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Study of Spontaneous Bacterial Peritonitis Antimicrobial Sensitivity Pattern in Cirrhotic Patients

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Abstract

Background: Spontaneous bacterial peritonitis (SBP) is an acute bacterial infection of ascitic fluid. Generally, no source of the infecting agent is easily identifiable. The aim of this work was to identify the most suitable antibiotic to describe for empiric therapy of spontaneous bacterial peritonitis (SBP) in Egyptian patients with liver cirrhosis and ascites. **Methods:** This study was carried out on 80 cirrhotic patients from Benha university hospitals and Ahmed Maher Teaching hospital underwent ascetic fluid analysis for PMN cell count and culture\sensitivity, Thorough history taking, full general and local examination, full investigations, serological tests for viral markers, modified Child's Pugh classification, abdominal ultrasonography and diagnostic abdominal paracentesis. **Results:** PMN cell count of all studied patients was over 250 cells/µL, 30 patients (37.5%) their culture were negative (no growth organisms) which is a large variant of SBP called culture negative neutrocytic ascites,50 patients (62.5%) their culture was positive. For gram stain negative organisms 41 patient (82%), E. coli (53.66%) mostly sensitive to cefotaxime (80%), ceftriaxone (87.50%), cefoperazone (76.92%), out of the 22 E. coli 4 (18.18%) were multidrug resistant, 3 (13.64%) were extensive drug resistant. For gram stain positive organisms 9 (18%), Staphylococcus aureus (77.78%) mostly sensitive to trimethoprim\sulphamethoxasole (100%), vancomycin (85.7%), linezolid (100%), out of 5 staphylococcus aureus 4 (57.14%) were multidrug resistant, 1 (20%) was extensive drug resistant. **Conclusion:** If PMN cell count more than 250 cells/µL should start empirical third generation cephalosporin antimicrobial treatment for 10 to 14 days even if culture\sensitivity result is negative. Amikacin & cefepime should be considered in empirical antimicrobial therapy in spontaneous bacterial peritonitis with dose adjustment according to creatinine clearance.

Key words: Spontaneous Bacterial peritonitis**,** Antimicrobial sensitivity pattern**,** Cirrhotic patients.

1. Introduction

Spontaneous bacterial peritonitis (SBP) is an acute bacterial infection of ascitic fluid. Generally, no source of the infecting agent is easily identifiable, Spontaneous bacterial peritonitis is a well-known and warning complication in patients with cirrhosis. Of patients with cirrhosis who have spontaneous bacterial peritonitis, 70% are Child-Pugh class C. In these patients, the development of spontaneous bacterial peritonitis is associated with a poor long-term prognosis [1].

Ascites is the most common complication of liver cirrhosis. About 50% of the patients will develop ascites within ten years from the first diagnosis. Liver cirrhosis is the most common cause of ascites accounting for nearly 80% of cases with ascites. The appearance of ascites carries a poor prognosis for cirrhotic patients with mortality rate of 50% within two to five years from its appearance [2].

Spontaneous Bacterial Peritonitis (SBP) is a frequent and important complications of liver cirrhosis and ascites occurring in 10% to 30% of hospital admitted patients. Bacteria causing SBP mainly come from the GIT [3].

In hospital, the mortality rate may be as high as 30% despite good infection control measures, mortality being generally due to complications such as acute variceal bleeding, hepatorenal syndrome or advanced liver failure [4].

The clinical picture of SBP is non-specific and variable, mainly depending on the stage at which SBP is diagnosed. The absence of clinical manifestations in some patients with SBP makes the dependence on a reliable marker is an important target taking into consideration that SBP is one of the most frequent and important complications found in cirrhotic patients with ascites [5].

The aim of this work was to identify the most suitable antibiotic to describe for empiric therapy of spontaneous bacterial peritonitis (SBP) in Egyptian patients with liver cirrhosis and ascites.

