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Assesment of Proportion and Associated factors of Spontaneous Bacterial Peritonitis Among Patients with Cirrhosis with Ascites Admitted at Tibebe Gion Specialized University Hospital, Bahir Dar, North West Ethiopia, 2022

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By: Yoseph Alebel (Internal Medicine Resident)

A RESEARCH THESIS TO BE SUBMITTED TO THE DEPARTMENT OF INTERNAL MEDICINE, SCHOOL OF MEDICINE, COLLEGE OF MEDICAL AND HEALTH SCIENCES, BAHIR DAR UNIVERSITY IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF SPECIALIZATION IN INTERNAL MEDICINE.

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BAHIR DAR, ETHIOPIA.

BAHIRDAR UNIVERSITY COLLEGE OF MEDICAL AND HEALTH SCIENCES,DEPARTMENT OF INTERNAL MEDICINE.

ASSESMENT OF PROPORTION AND ASSOCIATED FACTORS OF SPONTANEOUS BACTERIAL PERITONITIS AMONG PATIENTS WITH CIRRHOSIS WITH ASCITES ADMITTED AT TIBEBE GION SPECIALIZED UNIVERSITY HOSPITAL, BAHIR DAR, NORTH WEST ETHIOPIA, 2022.

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Declaration

This is to certify that the thesis entitled "Assessment of the proportion and associated factors of SBP among cirrhotic patients with ascites", submitted in partial fulfillment of the requirements for the degree of Doctor of Specialization in internal medicine of Department of internal medicine, Bahir Dar University, is a record of original work carried out by me and has never been submitted to this or any other institution to get any other degree or certificates. The assistance and help I received during the course of this investigation have been duly acknowledged.

Dr Yoseph Akebel 13/03/2015 BDU

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LIST OF ABBREVIATIONS AND ACRONYMS

AASLD-American Association for the Study of Liver Diseases

ALT-Alanine Transaminase

AST-Aspartate Transaminase

BUN-Blood Urea Nitrogen

CLD-Chronic Liver Disease

CNNA-Culture Negative Neutrocytic Ascites

EASL-European Association for Study of Liver Diseases

E.coli-Escherichia coli

GIT-Gastrointestinal Tract

HE-Hepatic Encephalopathy

INR-International Normalized Ratio

LFT-Liver Function Test

MELD-Model of End Stage Liver Disease

PMN-Poly Morphonuclear Leucocytes

PLT-Platelet

RFT-Renal Function Test

SBP-Spontaneous Bacterial Peritonitis

UGIB-Upper Gastrointestinal Bleeding

WBC-White Blood Cell

ABSTRACT.

Background: Spontaneous Bacterial Peritonitis (SBP) defined as ascitic fluid infection without an evidence of intra-abdominal Source of infection. one of the most common and life-threatening complications of patients with cirrhotic ascites. It is a diagnostic and therapeutic emergency. Therefore it is important to determine the proportion and associated factors of SBP among cirrhotic patients with ascites attending Tibebe Gion specialized University hospital..

Methods and Materials: A hospital based retrospective study was conducted among 191 adult patients of decompensated liver cirrhosis with ascites in Tibebe Gion specialized University Hospital in the last 3years and 6months. The Data was collected using checklist from Patients' Card by using systematic random sampling. Data were cleaned and checked for completeness, then entered into Epi Data 3.1, and exported to SPSS Version 23 for analysis. Descriptive statistics such as frequency, crosstab, and median were utilized. Binary logistic regression was conducted to identify candidate variables for multivariable logistic regression at a p-value of <0.05. Those variables whose P-value <0.05 in multiple binary logistic regression were considered as significantly associated variables with Spontaneous bacterial peritonitis.

Result: A total of 191 patients were participating in the study. Of which 132 (69.1%) were males. Most of the patients were under the age of 50-years.The proportion of spontaneous bacterial peritonitis was 22.5% (95% CI: 16.2%–28.5%). The study also found that serum sodium<130meq/l[AOR = 15.599; 95%CI, 4.56, 53.33], upper Gastro-intestinal bleeding [AOR =16.951; 95% CI,4.50,63.87], INR>2.3 [AOR = 4.032; 95%CI, 1.13, 14.36], Hepatic Encephalopathy [AOR =3.07; 95% CI,1.01,9.31], Serum Albumin<2.5g/dl [AOR = 3.66; 95%CI, 1.30, 10.36] and Serum Bilirubin>3g/dl [OR = 2.552; 95%CI, 1.28, 5.10] were stasticaly significantly associated with spontaneous bacterial peritonitis..

Conclusions: SBP is common among patients with cirrhotic ascites admitted at TGSUH. Low serum sodium, low serum albumin, patients having upper gastro-intestinal bleeding, patients with hepatic encephalopathy, high INR and high bilirubin were highly associated

SBP infection. Diagnostic paracentesis should be done immediately on admission to confirm the diagnosis and intervene early.

Key Words: Ascites, Cirrhosis, SBP, Associated factors and TGSH

1. INTRODUCTION

1.1 Background

In advanced stages of liver cirrhosis with ascites, patients tend to develop bacterial peritonitis without evidence of source of infection, a form of infection which has been termed spontaneous bacterial peritonitis (SBP) in 1963(1,2). Spontaneous bacterial peritonitis (SBP) is a common and serious infection occurring in patients with cirrhosis and ascites(2–4).The occurrence of SBP are independent of the etiology of liver diseases(5). SBP may be the precipitating factor for the occurrence of kidney failure, hepatic encephalopathy, gastrointestinal bleeding, hypervolemia hyponatremia and development of acute on chronic liver failure, systemic sepsis and poor survival(2,3). The symptoms and signs of SBP are subtle compared with those of patients who have surgical peritonitis in the absence of ascites(2). SBP may be asymptomatic in about 10-32% of cases, particularly in outpatients. Symptoms and signs of patients with SBP normally present with fever, abdominal pain, altered mental status, abdominal tenderness, diarrhea, paralytic ileus, hypotension and hypothermia (17%) (2, 3). Thus, all persons with cirrhosis and ascites should undergo a diagnostic paracentesis at the time of hospital admission(6).An increase in the permeability of the intestinal wall leads to translocation of bacteria and subsequent development of SBP. Intestinal bacterial overgrowth and uncontrolled bacterial growth in ascitic fluid then occur, as a result of an impaired host immune response(2). Less often, SBP results from bacteremia that originates at a distant site, such as a urinary tract infection(6). Factors associated with the risk of developing SBP in cirrhotic patients include upper gastrointestinal bleeding, poor liver function, low ascitic fluid protein levels <1gm/dl, prior SBP and hospitalization(2,3,6). Because of the significant risk of adverse outcomes related to SBP, identifying predisposing factors is of utmost urgency(2,3). Independent prognostic factors include Child-Pugh grade C liver cirrhosis, renal dysfunction, elevated blood urea nitrogen level before occurrence of peritonitis, age, intensive care unit admission, positive ascitic fluid culture and elevated serum bilirubin level during infection(3). More than 92% of all cases are Monomicrobial with aerobic gram negative bacilli being responsible for more than two thirds of cases(1,2). Escherichia coli accounts for nearly half of these cases followed by Klebsiella species and other gram negative bacteria(2). 25% of cases are caused by gram positive organisms with Streptococcus species being the most common(7).

