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CLINICAL, MICROBIOLOGICAL AND BIOCHEMICAL PROFILE OF INFECTIVE PERITONITIS IN A TERTIARY CARE CENTRE HOSPITAL OF WEST-BENGAL

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Abstract

Background: Peritonitis is inflammation of the peritoneum which is usually caused by a bacterial or fungal infection. Peritonitis is of two types- Primary and Secondary. Primary peritonitis refers to the inflammation of the peritoneal surface without any other intra-abdominal process. It is also called Spontaneous bacterial peritonitis (SBP). Secondary peritonitis develops as a result of inflammation of another organ within the abdomen. The former develops as a complication of liver disease, such as cirrhosis, or of kidney disease whereas the later results from the perforation of abdominal viscera. Peritonitis can also occur in patients with continuous ambulatory peritoneal dialysis. **Materials and Methods:** The study was conducted over a period of one and half year (Nov,2022 to Apr,2024). The sample were collected by paracentesis, processed in Vitek-2 Compact. Biomarkers were estimated in Dept of Biochemistry. **Result:** Sixteen different types of organisms were isolated and antimicrobial susceptibility were interpreted. Values of different biomarkers were corelated. Clinical features and risk factors were also noted. **Conclusion:** The results indicate that peritoneal fluid cultures are essential for guiding the appropriate antibiotic therapy, given the high prevalence of resistance to commonly prescribed antibiotics in peritonitis patients. Additionally, we found that inflammatory biomarkers in the peritoneal fluid are elevated in patients with culture-positive peritonitis.

INTRODUCTION

Peritonitis is inflammation of the peritoneum which is usually caused by a bacterial or fungal infection. Peritonitis is of two types- Primary and Secondary.[1] Primary peritonitis refers to the inflammation of the peritoneal surface without any other intra-abdominal process. It is also called Spontaneous bacterial peritonitis (SBP). The abdominal fluid in SBP is called ascites.[2] Ascites is clinically observed when 1500ml of fluid is collected in peritoneal cavity.[3] The reported incidence of Spontaneous bacterial peritonitis in patients is 20% per annum.[4] In children, Streptococcus pneumoniae, Group A streptococci, Enterobacterales, other gram-negative bacilli, and Staphylococci are the main causative agents. The most common bacterium recovered from adults is Escherichia coli, followed by Klebsiella pneumoniae, Streptococcus pneumoniae, enterococci and other Enterobacterales. Tuberculous peritonitis can occur from direct entry of the organism into the peritoneal cavity from the lymph nodes, intestine, or genital tract from patients with active disease. Peritonitis caused by fungus is rare, but Candida may be isolated from immunosuppressed patients and patients on long- term antibacterial therapy.[5]

Secondary peritonitis develops as a result of inflammation of another organ within the abdomen. The former develops as a complication of liver disease, such as cirrhosis, or of kidney disease whereas the later results from the perforation of abdominal viscera. Peritonitis can also occur in patients with continuous ambulatory peritoneal dialysis.[2] The causes of secondary peritonitis are a ruptured appendix, stomach ulcer or perforated colon, pancreatitis, diverticulitis, inflammatory bowel disease, trauma, obstruction, loss of bowel wall integrity after a destructive disease (e.g., ruptured appendix, ulcerative colitis, carcinoma). Clinical features of peritonitis are abdominal pain or tenderness, fever, bloating, nausea, vomiting etc.[1]It