2. Patients and Methods

The study was a cross sectional study, 80 patients with tense ascites, spontaneous bacterial peritonitis and manifestations of liver cirrhosis. Patients were admitted at the Hepatology and Gastro - enterology

Departments of Benha University Hospital and Ahmed Maher Teaching Hospital during the period between April 2021 and January 2022.

The protocol of this study was be approved by the committee of ethics of scientific research in Benha Faculty of Medicine in Benha University, all patients was given informed oral consents for participation in this study.

2.1Inclusion criteria:

- Patients ≥18 years old.
- Patients with liver cirrhosis, ascites and spontaneous bacterial peritonitis

2.2Exclusion criteria

- Patients with chronic kidney disease.
- presence of hepatocellular carcinoma at the time of serum collection.
- Secondary bacterial peritonitis.
- Patients with ascites due to causes other than cirrhosis with portal hypertension.
- Other non-peritoneal infections (skin infections, chest infections, urinary tract infections, meningitis, dental infections, gastroenteritis, biliary tract infections).
- Treatment with non-absorbable antibiotics in preceding 6 weeks.

All patients were subjected to the following:

1.Complete medical history:

- Stress on symptoms suggesting spontaneous bacterial peritonitis as (abdominal pain, fever)
- Precipitating factors as (therapeutic paracentesis, gastrointestinal bleeding and immunosuppressive drugs).
- Manifestations of liver cell failure e.g., Jaundice, lower limb oedema, deterioration of conscious level and bleeding tendency.
- Previous use of antimicrobial drugs.

2.Complete general and abdominal examination looking for:

- Signs of chronic liver disease e.g., jaundice ascites, liver size, spleen size.
- Signs of SBP such as fever and abdominal pain.

3. Laboratory investigations include:

- Complete blood count.
- Fasting blood sugar (mg/dl).
- Liver profile as:
- Aspartate aminotransferase (AST) (IU/L), Alanine aminotransferase (ALT) (IU/L).
- Serum albumin (g/dl).
- (Total, direct) serum bilirubin (mg/dl).
- Prothrombin time (sec), concentration, international normalized ratio (INR)
- Alkaline phosphatase (ALP)(IU/L).
- Kidney function test as: blood urea and serum creatinine(mg/dl).
- Autoimmune markers for liver disease:(ANA, ASMA, AMA and anti-LKM)
- Virology marker (HBsAg – HCvAb):

by using enzyme linked immunosorbent assay technique (ELISA).

4.Ascitic fluid taping and biochemical testing:

The ascitic fluids were aspirated under complete aseptic condition from each patient and they were checked for:

Biochemical tests including:

A. Total protein content.

B. Albumin.

C. Glucose.

WBCs (total and differential):

SBP is diagnosed when PMN count in ascitic **fluid ≥ 250 cell/mm**

- Serum ascites albumin gradient (SAAG):

The serum ascites albumin gradient, which is based on the difference between the albumin level of serum and of ascitic fluid, may be used to assess the extent of ascites (6).

- Culture and sensitivity

5. Modified Child's Pugh score:

Points	1	2	3
Encephalopathy	**None**	**Grade 1-2**	**Grade 3-4**
Ascites	**Absent**	**Slight**	**Moderate**
Bilirubin(mg/dl)	< 2	2-3	> 3
Albumin (g/dl)	> 3.5	3.5 –2.8	< 2.8
INR	< 1.7	1.7-2.2	> 2.2
Or			
Prothrombin time(sec.)	< 4	4 -6	>6 ➢

Pugh et al., 1973

1) Child A = (5 - 6) points.
2) Child B = (7 - 9) points.
3) Child C = (10 -15) points.

6. Pelvi-abdominal Ultrasonography:

Real time abdominal Ultrasonography was done for all patients included in the study by **(Mindray dc 30)** for evaluation of:

- Liver: size, texture, border, reflectivity, homogeneity, periportal thickening, hepatic veins and pattern.