Abdominal paracentesis and ascitic fluid analysis is the gold standard test for diagnosis(1). Spontaneous bacterial peritonitis refers to infection of the ascitic fluid, as evidenced by an ascitic fluid absolute polymorphonuclear leukocyte (PMN) count of at least 250 cells/mm3 (0.25 × 109/L), with or without a positive ascitic fluid culture, in the absence of an intra-abdominal surgically treatable source of infection(2,6). Culture-negative Neutrocytic ascites refers to individuals who have an ascitic fluid PMN count of at least 250 cells/mm3 (0.25 × 109/L) in combination with a negative bacterial culture-in the absence of another explanation for an elevated PMN count (e.g. pancreatitis, peritoneal carcinomatosis, or peritoneal tuberculosis) or

recent receipt of antimicrobial therapy. Obtaining ascitic fluid for diagnostic testing should be performed before treatment is initiated as even a single dose of broad-spectrum antibiotics can lead to no growth on bacterial culture in 86% of cases(6).Broad-spectrum antibiotic therapy is recommended for treatment of proven or suspected SBP and may be narrowed when susceptibility results become available(6).

1.2 Statement of the Problem

The prevalence of SBP in patients with liver cirrhosis ranges anywhere from twenty to fifty percent, depending on the study reviewed, with inpatient mortality rates as high as 32%. True incidence and prevalence appear to be difficult to recognize as diagnostic ascitic fluid cultures can remain negative even in the presence of SBP (8).

. In an observational study, each hour of delay in diagnostic paracentesis after admission was associated with a 3.3% increase of in-hospital mortality after adjusting for model for end-stage liver disease (MELD) score (9).A recent European study detected a prevalence of 11.3% among inpatients. When first described, mortality associated with SBP exceeded 90%, but, in-hospital mortality has been reduced to approximately 20% with early diagnosis and prompt treatment (10).

Early diagnosis and prompt management of SBP once it has developed and preventing infections in high risk groups by giving prophylactic antibiotics are measures that can reduce morbidity and mortality in patients with liver cirrhosis (2,3). Individuals with suspected spontaneous bacterial peritonitis (SBP) and ascitic fluid PMN greater than or equal to 250 cells/mm3 (0.25 × 109/L) should promptly receive empiric antibiotic therapy (6).

SBP is medical emergency, prompt management and prophylactic antibiotics are essential to reduce mortality Between 10 and 30% of patients with cirrhosis develop SBP, which carries hospital mortality rate ranging from 30 to 50 % .The risk of SBP recurrence is 70 % at 1st year (5). Secondary antibiotic prophylaxis in a person with cirrhosis who has a prior history of SBP reduces the risk of SBP recurrence from 68% to 20% (6). In Ethiopia, very little is known about the proportion, and associated factors of SBP in Cirrhotic patients with ascites. Programs to detect Spontaneous bacterial peritonitis, treat primarily and secondary Prevention strategies are very important for the patients survival, health care system, for policy makers and other stake holders those are interested on the area and to take the necessary measurements on preventive as well was treatment approach.

1.3. Significance of the Study

It was not known the proportion and associated factors of SBP in cirrhotic ascites patients at TGSH. The results from this study would give insight into the proportion and associated factors SBP and it will be used as a tool develop appropriate guidelines SBP management.

For the patients having advanced liver cirrhosis and ascites early diagnosis, proper treatment and taking secondary prophylaxis for high risk patients reduce their mortality and morbidity related to SBP, decrease cost, increase quality of life and productivity as a community.

For **researcher** can use as a reference to study further about SBP proportion and associated factors in cirrhotic ascites patients, which is little Known in Ethiopia.

Hospital administrators and policy makers by using this paper can see the gap and the magnitude of problem; they will give emphasis and prepare local protocols.

Stakeholders (our department) in collaboration with hospital administrators use this paper for guideline development.

2. LITERATURE REVIEW

2.1 Prevalence and outcomes SBP

Various studies have shown different results regarding the prevalence and outcomes of SBP in Cirrhotic ascites in different parts of the world. Among these studies, some of them are mentioned in the following paragraphs:

An Epidemiological Meta-Analysis on the Worldwide Prevalence, Resistance and Outcomes of Spontaneous Bacterial Peritonitis in Cirrhosis. Among Ninety-Nine articles, comprising a total of 5,861,142 individuals with cirrhosis was included. Pooled prevalence of SBP was found to be 17.12% globally, highest in Africa (68.20%), and lowest in North America (10.81%). Overall mortality was 30.61%, in-hospital mortality (23.38%), 30-day mortality (25.64%), 90-day mortality (37.64%) (10).

Ascitic fluid infection is sufficiently common (12% in an older series) at the time of admission of a patient with cirrhosis and ascites to justify a diagnostic paracentesis(6,11). The incidence is lower now due to prevention in high risk subgroups (11).

A prospective longitudinal study was carried out in patients attending Bangladesh Institute of Dhaka that SBP were developed 18.3% cases. Organism of culture of ascitic fluid in SBP patients (n=11) were E. coli and Pseudomonas spp. found in 2(18.2%) cases, the rest 6(54.5%) cases shows no growth. Among 11 SBP patients improvement occurred in 5(45.5%) cases and therest6(54.5%)casesdied(6).

