

**Prevalence of Group B Streptococcal Colonization in Pregnant Women and Its Antimicrobial Susceptibility Profile**

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**Abstract**

**Background:** Group B Streptococcus (GBS), also known as Streptococcus agalactiae, is an important cause of maternal colonization and can be transmitted from mother to newborn during labour and delivery. Maternal GBS colonization is associated with an increased risk of neonatal infections, including early-onset sepsis, pneumonia, and meningitis. Screening and appropriate antimicrobial management of colonized pregnant women therefore play an important role in preventing adverse neonatal outcomes.

**Aim:** To determine the prevalence of Group B Streptococcal colonization among pregnant women and to assess the antimicrobial susceptibility profile of the isolated GBS strains.

**Materials and Methods:** A prospective observational study was conducted among 65 pregnant women. Appropriate clinical and obstetric information was recorded, and specimens were collected for detection of GBS colonization. Isolated GBS strains were subjected to antimicrobial susceptibility testing using standard microbiological methods. The association of GBS

colonization with demographic, obstetric, gestational and clinical parameters was also evaluated.

**Results:** Out of 65 pregnant women screened, 13 (20.0%) were positive for GBS colonization, while 52 (80.0%) were negative. GBS positivity was comparatively higher among women aged 25–29 years and among multigravida and multiparous women. The highest proportion of colonization was observed among women between 28 and 36 weeks of gestation. Most GBS-positive women, 8 (61.5%), were asymptomatic. All isolates showed susceptibility to penicillin, ampicillin, ceftriaxone, vancomycin and linezolid. Resistance was highest to tetracycline, with 10 (76.9%) isolates showing resistance. Erythromycin resistance was observed in 4 (30.8%) isolates and clindamycin resistance in 3 (23.1%) isolates.

**Conclusion:** The study demonstrated a 20.0% prevalence of GBS colonization among the pregnant women studied. The high proportion of asymptomatic colonization highlights the importance of appropriate screening. The isolates retained excellent susceptibility to  $\beta$ -lactam antibiotics, whereas considerable resistance was observed to tetracycline, erythromycin and clindamycin. Routine screening along with antimicrobial susceptibility testing may help in appropriate management and prevention of GBS-associated maternal and neonatal infections.

**Keywords:** Group B Streptococcus, Streptococcus Agalactiae, Pregnancy, Maternal Colonization, Antimicrobial Susceptibility, Neonatal Infection.

### Introduction

Group B Streptococcus (GBS), also known as Streptococcus agalactiae, is a Gram-positive,  $\beta$ -haemolytic, facultative anaerobic bacterium that commonly colonizes the gastrointestinal and

genitourinary tracts of humans. In healthy adults, GBS colonization is generally asymptomatic and does not usually cause significant disease. However, maternal colonization during pregnancy is of considerable clinical importance because the organism can be transmitted vertically from the mother to the newborn during labour or following rupture of membranes and may subsequently cause invasive neonatal disease<sup>1,2</sup>.

Maternal GBS colonization is one of the most important risk factors for early-onset GBS disease (EOGBS) in newborns. Transmission generally occurs during labour through exposure of the newborn to colonized maternal genital secretions. Approximately half of infants born to colonized mothers may become colonized, although only a proportion subsequently develop invasive disease<sup>2</sup>. Early-onset infection usually presents during the first week of life and may manifest as sepsis, pneumonia or meningitis. Late-onset GBS disease occurs from the end of the first week through the first few months of life and is particularly associated with meningitis.<sup>3,4</sup>

The global burden of GBS infection remains substantial. A comprehensive global analysis estimated that maternal GBS colonization and GBS disease contribute significantly to neonatal morbidity and mortality worldwide, with a disproportionate burden occurring in low- and middle-income countries<sup>5</sup>. The World Health Organization recognizes GBS as an important cause of neonatal sepsis and meningitis and emphasizes the importance of preventive strategies directed at maternal colonization and intrapartum transmission.<sup>6</sup>

The prevalence of maternal GBS colonization varies considerably between geographical regions and populations. Differences may be related to ethnicity, geographical location, socioeconomic conditions, obstetric characteristics, gestational age, sampling

methods and laboratory techniques used for isolation. A systematic review and meta-analysis demonstrated substantial regional variation in maternal GBS colonization, highlighting the importance of obtaining local epidemiological data rather than relying solely on prevalence estimates from other populations<sup>7</sup>.

