International Journal of Life Sciences, Biotechnology and Pharma Research Vol. 14, No. 3, March 2025 Online ISSN: 2250-3137
Print ISSN: 2977-0122

DOI: 10.69605/ijlbpr_14.3.2025.72

ORIGINAL RESEARCH

Comparison of Detection of Vaginal Colonisation of Group B Streptococci in Pregnant Women by Culture and Molecular Methods in A Tertiary Care Centre

Ruby Khatoon[1], Rajkumar Khati[2], Ramanath Karicheri[3*]

[1,2,3]Department of Microbiology, Index Medical College Hospital & Research Centre, Malwanchal University, Indore-452016, India.

Corresponding Author
Dr. Ramanath Karicheri
Professor, Department of Microbiology, Index Medical College Hospital & Research Centre, Malwanchal University, Indore-452016, India
Email: ramanath.karicheri@gmail.com

Received: 29 December, 2024 Accepted: 28 February, 2025

ABSTRACT

Background: Streptococcus agalactiae or Group B Streptococcus is an important cause of maternal complications in pregnancy and neonatal infections leading to potentially severe ailments due to transmission during delivery. This study aimed to detect Streptococcus agalactiae in pregnant women by culture and molecular method for early detection and prevention of infection. **Methods:** A total of 90 vaginal swab samples were collected from Index Medical College Hospital & Research Centre, Indore and were subjected to culture, Gram staining, biochemical reactions, and molecular method i.e., Polymerase Chain Reaction. **Result:** 5 out of 90 (5.6%) samples showed growth of Group B Streptococcus by culture. PCR detected GBS in 24 samples. This yielded a positivity rate of 26.67%. All the positive isolates were subjected to antimicrobial susceptibility testing by disc diffusion. It was found that all isolates were susceptible to Penicillin (100%) and Vancomycin (100%). Maximum resistance was seen with Tetracycline (25%) followed by Erythromycin (20.83%), Linezolid (12.50%) and Clindamycin (8.33%). **Interpretation:** Similar rates of colonization are seen in different parts of the country when culture is the primary method of detection whereas, using a molecular method significantly increases the rates of detection **Conclusion:** Timely detection of GBS is pivotal in preventing neonatal morbidity and eventually, mortality owing to neonatal meningitis. Antenatal screening for GBS at 35-37 weeks of gestation is recommended. Although culture is the gold standard method for detection, the colonization rates may be under-recognized or under-documented if molecular method like PCR is not used. Penicillin allergy can lead to serious anaphylaxis. Hence, it is important to know the antimicrobial susceptibility pattern of the pregnant women.

Key words: Streptococcus agalactiae, vaginal swabs, neonatal infections, culture ,polymerase reactions.

INTRODUCTION

Streptococcus agalactiae is a bacterium which presides in lower part the genital tract of women. It is more commonly known as Group B *Streptococcus* and often, it is present in pregnant women as a colonizer seldom showing symptoms. The anatomical presence of this bacterium is due to migration of GBS from the gastrointestinal region to the genital tract. **(1)**

GBS is a Gram positive cocci. It exhibits beta hemolysis, which causes complete zone of clearing which can be appreciated in media like blood agar plates. GBS also generates antigens that are made up of type specific polysaccharide surrounding the bacterium, with all the capsular polysaccharides bearing a terminal chain; a side chain with sialic acids as their primary antigenic determinant. GBS occurs as a part of normal vaginal microflora and typically do not cause any symptoms. **(2)**

Albeit frequently asymptomatic, GBS has the potential to cause infections like urinary tract infections chorioamnionitis, postpartum endometritis, febrile illness, and in rare cases, endocarditis in pregnant mothers as well. The colonization in childbearing women with GBS imposes a threat for

DOI: 10.69605/ijlbpr_14.3.2025.72

the newborn babies, neonates and infants. Pregnant mothers may also deliver prematurely owing to GBS leading to complications in the newborn. [3]