- Focal lesion(s): number, site, size, shape, echogenicity, halo sign and vascularization by color Doppler assessment.
- Portal vein: diameter, patency, direction of flow, respiratory variation and velocity by color Doppler assessment.
- Spleen: size, splenic vein diameter, collaterals.

7. Ascitic fluid taping and culture:

a) Ascitic fluid taping:

- Taping of the ascitic fluid was collected before the start of antimicrobial therapy or at time where antibiotics were at the lowest concentration in patient's serum.
- Maximal barrier precautions were taken before sample collection (wearing clean gloves, surgical mask, and gowns) to prevent the introduction of organisms to the patient.
- To avoid contamination of the specimen with commensal microbiota, he skins over the needle puncture site was first cleaned in a circle approximately 5cm in diameter starting from center to periphery with 70% alcohol and was left to dry for 30-60sec. Then, the area was disinfected by applying 1-2% povidone iodine.
- A sterile 50ml syringe was then used to aseptically perform percutaneous aspiration of the peritoneal fluid.
- Immediately following the aspiration, 8-10ml of the fluid was inoculated onto Oxoid Signal blood culture bottle (Oxoid, UK).
- Another portion of the fluid (about 2ml) was added into an EDTA containing tube.
- About 3ml of the fluid were collected into a plain tube (with no additives) and submitted for analysis of ascitic fluid (total protein, glucose, albumin, SAAG and LDH).
- Both the inoculated blood culture bottle and the EDTA tube were transported immediately to the Microbiology laboratory for culture and total leukocyte count, respectively.

b) Processing of the ascitic fluid samples:

Microbiological investigations were carried out at the Microbiology Laboratory, Clinical Pathology Department, Ain Shams University Hospital.

Immediately after being received in the Lab, growth indicator chamber was inserted into the inoculated blood culture bottles, bottles were incubated at 36±1°C and were examined daily for evidence of growth (appearance of a fluid level in the growth indicator chamber). Positive bottles were subculture for the detection of aerobic and anaerobic organisms according to the Microbiology Lab procedures. Growing colonies were biochemically identified and their susceptibility to different antimicrobials was determined by the disk diffusion method following the recommendations of the Clinical and Laboratory Standard Institute (CLSI) (2014).

Absence of a fluid level in the growth indicator chamber, after 7 days incubation, denoted negative result. Negative bottles were examined by the Gram stain before being reported as negative to exclude the presence of any organisms that might be slow growers, fastidious, or inhibited by the effect of antibiotics.

Statistical Analysis:

Data collected were reviewed, coding and statistical analysis of collected data were done by using SPSS program (statistical package of social science; SPSS Inc., Chicago, IL, USA) version 24 for Microsoft Windows. Quantitative data are presented by the mean (as a measure of central tendency) and the standard deviation (as a measure of variance). Categorical data were presented as number and percent (%). Sample size was calculated with MedCalc software with level of significance (type I error) = 0.05, level of power (type II error) = 0.1

3. Results

Table (1) Culture results of studied patients

Culture		
	N	%
Negative (no growth)	30	37.50
Positive	50	62.50
Total	80	100

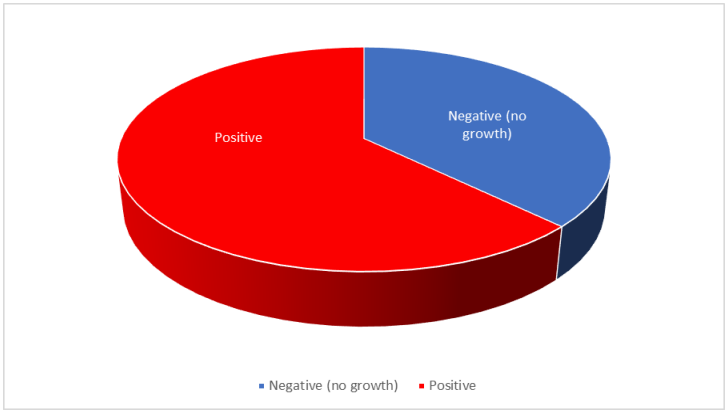

Fig (1) Culture results of studied patients

The previous table and figure showed that 50 patients (62.5%) their ascetic fluid samples culture was positive and 30 patients (37.5%) their ascetic fluid samples culture was negative **(no growth of any organisms).**