In India, available studies have reported variable rates of maternal GBS colonization. Studies from different parts of the country have reported prevalence ranging from relatively low rates to approximately 15% or more, depending on the population and microbiological methods employed<sup>8-11</sup>. Such differences emphasize the need for institution-specific surveillance and standardized screening practices.

The detection of maternal GBS colonization is particularly challenging because most colonized pregnant women remain asymptomatic. Consequently, absence of symptoms cannot reliably exclude maternal carriage. Colonization may also be transient or intermittent, and therefore the timing and site of specimen collection have an important influence on the detection rate<sup>2,12</sup>. Combined vaginal and rectal sampling has been shown to improve detection compared with sampling from a single anatomical site. Current recommendations emphasize appropriate late-pregnancy screening.<sup>6,12</sup>

Screening for GBS during pregnancy provides an opportunity to identify women who are at increased risk of transmitting the organism to their newborns. In culture-based screening strategies, vaginal and rectal specimens are collected and processed using appropriate enrichment and selective culture techniques. Accurate laboratory identification is essential because colonization status guides the decision regarding intrapartum antibiotic prophylaxis<sup>12,13</sup>.

Intrapartum antibiotic prophylaxis (IAP) is currently the principal strategy for preventing early-onset neonatal GBS infection in settings where screening-based prevention is implemented. Penicillin is generally considered the preferred agent, with ampicillin as an acceptable alternative. For women with penicillin allergy, antibiotic selection depends on the severity of the allergic reaction and the antimicrobial susceptibility profile of the isolated GBS strain<sup>12,13</sup>.

Antimicrobial susceptibility testing has consequently become increasingly important, particularly for women who have a history of severe penicillin allergy. Although GBS remains highly susceptible to penicillin and other  $\beta$ -lactam antibiotics in most settings, resistance to non- $\beta$ -lactam agents such as erythromycin, clindamycin and tetracycline is common<sup>14</sup>. A recent global systematic review and meta-analysis reported particularly high resistance to tetracycline, while resistance to penicillin, ampicillin and vancomycin remained comparatively low<sup>14</sup>.

Indian studies have reported similar antimicrobial susceptibility patterns. Resistance to tetracycline and erythromycin has been observed, while resistance to clindamycin varies between studies<sup>9,15</sup>. These findings demonstrate that antimicrobial susceptibility patterns may vary between populations and institutions and should therefore be periodically evaluated.

The clinical importance of maternal GBS colonization extends beyond simple identification of the organism. Maternal colonization can be associated with premature rupture of membranes and may increase the risk of neonatal systemic illness.<sup>6</sup> Furthermore, because a large proportion of colonized women may have no clinical symptoms, selective screening based solely on maternal symptoms is unlikely to identify all women at risk.

Despite increasing recognition of GBS as a cause of preventable neonatal disease, significant gaps remain in surveillance and prevention, particularly in low- and middle-income countries. Differences in screening policies, laboratory facilities, availability of enrichment culture, antimicrobial susceptibility testing and access to intrapartum prophylaxis may influence the observed burden of disease<sup>5,6</sup>. Development of maternal GBS vaccines is also being explored as a potential future strategy<sup>6</sup>.

Therefore, assessment of the prevalence of maternal GBS colonization along with characterization of the antimicrobial susceptibility profile of the isolated strains is important for local clinical practice. The present study was undertaken to determine the prevalence of Group B Streptococcal colonization among pregnant women and to evaluate the antimicrobial susceptibility profile of the isolated GBS strains.

## **Material and Methods**

### **Study Design and Study Population**

A hospital-based cross-sectional observational study was conducted in the Department of Microbiology in collaboration with the Department of Obstetrics and Gynaecology at a tertiary care teaching hospital. A total of 65 pregnant women attending the antenatal clinic were included in the study. The study was undertaken to determine the prevalence of Group B Streptococcus (GBS) colonization among pregnant women and to evaluate the antimicrobial susceptibility profile of the isolated GBS strains.