A prospective study carried out in East India at Narayam Medical College and Hospital, Jamuhar, Sasaram. Out of 60 cases of Cirrhosis of liver, the incidence of SBP in Cirrhosis of Liver was 13 (20.65%) Out of total 13 cases of SBP, 10 (78.94%) cases were culture Positive Neutrocytic Ascites and 3 (21.05%) cases were culture Negative Neutrocytic Ascites, and out of 10 cases of culture positive Neutrocytic ascites, 1 organism was isolated in 7 (73.33%) cases. Two organisms in 2 (20.00%) cases and 3 organisms in 1 (6.66%) cases indicating that incidence of Monomicrobial Neutrocytic ascites was highest, seen in 7 (73.33%) cases compared to polymicrobial Neutrocytic ascites, which was least seen in 1 (6.66%) case. Out of 13 cases of SBP, death occurred in 5 (38%) cases and 8(62%) patients survive(12).

A hospital based cross-sectional study was conducted in 200 patients of chronic liver disease with ascites in the Department of Medicine, RIMS, Imphal. 42 out of 200 patients, i.e. 21% were found to have SBP. 35 (83.33%) patients had Culture Negative Neutrocytic ascites (CNNA), 6 (14.28%) had Classical SBP and 1 (2.38%) had Bacterascites. Most of them were gram negative,

mainly Escherichia coli n=5 (71.42%), Klebsiella pneumonia n=1 (14.28%) and Staphylococcus aureus n=1 (14.28%). Most organisms isolated were susceptible to ceftriaxone (13).

A cross-sectional Hospital-based study was conducted at Korle-Bu Teaching Hospital (KBTH), Accra, Gahna involving 140 patients with ascites irrespective of the underlying cause. SBP was present in 30 (21.43%) patients.(3) Of the 30 patients that developed SBP, culture positive SBP was present in 26.67% (8/30) and CNNA was found in 63.33% (19/30). The prevalence of MNB was 10% (3/30) in this study. Among patients with the culture positive SBP, 5 (41.7%) positive cultures were due to E coli, followed by Corynebacterium spp. and Klebsiella spp. with 2 (16.7%) each Staphylococcus aureus, Staphylococcus epidermidis and Streptococcus viridians accounted for 1 (8.3%) of positive cultures.

A retrospective Hospital-based study done in Tunisia, Habib Thameur Hospital Eight hundred and twelve cirrhotic patients were collected. The study focused on 90 patients who developed a first episode of SBP, meaning a prevalence of 11%. Hospital mortality following the first episode of SBP was 10%. the SBP recurrence rate was 26% among patients who survived their first infectious episode (14).

A prospective, randomized, cross-sectional clinical study, included 100 adult patients of decompensated liver cirrhosis with ascites in Aswan University Hospital, Egypt, 62% of patients were diagnosed SBP. Classic SBP in 30.6%, CNNA in 59.7% and MNB in 9.7% of patients. Of 25 patients who have positive culture ascetic fluid, 60% were positive for gram-negative bacteria predominantly E. coli (1).

Institution-based cross-sectional study Conducted at University of Gondar Hospital, Northwest Ethiopia. Out of 24 patients, Five (20.8%) CLD patients had spontaneous bacterial peritonitis as a complication (15).

2.2. Prevalence and Associated factors of SBP.

The study conducted at Guru Gobind Singh Medical College and Hospital, India. Of the 122 patients studied, 27 (20.4%) patients were diagnosed as having SBP and its variants. The various factors that predispose to development of SBP include low ascitic fluid protein concentration, a high level of serum bilirubin, deranged serum creatinine, high Child-Pugh score and high MELD score(16).

A retrospective study included 216 patients with liver cirrhosis who were hospitalized ‘St. Apostle Andrew’ in Constanta, Romania. Univariate logistic regression analysis showed that there was an association between biological parameters such as serum white blood cells, total platelet count, total bilirubin, serum albumin, international normalized ratio, creatinine, erythrocyte sedimentation rate (ESR), serum sodium, alkaline reserve, and NLR, and clinical parameters, such us upper gastrointestinal bleeding and cardiac comorbidities in the occurrence

of SBP. Multivariate analysis identified ESR and NLR as predictive factors in the occurrence of SBP (17).

A descriptive, cross-sectional, single-center study was carried out on 132 consecutive patients of HE admitted to Bir Hospital, Nepal. Out of 132 patients, infection was the most common factor seen in 65 (49.2%) patients in this study. Infection in the form of spontaneous bacterial peritonitis (SBP) (18.2%) was the most common precipitant factor followed by 14.4% respiratory tract infections, 13.7% urinary tract infections, and 3% with fever of undetermined cause (18).

195 patients with liver cirrhosis complicated with SBP (study group) admitted in Tianjin, China and 195 patients without liver cirrhosis complicated with SBP (control group) were retrospectively analyzed. There were significant differences in patients between study group and control group in Child-Pugh classification, peripheral blood white blood cell (WBC), serum C-reactive protein (CRP), serum total bilirubin (TBil), ascites WBC, ascites albumin (ALB), and the ratio of complicated with upper gastrointestinal hemorrhage, hepatorenal syndrome, hepatic encephalopathy and hyponatremia ($P<0.01$); Logistic regression analysis found that Child-Pugh classification, serum CRP, ascites WBC, ascites ALB, upper gastrointestinal hemorrhage, hepatorenal syndrome, hepatic encephalopathy and hyponatremia were related to the occurrence of SBP and Child-Pugh classification, ascites ALB, upper gastrointestinal hemorrhage, hepatorenal syndrome and hyponatremia were its independent risk factors (19).

A number of studies show that PPI use is associated with higher prevalence of SBP in liver cirrhosis. In a retrospective cohort study of 7299 patients with decompensated cirrhosis from the U.S. Veterans' Health Administration database between the years 2001 and 2009, PPI use appeared to increase the rate of infection by 1.75 times compared to those who were not on PPIs.Around 25.9% who used PPIs developed serious infections, with the majority (75%) of infections being acid-suppression associated infections, including SBP, C.difficile, and pneumonia (8).

