



G-1461

SEROTYPE DISTRIBUTION OF GROUP B STREPTOCOCCI (GBS) IN BELGIUM: ISOLATES FROM NEONATAL INFECTION COMPARED TO ISOLATES FROM INFECTION IN ADULT OR COLONIZATION IN PREGNANT WOMAN

P.Melin, D.Keke, B.Campo, M.P. Hayette, G.Christiaens and P. De Mol
Belgian reference laboratory for GBS, medical microbiology, University Hospital of Liège, Liège, Belgium



Medical Microbiology, CHU, B-23
Sart Tilman - B 4000 Liège, BELGIUM
Phone: (32)4 366 24 38; Fax: (32)4 366 24 40
Email: Pierrette.Melin@chu.ulg.ac.be

ABSTRACT

Background: Group B Streptococci cause invasive disease in neonates, pregnant women and non-pregnant adults. In the last decades capsular serotypes Ia, Ib, II and III caused the majority of clinical diseases. More recently, in North America, serotype V emerged as the more common serotype in non-pregnant adults with invasive disease.

Methods: From January 1999 through December 2001, we received and serotyped a total of 334 clinically significant strains of GBS isolated in the laboratories belonging to the Belgian network for epidemiological surveillance. 113 were recovered from neonates' blood or cerebrospinal fluid (62 early onset EOD, 21 late onset LOD), 15 were isolated from pregnant women with severe infections and 206 were recovered from adults with invasive disease. From the same laboratories, during the first trimester of 2002, 322 isolates from pregnant women were also serotyped (max 5 isolates/lab).

Results: In neonatal EOD, serotype III was the more common (41.3%) followed by II (19.6%), Ia (16.3%), Ib (13%) V (8.7%) and IV (1.1%), whereas serotype III caused the majority (65.7%) of LOD cases. In adults, all serotypes were well represented except type IV: 20.3% Ia, 12.7% II, 23.1% III, 2.7% IV, 19% V and 9% remained not typeable (NT). In colonized pregnant women, all serotypes were also well represented except type IV: 25.5% Ia, 13.3% Ib, 14.9% II, 17.7% III, 5% IV, 15.5% V and 8.1% remained NT. Serotype III was more frequently the cause of EOD than in colonized pregnant women, and in contrast NT isolates did not cause EOD ($P < 0.001$).

Conclusions: 1) Type III was still the major serotype in neonatal infections in Belgium. 2) Serotype distribution of GBS differed by age-group of patients 3) Serotype V belonged to the 3 more represented serotypes in adults 4) Compared to colonizing GBS in pregnant women, distribution of serotypes causing EOD was different

BACKGROUND

Group B streptococci (GBS) or *Streptococcus agalactiae* continue to be a major cause of life-threatening infections, sepsis, pneumonia and meningitis in neonates. In the early onset disease, they are infected with the strain colonizing their mother's vagina. GBS have been also recognized as an important cause of invasive disease in pregnant and non-pregnant adults.

For preventing most neonatal GBS disease, strategies have focused on antimicrobial prophylaxis, but alternatively effort to develop effective vaccines are ongoing. On the basis of capsular polysaccharide antigens, GBS are subdivided into serotypes (Ia, Ib, II - VIII). In neonates, the presence of antibodies to type specific antigen is the major determinant of their immunity to GBS. The prevalence of different serotypes varies according to time and geographic locations. Therefore, ongoing surveillance of GBS serotype distribution is essential for developing and formulating the appropriate vaccine.

OBJECTIVES

To establish the current Belgian distribution of GBS serotypes causing infections in different patients' age-groups or colonizing pregnant women.

MATERIAL & METHODS

Bacterial isolates

◆ **From patients with invasive GBS infection:** From January 1999 through December 2001, laboratories belonging to the national surveillance network, sent to the Belgian reference laboratory for GBS, a total of 334 GBS isolated from invasive infections (see table1)

Table 1: Description of 334 strains of GBS isolated from invasive disease : Age groups and diagnostics (01.1999 - 12.2001, Belgium)

Patients	Diagnostic	Number (%)
Neonates	Early Onset Disease (EOD) Late Onset Disease (LOD)	113 (81.4) (18.6)
Pregnant Women	Bacteremia, chorioamnionitis, etc.	15
Non-Pregnant Adults	Bacteremia Skin and soft tissue infection ± bacteremia Septic arthritis, osteomyelitis ± bacteremia Pneumonia ± bacteremia Severe urinary tract infection ± bacteremia Meningitis, endocarditis, others	206 (54.8) (25.7) (5.3) (3.9) (4.4) (5.8)

◆ **GBS isolated from prenatal vaginal screening :** All the laboratories of the same network, were invited to forward 1 to 5 isolates of GBS colonizing pregnant women through January to March 2002: 68 laboratories forwarded a total of 322 isolates.

