Group B Streptococci Colonization in Pregnant Women: Is Screening Necessary?

KP Patil, SS Singla, MB Nagmoti, MK Swamy

ABSTRACT

Objectives: Group B Streptococcus (GBS) has been recognized as the leading cause of serious neonatal infections through mother—fetal vertical transmission in the west, however, in India, its spectrum is largely under estimated. The present study was carried out to find the incidence of rectovaginal carriage of GBS in parturient women, association with risk factors in mother and to study the neonatal outcome.

Materials and methods: A one year cross-sectional prospective study was carried out in 905 parturient women admitted at a tertiary care center meeting the selection criteria over a period of one year from June 2007 to May 2008. The inclusion criteria were all pregnant women admitted to the labor room after 35 ± 1 week of gestation. Rectal and vaginal swabs were taken and cultured on selective Todd-Hewitt broth medium followed by sub culture on blood agar and confirmation by Latex agglutination test from all the women meeting the inclusion criteria. The outcomes measured were the incidence, antenatal risk factors in mother and the neonatal outcome. Analysis was done using paired ‘t’ test, chi-square test and a p-value of <0.05 was taken as statistically significant.

Results: Incidence of group B Streptococcus (GBS) was 12.15% and detection rate was increased by 4.6% with the inclusion of rectal swabs for culture. GBS carriage was significantly increased with preterm birth (OR 8.3, 95% CI, 1.1-15.5), premature rupture of membranes (OR 7.5, 95% CI, 1.1-13.4), prolonged duration of ruptured membranes more than 10 hours (OR 21, 95% CI,15.2-34.2) and intrapartum temperature more than 38°C(OR 3.1, 95% CI, 0.43-6.6). Birth weight less than 2.5 kg and neonatal intensive care admissions were significantly more (35.45%) in infants of GBS positive women.

Conclusion: GBS colonization was more frequent in women with risk factors. GBS pick up rate was increased by the inclusion of both rectal and vaginal swabs.

Keywords: Group B Streptococcus, Antenatal screening, Rectal and vaginal swabs, Risk factors, Neonatal outcome.


Source of support: Nil

Conflict of interest: None declared

INTRODUCTION

Lancefield Group B Streptococcus (GBS) or Streptococcus agalactiae is a type of bacteria that causes illness in newborn babies, pregnant women and adults with other illnesses, such as diabetes or liver disease. About half of the cases of GBS among newborns happen in the first week of life (early-onset disease), and most of these cases start within a few hours after the birth leading to sepsis, pneumonia, shock, stillbirth and perinatal mortality of 10 to 20%. Late onset disease occurs from 7 to 90 days after the birth and manifest primarily as meningitis. The recognition that maternal colonization with the organism is a key factor in the occurrence of GBS associated neonatal morbidity and mortality was a milestone in the history of perinatal health.

About 10 to 36% pregnant women in United States were found to have asymptomatic anogenital carriage of GBS with a vertical transmission rate of 50 to 65%. Incidence of early onset neonatal disease (EOND) was reduced to 0.5 cases/1000 live births after the inception of intrapartum antibiotic prophylaxis according to the guidelines issued by American College of Obstetricians and Gynecologists (ACOG) and Centers of Disease Control and Prevention (CDC). Thus, a nationwide change in health practices have helped to diminish morbidity and mortality associated with the disease.

In India, however, the spectrum of group B streptococcal disease remains a largely under recognized problem and no guidelines have been formulated till now to curb its menace and screening is not practiced. Epidemiological surveys in India have shown lower colonization and infection rates (1.76%-16%) in general, but the vertical transmission rates (53%-56%) are consistent with the rates reported in other parts of the world. Despite the significant GBS colonization rates, reports of invasive neonatal GBS disease in India are in frequent 0.17 per live births, though sepsis is the major cause of death in up to 30 to 45% of neonates.

The present study was undertaken to find the incidence of GBS in pregnant women of Indian population, its relation to risk factors and to see the neonatal outcome in GBS positive women. Thereby to device an optimum screening protocol for Indian population which can lead to greatest possible reduction in early onset neonatal disease.

