Streptococcus agalactiae (Group B Streptococci) Carriage in Late Pregnancy in Kuwait

Noora Al-Sweiha Sitrat Maiyegunc Michal Diejomaoh Vincent Rotimia
Fatma KhodakhastaNahida Hassanb Susan Georgeb Saba Baigd

Departments of aMicrobiology and bObstetrics and Gynaecology, Faculty of Medicine, Kuwait University, and Departments of cPaediatrics and dObstetrics and Gynaecology, Maternity Hospital, Kuwait

Key Words
Group B streptococci · Carriage · Late pregnancy · Outcome

Abstract
Objectives: This study investigated the vaginal colonization rate of Streptococcus agalactiae (group B streptococci, GBS) in an antenatal population in a maternity hospital. Subjects and Methods: Anal, vaginal and combined anal and vaginal specimens were obtained from 110 pregnant women (mean age 30.7 ± 5.5 years) at 35–37 weeks of gestation, using a commercially prepared culturette, and transported in 0.5 ml of Stuart’s transport medium. The specimens were then cultured in standard selective Todd-Hewitt broth medium, supplemented with gentamicin and nalidixic acid. After 36 h of incubation, the broth culture was subcultured onto sheep blood agar and incubated in 5% carbon dioxide for 18–24 h. Representative colonies morphologically resembling GBS were tested with latex agglutination kit. Each culture-positive woman was given ampicillin or piperacillin prophylactically and followed up through labour and postpartum. Detailed records of biodata, antecedent antenatal events and pregnancy outcome were reviewed.

Results: The combined vaginal and anal specimens were positive for GBS in 18 (16.4%) women. Gestational age at delivery was 39.01 ± 1.79 weeks. The deliveries were uneventful and no neonate developed sepsis. Diabetes mellitus and pregnancy-induced hypertension/hypertension were detected antenatally in 16.6 and 11.5%, respectively. GBS carriage was not associated with adverse outcome of pregnancy. Conclusion: The colonization rate of GBS in pregnant women in Kuwait is high, and on the basis of the documented benefits of antenatal screening in Western countries, we recommend routine screening especially for our at-risk patients.

Introduction

Group B streptococcus (Streptococcus agalactiae, group B streptococci, GBS) is a recognized pathogen in pregnant women, and infection has been reported as a leading cause of neonatal sepsis and meningitis in many industrialized countries [1–4]. The incidence of neonatal sepsis and meningitis due to GBS is reported as 0.5–4%, while that of GBS colonization in pregnancy is 5–30% [5–8]. Newborn babies acquire GBS infection either from the
GBS Carriage in Late Pregnancy

Introduction

GBS is the principal cause of sepsis and meningitis in the neonatal period and is a major cause of early-onset GBS disease. Since the introduction of the above guidelines, there has been a substantial decline in the incidence of early-onset GBS disease.

Subjects and Methods

Antenatal screening for GBS followed by antimicrobial therapy or prophylaxis is not universally adopted by all countries and all physicians. We are not aware of any specific antenatal screening policy in the Arabian Gulf States, and the clinical presentation of GBS in these Gulf States is not well documented. We have therefore been motivated to carry out a study on GBS in Kuwait to (a) ascertain the incidence and associated morbidity in the antenatal population at the Maternity Hospital, Kuwait; (b) evaluate the obstetric outcome in cases of GBS colonization detected antenatally, and (c) use the above data (when possible) as a basis for formulating a screening policy.

Subjects and Methods

Antenatal patients in the late third trimester of pregnancy who were receiving regular antenatal care at the Maternity Hospital, Kuwait, from September 1, 1999 to June 30, 2001 were counselled with a view to including them in the GBS study. One hundred and ten patients gave informed consent to participate, while 67 refused. It is pertinent to point out that due to our antenatal patients’ aversion to vaginal examination and procedures, it was difficult to recruit patients for this study. Patients who were on antibiotics or had ruptured membranes or multiple pregnancy or already in labour were excluded from the study.

