

Original Research Article

Prevalence of positive group B streptococcal infections among pregnant women in Najran, Saudi Arabia

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Received: 24 September 2023

Accepted: 02 October 2023

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ABSTRACT

Background: Group B streptococcus (GBS) is the most common bacterium to infect women during pregnancy, and vaginal GBS colonisation is a risk factor for newborn GBS illness. The presence of GBS in the woman during labour is thought to be accurately predicted by GBS detection in the final five weeks before to delivery. This study aimed to assess the prevalence of GBS genital infections among pregnant women in Najran, Saudi Arabia.

Methods: This cross-sectional retrospective study was conducted at the Armed Forces Hospital in Saudi Arabia. The study included data from electronic health records of all pregnant women who were examined and tested for genitourinary GBS infection in the hospital. Data was retrieved using a pre-designed form that included characteristic of the pregnant women, the gestational age at the time of GBS testing, and swap result of GBS. For each positive GBS swap, the antibiotic sensitivity against twenty-one antibiotics was recorded.

Results: A total of 2308 pregnant women were included. The mean age was 32±7 years. The prevalence of positive GBS swap was 10.4%. The average gestational age of the women who had a positive swap was 34±9 weeks. Regarding antibiotics sensitivity, Penicillin (86.7%), Ampicillin (61.8%) and cephalexin (55.6%) were among the antibiotics that showed the highest sensitivity rates.

Conclusions: We found an isolation rate of 10.4% of GBS among pregnant women who attended Najran Armed Forces Hospital. We recommend more comprehensive screening programs and strict management plans to avoid antimicrobial resistance to spread among these GBS strains.

Keywords: Pregnant, Group-B-streptococcus, Prevalence, Saudi

INTRODUCTION

Group B Streptococcus (GBS) or *Streptococcus agalactiae* is a gram-positive bacterium that colonises the gastrointestinal and genitourinary tracts. The most frequent infectious cause of morbidity and death in newborns in the United States is known to be GBS.¹ Although current therapies are only successful in preventing early-onset disease, it is known that GBS may cause both early and late onset infections in newborns.

Spontaneous preterm birth (PTB) has been associated with the presence of infection and inflammation in the vaginal

tract during pregnancy.² Lactobacillus, which produces defence against pathogenic species, is the main colonising bacterium in healthy pregnant women.³ According to reports, bacterial vaginosis that develops in the early stages of pregnancy increases the risk for PTB.⁴ GBS is the most common vaginal bacterium to infect women during pregnancy, and vaginal GBS colonisation is a risk factor for newborn GBS illness.⁵ The presence of GBS in the woman during labour is thought to be accurately predicted by GBS detection in the final five weeks before to delivery.⁶

The incidence of GBS colonization during pregnancy is estimated to be between 10-30%. In the past two decades,

advancements in screening methods, prophylaxis during delivery, and secondary prevention strategies have led to a substantial decrease in early-onset GBS infections. The rate of early-onset GBS infections per 1000 live births has dropped from 1.7 in the 1990s to a range of 0.34 to 0.37 in recent years. The majority (70%) of early-onset GBS infections occur in full-term infants (37 weeks or more). Surprisingly, 60% of early-onset infections happen in patients who had a negative rectovaginal GBS culture between 35-37 weeks.¹ The presence of GBS in the rectovaginal area can be inconsistent. Up to 33% of women with a positive GBS culture at 35-37 weeks are not colonized at delivery, while around 10% of women who are colonized at delivery will have a negative culture result at 35-37 weeks.⁷ Since it is well established that prophylactic antibiotics given to women before birth might prevent vertical transmission of this bacterium to newborns, GBS screening is often done between 35 and 37 weeks of gestation.⁸

Additionally, there is a greater chance of having maternal GBS-related illnesses including bacteremia or urinary tract infections, which is important to note since maternal infection might result in PTB.^{9,10} Despite the clinical significance of vaginal GBS colonisation, few research have examined the relationship between PTB and early-stage vaginal GBS colonisation. Pregnant women may have transitory, recurrent, or chronic vaginal GBS colonisation, but those who experience it early in pregnancy may be more susceptible to GBS complications.¹⁰ In Saudi Arabia, few studies have explored the prevalence of this condition in the population, therefore, this study aimed to assess the prevalence of GBS genital infections among pregnant women in Najran, Saudi Arabia.

METHODS

This cross-sectional retrospective study was conducted at Najran Armed Forces Hospital, which is located in Najran, Kingdom of Saudi Arabia, during the period from March 2022 to April 2022 to assess the prevalence of GBS genital infection among pregnant women. The study included data from electronic health records from the Armed Forces Hospital. All recorded pregnant women who were examined and tested for genitourinary GBS infection were included. All women who have incomplete records were excluded from the study. This resulted in a sample size of 2308 participants. The data was retrieved using a pre-

designed form that included age in years, occupational status, parity, gravidity, number of previous abortions, medical conditions during pregnancy, gestational age at the time of GBS testing, and test result of GBS swap. For each positive GBS swap, the antibiotic sensitivity pattern against twenty-one antibiotics was recorded.

