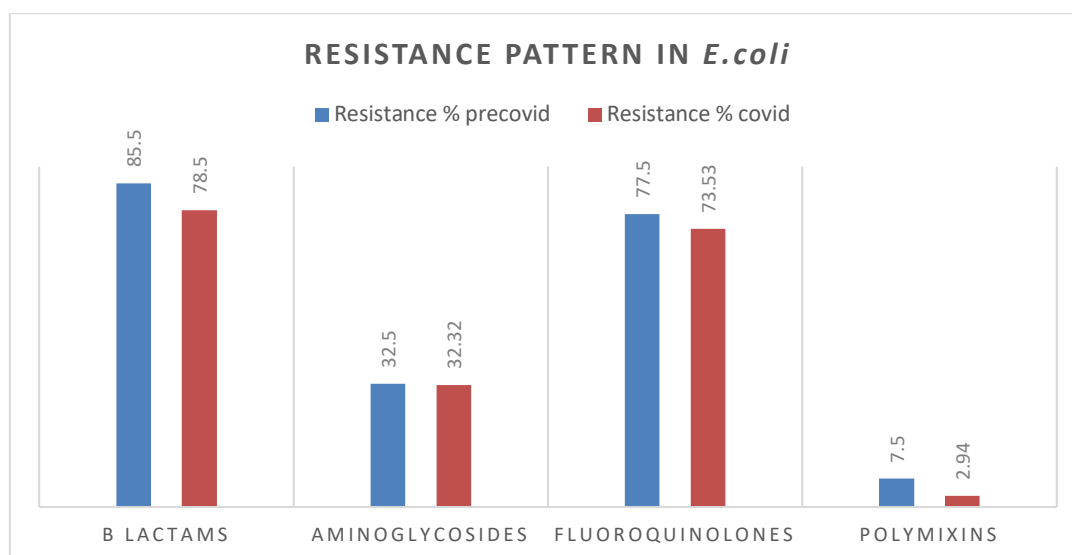
Out of total 542 pus samples, 356 were collected during pre-Covid second wave (January 2021 to March 2021) and 186 pus samples were collected during Covid second wave (April 2021 to June 2021).

Gram negative bacilli were predominant. *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*, *Acinetobacter baumannii*, *Escherichia coli*, *Staphylococcus aureus*, were the top organisms before and also during second wave of COVID 19.

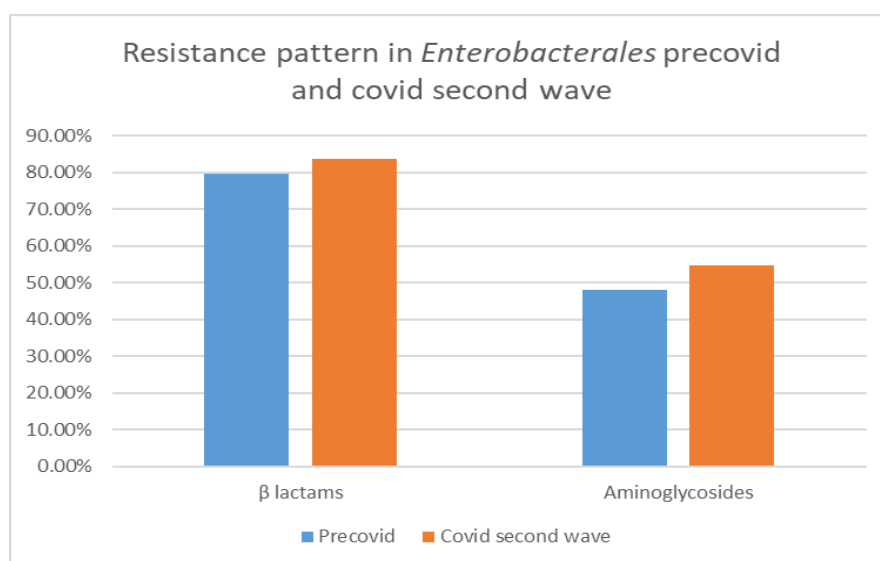
ORGANISMS	Precovid percentage	Covid percentage
<i>K.pneumoniae</i>	21.91%	19.89%
<i>S.aureus</i>	20.51%	13.44%
<i>P.aeruginosa</i>	18.26%	12.99%
<i>E.coli</i>	11.24%	18.28%
<i>A.baumannii</i>	11.24%	9.68%



