Prevalence of aerobic bacterial pathogens in sepsis cases at a tertiary hospital, Bangladesh

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Abstract

Background: sepsis remains an important cause of morbidity and mortality in hospitals especially in developing countries like Bangladesh. It is one of the top 10 leading causes of death worldwide pose and great challenge in critical care. Still it is a major health problem and creates a biggest challenge for the clinicians. **Objectives:**To isolate and identify aerobic bacteria in sepsis cases admitted in Rajshahi Medical College Hospital. **Methods:** A descriptive type of cross sectional study was carried out in the Department of Microbiology, Medicine, Surgery and Obstetric & Gynae deptt. of Rajshahi Medical College and Hospital during January 2015 to December 2015 .A total of 60 blood samples were collected from clinically diagnosed cases of sepsis and cultured on conventional method using brain heart infusion broth. **Results:** Culture had yielded growth of bacteria was 23(38.3%) cases, off which *E.coli was* 7(30.5%), *Staphylococcus aureus was* 6(26.1%), *Staphylococcus epidermidis* was 4(17.4%), *Acinetobacterspp. was* 3(13%), *Klebsiella pneumoniae was* 2(8.7%), *pseudomonas aeruginosa* was 1(4.3%). Out of 23(38.3%) culture positive cases 12(52.2%) were male and 11(47.8%) were female persons. **Conclusion:** A good number of patients of both sexes were suffering from sepsis and common aerobic bacteria were responsible for it. Another good number of cases may suffer from anaerobic bacteria which are not included in this study.

Key wards: sepsis, aerobic bacteria, tertiary hospital, Bangladesh.

Introduction

The sepsis or septicemia is a serious life-threatening infection that gets worse very quickly and is often fatal. It begins from minor injury at any part of the body with many symptoms such as rapid breathing, reduced alertness or confusion, fever with chills or low body temperature, decreased urination, rapid pulse,nausea and vomiting. In other way it is asystemic inflammatory response syndrome in response to an infection, characterized by the presence of two or more features such as abnormal body temperature, increase heart rate, respiratory rate, partial pressure of CO_2 and white blood cell count[1] or it is caused by an immune response triggered by an infection. Sepsis and its complications are a common cause of mortality worldwide .Sepsis is a secondary infection from primary infection such as skin, abdominal organ, lung, brain and urinary tract infection. In hospitalized patients, it starts from intravenous implants, surgical incisions, urinary catheters, and bed sores. Beside that it also occur in people with low immune status such as very young and elderly person, recent hospitalization, diabetes, HIV infection and treatment with immune suppressive drugs.

Incidence of sepsis is approximately 18 million cases per year throughout the world[2] and common in patients who have been hospitalized . It occurs 1-2% in hospitalized and 25% in ICU patient. In the United States sepsis occurs approximately every 3 per 1,000 patients.[1]

Both gram positive and gram negative bacteria are responsible for causing sepsis .Predominant causative bacteria of sepsis are *Staphylococcus aureus, Staphylococcus epidermidis, streptococcus spp., Escherichia coli,Klebsiellapneumonie, Pseodomonas aeruginosa, Acinetobacter spp.* etc.

Once the bacteria enter into the body through any injury, it is phagocytosed and lysed by phagocytic cells of the immune system and

release peptidoglycans from gram-positive bacteria and lipo-polysaccharide or endotoxin from gram-negative bacteria. The endotoxin initiate a cascade of events which leads to syndromes of sepsis, septic shock, multiple organ failure and death.[3] Identification of the causative agents of sepsis is necessary for the diagnosis and it is usually done by blood culture. However, bacteria are present in the blood in about 30% of sepsis cases. Still now blood culture remains the gold standard for the diagnosis of sepsis.[4]

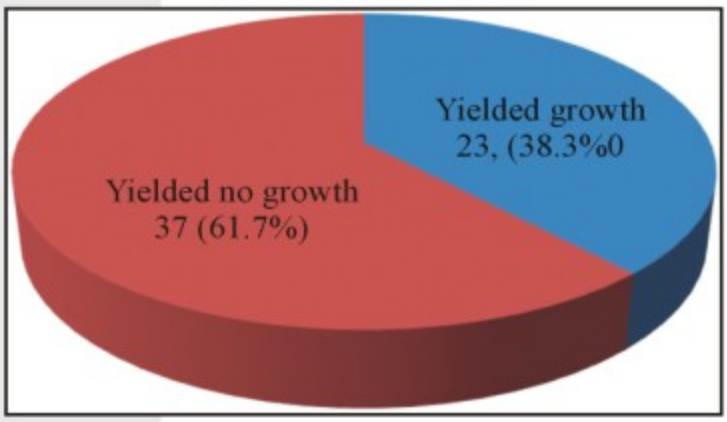

Figure1: Culture yielded growth of bacteria in sepsis cases. N=60

Methods

This descriptive type of cross sectional study was carried out in the Department of Microbiology, Medicine, Surgery and Obstetric & Gynae of Rajshahi Medical College and Hospital during January 2015 to December 2015 .A total of 60 blood samples were collected from clinically diagnosed cases of sepsis and cultured on conventional method using brain heart infusion broth. Blood samples were collected after disinfecting of the venous site with 70% alcohol and subsequently followed by povidone iodine. Under the aseptic condition 5ml of blood was drown by venipucture from two different sites and transferred into two blood culture bottles each containing 50 ml brain heart infusion broth. Routine subculture was done on blood agar and McConkey agar plate every alternative day up to 14 days. Pathogens were identified by colonial morphology and standard biochemical tests. Data were analyzed by computer using SPSS for windows. Descriptive analytical techniques involving frequency distribution and computation of percentage were applied.

