

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

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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 chemoprophylaxis 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 PPRM/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 analyze 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 from 01 Jan 2008 to 31 Dec 2008 was included in this survey. Among all women GBS vaginal smear was collec-

ted on admission to the labour ward and then cultured on AMIES B091 medium manufactured by Zakład Tworzyw Sztucznych, HAGMED, Poland. The stains, antibiogram and diagnostics were performed by NZOZ DIAGNOSTYKA, Laboratoria Medyczne, Łódź, Poland. Women with the GBS-positive stains were included in GBS-positive group. The result of culture together with detailed medical information concerning mother and the newborns were recorded. Statistical analysis was performed using statistical tools by Excel, MS Office 2003®.

Results

2222 women delivered in the Department of Perinatology, 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 period, 114 (5.13%) had GBS positive vaginal culture. There 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 antibiogram. In our study 24 cases had previously treated vaginal infection during pregnancy (21.1%).

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

Characteristics	GBS-POSITIVE		NON-GBS POPULATION	
	Mean	SD	Mean	SD
Maternal Age	29.14	4.5	30.16	4.56
Hight	166.51	6.31	165.56	5.32
Weight	75.64	10.53	78.83	14.74
Gravidity	1.61	0.77	1.69	0.95
Parity	1.48	0.63	1.51	0.81
Gestational age at delivery (wks)	38.83	2.04	37.85	2.96

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 chemoprophylaxis 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 unknown 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-positive 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 pregnancies while in 5.26% in general non-GBS population. PTD (*preterm delivery*) affected 6 (5.26%) of pregnancies 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

Pregnancy outcome	GBS-POSITIVE		NON-GBS POPULATION	
	<i>n</i>	%	<i>n</i>	%
Term deliveries	108	94.74	2066	91.7
Preterm deliveries	6	5.26	188	8.3
Vaginal Deliveries	83	72.81	1158	52.12
S.C. – cesarean section	31	27.19	1064	47.88

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

Characteristics	Mean	SD	Min	Max	<i>n</i>	%
Birth Weight (g)	3380.26	488.79	700	4640	114	100
Sex						
female					51	44.74
male					63	55.26
Apgar score	9.46	0.99	5	10		
Hospitalisation (days)	3.52	2.1	1	15		

6 of neonates born from GBS-positive mothers (5.26%) presented GBS-positive cultures and 8.77% ($n = 10$) needed therapy with antibiotics. EOD presented as congenital infection or X-ray confirmed pneumonia, affe-

cted 12 (10.52%) of infants born from GBS-positive mothers. 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 cesarean section (SC). In 5 (41.7%) newborns after VD and 2 (16.7%) after SC inappropriate chemoprophylaxis during labour was applied.

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

Complications	<i>n</i>	%
	18	15.79
Pneumonia	9	7.89
Congenital infection	3	2.63
EOD*	12	10.52
Icterus	4	3.51
Dermatitis/ Conjunctivitis	2	1.75
Neonatal death	1	0.88
GBS (+) culture	6	5.26
Antibiotics	10	8.77

*EOD=Pneumonia+Congenital infection

We noticed one case (0.88%; vs. 0.4% in general non-GBS population) of neonatal death due to congenial infection (EOD) in premature infant born in 24 week of gestation by vaginal delivery which was preceded by pPROM. In this case an appropriate therapy with antibiotics 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 appropriate chemoprophylaxis during the labour. In contrast only 15.8% ($n = 16/101$) of GBS-positive women with unknown GBS-status on admission received any chemoprophylaxis. The most surprising result of our study is the observation that 74.5% ($n = 85$) of GBS-positive women received no chemoprophylaxis during the delivery.

The major reason of this situation is that despite previously published ACOG and CDC recommendations [11] which advised antenatal GBS-culture examination between 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 recommendation was published in 2008 so it was relatively short period for its wide introduction to general obstetrical 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 reports variable prevalence of GBS-carriers among pregnant woman from 3.3 to 25.8% [4, 5, 8, 9] Given recommendations 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 mothers 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 experience 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 precise 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.

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