A cross-sectional study was conducted involving one hundred and three (103) patients at medical block in the Korle-Bu Teaching Hospital (KBTH), Gahna with cirrhotic ascites. The prevalence of SBP was 25.24% (26/103). Severe ascites and high INR were found to be independent predictors of SBP (3)

3. CONCEPTUAL FRAMEWORK

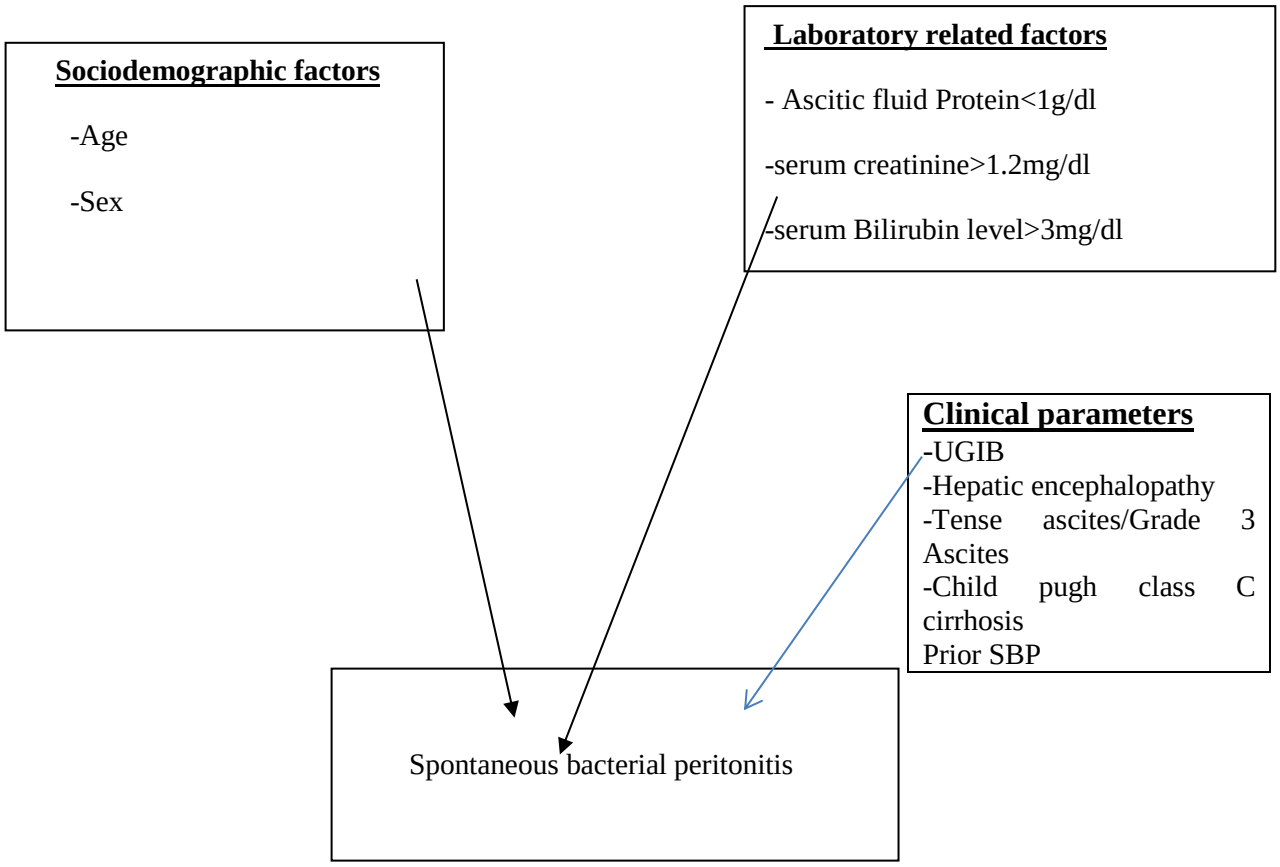

Figure 1 Conceptual frame work identifies factors associated with SBP

4. OBJECTIVES OF THE STUDY

4.1. General objective:

- To assess the proportion and associated factors of spontaneous bacterial peritonitis among Cirrhotic patients with ascites admitted at medical ward and intensive care unit at Tibebe Gion Specialized University Hospital, Bahir Dar, North West Ethiopia.

4.2 Specific objective**:**

- To determine the proportion of spontaneous bacterial peritonitis among Cirrhotic patients with ascites.
- To identify factors associated with SBP.

5. Methodology and MATERIAL

5.1. Study Design.

Hospital-based retrospective study was conducted at Tibebe Gion Specialized University Hospital, 2022.

5.2 Study Area and Period.

The study was conducted at Tibebe Gion Specialized University Hospital, Bahir dar, Northwest Ethiopia about 565 kilometers away from Addis Ababa, the capital city of the country. Tibebe Gion Specialized University Hospital is one of the largest hospitals in the country. It is a tertiary teaching hospital. It has different departments like internal medicine, surgery, pediatrics, gynecology/obstetrics, dermatology, radiology, and so on. The majority of patients presenting with ascites will present to the medical outpatient department (OPD), medical emergency, and medical wards. the medical OPD, emergency, and wards are staffed with Gastroenterologists, Internists, Internal medicine residents, Interns, and Nurses. The patient's clinical profile is kept recorded in their charts and register books.

The study was conducted from August 1 to 15, 2022 G.C in Tibebe Gion Specialized University Hospital, Bahir dar, Northwest Ethiopia.

5.3. Source Population and study population

5.3.1. Source Population.

The source populations were all Cirrhotic adult Patients with ascites, who are admitted to medical ward and/or ICU at Tibebe Gion Specialized University Hospital.

5.3.2. Study Population

The study populations were all adult Cirrhotic patients with ascites who are admitted to medical ward and/ or ICU at Tibebe Gion Specialized University Hospital from January 1st, 2018to June 30, 2022EG.C.

5.4 Inclusion and Exclusion criteria

5.4.1 Inclusion Criteria

1. All adults aged greater than or equal to 18 years who have cirrhosis and ascites by abdominal ultrasound and having at least ascitic fluid analysis or ascetic fluid culture.

5.4.2. Exclusion Criteria

1. Patients classified as having ascites due to malignancy, tuberculosis, renal, cardiac causes or secondary peritonitis.
2. Patients with Incomplete Medical Recording.

5.5. Sample Size determination and sampling technique

5.5.1. Sample Size determination:

The sample size of the study was calculated by using epi-info 7.1 through the assumption of 95% confidence interval (CI) and taking expected frequency 20.8% from University of Gondar(15). With margin of error 5% and the study population is < 10,000, the sample size was 153 and adds 10% incomplete data and the sample size was 191.

5.5.2. Sampling Techniques and procedure:

The data were collected by identifying the medical record number (MRN) of cirrhotic patients with ascites from the health management information system (HMIS) log book then the patients' chart was retrieved from hospital card room. a systematic random sampling was used to select study participants and the sampling interval (k value) were 2(384 divided by 191=2 w/h, the sampling interval). Of the first two participants, one Cirrhotic patient with ascites card was randomly selected by lottery method, and then every 2nd patient was selected to participate in the study till the sample size reaches 191.

