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The Causative Organisms of Neonatal Sepsis in Al-Kadhimiyia Teaching Hospital

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Abstract

Background Sepsis is common in the neonatal period which may be acquired in utero through the placental or trans-cervical routes and during or after birth and because the immunological system of neonates is not well developed which make this infection serious and fatal if not treated in accurate manner.

Objective To identify the most common causes of sepsis in Al-Kadhthimyia Teaching Hospital and its mortality rate.

Methods Across-sectional study was conducted during the period between 14th of February 2009 to 25th of February 2010 on 127 neonates with sepsis who were diagnosed clinically and they were admitted in Al-Kadhthimyia Teaching Hospital, they were divided into two groups according to the time of appearance of the symptoms which were early onset sepsis and late onset sepsis. Blood was taken from them and sends to Hospital laboratory for culture.

Results The most common clinical presentation in early onset sepsis (EOS) were, poor feeding, lethargy and fever (94.12%, 91.76 %, and 52.94 %, respectively), which is similar to late onset sepsis (LOS) (95.24 %, 92.86 % and 57.14 % respectively). The most common organisms responsible for EOS were Staph. aureus, Enterobacteria, and staph. epidermidis (25.89 %, 21.18 % and 21.18 %, respectively) while in LOS Staph. aureus, Enterobacteria and E. coli (21.43 %, 16.67 % and 11.90 %). The overall mortality was 29.92 % which was slightly more in LOS (30.95 %) than in EOS (29.41%) also it was more common in males than females in both groups.

Conclusion Staph. aureus, Enterobacteria were the leading causes of sepsis in both groups while staph. epidermidis were more common in EOS and E. coli was more common in LOS.

Key words Early onset, late onset, sepsis, neonate

Introduction

Neonatal sepsis is a significant cause of neonatal morbidity and mortality in the newborns particularly in preterm and low birth weight infants [(1)]. The frequency of neonatal bacterial infection ranges from 1-5 per 1000 live birth [(2)].

The epidemiological data from developed countries shows important difference in the incidence, risk factors, causative micro-organisms and antimicrobial sensitivities of pathogens and mortality rate from that of developing countries [(3,4)]. Group B-streptococcal disease is the most important cause of neonatal sepsis in Europe and North America [(5)], but there is preponderance of gram negative organisms in tropical and developing countries [(6)]. The clinical presentations are non specific in both early and late neonatal sepsis including poor feeding, lethargy, temperature instability, respiratory distress, seizures and abdominal distention [(7)].

This study was conducted to determine the clinical presentations, bacteriological profile and mortality rate in neonates admitted in Al-

Kadhimiyia teaching hospital in Baghdad with clinical diagnosis of sepsis.

Methods

This study included 127 suspected cases of neonatal sepsis, admitted to the Pediatric department of Al-Kadhimiyia Teaching hospital during the period between 14th of February 2009 to 25thof February 2010. The diagnosis of neonatal sepsis was clinical depending on the signs and symptoms including poor feeding, lethargy, temperature instability, respiratory distress, abdominal distention and seizures.

Early onset sepsis (EOS) was considered when the onset of symptoms was before one week of life and late neonatal sepsis (LOS) was considered in cases presenting after one week of life. Blood samples were collected from all the cases which were done by careful cleaning of the skin by antiseptic (alcohol) and then put in broth media to be send to the laboratory for culture in chocolate agar, first reading was done after 24 hr, second reading was done in second day, if the two readings were negative third one done after 27 hr and in case of negative result the culture consider to be negative. CRP (C-reactive protein) was not available at laboratory all the time so it was not included in our study.

Pre-term including live born infant delivered before 37 week from the last menstrual period. Term infants are an infant who delivered after 37 week of gestation. Post-term infants are those born after 24 week of gestation.

Statistical analysis

Significance for statistical difference was calculated using P value. P value less than 0.05 was regarded as significant.

Results

A total of 127 newborn with clinical sepsis were evaluated, blood culture reports were positive in 87/127 (89.76%) of the cases, males were affected more than females (59.84% and 40.16% respectively), as shown in table 1.

Table 1. Distribution of patients according to sex and gestational age.

Parameter		EOS		LOS		Total		P value
		No.	%	No.	%	No.	%	
Sex	Male	47	55.39	29	69.04	76	59.84	>0.05
	Female	38	44.61	13	30.96	51	40.16	
	Total	85	100	42	100	127	100	
Gestational age	Pre-term	21	24.70	12	28.57	33	25.98	>0.05
	Post-term	60	70.06	29	69.05	89	70.08	
	Full term	4	5.76	1	2.38	5	3.94	
	Total	85	100	42	100	127	100	

EOS = early-onset sepsis, LOS= late-onset sepsis

We chose our neonates from the pediatric general ward in 6th flower in Al-Kadhhimyia Teaching Hospital, so most of our patients were full term 89 (70.08%), preterm were 33 (25.98%) and post term were only 5 (3.94%). Eighty fife cases (66.9%) had early onset sepsis and 42 cases (33.7%) had late onset sepsis. The majority of newborns with neonatal sepsis presented with lethargy 117 (92.13%), poor feeding 120 (94.49%), fever 69 (54.33%), respiratory problems 54 (42.52%), vomiting 33 (25.98%), seizure 27 (21.26%), jaundice 26 (20.74%) and abdominal distention 11 (8.66%). There was no significant difference in clinical presentation between EOS and LOS (Table 2).

Table 2. Clinical presentation of neonatal sepsis.

