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Original Research Article

Prevalence and risk factors for group B streptococcal colonization in pregnant women in northern India

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ABSTRACT

Background: Group B Streptococci are a constituent of the normal vaginal bacterial microflora. During pregnancy there are optimal conditions for GBS multiplication in the vagina, which may have serious consequences for both the mother and her child. Aims: To study the prevalence of Group B Streptococcal colonization in pregnant women in Eastern U.P and antibiogram of the isolates (GBS) with a view to determine the pattern of antibiotic resistance. Study design: Observational cross-sectional study.

Methods: 300 pregnant women admitted at term gestation or with preterm labour were recruited in the study. Swabs were taken from the lower one third of vagina and the anorectal region and then placed in Todd-Hewitt Broth, an enrichment media for GBS and later subcultured on blood agar. It was then examined for beta haemolytic colonies. The Chi-square test and Fisher's exact test were used to compare the two groups. P values <0.05 were considered statistically significant.

Results: The culture positivity rate of GBS was 2%. Significant association was found with increasing age, gravidity (Age>30 years, p<0.012; Gravida>3, p<0.03), and higher socioeconomic status (p<0.007). No significant association found between GBS colonization and level of education, urban/rural area and gestational age. Prevalence of GBS in PROM was 5.6% and in preterm labour 3.3%. All the isolates were sensitive to ampicillin and resistant to gentamicin.

Conclusions: GBS colonization among pregnant women was significantly correlated with age, parity and socioeconomic status. In pregnancy GBS colonization can cause premature rupture of membranes and preterm labour.

Keywords: Group B streptococcus, Pregnancy, Puerperium

INTRODUCTION

The Group-B Streptococci (GBS) are known to cause a wide variety of infections in adults, but clinical interest in these bacteria mainly relates to their ability to cause serious neonatal illness, especially meningitis and sepsis. The primary risk factor for neonatal GBS infection is the maternal colonisation with the organism. This is also the basis of preventive strategies in western countries. According to studies, the GBS vaginal colonisation rates

in Europe ranged from 6.5% to 36% which is similar to United States where colonization is reported from 10-30% in pregnant women.^{1,2} However in developing countries like India, the problem has not been adequately studied and there are only a few studies available.³

GBS is a gram positive diplococcus that is beta haemolytic, meaning that it shows complete haemolysis on blood agar plates. GBS also produces type specific polysaccharides antigens that encapsulate the organism

and allow its classification into five serotypes. All the capsular polysaccharides have a terminal sialic acid side chain which is their major antigenic determinant. GBS are a constituent of the normal vaginal bacterial microflora, which often do not demonstrate any clinical symptoms. Approximately 10%–30% of pregnant women are colonized with GBS in the vagina or rectum.^{4,5} GBS colonization during pregnancy can be transient, intermittent, or persistent.⁶ The gastrointestinal tract serves as the primary reservoir for GBS and is the likely source of vaginal colonization. Heavy colonization, defined as culture of GBS from direct plating rather than from selective broth only, is associated with higher risk for early-onset disease in newborns.⁷ Although early-onset GBS disease in newborns has become relatively uncommon in western countries in recent years due to effective screening programmes and intrapartum antibiotic prophylaxis strategies, however the rates of maternal GBS colonization remain unchanged since the 1970s.⁸ The Centres for Disease Control (CDC) recommends that all pregnant women should be screened at 35-37 weeks of gestation for vaginal and rectal GBS colonization in developed countries whereas there are no guidelines regarding this in the developing countries like India.

The present study was carried out to study the prevalence and risk factors for Group B Streptococcal colonization in pregnant women in Eastern Uttar Pradesh and antibiogram of the isolates (GBS) with a view to determine the pattern of antibiotic resistance.

METHODS

This was an observational cross sectional study conducted in the Department of Obstetrics and Gynaecology at Nehru Hospital, B.R.D. Medical College, Gorakhpur from October 2011 to October 2012. 300 pregnant women admitted at term gestation or with preterm labour were recruited in the study after written informed consent. The pregnant women who were on

antibiotic intervention in the last trimester of pregnancy were excluded from the study. All pregnant women were subjected to complete history including demographic profile, obstetric history and general physical examination and obstetric examination.

Specimens to study the microbiological environment of vagina and the anal canal were collected with the help of serum-coated cotton-tipped swab sticks for culture. One swab was taken from the lower one third of vagina and second swab was taken from the anorectal region. The swabs were placed in Todd-Hewitt Broth, an enrichment media for GBS and later subcultured on blood agar. GBS strains were identified according to their morphology, beta hemolysis and characteristics biochemical reactions.

Data entry and analysis were done using statistical software SPSS for Windows Version 20.0. The Chi-square test and Fisher’s exact test were used to compare the two groups. P values <0.05 were considered statistically significant.

