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Bacteriological Profile ofBlood Culture Positive Sepsis inNeonatesin A Tertiary Care Centre.

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Abstract:*This prospective study was conducted in SNCU of GMCH to find out the bacteriological profile of neonatal sepsis and their sensitivity. In 93(13.64%) neonates out of 682 neonates, organisms were isolated. 56(60.22%) neonates had early onset sepsis and 37(39.78%) neonates had late onset sepsis. CoNS was the commonest organism causing both early (in 48.21%) and late (in 54.05%) onset sepsis respectively, followed by E. coli in EOS and Klebsiella species in LOS. 48.80% and 27.66% of CoNS were sensitive to linezolid and vancomycin respectively. All (100%) S. aureus were sensitive to vancomycin and linezolid, 80% were sensitive to ciprofloxacin and 60% were sensitive to gentamycin and amikacin. 40% of Klebsiella sp were sensitive to vancomycin and ciprofloxacin. 54.54% and 27.27% of E. coli were sensitive to vancomycin and ciprofloxacin respectively. 60 % of gram negative bacilli were sensitive to vancomycin. 60% of S. aureus were resistant to ceftriaxone/cefotaxime and penicillin. 25% of Klebsiella sp. were resistant to pipercillin and tazobactum. 36.36% of E. coli were resistant to ciprofloxacin, amikacin, ceftriaxone/cefotaxime and pipercillin tazobactum combination. 66.66% Pseudomonas sp. showed resistance to vancomycin and 33.33% showed resistance to pipercillin and tazobactum.*

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I. Introduction:

Bacterial Sepsis in an important cause of neonatalmortality and morbidity. In 2016, 2.6 million neonates died

This around the world. Prematurity, complications during labour delivery and infections contribute to more than 80% neonatal deaths [1].

Pre-term birth complications and infections were the two leading causes of neonatal deaths in India as found by a systematic analysis in 2013 [2,3]. Hospital based studies revealed that the incidence of neonatal sepsis is 30 per 1000 live births [4] and in community based studies it was found to be 2.7-17% of all live births in India [4,5].

The spectrum of causative organisms and their sensitivity is different in different regions.

study is undertaken with the following objectives:

1. To isolate and identify the causative organism of neonatal sepsis.
2. To compare the organisms responsible for early onset sepsis and late onset sepsis.
3. To evaluate the antibiotic sensitivity pattern.

II. Materials And Methods

This prospective study was conducted in the special Care New born Unit (SCNU) of Gauhati Medical College and Hospital, Guwahati. The study period was from 1st April, 2016 to 31st March, 2017.

Approval from the Institutional Ethical Committee was taken. All neonates presenting with clinical features or with risk factors of sepsis were investigated. Blood culture was sent in these cases where growth of bacteria and antibiotic sensitivitypattern were studied.

III. Results

682 cases were investigated for presence of sepsis including blood culture. In 93 (13.64%) neonates organisms were isolated and there was no growth in 589 (86.36%) neonates.Of these, 56 (60.22%) cases had early onset sepsis and 37 (39.78%) cases had late onset sepsis.

Table 1: Showing number of cases where organism was isolated in blood culture.

Cases	Number	Percentage
Total cases	682	100%
Number of cases with positive growth	93	13.64%
Number of cases with no growth	589	86.36%

Table 2 : Showing number of cases with early onset sepsis and late onset sepsis.

Type of sepsis	EOS	LOS
Number of Cases	56	37
Percentage of cases	60.22%	39.78%

Table 3: Table showing organisms isolated in EOS and LOS.

Organism	Total Number (percentage)	EOS Number (percentage)	LOS Number (percentage)
Coagulase Negative staphylococcus (CoNS)	47 (50.54%)	27 (48.21%)	20 (54.05%)
Klebsiella species	20 (21.50%)	6 (10.71%)	14 (37.84%)
E.Coli	11 (11.83%)	9 (16.07%)	2 (5.40%)
Staphylococcus aureus	5(5.37%)	4 (7.14%)	1 (2.70%)
Gram Negative bacilli	5 (5.37%)	5 (8.93%)	-
Pseudomonas aeurogenosa	3 (3.22%)	3 (5.36%)	-
Proteus mirabilis	1 (1.07%)	1 (1.78%)	-
Methicillin resistant staphylococcus	1 (1.07%)	1 (1.78%)	-
Total	93 (100%)	56 (100%)	37(100%)

