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RESEARCH ARTICLE

ROLE OF GROUP B STREPTOCOCCI IN NEONAT SEPSIS

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Abstract

Background: Group B streptococci is well defined pathogen in causing neonatal sepsis and meningitis since it is present as normal flora in the vagina of (2-30%) of pregnant women.

Aim: This work is aimed to evaluate the role of group B streptococci in causing neonatal sepsis as compared to other gram-positive cocci isolated from clinically diagnosed neonatal sepsis.
It is also to determine the susceptibility of the isolates to the commonly used antimicrobials.

Methods: Two-hundreds and fifty neonates borne at Al-Sulaimanyiah Teaching Hospital were the source of (2-3 ml) blood samples collected aseptically from each newborn.
Each blood sample was subjected to well known microbiological methods for blood culturing and final identification of the isolates. All isolates were tested for sensitivity or resistance for the commonly used antimicrobials using Kirby-Bauer technique.
Results: Out of 250 patients it was possible to obtain 105 isolates of grams-positive cocci from blood samples collected from each neonate during 9 months duration.
Out of 105 isolates it was possible to obtain 32 isoltes (31.2%) representing GBS, followed by Staph. aureus 31 isolates (29.6%). Staph. epidermidis (CONS) which ranks the 3rd among the isolates, it represented 27 (25.8%) isolates. The least of the isolates were group A streptococci 14 (13.4%) isolates.
The results of antimicrobial susceptibility of each isolate to the commonly used drugs as compared to an international values revealed that GBS is moderately sensitive to the drug cotrimaxozole and penicillin respectively while it is highly resistant to the drugs ceplotoxim (90.4%), Cephalaxine (99.5%) and to each of the drugs Amikacin, Cotrimaxazole and penicillin (90.4%) respectively. Group B streptococci is completely resistant to Amoxicillin (100%).
Staph. aureus revealed weak sensitivity to Amikacin (69.5%) while it is highly resistant to most of the drugs used in this study ranging from (83.8%-60.6%).
Conclusions: It is concluded that group B streptococci plays the major role in causing neonatal sepsis followed by staph. aureus. It is concluded also that Penicillin G is still the drug of choice in the treatment of neonatal sepsis caused by group B streptococci.

INTRODUCTION

Group B streptococci are normally found in (20-40%) of all healthy adult women, commonly found in the intestine, vagina and rectal area[1,2,3]. Group B streptococcal infections are acquired through direct contact with the bacteria while in uterus or during delivery, thus the infection is transmitted from the colonized mother to the newborn[5,4].

Group B streptococci is extremely rare in healthy individuals and is almost always associated with underlying abnormalities[6]. In the pregnant women GBS infection may cause chorioamnionitis and postpartum infection[7,8]. Newborn contracts GBS during pregnancy or from mother genital tract during labor and delivery.

Group B streptococci is the most common cause of life threatening infection in newborn including pneumonia, meningitis and neonatal sepsis[9]. About one out of every (10-200) babies whose mothers carry GBS develop symptoms of GBS disease[10].

Nearly (75%) of the cases of GBS diseases among newborns occur in the 1st week of life called early onset disease and that premature babies are most susceptible to GBS, infection than full-term babies[11].

Neonatal sepsis is the systemic response to infection with bacteria like GBS, viruses and fungi[12,13].

Group B streptococcal infection is best known as a cause of neonatal infection and one of the major causes of infected abortion[14].

Patients and methods

Patients: Two-hundreds and fifty newborn with signs of septicemia were the subject of this work during 9 months at Al-Sulaimaniah Teaching Hospital.

Methodology:

Specimen collection: Blood samples of 2ml were collected from each newborn at the 1st week of life aseptically and diluted as 1:10ml of liquid culture media for which (SPS) as anticoagulant is added (0.025-0.05) which is unharmful for bacteria but it inhibits antibacterial effect of serum and antibodies.

Specimen processing: Blood culture system is applied and inspected daily for a minimum of 7 days. Group B streptococci isolates were finally identified using rapid spot CAMP test[15]. Routine well know microbiological methods were applied for the final identification of other grams-positive isolates. Testing whether an isolate is sensitive or resistant were done according to Kirby-Bauer agar diffusion method against different antimicrobials[15]. Determination of the susceptibility of the isolates was according to an international values (Table 1).