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can be predicted that anaerobic organisms play a major role in intraabdominal infection as the anaerobes exceeds aerobes in the bowel by 1000-fold. So, they are generally found in peritoneal fluid along with Enterobacterales, enterococci or other Streptococci. Therefore, the organisms which are generally isolated from patients suffering from secondary peritonitis include E.coli, Bacteroides fragilis group, Staphylococcus aureus, enterococci, anaerobic Gram- negative bacilli, and anaerobic Gram-positive cocci.[5] Sometimes rarely dual organisms can cause secondary peritonitis.[6] Multidrug-resistant gram-negative bacilli and Staphylococcus aureus may be found in patients with altered bowel microbiota being treated with anti-microbial therapy.[5] Tertiary peritonitis is viewed as an advanced stage of the disease, where clinical peritonitis and signs of sepsis persist despite treatment for primary or secondary peritonitis. This type of peritoneal infection is frequently observed in critically ill or immunocompromised patients and lacks a surgically treatable focus after previous surgical intervention and source control. Healthcare-associated intraabdominal infections, often classified as tertiary peritonitis.[2] Laboratory findings for peritonitis are leukocytes in excess of 100/mm^3, with 50% polymorphonuclear cells which is about >= 500/mm^3.[7] A PMNL count 250/mm^3 is thoroughly indicative of SBP without bacterial isolation.[8] PMN count>500 PMN cells/mm3 shows the greatest specificity in absence of intra-abdominal and traumatic source of infection.[7] An elevated PMN count in the ascitic fluid>250/mm^3 (usually >1000/mm^3), total protein level of >1 g/dL, a serum lactate dehydrogenase level exceeding the normal upper limit for particular age group, and a glucose level of <50 mg/dl suggests Secondary bacterial peritonitis.[7,9,10] Microbiological investigations including culture establish the diagnosis. The sources of microorganisms are mostly endogenous. Antibiotic susceptibility report helps in selecting proper antibiotic which is the treatment of choice.[11] 20% to 25% of cultures are found to be culture negative despite distinct presence of clinical signs of bacterial infection.[12] So recently, the biomarkers are also important diagnostic tool for early diagnosis of peritonitis and diagnosis of culture negative specimen with clinical signs of peritonitis. CRP, ferritin, IL-6 is routinely estimated proinflammatory biomarkers for infective peritonitis.[13]

MATERIALS AND METHODS

This prospective study was carried out in the Microbiology and Biochemistry laboratory of Burdwan Medical College and Hospital, WB. Institutional Ethics Committee clearance and informed consent from patients were obtained. Sample were collected from 250 Clinically diagnosed patients with peritonitis attending the Medicine, Surgery and Paediatrics Department and Emergency of Burdwan Medical College and Hospital over a period of one and half year (Nov,2022 to Apr,2024). Specimen of peritoneal fluid were collected aseptically by the procedure called paracentesis. After centrifugation, from the deposit direct microscopy including Gram's stain, ZN stain and fungal stain were performed. Supernatant was processed in the Biochemistry Laboratory for the biomarkers. A part of the deposit was inoculated into Automated Blood Culture bottle. Blood Culture bottle was incubated in BACTEC Machine (BD). Identification of the isolates and antimicrobial sensitivity (AST) were performed using Vitek-2 Compact machine (BioMérieux). Anaerobic bacterial identification was done by using Vitek-2 ANC cards. Another part of deposit was subjected to culturing on Sabouraud's Dextrose Agar (SDA) tube and (SDCA) for fungal culture. The statistical software SPSS version 29.0 was used for the analysis.

RESULTS

Study participants were studied for presence of different types of Peritonitis such as Spontaneous Bacterial Peritonitis (SBP), Secondary peritonitis. Variants of SBP were also noted. Presenting symptoms were mainly abdominal pain, abdominal distension, respiratory distress fever, vomiting, constipation found during the study. Different bacterial and fungal isolates were identified as causative agents. The bacterial isolates found in this study were subjected to antibiotic susceptibility testing and their sensitivity pattern to different antibiotics were interpreted. Relevance of different biomarkers with culture positive samples were evaluated. Clinical features and risk factors associated with peritonitis were also studied and noted.

Table 1: Prevalence of Infective Peritonitis in in Study population (n=250)

Cases	Frequency	Percentage
Cases With Infective Peritonitis	127	50.8%
Cases With Non Infective Peritonitis	123	49.2%

Total 250 Clinically diagnosed patients with infective peritonitis were screened and peritoneal fluid were collected. Analysis revealed that 127 (50.8%) of them were confirmed to have infective peritonitis based on laboratory diagnosis, while the remaining 123 (49.2%) were found to be peritonitis due to non-infective causes. [Table:1]

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Table 2: Age distribution of the Study population(n=250)

	Minimum	Maximum	Mean ± SD
Age (Yrs.)	2	85	40.39 ± 19.24

Mean age of study subjects was 40.39± 19.24 years. The minimum age was 2yrs and the maximum age was 85yrs.

