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Original Article

# A RETROSPECTIVE STUDY TO EVALUATE THE EFFICACY OF INJECTION AUGMENTIN IN COVID-19 PATIENTS WITH PNEUMONIA AT A TERTIARY CARE TEACHING HOSPITAL, TELANGANA

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**ABSTRACT**

**Objective:** Coronavirus is a single-stranded, enveloped, positive-sense RNA virus. It is responsible for the acute respiratory syndrome (SARS) and the disease is named COVID-19 by WHO. It is also called SARS-CoV-2. Pneumonia is one of the complications of COVID-19 disease. Patients with pneumonia admitted to General Hospital were treated with Augmentin. Augmentin is a broad-spectrum antibacterial that has been available for clinical use in a wide range of indications for over 20 y and is now used primarily in the treatment of respiratory tract infections. The main objective of our study is to evaluate the efficacy of Augmentin in COVID-19 patients with pneumonia in terms of beneficial effects after treatment.

**Methods:** The present study was a retrospective, observational, record-based study of the case sheets of COVID-19 patients with pneumonia. The statistical analysis was done using paired t-test.

**Results:** In our institution COVID-19 patients with pneumonia were treated with Tablet FAVIRAPIR and Injection AUGMENTIN. The results were calculated using paired t-test and the P-value was<0.0001, which is significant as it is less than 0.05. Therefore, the post-treatment outcome results showed a significant improvement in disease reduction.

**Conclusion:** The study concludes that the empirical treatment of COVID-19 patients with pneumonia using an appropriate antibiotic reduces further deterioration of patients with pneumonia due to complications and also protects the patients from acquired infections during the hospital stay.

**Keywords**: Covid-19 patients, Retrospective study


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## INTRODUCTION

Coronavirus is a single-stranded enveloped positive-sense RNA virus. It is responsible for severe acute respiratory syndrome and the disease is named as COVID-19 by WHO [1]. It is also called SARS-CoV-2. The clinical features of this disease are fever, dry cough, tiredness, aches and pains, sore throat, diarrhoea, conjunctivitis, headache, loss of taste and smell, a rash of the skin, discoloration of fingers or toes, difficulty breathing, chest pain or pressure, loss of speech or movement. Pneumonia is one of the complications of COVID-19 disease. It can be diagnosed by the peripheral and multifocal location of pulmonary infiltrates with ground glass appearance [2].

Patients with pneumonia admitted to Osmania General Hospital were treated with injection Augmentin. Augmentin is a broad-spectrum antibacterial that has been available for clinical use in a wide range of indications for over 20 y and is now used primarily in the treatment of respiratory tract infections [3]. The low propensity of Augmentin to select resistance mutations and a favorable PK/PD profile predictive of high bacteriological efficacy may account for the longevity of this combination in clinical use. Augmentin is a valuable treatment for respiratory tract infections, in particular, because the physician is often unable to determine the underlying causative pathogen(s) in covid-19 infections, and thus empirical therapy is required. Antimicrobial exposure has been demonstrated to be a risk factor for increased microbial resistance. In addition to that, a long duration of hospitalization with intensive care unit stay increases the risk of infections with multidrug-resistant organisms. An antimicrobial stewardship program is among other important strategies to reduce the such risk [4]. Recent studies suggest that patients with altered gut microbiota might experience more severe Covid-19 symptoms. Given that antibiotics may further alter digestive microbial flora, empiric treatment for bacterial pneumonia in Covid-19 patients should only be initiated when clinical suspicion is high [5].

In most countries, health systems faced an acute and critical challenge: the Covid-19 pandemic. During this pandemic, the most frequently used antibiotics were Augmentin, fluoroquinolones, macrolides and cephalosporins [6]. The intravenous route of administration of antibiotics was the most used as many patients were defined as having severe Covid-19 infection and may have had impaired oral absorption. Secondary bacterial infections are often responsible for fatalities among pandemics, in a Wuhan-based study reporting outcomes and treatment for 191 patients hospitalized for Covid-19, 50% of deaths were imputable to secondary bacterial infections [7]. Thus, antibiotics appear to be a crucial defense against mortality in Covid-19 patients [8]. But resistance to antimicrobials is already currently estimated to cause 700, 000 deaths worldwide yearly and would therefore also be expected to play a significant role in Covid-19-related mortality [9]. There are only a few studies on the usage of Augmentin in the treatment of Covid-19 pneumonia. Therefore, this study is intended to evaluate the efficacy of Augmentin in covid-19 patients with pneumonia.