Data was entered to a Microsoft Excel sheet, which then was transformed to the Statistical Package for Social Sciences version 26 for further processing and analysis. Simple frequency tables were used for descriptive analysis, and qualitative data were expressed in terms of number and percentages. The prevalence of positive GBS swap, and the antibiotics susceptibility pattern were presented in tables. The authors obtained approval from Research and Ethics Committee of Najran Armed Force Hospital. The collected data did not include any personal identifying data and was used for research purposes only.

RESULTS

A total of 2308 pregnant women were included in the study. The mean age of the participants was 32±7 years with a range of 18 to 46 years. The prevalence of positive GBS swap was found to be 10.4% (Table 1).

Table 1: Age and GBS swap results of the total participants (n=2308).

Parameters	Frequency (%)
Age in years	
18-29	960 (41.6)
30-39	1003 (43.5)
40-46	345 (14.9)
Mean±SD	32±7
GBS swap	
Negative	2067 (89.6)
Positive	241 (10.4)

Table 2 shows the characteristics of pregnant women with positive GBS swap. Their mean age was 34±7 years and most of them (64.7%) were housewives. Gravidity ranged from 1 to 11, whereas parity ranged from 0 to 9, and abortions ranged from 0 to 4. The average gestational age of the women who had a positive swap was 34±9 weeks. Regarding antibiotics sensitivity pattern, Penicillin (86.7%), Ampicillin (61.8%) and Cephalexin (55.6%) were among the antibiotics that showed the highest sensitivity rates. Further details are provided in Table 2.

Table 2: Characters of women whose GBS swap was positive (n=241).

Parameters	Frequency (%)
Age in years	
18-29	77 (32)
30-39	116 (48.1)
40-46	48 (19.9)
Mean±SD (range)	34±7 (18-52)

Continued.

Parameters	Frequency (%)
Occupation	
Housewife	156 (64.7)
Occupied	85 (35.3)
Gravidity, mean±SD (range)	3±2 (1-11)
Parity, mean±SD (range)	2±2 (0-9)
Abortions, mean±SD (range)	0±1 (0-4)
Gestational age in weeks, mean±SD (range)	34±9 (7-42)
Medical conditions	
Gestational diabetes	22 (9.1)
Hypertension	4 (1.7)
Hypothyroidism	6 (2.5)
None	193 (80.1)
Others	16 (6.6)
Sensitivity	
Amoxicillin	1 (0.4)
Ampicillin	149 (61.8)
Augmentin	5 (2.1)
Cefalexin	134 (55.6)
Cefazolin	80 (33.2)
Cefdidnir	2 (0.8)
Cefdinir	6 (2.5)
Cefipime	24 (10)
Cefixime	49 (20.3)
Cefprozil	1 (0.4)
Cefroxil	8 (3.3)
Cefrozil	23 (9.5)
Ceftazidime	13 (5.4)
Ceftiaxone	15 (6.2)
Ceftriaxone	23 (9.5)
Cefuroxime	117 (48.5)
Ciprofloxacin	1 (0.4)
Clindamycin	9 (3.7)
Erythromycin	1 (0.4)
Penicillin	209 (86.7)
Vancomycin	3 (1.2)

DISCUSSION

The strategy currently advised to reduce incidence of GBS colonisation in neonates and prevent early-onset GBS-related diseases is universal screening of mothers for vaginal or rectal GBS colonisation at 35 to 37 weeks of gestation, and selective intrapartum antibiotic prophylaxis for all screen-positive women.^{11,12} Each pregnancy should include a GBS culture because colonisation may be transient.¹³ Even if a GBS culture is negative between 35 and 37 weeks, a positive GBS urinary tract infection at any point during the pregnancy is a sign of extensive colonisation, and these individuals should undergo prophylaxis.¹ Young maternal age and black race are two additional risk factors for the early development of GBS disease.¹³

In this study, we found a GBS prevalence of 10.4% among pregnant women who attended Najran Armend Force

Hospital. Our findings are lower than that reported in Italy (18%), Poland (17.2%), United Kingdom (21%), and Netherlands (21%).¹⁴⁻¹⁷ Our results were higher than those reported from North Ethiopia (9%), and Mozambique (1.8%).^{18,19}

