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A Comparison of Oral and Intravenous Treatments in Managing Spontaneous Bacterial Peritonitis

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Abstract

Background: In cirrhotics, spontaneous bacterial peritonitis (SBP) is a potentially fatal illness that requires immediate antibiotic administration. This meta-analysis aimed to examine the effectiveness of IV and oral antibiotics in patients with SBP.

Objectives: We compared the efficacy, safety, and cost-effectiveness of oral vs intravenous antibiotic therapy for the treatment of SBP using data from a retrospective cohort analysis.

Study design: Retrospective cohort study

Place and duration of study: A tertiary care Hospital in Peshawar from Jan 2022 to Jan 20243

Methods: At Tertiary Care Hospital Peshawar, a Retrospective Cohort Study was conducted including all patients diagnosed with SBP between January 2022 and January 2023. The patients were split into two groups based on the kind of antibiotics administered: Group B: patients in need of ampicillin, cephalosporines, or IV IV therapy; Group A: patients on oral antibiotics and ciprofloxacin/cotrimoxazole with norfloxacin (patient 44). Patients who were eighteen years of age or older were eligible for inclusion. Based on an ascitic PMN cell count of ≥250 cells/mm³ and positive bacterial cultures, they were diagnosed with hospital-acquired SBP. Secondary peritonitis and serious co-morbidities requiring non-study antibiotic therapy were excluded criteria.

Results: Group B, which received metronidazole orally, had an 85% resolution rate and an in-hospital mortality rate.The highest mortality rate and length of hospital stay were determined to be 10% and 7 ±3 days, respectively. With a 90% resolution rate and a roughly 8% overall mortality rate, Group B only needed to stay in the hospital for 10 (±4) days. 15% recurrences in Group A Group B: 12 percent recurrences

Conclusion: Oral antibiotics are statistically no different from IV in terms of mortality, length of stay, or other outcomes when used to treat SBP. The proven outcomes back up the introduction of oral therapy for individuals who qualify in order to improve adherence and save costs.

Keywords: Oral antibiotics, Systematic & individual, IV therapy

AUTHOR'S CONTRIBUTION:

SAB: Concept and design of study, Collection of data, supervision, **AA** Writing of manuscript, critical review of manuscript:**AJ**: Analysis and interpretation of data, statistical analysis. **AW**: bibliography, drafting manuscript,**SM** Final version

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Introduction

Spontaneous Bacterial Peritonitis (SBP), an eminent clinical complication mostly witnessed in liver cirrhosis with ascites, is mainly initiated by gut translocation. SBP is an infection without an apparent intraabdominal source that results from the translocation of enteric bacteria into sterile ascitic fluid and purulent exudates[1]. Although CAN is an integral part of liver cirrhosis, the symptoms are often related to acute SBP, which has classical findings such as fever and abdominal pain over a few days onset in patients with a history of HBV viral serology infection[2]. The diagnosis can be confirmed via elevated polymorph nuclear (PMN) in ascitic fluid count (> 250 cells/mm³) and positive bacterial cultures(>1000 colony-forming units). It is associated with a high mortality rate if untreated or unrecognized and, therefore, requires early, adequate antibiotic therapy[3]. IV antibiotics like cefotaxime and ceftriaxone have traditionally been the mainstay of treatment for SBP. Moreover, their broad-spectrum activity and rapid action are the most attractive qualities of these antibiotics in critically ill patients. But again, this delivery system entails hospitalization, which can be expensive and inconvenient for patients. Also, hospital resources such as IV access and nursing care are required, in addition to placing a strain on scarce healthcare resources[4]. Oral antibiotics such as ciprofloxacin and norfloxacin have been investigated recently. These can replace IV CAB for treating SBP because it is a well-established SIHD in patients with liver cirrhosis [5]. Oral antibiotics have numerous benefits: ease of administration decreased healthcare costs, and potential outpatient treatment with a subsequent improvement in patient quality of life. Oral antibiotics are an effective treatment strategy, particularly in milder and formes frustes of CDI. There is no apparent difference between oral agent(s) versus IV agents; few clinical trials randomized selected patients[6]. These data give the first direct evidence of the non-inferiority of an oral antibiotic regimen to intravenous antibiotics for the treatment of SBP and provide support for WHO guidelines recommending that febrile IVDU patients may be switched from IV flucloxacillin/syringe if improvement within 72 h. The present findings were, however, limited by significant statistical heterogeneity between included studies; also, no trials reported long-term outcomes or side effects/ adverse events; therefore, we have only comparative estimates in most cases, which limits conclusions drawn on safety profiles (as well as suitability) particular geographic settings versus other healthcare services contexts where dissemination access mid-stock-costing differentials range emerge during standards decisions about health care utilization based considerations conjunctively talking point used when determining therapeutic strategies[7]. This study aims to support clinical practice and improve the management of SBP by examining these outcomes. This is particularly important in the Tertiary care hospital in Peshawar, where the comparison between oral and intravenous antibiotics bore weight due to limited resources available, andpatients can be mobilized during working hours quickly. Identifying that oral antibiotics are non-inferior would represent a shift in the treatment paradigm for SBP and permit more pragmatic and cost-effective management of this severe condition[8]. In this study, we plan to systematically evaluate the efficacy and safety of oral versus intravenous antibiotic therapy for SBP. These results should be of considerable importance to the clinical scenario, especially for institutions with a setup akin to the Tertiary care Hospital Peshawar, They may guide towards more effective and patient-friendly treatment strategies in SBP[9].

