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Original Research Article

Study of clincial profile and outcome of *Klebsiella sepsis* in neonates at a tertiary care centre

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ABSTRACT

Background: Objective of the study is to study clinical profile and outcome of *Klebsiella sepsi*s in neonates.
Methods: A retrospective observational study from January 2018 to Sep 2018. After getting approval of institute ethics committee, admitted neonates whose blood culture showed *Klebsiella* growth were enrolled. A detailed history, birth weight, sex , age, APGAR, need for resuscitation at birth, distress at birth, ventilator support, CPAP, central line, blood products, species of *Klebsiella* and drug sensitivity and outcome-discharge or death were taken. Data were entered into Microsoft excel data sheet and was analyzed using SPSS 23 version software.
Results: Out of the total 252 positive blood culture, 110 (43%) grew *Klebsiella* in blood culture. 92 cases were included in the study. Male to female ratio was 1.24:1. Mean age at admission was 1.22 days. 40 (43.5%) died and 52(56.5%) were discharged. Birth weight was 1.635±802 gm for babies who died and 2211±939 gm among discharged. Mean gestational age were 32.5 weeks in died and 34.8 weeks among discharged. Mortality was 23(57.5%) in males, low birth weight babies 23(59%), thrombocytopenia 28 (78%), invasive mode of ventilation 19(67%). By Univariate analysis, it was found that pregnancy induced hypertension (PIH), premature rupture of membrane (PROM), abnormal APGAR, Birth weight, shock, invasive ventilation, DIC, inotropes, blood products, abnormal total count, thrombocytopenia, umbilical venous catheterization were factors which influenced outcome. Regression analysis identified only thrombocytopenia and umbilical venous catheterization as factors that influenced outcome in *Klebsiella sepsis. Klebsiella* isolated was uniformly sensitive to Meropenam.
Conclusions: No single risk factor was ascertained but thrombocytopenia and umbilical venous catheterization possibly influence the outcome of *Klebsiella sepsis*. Mortality is high in neonates.

Keywords: *Klebsiella*, Sepsis, Thrombocytopenia, Umbilical venous catheterization

INTRODUCTION

Sepsis is the leading cause of morbidity and mortality among neonates worldwide.[1] Hospital based studies suggests an incidence of 30 per 1000 live births.[2] Community-based studies indicate an incidence of 2.7-17% of all live births.[2,3] As per The National Neonatal Perinatal Database of India, the incidence of culture proven cases of sepsis is 8.5 per 1,000 live births.[2] Sepsis is termed as Early- onset (EOS) if it manifests within first 72 hours of life. Gram negative bacteria which colonize maternal genitourinary tract are the predominant causes of early onset sepsis. *Klebsiella pneumoniae* is the most common organism isolated in EOS.[1,4,5]

Klebsiella pneumoniae is a Gram-negative, non-motile, encapsulated, lactose-fermenting, facultative anaerobic bacillus. Klebesilla produces capsule or slime layer, which protects from host defenses and is used for serologic identification. *Klebsiella pneumoniae* has ability to survive in the hospital environment and spread rapidly resulting in outbreaks.[6]

METHODS

A retrospective observational study conducted from January 2018 to Sep 2018. After getting approval of institute ethics committee, admitted neonates whose blood culture grew *Klebsiella* were included in the study. A detailed antenatal, natal and post-natal history, mode of delivery, birth weight, sex, age, APGAR, need for resuscitation at birth, distress at birth, ventilator support, continous positive airway pressure (CPAP), central line, need for blood products, species of *Klebsiella* and drug sensitivity and outcome discharge or death were noted. Data was entered into Microsoft excel data sheet and were analyzed using SPSS 23 version software.

Categorical data was represented in the form of frequencies and proportions. Continuous data was represented as mean and standard deviation. Chi-square was used for categorical variables as the test of significance. Independent t test or Mann Whitney U test were used as the test of significance to identify the mean difference between two groups. Wilcoxon rank Sum test and Kruskal Wallis test were used for skewed continuous variable. Univariate analysis and regression analysis were used to identify relationship between variables. p value <0.05 was considered as statistically significant.