Result

A total of 60 samples of blood culture of the suspected sepsis patients, 23(38.3%) yielded growth of bacteria and the rest did not yield any growth of bacteria (Figure 1).

Table 1 shows culture positive cases according to age and sexes. Male are 12(52.2) and female are 11(47.8). Male-female ratio is 1: 0.92. Maximum 9(39.2) cases are found in age groups > 55years followed by 05(21.7) in 45-54 years 4(17.4) in15-24 years3(13) in 25-34 years and minimum 2(8.7) in 35-44years.

Table 1: Age and sex distribution of bacterial culture positive sepsis cases. N=23

Age in years	Male N (%)	Female N (%)	Total N (%)
15 – 24	02(8.7)	02(8.7)	04(17.4)
25 – 34	01(4.3)	02(8.7)	03(13)
35 – 44	01(4.3)	01(4.3)	02(8.7)
45– 54	03(13)	02(8.7)	05(21.7)
>55	05(21.7)	04(17.4)	09(39.2)
Total N (%)	12(52.2)	11(47.8)	23(100)

Table 2: Identified bacteria from sepsis cases according to age. N=23

Age in years	*Escherichia coli* N (%)	*Staphylococcus aureus* N (%)	*Staphylococcus epidermidis* N (%)	*Acinetobacter* N (%)	*Klebsiella pneumonia* N (%)	*Pseudomonas aeruginosa* N (%)	Total N (%)
15 –24	3(13)		1(4.3)				4(17.4)
25 – 34	1(4.3)		2(8.7)				3(13)
35 – 44	1(4.3)		1(4.3)				2(8.7)
45 – 54	2(8.7)	2(8.7)			1(4.3)		5(21.7)
>55		4(17.4)		3(13)	1(4.3)	1(4.3)	9(39.2)
Total N(%)	7(30.5)	6(26.1)	4(17.4)	3(13)	2(8.7)	1(4.3)	23(100)

Table 2 shows identified bacteria in sepsis cases according to age. Among 23 culture positive cases, *Escherichia coli was* 7(30.5) which were found 3(13) in 15-24 years, 2(8.7) in 45-54 years and remain 1(4.3) and 1(4.3) in 25-34 and 35-44 years. *Staphylococcus aureus*was 6(26.1) among them 4(17.4) in >55 years and 2(8.7) in 45-54 years.*Staphylococcus epidermidis* are 4(17.4) and there distribution was 2(8.7) in 25-34 years and remain 1(4.3) and 1(4.3) in 15-24 and 35-44 years. *Acinetobacter spp.*was 3(13) which found only in > 55 years. *Klebsiella pneumoniae* are 2(8.7) and they are distributed as 1(4.3) and1(4.3) in 45-54 and > 55 years . *Pseudomonas aeruginosa*was 1(4.3) it was found in age group > 55 years.

Discussion

out of 60 blood samples, 23(38.3%) had yielded growth of bacteria where male were 12 (52.2%) and female were 11(47.8%), the ratio was 1:0.9. *Escherichia. coli* was the predominant (30.4%) bacterial isolate which was comparable to that reported by Ahmed *et al.*.(2002)[5] and Sharifunnahar *et al.*(2013)[6] from Bangladesh where the reported isolates were 30% and 25.80% respectively. A lower rate of isolation of *E .coli* was also observed by Amit *et al.*(2014)[7] and Nishat *et al.*(2014)[8] from India, Which were 14.98% and 13%,respectively. *Staphylococcus aureus* was isolated from 6(26.1%) cases which was similar to the study of Mustafa *et al.* (2014)[9] from India an Kochhar*et al.* (2011)[10] from Kenya, where isolated *Staphylococcus aureus* 24.1% and 27% respectively. Our study differed with the finding of sharma*et al.*(2002)[11] from india and Srinivasa *et al.*(2014)[12] from Nepal where they found 51.9%, 52.7% respectively. *Staphylococcus epidermidis* constituted about 4(17.4%).This finding was nearly similar to the study of Arora *et al.*(2007)[13] and Roy *et al.*(2002)[14] were from India and their isolation rate were 20.16% and 16.5% respectively. Higher rate of islations were reported by Alam *et al.*(2011)[15] from India where the isolation rate of *Staph epidermidis* was 63.5% *Acinetobacter spp.* was another isolate which constituted about 3(13%) of the total isolate. This study was comparable to reported by of Nishat *et al.*(2014)[8] and Arora *et al.*(2007)[13] all were from India and their reported isolates were 13% and 12.13% respectively. Higher rate of isolation reported by Alam *et al.*(2011)[15] from India where *Acinetobacter spp.* was 31%. *Klebsiella pneumoniae* was 8.7% in this study which was nearly similar to the study of Sharma *et al.*(2013)[16] in India they found 7.6% respectively. A higher isolation also observed by Mustafa *et al.*(2014)[9] in India,where they found 35% respectively. *Pseudomonas aeruginosa* was 4.3% which was similar to the study of Amit *et al.*(2014)[7]

in India where they found 5.67%, rate of islation respectively. A higher isolation rate also was reported by Alam *et al.*(2011)[15] from New Delhi and Sharifunnaher *et al.(*2013)[6] from Bangladesh, where they found 13.8% and 46.55%, isolation rate respectively. Dissimilarity may be due to improper sanitation of hospital, personal hygiene ,long time presence of persist foreign bodies such intravenous canulla, central venous lines etc.

We may concluded from this study that a good number of sepsis cases are found in different ages and both sexes. All the isolates in our study were important pathogens for sepsis but these organism also abundant in hospital environment and can be responsible for nosocomial infection.

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