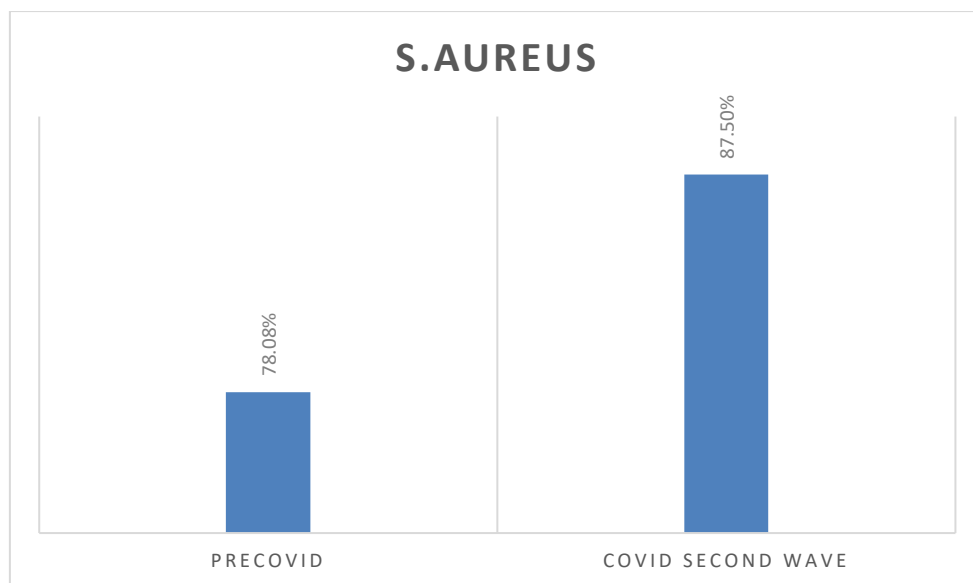




Enterobacterales group of organisms had increased resistance to beta lactam and aminoglycoside drugs during second wave period



Staphylococcus aureus showed increased MRSA from 78.08% (pre-Covid second wave) to 87.5% (Covid second wave).



Discussion

SL NO	Study conducted by	Duration of study	Place	Remarks
1	Present study	From January 2021 to June 2021,	Bengaluru, Karnataka, India	Increase in antimicrobial resistance noted
2	Taleb M et al [5]	July 1, 2019 to December 31, 2019 (pre-COVID 19 period) and July 1, 2021 to December 31, 2021 (post-COVID-19 period)	Gaza	The overall AMR rate was high in the post-COVID-19 period compared to pre-COVID-19 period.
3	Golli AL et al [6]	Pre-COVID 19 period and Post-COVID 19 period	Craiova, Romania	Significantly increasing trend in the antimicrobial resistance rate of Gram-negative pathogens against certain antibiotics
4	Karataş M et al [7]	December 15, 2019, and June 15, 2020,	Turkey	A. baumannii was the main pathogen in the respiratory infections of COVID-19 patients and rate was significantly higher than pre-pandemic and pandemic era control groups.
5	Neri JEC et al [8]	PreCOVID (January 2018 to March 2020) and Post COVID (from April 2020 to December 2022)	Belém, Pará, Brazil	Following the COVID-19 pandemic, a substantial increase in antimicrobial resistance was observed, particularly to carbapenems and aminoglycosides.

Conclusion

This study provides the baseline data of comparatively increase in antimicrobial resistance of commonly isolated pathogens during covid second wave with pre-covid second wave Resistance pattern has increased significantly in K.pneumoniae,

P.aeruginosa and S.aureus with increase in Multi Drug Resistant isolates during second wave, where as in E.coli and A.baumannii no significant rise in resistance. The practice of empirical antimicrobial treatment has led to the emergence of antimicrobial resistance among clinical isolates.

Increased resistance emphasizes the need for implementing antimicrobial stewardship in the health care settings.

Predominance of Gram-negative bacteria in COVID-19 patients along with significant rates of resistance to higher generation antibiotics is an alarming finding. A high mortality rate among patients with secondary infections calls for extra care to enhance infection control procedures and antimicrobial stewardship interventions. This will not only save patient lives but also prevent the selection of drug-resistant infections, which are highly favorable in the current environment [1].

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