Clinical presentation	EOS		LOS		Total		p value
	No.	%	No.	%	No.	%	
	85		42		127		
Poor feeding	80	94.12	40	95.24	120	94.49	>0.05
Lethargy	78	91.76	39	92.86	117	92.13	>0.05
Fever	45	52.94	24	57.14	69	54.33	<0.05
Respiratory problem (respiratory distress)	37	43.53	17	40.48	54	42.52	>0.05
Vomiting	21	24.71	12	28.57	33	25.98	>0.05
Seizure	18	21.18	9	1.43	27	21.26	>0.05
Jaundice	17	20	9	21.43	26	20.47	>0.05
Abdominal distension	8	9	3	7.14	11	8.66	>0.05

EOS = early-onset sepsis, LOS= late-onset sepsis

The most common organisms isolated from blood culture of those with EOS were Staph aureus (25.89%), Enterobacteria (21.18%) and Staph. epidermidis (21.18%). While in LOS Staph. aureus cause (21.43%), Enterobacteria (16.67%) and E. coli (11.9%), (Table 3).

Table 3. Organisms isolated from blood culture from neonate with sepsis.

Microorganism	EOS		LOS		Total		P value
	No	%	No	%	No	%	
Staph. Aureus	22	25.89	9	21.43	31	24.40	>0.05
Enterobacteria	18	21.18	7	16.67	25	19.68	<0.05
Staph. Epidermidis	11	12.94	3	7.14	14	11.26	>0.05
No growth	9	10.59	4	9.52	13	10.34	>0.05
E. Coli	8	9.42	5	11.90	13	10.34	>0.05
Pseudomonas	5	5.89	2	4.77	7	5.51	>0.05
Contaminated	4	4.7	3	7.14	7	5.51	>0.05
Strep. Viridans	3	3.52	4	9.52	7	5.51	>0.05
Strep. Faecalis	3	3.52	3	7.14	6	4.82	>0.05
Proteus	1	6.47	0	0	1	007	>0.05
Klebsiella	1	6.47	2	4.77	3	2.56	>0.05
Total	85	100	42	100	127	100	>0.05

EOS = early-onset sepsis, LOS= late-onset sepsis

In this study the overall mortality rate was (29.92 %)(total number of deaths 38). The total number of death in males was 24 (63.16 %), while the number in females was 4 (36.84). The study also showed that (66 %) of death occur in EOS and (34 %) occur in LOS. Regarding the gestational age, it was found that 25(65.79 %) of death occur in pre term, and the other 13 (34.21 %) occur in full term and there is no death in post term, as shown in table 4.

Table 4. Demographic profile and mortality rate.

Parameter		EOS		LOS		Total	
		No	%	No	%	No	%
Sex	Male	16	64	8	61.54	24	63.16
	Female	9	36	5	38.46	14	36.84
	Total	25	100	13	100	38	100
Gestational Age	Pre-term	17	8	8	62	25	65.79
	Full-term	8	32	5	38	13	34.21
	Post-term	0	0	0	0	0	0
	Total	25	100	13	100	38	100

EOS = early-onset sepsis, LOS= late-onset sepsis

Discussion

For the effective management of neonatal sepsis, knowledge about bacteriological profile play a vital role, in this study we found that EOS was more common than LOS which is similar to other reports [5,9]. Males are affected more than females as documented by other studies [8,9,10].

The international criteria for the clinical diagnosis of neonatal sepsis include lethargy, no sucking, respiratory rate >60, grunting, fever, convulsion and abdominal distention [5].

In this study there is no statistically significant difference in the clinical presentation between, EOS and LOS, as the P values was> 0.05 except in fever where there is statistical difference as the P value was < 0.05, which may be due to difference in the causative agents or due to difference in severity between EOS and LOS.

In this study, blood culture is positive in(89.76%), negative blood culture (10.34%) which could be due to administration of antibiotic before blood collection or may be due to infection by anaerobes. Negative blood culture dose not exclude sepsis and this finding is comparable to other reports, where about (26-30%) of all neonatal sepsis caused by anaerobes [9,10,11].

In this study there is no significant statistical difference regarding the etiological organism between EOS and LOS as the P value is > 0.05, except in Enterobacteria, where the statistical difference is significant as the P value is < 0.05 .This is due to presence of this organism in vagina as normal flora which causes the infection to neonate when he pass through birth canal during delivery.

In this study the predominant organism isolated from blood culture is staph. aureus, which is in agreement with other reports [12,13]. In Europe and North America, group B streptococci are the most common organism [5]. This could be due to increase in nosocomial infections among neonate delivered in developing countries than developed one.

In this study, Enterobacteria is the predominant gram-negative organism in both EOS and LOS, the report of the National Neonatal –Perinatal showed Klebsiella as the predominant gram negative pathogen [14]. A study in Nepal showed that Enterobacteria as well as Klebsiella as the predominant gram negative agents [15].

The mortality rate is (29.92%), and in males the mortality rate is much higher than in females (63.16% *Vs* 36.84% respectively), these results are similar to that found by other studies in Karachi and in Taiwan [15,16], while a study in Italy shows a mortality rate of (6%) only. This increase in mortality rate among male due to the possibility of a sex-linked factor in host susceptibility [7], while the decreased mortality rate in developed country may be due to early detection and availability of specific diagnostic and treatment measures .

Conclusion

It is concluded that Staph. aureus and Enterobacteria are the leading causative agents of sepsis in both early and late onset groups, while staph. epidermidis was more common in EOS and E. Coli was more common in LOS and the mortality rate were more in male and pre term neonate .

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