### **Inclusion Criteria**

Pregnant women attending the antenatal clinic during the study period were eligible. Women willing to participate and providing written informed consent were enrolled. Pregnant women were included irrespective of gravidity,

parity, gestational age, or presence or absence of symptoms suggestive of genital tract infection.

### **Exclusion Criteria**

Women who refused to participate or did not provide informed consent were excluded. Women who had received recent antimicrobial therapy that could influence GBS culture results were also excluded. Samples that were inadequate, improperly collected, contaminated, or unsuitable for microbiological processing were excluded from analysis.

### **Data Collection**

Relevant demographic, clinical and obstetric information was collected using a predesigned case record form. Parameters included age, gravidity, parity, gestational age, gestational diabetes mellitus, previous abortion, previous preterm delivery, history of GBS colonization/infection, prolonged rupture of membranes, recent antibiotic use, and vaginal or urinary symptoms.

### **Sample Collection**

Vaginal specimens were collected from each participant under appropriate aseptic precautions using sterile swabs. Care was taken to obtain an adequate specimen while avoiding contamination. The collected specimens were transported promptly to the microbiology laboratory for processing.

### **Microbiological Examination**

The specimens were processed using standard microbiological procedures for isolation and identification of GBS. Suspected colonies were examined by Gram staining and appropriate biochemical/confirmatory tests. GBS was identified on the basis of characteristic microbiological findings and confirmation of group B antigen where applicable.

### Antimicrobial Susceptibility Testing

Antimicrobial susceptibility testing was performed on confirmed GBS isolates using a standardized susceptibility-testing method according to applicable CLSI guidelines. Antibiotics assessed included penicillin, ampicillin, ceftriaxone, vancomycin, linezolid, erythromycin, clindamycin and tetracycline.

### Quality Control

Standard quality-control procedures were followed throughout specimen processing, organism identification, and antimicrobial susceptibility testing. Appropriate reference strains were used as required to ensure reliability of laboratory results.

### Statistical Analysis

Data were entered into a spreadsheet and analyzed statistically. Categorical variables were expressed as frequency and percentage. The prevalence of GBS colonization was calculated as the number of GBS-positive women divided by the total number screened. A p-value <0.05 was considered statistically significant where inferential testing was performed.

### Ethical Considerations

Written informed consent was obtained from all participants before enrolment. Participant confidentiality was maintained throughout the study, and collected specimens and clinical information were used only for the stated study objectives.

### Results

A total of 65 pregnant women were included in the study. Vaginal/rectal specimens were processed for detection of Group B Streptococcus (GBS), followed by antimicrobial susceptibility testing of GBS isolates.

Table 1: Age-wise distribution of study participants (n=65)

| Age group | Number (n) | Percentage (%) |
|-----------|------------|----------------|
|-----------|------------|----------------|

|             |    |      |
|-------------|----|------|
| <20 years   | 3  | 4.6  |
| 20–24 years | 19 | 29.2 |
| 25–29 years | 27 | 41.5 |
| 30–34 years | 12 | 18.5 |
| ≥35 years   | 4  | 6.2  |
| Total       | 65 | 100  |

Table 1: The age-wise distribution of the 65 pregnant women showed that the majority belonged to the 25–29 years age group, comprising 27 (41.5%) participants, followed by the 20–24 years group with 19 (29.2%) participants. Twelve (18.5%) women were aged 30–34 years, while 4 (6.2%) were aged ≥35 years and 3 (4.6%) were below 20 years.