Interpretation of zone inhibition by using Kirby & Bauer method
(Table 1) (Disk diffusion method)

Anti microbial agent	Code	Disk Potency Mcg/DISC	Diameter of zone inhibition		
			Resistance	Intermediate	Sensitive
1. Ampicilln	AM	10	≤11	12-13	≥20
2. Cefataxime	CTX	30	≤14	15-22	≥23
3. Cephalexin	KF	30	≤14	15-17	≥18
4. Chloamphenicol	C	30	≤12	13-17	≥18
5. Ciprofloxacin	CIP	10	≤15	16-20	≥21
6. Clindamycin	CN	2	≤12	13-17	≥18
7. Tobramycin	TM	10	≤13	13-14	≥15
8. Erythromycin	E	15	≤13	14-17	≥18
9. Ampiclox	ANP	30	≤14	15-16	≥17
10. Gentamycin	GN	10	≤12	13-14	≥15
11. Nalidixic acid	NAL	30	≤13	14-18	≥19
12. Penicillin G	PG	6	≤20	21-28	≥29
13. Rifampicin	RA	5	≤16	17-19	≥20
14. Co-Trimoxazole	SXT	25	≤18	19-23	≥24-32
15. Amoxicillin	AMN	10	≤90	-	≥29
16. Amikacn	AN	30	≤14	15-16	≥17

Results

In this study it was possible to obtain 105 isolates out of 205 neonates (42%), table 2 shows that out of 105 isolates GBS represent 33 isolates (31.2%) followed by staph. aureus 31 isolates (29.6%). Staph. epidermidis (CONS) ranks the 3rd which is 27 isolates (25.8%) while GABHS represented the least of the isolates 14 (13.4%).

The result of the sensitivity of the isolates as in (Table 3) revealed that GBS is moderately sensitive to the drugs Cotrimoxazole and Penicillin G (72.8%) respectively.

Staph. aureus is very weakly sensitive to Amikacin (9.6%), it is highly resistant to this drug (97.8%), while staph. epidermidis is more sensitive to the drug Amikacin (74.2%).

Group A streptococci is highly sensitive to each of the drugs Cotrimoxazole, penicillin, Ampiclox and Gentamycin (90.3%) respectively. (Table 4) reveal that GBS is completely resistant (100%) to the drug amoxicillin, while it is highly resistant to the drug cephalexin (99.5%) while it is less resistant to each of the drugs ceflotaxime, Amikacin, Cotrimoxazole and Penicillin G (90.4%) respectively.

Staph. epidermidis (CONS) is highly resistant to each of the drugs Cotrimoxazole. Penicillin G and Tobramycin.

Group AβHS is completely resistant (100%) to most of the drugs used in this study except Penicillin G, Ampiclox and Gentamycin to which it is highly sensitive.

An important result in this study is that the prevalence of GBS neonatal sepsis is increasing and that the resistant to most of the drugs is increasing also.

In this work it can be obtained that newly emerged staph. aureus to Amikacin can be recorded as Amikacin resistant staph. aureus (ARSA).

(Table 2) Bacteria isolated from neonatal sepsis conditions.

Type of bacteria	No. of isolates	%
GBβHS	**33**	**31.2**
Staph. aureus	**31**	**29.6**
Staph. epidermidis	**27**	**25.8**
GAβHS	**14**	**13.4**
Total	**105**	**100**

(Table 3) Percentage of the sensitivity of the isolates to different antimicrobial agents.

Types of bacteria	No. of isolates	%	Antimicrobial agents										
			CTX	KF	AM	SXT	PG	AMP	GN	AMX	TM	AN	CIP
GBβHS	**33**	**31.2**	**6**	**31.2**	**12.4**	**72.8**	**72.8**	**6.1**	**0**	**12.2**	**36.4**	**36.4**	**36.4**
Staph. aures	**31**	**29.6**	**52.8**	**22.5**	**12.6**	**17.5**	**25.8**	**35.8**	**33.3**	**35.3**	**37.1**	**30.1**	**30.1**
Staph. epidermidis	**27**	**25.8**	**30.6**	**30.6**	**74.2**	**74.2**	**29.1**	**38.7**	**18.5**	**51.6**	**77.4**	**57.6**	**57.6**
GAβHS	**14**	**13.4**	**0**	**0**	**0**	**90.3**	**90.3**	**90.3**	**90.3**	**0**	**0**	**0**	**0**

(CTX = Ceflotaxime), (KF = Cephalexin), (AM = Amikacin), (SXT = Cotrimoxazole), (PG = Penicillin G), (AMP = Ampiclox), (GN = Gentamycin), (AMX = Amoxicillin), (TM = Tobramycin), (AM = Amikacyin), and (CIP = Ciprofloxacin).