The Maternity Hospital, Kuwait, a tertiary care centre and teaching hospital, is the main referral centre for all abnormal obstetric cases in Kuwait. The outpatient clinics cater for well over 38,418 patients (2,496 of these are new cases) annually. The annual number of deliveries recorded in the hospital is 11,820, and the caesarean section rate is 20%. Neonatal services are provided by a well-equipped and well-staffed large neonatal department in the same vicinity as the maternity hospital; this department provides highly specialized intensive care for neonates who have a wide variety of complex clinical problems.

Anal, vaginal and combined anal and vaginal swabs were collected from the 110 patients using a commercially prepared culturette at 35–37 weeks gestation as recommended by the Center for Disease Control and confirmed by Yancey et al. [20], and transported in 0.5 ml of Stuart’s transport medium from the Maternity Hospital to the Microbiology Department of the Faculty of Medicine, Kuwait University. The specimens were then cultured in standard selective Todd-Hewitt broth medium, supplemented with gentamicin and nalidixic acid. After incubation for 36 h, the broth culture was subcultured onto sheep blood agar and incubated in 5% carbon dioxide for 18–24 h. Representative colonies resembling GBS were tested with latex agglutination kit. Each culture-positive woman was treated antenatally with ampicillin or piperacillin prophylactically (an appropriate cephalosporin was used in cases of allergy to penicillin). The patients were all followed through labour and postpartum. As a deliberate policy of this study, no further treatment was given prophylactically when the patients were in labour.
Table 1. Clinical characteristics of the study population (n = 110)

<table>
<thead>
<tr>
<th>Category</th>
<th>Kuwaiti, %</th>
<th>Non-Kuwaiti, %</th>
<th>Mean age, years</th>
<th>Mean parity</th>
<th>History of recurrent spontaneous miscarriage, %</th>
<th>Mean gestational age at VS test, weeks</th>
<th>Mean gestational age at delivery, weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kuwaiti</td>
<td>60.2</td>
<td>39.8</td>
<td>30.7 ± 5.5</td>
<td>1.94 ± 1.26</td>
<td>17.2</td>
<td>35.69 ± 2.25</td>
<td>39.07 ± 1.79</td>
</tr>
</tbody>
</table>

VS = Vaginal/anal swabs.

Detailed records of the biodata of the patients, the antenatal events and the outcome of pregnancy were analysed. The details of the data on maternal outcome included the onset of spontaneous labour and the gestational age at the onset of labour, the presence of preterm labour, premature rupture of membranes, prolonged rupture of membranes (>18 h), prolonged labour, intrapartum pyrexia, and mode of delivery. The outcome of the puerperium was ascertained, in particular the occurrence of puerperal pyrexia and genital sepsis with associated bacteria. Also documented was the perinatal outcome, with an emphasis on the fetal birth weight, the Apgar score and the presence of neonatal sepsis. Deliberate efforts were made to identify any cases of neonatal sepsis (early-onset and/or late-onset) and the associated bacteriological agent.

Statistical Analysis
An analysis of events in the GBS-positive and GBS-negative groups was performed using the Fisher’s exact two-tailed and the χ² test using the SPSS (Statistical Package for the Social Sciences, Chicago, Ill., USA, Version 10 statistical package for Windows 2000).

Results
Of the 110 combined vaginal and anal specimens, 18 were positive for GBS, giving a prevalence of 16.4% for GBS colonization. The clinical characteristics of the study population are shown in table 1. The ratio of Kuwaitis/non-Kuwaitis in the entire study population was 2:1. Among the non-Kuwaitis were the following ethnic groups: Indians, Filipinos, Pakistanis, Bangladeshis, Arabs of various nationalities, and a very small number of Africans. Of the GBS-positive patients, 67% were Kuwaiti compared to 33% non-Kuwaiti, reflecting the Kuwaitito-non-Kuwaiti ratio of 2:1 in our clinic. Ethnicity, therefore, did not play any contributory role in GBS colonization in our study.