Approximately half of the GBS infections in newborns manifest within the first 7 days of life, known as Early Onset Disease (EOD) with majority of cases presenting within hours of birth, leading to severe condition such as pneumonia, shock, sepsis, stillbirth and also a perinatal mortality rate of 10 to 20%. If GBS infection occurs after 7 days of life or specifically, between 7-90days after birth, it is known as Late Onset Disease (LOD). A landmark achievement to the perinatal heath community will be the recognition of *Streptococcus agalactiae* infection in mother's genital tract as the prime root of genesis for neonatal morbidity and mortality. [4] Studies and research bear citations and documentation that transmission rates from mothers colonized with GBS to their infants are 29 times greater than those from noncolonized mothers. Depending on cross ethnic groups and geographical locations, prevalence of GBS vaginal and/or rectum colonization varies significantly, typically falling between approximately 10% and 40%. [5] Colonization rates can be detected in pregnancy by appropriate screening of the pregnant women. Screening for Group B *Streptococcus* (GBS) can be approached in mainly two ways :– Screening based on selective risk factors and antibiotic prophylaxis or antenatal screening all pregnant women universally at 35-37 weeks gestation and antibiotic prophylaxis.[6] Group B β-hemolytic *Streptococcus* or *Streptococcus agalactiae* often abbreviated as GBS are distinguished by the presence of a Lancefield-grouping antigen, which is a cell surface polysaccharide that is type-specific and crucial for the bacterium's classification. This Lancefield-grouping antigen aids in distinguishing GBS from other bacterial groups. Additionally, GBS also contains various protein antigens on its cell surface that serves to its immunological profile, playing a significant role in the identification, study, and understanding of the bacterial reactions with the host immune system and its general pathogenicity [7] *Group B Streptococcus* (GBS) is classified into 10 distinct serotypes on the basis of its distinct capsular polysaccharide (CPS) antigens. These capsular polysaccharides are critical virulence factors for GBS isolates serving antiphagocytic functions, aiding the bacteria in evading the host's immune defenses. Due to their significant role in bacterial virulence, CPS antigens in bacterial virulence has led to their use as key components in new multivalent GBS vaccines development. These vaccines aim to provide comprehensive protection by targeting multiple GBS serotypes simultaneously, leveraging the antiphagocytic properties of the CPS antigens to enhance the host's immune response against GBS infections. [8] Vertical transmission, occurring through recto-vaginal maternal colonization is widely recognized as the most critical determinant of neonatal infection. This mode of transmission significantly escalates the risk of infection for neonates, who are exposed to the bacteria during the birthing process. Specifically, neonates born to women colonized with GBS face an alarming increase in risk, being more likely to acquire this potentially serious infection compared to their counterparts born to women who are not colonized. This stark disparity in infection risk highlights the imperative of vigilantly monitoring and managing GBS colonization in expectant mothers to safeguard the health and well-being of their newborns reinforcing the importance of targeted interventions and preventive strategies in obstetric care.[9] GBS colonization rates exhibit notable variability on a global scale influenced by diverse culture methods which encompass variations in the number and types of anatomical sites sampled and the specific growth media utilized for detection. Nevertheless, regardless of these dissimilarities, substantial and genuine regional variations in GBS colonization persist, highlighting differences in local epidemiological dynamics, healthcare practices and diagnostic methods. These methodological nuances play an important role for some of the observed disparities in colonization rates across different regions. [10] In India, determining the prevalence rate during pregnancy can provide crucial and invaluable information, given the fact that at least 1-2% of childbirth from mothers with GBS during delivery go on to manifest in to early-onset GBS disease that can lead to severe complications in newborns. This information is essential for understanding the potential burden of neonatal GBS disease in the Indian context and for informing targeted public health strategies aimed at preventing and managing it. Spontaneous deliveries also occur in many cases. Furthermore, with evidence and data as such, it can be used to guide the development of national guidelines and protocols for GBS screening and management, implement appropriate interventions, such as intrapartum antibiotic prophylaxis. [11] The impact of neonatal infections on the global disease burden is substantial. In nations where economy lags behind the rest of the world or developing nations, the cases of neonatal infections are approximately 6.9 million every year. This high incidence is accountable for at least half a million deaths in the world as reported in 2012. Among the various pathogens responsible for these infections, Group B Streptococcus (GBS) stands out as a leading cause, having been identified for over five decades. Its role is also well known in causing invasive GBS (iGBS) diseases in young infants. [12] When early-onset disease (EOD) is established as invasive Group B *Streptococcus* (GBS) disease occurring in infants from the day of birth to 6 days after birth and late-onset disease (LOD) as occurring in infants a week or 7 days after to 89 days of birth, a review will be done comprehensively citing that EOD is roughly twice as common as LOD. However, this prevalence does not hold true for all regions, with

DOI: 10.69605/ijlbpr_14.3.2025.72

certain Asian locations, such as Hong Kong, India, and Thailand, reporting EOD rates up to six times greater than the prevalence of LOD. [13] Over the past thirty years, reducing the vertical transmission of Group B *Streptococcus* (GBS) to newborns has been a major priority. The most effective and efficient method involves routine checkup or screening tests for pregnant women to detect GBS colonization followed by administering intrapartum antibiotics. [14] In countries that are equipped with better infrastructure and developed economically, routine screening for pregnant women and the implementation of intra-partum antibiotic prophylaxis (IAP) have been broadly adopted and have significantly decreased the incidence of morbidity and mortality in neonates due to GBS. Conversely, in low-income regions, despite similar rates of recto-vaginal colonization with S. *agalactiae* among pregnant women, screening and IAP to avert invasive disease are largely not practiced because of constraints in health resources, lack of knowledge and inaccessibility. [15] Early recognition of Group B *Streptococcus* (GBS) colonization in pregnant mothers is crucial for timely interventions. These timely identifications can help prevent neonatal disease by facilitating antibiotic prophylaxis. This proactive approach not only reduces the risk of transmission during childbirth but also important in comprehensive screening and management. [16] Efforts have been initiated to evolve and effectuate a rapid enrichment combined with antigen detection test designed to swiftly detect Group B *Streptococcus* (GBS) colonization in pregnancy within less than 8 hours. This innovative diagnostic approach can help reducing the cases of neonatal septicemia by early diagnosis and therapeutic management. [17] There are a few of studies from India and Pakistan that enumerates *Streptococcus agalactiae* as the primary or one of the leading organisms behind cases of sepsis of neonates [18] But only a handful of evidence from research articles have been documented till date from India and as such our knowledge regarding the true prevalence of GBS is not reliable and remains unknown. The lack of appropriate, timely screening during pregnancy In short, published data regarding the prevalence of *Group B Streptococci* in pregnant women are scanty from Indian subcontinent. is one of the prime causes. It is safe to say that GBS is very likely under reported from India. [19] The present study aims to detect the presence of Group B streptococci from vaginal swabs of pregnant woman attending a tertiary care center, in central India by culture as well as polymerase chain reaction.