## MATERIALS AND METHODS

### Study design

This was a retrospective, observational record-based study. The approval (Ref. No. IEC/OMC/2022/M. No. (03)/Acad-09) to conduct the study was obtained from the Institutional Ethics Committee of Osmania Medical College before starting the study. Case sheets of patients diagnosed as positive for COVID-19 disease with pneumonia were used to conduct this study.

### Study setting

The study was conducted at Osmania General Hospital in Hyderabad, a tertiary care teaching hospital in Telangana. The study was conducted during the period from March 2022 to May 2022. During this period of 3 mo, the case sheets of patients reported during a period of 1 y, from May 2020 to July 2021 were scrutinized.

**Study duration**

The duration of the study was 3 mo.

**Study subjects**

Covid-19 patients of moderate severity with pneumonia.

**Study tool and data collection**

Case sheets of COVID-19 patients with Pneumonia of moderate severity based on the CORADS score during a period of 1 y, from May 2020 to July 2021 and were evaluated. The collected data was analysed statistically to obtain the results of the effect of injection Augmentin in COVID-19 patients with pneumonia.

**Inclusion and exclusion criteria**

All Covid-19 positive cases with pneumonia treated with Favipiravir and Injection Augmentin were included in the study. COVID-19 patients on other antibiotics, pneumonic patients with non-COVID etiology and patients with prior history of usage of Augmentin were excluded from the study to reduce subjective bias.

**Method**

A retrospective study was conducted at Osmania General Hospital using the case sheets of patients diagnosed with moderate COVID-19 with pneumonia. A total of 181 COVID-19 positive case sheets were studied. Out of 181 cases studied, about 114 were included in the study. 67 cases were excluded from the study out of which 50 cases were of Pulmonary Tuberculosis with COVID-19 disease, 13 cases were of Community-acquired pneumonia patients positive for COVID-19, and 4 cases were of HIV positive for COVID-19.

Out of 114 cases included 73 were males and 41 were females. The duration of hospital stay is two weeks in the majority of these cases. Comorbidities like Hypertension in 66 cases and Diabetes in 38 cases were observed and they were on variable medications. A detailed evaluation of baseline line investigations like Reverse Transcriptase Polymerase Chain Reaction (RTPCR) and Computerized Tomography (CT) CORADS scores was performed.

In RTPCR a sample throat swab of patients is taken to analyze the genetic fragments of the virus. RTPCR test has the highest sensitivity and is preferred for screening asymptomatic individuals [10]. This was done in our hospital to screen the patients and provide information about the disease's presence or absence. CT scan of cases was evaluated to observe the level of suspicion of pulmonary involvement in COVID-19 patients. CORAD score is a categorical assessment of chest CT scan in Covid-19 patients [11]. CORADS stands for COVID-19 Reporting and Data System. This score was done in our hospital to evaluate the severity of the disease and pneumonia. The cases of moderate severity with pneumonia based on the RTPCR results and CT chests CORADS score results were treated with antivirals like tablet Favipiravir and injection Augmentin. The dose of Tablet Favipiravir given was 1600 mg twice daily on the first day, followed by 800 mg twice daily for 14 d. Injection Augmentin was administered as 1.2 grams thrice daily for five days. The post-treatment outcomes of case reports of these patients were compared with those of baseline investigations.

**Statistical analysis**

Statistical analysis was done using paired t-test to compare the baseline investigations with the post-treatment outcomes.

**RESULTS**

181 case sheets were studied and out of these 67 were excluded based on the exclusion criteria. 50 case sheets were excluded due to pulmonary TB on antibiotics. 13 case sheets were excluded due to community-acquired pneumonia. 4 cases were excluded due to HIV on other antivirals. Among the 114 patients, 73 were males and 41 were females. Most of the patients affected were males.