Serotyping

Upon receipt, the isolates were confirmed as belonging to group B. Serotyping was performed by a coagglutination method: GBS Serotyping Test (ESSUM, Denmark). The typing set included reagents specific for polysaccharidic antigens Ia, Ib, II, III, IV and V.

Statistics

Distribution of GBS serotypes within the different groups were compared by the chi-square test.

RESULTS

Table 2: Distribution of GBS serotypes among different groups of Belgian patients, from 1999 through 2001 and from January through March 2002 (Percent with serotype)

Serotypes	Neonates EOD	LOD	Infected Adults (Pregnant or not)	Colonized Pregnant Women
Ia	16.3	4.8	20.3	25.5
Ib	13	4.8	12.7	13.3
II	19.6	0	13.1	14.9
III	41.3	85.7	23.1	17.7
IV	1.1	0	2.7	5
V	8.7	4.8	19	15.5
NT	0	0	9	8.1
Total No.	92	21	221	322

Figure 1 : Comparison between distributions of GBS serotypes:
- EOD / Prenatal colonization
- EOD / Infections in adults
- Prenatal colonization / Infections in adults

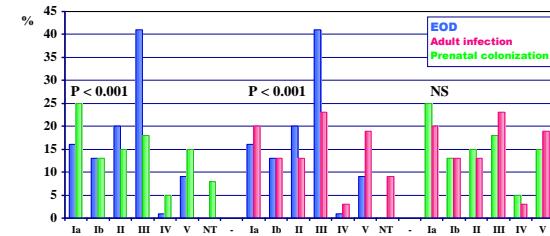
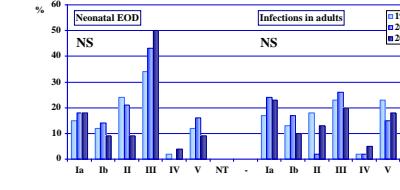


Figure 2 : Annual distribution of serotypes of EO neonatal GBS infections and infections in adults



NS : The distribution is not significant at the .05 level

DISCUSSION AND CONCLUSION

◆ Serotype III predominant in neonatal infections

In this study of the serotype distribution of GBS isolated from neonates since 1999, we showed that serotype III, followed by serotypes Ia/b and II had predominantly caused EOD, whereas serotype III alone caused 85.7 % of LOD. These distributions are consistent with the results of population-based studies from Canada. Similar to our population, serotype III was also the most common serotype causing neonatal infections in Canada or Finland, accounting for more than 40% of all cases whereas it was less in other reports from the US. In our study, serotype V accounted for 8.7% in EOD, which is between the occurrence reported in North America, around 15% and in Finland, 1%. In our series, non-typable isolates had not caused any neonatal EOD or LOD.

◆ All serotypes well represented in adults, except serotype IV

The distribution of serotypes among adults with invasive disease and in women colonized during pregnancy, were not different. Serotypes Ia, III and V were predominant.

◆ Difference between serotype distributions in neonatal EOD, in adults and in pregnant women

The serotype distribution of isolates causing neonatal EOD was significantly different from serotype distribution in adults with invasive infection ($P < 0.001$), but it was also different from the serotype distribution of colonizing strains during pregnancy ($P < 0.001$). Even though rate of GBS vertical transmission from mother to infant has been shown independent from serotype, our data suggest a higher virulence for serotype III isolates or an increased neonatal susceptibility to this serotype.

◆ No significant change in serotype distribution over a 3-year period

These data highlight :

- ◆ The importance of ongoing national monitoring of serotypes to ensure appropriateness of protective human GBS vaccine introduction.
- ◆ The major responsibility of serotype III in neonatal infections

REFERENCES

- Baker CJ. Vaccine prevention of group B streptococcal disease. *Pediatr Ann* 1993;22:711-4
- Blumberg HM, Stephens DS, modansky M et al. Invasive group B streptococcal disease: the emergence of serotype V. *J Infect Dis* 1996;173:365-73
- CDC. Review of perinatal group B streptococcal disease: a public health perspective. *MMWR* 1996;45 (RR-7)
- Schuchat A and Wenger JD. Epidemiology of group B streptococcal disease: risk factors, prevention strategies, and vaccine development. *Epidemiologic Reviews* 1994;16:374-402
- Davies D et al. Population-based active surveillance for neonatal group B streptococcal infections in Alberta, Canada: implications for vaccine formulation. *Pediatr Infect Dis J* 2001;20:879-94
- Harrison LH, Elliott JA, Dwyer DM et al. Serotype distribution of invasive group B streptococcal isolates in Maryland: implication for vaccine formulation. *Maryland Emerging Infections Program. J Infect Dis* 1998;177:998-1002
- Kalliolela S, Vuopio-Varkila J, Takala AK, Eskola J. Neonatal group B streptococcal disease in Finland: a ten-year nationwide study. *Pediatr Infect Dis J* 1998;18:806-10