Women's lower vaginal tract is dominated by the bacteria Streptococcus agalactiae. It is most usually referred to as Group B Streptococcus, and pregnant women frequently have it as a colonizer that rarely exhibits symptoms. This bacterium's anatomical presence results from GBS migrating from the gastrointestinal tract to the vaginal tract. (1) Gram-positive cocci are what GBS is. In medium such as blood agar plates, it displays beta hemolysis, which results in a full zone of clearance. Additionally, GBS produces antigens composed of type-specific polysaccharides that envelop the bacteria. The main antigenic determinant of all capsular polysaccharides is a terminal chain, which is a side chain that contains sialic acids. GBS usually has no symptoms and is a natural part of the vaginal microbiota. (2) Although GBS is often asymptomatic, it can also result in infections such as chorioamnionitis, postpartum endometritis, urinary tract infections, feverish sickness, and in rare instances, endocarditis in expectant mothers. Newborns, neonates, and infants are at risk due to colonization in women with GBS who are pregnant. Due to GBS, pregnant women may also give birth too soon, which could cause problems for the unborn child. (3)

Known as Early Onset Disease (EOD), about half of GBS infections in newborns appear within the first seven days of life. Most cases appear within hours of birth and can result in serious conditions like pneumonia, shock, sepsis, stillbirth, and a perinatal mortality rate of 10 to 20%. GBS infection is referred to as Late Onset Disease (LOD) if it manifests after 7 days of life, or more precisely, between 7 and 90 days after birth. The identification of Streptococcus agalactiae infection in the mother's vaginal tract as the primary cause of newborn illness and mortality will be a significant accomplishment for the perinatal health community. (4) Research and studies support the claim that moms who have been colonized with GBS have 29 times higher transmission rates to their offspring than mothers who have not been colonized. The frequency of GBS vaginal and/or rectum colonization varies greatly depending on cross-ethnic groupings and geographic areas, usually ranging from 10% to 40%. (5) By properly screening pregnant women, colonization rates during pregnancy can be identified. There are two primary approaches to screening for Group B Streptococcus (GBS): either prenatal screening for all pregnant women at 35–37 weeks gestation and antibiotic prophylaxis, or screening based on specific risk factors and antibiotic prophylaxis.[6] The presence of a Lancefield-grouping antigen, a type-specific cell surface polysaccharide that is essential for the bacterium's classification, distinguishes Group B β-hemolytic Streptococcus or Streptococcus agalactiae, commonly shortened to GBS. GBS can be distinguished from other bacterial groups with the help of this Lancefield-grouping antigen. Furthermore, GBS's cell surface has a variety of protein antigens that contribute to its immunological profile and are crucial for identifying, analyzing, and comprehending the bacterial responses to the host immune system as well as its overall pathogenicity. [7] Ten different serotypes of Group B Streptococcus (GBS) are distinguished by their unique capsular polysaccharide (CPS) antigens. For GBS isolates performing antiphagocytic roles, these capsular polysaccharides are essential virulence

DOI: 10.69605/ijlbpr_14.3.2025.72

components that help the bacteria elude the host's immune system. CPS antigens have been used as essential ingredients in the development of novel multivalent GBS vaccines because of their important involvement in bacterial pathogenicity. By concurrently targeting several GBS serotypes, these vaccines seek to offer complete protection by boosting the host's immune response against GBS infections by utilizing the antiphagocytic qualities of the CPS antigens. [8] It is commonly acknowledged that the most important factor influencing newborn infection is vertical transmission, which happens through recto-vaginal maternal colonization. Neonatals exposed to the bacterium throughout the delivering process are at a much higher risk of infection due to this mechanism of transfer. In particular, neonates born to women colonized with GBS are at a startlingly higher risk of contracting this potentially dangerous illness than their non-colonized peers. This glaring difference in infection risk emphasizes how crucial it is to closely monitor and treat GBS colonization in pregnant mothers in order to protect the health and welfare of their unborn children. This emphasizes the significance of focused interventions and preventative measures in obstetric care.[9] Globally, GBS colonization rates vary significantly due to a variety of culture techniques, including differences in the quantity and kinds of anatomical locations tested and the growth media used for detection. However, despite these variances, significant and real geographical differences in GBS colonization still exist, indicating variations in local epidemiological dynamics, medical procedures, and diagnostic techniques. Some of the observed differences in colonization rates between regions can be attributed to these methodological subtleties. [10] Given that at least 1-2% of deliveries from mothers with GBS result in early-onset GBS disease, which can cause serious difficulties for babies, knowing the prevalence rate during pregnancy can be vital and highly helpful in India. Understanding the possible burden of newborn GBS disease in the Indian context and using this information to guide focused public health initiatives for its management and prevention are crucial. In many instances, spontaneous deliveries can take place. Additionally, using data and evidence as such can help direct the creation of national standards and protocols for the screening and management of GBS and carry out suitable actions, like the prophylactic use of intrapartum antibiotics. [11] Neonatal infections have a significant effect on the worldwide disease burden. Approximately 6.9 million instances of newborn illnesses occur annually in undeveloped or economically underdeveloped countries. According to a 2012 research, this high prevalence is responsible for at least 500,000 deaths worldwide. Having been recognized for more than 50 years, Group B Streptococcus (GBS) is one of the most common organisms that cause these illnesses. It is also known to play a part in the development of invasive GBS (iGBS) disorders in premature newborns. [12] A thorough review will be conducted pointing out that EOD is about twice as common as LOD when EOD is defined as invasive Group B Streptococcus (GBS) disease that affects infants from the day of birth to six days after birth and late-onset disease (LOD) as occurring in infants a week or seven days after to 89 days of birth. Some Asian areas, including Hong Kong, India, and Thailand, record EOD rates up to six times higher than the prevalence of LOD, indicating that this prevalence is not consistent across all regions. [13] Reducing the vertical transmission of Group B Streptococcus (GBS) to neonates has been a top priority for the last three decades. Pregnant women who have regular checkups or screening tests to identify GBS colonization and then get intrapartum antibiotics are the most successful and efficient technique. [14] Routine screening for pregnant women and the use of intra-partum antibiotic prophylaxis (IAP) have been widely adopted and have considerably reduced the incidence of morbidity and mortality in neonates due to GBS in nations with better infrastructure and economic development. On the other hand, despite comparable rates of S. agalactiae recto-vaginal colonization in pregnant women in low-income areas, screening and IAP to prevent invasive illness are mainly not used due to a lack of health resources, ignorance, and accessibility issues. [15] Timely interventions depend on early detection of Group B Streptococcus (GBS) colonization in expectant mothers. By enabling antibiotic prophylaxis, these prompt identifications can aid in the prevention of newborn illness. In addition to lowering the risk of transmission during childbirth, this preemptive strategy is crucial for thorough screening and therapy. [16] In order to quickly identify Group B Streptococcus (GBS) colonization in pregnancy within less than eight hours, efforts have been made to develop and implement a rapid enrichment combined with antigen detection assay. Through early detection and treatment, this novel diagnostic method can contribute to a decrease in neonatal septicemia instances. [17] A small number of research from Pakistan and India include Streptococcus agalactiae as the main or one of the main organisms responsible for neonatal sepsis infections. [18] However, there is currently very little evidence from research publications from India, therefore our understanding of the actual prevalence of GBS is unreliable and uncertain. The absence of early and proper screening during pregnancy One of the main explanations is the lack of published data on the prevalence of Group B streptococci in pregnant women from the Indian subcontinent. GBS is probably underreported from India, it is safe to state. **[19]** The goal of this study is to use polymerase chain reaction and culture to identify the presence of Group B streptococci in vaginal swabs taken from pregnant patients at a tertiary care facility in central India.