Table 2: Obstetric characteristics of participants

| Parameter       | Category     | n  | %    |
|-----------------|--------------|----|------|
| Gravidity       | Primigravida | 31 | 47.7 |
|                 | Multigravida | 34 | 52.3 |
| Parity          | Nulliparous  | 32 | 49.2 |
|                 | Multiparous  | 33 | 50.8 |
| Gestational age | <28 weeks    | 11 | 16.9 |
|                 | 28–36 weeks  | 35 | 53.8 |
|                 | ≥37 weeks    | 19 | 29.2 |

Table 2: Among the 65 participants, 31 (47.7%) were primigravida and 34 (52.3%) were multigravida. In terms of parity, 32 (49.2%) women were nulliparous and 33 (50.8%) were multiparous. Regarding gestational age, 11 (16.9%) women were below 28 weeks, 35 (53.8%) were between 28 and 36 weeks, and 19 (29.2%) were at or beyond 37 weeks.

Table 3. Distribution according to clinical and obstetric risk factors

| Risk factor          | Present n (%) | Absent n (%) |
|----------------------|---------------|--------------|
| Gestational diabetes | 8 (12.3)      | 57 (87.7)    |

|                                     |           |           |
|-------------------------------------|-----------|-----------|
| mellitus                            |           |           |
| Previous abortion                   | 11 (16.9) | 54 (83.1) |
| Previous preterm delivery           | 5 (7.7)   | 60 (92.3) |
| Previous GBS colonization/infection | 2 (3.1)   | 63 (96.9) |
| Prolonged rupture of membranes      | 6 (9.2)   | 59 (90.8) |
| Recent antibiotic use               | 9 (13.8)  | 56 (86.2) |
| Vaginal discharge                   | 14 (21.5) | 51 (78.5) |

Table 3: Vaginal discharge was the most frequently reported risk factor, occurring in 14 (21.5%) women, followed by previous abortion in 11 (16.9%) and recent antibiotic use in 9 (13.8%). Gestational diabetes mellitus was present in 8 (12.3%), prolonged rupture of membranes in 6 (9.2%), previous preterm delivery in 5 (7.7%), and previous GBS colonization or infection in 2 (3.1%) women.

Table 4: Overall prevalence of GBS colonization

| Culture result | Number (n) | Percentage (%) |
|----------------|------------|----------------|
| GBS positive   | 13         | 20.0           |
| GBS negative   | 52         | 80.0           |
| Total          | 65         | 100            |

Table 4: Among the 65 pregnant women screened, 13 (20.0%) were positive for Group B Streptococcus, whereas 52 (80.0%) were negative. Thus, the overall prevalence of GBS colonization was 20.0%.

Table 5: GBS colonization according to age group

| Age group   | Total n | GBS positive n (%) | GBS negative n (%) |
|-------------|---------|--------------------|--------------------|
| <20 years   | 3       | 0 (0.0)            | 3 (100)            |
| 20–24 years | 19      | 3 (15.8)           | 16 (84.2)          |
| 25–29       | 27      | 6 (22.2)           | 21 (77.8)          |

|             |    |           |           |
|-------------|----|-----------|-----------|
| years       |    |           |           |
| 30–34 years | 12 | 3 (25.0)  | 9 (75.0)  |
| ≥35 years   | 4  | 1 (25.0)  | 3 (75.0)  |
| Total       | 65 | 13 (20.0) | 52 (80.0) |

Table 5: The highest number of GBS-positive cases was observed in the 25–29-year age group, with 6 cases. This was followed by 3 positive cases each in the 20–24-year and 30–34-year groups, while 1 case was observed among women aged ≥35 years.

Table 6. GBS colonization according to gravidity and parity

| Parameter | Category     | Total n | GBS positive n (%) | GBS negative n (%) |
|-----------|--------------|---------|--------------------|--------------------|
| Gravidity | Primigravida | 31      | 5 (16.1)           | 26 (83.9)          |
|           | Multigravida | 34      | 8 (23.5)           | 26 (76.5)          |
| Parity    | Nulliparous  | 32      | 5 (15.6)           | 27 (84.4)          |
|           | Multiparous  | 33      | 8 (24.2)           | 25 (75.8)          |