Table (2) Gram stain results of studied patients

Gram stain		
	N	**%**
Negative	41	82
Positive	9	18
Total	50	100

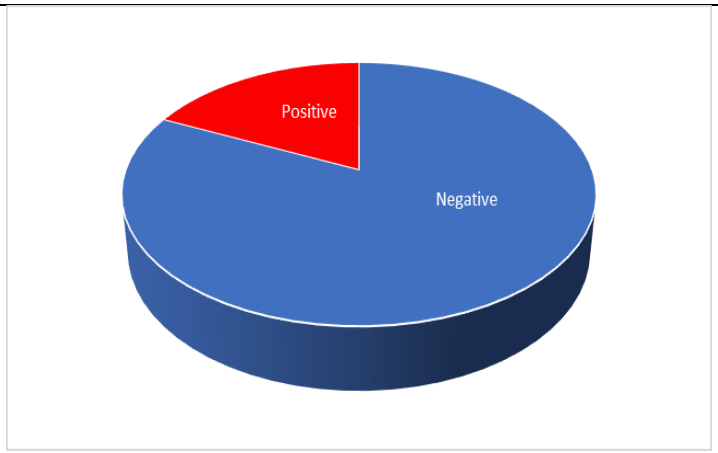

Fig. (2) Gram stain results of studied patients

The previous table and figure showed that 50 patients which their culture was positive for ascitic organisms divided to 41 patients (82%) were gram stain negative organisms and 9 patients (18%) were gram stain positive organisms.

Table (3) Gram negative organisms' percentage of studied patients

Gram Stain Negative		
	N	**%**
E. Coli	22	53.66
Klebsiella	12	29.27
Proteus spp.	4	9.76
Citrobacter spp.	2	4.88
Pseudomonas	1	2.44
Total	41	100

The previous table showed that 41 patients with growth of **gram stain negative** organisms in their ascetic fluid culture showed 22 patients (53.66%) resulted in growth of E. coli and 12 patients (29.27%) resulted in growth of klebsiella spp.

Table (4) Gram negative organisms' culture\ sensitivity results of studied patients

Gram stain Negative		E. Coli (n=22)		Klebsiella (n=12)		Proteus spp. (n=4)		Citrobacter spp. (n=2)		Pseudomonas (n=1)	
		N	%	N	%	N	%	N	%	N	%
Ampicillin	Sensitive	4	28.57	0	0.00	0	0.00	0	0.00	0	0.00
	Resistant	10	71.43	6	100.00	3	100.00	1	100.00	0	0.00
Ampicillin + Sulbactam	Sensitive	11	50.00	0	0.00	1	25.00	0	0.00	0	0.00
	Resistant	11	50.00	11	100.00	3	75.00	2	100.00	0	0.00
Trimethoprim + Sulfamethoxazole	Sensitive	6	31.58	6	60.00	0	0.00	2	100.00	0	0.00
	Resistant	13	68.42	4	40.00	1	100.00	0	0.00	0	0.00
Amikacin	Sensitive	17	100.00	10	90.91	3	75.00	1	100.00	0	0.00
	Resistant	0	0.00	1	9.09	1	25.00	0	0.00	1	100.00
Gentamycin	Sensitive	13	86.67	9	100.00	2	50.00	1	100.00	0	0.00
	Resistant	2	13.33	0	0.00	2	50.00	0	0.00	1	100.00
Ciprofloxacin	Sensitive	10	50.00	5	41.67	1	33.33	1	50.00	1	100.00
	Resistant	10	50.00	7	58.33	2	66.67	1	50.00	0	0.00
Levofloxacin	Sensitive	10	50.00	5	45.45	1	33.33	1	50.00	1	100.00
	Resistant	10	50.00	6	54.55	2	66.67	1	50.00	0	0.00
Meronam	**Sensitive**	19	100.00	10	100.00	3	100.00	2	100.00	1	100.00
	Resistant	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Tienam	**Sensitive**	20	100.00	10	100.00	3	75.00	2	100.00	1	100.00
	Resistant	0	0.00	0	0.00	1	25.00	0	0.00	0	0.00
Cefoxitin	**Sensitive**	5	35.71	3	75.00	1	50.00	0	0.00	0	0.00
	Resistant	9	64.29	1	25.00	1	50.00	0	0.00	0	0.00
Cefoperazone	**Sensitive**	10	76.92	4	80.00	2	50.00	0	0.00	0	0.00
	Resistant	3	23.08	1	20.00	2	50.00	0	0.00	0	0.00
Cefotaxime	**Sensitive**	16	80.00	7	77.78	1	33.33	1	100.00	0	0.00
	Resistant	4	20.00	2	22.22	2	66.67	0	0.00	0	0.00
Ceftriaxone	**Sensitive**	14	87.50	4	44.44	1	33.33	1	50.00	0	0.00
	Resistant	2	12.50	5	55.56	2	66.67	1	50.00	0	0.00
Cefepime	**Sensitive**	17	77.27	5	55.56	2	50.00	1	50.00	0	0.00
	Resistant	5	22.73	4	44.44	2	50.00	1	50.00	0	0.00
Ceftazidin	**Sensitive**	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
	Resistant	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00