The mean age of the patients was 30.7 ± 5.5 years. The mean gestational age at the onset of delivery was 35.69 ± 2.25 and 39.07 ± 1.79 weeks, respectively. The incidence of recurrent spontaneous miscarriage was high (17.2%). The incidence of caesarean section of 22.5% and operative vaginal delivery (ventouse 8.2% and forceps 2.0%) was slightly higher than the normal rates of 20% for caesarean and 3–4% ventouse delivery, although the differences were not significant. The only fetal loss in the study was a fresh stillbirth due to abruptio placentae at 31 weeks gestation in a GBS-negative mother; the fetus was 1.312 kg at birth. No case of neonatal sepsis in either GBS-positive or GBS-negative patients was observed. Thus neither early-onset nor late-onset neonatal GBS disease was encountered. The Apgar scores and the average birth weight were within the normal range (table 2). The overall obstetric outcome of the patients was quite satisfactory. There were no cases of prolonged labour, prolonged rupture of membranes or intrapartum fever. The important antenatal events recorded were diabetes mellitus (16.6%), pregnancy-induced hypertension and hypertension (11.5%) and anaemia (3.5%). No patient volunteered a history of having delivered a previous child with GBS sepsis.

The influence of GBS colonization on pregnancy outcome is given in table 3. There was no significant difference in the ages of the patients among either GBS-positive patients (30.5 ± 5.5 years) or GBS-negative (30.7 ± 6.0 years), p < 0.89. The mean birth weights for the GBS-positive and -negative were 3,368 ± 388 g and 3,443 ± 348 g, respectively (p = 0.414). The mode of delivery was comparable in both groups. Positive GBS colonization did not have any significant effect on the outcome of the pregnancy. Three cases of puerperal sepsis (genital tract sepsis, 3.7%) were observed in the negative GBS subgroup.

Table 2. The obstetric outcome of the study population (n = 110)

<table>
<thead>
<tr>
<th>Event</th>
<th>Cases</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mode of delivery</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spontaneous vaginal delivery</td>
<td>66</td>
<td>67.3</td>
</tr>
<tr>
<td>Caesarean section</td>
<td>22</td>
<td>22.5</td>
</tr>
<tr>
<td>Ventouse</td>
<td>8</td>
<td>8.2</td>
</tr>
<tr>
<td>Forceps</td>
<td>2</td>
<td>2.0</td>
</tr>
<tr>
<td>Undelivered patients</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(at the end of study period)</td>
<td>12</td>
<td>10.9</td>
</tr>
<tr>
<td>Puerperal pyrexia</td>
<td>3</td>
<td>3.1</td>
</tr>
<tr>
<td>Fetal outcome</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apgar score</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>1.0</td>
</tr>
<tr>
<td>4–6</td>
<td>4</td>
<td>4.1</td>
</tr>
<tr>
<td>≥7</td>
<td>93</td>
<td>94.9</td>
</tr>
<tr>
<td>Mean birth weight, g</td>
<td>3,372.57 ± 547.00</td>
<td></td>
</tr>
</tbody>
</table>
### Table 3. The effects of GBS colonization on pregnancy outcome

