Risk factors for maternal colonization with group B β -hemolytic streptococci

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Colonization with group B β -hemolytic streptococci (GBS) at any time during pregnancy is an important risk factor for neonatal sepsis. To determine which groups of pregnant women are at high risk for GBS, a retrospective chart review was conducted on 608 pregnant women who had recorded data on prenatal charts and were seen between October 1995 and December 1997 at a family practice-run prenatal clinic. A total of 543 subjects were studied after exclusion of women who had no results of GBS colonization recorded. Demographically, the study population comprised 91.1% white non-Hispanic, 4.8% African-American, 1.5% Asian, and 2.6% white Hispanic women; 28.9% were primiparas, 38.9% unmarried; 60.0% low income; 31.1% smokers, 7.7% with a history of drug or alcohol use; 8.4% with a history of sexually transmitted disease; and 27.2% with fewer than 11 prenatal visits. The mean age was 26.4 years (range, 14 to 42 years). Seventy-six (14.0%) of the study subjects were colonized with GBS. White non-Hispanic women had a GBS colonization prevalence of 13.6%; for all others, prevalence was 18.7%. No statistically significant differences were found in regard to age, weight, number of prenatal visits, income level, marital status, history of drug use, or parity. The GBS colonization rate for smokers was 33.1% versus 16.4% for nonsmokers ($P=.012$).

Maternal colonization of GBS was not found to be associated with any of the risk factors studied, other than smoking. This study identified smoking as a possible risk factor for GBS infection. Routine screening for GBS infection during pregnancy may be beneficial because no strong risk factors for colonization exist.

(Key words: Group B β -hemolytic *Streptococcus*, pregnancy, colonization)

Group B β -hemolytic streptococcal (GBS) infection is the most common neonatal infection in the United States and Europe.^{1,2} Between 1 per 1000 and 3 per 1000 live births are infected, with

a 5% to 20% mortality rate among the infected.^{3,4} The vertical transmission rate has been reported at 1% to 2%.^{2,5} Rates of maternal colonization of GBS vary from 1.6% to 40.0%.¹⁻³

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It has been proven in several randomized controlled trials that intrapartum antibiotics given to GBS-carrier mothers can prevent neonatal infections.⁴ Yet, screening for GBS colonization is controversial. Currently, the Centers for Disease Control and Prevention (CDC) recommends two different options for prevention of neonatal GBS infection:

- ☐ a screening-based approach that advocates screening all pregnant women at 35 to 37 weeks' gestation and treating all patients who test positive, and
- ☐ a risk-factor approach that entails no screening for GBS infection but simply recommends treatment of all patients with identified risk factors.

Our study was designed to determine risk factors for maternal colonization with GBS during pregnancy.

Materials and methods

Retrospective review was conducted on the charts of 608 women seen in a family practice resident-run prenatal clinic at Wilson Regional Medical Center, Johnson City, NY between October 1995 and December 1997. The clinic policy is to test routinely for GBS colonization. The medical center serves a small urban center with a large rural population in the southern tier of New York State. The family practice prenatal clinic staff comprises residents and attending physicians. Charts of 65 of the 608 study subjects were excluded as no results for GBS colonization were recorded. This excluded group did not differ with regard to age, weight, or GBS colonization by risk factor. A total of 543 charts were available for analysis. Eligibility criteria were:

■ Subjects must have attended the clinic during the study period, October 1995 through December 1997.

■ Culture for GBS must have been done and recorded on the chart.

Vaginal and anal cultures were obtained at a mean (SD) of 36 (2) weeks' gestation with a sterile cotton swab. The swab was then transported to the hospital laboratory and placed in Lim culture medium.

The standard prenatal forms from the American College of Obstetricians and Gynecologists (Washington, DC) were

Table 1
Group B β -Hemolytic Streptococcal (GBS) Colonization by Risk Factors (N=543)

Characteristic	No. (%)	GBS maternal colonization positive No. (%)	P value
■ Race ☐ White non-Hispanic ☐ Other	495 (91.1) 48 (8.9)	39 (13.6) 10 (16.7)	NS*
■ Income level ☐ High ☐ Low	217 (40.0) 326 (60.0)	31 (14.3) 41 (12.6)	NS
■ Marital status ☐ Married ☐ Not married	332 (61.1) 211 (38.9)	52 (15.7) 23 (10.9)	NS
■ Smoking ☐ Smoker ☐ Nonsmoker	169 (31.1) 374 (68.9)	24 (33.1) 61 (16.4)	.001
■ Drug or alcohol use ☐ Positive ☐ Negative	42 (7.7) 501 (92.3)	3 (7.1) 73 (14.6)	NS
■ STD† history ☐ Positive ☐ Negative	70 (8.4) 473 (91.6)	10 (14.3) 65 (13.7)	NS
■ Parity ☐ Primipara ☐ Multipara	157 (28.9) 386 (71.1)	20 (12.7) 56 (14.5)	NS

* NS = Not significant.
† STD = Sexually transmitted disease.

reviewed to obtain data on the major risk factors of pregnancy such as parity, marital status, history of sexually transmitted diseases (STDs), history of tobacco and alcohol use, number of prenatal visits, race, age, and weight. Prevalence rates for GBS colonization were determined for the practice group.

All data were analyzed by use of the Statistical Package for the Social Sciences (SPSS) 6.1 for Windows software. Categorical variables were evaluated using the χ^2 -test, and continuous variables were evaluated using the Student's *t*-tests.