DOI: 10.69605/ijlbpr_14.3.2025.72

MATERIALS AND METHODS

After obtaining approval and clearance from the institutional ethics committee, the patients fulfilling the inclusion criteria will be enrolled for the study after obtaining informed consent.

Sample collection

Vaginal swabs from pregnant women consenting to the study will be collected maintaining aseptic precautions and immediately transported to the laboratory. The swabs used will be Sterile Flocked Nylon Swab with break point (HiMedia, Mumbai). Excessive vaginal secretions or discharge will be wiped off and the swab will be inserted into vagina, about 2cm inside the vaginal introitus. [20]

Sample transport

Swabs will be transported to laboratory within 4 hours and will be placed into enrichment media, Todd-Hewitt broth supplemented with Colistin (10µg/ml) and Nalidixic acid (15µg/ml) (known as Lim broth).

Processing of sample and culture:

Swabs placed in the in-enrichment broth medium will be incubated at 37°C for 18-24 hr and enriched broth will be observed for turbidity. If no turbidity will be seen, broth medium will be incubated for another 24 hours. A loop full of turbid broth will be plated on to 5% Sheep Blood Agar plates and incubated at 37°C under microaerophilic condition i.e. in candle jar containing 5-10% CO2 for a period of 24-48 hours. The 5% Sheep Blood Agar plates will be examined at 24 and 48 hours of incubation. Group B *Streptococcus* will be identified based on β-hemolysis on 5% Sheep blood agar, colony morphology, Gram staining, Hippurate hydrolysis, CAMP factor. All the suspected *Streptococci agalactiae* colonies will be also identified using standard laboratory protocol and automated culture method by VITEK-2 system, automated instrument for ID/AST testing, BioMerieux Diagnostics. [21-23]. Further confirmation of the organism was done by Hippurate hydrolysis and CAMP test.

Polymerase Chain Reaction

GBS isolates were freshly sub-cultured on to 5% Sheep blood agar plates and incubated over night. Freshly sub-cultured bacterial colonies were used for DNA extraction by using Qiagen DNA mini kit (QIAamp DNA mini kit, Hilden, Germany) according to the manufacturer's instruction. PCR targeting cps gene that encodes the capsular polysaccharide using previously established primers [28], forward primer CAATCCTAAGTATTTTCGGTTCATT and reverse primer TAGGAACATGTTCATTAACATAGC was performed. The amplified product length was 688 base pairs.

DNA extraction

DNA extraction was performed as per manufacturer's instructions (QIAamp DNA mini kit, Hilden, Germany). For GBS DNA extraction:

- 200µl of the Todd-Hewitt Broth swab sample was transferred to 1.5ml Eppendorf tube and 20 µl Proteinase K and 10 µl RNAase A was added to it.
- Dry bath incubation at 56°C for 10 minutes was done.
- 200µl of lysis buffer was added and vortexed for 15seconds.
- This mixture was incubated in dry bath at 56°C for 15minutes.
- To this, 200 µl of 100% ethanol was added and the mixture was transferred to spin column (2ml collection tube).
- After centrifugation for 1minute at 8000rpm, the flow-through was discarded. 500 µl of wash buffer AW1 was added and centrifuged at 10000rpm for 1minute. Flow- through was discarded.
- Similarly, 500 µl wash buffer AW2 was also added, centrifuged at 10000rpm for 1 minute and flow-through was discarded.
- The spin column was placed in a clean 1.5ml Eppendorf tube and 200ul elution buffer was added and centrifuged at 10000rpm for 1minute.