5.6 VARIABLES IN THE STUDY.

5.6.1. Dependent variables

Spontaneous bacterial peritonitis (yes/no)

5.6.2. Independent variables

Age

Sex

Residence

Causes of cirrhosis

Grade of ascites

Child Pugh class cirrhosis

Elevated creatinine

Elevated bilirubin

UGIB

Hepatic Encephalopathy

Elevated INR

Low Serum Na+

Low Total Ascitic protein<1g/dl

Low serum albumin

Prior SBP

Hospital admission

5.7. OPERATIONAL DEFINATION

- **Ascites** is the presence of fluid in the peritoneal cavity.
- **Cirrhotic ascites is** Ascites due to cirrhosis of Liver.
- **Spontaneous bacterial peritonitis** refers to infection of the ascitic fluid, as evidenced by an ascitic fluid absolute polymorphonuclear leukocyte (PMN) count of at least 250 cells/mm3 (0.25 × 109/L), with or without a positive ascitic fluid culture, in the absence of an intra-abdominal surgically treatable source of infection.
- **Upper gastrointestinal bleeding** is defined as hemorrhage originating proximal to the ligament of Treitz. Presenting as either bloody vomiting or black tarry stool.

5.8. DATA COLLECTION TOOLS AND PROCEDURES

Data were collected using data collection check list. The data collectors were include three residents: 2 year 1 residents and 1 year 3 resident and the principal investigator. A pre-test were given about the general process of data collection. The contents of the checklist were including sociodemographic profile, clinical symptoms and signs, laboratory results and outcomes during hospital stay. The data were collected by identifying the medical record number of cirrhotic patients with ascites from the health management information system (HMIS) log book and the patient's chart was reviewed for information like sociodemographic data, clinical presentation, laboratory parameters like AST, ALT, Total Bilirubin, INR, serum albumin, serum Na+, creatinine and Ascitic fluid Analysis. The patient charts also assessed having prior SBP or not were reviewed.

5.9. DATA QUALITY ASSURANCE AND ANALYSIS.

Before starting the data collection, data collection check list will be cross checked with available information on records; training was given to the data collector on how to collect the data. A pre-

test was carried out on 5% of the actual sample size who fulfilled the criteria. Based on the finding of the pre-test, the data collection checklists were revised. Every day the principal investigator was checking the collected data and any incomplete documents were cleaned and checked for quality before data entry.

Data were checked for completeness and entered into Epi data 3.1, and exported to SPSS version 23 for analysis. Descriptive statistics such as frequency, crosstab, and median were utilized. Binary logistic regression was conducted to identify candidate variables for multivariable logistic regression at a p-value of <0.05. Those variables who's P-value

<0.05 in multiple binary logistic regressions were considered as significantly associated variables with spontaneous bacterial peritonitis.

Both crude and adjusted odds ratios with their 95% confidence intervals (CI) were computed to measure the strengths of associations between variables. A p-value of <0.05 was considered statistically significant. The Hosmer-Lemeshow test for logistic regression was checked to examine the goodness of fit of the model, and data were fitted for the model (x2 = 3.82, p-value = 0.7). Multicollinearity was assessed using variance inflation factors (VIF), and all variables had VIF< 10 which means no Multicollinearity.

5.10. ETHICAL CONSIDERATION

Before beginning data collection, ethical approval was taken from Institutional Review Board of College of Medicine and Health Sciences. Official letter of support were obtained from Tibebe Gion specialized university Hospital. The objective of study was explained to the Institutional Review Board of College of Medicine and Health Sciences. There were no mentioning of patients name in data collection checklist and patients' card was returned to card room/archive as soon as data collection checklist was filled. Patient card were not be taken out of hospital.

6. RESULT

6.1 Socio-demographic characteristics and Etiologies Cirrhosis Among study participants

A total of 191 individuals were participating in the study. Of which 132 (69.1%) were males with ratio 2.3:1.. Most study patients 149(78%) were under the age of 50years which is similar, there was a 4% reduced odds of SBP with increasing age in Ghana. Regarding the Residence, most patients were from Rural 139(72.8%).
In this study, the most Common Cause of Cirrhosis was HBV 94(49.2%), Followed by Unknown Causes 70(36.6%), HCV 13(6.8%) and Others 6(3.1%) had both HBV and HCV Infection. there were 2(1.05%) with Autoimmune causes both were females and ANA positive.

Table 1-Socio-demographic characteristics of the study participants, n=191, TGSUH, 2022.

Variable	Category	Frequency	Percent (%)
Sex	M	132	69.1
	F	59	30.9
Age(Yrs.)	18-35	79	41.4
	36-50	70	36.6
	51-65	35	18.3
	>65	7	3.7
Residence	Rural	139	72.8
	Urban	52	27.2

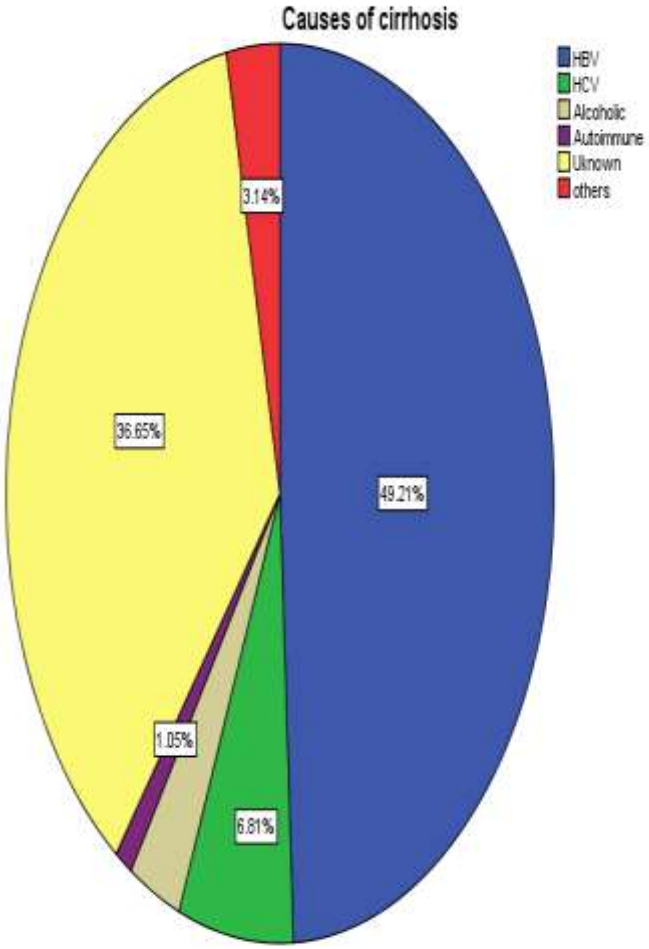

Figure 2, Shows the causes of cirrhosis among the study participants, TGSUH, 2022.