Table 3: Gender distribution of the Study population (n=250)

Gender	Frequency	Percentage
Female	149	59.6%
Male	101	40.4%

Table 4: Distribution of Clinical features in cases with peritonitis (n=127)

Clinical Presentation	Frequency	Percentage
Pain Abdomen	124	97.64%
Abdominal Distention	120	94.49%
Respiratory Distress	111	87.40%
Fever	62	48.82%
Vomiting	41	10.33%
Constipation	27	21.26%

Table 5: Prevalence of different types of Peritonitis in samples studied (n=127)

Type of Peritonitis	Frequency	Percentage
Cases of Primary Peritonitis (Sbp)	54	42.5%
Cases of Secondary Peritonitis	73	57.5%

Table 6. Prevalence of Culture-positive samples among laboratory diagnosed peritonitis patients (n=127)

Culture Positivity Among Infective Peritonitis	Frequency	Percentage
Culture Positive	57	44.88%
Culture Negative	70	55.12%

Table 7: Prevalence of Culture-positive samples among Primary peritonitis patients (n=54)

Culture Positivity Among Primary Peritonitis (Sbp)	Frequency	Percentage
Culture-Positive	18	33.34%
Culture-Negative	36	66.66%

Table 8: Prevalence of clinical variants of Spontaneous bacterial peritonitis (SBP) in this study (n=54)

Variant of Sbp	Frequency	Percentage
Classic-Spontaneous Bacterial Peritonitis (C-Sbp)	10	18.5%
Mono-Microbial Non- Neutrocytic Bacterascites (Mnba)	8	14.8%
Culture Negative Neutrocytic Ascites (Cnna)	36	66.7%

Table 9: Prevalence of Culture-positive samples among Secondary peritonitis patients (n=73)

Culture Positivity Among Secondary Peritonitis	Frequency	Percentage
Culture-Positive	39	54.24%
Culture-Negative	34	46.58%

Table 10: Microbiological profile and prevalence of clinical isolates of infective peritonitis (n=63)

Organisms Isolated In Bacterial Peritonitis	Frequency	Percentage
Esherichia Coli	13	20.63%
Klebsiella Spp. (Pneumoniae & Oxytoca)	9	14.29%
Enterobacter Cloacae	4	6.41%
Cronobacter Sakasaki	2	3.19%
Staphylococccus Aureus (Mrsa)	3	4.66%
Staphylococccus Aureus (Mssa)	3	4.66%
Enterococcus Spp. (Faecalis & Faecium)	5	7.94%
Streptococcus Pneumoniae.	2	3.19%
Staphylococccus Epidermidis	4	6.41%
Staphylococccus Haemolyticus	2	3.19%
Pseudomonas Aeruginosa	4	6.41%
Candida Spp.	6	9.46%
Acinetobacter Baumannii	2	3.19%
Anaerobes	2	3.19%
Myroides Spp.	1	1.59%
Afb	1	1.59%

Two anaerobic isolates (3.19%) were characterized, namely Bifidobacterium bifidum and Bacteroides fragilis with aerobes as dual pathogen. Bifidobacterium bifidum was isolated along with E coli in case of duodenal perforation and Bacteroides fragilis was isolated along with Staphylococcus aureus in a case of peritonitis along with sepsis. Other than this, other dual organism was also isolated which were Escherichia coli with Klebsiella

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spp., Escherichia coli with Enterococcus spp., Klebsiella spp. with Enterococcus spp., MSSA with Candida spp. This indicates the presence of dual pathogens in cases of secondary peritonitis.