Amplification

Amplification of purified, extracted DNA was performed in a thermocycler with the cycling conditions:

Initial denaturation for 5minutes at 95°C, 35 cycles of 30 seconds at 95°C, 30 seconds at 56°C, 1 minute at 72°C and final cycle of 5 minutes at 72°C.

Gel electrophoresis

Gel electrophoresis was carried out in 1.5% agarose gel using Tris-acetate-EDTA buffer.

Result and Interpretation

The gel was viewed under UV illumination and captured using the digital camera attached to the computer. Visualisation of distinct bands at specific amplicon size for tested gene was considered positive PCR reaction.

RESULT

A total of 90 vaginal swabs from pregnant women attending Index Medical College Hospital & Research Centre, Indore at gestational age 35-37 weeks was collected from January 2022 to January 2025.

Culture Results:

A total of 90 vaginal swab samples were collected from pregnant women at gestational age 35-37 weeks. 5 of the total 90 vaginal swabs showed growth on 5% Sheep blood agar plate culture that was confirmed with biochemical reactions and automated Vitek-2(BioMérieux) compact system. Vaginal swabs of 85 pregnant women showed no growth on sheep blood agar plate medium. Out of 90 samples, 5 isolates were

DOI: 10.69605/ijlbpr_14.3.2025.72

positive and 85 isolates were negative for Group B Streptococcus by culture. This yielded a positivity percentage of 5.6%.

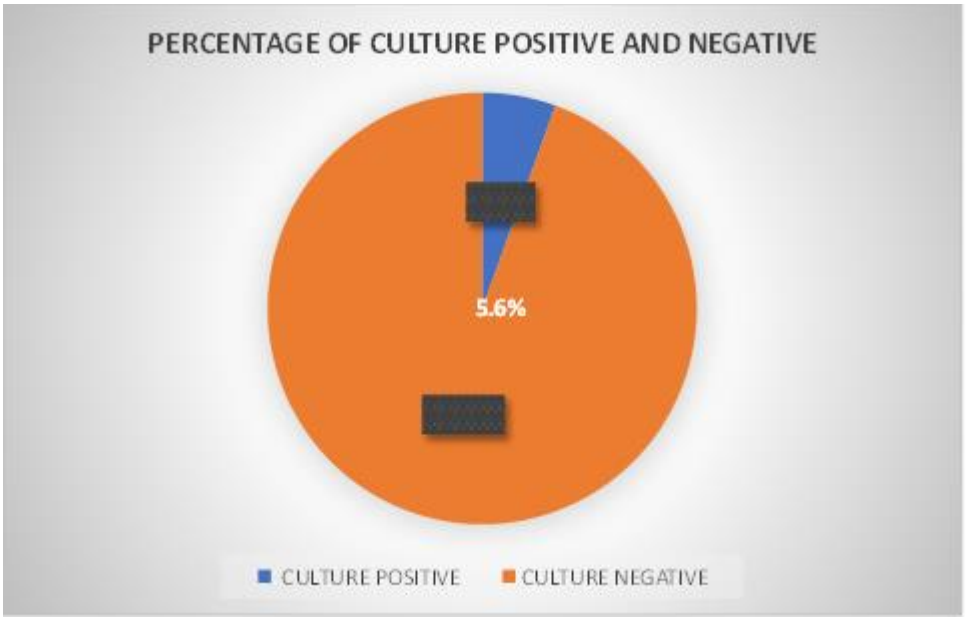
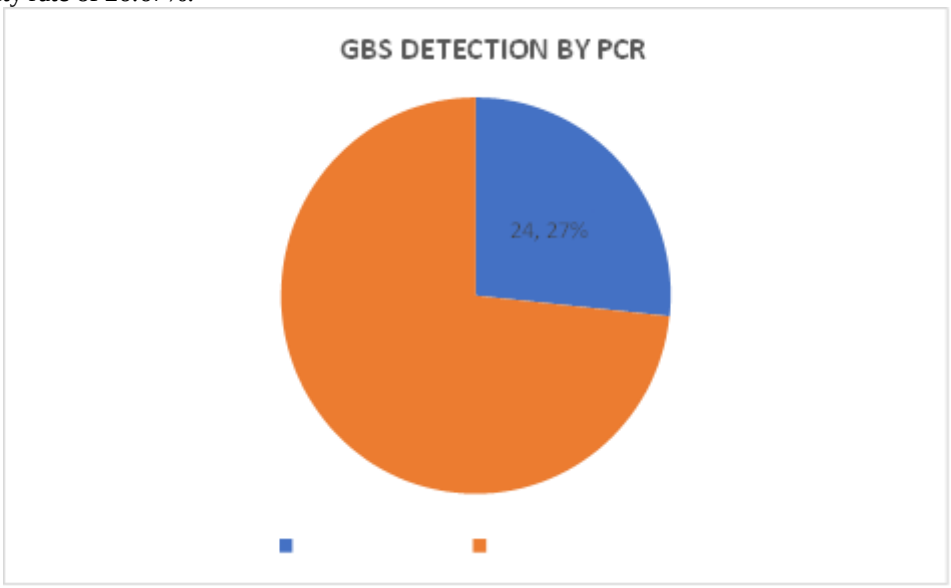


Fig 1: Percentage of positive Group B streptococcal isolates by culture

PCR Results

PCR identified Group B Streptococcus in 24 vaginal swab samples out of the total 90 samples. This amounted to a positivity rate of 26.67%.



