Relationship between the microorganisms isolated from septicemic neonates and place of delivery

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Summary:

Background: Neonatal septicemia is a significant cause of morbidity and mortality worldwide especially so in developing countries. To reduce the mortality caused by neonatal septicemia, it became vital to diagnose it as soon as possible and treat with administration of appropriate antibiotics.

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Objective: To study the relationship between themicroorganisms isolated from septicemic neonates with place of delivery.

Patients and Methods: Blood sample was obtained from 76 neonates (50 of them are born in Baghdad teaching hospital (Inborn), 26 of the babies are born at home or in Al-Elwya teaching hospital (out born) ,the laboratory diagnosis for the out born patients done in the same hospital(Al-Elwya teaching hospital .The aged of the neonates ranged from1 hour-28 days. These neonates are diagnosed clinically (poor feeding, respiratory distress, fever, hypothermia, gastrointestinal and/or central nervous system symptoms) and bacteriologically to have neonatal septicemia.

Results: One of the most important neonatal factors predisposing to infection is place of delivery, in our study significant number of babies was had sepsis at inborn group (65.8%) as compared to out born (34.2%). Gram negative bacteria constituted 71% of the total isolates.
(28%) of neonates born in Baghdad teaching hospital (inborn) were infected with K. pneumoniae**,** (24%) of them were infected with S.aureus, and (10%) of them were infected with E. cloacae and P. aeruginosa equally. On the other hand (26.9%) neonates born at home or in any other hospital (out born) were infected with E. coli followed by Enterobacter species (23%).

Conclusion: inborn babies were at higher risk for infection with K. pneumoniae and S. aureus, whereas out born babies were at risk of E.coli infection.

Keywords: Neonatal septicemia (NNS), Place of delivery, Microorganisms, Neonate.

Introduction:

Neonatal sepsis is defined as a clinical syndromeof bacteremia with signs and symptoms of infection inthe first four weeks of life (1).
Neonatal sepsis is the single most important cause of neonatal deaths in the community, accounting forhalf of them. Surviving infants can have significant neurologicalsequelae as a consequence of CNS involvement, septicshock or hypoxemia secondary to severe parenchymallung disease (2).
Etiological agents of neonatal septicemia are bacteria, fungi (mainly candida), viruses and rarely protozoa. In numerous studies, certain predisposing factors related to pregnancy,
Delivery, as well as neonatal diseases has been identified as important causes of sepsis in the newly born infants such as prematurity, prolonged rupture of amniotic membranemore than 24 hours, maternal fever,chorio-amnionitis, prolonged labor and prenatal asphyxia, unsafe place of delivery or unclean delivery and low birth weight neonates. For many years attention has also been drawn to the risk of cross infection in Neonatal Intensive Care Unit (nosocomial infection) (3, 4, 5).
However, the clinical diagnosis of neonatal septicemia is difficult in many situations as it present with non-specific symptoms and signs (4).Thus microbiologic blood culture results continue to be considered the gold standard for diagnosis of bacterial sepsis (6,7).
The sign and symptoms of sepsis according to their frequency are as follow:
The reluctance to feed, lethargy, fever, Jaundice, tachypnea, chest retraction, hypothermia, septic umbilicus, pallor, diarrhea, seizure, cyanosis & abdominal distension (8).
Treatment is most often begun before a definite causative agent is identified. It consists of penicillin (usually ampicillin) plus an amino glycoside such as gentamycin (9, 10, 11).Therapy for most of blood stream infections should be continued for at least 5-7 days after a clinical response had occurred (12,13).

Patients and Methods:

The study included newborns admitted in the Neonatal In born Care Unit of Baghdad Teaching Hospital. Seventy- six neonates were selected to be included in the study; fifty neonates with septicemia (65.8%) were born in hospital, while twenty six neonates were born at home or in Al-Elwya teaching hospital (34.2%) (Out born), the laboratory diagnosis for the out born patients done in the same

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hospital (Al-Elwya teaching hospital). All the selected neonates had one or more signs of sepsis such as lethargy, poor feeding, abdominal distension, respiratory distress, and instability in temperature, pathological jaundice, convulsions, chills, vomiting, fever, malaise, hypothermia, toxicity and eventually the extreme form being-shock (8).

Approximately 2ml of blood were aspirated from each neonate was taken from peripheral vein by disinfecting skin using iodine solution that left to dry then wiped off with (70%) alcohol, samples were taken and cultured aerobically and anaerobically,whenever possible before antimicrobial therapy was administered,(samplesof blood were injected into a set of two bottles of media one bottle containing Brain-heart infusion broth for cultivation of aerobic bacteria; the second bottle contained Thioglycolate broth for cultivation of anaerobes, Both media were warmed to 37°C in the incubator and the rubber top of the bottle was swabbed with iodine and alcohol to destroy contaminant before inoculation of the samples, each bottle was labeled with patient's name, date and time of the sampling,the bottles were then incubated at 37°C for 18-24 hours),the isolated bacteria were defined by colonial morphology, Gram stain reaction, biochemical reactions and confirmed by API-20E biotyping (API 20E system) (9, 10).