Table 11: Frequency and percentage of different antibiotics for Escherichia coli isolates in this study (n=13)

Antibiotics	Frequency and percentage of sensitive isolates	Frequency and percentage of intermediate isolates	Frequency and percentage of resistant isolates
Amikacin	6 (46.2%)	2 (15.4%)	5 (38.5%)
Aztreonam	6 (46.2%)	2 (15.4%)	5 (38.5%)
Cefepime	6 (46.2%)	2 (15.4%)	5 (38.5%)
Cefoperazone- Sulbactam	5 (38.5%)	2 (15.4%)	6 (46.2%)
Ceftazidime	2 (15.4%)	4 (30.8%)	7 (53.8%)
Ciprofloxacin	2 (15.4%)	1 (7.7%)	10 (76.9%)
Colistin	_	13 (100%)	_
Polymyxin -B	_	13 (100%)	
Gentamicin	3 (23.1%)	1 (7.7%)	9 (69.2%)
Imipenem	9 (69.2%)	_	4 (30.8%)
Levofloxacin	1 (7.7%)	2 (15.4%)	10 (76.9%)
Meropenem	9 (69.2%)	_	4 (30.8%)
Minocycline	3 (23.1%)	10 (76.9%)	_
Piperacillin-Tazobactam	6 (46.2%)	_	7 (53.8%)
Tigecycline (EUCAST}	13 (100%)	_	_
Trimethoprim/ Sulfamethoxazole	5 (38.5%)	_	8 (61.5%)
Amoxicillin+ clavulinic acid	3 (23.1%)	2 (15.4%)	8 (61.5%)
Ceftriaxone	1 (7.7%)	5 (38.5%)	7 (53.8%)
Cefuroxime	_	2 (15.4%)	11 (84.6%)
Ertapenem	2 (15.4%)	6 (46.2%)	5 (38.5%)
Ampicillin	2 (15.4%)	4 (30.8%)	7 (53.8%)

7 isolates of Klebsiella spp. were sensitive to gentamicin (77.8%). Following closely, aztreonam proved to be the second most effective drug, with susceptibility noted in 5 out of 9 isolates (55.8%). 7 isolates (77.8%) are ESBL and 5 (55.56%) isolates are MBL among Klebsiella spp. All isolates of Enterobacter cloacae (100%) were susceptible to Amikacin, Gentamicin, Ciprofloxacin. Ceftriaxone was the second most effective drug, with 3 out of 4 isolates (75%) showing susceptibility. All isolates of Pseudomonas spp. (100%) were susceptible to Aztreonam, Imipenem, Trimethoprim/Sulfamethoxazole and Piperacillin-Tazobactam. Therefore, 18 isolates (51.43%) are ESBL producers and 7 (20%) isolates are MBL procedures among gram- negative bacteria found in this stud.

Table 12: Frequency and percentage of different antibiotics for Staphylococcus aureus. isolates in this study (n=6)

Antibiotics	Frequency and percentage of sensitive isolates	Frequency and percentage of intermediate isolates	Frequency and percentage of resistant isolates
Vancomycin	6 (100%)	_	_
Teicoplanin	6 (100%)	_	_
Linezolid	6 (100%)	_	_
Tetracycline	6 (100%)	_	_
Cefoxitin	3 (50%)	_	3 (50%)
Oxacillin	3 (50%)	_	3 (50%)
Rifampicin	2 (33.33%)	_	4 (66.67%)
Ampicillin	1 (16.66%)	1 (16.66%)	4 (66.67%)
Levofloxacin	4 (66.67%)	1 (16.66%)	1 (16.66%)
Gentamicin	2 (33.33%)	3 (50%)	1 (16.66%)
Ciprofloxacin	2 (33.33%)	2 (33.33%)	2 (33.33%)
Trimethoprim/ Sulfamethoxazole	5 (83.34%)	_	1 (16.66%)
Tigecycline	6 (100%)	_	_

This table shows that all isolates of *Staphylococcus aureus* (100%) were susceptible to vancomycin, teicoplanin, linezolid, tigecycline, tetracycline. 3 of them were MSSA and 3 of them was MRSA. Trimethoprim/Sulfamethoxazole was the second most effective drug, with 5 out of 6 isolates (83.34%) showing susceptibility.