Out of all cases of culture proven sepsis, *Coagulase Negative staphylococcus species (CoNS*) was the most common organism and was isolated in 47 (50.54%) cases followed by *Klebsiella* species which grew in 20 (21.5%) cases. *E.coli* was isolated in 11 (11.83%) cases and *Staphylococcusaureus* and gram negativebacilli grew in 5 (5.37%) cases each. *Pseudomonas aerogenosa* was positive in 3 (3.22%) cases followed by *Proteus mirabilis* and *Methicillin* resistant *Staphylococcus* which was isolated in 1 (1.07%) case each.
CoNS was the commonest organism causing early onset sepsis.It was isolated in 27 (48.21%) cases followed by *E.coli* in 9 (16.07%), *Klebsiella* in 6 (10.71%), gram negative bacilli in 5 (8.93%) and *S. aureus* in 4 (7.14%) cases. CoNS was also the commonest organism causing late onset sepsis. It was isolated in 20 (54.05%) cases followed by Klebsiella species in 14 (37.84%) cases of LOS.

Table: 4 Showing antibiotic sensitivity pattern of gram positive isolates.

Drugs to which sensitive	CoNS (n = 47), Number (percentage)	*S. aureus* (n = 5), Number (percentage)	MRSA (n = 1), Number (percentage)
Linezolid	22 (48.80)	5 (100)	-
Vancomycin	13 (27.66)	5 (100)	-
Ciprofloxacin	9 (19.14)	4 (80)	-
Gentamycin	9 (19.14)	3 (60)	-
Amikacin	9 (19.14)	3 (60)	1 (100)
Azithromycin	7 (14.89)	2 (40)	-
Cotrimoxazole	3 (6.38)	1 (20)	1 (100)
Pipercillin + Tazobactum	3 (6.38)	2 (40)	-
Ceftriaxone/Cefotaxime	2 (4.25)	2 (40)	-
Cefixime	2 (4.25)	2 (40)	-
Penicillin	2 (4.25)	-	-
Doxycycline	2 (4.25)	-	-
Ceftazidime	1 (2.13)	-	-
Tigecycline	1 (2.13)	-	-
Polymixin B	-	-	1, (100)

respectively. 19.14% of CoNS were sensitive to gentamycin, ciprofloxacin and amikacin. All (100%) *S. aureus* were sensitive to vancomycin and linezolid, 80% were sensitive to ciprofloxacin and 60% were sensitive to gentamycin and amikacin.

Table: 5 Table showing antibiotic sensitivity pattern of gram negative isolates.

Drugs to which sensitive	*Klebsiella* species(n=20), Number (percentage)	*E. coli* (n=11), Number (percentage)	*Gram negative bacilli* (n=5), Number (percentage)	*Pseudomonas* species(n=3), Number (percentage)	*Proteus mirabilis* (n=1), Number (percentage)
Ciprofloxacin	8 (40)	3 (27.27)	1 (20)	1 (33.33)	-
Imipenem/ Meropenem	7 (35)	-	1 (20)	2 (66.66)	-
Polymixin B	4 (20)	-	-	-	-
Vancomycin	8 (40)	6 (54.54)	3, (60)	-	-
Amikacin	3 (15)	-	1 (20)	-	-
Gentamycin	3 (15)	-	-	-	-
Ceftriaxone/ Cefotaxime	1 (5)	2 (18.18)	1 (20)	-	-
Cefepime	1 (5)	1 (9.09)	-	-	-
Linezolid		1 (9.09)	-	-	1 (100)
Cefoperazone	1 (5)	-	-	-	-
Pipercillin + Tazobactum	-	2 (18.18)	1 (20)	-	-
Tigecycline	-	2 (18.18)	-	-	-
Penicillin	-	-	-	-	1 (100)
Ceftazidime	-	-	-	1 (33.33)	-
Doxycycline	-	-	1 (20)	-	-

Among the gram negative isolates 40% of Klebsiella *sp* were sensitive to vancomycin and ciprofloxacin and 35% were sensitive to meropenem/ imipenem. 54.54% and 27.27% of *E. coli* were sensitive to vancomycin and ciprofloxacin respectively. 60 % of gram negative bacilli were sensitive to vancomycin. 66.66% of *Pseudomonas* weresensitive Polymixin B.