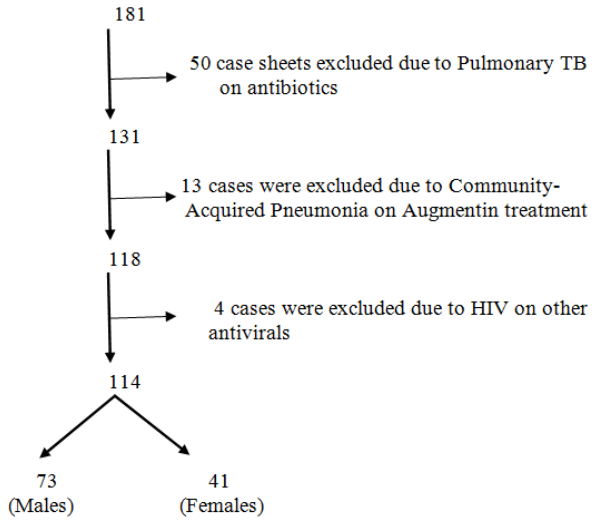


**Fig. 1: Total number of case sheets examined based on inclusion and exclusion criteria**

The results of the baseline investigations, like RTPCR and CORADS scores were compared with that of post-treatment values. After treatment of COVID-19, patients with pneumonia of mild to moderate severity by Injection Augmentin who were on Favipiravir showed a significant improvement in symptoms and signs. It was evident that the age group of patients most affected was between 30 to 55 y. Between 20-30 y of age, about 8 patients were studied and there was an improvement in CORADS score from 1 to negative in 2 patients, 2 to negative in 1 patient, 3 to negative in 1 patient, 2 to 1 in 2 patients, 3 to 1 in 1 patient and 3 to 2 in 1 patient. The P-value was 0.00081, which is less than 0.05 and significant. Between 30-40 y of age, about 25 patients were studied and there was an improvement in CORADS score from 1 to negative in 8 patients, 2 to negative in 4 patients, 2 to 1 in 3 patients, 3 to 1 in 5 patients, 3 to 2 in 2 patients, 4 to 1 in 1 patient and 4 to 2 in 2 patients. The P-value was less than 0.00001, which is less than 0.05 and significant. Between 40-50 y of age, about 46 patients were studied and there was an improvement in CORADS score from 1 to negative in 10 patients, 2 to negative in 7 patients, 3 to 0 in 3 patients, 2 to 1 in 15 patients, 3 to 1 in 4 patients, 3 to 2 in 4 patients, 4 to 1 in 1 patient and 4 to 2 in 4 patients. The P-value was less than 0.00001, which is less than 0.05 and significant. Between 50-60 y of age, about 23 patients were studied and there was an improvement in CORADS score from 2 to negative in 6 patients, 3 to 0 in 2 patients, 2 to 1 in

10 patients, 3 to 1 in 1 patient, 3 to 2 in 2 patients and 4 to 2 in 4 patients. The P-value was less than 0.00001, which is less than 0.05 and significant. Between 60-70 y of age, about 9 patients were studied and there was an improvement in CORADS score from 2 to negative in 3 patients, 2 to 1 in 3 patients, 3 to 1 in 3 patients, 3 to 2 in 1 patients. The P-value was 0.00002, which is less than 0.05 and significant. Between 70-80 y of age, about 3 patients were studied and there was an improvement in CORADS score from 2 to negative in 1 patient and 2 to 1 in 2 patients. The P-value was 0.10379, which is greater than 0.05 and not significant. Therefore, from the outcome results, it is clear that there is a significant improvement in the pneumonic symptoms.

**Table 1: Comparision of the baseline and post-treatment results of CORADS score**

| Age group | Number of cases showing improvement in CORADS score | | | | | | | | P-value |
|---|---|---|---|---|---|---|---|---|---|
| | 1 to negative | 2 to negative | 3 to negative | 2 to 1 | 3 to 1 | 3 to 2 | 4 to 1 | 4 to 2 | |
| 20-30 y | 2 | 1 | 1 | 2 | 1 | 1 | 0 | 0 | 0.00081* |
| 30-40 y | 8 | 4 | 0 | 3 | 5 | 2 | 1 | 2 | <0.00001* |
| 40-50 y | 10 | 7 | 3 | 15 | 4 | 2 | 1 | 4 | <0.00001* |
| 50-60 y | 0 | 6 | 2 | 10 | 1 | 2 | 0 | 2 | <0.00001* |
| 60-70 y | 0 | 3 | 0 | 3 | 2 | 1 | 0 | 0 | 0.00002* |
| 70-80 y | 0 | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 0.10379 |

Paired t-test, *P<0.01 significant, P>0.05 not significant.

RTPCR outcomes have also shown a significant improvement in the disease. In most of the cases, the post-treatment RTPCR results were negative and this is a positive sign of improvement in the viral load reduction after treatment with an Injection Augment of 1.2 grams three times daily in patients on antiviral treatment for COVID-19 Pneumonia.