The previous table showed that most common resulted organism was E. coli (53.65%) which sensitive to cefotaxime (80%), cefoperazone (76.92%), ceftriaxone (87.50%) and amikacin (100%).

Table (5) Gram positive organisms' culture\ sensitivity results of studied patients

Gram stain Positive		Staphylococcus aureus (n=7)		Enterococci (n=1)		Staphylococcus coagulase negative (n=1)	
		N	%	N	%	N	%
Ampicillin	**Sensitive**	0	0.00	0	0.00	0	0.00

	Resistant	3	100.00	1	100.00	0	0.00
Ampicillin + Sulbactam	**Sensitive**	1	25.00	0	0.00	0	0.00
	Resistant	3	75.00	1	100.00	0	0.00
Trimethoprim + Sulfamethoxazole	**Sensitive**	1	100.00	0	0.00	0	0.00
	Resistant	0	0.00	1	100.00	0	0.00
Amikacin	**Sensitive**	0	0.00	1	100.00	1	100.00
	Resistant	0	0.00	0	0.00	0	0.00
Gentamycin	**Sensitive**	3	42.86	1	100.00	0	0.00
	Resistant	4	57.14	0	0.00	1	100.00
Ciprofloxacin	**Sensitive**	1	50.00	1	100.00	0	0.00
	Resistant	1	50.00	0	0.00	0	0.00
Levofloxacin	**Sensitive**	1	50.00	1	100.00	0	0.00
	Resistant	1	50.00	0	0.00	1	100.00
Cefoxitin	**Sensitive**	0	0.00	0	0.00	0	0.00
	Resistant	1	100.00	0	0.00	0	0.00
Teicoplanin	**Sensitive**	2	33.33	0	0.00	0	0.00
	Resistant	4	66.67	0	0.00	0	0.00
Vancomycin	**Sensitive**	6	85.71	1	100.00	0	0.00
	Resistant	1	14.29	0	0.00	0	0.00
Linezolid	**Sensitive**	2	100.00	0	0.00	1	100.00
	Resistant	0	0.00	0	0.00	0	0.00
Clindamycin	**Sensitive**	4	57.14	0	0.00	0	0.00
	Resistant	3	42.86	0	0.00	0	0.00
Erythromycin	**Sensitive**	1	25.00	0	0.00	0	0.00
	Resistant	**3**	**75.00**	**0**	**0.00**	**1**	**100.00**

The previous table showed that most resulted organism was staphylococcus aureus (77.78%) which sensitive to trimethoprim \sulfamethoxazole (100%), sensitive to ciprofloxacin (50%), sensitive to levofloxacin (50%), sensitive to vancomycin (85.71%) and sensitive to linezolid (100%).

