ORIGINAL ARTICLE

Evaluation of conventional and CHROMagar method for the detection of Group B *Streptococcus* in antenatal cases

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ABSTRACT

Background: Group B *Streptococcus* (GBS) has reemerged as a major pathogen during the past few decades. Newborns with early-onset GBS disease acquire infection from the maternal genital tract. The aim of the present study was to find the prevalence of GBS among antenatal cases and to evaluate the conventional and CHROMagar™ Strep B agar method in the detection of GBS colonization among pregnant women. **Materials and Methods:** A total of 160 vaginal swabs were collected from pregnant women of 35–37 weeks of gestation and inoculated onto 5% sheep blood agar and CHROMagar™ Strep B agar. GBS grown on 5% sheep blood agar and CHROMagar™ Strep B agar were confirmed by biochemical and latex agglutination tests. **Results:** GBS was detected in 14.38% of pregnant women. CHROMagar™ Strep B agarshowed 100% sensitivity and specificity in comparison with the conventional method. **Conclusion:** In the present study, GBS was prevalent in 14.38% of the antenatal cases. CHROMagar™ Strep B agar with 100% sensitivity and specificity can be used to screen all pregnant women for GBS colonization as it does not require expertise in identification.

Key words: CHROMagar™ Strep B agar, Group B *Streptococcus*, latex agglutination

INTRODUCTION

Since 1970s, Group B *Streptococcus* (GBS) has been recognized as the most important infectious cause of morbidity and mortality in newborn infants.[1] In the past few decades, GBS has gained importance due to its ability to cause serious neonatal infections. In developed countries, GBS is the leading cause of sepsis and meningitis in neonates with a high case fatality rate of about 40%–80%, yet the magnitude of infection in developing countries such as India has not been adequately studied.[2]

GBS, also known as *Streptococcus agalactiae*, is one of the leading pathogens associated with early (one to six days of life) and late onset (7–90 days) of neonatal sepsis. The main source of GBS infection is the maternal genital tract and anorectal flora. GBS is present in lower genital tract of 15%–20% of pregnant women.[3]

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To reduce the incidence of neonatal diseases caused by GBS, the Center for Disease Control and Prevention (CDC) recommends the use of intrapartum antibiotic prophylaxis in pregnant women who are GBS carriers.[4] In India, very few studies have been carried out on the prevalence of GBS colonization in the vagina of pregnant women.[5] The spectrum of GBS disease remains a largely underrecognized problem. The aim of the present study was to find the prevalence of GBS among antenatal cases and to evaluate the conventional and CHROMagar™ Strep B agar method in the detection of GBS colonization among pregnant women.

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How to cite this article: We will update details while making issue online***

MATERIALS AND METHODS

The study was conducted from December 2014 to September 2015 at Adichunchanagiri Hospital and Research Centre, a tertiary care center at BG Nagara, Karnataka, India. A total of 160 randomly selected pregnant women of 35–37 weeks of gestation attending outpatient department in the Department of Obstetrics and Gynecology formed the study group. The study population represented the rural population as the hospital cares the patients from villages in and around BG Nagara. The study was approved by the Research and Ethical Committee of Adichunchanagiri Institute of Medical Sciences.

A detailed obstetric history was taken as per the pro forma. Patients with a history of intake of antibiotics during the past two weeks and preexisting medical diseases complicating pregnancy were excluded from the study.

After taking informed consent from all the participants, two vaginal swabs were collected from each pregnant woman and processed in the microbiology laboratory. One swab was inoculated to 5% sheep blood agar and another onto CHROMagar™ Strep B agar (CHROMagar, Paris, France). Plates were incubated at 37°C for 48 h. Growth on blood agar was identified by colony morphology, β-hemolysis, Gram-stain, catalase, hippurate hydrolysis, and Christie–Atkins–Munch–Petersen test. GBS isolated was confirmed by latex agglutination test (Streptex, Remel, Europe, UK). On CHROMagar™ Strep B agar, characteristic purple-colored colonies appeared in 24–48 h [Figure 1] and were confirmed by latex agglutination test.

