Group B streptococci (GBS) prevalence in pregnant women in Łódź region: an obstetrical approach and neonatal complications

MARcin SERAFIN, MARIA PROŚNIEWSKA, JAROSŁAW KAlINKA

Abstract

Background: Group B of Streptococci (GBS) is one of the major reasons of newborns morbidity. Early onset streptococcal disease (EOD) affects newborns, whose mothers were carriers of GBS in their genitourinary tract. The aim of this study was to assess GBS-prevalence in pregnant/labouring women in Łódź region, Poland and to assess its impact on neonatal morbidity. Methods: All 2222 women who gave birth in 2008 in the Department of Perinatology, Medical University of Łódź, were included in the survey. GBS was diagnosed based on vaginal culture. Results: 114 women had a GBS positive vaginal culture (5.13%). Only 13 (11.4%) of GBS positive women presented vaginal GBS culture results on admission. In 2008 only 16.7% of women received appropriate chemotherapy during the labour. EOD affected 12 (10.5%) of infants born from GBS positive mothers. EOD was diagnosed more frequently in group of preterm newborns (9.6-fold increased risk of EOD), when delivery was preceded by PPROM/PROM (9.7-fold increased risk) and when newborns were delivered by cesarean section (1.33-fold increased risk). In one case (0.88%) the infant death was noticed. Conclusions: Unknown GBS-status in pregnancy is serious problem in perinatal care leading to neonatal complication, which could be avoided if recommended simple microbiological examination were performed in 35-37 wks.

Key words: GBS, EOD, pPROM, prematurity, prevalence

Introduction

The colonization by some of the microorganisms in pregnant women is a significant risk factor of development of congenital infection in newborns [1-3] what could increase the risk of infants morbidity and mortality. The group B of Streptococci (GBS) is the family of comensal germs, which resides in lower part of intestinal and urogenital tract in up to 40% of women all over the world and 3.3-25.8% in Polish population of pregnant women [2, 4-9]. The relatively high incidence of GBS carriers among pregnant women is the major problem in eradication of bacteria. Group B of Streptococci includes Streptococcus agalactiae as the most important species. The maternal colonization of GBS shows no clinical signs but could constitute a significant factor of intrauterine infection. Bacteria colonize up to 50% of newborns from GBS-positive mothers. Congenital infection develops in 1-3% of these children, if appropriate chemoprophylaxis is not applied during the labour [1, 2, 4, 5].

Streptococcal early-onset disease (EOD) develops in newborns in first week after delivery (90% during first 72 h). It is associated with high mortality of infants (5-6% among mature infants and up to 25% among premature newborns). EOD appears commonly as bacteriemia, pneumonia, meningitis, sepsis and infection of urinary tract, osteomyelitis and/or arthritis [2, 3, 10].

There are varied epidemiological data according GBS carriers in Poland, including pregnant/labouring women. It is worth to know if the problem of GBS constitutes serious problem in Polish population, especially in cases of prematurity, severe infections and mortality [4].

The main aim of this study was to assess the GBS-prevalence in population of laboring women in Łódź region, to analyzed an obstetrical approach to Polish Gynecological Society recommendation concerning GBS in pregnancy and to evaluate the impact of GBS on neonatal morbidity.

Material and methods

We retrospectively analyzed all women who gave birth in the Department of Perinatology, Medical University of Łódź, Poland which constitutes the IIIrd referential center of perinatal care. Each woman who gave birth form 01 Jan 2008 to 31 Dec 2008 was included in this survey. Among all women GBS vaginal smear was collec-
tested on admission to the labour ward and then cultured on AMIES B091 medium manufactured by Zakład Two-
ryw Sztucznych, HAGMED, Poland. The stains, antibio-
gram and diagnostics were performed by NZOZ DIAG-
NOSTYKA, Laboratoria Medyczne, Łódź, Poland. Wo-
men with the GBS-positive stains were included in GBS-
positive group. The result of culture together with de-
tailed medical information concerning mother and the
newborns were recorded. Statistical analysis was per-
formed using statistical tools by Excel, MS Office 2003®.

Results

2222 women delivered in the Department of Peri-
natology, Medical University of Łódź, Poland in 2008,
while total number of 2254 infants were born in given
year. Among analyzed women who delivered in that pe-
riod, 114 (5.13%) had GBS positive vaginal culture. The-
re were no significant differences between GBS-positive
women and general population (characteristics shown in
Table 1). In GBS-positive group 16 of women (14.04%) had a MLSB-stains (resistance to macrolide, lincosamide
and streptogramin B type antibiotics) result in antibio-
gram. In our study 24 cases had previously treated vagi-
nal infection during pregnancy (21.1%).