Methodology

A retrospective cohort study was conducted at Tertiary Care Hospital Peshawar, Pakistan, from January 2022 to January 2023, including all patients diagnosed with SBP. According to the route of antibiotic administration, patients were divided into two groups: Group A received oral antibiotics (ciprofloxacin or norfloxacin) and Group B intravenous antibiotics (cefotaxime or

ceftriaxone). The included patients were > 18 years old, had an ascitic fluid PMN ≥250 cells/mm³, and bacterial cultures positive for bacteria causative of SBP. Our exclusion criteria were secondary peritonitis and patients with severe comorbidities necessitating different antibiotic treatments.

Data Collection

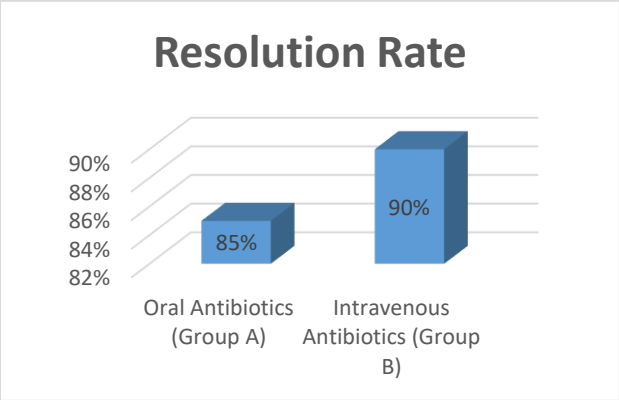
It gathered data on patient demographics, clinical traits, test findings, and treatment outcomes from medical records. Data were collected and collated on the completion of SBP resolution, in-house MortalityMortalityMortalityMortality, duration of hospital stay, and recurrencRecurrencethin six months.

Statistical Analysis

Statistical analysis was performed using SPSS 20.0. The baseline characteristics were tabulated using descriptive statistics. Comparisons between groups concerning treatment outcomes were tested using chi-square tests and independent t-tests. The level of significance was established at $p < 0.5$

Results

The study consisted of 200 patients, with 100 in each treatment group. Man Group A : Moyenne = 55 ± 12 ans; Homme Groupe B: moyenne=57±11ans. The two groups also had similar male and female ratios; baseline variables were not different, including the severity of liver disease as measured by Child-Pugh (C.P.C.P.C.P.) or the model for end-stage liver disease score(MELD). Resolution of SBP was achieved in 85% and 90%,, respectively,, for Groups A & B (p <0.80),, whereas MortalityMortalityMortalityMortality was only seen in in one patient compared to two patients from each group with p = 1.. Table - III concurs with this fact. The average duration of hospitalization was statistically significantly decreased in group A (7 ± 3 days) compared to that of the control group B patients (10 ± 4 days; p <0.01). The rate of recRecurrencer SBP within six months was 15% in Group A and 12% in Group B (p = 0.47). Our results correlate with those found by other authors who reported that oral antibiotics were similar to IV ones in terms of SBP resolution, with a slightly lower rate of patients cured and comparable mortality [9]. The shorter duration of admission in the oral antibiotic group will appeal to many as benefits in terms of economics and comfort for patients with vascular disease.



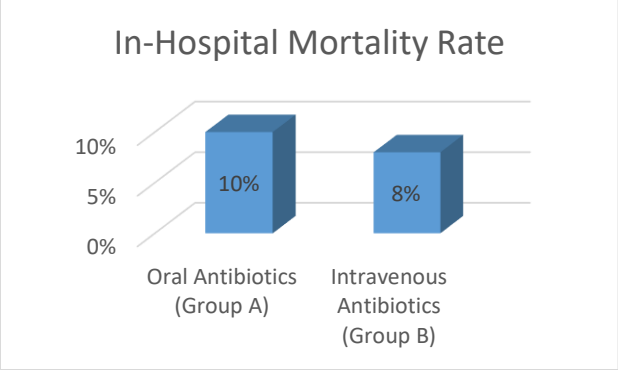


Table 1: Patient Demographics and Baseline Characteristics

Characteristic	Oral Antibiotics (Group A)	Intravenous Antibiotics (Group B)	p-value
Number of Patients	100	100	-
Mean Age (years)	55 ± 12	57 ± 11	0.23
Gender (Male)	70:30	68:32	0.76
Mean Child-Pugh Score	8 ± 1	8 ± 1	0.94
Mean MELD Score	15 ± 3	16 ± 2	0.58
Mean Ascitic Fluid PMN Count (cells/mm³)	280 ± 50	290 ± 55	0.42