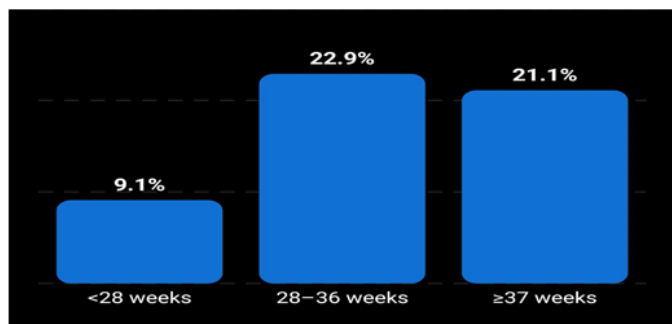
Table 6: GBS colonization was observed in 5 of 31 (16.1%) primigravida women and 8 of 34 (23.5%) multigravida women. Similarly, 5 of 32 (15.6%) nulliparous women and 8 of 33 (24.2%) multiparous women were GBS positive.

Table 7. GBS colonization according to gestational age

| Gestational age | Total n | GBS positive n (%) | GBS negative n (%) |
|-----------------|---------|--------------------|--------------------|
| <28 weeks       | 11      | 1 (9.1)            | 10 (90.9)          |
| 28–36 weeks     | 35      | 8 (22.9)           | 27 (77.1)          |
| ≥37 weeks       | 19      | 4 (21.1)           | 15 (78.9)          |
| Total           | 65      | 13 (20.0)          | 52 (80.0)          |

Table 7: GBS positivity was lowest among women below 28 weeks, where 1 of 11 (9.1%) women was positive. Among women between 28 and 36 weeks, 8 of

35 (22.9%) were positive, while 4 of 19 (21.1%) women at  $\geq 37$  weeks were positive



Graph 1: GBS colonization according to gestational age

Table 8. Clinical presentation among GBS-positive women (n=13)

| Clinical finding         | GBS-positive cases n (%) |
|--------------------------|--------------------------|
| Asymptomatic             | 8 (61.5)                 |
| Vaginal discharge        | 4 (30.8)                 |
| Dysuria/urinary symptoms | 2 (15.4)                 |
| Other genital symptoms   | 1 (7.7)                  |

Table 8: Among the 13 women who tested positive for GBS, 8 (61.5%) were asymptomatic. Vaginal discharge was reported in 4 (30.8%) women, urinary symptoms in 2 (15.4%), and other genital symptoms in 1 (7.7%) woman.

Table 9. Antimicrobial susceptibility pattern of GBS isolates (n=13)

| Antimicrobial agent | Sensitive n (%) | Intermediate n (%) | Resistant n (%) |
|---------------------|-----------------|--------------------|-----------------|
| Penicillin          | 13 (100)        | 0 (0)              | 0 (0)           |
| Ampicillin          | 13 (100)        | 0 (0)              | 0 (0)           |
| Ceftriaxone         | 13 (100)        | 0 (0)              | 0 (0)           |
| Vancomycin          | 13 (100)        | 0 (0)              | 0 (0)           |
| Linezolid           | 13 (100)        | 0 (0)              | 0 (0)           |
| Erythromycin        | 9 (69.2)        | 0 (0)              | 4 (30.8)        |
| Clindamycin         | 10 (76.9)       | 0 (0)              | 3 (23.1)        |
| Tetracycline        | 3 (23.1)        | 0 (0)              | 10 (76.9)       |

Table 9: All 13 GBS isolates were susceptible to penicillin, ampicillin, ceftriaxone, vancomycin and linezolid. Erythromycin susceptibility was observed in 9 (69.2%) isolates and resistance in 4 (30.8%). Clindamycin was susceptible in 10 (76.9%) and resistant in 3 (23.1%). Tetracycline showed the highest resistance, with 10 (76.9%) isolates resistant.