Table (6) Multidrug resistant organisms of studied patients

Resistance		**MDR**		**XDR**		**PDR**	
		N	**%**	**N**	**%**	**N**	**%**
Gram stain Negative	**E. Coli**	4	18.18	3	13.64	0	0.00
	Klebsiella	2	16.67	1	8.33	0	0.00
	Proteus spp.	1	25.00	1	25.00	0	0.00
	Citrobacter spp.	0	0.00	0	0.00	0	0.00
	Pseudomonas	0	0.00	0	0.00	0	0.00
Gram stain Positive	**Staphylococcus aureus**	4	57.14	1	14.29	0	0.00
	Enterococci	0	0.00	0	0.00	0	0.00
	Staphylococcus coagulase negative	1	100.00	0	0.00	0	0.00

The previous table showed that according to CDC definition of multi-drug resistant most common resistant organism was E. coli in which 4 samples (18.18%) were multidrug resistant, 3 samples (13.64%) were extensive drug resistant organisms, no samples were pan-drug resistance and staphylococcus aureus in which 4 samples (57.14%) were multidrug resistant, 1 sample (14.29%) were extensive drug resistant organisms, no samples were pan-drug resistance.

4. Discussion

In the current study 30 patients (37.5%) with spontaneous bacterial peritonitis and their ascetic fluid culture were negative for microbial growth in consistent with study in which Culture-negative neutrocytic ascites (probable spontaneous bacterial peritonitis) is noted when the ascitic fluid culture results are negative, but the PMN count is 250 cells/µL or higher, this may happen in as many as 50% of patients with SBP and may not actually represent a distinctly different disease entity. It may be the result of poor culturing techniques or late-stage resolving infection, these patients should be treated just as aggressively as those with positive culture results [8].

50 patients (62.5%) their culture were positive, 41 patients with spontaneous bacterial peritonitis their ascetic fluid culture resulted in growth of gram stain negative organisms mostly E.coli 22 (53.66%), klebsiella 12 (29.27) & 9 patients resulted in growth of gram stain positive organisms mostly 7 (77.78%) staphylococcus aureus in consistent with [9] studies which goes to spontaneous bacterial peritonitis infections have been caused by aerobic gram-negative organisms (50% of these being Escherichia coli). The remainder has been due to aerobic gram-positive organisms [9].

E.coli culture\sensitivity result showed 4 (28.57%) sensitive to ampicillin, 11 (50%) sensitive to ampicillin/sulbactam, 6 (31.58%) sensitive to trimethoprim/sulfamethoxazole, 17 (100%) sensitive to amikacin, 13 (86.67%) sensitive to gentamycin, 10 (50%) sensitive to ciprofloxacin , 10 (50%) sensitive to levofloxacin, 19 (100%) sensitive to meronam, 20 (100%) sensitive to tienam, 5 (35.71%) sensitive to cefoxitin, 10 (76.92%) sensitive to cefoperazone, 16 (80%) sensitive to cefotaxime, 14 (87.50%) sensitive to ceftriaxone, 17 (77.27%) sensitive to cefepime and 10 (71.43%) resistant to ampicillin, 11 (50%) resistant to ampicillin/sulbactam, 13 (68.42%) resistant to trimethoprim/sulfamethoxazole, 2 (13.33%) resistant to gentamycin, 10 (50%) resistant to ciprofloxacin, 10 (50%) resistant to levofloxacin, 9 (64.29%) resistant to cefoxitin, 3 (23.08%) resistant to cefoperazone, 4 (20%) resistant to cefotaxime, 2 (12.5%) resistant to ceftriaxone, 5 (22.73%) resistant to cefepime(10).