Table: 6 Table showing resistance pattern of the isolated organisms.

Drugs to which resistant	CoNS, n=47 Number (percentage)	*Klebsiella* sp, n=20 Number (percentage)	*E.coli* n=11 Number (percentage)	*S. aureus* n=5 Number (percentage)	*Gram negative bacilli*, n=5 Number (percentage)	*Pseudo-monas*, n=3 Number (percentage)	*Proteus mirabilis* n=1 Number (percentage)	MRSA, n=1 Number (percentage)
Penicillin	3 (6.38)	1 (5)	2 (18.18)	3 (60)	-	-	-	-
Ceftriaxone/ Cefotaxime	4 (8.51)	2 (10)	4(36.36)	3 (60)	-	-	1 (100)	-
Cotrimoxazole	7 (14.89)	-	-	2 (40)	-	-	-	-
Levofloxacin	2 (4.25)	-	-	-	2 (40)	-	-	1 (100)
Cefixime	2 (4.25)	-	1(9.09)	-	-	-	-	-
Cefoperazone	2 (4.25)	2 (10)	3 (27.27)	-	-	1 (33.33)	-	-
Cefuroxim	-	-	1(9.09)	-	-	2 (66.67)	-	-
Cefepime	-	4 (20)	4(36.36)	-	3 (60)	-	-	-
Azithromyn	3 (6.38)	-	3(27.27)	-	1 (20)	2 (66.67)	1 (100)	-
Amikacin	2 (4.25)	3 (15)	4(36.36)	-	-	-	-	-
Ampicillin	2 (4.25)	3 (27.27)	2(18.18)	-	-	-	-	-
Ceftazidime	1 (2.12)	-	-	-	1 (20)	-	-	-
Ciprofloxacin	4 (8.25)	2 (10)	4(36.36)	3 (60)	-	-	-	-
Doxycycline	-	-	1(9.09)	-	1 (20)	2 (66.67)	-	-
Gentamycin	2 (4.25)	1(5)	2 (18.18)	-	1 (20)	-	-	-
Vancoumyin	2 (4.25)		1(9.09)	-	1 (20)	2 (66.67)	1 (100)	1(100)
Pipercillin + Tazobactum	3 (6.38)	5 (25)	4(36.36)	-	1 (20)	-	-	-
Tigecycline	-	-	-	-	-	-	1 (100)	-
Norfloxacin	-	-	-	-	-	-	1 (100)	-
Nitrofurantoin	-	-	-	-	-	-	1 (100)	-

12.76% CoNS were resistant to penicillin and 8.51% were resistant to ceftriaxone/cefotaxime. 60% of *S. aureus* were resistant to ceftriaxone/cefotaxime and penicillin. 25% of *Klebsiella sp*. were resistant to pipercillin and tazobactum, 15% were resistant to amikacin and 10% were resistant to ceftriaxone/cefotaxime andciprofloxacin.36.36% of *E. coli* were resistant to ciprofloxacin, amikacin, ceftriaxone/cefotaxime and pipercillin andtazobactum combination. 66.66% *Pseudomonas sp*. showed resistance to vancomycin and 33.33% showed resistance to pipercillin andtazobactum.

IV. Discussion

In this study in 13.64% cases of neonatal sepsis, organisms were isolated during blood culture. This is comparable to studies by Poonam Marwar et al [6] and M.N. Shah and P.B. Desai [7] where culture positivity was 18.91% and 20.87%respectively. Some studies showed high culture positivity of 82.35% and 35.9% [8, 9].

Early onset sepsis constituted 60.22% cases and 39.78% constituted late onset sepsis. This is similar to studies by Poonam Marwar et al [6], B. Satyarthi et al [9] and Rahul Kamble and Rajesh Ovhal [10].