DISCUSSION

In the present study, 90 vaginal swabs sample were obtained from pregnant women. Vaginal colonization in the women with Group B *Streptococcus* was determined by culture, and biochemical reactions, and polymerase chain reaction.

In our present study, Group B *Streptococcus* was found in 5 out of 90 pregnant women by culture yielding a culture positivity rate of 5.6%. This is very similar to the data by Gurudas et al, in Kerala where GBS was isolated by culture from 4.8% of the mothers screened during pregnancy for *Streptococcus agalactiae*. [25] The studies conducted in South East Asian countries and primarily India, show similar rates, some studies in India have documented even lesser rates while studies in Africa show higher positivity rates. There is also difference in prevalence rates within different states of India itself due to various factors.

Present study rates concurs with Arif et al., who in their study in Mumbai, India that included 100 pregnant women isolated GBS from 4 women. The

DOI: 10.69605/ijlbpr_14.3.2025.72

culture positivity rate was 4%. [26] Goel et al., in their study amongst 450 women found the vaginal colonization rate to be 3.3% by culture. [9] This data aligns with the current study rates. In another study by Vinod et al., GBS isolation by culture on 5%Sheep blood agar from 126 pregnant women identified similar rates with current study. 5.5% rectal swabs and 3.17% swabs from vagina were positive for Group B *Streptococcus*.(24) In a study conducted in CMC Vellore, India by Santhanam et al, conducted an observational study to find the GBS colonization rate in pregnant area. It was observed that when vaginal samples were cultured primarily into blood agar plates, the colonization rate was 2.6% while using an enrichment medium increased the rate to 7.6%, which closely resembles the rate of present study.[14] Higher rates of isolation were also seen from a few studies in India that showed a prevalence rate of 15% and 14.3% [11,31] while studies showing lower rates than detected in present studies have also been documented where the culture positivity rates were 2%.[2]

In our present study, Group B *Streptococcus* was found in 5 out of 90 pregnant women by culture yielding a culture positivity rate of 5.6%. This is very similar to the data by Gurudas et al, in Kerala where GBS was isolated by culture from 4.8% of the mothers screened during pregnancy for *Streptococcus agalactiae*. [29] The studies conducted in South East Asian countries and primarily India, show similar rates, some studies in India have documented even lesser rates while studies in Africa show higher positivity rates. There is also difference in prevalence rates within different states of India itself due to various factors.

Present study rates concurs with Arif et al., who in their study in Mumbai, India that included 100 pregnant women isolated GBS from 4 women. The culture positivity rate was 4%. [30] Goel et al., in their study amongst 450 women found the vaginal colonization rate to be 3.3% by culture. (9) This data aligns with the current study rates. In another study by Vinod et al., GBS isolation by culture on 5%Sheep blood agar from 126 pregnant women identified similar rates with current study. 5.5% rectal swabs and 3.17% swabs from vagina were positive for Group B *Streptococcus*.[31] In a study conducted in CMC Vellore, India by Santhanam et al, conducted an observational study to find the GBS colonization rate in pregnant area. It was observed that when vaginal samples were cultured primarily into blood agar plates, the colonization rate was 2.6% while using an enrichment medium increased the rate to 7.6%, which closely resembles the rate of present study.[14] Higher rates of isolation were also seen from a few studies in India that showed a prevalence rate of 15% and 14.3% [11,31] while studies showing lower rates than detected in present studies have also been documented where the culture positivity rates were 2%. [2,27] Table 10: Showing comparison of culture rates among various studies.

Author	Gbs detection by culture
Present study	5.6%
Gurudas et al	4.8%
Arif et al	4%
Goel et al	3.3%
Vinod et al	8.7%
Santhanam et al	2.6% (In 5%SBA) 7.6% (In enriched medium)

The rate of GBS isolation was much higher in the present study when molecular method i.e., Polymerase Chain Reaction (PCR) was used. PCR identified GBS in 24 women compared to 5 culture positive isolates. The prevalence rate of colonization by GBS detected by PCR was 26.67% and by culture was 5.6%. This closely resembles the data by Bakhtiari et al., where culture methods detected GBS in 9.3% isolates but PCR increased the rate to 11.3%. [32] In a study by Bidgani et al, culture methods identified GBS in 27.7% vaginal samples and PCR revealed a colonization rate of 43.8%.[1] This data is also akin to our study where we observed an increase in prevalence rates by PCR. Baliga et al., identified GBS in 8 out of 50 samples by culture while PCR identified GBS in 31 isolates(62%) which resonates with our study.[33] Daramroodi et al., in their study found the colonization rate by culture to be 5% and the colonization rate when PCR was performed was found to be 6%.In a study done by Dmitriev et al., out of a total of 71 vaginal samples, culture plates yielded no growth for GBS but PCR detection was positive in 36 samples (50.7%). They also used other methods like counter immunoelectrophoresis (CIE) which detected GBS in 16 samples for streptococcal antigens but surprisingly culture failed to identify GBS completely.[34]

Comparison of PCR detected rates among various studies.