Table 1. Characteristics of GBS-positive women
and general non-GBS population

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>GBS-POSITIVE</th>
<th>NON-GBS POPULATION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Maternal Age</td>
<td>29.14</td>
<td>4.5</td>
</tr>
<tr>
<td>Height</td>
<td>166.51</td>
<td>6.31</td>
</tr>
<tr>
<td>Weight</td>
<td>75.64</td>
<td>10.53</td>
</tr>
<tr>
<td>Gravidity</td>
<td>1.61</td>
<td>0.77</td>
</tr>
<tr>
<td>Parity</td>
<td>1.48</td>
<td>0.63</td>
</tr>
<tr>
<td>Gestational age at delivery (wks)</td>
<td>38.83</td>
<td>2.04</td>
</tr>
</tbody>
</table>

Only 13 (11.4%) of GBS-positive women presented
result of GBS-culture on admission. In that group 92.3%
(n = 12/13) of those women had correct chemoprophy-
laxis applied during the labour.

Retrospective analysis showed that in total group of
114 GBS-positive women only in 19 cases (16.67%) an
appropriate chemoprophylaxis was applied according to
the recommendation. That group of GBS-positive woman
included 12/13 patients with known GBS-status and
7/101 women with unknown GBS-status. In further 10
(8.77%) cases the approach was partially correct (not
recommended antibiotic agent was given i.e. cefuroxime
or gentamycine if rupture of membranes was diagnosed).
That group included only GBS-positive woman with un-
known GBS-status.

In our group of GBS positive mothers only 1 (0.88%) case of maternal complication (i.e. puerperal infection)
was noticed.

In comparison of pregnancy outcome the GBS posi-
tive pregnancies tend to result more often in vaginal
delivery than in general population (72.81% vs. 52.12%). Prematurity appeared in 8.3% of GBS-positive preg-
nancies while in 5.26% in general non-GBS population.

PTD (preterm delivery) affected 6 (5.26%) of pregnan-
cies from GBS-positive group and 5 (4.38%) of them
were followed by pPROM (preterm premature rupture
of membranes). The comparison of pregnancy outcome
in GBS and non-GBS groups is shown in Table 2.

Table 2. Comparison of pregnancy outcome
in GBS-positive and in non-GBS women

<table>
<thead>
<tr>
<th>Pregnancy outcome</th>
<th>GBS-POSITIVE</th>
<th>NON-GBS POPULATION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Term deliveries</td>
<td>108</td>
<td>94.74</td>
</tr>
<tr>
<td>Preterm deliveries</td>
<td>6</td>
<td>5.26</td>
</tr>
<tr>
<td>Vaginal Deliveries</td>
<td>83</td>
<td>72.81</td>
</tr>
<tr>
<td>S.C. – cesarean section</td>
<td>31</td>
<td>27.19</td>
</tr>
</tbody>
</table>

Infants born from GBS-positive women had higher
mean birthweight (3380.26 g vs. 3034.4 g). There were
no significant differences in Apgar score (9.46 vs. 9.64),
although the death rate was higher in GBS-positive
group (0.88% vs. 0.4%). The neonatal outcomes (infants
born from GBS-positive group) is presented in Table 3.

Table 3. Characteristics of infants born
from GBS-positive women

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Mean</th>
<th>SD</th>
<th>Min</th>
<th>Max</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth Weight (g)</td>
<td>3380.26</td>
<td>488.79</td>
<td>700</td>
<td>4640</td>
<td>114</td>
<td>100</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>51</td>
<td>44.74</td>
</tr>
<tr>
<td>male</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>63</td>
<td>55.26</td>
</tr>
<tr>
<td>Apgar score</td>
<td>9.46</td>
<td>0.99</td>
<td>5</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hospitalisation (days)</td>
<td>3.52</td>
<td>2.1</td>
<td>1</td>
<td>15</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
ected 12 (10.52%) of infants born from GBS-positive mo-
thers. None of GBS-positive mother that gave birth to
EOD-affected infants received any prophylaxis during the
labour.

In group of EOD-affected neonates 4 were delivered
before term and 8 were term newborns. In whole group
of infants affected with EOD (n = 12), 8 (66.7%) were
delivered vaginally while in 4 (33.3%) cases cesarean
section were performed. Subgroup analysis showed that
EOD appeared more often when vaginal delivery (VD)
was performed (3-fold higher in PTD subgroup; 1.5-fold
higher in term delivery subgroup) comparing to cesa-
rean section (SC). In 5 (41.7%) newborns after VD and
2 (16.7%) after SC inappropriate chemoprophylaxis du-
ring labour was applied.