6.2 Clinical and laboratory characteristics of the study participants.

Among 191 study participants, 43(22.5%) patients had SBP. Out of 43 SBP Patients 32(74.42%) were males and 11(25.58%) were female. regarding the etiology, HBV is the commonest cause 26(60.47%), followed by unknown cause 10(23.26%), HCV 6(13.95%) and others (both HBV & HCV) 1(2.33%). Regarding the clinical presentation, 34 patients had Clinical Symptoms and Signs during hospital Admission and 9 (20.94%) patients had no symptoms or Signs and diagnosed by Routine Ascitic fluid Analysis.

From 34 Symptomatic SBP patients, the most common complaint was Abdominal pain and UGIB 13(38.2%) each symptoms followed by Change in mentation 5(11.8%), Fever 3(8.8%) and Diarrhea 1(2.9%).The most common Physical finding/sign was Abdominal Tenderness 16(43.2%), Hepatic Encephalopathy 13(35.1%) and fever 7(18.9%). From 43 SBP Diagnosed participants, 31(72.09%) patients were having Child pugh Class C and 12(27.91%) were Child class B. All patients were treated with Ceftriaxone but 2 patients were treated with Vancomycin after taking Ceftriaxone. Among the study participants 12(27.91%) had prior SBP. regarding the patient condition at hospital discharge 29(67.4%) were Improved, 9(20.9%) Died and 5(11.6%) left against medical advice.

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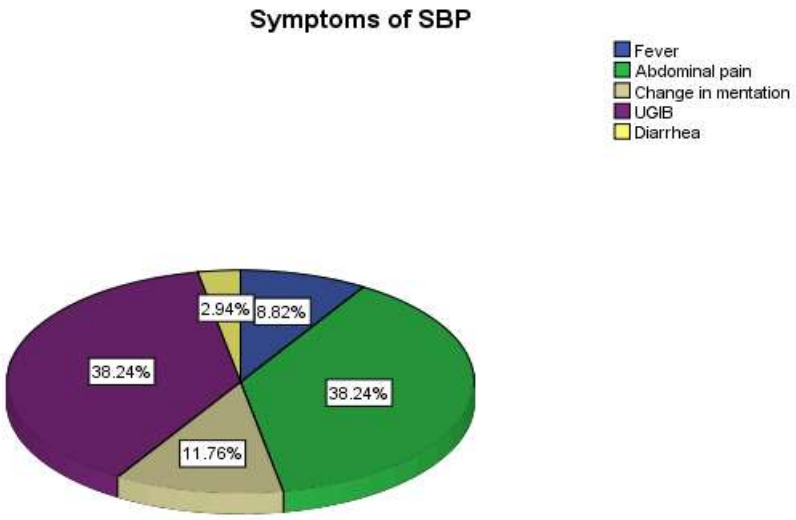

Figure 3.Clinical symptoms among symptomatic SBP study patients, TGSUH, 2022

6.3 The proportion of SBP among Cirrhotic patients with Ascites

From 191Cirrhotic patients with Ascites, the overall Proportion of SBP was found to be 22.5% (95% CI: 16.2%–28.5%), diagnosed by Ascitic fluid Analysis during hospital Admission.

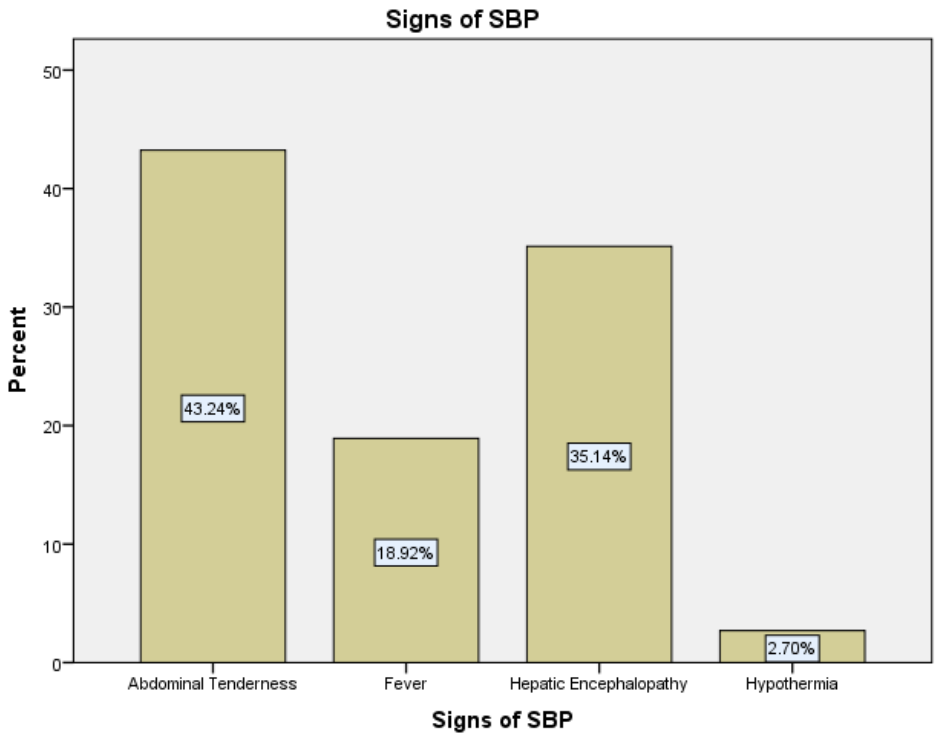

Figure 4 physical finding or signs among SBP patients, TGSUH, 2022.

Table 2Clinical and laboratory characteristics of the study participants, n=191, TGSUH, 2022.