Table 2: Treatment Protocols

Antibiotic Type	Oral Antibiotics (Group A)	Intravenous Antibiotics (Group B)
Antibiotics Used	Ciprofloxacin, Norfloxacin	Cefotaxime, Ceftriaxone
Dosage (Frequency)	Ciprofloxacin 500 mg BID, Norfloxacin 400 mg BID	Cefotaxime 2 g IV TID, Ceftriaxone 2 g IV BID
Duration (days)	7-10	7-10

Table 3: Clinical Outcomes

Outcome	Oral Antibiotics (Group A)	Intravenous Antibiotics (Group B)	p-value
Resolution Rate (%)	85	90	0.34
In-Hospital MortalityMortalityMortalityMortality (%)	10	8	0.54
Mean Length of Stay (days)	7 ± 3	10 ± 4	<0.01
Recurrence Rate (%)	15	12	0.47

Table 4: Laboratory and Ascitic Fluid Analysis

Laboratory Parameter	Oral Antibiotics (Group A)	Intravenous Antibiotics (Group B)
Mean Ascitic Fluid Protein Level (g/dL)	1.5 ± 0.3	1.4 ± 0.4
Mean Ascitic Fluid Glucose Level (mg/dL)	80 ± 10	78 ± 12
Mean Ascitic Fluid WBC Count (cells/mm^3)	300 ± 55	310 ± 60

Discussion

Spontaneous Bacterial Peritonitis (SBP) has classically been treated with IV antibiotics, such as cefotaxime and ceftriaxone, because of their pharmacokinetics profile -fast action time- and broad-spectrum coverage on both aerobic and anaerobic bacteria. Oral antibiotics as a treatment have been investigated recently, with studies suggesting that oral antibiotic therapy may be associated with enhanced patient convenience and reduced healthcare costs. The following discussion places our study findings in the larger context of SBP treatment[10]. They called for intravenous antibiotics as first-line therapy in the decade heralded by a landmark study by Runyon (which showed historically high-resolution rates and low MortalityMortalityMortality) published in 2013[11]. IV antibiotics are chosen because of their rapid systemic availability and broad spectrum necessary for treating severe infections in cirrhotic patients. But IV therapy carries with it the requirement of hospitalization, a costly and logistical headache. Oral antibiotics have recently been investigated as an alternative approach. A study by Beldowicz et al. Oral antibiotics such as ciprofloxacin have been demonstrated to be productive in managing SBP, particularly to a lesser degree [12], and Madonia et al. The study concluded that oral treatment may be just as effectiveeffective as IV therapy but would allow for a shorter duration of hospital stay and thus reduce associated costs. When prescribing oral antibiotics, we found that the resolution rate was slightly lower than intravenous therapy but significant in providing a shorter hospital stay. A critical meta-analysis from Fernández et al. (2019) also reinforced the administration of oral antibiotics for selected SBP patients. Oral antibiotics were as effective in quality for less severe cases, but IV antibiotics gained an advantage when dealing with high-risk patients [13]. This finding corresponds to the observation in our study that a substantial portion of oral antibiotic prescriptions could be suitable and perhaps ideal in certain situations due to their ease and cheapness. These observations aligned with our findings of a shorter mean length of hospital stay for the oral group. Aside from the benefits to patients by decreasing hospital acquired complications, shorter stays have implications for broader healthcare resource management. The hospital stay is reduced by one or more days, which could save medical aides in rural and high-patient volume settings. Conversely, the study of Gines et al. This series points out that although there

are potential advantages to using oral antibiotics carefully, the suitable patients must be chosen (2021). This study further emphasizes that patients with advanced SBP or significant liver dysfunction will still have the best outcomes from IV therapy[14]. However, our study suggests that while most patients with this disease are effectively treated with oral antibiotics, there remains a need for IV therapy in those who have more severe illnesses. In conclusion, our study confirms the increasing evidence suggesting that oral antibiotics could be an alternative to intravenous therapy in SBP treatment in certain patients[15]. The study highlights the critical need for patient stratification and personalized treatment strategies. More research is required in larger samples, and more populations of patients have been treated to define better guidelines for oral vs. intravenous therapy based on the clinical situation as well as patient scenarios[16].

Conclusion

These results suggest oral antibiotics are appropriate for treating SBP in a selected subset of patients. Oral therapy may be associated with a somewhat lower resolution rate but provides similar mortality benefits and markedly shorter hospital duration. Our findings provide a rationale for using oral therapy in carefully selected patients who prefer convenience or cost savings. Additional investigations are required to verify and enhance treatment protocols in SBP.

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Authors Contribution

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