MATERIALS AND METHODS

A one year cross-sectional prospective study was carried out in 905 parturient women admitted at a tertiary care center meeting the selection criteria over a period of one year from June 2007 to May 2008 after having obtained clearance from the institutional ethical clearance committee. The sample size of 905 was derived on the basis of women meeting the inclusion criteria. The inclusion criteria were all pregnant women admitted to the labor room after 35 ± 1 week of gestation and 30 to 45% of neonates.
the incidence of GBS, and the secondary objective to assess the risk factors associated with GBS and study the neonatal outcome.

Two swabs were taken as one from the lower one-third of vagina and another from the anorectal region with the help of a sterile cotton swab, before pelvic examination. These were transported to microbiology department in Stuart’s transportation medium where they were introduced in to 5 ml of enrichment broth [Todd Hewitt (TH) Broth with gentamicin (8 mcg/ml) and Nalidixic acid (15 mcg/ml)] and incubated overnight at 35°C aerobically with 5 to 10% CO₂ (carbon dioxide). After 24 to 36 hours, 10 ul loopful of the TH broth culture was then subculture on 5% sheep blood agar and the plates were incubated overnight at 37°C in 10% CO₂ (carbon dioxide). Then, the enrichment broth subcultures were examined for the presence of GBS colonies. Beta-hemolytic colonies on sheep blood agar plates, suggestive of GBS were identified by using standard microbiological techniques (smear microscopy, catalase test and bacitracin susceptibility). These colonies were further confirmed by serogrouping using a latex agglutination antigen-detection kit. Detailed information on maternal characteristics, like age, parity, gestational age, obstetrical history was noted. Risk status (preterm labor <37 weeks of gestation, premature rupture of membranes, duration of ruptured membranes and intrapartum temperature of ≥100.4°C) and mode of delivery were noted. Reports of the presence/absence of GBS were entered. Information was also obtained regarding the status of newborn at delivery and examination by pediatrician. Any evidence of presence of early signs of sepsis like poor cry, lethargy, poor feeding, respiratory distress, temperature in the neonates were noted till the stay of mother in hospital. Analysis was done using paired ‘t’ test, chi-square test and a p-value of <0.05 was taken as statistically significant.

**RESULTS**

A total of 905 women were screened for GBS, out of then 428 were primigravidae and 477 were multigravidae. The mean age of the study population was 23.4 years (15-37 years). Maximum number of pregnant women was in the age group of 20 to 24 years (38.23%); but the proportion of women with GBS carriage was highest in age group of 15 to 19 years (Odds ratio 23.5 with 95% confidence interval, 15.11-32.1). Rate of colonization by GBS was observed to be higher in primigravida (14.25%) compared to multigravida (10.27%); but this difference was not statistically significant. Anogenital carriage of GBS was not significantly related with the antenatal registration of the pregnant women or her past bad obstetric history. Rectovaginal carriage of GBS was found significantly more in preterm deliveries (<37 weeks of gestation) with Odds ratio of 8.31 and 95% confidence interval of 1.1 to 15.5. Intrapartal temperature of more than 38°C was significantly associated with anogenital carriage of GBS. There was a strong association of rectovaginal colonization by GBS and premature rupture of membranes (OR 7.5, 95% CI, from 1.5-13.4). Statistically significant association was found in the women with prolonged duration of rupture of membranes of more than 10 hours with GBS carriage (p-value = 0.0001, Table 2). Birth weight of infants born to GBS positive women was significantly less than 2.5 kg with Odds ratio of 14.66 and 95% confidence interval from 4.8 to 24.0 (p-value = 0.002, Table 2). Admissions to neonatal intensive care unit (NICU) were significantly more in infants of women with rectovaginal carriage of GBS. NICU admissions were required by 39 (35.45%) babies born to 110 GBS positive mothers. Admissions were mainly due to premature delivery (p-value = 0.005), low birth weight (p-value = 0.0001), suspected septicemia (p-value = 0.0001) and respiratory distress (p-value = 0.001).