Variable	Category	Frequency	Percentage
	Yes	43	22.51
SBP	No	148	77.48
Clinical feature of SBP	Symptomatic	34	79.07
	Asymptomatic	9	20.93
Child pugh class	B	53	27.7
	C	138	72.3
UGIB	Yes	22	11.5
	NO	169	88.5
HE	Yes	31	16.2
	No	160	83.8
Prior SBP	Yes	12	6.28
	No	179	93.72
Serum Na+	<130meq/l	27	85.9
	>130meq/l	164	14.1
Serum albumin	<2.5g/dl	97	50.8
	>2.5g/dl	94	49.2
Serum bilirubin	>3mg/dl	73	38.2
	<3mg/dl	118	61.8
INR	>2.3	169	88.5
	<2.3	22	11.5
Serum Creatinine	>1.2mg/dl	14	92.7
	<1.2mg/dl	177	7.3
Ascitic total WBC in SBP	>500cells	35	81.4
	<500cells	8	18.6

6.4 Factors associated with SBP among Cirrhotic patients with ascites.

All variables were assessed for Binary logistics analysis and variables which have a p-value <0.05 in the Binary logistics Analysis was eligible for multivariable logistic regression analysis. However, variables such as sex, residency, serum Cr>1.2mg/dl, grade of ascites and prior SBP had a p-value >0.05 and exclude from further Analysis. Six variables (serum Albumin<2.5g/dl, serum Sodium<130meq/l, INR>2.3, total Bilirubin>3mg/dl, having UGIB and having Hepatic Encephalopathy) have a statistically significant association with SBP occurrence in multivariable logistic regression analysis.

Patients who have serum Albumin<2.5g/dl were 3.66 times more likely to develop SBP than patients who have serum Albumin>2.5g/dl [AOR = 3.66; 95%CI, 1.30, 10.36] and Patients having serum Sodium<130meq/l were 15.59 times more likely to develop SBP than patients having serum Na+ >130meq/dl [AOR = 15.59; 95%CI, 4.56, 53.33]. The odds of SBP among UGIB patients were 16.951 times higher as compared to patients without UGIB [AOR =16.951; 95% CI,4.50,63.87]. The odds of SBP among patients having Hepatic encephalopathy were 3.07 times higher as compared to patients without HE [AOR =3.07; 95% CI,1.01,9.31].

Patients having INR>2.3 were 4.032 more likely to develop SBP than patients having INR<2.3 [AOR = 4.032; 95%CI, 1.13, 14.36] and Patients who have serum Bilirubin >3g/dl were 2.552 times more likely to develop SBP than patients having serum Bilirubin<3g/dl [OR = 2.552; 95%CI, 1.28, 5.10].

Table 3:-Factors Associated with Spontaneous bacterial peritonitis among cirrhotic patients with ascites (n=191), TGSUH, 2022.

Variable	Category	SBP Yes(n=43) %	No(n=148) %	COR [95%CI]	AOR [95%CI]	P-value
Serum Na+	<130meq/l	21(77.78)	6(22.2)	22.59[8.21,62.17]	15.599	<0.001
	>130meq/l	22(13.41)	142(86.59)	1.00	1.00	
UGIB	Yes	15(68.18)	7(31.82)	10.79[4.03,28.88]	16.95[4.49,63.87]	<0.001
	No	28(16.57)	141(83.43)	1.00	1.00	
HE	Yes	14(45.16)	17(58.84)	3.72[1.65,8.40]	3.07[1.01,9.30]	0.047
	No	29(18.14)	131(81.86)	1.00	1.00	
Serum albumin	<2.5mg/dl	36(37.13)	61(62.87)	.0.14(0.06,0.33)	3.66[1.3,10.36]	0.014
	>2.5mg/dl	7(7.45)	87(92.55)	1.00	1.00	
`INR	>2.3	9(40.91)	13(59.09)	0.36(0.14,0.92)	4.03[1.13,14.36]	0.031
	<2.3	34(20.12)	135(79.88)	1.00	1.00	
Serum Cr	>1.2mg/dl	8(57.14)	6(42.86)	5.41(1.76,16.6)	2.96[0.41-17.87]	0.237
	<1.2mg/dl	35(19.77)	142(80.23)	1.00	1.00	
Serum total bilirubin	>3mg/dl	19(16.1)	99(83.90)	0.39(0.20,0.78)	0.50[0.20,1.32]	0.16
	<3mg/dl	24(32.88)	49(67.12)	1.00	1.00	

COR= Crude Odds Ratio, AOR = Adjusted Odds Ratio.

7. DISCUSSION

The proportion of SBP in this study was found to be 22.5% (95% CI: 16.2%, 28.5%). This finding was in line with the study conducted at the University of Gondar which was 20.8% (15). The observed similarity might be due to similarity in population Characteristics.

the proportion of SBP in this study was lower than that of Egypt 62% (1) and Ghana 25.7% (2) but higher than the Pooled prevalence of SBP was found to be 17.12% globally (10) and in Bangladish 18.3% (5).This is similar compared to 10-30% found by most studies from the developed world [12,14, 17, 18]. This difference may be due to the difference in the severity or stage of liver cirrhosis involved in the study.

The diversity of the clinical and laboratory parameters that is associated with the presence of SBP has been reported in various literatures. In this study, Patients having serum Sodium<130meq/l were 15.59 times more likely to develop SBP than patients having serum Na+ >130mg/dl [AOR = 15.599; 95%CI, 4.56, 53.33]. This result is consistent with the study in Romania (17). Hyponatremia often reflect the state of liver function and the lower the level of serum sodium, the more severe the damage of liver function and hyponatremia has been associated with higher prevalence of refractory ascites, hepatic encephalopathy, SBP, HRS and mortality (9). So hyponatremia is an independent risk factors for the occurrence of liver cirrhosis complicated with SBP (19).

This study also showed the odds of SBP among UGIB patients were 16.951 times higher as compared to patients without UGIB [AOR =16.951; 95% CI,4.50,63.87]. Bacterial infections are observed in up to 50% patients with cirrhosis hospitalized for GI bleeding, and are associated with strong risks of failure to control bleeding, early re-bleeding and mortality (20).esophageal varices and esophageal variceal bleeding were more common among SBP patients compared with non-SBP patients (21). A systematic antibiotic prophylaxis during upper GI bleeding leads to fewer infections and a lower short-term mortality, which seems to be the consequence of a lower rate of early rebleeding (22).