## DISCUSSION

Pneumonia is one of the most common complications observed in patients of COVID-19. The causative pathogens for COVID-19 pneumonia are not known due to the reason that the disease may be caused by the virus itself or due to secondary bacterial infection, co-bacterial infection, or nosocomial infection. Recent studies suggest that in patients with COVID-19 pneumonia only a minority of them who received antibiotics have proven secondary or co-bacterial infection, indicating a major empiric use of antibiotics. It was assessed by improvement in the reduction of ground-glass opacities and consolidations, with a bilateral and peripheral distribution on chest computed tomography (CT) and X-ray imaging and their findings [12]. A point prevalence study was conducted on patients of COVID-19 wards at 2 centers in Singapore to assess the appropriateness of antibiotics usage in COVID-19 disease. As per this study, Augmentin was the most prescribed antibiotic [13]. Antibiotics are generally used in COVID-19 to treat upper respiratory tract infections, pneumonia and other infections caused by opportunistic bacteria due to low immunity caused by viral infection.

In our study, the case sheets of COVID-19 patients with pneumonia were evaluated to assess the efficacy of Injection Augmentin to curtail respiratory symptoms of COVID-19 pneumonia. Baseline values of RTPCR and CORADS scores were compared with those of post-treatment outcomes of COVID-19 patients with pneumonia. The results showed that males are more affected than females [14]. Males are more affected than females due to higher expression of ACE-2, lifestyle behavior such as smoking, drinking, and immunological differences driven by sex hormone and X-chromosome. The commonly affected age group was between 30 to 55 y.

Other antibiotics used to control COVID-19 complications are macrolides, Fluoroquinolones, Cephalosporins, etc. In our institution Injection, Augmentin was given to treat pneumonia associated with COVID-19. The patients were on the antiviral tablet Favipiravir to reduce the disease. In addition to antibiotics and antiviral some other frequently used drugs in patients with COVID-19 were anticoagulants (heparin, enoxaparin) and corticosteroids (hydrocortisone, methylprednisolone). Baseline and post-treatment outcomes of the symptoms were compared by RTPCR and CORADS scores. The results were obtained using paired t-test. P-values were less than 0.05, which implies that there was a significant reduction in the symptoms of pneumonia in COVID-19 patients by Injection Augmentin. It is given as 1.2 grams thrice daily for five days. The absence of guidelines of antibiotic use and protocols for national therapeutic and infection control have led to misuse and overuse of antimicrobials in hospital settings [15]. Most of the studies reported heavy empirical use contrasting with relatively low frequency of bacterial co-infection and secondary infections [16]. Antimicrobial stewardship is an important way to optimize the use of antimicrobials to prevent the development of resistance and to enhance patient outcomes. Further studies investigating antibiotic use in patients are of utmost importance to limit irrelevant antibiotic prescriptions and, thereby, antimicrobial resistance [17].

## CONCLUSION

As most of the respiratory tract infections are treated empirically, it is important to choose an antibiotic that covers all the major pathogens, including the resistant strains. This antibiotic therapy should be based on the principle of targeting bacterial eradication and use of PK/PD predictors of maximal bacterial eradication and these should reflect the local resistance pattern. A possible explanation for antibiotic use in lung coverage was for pneumococcal, gram-negative and atypical bacterial infections. Specific patients' comorbidities should be addressed when deciding on the type of antibiotic and route of administration to use. Quinolones were frequently used in many reported studies. In our hospital Injection, Augmentin was used in most hospitalized cases of Covid-19 pneumonia. The impact of Covid-19 on antimicrobial resistance is currently difficult to predict. Further research on this matter is essential to determine relevant indications for antibiotic use in Covid-19 patients.

## LIMITATIONS

The study was limited to Osmania General Hospital, with relatively good health care facilities and may be different from other hospitals, especially in small towns, in rural areas. This study was of short duration and the results were based only on the major investigations like RTPCR and CT scans.

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## AUTHORS CONTRIBUTIONS

Dr. Aitha Swetha Rani planned and designed the concept of the manuscript, contributed to drafting the manuscript, and reviewed the manuscript, Dr. Pudutha Madhavi supported in designing, drafting the manuscript, and literature search, Dr. Chakradhar. T reviewed the manuscript and contributed to designing the final version to be published.

## CONFLICTS OF INTERESTS

Declared none

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