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Group B streptococcal carriage among parturients and their neonates in Zaria, Nigeria

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Summary

In an epidemiological study of Group B streptococcal (GBS) carriage carried out on 100 mothers and their newborns in Zaria, 14 mothers were found to be vaginal and perineal carriers while 13 infants were found to be colonised at birth. The colonization rate of infants born to colonised mothers was 93%. The results also showed no association between carriage of (GBS) and frequency of coitus, polygamous union, multiparity, low educational status and lack of prenatal care.

In terms of morbidity, neither the colonised women nor the infants developed clinical GBS infection. The study also revealed that all the GBS isolated were sensitive to penicillin and resistant to sulphatriad. The findings suggest that although carriage is fairly high in this environment, GBS is not a common cause of perinatal infection.

Résumé

Une étude épidémiologique concernant les porteurs de streptocoques group B (SGB) a été effectuée sur 100 méres et leur nouveau — nés ai Zarie. 14 méres étaient porteuses d'infections vaginales et vaginales et périneales asymp to matiques tandis que 13 enfants étaient infectés à la naissance. Le taux d'enfants porteurs nés de meres porteuses était de 93% — les résultats ont montré également l'absence de corrélation entre la fréquence des porteurs de SGB et la frequence des rapports sexuels, la polygamie, la multiparité, le faible niveau d'éducation et le manque de soins prénatals.

Quant á la morbidité, ni les méres infectées ni les enfants n'ont developpé d'infections cliniques á SGB. L' étude a également révéli que tous les SGB isolés étaient sensibles á la pénicilline et résistants aux sulfamides. Les premières conclusions sont que, bien que le nombre de porteurs soit relativement éleve dans ce cont exte, SGB n'est pas une cause courante d'infections périnatales.

Introduction

The group B streptococcus has for a long time been associated with obstetric sepsis[1-3]. Much attention has also focussed on neonatal sepsis due to this organism[4-6]. The pioneering work of Lancefield has been rewardingly extended to reveal the numerous characteristics of the GBS and enhance its identification[7-11].

The first case of neonatal GBS infection reported from Nigeria was in 1980 (Onile *et al.*)[12]. Amiebenomo and Bello (personal communication) recently detected a (non-fatal) case of GBS neonatal septicaemia at the Ahmadu Bello University Teaching Hospital (ABUTH), Zaria. Several workers have demonstrated a strong association between genital tract carriage of GBS in pregnant women and acquisition of the organism by their babies[13-15]. This is because the genital and lower intestinal tracts are known habitats of the organism. Also, nosocomial transmission is known to occur[16]. Pregnancy and the peripartum period are hazardous with regard to GBS infection even though the magnitude of this may not be easily appreciated since infection in the adult is sometimes subclinical. GBS has been associated with chorioamnionitis[17], urinary tract infections[18], and septic abortion[19]. In addition there is considerable evidence that it could be sexually transmitted[20,21].

Against this background, coupled with the relatively high incidence of perinatal and postpartum sepsis among our patients, it became necessary to study the epidemiology of GBS in pregnant women and their neonates at the ABUTH.

Materials and methods

The subjects included in this study were 100 pregnant Nigerian women in labour (with intact

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membranes) and their newborns delivered at the ABUTH, Zaria between July and November 1985. The hospital has an average of 5000 deliveries annually and many of these are referred from other centres with complications. Upon admission to the labour ward, each patient was questioned as to rupture of membranes or recent antibiotic treatment. A patient was disqualified from the study if any of these was present. Otherwise informed consent to participate and detailed clinical information including coital frequency during pregnancy were obtained from the patient.

After a general systemic examination, both perineal and high vaginal swabs were taken under sterile conditions, care being taken to exclude rupture of membranes. Subsequently a digital vaginal examination was done. Management of the patient during labour was routine except when otherwise indicated. Each newborn baby was carefully examined at birth, both external ear canals and umbilical stump were separately swabbed. Additional swabs were taken from the placenta and *liquor amnii* if delivery was by Caesarean section. All swabs were sent for microbiological studies in Stuart's transport medium. Those babies from whom GBS was cultured were observed in hospital and discharged after a minimum of two days if they remained well, to be followed up fortnightly until the eighth week. The mothers were instructed to report any ill-health at once.

Laboratory methods

All swabs were cultured on blood agar plates and Gram stain was done on colonies from positive ones. Then identified streptococci were subcultured on fresh blood agar to obtain pure cultures. Serological grouping was done using both the Christie, Atkins, Munch-Peterson (CAMP) test[9] and Streptex reagent (Wellcome Reagents Limited, London). Antibiotic sensitivity of the isolates was tested using the disc diffusion method (Oxoid Limited, England).

Statistical analysis was done by the Chi-square test and when necessary by the Fisher's exact test.

Results

There were 100 mother-baby pairs out of whom five were delivered by Caesarean Section. Relevant clinical characteristics are shown in Table 1. GBS isolation was uniform for both the high vaginal and perineal swabs of 14 (14%) of the 100 mothers tested. Thirteen per cent of the 100 infants of these mothers were colonised at birth giving an acquisition rate of 93%. Neonatal colonization was uniform for both the umbilicus and the external ear canal in 10 cases. Of the remaining three, two were from the ear only while one was from the umbilicus only. There were no isolates from the five placentae and *liquor amnii*.