RESULTS

Out of the total 252 cases, 110(43%) grew *Klebsiella* in blood culture. 92 cases were included in the study.18 were excluded as complete data could not be retrieved. 51 were males and 41 females (1.24:1). Mean age of admission was 1.22 days. Birth weight was 1635±802 gm for babies who died and 2211±939 gm for babies who got discharged. 40(43.5%) died and 52(56.5%) were discharged. Mean gestational age was 32.5 weeks among death and 34.8 weeks among those who got discharged.

Table 1: Basic data.

Variable	Total (92)	Discharge 52(56.5%)	Death 40(43.5%)	p value
Birth weight (Mean)	1960±923	2211±939	1635±802	0.009
M:FM	51:41 (1.24:1)	28:14 (2:1)	23:17 (1.35:1)	0.353
Term: Preterm	29:63	21:31	8:32	0.03
GES age (Mean)	33	34.88±3.3	32.5±4.3	0.06

Lower Segment Ceasearn section (LSCS) was the mode of delivery among 40(43.47%) of cases. Birth weight of the babies in this study were divided into <1000 gm which had 8(8.7%) cases, 1000-1500 gms which had 31(33.7%) cases and 53(57.6%) were more than 1500 gm. 66(71.7%) neonates were appropriate for gestational age (AGA), 23(25%) were small for gestational age and 3(3.3%) were large for gestational age. Of the 17(18.5%) cases in which mother had gestational diabetes (GDM) 6(35%) got discharged and 11(64%) died. Pregnancy induced hypertension (PIH) was in the mother in 31(33.7%) cases of which 14(46%) got discharged and 17(54%) died. 22(23.9%) cases had history of premature rupture of membranes (PROM), of which 20(91%) got discharged and 2(9%) died. Abnormal APGAR score was seen in 32(34.8%) cases. 43(46.7%) had respiratory distress at admission of which 20(46%) got discharged and 23(54%) died. Of the 32(34.8%) cases requiring continous positive air way pressure support (CPAP), 16(50%) died and remaining 16(50%) got discharged. 28(30%) neonate were ventilated of which 9(32%) survived and 19(67%) died.

Table 2: Clinical profile and outcome.

Variable	Total (92)		Dis(52)		Death(40)	
	n	%	n	%	n	%
LSCS	40	43.47	26	65	14	35
Weight <1000	8	8.7	0	0	8	100
1000-1500 gm	31	33.7	16	51	15	49
>1500 gm	53	57.6	36	67	17	33
AGA	66	71.7	36	54	30	46
SGA	23	25	13	56	10	47
LGA	3	3.3	3	100	-	-
GDM	17	18.5	6	35	11	64
PIH	31	33.7	14	46	17	54
PROM	22	23.9	20	91	2	9
Abnormal APGAR	32	34.8	13	41	19	59
Resp distress	43	46.7	20	46	23	54
CPAP	32	34.8	16	50	16	50
Mech Ventilation	28	30	9	32	19	67
Hypoglycemia	7	7.5	2	28	5	62
Apnea	27	29.3	9	33	16	67
Seizure	16	17.4	6	37	10	63
Shock	50	54.3	10	20	40	80
DIC	32	34.8	5	15	27	85
G I bleed	23	25	7	30	16	70
Pulmonary bleed	19	20.7	1	6	18	94
Inotropes	54	58.7	13	24	39	72
Blood products	44	47.8	12	27	32	73
Total Count	22	23	9	41	13	59
Thrombocytopenia	36	39.1	8	22	28	78
CRP	54	58.7	33	61	21	38
K.oxytinca	53	57	33	62	19	30
K. pneumonia	30	32	18	60	12	40
ESBL	4	04	2	50	2	50
UVC	44	48	11	25	33	75

Apnea and seizure were present in 16(17.4%) cases. Shock was present in 50(54.3%) cases of which 10(20%) survived and 40(80%) died. 54(58.7%) neonate were started on inotropes of which 13(24%) survived and were discharged and 39(72%) died. Of the 32(34.8%) cases