Results

The study population comprised 495 (91.1%) white non-Hispanic, 26 (4.8%) African-American, 8 (1.5%) Asian, and

14 (2.6%) white Hispanic women. One hundred fifty-seven (28.9%) of the subjects were primipara; 211 (38.9%) were unmarried; 326 (60.0%) had low income; 169 (31.1%) were smokers; and 42 (7.7%) had a history of drug or alcohol use (Table 1).

The mean age was 26.4 years, with a range of 14 to 42 years. Because of the large portion of white non-Hispanic subjects in this sample, all other races were condensed into one category (other) for subsequent analyses.

Seventy-six (14%) of all subjects were colonized with GBS. By race, the prevalence of colonization with GBS was 13.6% for white non-Hispanic women and 16.7% for others.

No statistically significant differences

were found with respect to age, weight, number of prenatal visits (Table 2), income level, marital status, history of drug and alcohol use, or parity. Primiparas had a GBS colonization rate of 12.7%, and multiparas, 14.5% ($P=.79$). The single statistically significant difference that was found showed smoking to be a major risk factor ($P=.012$). A Pearson's correlation was calculated on the smoking variable ($r=.108$). A multivariate logistic analysis of variables revealed no significant associations.

Discussion

Screening for GBS infection during pregnancy is a controversial subject. The current CDC recommendations are to screen all pregnant women for GBS infection

Table 2
Colonization of Group B β -Hemolytic Streptococci (GBS)

Variable	Culture for GBS		P value
	Positive, (n=76) Mean (SD)	Negative, (n=459) Mean (SD)	
☐ Age, y	27.3 (6.0)	26.2 (6.3)	NS*
☐ Weight, pounds	152.5 (39.8)	153.1 (40.4)	NS
☐ Prenatal visits, No.	13.2 (3.5)	12.0 (4.1)	NS

*NS = Not significant.

late in pregnancy and to treat those women who test positive at 36 weeks, at the time of delivery. The CDC recommendations include the insertion of a swab into two sites (vaginal orifice and anus) and the culturing on selective media in order to maximize the reported number of women truly colonized.³

The other option is *not* to screen and to treat patients for clinical signs of amnionitis during labor or antepartum risk factors such as GBS bacteriuria during pregnancy or having a previous infant infected with GBS. Critics point out that this approach may lead to a slightly higher incidence of neonatal GBS infection.⁶

In contrast to other studies that have demonstrated an increased prevalence of GBS infection in older women with increased parity,^{7,8} our study did not show this association, although numbers of subjects in our study were limited.

Our study confirmed a report by Regan and colleagues⁷ that demonstrated that smoking may be weakly predictive of GBS colonization. The proportion of smokers among the study subjects (31.1%) was higher than the national average of around 16%⁹; however, according to tables published on the Internet,⁹ 29.0% of pregnant women with 9 to 11 years of education in 1993 smoked. Our clinic population was heavily represented by women who fit this criterion.

Studies have reported the prevalence of GBS colonization to be from 1.6% in certain populations to as high as 40%.^{1,5}

The overall prevalence of GBS colonization in our study was 14%.

Previous studies have demonstrated a higher prevalence of GBS colonization among different races.³ Our study did not show any significant difference between the racial groups we studied; however, the proportion of minorities is low in our community.

Although other studies have noted a higher prevalence of GBS infection in women infected with *Neisseria gonorrhoeae*,⁷ our findings did not reveal a higher colonization for women with any STD. None of the subjects in our study was positive for the human immunodeficiency virus.

Comment

We observed that the prevalence of GBS colonization is not associated with any of the risk factors that we examined other than smoking. Based on major risk factors identified from prenatal records, pregnant patients cannot be easily categorized into high-risk groups for colonization of GBS. Universal screening of all pregnant women for GBS colonization, as is done in many centers, may be a prudent practice.

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References

1. Eidelman AI, Rudensky B, Turgeman D, Nubani N, Schimmel MS, Isacson M. Epidemiology of group B streptococci colonization and disease in mothers and infants. Update on ongoing 10-year Jerusalem study. *Isr J Med Sci* 1990;26:71-73.
2. American College of Obstetricians and Gynecologists. Group B streptococcal infections in pregnancy. *ACOG Technical Bulletin* 1992; 170:1-5.
3. Schuchat A, Whitney C, Zangwill K. Prevention of perinatal group B streptococcal disease: a public health perspective. *MMWR* 1996;45:1-23.
4. Jeffery HE, McIntosh EDG. Antepartum screening and nonselective intrapartum chemoprophylaxis for group B streptococcus. *Aust NZ J Obstet Gynaecol* 1994;34(1):14-19.
5. Lakshmi V, Das S, Shivananda PG, Savitri P, Rao K. Incidence of group-B beta haemolytic streptococci in the vaginal flora of pregnant women. *Indian J Pathol Microbiol* 1988;31:240-244.
6. Schaaf V, Hlaing V. Group B streptococcal colonization in pregnancy. *Obstet Gynecol* 1976; 47:719-721.
7. Regan JA, Klebanoff MA, Nugent RP. The epidemiology of group B streptococcal colonization in pregnancy. *Obstet Gynecol* 1991; 77:604-610.
8. Orrett FA, Olagundoye V. Prevalence of group B streptococcal colonization in pregnant third trimester women in Trinidad. *J Hosp Infect* 1994; 27:43-48.
9. National Center of Health Statistics. Available on World Wide Web at www.cdc.gov/nch-sswww/