klebsiella culture\sensitivity result showed 6 (60%) sensitive to trimethoprim/ sulfamethoxazole, 10 (90.91%) sensitive to amikacin, 9 (100%) sensitive to gentamycin, 5 (41.67%) sensitive to ciprofloxacin, 5(45.45%) sensitive to levofloxacin, 10 (100%) sensitive to meronam, 10 (100%) sensitive to tienam, 3 (75%) sensitive to cefoxitin, 4 (80%) sensitive to cefoperazone, 7 (77.78%) sensitive to cefotaxime, 4 (44.44%) sensitive to ceftriaxone, 5 (55.56%) sensitive to cefepime and 6 (100%) resistant to ampicillin, 11 (100%) resistant to ampicillin/sulbactam, 4 (40%) resistant to trimethoprim/sulfamethoxazole, 1 (9.09%) resistant to amikacin, 7 (58.33%) resistant to ciprofloxacin, 6 (54.55%) resistant to levofloxacin, 1 (25%) resistant to cefoxitin, 1 (20%) resistant to cefoperazone, 2 (22.22%) resistant to cefotaxime, 5 (55.56%) resistant to ceftriaxone, 4 (44.44%) resistant to cefepime [11].

Proteus culture\sensitivity result showed 1 (25%) sensitive to ampicillin/sulbactam, 3 (75%) sensitive to amikacin, 2 (50%) sensitive to gentamycin, 1 (33.33%) sensitive to ciprofloxacin, 1 (33.33%) sensitive to levofloxacin, 3 (100%) sensitive to meronam, 3 (75%) sensitive to tienam, 1 (50%) sensitive to cefoxitin, 2 (50%) sensitive to cefoperazone, 1 (33.33%) sensitive to cefotaxime, 1 (33.33%) sensitive to ceftriaxone, 2 (50%) sensitive to cefepime and 3 (100%) resistant to ampicillin, 3 (75%) resistant to ampicillin/sulbactam, 1 (100%) resistant to trimethoprim/ sulfamethoxazole, 1 (25%) resistant to amikacin, 2(50%) resistant to gentamycin, 2 (66.67%) resistant to ciprofloxacin, 2 (66.67%) resistant to levofloxacin, 1 (25%) resistant to tienam, 1 (50%) resistant to cefoxitin, 2 (50%) resistant to cefoperazone, 2 (66.67%) resistant to cefotaxime, 2 (66.67%) resistant to ceftriaxone, 2 (50%) resistant to cefepime(12).

Citrobacter species culture\sensitivity result showed 2(100%) sensitive to trimethoprim/sulfamethoxazole, 1 (100%) sensitive to amikacin, 1 (100%) sensitive to gentamycin, 1 (50%) sensitive to ciprofloxacin, 1 (50%) sensitive to levofloxacin, 2 (100%) sensitive to meronam, 2 (100%) sensitive to tienam, 1 (100%) sensitive to cefotaxime, 1 (50%) sensitive to ceftriaxone, 1 (50%) sensitive to cefepime and 1 (100%) resistant to ampicillin, 2 (100%) resistant to ampicillin/sulbactam, 1 (50%) resistant to ciprofloxacin, 1 (50%) resistant to levofloxacin, 1 (50%) resistant to ceftriaxone, 1 (50%) resistant to cefepime.

Pseudomonas culture\sensitivity result showed sensitive to ciprofloxacin, levofloxacin, meronam tienam and resistant to amikacin, gentamycin, ceftazidine.

Staphylococcus aureus culture\sensitivity result showed 1(25%) sensitive to ampicillin \sulbactam, 1(100%) sensitive to trimethoprim\sulfamethoxazole, 3(42.86%) sensitive to gentamycin, 1(50%) sensitive to ciprofloxacin, 1(50%) sensitive to levofloxacin, 2 (33.33%) sensitive to teicoplanin, 6 (85.71%) sensitive to vancomycin, 2 (100%) sensitive to linezolid, 4(57.14%) sensitive to clindamycin, 1(25%) sensitive to erythromycin and 3(100%) resistant to ampicillin, 3(75%) resistant to ampicillin \sulbactam, 4(57.14%) resistant to gentamycin, 1(50%) resistant to ciprofloxacin, 1(50%) resistant to levofloxacin, 1(100%) resistant to cefoxitin, 4 (66.67%) resistant to teicoplanin, 1 (14.29%) resistant to vancomycin, 3(42.86%) resistant to

clindamycin, 3 (75%) resistant to erythromycin.