with DIC 27(85%) died and only 5(15%) got discharged. G I bleed was seen in 23(25%) of cases and pulmonary bleed was seen in 19(20.7%) of cases of which 18(94%) died. Total count was abnormal in 22(23%) cases. Thrombocytopenia seen in 36(39.1%) of which 8(22%) survived and 28(78%) died. C reactive protein was positive in 54(58.7%) cases. Umbilical venous catherization was done in 44(48%) cases of which 33(75%) died and 11(25%) survived. Mortality was high in males 23(57.5%) as compared to females 17(42.5%), low birth weight babies 23(59%), babies with thrombocytopenia 28(78%), invasive mode of ventilation 19(67%). 39(72%) of them required inotropes, 32(73%) were transfused blood products. 1 cases had CSF culture proven meningitis. Mean duration of hospital stay was 14 days. All were uniformly sensitive to Meropenam. Univariate analysis showed that factors such as premature rupture of membrane premature rupture of membrane, abnormal APGAR, birth weight, shock, DIC, need for inotropes, blood products, abnormal total count, C reactive protein (CRP), thrombocytopenia, umbilical venous catheterization influence the outcome. Regression analysis identified thrombocytopenia and umbilical venous catheterization as risk factors that influenced outcome in this study.

Table 3: Logistic regression analysis.

	B	S.E	WALD	Df	Sig	(Exp(B))	Lower	Upper
Weight coded	0.475	0.681	0.487	1	0.485	1.608	0.423	6.110
APGAR	1.052	0.684	2.362	1	0.124	2.863	0.749	10.947
UVC	1.583	0.702	5.087	1	0.24	4.871	1.231	19.281
DIC	1.333	0.868	2.357	1	0.125	3.792	0.692	20.786
Blood products	-0.025	0.903	0.001	1	0.978	0.975	0.166	5.722
Low platelets	2.254	0.714	9.977	1	0.002	9.525	2.352	38.569
Constant	-3.075	0.648	22.523	1	0.000	0.046		

(s) entered on step 1: weight Coded, APGAR, UVC, DIC, blood products, low platelet

DISCUSSION

Klebsiella is the most common organism isolated in neonatal sepsis.[4,5] *Klebsiella* is reported to cause outbreak of neonatal sepsis in NICU's.[7] In DeNIS study done in various tertiary centres in Delhi, *Klebsiella* was isolated as the cause of sepsis in 17 % of cases with mortality of 56%.[8] In the present study Klebiella was isolated in 110 cases (43%) of cases which showed growth in blood culture. In a study by Shitaye et al, prematurity was observed to be a common risk factor for neonatal sepsis irrespective of the pathogen.[5]

In the present study, premature rupture of membrane (PROM), abnormal APGAR, birth weight, shock, DIC, need for inotropes, blood products, abnormal total count, CRP, thrombocytopenia, umbilical venous catheterization were initially identified as factor that influence the outcome in Univariate analysis. In study done by Vishnu Bhatt et al it was found in Univariate analysis, neonates with birth weight ≤2.5 Kg, preterm neonates, inborn babies, as neonatal early onset sepsis risk factor.[9] In their study regression analysis identified neonates with birth weight ≤2.5 Kg and inborn babies to be at higher risk of developing *Klebsiella* infection.[9] In the present study regression analysis identified only 2 factors, thrombocytopenia, and umbilical venous catheterization influenced outcome. Though thrombocytopenia is identified as factor which influences the outcome it was not conclusive whether it is cause or effect of *Klebsiella* sepsis. All sick babies were secured with umbilical venous catherization. In this study, *Klebsiella* was uniformly sensitive to Meropenem which was similar to that found in study done by Vishnu Bhat et al. In this study it was found that no single factor including prematurity, premature rupture of membrane(PROM), shock need for inotropes etc influence the outbreak or outcome of *Klebsiella* sepsis and *Klebsiella* has mortality as high as 50%-60%. Sensitivity of *Klebsiella* was varied for common antibiotics used in NICU and it showed uniform sensitivity to Meropenem. Usage of meropenem in NICU must be strictly governed to prevent emergence of multi drug resistant *Klebsiella*.[10,11] Emphasis must be given to prevent outbreak by strict hand hygiene. Early and appropriate antibiotics must be started to control infection as no clear risk factors are documented which determine the outcome in *Klebsiella sepsis.* Limitation of this study is It's a retrospective study and data were collected from hospital records.

What study add's

Prevention of sepsis remains only the proven armoury to combat neonatal sepsis and improve neonate survival.

CONCLUSION

Klebsiella is a proven organism causing outbreaks of sepsis in NICU and no single risk factor could be identified but thrombocytopenia and umbilical venous

catheterization as factor influencing the outcome in *Klebsiella* sepsis could be ascertained. Mortality is high in neonates.

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