Table 10: Macrolide and lincosamide resistance among GBS isolates

| Resistance pattern                          | n | %    |
|---------------------------------------------|---|------|
| Erythromycin-resistant                      | 4 | 30.8 |
| Clindamycin-resistant                       | 3 | 23.1 |
| Both erythromycin and clindamycin resistant | 3 | 23.1 |
| Susceptible to both                         | 9 | 69.2 |

Table 10: Among the 13 GBS isolates, 4 (30.8%) were resistant to erythromycin and 3 (23.1%) were resistant to clindamycin. Three isolates (23.1%) demonstrated resistance to both erythromycin and clindamycin, whereas 9 (69.2%) were susceptible to both

Table 11: Summary of major findings

| Finding                          | n     | %    |
|----------------------------------|-------|------|
| Total pregnant women studied     | 65    | 100  |
| GBS-positive women               | 13    | 20.0 |
| GBS-negative women               | 52    | 80.0 |
| GBS colonization in multigravida | 8/34  | 23.5 |
| GBS colonization at 28-36 weeks  | 8/35  | 22.9 |
| Penicillin susceptibility        | 13/13 | 100  |
| Ampicillin susceptibility        | 13/13 | 100  |
| Vancomycin susceptibility        | 13/13 | 100  |
| Erythromycin resistance          | 4/13  | 30.8 |
| Clindamycin resistance           | 3/13  | 23.1 |
| Tetracycline resistance          | 10/13 | 76.9 |

Table 11: Overall, 13 (20.0%) of 65 women showed GBS colonization. Colonization was comparatively more frequent among multigravida/multiparous women and women between 28 and 36 weeks. The isolates showed complete susceptibility to penicillin, ampicillin and vancomycin, with considerable resistance to tetracycline, erythromycin and clindamycin.

## Discussion

Group B Streptococcus (GBS), also known as Streptococcus agalactiae, is an important colonizer of the gastrointestinal and genital tracts of pregnant women. Maternal genital tract colonization is usually asymptomatic, but transmission to the newborn during labour or after rupture of membranes may result in serious neonatal infections such as sepsis, pneumonia and meningitis<sup>1-4</sup>.

In the present study, 65 pregnant women were screened and 13 (20.0%) were positive for GBS colonization, while 52 (80.0%) were negative. The prevalence observed in our study indicates that GBS colonization is relatively common among pregnant women. This finding is comparable with prevalence reported in several international populations. However, considerable geographical variation has been reported because of differences in study population, gestational age, sampling sites, specimen-collection methods and microbiological techniques.<sup>5,6</sup>

Indian studies have also demonstrated considerable variation in GBS prevalence. A study conducted among pregnant women in Delhi reported a colonization rate of approximately 15%, whereas a tertiary-care study from South India reported a prevalence of 12.9%<sup>7,8</sup>. Other Indian studies have reported lower prevalence rates, further demonstrating that maternal GBS carriage varies between populations and healthcare settings<sup>9-11</sup>.

In our study, GBS positivity was highest in the 25–29-year age group, followed by women aged 30–34 years. This finding may partly reflect the age distribution of the study population. Age has not been established as a consistent independent predictor of GBS colonization. Maternal colonization is influenced by several demographic, behavioural, obstetric and microbiological factors<sup>6,10</sup>.

GBS colonization was somewhat higher among multigravida women (23.5%) than primigravida women (16.1%) and among multiparous women (24.2%) compared with nulliparous women (15.6%). Previous studies have reported variable associations between GBS colonization and parity or gravidity. These factors alone, however, cannot reliably identify colonized women, supporting the importance of microbiological screening<sup>6,10</sup>.

The highest proportion of GBS-positive women in the present study belonged to the 28–36-week gestational-age group (22.9%). GBS carriage may be transient or intermittent, making the timing of specimen collection an important factor in determining colonization status. Current recommendations support screening during late pregnancy, particularly around 35–37 weeks, to improve identification of women likely to be colonized at delivery.<sup>1-4,12,16</sup>

A noteworthy finding was that 8 of the 13 GBS-positive women (61.5%) were asymptomatic. This emphasizes that maternal GBS colonization frequently occurs without clinical manifestations. Therefore, relying solely on clinical symptoms may fail to identify a considerable proportion of colonized women. Systematic screening during pregnancy is consequently important for identifying women at risk of transmitting GBS to their newborns<sup>1-4,16</sup>.