Statistical analysis:

Data was analyzed statistically using PEPI program version 4. Results were expressed using simple statistical parameters such as frequency and percentages. Analysis of qualitative data was assessed using Likelihood ratio-chi square test and p-value for each row.

Results:

Eleven different organisms were responsible for septicemia in neonates during the present study period. Gram-negative bacilli constituted the largest number (71%) of the total isolates. Table (1) shows that (65.8%) of septicemic neonates were born in hospitals (inborn), while (34.2%) were born at home or in any other hospital (out born).Table (2) shows that (28%) of neonates born in hospitals (inborn) were infected with K. pneumoniae, (24%) of them were infected withS.aureus, and (10%) of them were infected with E. cloacaeand P. aeruginosa equally. On the other hand (26.9%) neonates born at home (out born) were infected with E. coli followed by Enterobacter species (23%).

Table (1): Distribution of 76 neonatal septicemia cases in relation to place of delivery.

Place of delivery	*Septicemic cases No. (%)*
Inborn(NNS of Baghdad Teaching Hospital)	50(65.8)
Outborn(babies born at home or in Al-Elwya teaching hospital)	26(34.2)
Total	76(100)

Table (2): Distribution of blood culture microorganisms causing NNS in relation to place of delivery.

Organisms	*Inborn*	*Out born*	*Total*	Chi square	p-value
	No. (%)	*No. (%)*			
K.	14(28)	4(15.4)	18	0.04	0.982
S.aureus	12(24)	4(15.4)	16	0.03	1.000
S.epidermidi	2(4)	2(7.7)	4	1.16	1.000
E.cloacae	5(10)	3(11.5)	8	0.63	1.000
E. aerogenes	0(0)	3(11.5)	3	7.66	0.238
E.coli	3(6)	7(26.9)	10	6.23	0.487
P.aeruginosa	5(10)	2(7.7)	7	0.10	1.000
S.marcescen	4(8)	0(0)	4	1.79	1.000
Group-B-beta	1(2)	1(3.8)	2	0.651	1.000
A.baumannii	2(4)	0(0)	2	0.94	1.000
C.koserae	2(4)	0(0)	2	0.94	1.000
Total	50(100	26(100	76	1.01	1.000

(Likelihood ratio- chi square test, p-value)
The mean frequency for cells under 5.

Discussion:

Table (1) shows that most NNS cases (65.8%) were born in hospital (inborn). This result is consistent with other studies by Freedman *et. al.,* (1981), Dawodu*et. al.,* (1997) and Obi *et. al.,* (1999) (15, 16, 17), where the percentage of inborn septicemic neonates were 62.5%, 70% and 68% respectively. In contrast to others recorded by Battisti*et. al.,* (1981), Bang *et. al.,* (1999) and Ahmed *et. al.,* (2002) (1, 17, 18) where most deliveries were conducted at home or in any other hospital (out born), this result is due to the incidence of inborn delivery is more than the incidence of out born delivery during our study period.

The present study (table 2) revealed the prevalence of *E. coli* (26.9%) in out born babies. This may due to delivery at home under conditions of poor hygiene, or due to the fact that it is commonly found as a part of vaginal contaminating flora. Such findings were also reported by Ahmed *et. al.,* (2002) and Tallur*et. al.,* (2000)(18, 19). Eriksson (1983), Tallur*et. al.,* (2000) and Abida Malik *et. al.,* (2001) (20,19,21) reported that there were a higher

incidence of septicemia due to *K. pneumoniae, P. aeruginosa, S. aureus, E. cloacae* in the inborn population, these results were similar to the present results. All these mentioned organisms were established nosocomial pathogens and many of the neonates in our study could have acquired them nosocomially.

Ohlsson and Veamcombe (1987) and Abida Malik *et. al.*, (2001) (22, 21) reported an increasing incidence of nosocomial sepsis caused by *S. epidermidis*, Acinetobacter spp. and S. *marcescens* in NICU.

Conclusions:

Gram negative bacteria were the most common organisms isolated from septicemic neonates in our study mainly *K. pneumoniae, Enterobacter* species, *E. coli, P. aeruginosa*. Inborn babies were in higher risk for infection withK. *pneumoniae*, whereas out born babies were at higher risk of *E.coli* infection.

Author contributions:

Prof. Nedal Sabri Ayoub do the drafting of manuscript and critical revision, Assis. Lec. Yasmeen

Jawaad Al-Bayaa do the study conception and acquisition of data analysis, Assis.Lec. Hiba Sabah Jasim

do the design and the interpretation of data.

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