Table 1: Clinical characteristics of patients

Groups	No. of Patients (*n*)	Percentage
Age Range (yrs)		
≤ 19	19	19
20 - 29	52	
≥ 30	29	29
Parity		
Primigravidae	31	31
Para 1 - 4	49	49
> para 4	20	20
Gestational Age (wks)		
< 37	6	6
37 - 41	84	84
≥ 42	10	10
Socioeconomic Class		
Literate	47	47
Illiterate	53	53
Mode of Delivery		
Vaginal delivery	95	95
Caesarean Section	5	5

Table 2 shows the relationship between coital frequency, marital status, parity, antenatal care, social status and GBS carriage. There is a positive correlation in each but none is statistically significant.

Table 2: Relationship between coital frequency, marital status, parity, antenatal care, social status and GBS carriage

Groups	No. of Patients *n*	No. and % Patients with Positive Cultures	Test of Significance
Coital Frequency			
Once or twice weekly	81	9 (11)	
Three times weekly	19	5 (26)	$P > 0.10$ ns
Marital Status			
Monogamous union	74	9 (12)	
Polygamous union	26	5 (19)	$P > 0.50$ ns
Parity Range			
Primigravidae	31	2 (7)	$P = 0.09$ (Fisher's exact test)
Multipara	69	12 (17)	ns
Antenatal Care			
Booked	82	11 (13)	$P = 0.18$ (Fisher's exact test)
Unbooked	18	3 (17)	ns
Social Class			
Literate	47	6 (13)	
Illiterate	53	8 (15)	$P > 0.50$ ns

All isolates were strongly sensitive to penicillin, erythromycin, chloramphenicol and ampicillin but resistant to sulphatriad. Four of the women had intrapartum pyrexia but none harboured GBS. Six patients went into premature labour and two of them harboured GBS. The only still-born baby in the group was a macerated, 3.20kg female. GBS was cultured from all sites in both mother and baby. The mother had severe pre-eclampsia but recovered fully after delivery. None of the colonised babies had neonatal infection.

Discussion

This is the first study of GBS carriage in Northern Nigeria. Ekwempu *et al.*[22] studied the vaginal flora of pregnant women at the ABUTH Zaria but did not specifically search for GBS. The criteria for selecting the patients for the study were strict. The majority of our patients report in labour after rupture of the membranes. Inclusion of such cases would undoubtedly give unreliable neonatal GBS acquisition rates. However, it is possible to identify a case of neonatal GBS sepsis if a larger population (including those with ruptured membranes) is studied.

The study shows that GBS colonisation of women in Zaria is fairly high (14%), being only slightly lower than those reported from Ibadan in 1980 and 1983[14,23] but higher than that reported from Lagos in 1978[24]. Maternal colonization by GBS varies from place to place[13,21] and also in the same individual from time to time — mostly because conversions do occur[25]. Variations could be due to technical reasons affecting sample collection and treatment, site of collection — the genital tract and perineum being very important sites[26]; method of identification and perhaps environmental factors.

The infant colonization rate of 13% obtained from this study is higher than those previously reported from Nigeria[14,23]. Generally the rates reported from developed countries tend to be higher than these although Pass *et al*[27] reported a rate of 12.5%. Differences in neonatal colonization rates are attributable to the factors affecting maternal colonization and the load at the sites. The ear and umbilicus give the highest yields. The difference between the isolation rates from these sites is marginal — 92.3% and 84.5% for the ear and umbilicus respectively. Despite a high acquisition rate from the mother (93%) there was no case of neonatal GBS sepsis even after follow up for eight weeks. The reasons for this are not clear but possibly there are very few virulent GBS strains in our environment or our babies are not readily susceptible

to GBS infection. The difference in the carriage rates between those with a high coital frequency and others although not statistically significant may be due to alteration of the vaginal flora induced by increased sexual activity. It may also be related to carriage of GBS in the male urethra.

Polygamy is very common in this society because of the predominantly Muslim population and a test of its association with carriage is called for since it is related to sexual activity. The wife of a polygamous man may have coitus less frequently than her counter part from a monogamous home but may be more exposed to contamination or frank infection from indirect exposure (through her husband) to many partners. The marginal difference between GBS carriage in booked and unbooked cases should not be seen as portraying identical positions for the two groups. The latter group still has a much higher incidence of obstetric complications with higher morbidity and mortality. Anaemia is just one of these and it has been identified as a risk factor associated with GBS colonization of women during the third trimester[28]. Literacy rather than husband's income was the basis for social class rating here because of the diversity in marital status. GBS carriage is about the same in literate and illiterate women here probably because a large proportion of the people in the two groups have similar habits. It may on the other hand be that the factors which influence GBS carriage are not dependent on social class.

The strong sensitivity of GBS to penicillin is well known and it is the antibiotic of choice in the treatment of GBS infection. The suggestions that antibiotic prophylaxis is necessary so as to eradicate genital GBS during pregnancy and reduce GBS neonatal infections does not seem acceptable for several reasons. It is uneconomical to embark on such measure when the infection rate is so low. Secondly, making allowance for possible false negatives in identification, some carriers may be missed. Also conversions do occur. Thirdly, several attempts to eradicate the carrier state have failed. The fourth reason is that the effects of antibiotic prophylaxis on the genital flora of a pregnant woman are unpredictable. With a fairly high maternal GBS carriage rate in labour, neonatal GBS sepsis (with its high mortality rate) is a real possibility, the seeming rarity notwithstanding. In such cases prompt institution of treatment with penicillin (except where specifically contraindicated) is recommended. It was not possible to investigate the cause of death in the macerated fetus born to a GBS mother at that time due to socio-cultural reasons. To the best of the author's knowledge there is no record of still-birth attributed to GBS and it is likely that the intrauterine death resulted from the severe pre-eclampsia.

The GBS isolated in this study were not serotyped because it was not possible to send them outside Nigeria to a Reference Laboratory. However, one could speculate that type III may be predominant as found in another Nigerian study[14].

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