<table>
<thead>
<tr>
<th>Event</th>
<th>Positive GBS colonization (n = 18)</th>
<th>Negative GBS colonization (n = 92)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>History of recurrent spontaneous miscarriage</td>
<td>5 27.8</td>
<td>14 15.2</td>
<td>0.098</td>
</tr>
<tr>
<td>Cervical cerclage in current pregnancy</td>
<td>1 5.6</td>
<td>9 9.9</td>
<td>0.284</td>
</tr>
<tr>
<td>Preterm labour</td>
<td>1 5.6</td>
<td>5 5.4</td>
<td>0.492</td>
</tr>
<tr>
<td>Apgar score 0</td>
<td>0 0</td>
<td>1 1.1</td>
<td>0.328</td>
</tr>
<tr>
<td>4–6</td>
<td>1 5.6</td>
<td>3 3.3</td>
<td>0.317</td>
</tr>
<tr>
<td>≥7</td>
<td>16 94.1</td>
<td>77 95.1</td>
<td>0.289</td>
</tr>
<tr>
<td>Neonatal sepsis</td>
<td>0 0</td>
<td>0 0</td>
<td></td>
</tr>
<tr>
<td>Puerperal sepsis</td>
<td>0 0</td>
<td>3 3.7</td>
<td>0.219</td>
</tr>
</tbody>
</table>

### Discussion

In this study, the incidence of GBS colonization of 16.4% is within the previously reported range of 11.4–26.5% [1, 2, 4, 15, 21, 22] in both developed and developing countries, and is similar in particular to rates of 12–22% for India/Pakistan, North Africa and the Middle East [22]. GBS colonization is thus a universal problem that requires appropriate measures for control and management.

Much background data and research including cost-benefit analyses have accumulated on GBS colonization in developed countries, and clear policies have been formulated for screening, prophylaxis and management including the use of vaccines [17–19]. Such guidelines should assist other countries in formulating their policies, but it is pertinent to state here that the acceptance and implementation of screening policies are limited, probably because of the improvement in the effects of GBS colonization on neonatal/maternal morbidity/mortality and the reduction in the incidence of the previously documented adverse pregnancy outcome due to GBS.

We did not observe any significant adverse effect on pregnancy outcome arising from GBS colonization, similar to previous reports [14, 15, 23]. However, this finding is contradicted by other studies [13, 24, 25] that report a significantly increased incidence of premature rupture of membrane (PROM) in GBS patients at 15.3% vs. others at 8.1% (p < 0.005), and preterm labour in GBS patients at 5.4% vs. others 1.8% (p < 0.005). Bacterial vaginosis [26] has been associated with increased risks of PROM and preterm labour, and when found in association with GBS, these risks are increased. In our study only 5.2% of the GBS patients had bacterial vaginosis and even in these cases, adverse pregnancy outcome was also absent. A heavy GBS colonization has been associated with increased risk of preterm low birth weight and preterm delivery, while light colonization did not lead to adverse pregnancy outcome [4]. We did not quantify the severity of GBS colonization in this study population, which was small compared to other studies.

The high incidence of past history of recurrent spontaneous miscarriage (RSM) in this study population was essentially due to the fact that a large proportion of the clinic population had a previous history of RSM. In any case, RSM did not play any relevant role in the obstetric outcome of the patients studied.

Although the high incidence of GBS colonization in this study is similar to that reported in developed countries where antenatal screening policies and prophylactic antibiotic prophylaxis are implemented in order to reduce possible adverse effects of GBS, we still support the introduction of antenatal screening for our clinic population. In view of the fact that our study population was small and there was no adverse obstetric effect of GBS colonization reported, and a cost-benefit analysis was not performed, one may question the basis and the benefits of recommending such a policy. However, considering available published data on GBS that have revealed adverse outcome due to GBS, including the fact that GBS is still the most frequent cause of neonatal sepsis [27], it is our considered opinion that we should not wait for adverse outcome before we introduce routine antenatal screening for GBS, particularly for patients at risk such as those with diabetes mellitus and or previous preterm delivery, PROM or low birth weight. Larger studies that will
include a cost-benefit analysis component are being planned so that appropriate policy for general routine antenatal screening for GBS in Kuwait can be formulated.

Conclusions

The incidence of 16.4% for GBS colonization in pregnant antenatal patients in Kuwait is high. Although GBS colonization did not show adverse effects, based on reported experience of adverse outcome in other studies, we recommend the implementation of antenatal screening for GBS for high-risk patients in our clinics.

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References