Table 13: Comparison of levels of different biomarkers among culture- positive and culture-negative peritonitis patients

Biomarkers	Culture- Positive (N=63)	Culture- Negative (N=187)	P-Value
Crp(Mg/Dl)	18.71±18.86	0.95±1.01	0.001
Il-6(Pg/Ml)	39.78±33.44	0.70±0.85	0.001
Ferritin(Ng/Ml)	281.11± 321.31	58.27±46.55	0.001

Data expressed as mean±SD. Test done: Independent Samples T test ($p < 0.05$ considered significant).

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DISCUSSION

Distribution of Clinical features in cases with peritonitis: In the study conducted by Shewtank Goel et al, done at SHKM Government Medical College, various clinical signs were observed among the study population: fever was present in 70%, abdominal pain in 80%, upper GI bleed in 40%, tenderness in 60%, hypotension in 30%, and absent bowel sounds in 20%.[14] A different study conducted by Raj Kumar et al. showed that all patients presented with abdominal pain. In addition to abdominal pain, fever was present in 52 patients (33.99%), constipation in 25 patients (16.34%), and diarrhea in 20 patients (13.07%). Signs of dehydration were observed in 37 patients (24.18%), abdominal distension in 132 patients (86.27%), and abdominal guarding and/or rigidity in 148 patients (96.73%). Moreover, 14 patients (9.15%) with secondary generalized peritonitis presented with hypovolemic shock. The study highlighted that abdominal pain, fever, abdominal distension, and abdominal guarding and/or rigidity were common clinical signs.[15] In this study, Abdominal pain was the most common symptom, experienced by 124 patients (97.64%). Additionally, 120 patients (94.49%) had abdominal distension, 111 patients had respiratory distress (87.40%), 62 patients (48.82%) had a fever, and 27 patients (21.26%) experienced constipation. Abdominal pain, fever, and abdominal distension were noted as common symptoms in this study population.

Risk factor commonly identified were the patients suffering from cirrhosis having ascites, patients with kidney failure, chronic kidney disease. In pediatric age group, nephrotic syndrome was prominent. Patients undergoing for peritoneal dialysis and repeat paracentesis were also affected. Perforation of intestinal ulcers such as gastric and duodenal ulcers was one of the leading risk factors for secondary peritonitis.

Prevalence of different types of Peritonitis in samples studied

Fifty-four cases (42.5%) presented with primary peritonitis or spontaneous bacterial peritonitis (SBP), while 73 cases (57.5%) presented with secondary peritonitis fulfilled the laboratory criteria in this study population (n=127) and matches with different literature.[7,9,10]

Prevalence of Culture-positive samples among laboratory diagnosed peritonitis patients

Referencing from the information from different literature,[7,9,10] we have got 57 culture-positive samples (44.88%) and 70 culture-negative samples (55.12%) among laboratory-diagnosed peritonitis patients fulfilling the above criteria for primary and secondary peritonitis respectively in this study.

Prevalence of clinical variants of Spontaneous bacterial peritonitis (SBP) in this study

The most common variant of Spontaneous Bacterial Peritonitis (SBP) in the study, was Culture Negative Neutrocytic Ascites (CNNA), with a prevalence of 36 cases (66.7%). The prevalence of Mono-microbial Non-neutrocytic Bacterascites (MNBA) and Classic-Spontaneous Bacterial Peritonitis (C-SBP) were 8 cases (14.8%) and 10 cases (18.5%) respectively. Our study had similarities with the work done by Shewtank Goel et al that the most common variant of Spontaneous Bacterial Peritonitis (SBP) that they found out was Culture Negative Neutrocytic Ascites (CNNA), accounting for 60% of cases. The prevalence of Mono-microbial Non-neutrocytic Bacterascites (MNBA) and Classic-Spontaneous Bacterial Peritonitis (C-SBP) was 20% each.[14]

Prevalence of Culture-positive samples among Primary peritonitis patients

Shewtank Goelet al. at SHKM Government Medical College also saw that 40% samples were culture-positive in their study.[14] Long Cong Nguyen et al at Bach Mai Hospital in Hanoi, Vietnam, reported that ascitic fluid cultures were positive in 29.3% of SBP cases in their study.[16] In this study, among laboratory-diagnosed primary peritonitis patients, there were 18 culture- positive samples (33.34%) and 36 culture-negative samples (66.66%).