Common organisms responsible for neonatal sepsis were CoNS (50.54%),*Klebsiella* species (21.50%), *E. coli* (11.83%) and *Staphylococcusaureus*and Gram negative bacilli (5.37% each) when we considered both LOS and EOS together.This is similar to a study by Reddy KV et al [11] which showed that CoNS was the commonest organism followed by*Klebsiella*. Poonam Marwah et al [6] found the commonest organism to be *Staphylococcus* followed by *Klebsiella*. Debnath J et al [12] found that gram positive organisms (51.1%) were more frequently is isolated thangram negative organisms (48.9%) and *Staphylococcus aureus*(34.6%) was the commonest followed by *Klebsiellapneumoniae* (24.4%) and *Staphylococcus epidermidis* (14.2%).Sathyamurthi et al [9] found *Klebsiella* to be the commonest organism in their study. KumaravelKS and Ramesh Babu B [13] also found *Klebsiella* to be commonest organism followed by *E.coli*. D.E. Premalatha et al [8] found *Klebsiellapneumoniae*to the commonest isolate followed by CoNS and *Citobacter* species.

In this study CoNS was the commonest organism causing early onset sepsis. It was isolated in 27 (48.21%) cases followed by *E.coli* in 9 (16.07%), *Klebsiella* in 6 (10.71%) and gram negative bacilli in 5 (8.93%) and *S. aureus* in 4 (7.14%) cases. CoNS was also the commonest organism causing late onset sepsis. It was isolated in 20 (54.05%) cases followed by Klebsiella species in 14 (37.84%) cases of LOS. Poonam Marwah et al [6] found *S.aureus* to be the commonest organism causingboth EOS and LOS followed by *K. pneumonia* and *Acinetobacter.* In a study by Satyamurthi et al [9], EOS was caused by *Klebsiella* most frequently followed by *S. aureus*and LOS was caused by *Klebsiella*most commonly followed by CoNS. D.E. Premalatha et al [8] also found *Klebsiellapneumoniae* tobe the commonest organism in EOS and LOS next to which is CoNS.

Our study shows that most of the gram positive organisms were sensitive to vancomycin and linezolid. 100% of*Staphylococcusaureus* were sensitive to vancomycin and linezolid. 48.80% of CoNS were sensitive to vancomycin. Other sensitive drugs were gentamycin, ciprofloxacin and amikacin. A study by Ghanashyam D. Kumbhar et al [14] found that more than 80% of gram positive organisms including *S. aureus* were sensitive to vancomycin. Rahul Kamble and Rajesh Ovhal [10] found in their study that all gram positive organisms were sensitive to vancomycin, pristinomycin and linezolid. In a study by Poonam Marwah et al [6] *S. aureus* was seen to show good sensitivity to aminoglycosides, vancomycin and linezolid.

In our study 40 % of *Klebsiella pneumoniae* showed sensitivity to ciprofloxacin and vancomycin and 35% showed sensitivity to meropenem, 54.54% of E. Coli showed sensitivity tovancomycin, 27.27% showed sensitivity to ciprofloxacin and 18.18% of the *E. coli* were sensitive to ceftriaxone/cefotaxime. In their study, Ghanashyam D. Kumhar et al [14] found that most gram negative isolates (50-75%) were sensitive to ciprofloxacin and fifty percent of *Klebsiella* and *E. coli* were sensitive to ciprofloxacin and amikacin. Rahul Kamble and Piyush Ovhal [10] observed that 56.25% of *Klebsilella pneumoniae* were sensitive to ciprofloxacin and amikacin . All their Enterobactericeaewere sensitive to pipercillin and tazobactum.

We found that 25% of *Klebsiella sp*. were resistant to pipercillin and tazobactum, 15% were resistant to amikacin and 10% were resistant to ceftriaxone/cefotaxime, ciprofloxacin. 36.36% of *E. coli* were resistant to ciprofloxacin, amikacin, ceftriaxone/cefotaxime and pipercillin tazobactum combination. 66.66% *Pseudomonas sp*. showed resistance to Vancomycin and 33.33% showed resistance to pipercillin and tazobactum.In a study by Rahul Kamble and Rajesh Ovhal [10] it was observed that there was complete resistanceof *Klebsiellapneumoniae* isolates to ampicillin , amoxyclav, cefazolin, cephalothin, cefuroxime and cefoperzone. In their study D.E. Premalatha et al [8] found that 100% of the gram positive organisms were resistant to penicillin, 66% of CoNS were resistant to methicillin and gram negative bacteria showed high level of resistance to ampicillin, gentamycin, inipenem and amikacin. Poonam Marwah et al [6] found low resistance of organisms to cephalosporin in their study.