This study also revealed, Patients having INR>2.3 were 4.032 more likely to develop SBP than patients having INR<2.3 [AOR = 4.032; 95%CI, 1.13, 14.36] which is similar that severe ascites and high INR showed strong independent association with SBP in Ghana(3)and Israel(21).

The odds of SBP among patients having Hepatic Encephalopathy were 3.07 times higher as compared to patients without HE [AOR =3.07; 95% CI,1.01,9.31]. This was consistent with a study done in USA who reported SBP as the most common precipitant in HE (18).

In our study, Patients who have Serum Albumin<2.5g/dl were 3.66 times more likely to Develop SBP than patients who have Serum Albumin>2.5g/dl [AOR = 3.66; 95%CI, 1.30, 10.36] and Patients who have Serum Bilirubin >3g/dl were 2.552 times more likely to Develop SBP than patients having Serum Bilirubin<3g/dl [OR = 2.552; 95%CI, 1.28, 5.10]. High serum bilirubin, hypoalbuminemia, HE and high INR are among five markers used to stage the severity of liver disease according to Child-Pugh rankings. The higher the child pugh class score, the greater the risk of SBP (2). this helps to explain why 72.09% of cases of SBP were seen in our patients with Child-Pugh class C cirrhosis.

8. LIMITATION OF THE STUDY

This study was based on secondary data which is not as reliable as primary data. Not all information important for this study was found on patient's card. The patients' charts/cards were incomplete and poor documentation of data by physicians like marital status and Occupation. Some laboratory parameters like total ascitic fluid protein and culture of ascitic fluid not done at all. Risk association for those variables which were not documented was difficult to analyze and are not included in this study could affect SBP prevalence and diagnosis. thus, interpreting this study finding needs to be under the consideration of these limitations.

9. CONCLUSION.

SBP is common among patients with cirrhotic ascites admitted at TGSUH. Low serum sodium, low serum albumin, patients having upper gastro-intestinal bleeding, patients with hepatic encephalopathy, high INR and high bilirubin were highly associated SBP infection. Diagnostic paracentesis should be done immediately on admission to confirm the diagnosis and intervene early.

RECOMMENDATION

For physicians all cirrhotic ascites patients who admitted to the hospital immediate evaluate for SBP and ascitic fluid analysis should be done as early as possible.

For our department, GI unit a Guideline should be prepared on-early risk assessment and early diagnosis. Should avail bedside ascitic fluid culture and full ascitic fluid analysis.Early antibiotic initiation and identifying high risk patients put on secondary prophylaxis.

For hospital Administrator and Regional health Bureau: I recommend fulfilling laboratory tools for ascitic fluid culture for TGSUH.

For researchers: no other study in Bahir dar and few as Country level on the proportion and associated factors of SBP in cirrhotic patients. I recommend to do further research on this field.

Dissemination plan

The study will be submitted for TGSH, Bahir Dar University, and Amhara Regional Health Bureau and at large for national level.

It will also be submitted for scientific publications at the end of the presentation

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11. Annex: Data collection check list.

Data collecting format on proportion, outcome associated factors of SBP in TGSUH, medical ward and ICU for the past Three years.

Name of data collector……sign……

Date: _____/_____/_____

Medical record number/MRN _____

Part one: Sociodemographic data of patients.

101. Sex 1/ male 1/ Female

102. Age 18-35

36-50

51-65

>65

103. Residence 1, Urban 2, Rural

104. Marital Status: 1, Single

2, Married

3, Divorced

4, Widowed

105. Occupation 1, Farmer

2, Merchant

3, Government employee.

4, Private employee

Part two: Clinical feature, laboratory results

201. Causes of Cirrhosis:

1, HBV 2, HCV 3, Alcohol 4, Autoimmune 5, Unknown 6, both HBV & HCV

202. Cirrhotic patient with Ascites

1, have SBP 2, don't have SBP

203. Clinical presentation of Sbp:

1, Symptomatic 2, Asymptomatic

204. If Symptomatic, the initial presentation:

1, fever 2, Abdominal pain 3, Change in Mental status 4, Diarrhea 5, UGIB

205. The Clinical Signs of initial presentation:

1, fever (T>37.5 0 C) 2, Hypothermia 3, Abdominal Tenderness

4, Hypotension 5, paralytic ileus. 6, Hepatic encephalopathy

206. Initial Laboratory Values during initial admission or SBP diagnosis:

- ALT……
- AST……
- Bilirubin total……
- Bilirubin direct……
- Serum Albumin…….
- INR……
- Na+ ……
- Cr……
- Urea/BUN……
- WBC……
- Platelet count…….

207. Ascitic fluid Analysis:-Total WBC ……

-% PMN……

-% Lym…….

- Other cell, specify……

-ascitic albumin……

-Glucose…….

-Gram stain: 1, gram reaction seen, specify…….

2, No gram reaction.

3, more than 1 gram reaction seen.

208.Ascitic fluid Culture: 1, Positive

2, Negative

3, not done

209.If Culture POSITIVE: 1, E.coli

2, Klebsiella Pneumonia.

3, Streptococcus SPP.

4, Polymicrobial (>=2micro-organism)

5, Others, Specify……

210.Choice of Antibiotics for SBP treatment during the hospital stay:

1, Cefotaxime 2, Ceftriaxone 3, Meropenem

4, Others (Specify)……

Table 4:-Modified Child-Pugh Class, please classify the patient based on the parameter below:

Parameters	Points assigned		
	1	2	3
Ascites	Absent	Slight	Moderate
Bilirubin	<2 mg/dl	2 -3 mg/dl	>3 mg/dl
Albumin	>3.5 mg/dl	2.8 – 3.5 mg/dl	<2.8 mg/dl
Prothrombin time prolongation			
Seconds over time	<4	4 – 6	>6
INR	<1.7	1.7 – 2.3	>2.3
Encephalopathy	None	Grade 1 to 2	Grade 3 to 4

1. Child pugh class A…….5 to 6
2. Child pugh class B……..7 to 9
3. Child pugh class C……..10 to 15

211. Patient Condition at discharge:

1, Improved 2, Dead 3, Left Against Medical Advice

212. If the patient discharged with Improvement, secondary SBP prophylaxis:

1, Given 2, not given 3, not documented

213. If the patient died: Cause of death:

1, Septic shock with multiorgan failure

2, Hepatic encephalopathy

3, UGIB 4, other, specify……

214. SBP Dx and treatment, is it

1, 1st time 2, 2nd time 3, >2x.

THANK YOU.