Prevalence of Culture-positive samples among Secondary peritonitis patients

Adedoyin Babatunde Ojo et al from the Department of Surgery at University College Hospital and the College of Medicine, University of Ibadan, Nigeria, reported that out of 60 participants, 44 had a positive culture (73.33%) in cases of secondary peritonitis.[17] Similar to the above study, no. of culture-positive samples in this study was 39 (54.24%) and no. of culture- negative sample was 34 (46.58%) among laboratory diagnosed secondary peritonitis patients. It should be noted that the prevalence of culture-positive samples did not match the number of isolates identified due to the isolation of dual organisms in cases of secondary peritonitis. According to the previous data mentioned, there were 57 culture-positive cases, but 63 clinical isolates were found.

Different organisms isolated in infective peritonitis:

A study done by Hitisha Mittal et al stated that in South Indian population, 38.2% of cultures were positive. The most isolated pathogen was *Escherichia coli.* Although third-generation cephalosporins exhibited high resistance rates, 74.5% of isolates were susceptible to amikacin. However, 42% of culture-positive isolates showed multidrug resistance, with the highest rates observed in Enterococcus faecium (64.2%) and Acinetobacter baumannii (71.4%).[18]

Another study done by Adedoyin Babatunde Ojo et al documented that Escherichia coli -22 (36.7%) was the primary organism isolated followed by Klebsiella pneumoniae -19 (31.7%). Other organisms which were isolated by them are stated in decreasing order according to the no. of isolates i.e. Candida albicans -11 (18.3%), Staphylococcus aureus -9 (15%), Enterococcus faecalis 8 (13.3), Enterobacter cloacae-7 (11.7), Streptococcus spp. -7 (11.7%), S. albus -6

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(10%), MRSA -6 (10%). Among anaerobes, Anaerococcus group -10 (16.7%), Bacteroides fragilis -9 (15%), Peptococcus spp. -1 (1.7%) were isolated.[17] Our study showed the similarities with the above mentioned studies.

Frequency and percentage of different antibiotics

A study by Raquel Pimentel et al. on "Spontaneous Bacterial Peritonitis in Cirrhotic Patients: A Shift in the Microbial Pattern?" found that Escherichia coli was the most common pathogen (33.8%), and 31.7% of bacteria were multidrug-resistant. The study highlighted a shift in the microbial profile of SBP, with half of the isolated microorganisms being gram-positive.[19]