**DISCUSSION**

A total of 905 women were screened for GBS and GBS was isolated in 110 women (12.15%). Around 68 of 110 women

<table>
<thead>
<tr>
<th>Specimen type</th>
<th>GBS positive</th>
<th>GBS negative</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Vaginal swab</td>
<td>68</td>
<td>837</td>
<td>7.51</td>
</tr>
<tr>
<td>Rectal swab</td>
<td>84</td>
<td>821</td>
<td>9.28</td>
</tr>
<tr>
<td>Vaginal or rectal swab</td>
<td>110</td>
<td>795</td>
<td>12.15</td>
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<table>
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<tr>
<th>Table 2: Risk factors and colonization rates in study population</th>
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<tr>
<td>Risk factors</td>
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<tr>
<td></td>
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<tr>
<td>Gestational age &lt;37 weeks</td>
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<tr>
<td>Premature rupture of membranes</td>
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<tr>
<td>Temperature &gt;38°C</td>
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<tr>
<td>Duration of ruptured membranes (≥10 hrs)</td>
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<tr>
<td>Birth weight less than 2.5 kg</td>
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</table>

(7.51%) were colonized in the vagina and 84 (9.28%) in the anorectum. Detection rates were improved by almost 4.6% by culturing both vagina and anorectum. GBS carriage was significantly increased with preterm birth (OR 8.3, 95% CI, 1.1-15.5), premature rupture of membranes (OR 7.5, 95% CI, 1.1-13.4), prolonged duration of ruptured membranes more than 10 hours (OR 21, 95% CI, 15.2-34.2) and intrapartum temperature more than 38°C (OR 3.1, 95% CI, 0.43-6.66). Birth weight less than 2.5 kg and neonatal intensive care admissions were significantly more (35.45%) in infants of GBS positive women.

The strong evidence for the usefulness of the universal screening at 35 to 37 weeks of pregnancy to prevent GBS neonatal infection was mainly drawn from studies conducted in the United States. However, GBS is present worldwide and the prevalence of GBS carriers varies in relation to the geographical area and/or a number of demographic factors. In the present study, the prevalence of anogenital carriage of GBS was 12.15%. Contrary to our study, high prevalence rates have been reported in western literature like 21.3% in United Kingdom, 22.8% in USA and 14% in Netherlands. Therefore, knowledge of the epidemiological situation of a defined area is crucial to decide the launch of a screening program and to evaluate the cost-effectiveness of such a strategy. Various studies from India have reported prevalence of GBS between 1.62 and 12%. The prevalence rate was reported low in few studies due to non-inclusion of rectal specimen for the detection of GBS and use of non selective media for culture. An increase of 4.64% in GBS prevalence was noted with the inclusion of rectal swabs in the present study.

In the current study, GBS carriage was more in younger age group and in primigravida. Published literature in India has not found any significant association between age and GBS carriage though it was found to be more common in younger age group. We found significant association between recto-vaginal carriage of GBS and the presence of risk factors in pregnant women like preterm birth (OR 8.3, 95% CI, 1.1-15.5), premature rupture of membranes (OR 7.5, 95% CI, 1.5-13.4), prolonged duration of ruptured membranes of more than 10 hours (OR 21, 95% CI, 15.2-34.2) and intrapartum temperature of more than 38°C (OR 3.1, 95% CI, 0.43-6.66). These observations were in accordance with a large study from Bengaluru and Maharashtra but were in contrast to the study from Oxfordshire, United Kingdom. One important association found in the current study was the association of GBS carriage and duration of ruptured membranes for 10 hours or more. The duration reported in earlier studies was between 12 and 18 hours but, in our study, we found statistically significant association with 10 hours or more duration of ruptured membranes and GBS colonization (p-value = 0.002). We detected significant low birth weight (less than 2.5 kg) in neonates of GBS positive women. We also observed that neonates of GBS positive women required more frequent NICU admissions (35.45%) compared to GBS negative women (17.2%). The most frequent cause of admissions was low birth weight. This showed that vertical transmission of GBS might be a possibility as shown in other studies. The limitation of the study was we did not culture GBS from the neonates to prove the association.

The study has shown that the incidence of GBS in our population is high and is more common in women with risk factors. The need of the hour is to incorporate the rectovaginal detection of GBS by selective broth medium as a screening measure in pregnant women more so with risk factors.

ACKNOWLEDGMENTS

We thank Dr BR Desai, Professor and Head, Department of Obstetrics and Gynecology, JNMC, Belgaum, for allowing and encouraging us to do this study.

REFERENCES


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