Table 4. Neonatal complications in infants born
from GBS-positive woman

<table>
<thead>
<tr>
<th>Complications</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pneumonia</td>
<td>9</td>
<td>7.89</td>
</tr>
<tr>
<td>Congenital infection</td>
<td>3</td>
<td>2.63</td>
</tr>
<tr>
<td>EOD*</td>
<td>12</td>
<td>10.52</td>
</tr>
<tr>
<td>Icterus</td>
<td>4</td>
<td>3.51</td>
</tr>
<tr>
<td>Dermatitis/ Conjunctivitis</td>
<td>2</td>
<td>1.75</td>
</tr>
<tr>
<td>Neonatal death</td>
<td>1</td>
<td>0.88</td>
</tr>
<tr>
<td>GBS (+) culture</td>
<td>6</td>
<td>5.26</td>
</tr>
<tr>
<td>Antibiotics</td>
<td>10</td>
<td>8.77</td>
</tr>
</tbody>
</table>

*EOD=Pneumonia+Congenital infection

We noticed one case (0.88%; vs. 0.4% in general non-
GBS population) of neonatal death due to congenial in-
fecion (EOD) in premature infant born in 24 week of ge-
station by vaginal delivery which was preceded by
pPROM. In this case an appropriate therapy with antibio-
tics was applied. All neonatal complications are shown in
Table 4.

Discussion

Results of this study showed that 5.13% of delivering
women had GBS positive vaginal culture.

In our study 92.3% (n = 12/13) GBS-positive woman
with known GBS-status on admission received appro-
priate chemoprophylaxis during the labour. In contrast
only 15.8% (n = 16/101) of GBS-positive women with
unknown GBS-status on admission received any chemo-
 prophylaxis. The most surprising result of our study is
the observation that 74.5% (n = 85) of GBS-positive wo-
men received no chemoprophylaxis during the delivery.

The major reason of this situation is that despite pre-
viously published ACOG and CDC recommendations [11]
which advised antenatal GBS-culture examination bet-
 tween 37-37 weeks of gestation in 2008 there was still
high rate of pregnant patients with unknown GBS-status
presented on admission to the delivery room. We should
also remember that Polish Gynecological Society recom-
 mendation was published in 2008 so it was relatively
short period for its wide introduction to general ob-
stetrical practice [15].

From the other side the problem of GBS-carriers in
our population seems not to be as big as it is in other
populations (5.13%). Other Polish perinatal centers re-
ports variable prevalence of GBS-carriers among preg-
nant woman from 3.3 to 25.8% [4, 5, 8, 9] Given re-
commendations stands that anovaginal smears should be
collected form pregnant woman [11, 15], while only
vaginal swab on admission was taken during this study.
One of the problems with vaginal GBS culture is that the
microbiological preparation needs relatively long time
[2, 18, 19]. Normally microbiological culture takes a few
days, which is too long for patients with advanced labour.
So quick bed-side tests are needed to assess GBS-status
of patients who were not examined between 35-37wks or
for preterm delivering patients. Quick bedside-test are
now available and this could be good solution for this
problem [18].

Early onset streptococcal disease of newborns (EOD)
appears more frequently in cases of prematurity (9.6-
fold) and pPROM/PROM (9.7-fold) in the population of
infants born from mothers affected with GBS. It seems
that these perinatal conditions should be considered as
a significant risk factors for development of EOD among
GBS-positive women. This observations confirm results
of other studies [1-5, 11-14]

In our group of infants born from GBS-positive mo-
thers neonatal deaths occurred twice as often as in
general population (0.88% vs. 0.4%). Other studies also
report that EOD increases neonatal death rate among
those infants. Some of the researchers noticed even over
25% of deaths in similar group [1, 2, 4]. The explanation
for relatively low neonatal mortality rate observed in our
study could be very well trained and educated neonatal
and intensive care personnel, who has a great experien-
ce in severe neonatal pathologies supplied by the most
advanced medical equipment. From the other hand only
1 case of neonatal death among 114 of infants included
in that survey is not a significant number in any analysis.
Some further observations are needed to get more pre-
cise data about death ratio among infants due to EOD.
Also surprisingly, the frequency of EOD in whole group of infants born from GBS positive women was 1.33-fold greater if cesarean section was performed as compare to vaginal delivery. Other authors’ results show no such an observation [2]. According to recommendation and various data cesarean section should prevent EOD infection among infants [11, 15]. Probably one of the reasons of observed high rate of infection among GBS-positive mothers who underwent cesarean section were the unknown status of vaginal culture in mothers, when cesarean section was preceded by pPROM/PROM. Other reason of such a condition may be the lack of appropriate chemoprophylaxis during the labour [10, 16, 17].

According to our results 10.52% of EOD-complicated outcomes (including one neonatal death) in neonates might be avoided when appropriate chemoprophylaxis was applied.

More accurate data according rate of maternal colonization and infections in infants is needed. Precise identification of GBS based on serological methods may result in accurate strategies of prevention and treatment of GBS infections in pregnant women decrease obstetrical complications and congenital infections in newborns [2, 10, 18]. Unknown GBS-status of pregnant woman is still serious problem in perinatal care that leads to neonatal complication, which could be avoided if recommended simple microbiological examination was correctly performed in 35-37 weeks of gestation.

References