A study by Dagninet Alelign, Gemechu Ameya, and Munira Siraj, titled "Bacterial Pathogens, Drug-Resistance Profile and Its Associated Factors from Patients with Suspected Peritonitis in Southern Ethiopia," found a bacterial peritonitis prevalence of 19.05%. E. coli was the most prevalent isolate (36.67%), followed by S. aureus (13.33%). Multidrug-resistant strains made up 43.3% of the isolates, with a quarter of the S. aureus strains being methicillin-resistant.[20] According to the data provided by Rainer Grotelüschen et al in their study done in year 2020 noted that empiric antibiotic therapy with second or third-generation cephalosporins combined with metronidazole has a low in vitro sensitivity rate, ranging from 55% to 73%. This combination was mainly effective against E. coli, Streptococci, and Bacteroidaceae, which were isolated in 39%, 8%, and 22% of cases, respectively. Cefuroxime or Cefotaxime with Metronidazole showed effectiveness against 65% and 69% of the identified germs. In contrast, Meropenem was effective in 98% of cases and covered the entire spectrum of investigated germs, making it the preferred choice for critically ill patients with secondary peritonitis. Meropenem and Imipenem, the most commonly used carbapenems, have sensitivity rates of over 90% for E. coli and Klebsiella pneumoniae, which account for 50% of the microbes detected in secondary peritonitis. Tigecycline was effective in 88% of cases overall and shows excellent results for treating Enterococcus, with effectiveness greater than 99% in their study. A significant issue seen by them was that Enterococcus's natural resistance to various antibiotics, which is associated with increased mortality. Enterococci were found in 10% of their patient population.[21] Our study demonstrates that Tigecycline, Imipenem, and Meropenem were sensitive for most Escherichia coli isolates, with Tigecycline showing the highest sensitivity at 13 (100%), followed by Imipenem and Meropenem at 9 (69.2%) each. 10 isolates (76.92%) are ESBL and 2 (15.38%) isolates are MBL among Escherichia coli.7 isolates of Klebsiella spp. were sensitive to gentamicin (77.8%). Following closely, aztreonam proved to be the second most effective drug, with susceptibility noted in 5 out of 9 isolates (55.8%). 7 isolates (77.8%) are ESBL and 5 (55.56%) isolates are MBL among Klebsiella spp. Total 17 isolates were ESBL and 7 isolates were MBL. All isolates of Staphylococcus aureus (100%), including 3 MSSA and 3 MRSA isolates, were susceptible to Vancomycin, Teicoplanin, Linezolid, Tigecycline, and Tetracycline. Trimethoprim/Sulfamethoxazole was the second most effective drug, with 5 out of 6 isolates (83.34%) showing susceptibility.There were.All Gram-negative isolates showed intermediate susceptibility to Colistin and Polymyxin- B.(CLSI).[22]

Comparison of levels of different biomarkers among culture- positive and culture-negative peritonitis patients.

A study by Nakul Kadam et al. on "Ascitic Fluid High Sensitive C-Reactive Protein (hs-CRP) as a Prognostic Marker in Cirrhosis with Spontaneous Bacterial Peritonitis" found that ascitic fluid hs-CRP levels were significantly higher in patients with SBP compared to those without. Elevated hs-CRP levels were also associated with higher mortality and prolonged hospital stays, suggesting it as a useful prognostic marker in cirrhosis with SBP.[23] Another study by Ulrich Mayr et al., "Ascitic Interleukin 6 Is Associated with Poor Outcome and Spontaneous Bacterial Peritonitis: A Validation in Critically Ill Patients with Decompensated Cirrhosis," examined the role of ascitic interleukin 6 (IL-6) in 64 cirrhosis patients. In a subgroup of 19 patients with SBP, ascitic IL-6 effectively detected SBP and correlated with ascitic polymorphonuclear neutrophils. The study concluded that ascitic IL-6 is a highly prognostic and diagnostic biomarker for critically ill patients with liver cirrhosis.[24] Levels of Biomarkers in peritoneal fluid such as CRP, IL-6 and ferritin were noted. In Table no. it is seen that levels of CRP, IL-6 and ferritin in Culture-positive patients of peritonitis is comparatively higher than Culture-negative patients of peritonitis. The levels CRP, IL-6 and ferritin done in this study are statistically significant (as p-value is 0.001,0.001 and 0.001 respectively). So, from this it is clear that the rise in Biomarkers in peritoneal fluid for Culture- positive patients of peritonitis significantly more when compared to Culture-negative patients of peritonitis.

CONCLUSION

Our study investigated the bacteriological and clinical characteristics of patients with primary and secondary peritonitis, including conducting antibiotic susceptibility tests. The results indicate that peritoneal fluid cultures are essential for guiding the appropriate antibiotic therapy, given the high prevalence of resistance to commonly prescribed antibiotics in peritonitis patients. Additionally, we found that inflammatory biomarkers in the peritoneal fluid are elevated in patients with culture-positive peritonitis. These biomarker levels can thus be valuable in aiding accurate diagnosis and timely initiation of antibiotic treatment in peritonitis cases.

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