Author	Gbs detection by pcr
Present study	26.67 %
Bakhtiari et al	11.3%
Bidgani et al	43.8%
Baliga et al	62%
Daramroodi et al	6%
Dmitriev et al	50.7%

SUMMARY & CONCLUSION

The infection of Streptococcus agalactiae or Group B Streptococcus (GBS) during childbirth can result in potentially severe infections such as neonatal sepsis, meningitis, and preterm births. This infection impacts pregnant women and their newborns. Effective antenatal screening of women and the implementation of necessary intrapartum antibiotic prophylaxis are essential for the prompt diagnosis of GBS during pregnancy.

In our country, there is a dearth of suitable guidelines for the antenatal screening of pregnant women for

DOI: 10.69605/ijlbpr_14.3.2025.72

GBS. Consequently, the majority of neonatal fatalities that occur within the first seven days of life are attributable to GBS that was not detected or identified during early pregnancy. In order to mitigate the risk of infection and consequent morbidities for both the mother and child, it is imperative to conduct routine screenings for this bacterium. The polymerase chain reaction is determined to be more sensitive for the early detection of colonization by this bacterium

REFERENCES

1. Bidgani S, Navidifar T, Najafian M, Amin M. Comparison of group B streptococci colonization in vaginal and rectal specimens by culture method and polymerase chain reaction technique. J Chin Med Assoc. 2016 Mar;79(3):141-5. doi: 10.1016/j.jcma.2015.06.021.
2. Khatoon F, Nigam A, Sharma N, Srivastava R, Sangal R, Malik N. Prevalence and risk factors for group B streptococcal colonization in pregnant women in northern India. Int J Reprod Contracept Obstet Gynecol. 2016;4361–4. https://doi.org/10.18203/2320-1770.ijrcog20164343
3. Warrier LM, Joy S, C RR, Bashir RA. Group B Streptococcal Colonization among Pregnant Women and Neonates in a Tertiary Care Hospital in South India. Indian J Pediatr. 2022 Dec;89(12):1187-1194. doi: 10.1007/s12098-022-04120-4.
4. Patil KP, Singla SS, Nagmoti MB, Swamy MK. Group B Streptococci Colonization in Pregnant Women: Is Screening Necessary? J South Asian Feder Obst Gynae 2013;5(2):64-67.
5. Elbaradie SM, Mahmoud M, Farid M. Maternal and neonatal screening for Group B streptococci by SCP B gene based PCR: a preliminary study. Indian J Med Microbiol. 2009 Jan-Mar;27(1):17-21.
6. Mhaskar R, Sathyan S, Nadig S, Bhat S, Shamsundar R. Selective risk factor based screening of pregnant women for Group B streptococcal colonization in a teaching hospital in South India. J Obstet Gynecol India. 2005 Aug;55(4).
7. Procop GaryW. Koneman's Color Atlas and Textbook of Diagnostic Microbiology. 6th Edition. Lippincott Williams & Wilkins; 2006.
8. Shrestha K, Sah AK, Singh N, Parajuli P, Adhikari R. Molecular Characterization of Streptococcus agalactiae Isolates from Pregnant Women in Kathmandu City. J Trop Med. 2020 Aug 28;2020:4046703. doi: 10.1155/2020/4046703.
9. Goel N, Wattal C, Gujral K, Dhaduk N, Mansukhani C, Garg P. Group B Streptococcus in Indian pregnant women: Its prevalence and risk factors. Indian J Med Microbiol. 2020 Jul-Dec;38(3 & 4):357-361. doi: 10.4103/ijmm.IJMM_20_333.
10. Woldu ZL, Teklehaimanot TG, Waji ST, Gebremariam MY. The prevalence of Group B Streptococus recto-vaginal colonization and antimicrobial susceptibility pattern in pregnant mothers at two hospitals of Addis Ababa, Ethiopia. Reprod Health. 2014 Dec 5;11:80. doi: 10.1186/1742-4755-11-80.
11. Chaudhary M, Rench MA, Baker CJ, Singh P, Hans C, Edwards MS. Group B Streptococcal Colonization Among Pregnant Women in Delhi, India. Pediatr Infect Dis J. 2017 Jul;36(7):665-669. doi: 10.1097/INF.0000000000001514.
12. Gonçalves BP, Procter SR, Paul P, Chandna J, Lewin A, et al. Group B streptococcus infection during pregnancy and infancy: estimates of regional and global burden. Lancet Glob Health. 2022 Jun;10(6):e807-e819. doi: 10.1016/S2214-109X(22)00093-6. Epub 2022 Apr 28. Erratum in: Lancet Glob Health. 2022 Jul;10(7):e960. doi: 10.1016/S2214-109X(22)00235-2.
13. Delara M, Vadlamudi NK, Sadarangani M. Strategies to Prevent Early and Late-Onset Group B Streptococcal Infection via Interventions in Pregnancy. Pathogens. 2023 Feb 1;12(2):229. doi: 10.3390/pathogens12020229.
14. Santhanam S, Jose R, Sahni RD, Thomas N, Beck MM. Prevalence of group B Streptococcal colonization among pregnant women and neonates in a tertiary hospital in India. J Turk Ger Gynecol Assoc. 2017 Dec 15;18(4):181-184. doi: 10.4274/jtgga.2017.0032.