Enterococci culture\sensitivity result showed sensitive to Amikacin, Gentamycin, Ciprofloxacin, Vancomycin Levofloxacin and resistant to ampicillin, ampicillin \sulbactam, trimethoprim/sulfamethoxazole.

Staphylococcus coagulase negative culture\sensitivity result showed sensitive to Amikacin, Linezolid and resistant to Gentamycin, Levofloxacin, Erythromycin.

The most common resulted organism was E.coli 22 (53.65%) sensitive to cefotaxime (80%), cefoperazone (76.92%) , ceftriaxone (87.50%) in consistent with A 2009 guideline from the American Association for the Study of Liver Diseases which recommends that adult cirrhotic patients with ascitic fluid polymorphonuclear neutrophil (PMN) counts of 250 cells/µL or greater in a community-acquired setting (in the absence of recent beta-lactam antibiotic exposure) should receive empiric antibiotic therapy(e.g., an intravenous third-generation cephalosporin, preferably cefotaxime 2 g every 8 hours). Patients with cirrhosis who have PMN counts of 250 cells/µL or more in a nosocomial setting or patients who have recently received beta-lactam antibiotics should receive empiric antibiotic therapy based on local susceptibility testing of bacteria [10].

The current study show high sensitivity to aminoglycosides E.coli 17 (100%) , klebsiella 10 (90.91%), proteus 3 (75%) sensitive to amikacin in consistent with study published in world journal of gastroenterology 2005 in which single daily dose of amikacin in the treatment of SBP in cirrhotic were not associated with an increased incidence of renal impairment or nephrotoxicity, however the efficacy of a5-day regimen of amikacin is less than a 5-day regimen of cefotaxime in SBP treatment [11].

Also high sensitivity to cefepime (4th generation cephalosporins) is noted in this study E.coli 17 (77.27%), klebsiella 5 (55.56%) proteus 2 (50%) in consistent with a study published in European journal of general medicine 2010 in which cefepime shown high efficacy in treatment of SBP [12].

According to **CDC definition** of multidrug resistant organism in this study culture\sensitivity result showed 4 (18.18%) out of 22 E. coli were multidrug resistant, 3 (13.64%) out of 22 E. coli were extensive drug resistant, 2 (16.67%) out of 12 klebsiella were multidrug resistant, 1 (8.33%) out of 12 klebsiella were extensive drug resistant ,1 (25%) out of 4 proteus spp. were multidrug resistant, 1 (25%) out of 4 proteus spp. were extensive drug resistant, 4 (57.14%) out of 5 Staphylococcus aureus were multidrug resistant, 1 (20%) out of 5 Staphylococcus aureus was extensive drug resistant, 1 (100%) out of 1 Staphylococcus coagulase negative multidrug resistant, no samples were pan drug resistance in consistent with study which was a prospective study showed that patients with spontaneous bacterial peritonitis on long-term norfloxacin subsequently developed quinolone-resistant spontaneous bacterial peritonitis [13].

5. Conclusion

Any patient with liver cirrhosis and ascites complain of abdominal pain, vomiting, fever or disturbed conscious level should undergo ascetic fluid analysis for PMN cell count and culture\sensitivity. If PMN cell count more than 250 cells/µL should start empirical third generation cephalosporin antimicrobial treatment for 10 to 14 days even if culture\sensitivity result is negative. Amikacin & cefepime should be considered in empirical antimicrobial therapy in spontaneous bacterial peritonitis with dose adjustment according to creatinine clearance.

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