Analysis of vaginal and rectal sampling methods for maternal group B streptococcal isolation

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ABSTRACT

Background: Group B streptococci (GBS) is considered as an important cause of neonatal morbidity and mortality. The Centers for Disease Control and Prevention (CDC) recommends recto‑vaginal sampling of pregnant women and the use of selective broth medium for GBS isolation. This study was done to evaluate the GBS yield from only vaginal, only rectal, and both rectal and vaginal swabs collected. In addition, the drawbacks of using the selective broth mediums for GBS isolation were also analyzed.

Methodology: This was a prospective study that was done to screen 300 pregnant women for vaginal and rectal GBS colonization. Vaginal and rectal swabs were inoculated separately in Todd Hewitt Broth and later subcultured on blood agar for GBS isolation.

Results: The GBS detection rates from both vaginal and rectal swabs were 42.9%, indicating heavy colonization in these women. In addition, our study noted certain drawbacks with the use of selective Todd Hewitt Broth medium used for GBS isolation.

Conclusion: GBS isolation rate was higher when both rectal and vaginal swabs were collected. Our study also concluded that there was a need to develop alternative culture media for GBS isolation in view of the drawbacks encountered with the selective Todd Hewitt Broth medium.

Key words: Genital tract; group B streptococci; rectal swab; Todd Hewitt Broth media; vaginal swab.

Introduction

Group B streptococcus (GBS) is a commensal organism of the gastrointestinal (GI) and genital tracts. Asymptomatic GBS colonization is found in about 25% of pregnant women. Newborns acquire GBS while in utero by the ascending route or during the birth process. The Centers for Disease Control and Prevention (CDC) has recommended universal screening of pregnant women and intrapartum antibiotic prophylaxis to reduce neonatal GBS colonization and early-onset GBS disease. The prevalence of maternal GBS colonization may vary depending on the number and type of sites cultured, culture methods, time of pregnancy, race, age, parity, and socioeconomic status. The CDC recommends rectovaginal sampling to increase the GBS isolation rates. The rectovaginal swabs have been reported to provide high bacterial yields, as the GI tract is a natural reservoir for GBS and a potential source of vaginal colonization. This study was done to analyze the yield of GBS from rectal and vaginal swabs collected from pregnant women.

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Material and Methods

This was a prospective study done in a tertiary care teaching institute in Puducherry, South India over a period of 20 months. The sample size was determined to be 300 cases for a statistical power of 80% and to obtain a significance at level 5% ($P = 0.05$). The study was approved by the research and ethics committee of the institute. Pregnant women in their second and third trimesters, attending the antenatal outpatient department (OPD) of the institute, were enrolled in the study and informed consent was obtained from the women. Women with a history of intake of antibiotics during the past 2 weeks, preexisting medical disorders complicating pregnancy, and women in labor were excluded from the study. Each specimen consisted of separate vaginal and rectal swabs that were collected using aseptic techniques. Swabs were immediately placed in separate Todd Hewitt Broth, an enrichment medium for GBS and transported to the microbiology laboratory. The broth was incubated for 24 h at 37°C in 5% carbon dioxide (CO$_2$) atmosphere and later subcultured onto blood agar plates, which was further incubated for 18–24 h at 37°C. The blood agar plates were examined at 24 and 48 h for the presence of GBS colonies. GBS was identified based on the colony morphology; beta hemolysis; and characteristic biochemical reactions (catalase-negative, sodium hippurate hydrolysis positive, Christie, Atkins, and Munch-Peterson [CAMP] test positive, bacitracin resistance) and was confirmed by latex agglutination test. Detection rates for the vaginal and rectal sampling techniques were studied. Data entry and analysis were done using the Statistical Package for the Social Sciences (SPSS) software for Windows, version 16.0 (SPSS Inc, Chicago, IL, USA). Percentages were calculated for categorical variables.

Results

Out of the 367 women who met the eligibility criteria, 300 women participated in the study. The acceptance rate for the study among pregnant women was 81.7%. The GBS isolation in our study was 2.3% ($n = 7$). The majority of women belonged to the age group 21–30 years and all the GBS isolates were obtained from this age group [Figure 1]. The majority of the swabs in the third trimester were collected close to term, i.e., between 34 to 37 weeks [Table 1]. Three out of the seven GBS positive women had vaginal discharge. The difference between women who had vaginal discharge and were GBS positive and women with vaginal discharge but were GBS negative was not significant ($P = 0.311$) [Table 2]. GBS colonization was identified in 28.6% of vaginal specimens. Similarly, the isolation rate from rectal swabs was also 28.6%. The GBS detection rate from both vaginal and rectal swabs was 42.9%, indicating heavy colonization in these pregnant women [Figure 2].

Discussion

Maternal GBS colonization is an important risk factor for sepsis and infections in a newborn. There exists variation in maternal GBS colonization from different populations. The GBS carriage rate among pregnant women in the present study was 2.3% using the selective Todd Hewitt Broth method for GBS isolation.

The detection rate of GBS colonies was 42.9% from both vaginal and rectal samples. The isolation from only vaginal swabs was equal to that of isolation from only rectal swabs, which was 28.6%. When GBS was isolated from both vaginal and rectal samples, it was considered as heavy colonization.
Hence, heavy colonization was seen in 42.9% of our study population. Our study results implied that the detection rate was higher among both vaginal and rectal sampling than when only rectal or only vaginal swabs were collected. This is in support of the CDC recommendations that rectovaginal swabs increase the yield of GBS. Our results were similar to other studies done in different parts of the world. However, a study done by Gupta in 2004 reported GBS detection rates of 23.3%, 23.8%, and 28.9% by the use of rectovaginal, vaginal, and cervical swabs, respectively; however, the differences between these values were not statistically significant.

Our study was done using the selective Todd Hewitt Broth media in accordance with the CDC recommendations and several other studies to increase the yield of GBS isolation. However, we noted several drawbacks with the use of the Todd Hewitt Broth media for GBS isolation in our set up. Primarily, we faced difficulty in procuring the selective broth media as it was not available in our microbiology laboratory and it was expensive. It had potential drawbacks like the need for longer turnaround time (approximately 48 h) and the requirement for additional subculture onto blood agar. In addition to these drawbacks, ancillary tests are required for the identification of GBS colonies. The entire process of GBS detection typically takes between 48 and 72 h; hence, it is time-consuming. In this era, when cost containment and rapid result reporting are of paramount importance, alternative culture media for GBS culture need to be identified and studied. There are few studies that suggest the use of Granada medium, a commercially available selective agar, that allows for direct visual identification of GBS colonies. This may serve to reduce the time required to detect GBS and eliminate the need for ancillary tests to confirm the presence of GBS colonies. Further studies are required to compare the Todd Hewitt Broth with Granada medium method for determining GBS isolation from pregnant women.

Conclusion

Our study concluded that the isolation rate of GBS among pregnant women was higher when rectovaginal specimens were collected than when only vaginal or only rectal swabs were collected. However, the isolation rate of GBS among pregnant women in our study was low (2.3%), which could be because of the small sample size. The results obtained in our study cannot be generalized to the entire population as this is a single-center-based study with small sample size. Further large multicentric studies are required to substantiate the results obtained in our study. Several drawbacks were identified with the use of Todd Hewitt Broth medium for GBS culture; hence, there is a felt need for developing an alternative culture media for GBS isolation.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms for participation in the study.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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