V. Conclusion

In our study, out of 682 suspected cases of suspected neonatal sepsis, organisms could be isolated in 13.64% cases. Majority of cases had early onset sepsis. CoNS was the commonest organism isolated in both early and late onset sepsis. There was high sensitivity of CoNS to linezolid and vancomycin and all cases of *S. aureus* were sensitive to these two drugs. Gram negative organisms *Klebsiella* species and *E. coli* were sensitive to vancomycin, ciprofloxacin, meropenem and imipenem. Most of *S. aureus* were resistant ceftrixone, cefotaxime and penicillin.

Bibliography

[1]. http://data.unicef.org>child-survival

[2]. Liu L, Oza S, Hogan D, Perin J, Rudan I, Lawn JE et al. Global, regional and national causes of child mortality in 2000-13, with projections to inform post-2015 priorities: an updated systematic analysis. Lancet 2015; 385 (9966): 430-440.

[3]. Liu L, Johnson HL, Cousens S, Perin J, Scotl S, Lawn JE et al. Global, regional and national causes of child mortality : an updated systematic analysis for 2010 with time trends since 2000. Lancet 2012; 379; 2151-2161.

[4]. National Neonatal Perinatal Database. Report for the year 2002-03. Available at http;//www.newbornwhocc.org/pdf/nnpd_report_2002-03.PDF.

[5]. Bang AT, Bang RA, Baitule S, Deshmukh M, Reddy MH. Burden of morbidities and the unmet need for health care in rural neonates a prospective observational study in Gadchiroli, India. Indian Pediatrics 2001; 38:952-965.

[6]. Poonam Marwah, Deepak Chawla, Jagdish Chander, Vishal Guglani and Ashish Marwah. Bacteriological profile of neonatal sepsis in a Tertiary – care Hospital of Northern India. Indian Pediatrics 2015; Vol. 52 : 158-159.

[7]. M.N Shah and P.B. Desai. Clinical and bacteriological profiles of flood culture positive sepsis in newborns. International Journal of Pharmacy & Life Sciences; Vol. 2 issue 9 Sep 2011, 1041-1045.

[8]. D.E. Premalatha, Mallikarjun Koppad, L.H. Halesh, K.C. Siddesh, N. Prakesh. The Bacterial Profile and Antibiogram of Neonatal Septicaemia in a Tertiary Care Hospital. International Journal of Recent Trends in Science and Technology, 2014, Vol. 10, Issue 3: 451-455.

[9]. B. Sashyamurthi, K.V. Leela, R. Narayanababu, S. Padmanaban, S.Sreedevi, Sujatha, Heber Anandan Clinical and Bacteriological Profile of Neonatal sepsis in a Tertiary Care Hospital. International Journal of Scientific Study; November 2016, Vol. 4, issue 8: 57-60.

[10]. 0. Rahul Kamble and Rajesh Ovhal. International Journal of Current Microbiology and Applied Sciences 2015, Vol. 4, No. 2: 172-182.

[11]. K. Venkataramana Reddy, K. Sailaja, A. Ashok, K. Poojitha. Clinico- bacteriological Profile of neonatal sepsis in rural Tertiary Care Hospital. International Journal of Contemporary Pediatrics 2017; Vol. 4, issue 4: 1259-1262.

[12]. Jayanta Debnath, Pradip Kumar Das. Bacteriological profile and antibiotic susceptibility of neonatal septicemia in a tertiary care hospital of Tripura. Indian J Microbiol Res 2015 (4) : 238-243.

[13]. Kumaravel KS, Rameshbabu B. A study of the Bacteriological Profile and Antibiotic Sensitivity in Neonatal Septicemia. International Journal of Contemporary Medical Research 2016; 3 (6) : 1830-1831.

[14]. Ghanshyam D. Kumhar, V.G. Ramachandran and Piyush Gupta. Bacteriological Analysis of Blood Culture Isolates from Neonates in a Tertiary Care Hospital in India. J Health Popul Nutr 2002 Dec; 20 (4), 343-347.

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