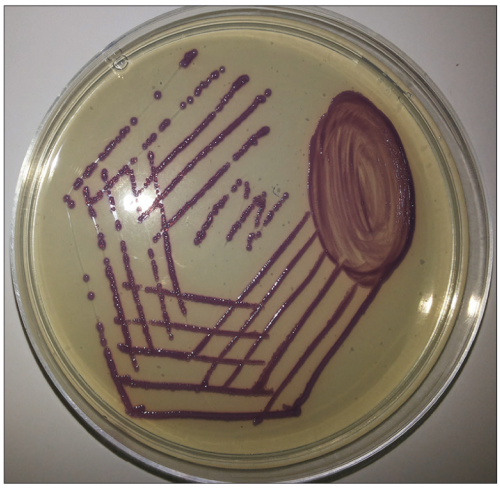

Figure 1: Group B *Streptococcus* colonies on CHROMagar™ Strep B agar

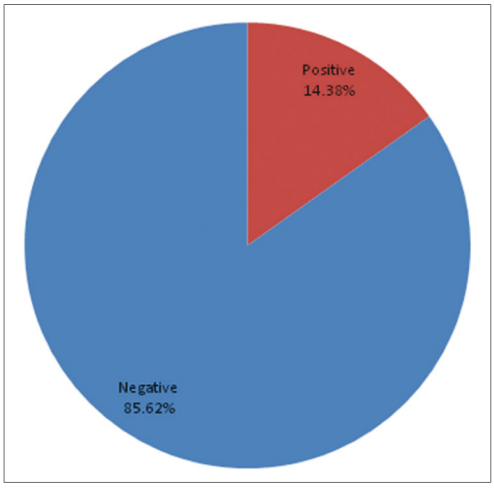

Figure 2: Distribution of Group B *Streptococcus* among pregnant women

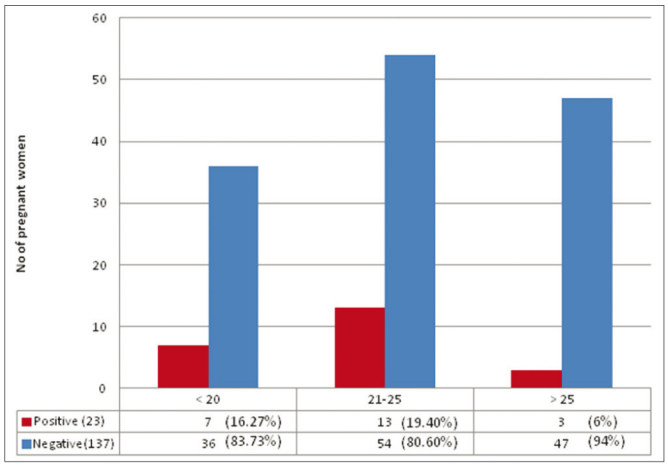

Figure 3: Prevalence of Group B *Streptococcus* in relation to age of the study group

RESULTS

A total of 160 pregnant women were enrolled for the study. The age of the participants ranged from 18 to 31 years with a mean age of 23.1 years. GBS strains were isolated from 23 pregnant women corresponding to the colonization of 14.38%.

Figure 2 shows the distribution of GBS among pregnant women.

Figure 3 shows the prevalence of GBS in relation to age of the study group.

DISCUSSION

Early-onset infections are acquired through exposure to GBS from the vagina of colonized women. Neonatal infection occurs primarily when GBS ascends from vagina to the amniotic fluid after the onset of labor or rupture of membrane although GBS can invade through intact membranes. GBS can be aspirated into the fetal lung, which in turn can lead to bacteremia. Infants also

can become infected with GBS during passage through vaginal canal.[6]

In late-onset neonatal infection (7–90 days), transmission can be horizontal (from the other infected infant or health-care workers) or vertical from mother due to close proximity.[7]

The issue of GBS screening in pregnant women is a new concept in India. In India, very few studies have been carried out, mainly to study the prevalence of GBS during pregnancy. The prevalence of GBS in vaginal flora varied from 2% to 17% as reported by various studies [Table 1].[2,4,5,8-10] The prevalence varies with ethnicity, geographic area, and age.