RESULTS

Table 1 describes the prevalence of GBS infections with respect to age, parity and socio-economic status. Significant association was found with increasing age (Age>30 years, p <0.012), socioeconomic status (significantly more prevalent in upper socioeconomic status, p<0.007) and in higher gravidity (Gravida >3, p <0.03). No association was found with urban/rural population (p = 0.110).

Among the 6 GBS colonized mothers, GBS was isolated in two cases from vagina 2/6 (33.33%), in two cases from rectum (33.33%) and in two cases from both vagina and rectum (33.33%). Prevalence of other micro-organisms isolated from the anogenital region was *Staphylococcus aureus* (24%), *E. coli* (8.3%), *Candida spp.* (7%), *Klebsiella* (5.7%), *Streptococcus pyogenes* (1%) and other bacteroids (1.7%).

Table 1: Prevalence and correlates of GBS colonization among pregnant women.

Age (years)	GBS positive cases	GBS negative cases	Total	Prevalence%	Test of significance
15-25	1	178	179	0.6%	X ² =11.0 p = 0.012
25-30	2	87	89	2.2%	
30-35	2	21	23	8.6%	
>=35 Years	1	8	9	11.1%	
Socio economic status					
Upper middle class	2	14	16	12.5	X ² =9.885 p=0.0071
Lower middle class	3	159	162	1.9	
Lower class	1	121	122	0.8	
Gravida					
G 1	1	121	122	0.8%	X ² =6.801 p=0.0334
G-2	0	76	76	0.0%	
≥G3	5	97	102	4.9%	

All the GBS isolates were found to be sensitive to ampicillin followed by erythromycin and penicillin. Resistance was seen with gentamicin, tetracycline and Kanamycin.

Out of the total 6 positive cases, 1 woman presented with preterm rupture of membrane and 1 presented with preterm labour (Table 2).

Table 2: Prevalence of complication following GBS anogenital colonization during pregnancy.

Complications	GBS positive cases	GBS negative cases	Total cases with complication	Prevalence (%)
Incidence of PROM	1	17	18	5.6
Incidence of preterm labour	1	29	30	3.3
Fever during pregnancy	0	12	12	0.0

$X^2=0.6897$
 $p=0.7083$

Table 3: Relation between colonization of GBS and adverse event in puerperium.

Adverse events in puerperium	GBS positive cases	GBS negative cases	Total cases with adverse events	Prevalence (%)
Fever	0	23	23	0
UTI	1	48	49	2.04
Sepsis	0	4	4	0

$X^2=0.5584$
 $P=0.7564$

The density of maternal colonization with GBS at delivery was found to be an important predictor of neonatal outcome. Out of 6 positive cases, 2 cases were colonized at both vagina and anorectal region and neonatal outcome was stillbirth. In 2 cases where GBS was present in vagina only, one woman had preterm rupture of membrane and one woman had preterm labour. In two cases, GBS was present in anorectal region and it was neither associated with any maternal complication nor neonatal complication. Table 3 depicts the puerperal complications.

DISCUSSION

Epidemiological studies in India have shown lower colonisation and infection rates in general. The reported low prevalence of GBS infection from Indian subcontinent may be due to the low rate of institutional deliveries and inadequate screening.⁹ However few authors from India reported similar rates as in United States attributing it to the adequate culture techniques and microbiological media.¹⁰

Maternal colonization by GBS was observed to range from 4% to 40% in several studies conducted worldwide.¹¹⁻¹³

In this study, the culture positivity rate of Group-B streptococcus was 2%. The other Indian studies have quoted the similar rates (2.35 and 2.52%).^{14,15} Similar rates have also been reported by few other authors from the developing world besides India.¹⁵⁻¹⁷

In this study prevalence of Group-B Streptococcus colonization was found to be more in women with age greater than 30 years of age. A study from Trinidad by Orrett FA et al showed a significant trend of increasing

prevalence with increasing age.¹⁸ However Javanmanesh F et al found no significant association with age and education.¹⁹

The prevalence of the GBS colonization was found to be higher in socially privileged class in our study which was comparable to the study from New Zealand who also found increased risk of GBS colonization in socially advantaged population.²⁰ Although most of the studies have found increased colonization rate with increasing parity comparable to our study but Dechen TC et al has found no association between gravid and GBS colonization.^{14,21,22}

All the isolates were found to be sensitive to ampicillin, followed by erythromycin and penicillin. Resistance was seen with gentamicin followed by tetracycline and Kanamycin. This pattern was similar to other studies.^{23,24}

The density of maternal colonization at delivery was found to be an important predictor of vertical transmission of GBS to the neonate. It was observed that if Group-B Streptococcus was carried in both vaginal and anorectal region, then the neonatal outcome was worse, resulting in stillbirths.

CONCLUSION

This study showed the prevalence of GBS colonization among pregnant women to be 2% and all the isolates were found to be ampicillin sensitive. GBS was significantly correlated with age, parity and socioeconomic status. In pregnancy GBS colonization can cause PROM and preterm labour. Heavy colonization can lead to intrauterine death. There is a need to carry out the study in the community to know the true prevalence in the general population.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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