15. Belard S, Toepfner N, Capan-Melser M, Mombo-Ngoma G, Zoleko-Manego R, Groger M,et al. Streptococcus agalactiae Serotype Distribution and Antimicrobial Susceptibility in Pregnant Women in Gabon, Central Africa. Sci Rep. 2015 Nov 25;5:17281. doi: 10.1038/srep17281.
16. Singh AK, Beyong T, Agarwal L, Lundup C, Bezbaruah V. Group B Streptococcal Colonisation among Pregnant Women Attending a Tertiary Care Hospital of Northeast India. Natl J Lab Med [Internet]. 2021 [cited 2024 Jun 26]; Available from: https://njlm.net/article_FULLTEXT.aspx?issn=0973709x&year=2021&month=July&volume=10&issue=3&page=MO01%20-%20MO04&id=2493
17. Das A, Ray P, Sharma M, Gopalan S. Rapid diagnosis of vaginal carriage of group B beta haemolytic streptococcus by an enrichment cum antigen detection test. Indian J Med Res. 2003 Jun;117:247–52.
18. Shafiq D, Izhaar M, Sadia C. Frequency of streptococcus agalactiae colonization inpregnant women in a tertiary care health center of Punjab.J Sheikh Zayed Med Coll. 2015;6(4):861-863
19. Dr Akriti, Dr Sharda Patra, Dr Sushma Nangia, Dr Sonal Saxena, "Group B Streptococcus Colonization: Prevalence and its Effect on Maternal and Neonatal Outcome", International Journal of Science and Research (IJSR), Volume 8 Issue 1, January 2019, pp. 1316-1318, URL: https://www.ijsr.net/getabstract.php?paperid=ART20194474, DOI: https://www.doi.org/10.21275/ART20194474
20. Filkins L, Hauser JR, Robinson-Dunn B, Tibbetts R, Boyanton BL, Revell P. Guidelines for the Detection and Identification of Group B Streptococcus. Am Soc Microbiol. 2020 Mar 10;
21. Lancefied R. Hare R. The serological differentiation of pathogenic and, non- pathogenic strains of hemolytic streptococci from parturient women., J Exp Med 1935: 61-335 -449. [cited 2024 Jun 29]. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2133228/
22. Campbell JR, Baker CJ, Edwards MS. Deposition and degradation of C3 on type III group B streptococci. Infect Immun. 1991 Jun;59(6):1978–83.
23. Rajagopal L. Understanding the regulation of Group B Streptococcal virulence factors. Future Microbiol. 2009 Mar;4(2):201–21.
24. R V, Govindan S, M M. Prevalence and antibiotic pattern of group B streptococcus among antenatal women attending a tertiary care centre in Puducherry. Indian J Microbiol Res. 2020 Dec 28;5(4):466–9.
25. Chaudhary U, Sabherwal U, Chugh TD. Prevalence of group B streptococci in obstetrical cases. Indian J Med Res. 1981 May;73:710–4.
26. Cieslewicz MJ, Chaffin D, Glusman G, Kasper D, Madan A, Rodrigues S, et al.Structural and Genetic Diversity of Group B Streptococcus Capsular Polysaccharides. Infect Immun. 2005 May;73(5):3096–103.
27. Das M, Lalitha S. LS, Subbarayudu S. SS, Mohanty D MD. Prevalence of Group B Streptococcal Carriage in Pregnant Women. Indian J Appl Res. 2011 Oct 1;4(3):312–4.
28. Imperi M, Pataracchia M, Alfarone G, Baldassarri L, Orefici G, Creti R. A multiplex PCR assay for the direct identification of the capsular type (Ia to IX) of Streptococcus agalactiae. J Microbiol Methods. 2010 Feb;80(2):212–4.
29. Gurudas G, Arjun R, Jain N, Ranganayaki V, Sasikumar C, Mohan V, et al. Prevalence of Group B Streptococcus in pregnant women in Kerala and relation to neonatal outcomes: a prospective cross-sectional study. J Trop Pediatr. 2022 Dec 1;68(6):fmac092.
30. Arif D, Urehkar AD, Kore A, Chaudhary BL, Nissar J, Singh S. Prevalence of Streptococcus agalactiae in Pregnant Women and its Antibiotic Sensitivity Pattern. 2015;
31. Doddaiah V, Shivanna V, Vijaylakshmi S, Santhya S. Evaluation of conventional and CHROMagar method for the detection of Group B Streptococcus in antenatal cases | Request PDF. J Acad Clin Microbiol [Internet]. 2016 Jan [cited 2024 Jul 15];18(2)(127).

DOI: 10.69605/ijlbpr_14.3.2025.72

Availablefrom:https://www.researchgate.net/publication/311153168_Evaluation_of_conventional_and_CHROMagar_method_for_the_detection_of_Group_B_Streptococcus_in_antenatal_cases

32. Bakhtiari R, Dallal MS, Mehrabadi J, Heidarzadeh S, Pourmand M. Evaluation of Culture and PCR Methods for Diagnosis of Group B Streptococcus Carriage in Iranian Pregnant Women. 2012;41.
33. Baliga S. Evaluation of Culture, Antigen Detection and Polymerase Chain Reaction for Detection of Vaginal Colonization of Group B Streptococcus (GBS) in Pregnant Women. J Clin Diagn Res [Internet]. 2014 [cited 2024 Jul 4]; Available from: http://www.jcdr.net/article_fulltext.asp?issn=0973-709x&year=2014&volume=8&issue=2&page=47&issn=0973-709x&id=4004
34. Dmitriev A, Suvorov A, Shen AD, Yang YH. Clinical diagnosis of group B streptococci by scpB gene based PCR. INDIAN J MED RES. 2004.