(Table 4) Percentage of the resistance of the isolates to different antimicrobial agents.

Types of bacteria	No. of isolates	%	Antimicrobial agents										
			CTX	KF	AM	SXT	PG	AMP	GN	AMX	TM	AN	CIP
GBβHS	33	31.2	90.4	99.5	90.4	90.4	35.5	35.5	90.4	100	66.7	58.3	53.8
Staph. aures	31	29.6	70.6	58.1	97.8	83.8	83.8	58.1	58.1	66.7	83.8	70.6	70.6
Staph. epidermidis	27	25.8	81.5	92.6	92.6	81.5	63	81.5	74.1	92.6	47.1	40.8	66.6
GAβHS	14	13.4	13.4	100	100	100	100	100	100	100	100	100	100

(CTX = Ceflotaxime), (KF = Cephalexin), (AM = Amikacin), (SXT = Cotrimoxazole), (PG = Penicillin G), (AMP = Ampiclox), (GN = Gentamycin), (AMX = Amoxicillin), (TM = Tobramycin), (AM = Amikacyin), and (CIP = Ciprofloxacin).

Discussion

Sepsis is the systemic response to infections with various agents[16]. The incidence of neonatal sepsis varies from (1-4/1000) live birth with considerable fluctuation overtime with geographic location[17]. Attack rates of neonatal sepsis increase significantly in low birth weights infants in the presence of chorioamnionitis, congenital defects and premature ruptured membrane[18].

Valuable data collected, prospectively on very low weight birth neonates in which early onset sepsis occurred in (2%) of LBW infants due to GBS a result which disagree with our results in which sepsis is occurred in (42%) of neonates, this could be due to either that the neonates in our study are with sever complications like very low weight birth or that the mothers are highly contaminated with GBS. The results of our study indicates that GBS were predominant i.e 33 (31.2%) of the total isolates 105 which disagree with others[19,20] who found that GBS were (10.4%) of the total isolates also confirm that GBS as a cause of neonatal sepsis is increasing.

Group B streptococci causing early onset sepsis because the acquisition before or during delivery since GBS is a commensal in the genital tract of (20-40%) of women which is carried asymptomatically, it colonizes the vagina from gut and ascend into uterus at any stage of pregnancy[21].

Early onset of neonatal sepsis caused by GBS prevention involves, treating pregnant women intrapartum with antibiotics if any of the following risk factors during delivery at more than 37 weeks gestation, membrane rupture for for more than 18h duration or temperature during labor higher than 38c[22].

Our results of antimicrobial susceptibility (Table 3) revealed that GBS is sensitive to Cotrimoxiazole, penicillin (72.8%) respectively a result which disagree with others[23] who found that GBS is highly sensitive to penicillin (91.7%) this also confirm our observation that resistant GBS to antimicrobials is increasing. From this observation penicillin could be considered the drug of choice in the treatment of neonatal sepsis caused by GBS[24].

(Table 4) shows that GBS is completely resistant to Cephalexin (99.5%) and less resistant to each of the drugs Amikacin, Cotrimaxozole, Ceflotaxime and Gentamycin (90.4%) respectively a result which agrees with those[23,24] who found similar results.

(Table 3) in which staph. aureus revealed low sensitivity to the drug Amikacin (69.5%) which seems to us it agrees with others[25] who found that staph. aureus is sensitive to Amikacin (68.6%).

In conclusion, GBS can play the major role in causing neonatal sepsis and that Penicillin G and Cotrimoxazole are the drugs of choice in treating neonatal sepsis cause by GBS.

Since (97.8%) of staph. aureus isolates are Amikacin resistant so this drug can not be used for infections of neonatal sepsis caused by this organism at least in the areas in which this work has been done.

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