The antimicrobial susceptibility results in the present study were encouraging for the commonly recommended  $\beta$ -lactam agents. All 13 GBS isolates (100%) were susceptible to penicillin and ampicillin. Penicillin remains the preferred antibiotic for intrapartum prophylaxis, with ampicillin being an accepted alternative<sup>1,2,17-19</sup>. Earlier clinical trials demonstrated that intrapartum antimicrobial prophylaxis can substantially reduce maternal-to-neonatal transmission and early-onset GBS disease.<sup>17,18</sup>

All isolates in our study were also susceptible to ceftriaxone, vancomycin and linezolid. The absence of vancomycin resistance is reassuring because vancomycin remains an important alternative for selected women with severe  $\beta$ -lactam allergy. However, antimicrobial selection in such patients should be based on susceptibility testing whenever appropriate<sup>2,14,16</sup>.

In contrast, 10 of 13 isolates (76.9%) showed resistance to tetracycline. This high level of resistance is consistent with the worldwide antimicrobial resistance pattern of GBS. A recent global systematic review reported tetracycline resistance of approximately 77.8%, making tetracycline one of the least useful antimicrobial agents against GBS.<sup>14</sup> Similar high tetracycline resistance has also been reported in studies from India and other countries<sup>11,15</sup>.

Erythromycin resistance was observed in 4/13 isolates (30.8%), while clindamycin resistance was observed in 3/13 isolates (23.1%). These findings are clinically important because clindamycin may be considered for women with severe penicillin allergy. Increasing resistance to macrolides and lincosamides has been reported in different geographical regions<sup>8,14,15</sup>.

In the present study, 3 isolates demonstrated resistance to both erythromycin and clindamycin. This observation

highlights the importance of antimicrobial susceptibility testing when an alternative to penicillin is required. In women with severe penicillin allergy, susceptibility-guided selection of an alternative antibiotic is particularly important because resistance to clindamycin is increasingly reported.<sup>2,14,16</sup>

Population-based evidence has shown that implementation of systematic prevention strategies can substantially reduce neonatal early-onset GBS disease.<sup>21</sup> Nevertheless, GBS remains an important cause of invasive disease in young infants, particularly during the first weeks of life.<sup>20,22</sup>

The results of the present study therefore support the need for continued surveillance of maternal GBS colonization and antimicrobial susceptibility. Although the sample size was limited to 65 women, the 20% colonization rate and substantial resistance to tetracycline, erythromycin and clindamycin demonstrate the importance of local epidemiological data. Larger multicentric studies would be useful to establish the prevalence, risk factors and resistance patterns of GBS in the Indian population.

Overall, our findings reinforce the importance of maternal GBS screening, appropriate intrapartum prophylaxis and antimicrobial susceptibility testing. Penicillin and ampicillin remain appropriate first-line agents because of the preserved susceptibility observed in our isolates, whereas resistance to alternative agents warrants continued monitoring<sup>1,2,14,16,19,23,24</sup>.

## Conclusion

The present study demonstrated a 20% prevalence of Group B Streptococcus colonization among pregnant women, indicating that maternal GBS carriage is relatively common in the study population. A considerable proportion of colonized women were

asymptomatic, highlighting the limitations of symptom-based detection alone and supporting the importance of appropriate antenatal screening.

All GBS isolates showed susceptibility to penicillin, ampicillin, ceftriaxone, vancomycin and linezolid, supporting the continued use of  $\beta$ -lactam antibiotics as the preferred agents for prevention and treatment. However, substantial resistance to tetracycline, erythromycin and clindamycin was observed. Therefore, regular surveillance of GBS antimicrobial susceptibility and susceptibility-guided selection of alternative antibiotics are recommended, particularly in women with  $\beta$ -lactam allergy.

Overall, early identification of maternal GBS colonization and appropriate intrapartum antibiotic prophylaxis can play an important role in reducing maternal-to-neonatal transmission and early-onset neonatal GBS disease.

### Limitations

The study was limited by the small sample size of 65 participants and single-centre design, which may limit the generalizability of the findings.

Larger multicentric studies with longer follow-up are needed to validate the prevalence and antimicrobial Susceptibility Patterns Observed.

### Declarations

Consent to participate: There is consent to participate.

Consent for publication: There is consent for the publication of this paper.

Authors' contributions: Author equally contributed the work.

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