Maternal GBS colonization may be transient or intermittent and therefore a test to detect GBS colonization during intrapartum period could be most advantageous compared to the earlier antenatal screening tests. CDC recommends culture-based screening at 35–37 weeks of gestation which can reduce or eliminate transmission of GBS to neonates by giving appropriate antibiotic therapy to pregnant women.[11]

In the present study, GBS was isolated from vaginal swab by conventional and CHROMagar™ Strep B agar method. CHROMagar™ Strep B agar method is technically simple, time saving, and cost-effective with 100% sensitivity and specificity compared to technically demanding, time-consuming, elaborate, and costlier conventional method. To the best of our knowledge, chromogenic medium for the detection of GBS has not been reported in the available literature in India, and other Indian studies have used conventional methods for the detection of GBS in pregnant women.[12] CHROMagar™ Strep B agar will be useful in resource-constrained laboratories of developing countries such as India.

GBS colonization was more among the age group of 21–25 years (19.40%) followed by ≤20 years of age group (16.27%). Among 23 GBS-colonized pregnant women, 60.87% and 39.13% were primigravida and multigravida, respectively, whereas Sharmila *et al.* reported more incidences among multigravida.[4] Hajare *et al.* have reported that GBS colonization was more among primigravida and <20 years' age group (46.7%) followed by 21–25 years' (33.3%) and >25 years' age group (13.3%).[5] Hence, routine screening of all pregnant women for GBS colonization is necessary.

Table 1: Group B *Streptococcus* carrier state among pregnant women as reported by various studies

Various studies	Group B *Streptococcus* (%)
Present study 2015	14.38
Konikkara *et al.*, 2014[2]	16
Pradeep and Rao, 2013[8]	3.5
Rubini *et al.*, 2013[9]	9.1
Hajare *et al.*, 2012[5]	7.5
Sharmila *et al.*, 2011[4]	2.33
Poisson *et al.*, 2011[10]	9.1

The USA and Canada have made national policy to screen women of reproductive age group, especially pregnant women to detect GBS colonization which was backed by the CDC. At present, there is no national policy in India about screening for GBS colonization among pregnant women. To reduce the incidence of neonatal diseases caused by GBS, the CDC recommends the use of intrapartum antibiotic prophylaxis in pregnant women who are GBS carriers.[13] Continued surveillance and more detailed studies are needed in the understanding of the epidemiology of disease caused by GBS.[6]

In India, national policy to screen pregnant women (35–37 weeks' gestation) to detect vaginal GBS colonization and a protocol for prophylactic treatment should be designed as children are the future pillars of a nation. This in future will help in reducing the rate of mortality and morbidity among newborns. In the present study, follow-up of GBS carriers has not been done as it is a preliminary study.

Further, nationwide multicentric studies are necessary to confirm the correlation between GBS colonization in pregnant women and its transmission to their neonates.

CONCLUSION

In the present study, GBS was prevalent in 14.38% of the antenatal cases. At present, there is no national policy in India about screening for GBS colonization among pregnant women. It is necessary to screen all pregnant women for colonization of GBS to reduce the rate of neonatal morbidity and mortality. CHROMagar™ Strep B agar being a selective medium is technically simple, rapid, cost-effective with high sensitivity and specificity, and has more advantages in the detection of GBS carrier state among pregnant women compared to slow, elaborate, technically demanding, and costlier conventional method. CHROMagar™ Strep B agar will be useful in resource-constrained laboratories of developing countries such as India.

Acknowledgement

With a deep sense of gratitude, authors wish to express sincere thanks for the free supply of CHROMagar™ Strep

B agar by CHROM agar, Paris, France. We like to mention special thanks to the staff of ANC clinic and pregnant women for their co-operation. Authors are grateful to Dr. Manohar T.M., Medical Superintendent, AH&RC and Dr. Shivaramu M.G., Principal, AIMS, BG Nagara for their support.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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