In comparison with Saudi studies, Al Qahtani and Musleh found that 19% of the women who attended King Fahd University Hospital during labor were colonized with GBS.²⁰ In another study in Makkah, the positivity rate for GBS was 16.3%.²¹ The colonization rates in these studies are higher compared to the average colonization rate of 12.7% reported in a comprehensive review of 34 studies from 23 developing countries.²² In Riyadh and Jeddah, the colonization rates were even higher, with 27.6% and 31.6% respectively.^{23,24} The differences in the GBS colonization prevalence could be due to various factors such as geographical location, age, parity, and socioeconomic status.²⁵ In comparison, other three Saudi

studies showed modest colonization rates of 7.4%, 4.76%, and 2.1%.^{26,27} However, one study used urine samples from pregnant women without a vaginal or rectal swab, which might explain the low prevalence of GBS.²⁶

Overall, pregnancy has a 10–30% rate of GBS colonization. The incidence of early-onset GBS infection has significantly decreased during the past 20 years as a result of advancements in early-onset GBS illness secondary prevention, intrapartum prophylaxis, and screening for GBS colonization. For every 1000 live births in the early 1990s, there were roughly 1.7 cases of early-onset GBS infection. In recent years, this has dropped to 0.34 to 0.37 per 1000 live births. Term newborns (born at a gestational age greater than 37 weeks) account for 70% of cases of early-onset GBS infection.¹ It is interesting to note that 60% of early-onset infections happen in patients between 35 and 37 weeks after a negative rectovaginal GBS culture.⁷ There are gaps in the colonisation of GBS in the rectovaginal region. Up to 33% of patients with a positive GBS culture at 35–37 weeks do not have the infection when they give birth. On the other hand, 10% of pregnant women who are colonised will have a poor culture at 35–37 weeks.⁷

CONCLUSION

We found an isolation rate of 10.4% of GBS among pregnant women who attended Najran Armed Forces Hospital. We recommend more comprehensive screening programs and strict management plans to avoid antimicrobial resistance to spread among these GBS strains.

ACKNOWLEDGEMENTS

The authors would like to acknowledge Najran Armed Force Hospital board for providing us with permission to conduct this study.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

- Verani JR, McGee L, Schrag SJ, Division of Bacterial Diseases, National Center for Immunization and Respiratory Diseases C for DC and P (CDC). Prevention of perinatal group B streptococcal disease--revised guidelines from CDC, 2010. MMWR Recomm reports Morb Mortal Wkly report Recomm reports. 2010;59:1-36.
- Goldenberg RL, Culhane JF, Iams JD, Romero R. Epidemiology and causes of preterm birth. Lancet 2008;371:75-84.
- Kindinger LM, Bennett PR, Lee YS, Marchesi JR, Smith A, Cacciatore S, et al. The interaction between vaginal microbiota, cervical length, and vaginal progesterone treatment for preterm birth risk. Microbiome. 2017;5:6.
- Leitich H, Bodner-Adler B, Brunbauer M, Kaider A, Egarter C, Husslein P. Bacterial vaginosis as a risk factor for preterm delivery: A meta-analysis. Am J Obstet Gynecol. 2003;189:139-47.
- Stoll BJ, Hansen NI, Sánchez PJ, Faix RG, Poindexter BB, Meurs KP Van, et al. Early Onset Neonatal Sepsis: The Burden of Group B Streptococcal and E. coli Disease Continues. Pediatrics. 2011;127:817-26.
- Yancey MK, Schuchat A, Brown LK, Ventura VL, Markenson GR. The accuracy of late antenatal screening cultures in predicting genital group B streptococcal colonization at delivery. Early Hum Dev. 1997;49:238-9.
- Regan JA, Klebanoff MA, Nugent RP, Eschenbach DA, Blackwelder WC, Lou Y, et al. Colonization with group B streptococci in pregnancy and adverse outcome. Am J Obstet Gynecol. 1996;174:1354-60.
- Schrag S, Gorwitz R, Fultz-Butts K, Schuchat A. Prevention of perinatal group B streptococcal disease. Revised guidelines from CDC. MMWR Recomm reports Morb Mortal Wkly report Recomm reports. 2002;51:1-22.
- Schrag SJ, Zywicki S, Farley MM, Reingold AL, Harrison LH, Lefkowitz LB, et al. Group B Streptococcal Disease in the Era of Intrapartum Antibiotic Prophylaxis. N Engl J Med. 2000;342:15-20.
- Muller AE, Oostvogel PM, Steegers EAP, Joep Dörr P. Morbidity related to maternal group B streptococcal infections. Acta Obstet Gynecol Scand. 2006;85:1027-37.
- Aila NA El, Tency I, Claeys G, Saerens B, Cools P, Verstraelen H, et al. Comparison of different sampling techniques and of different culture methods for detection of group B streptococcus carriage in pregnant women. BMC Infect Dis. 2010;10:285.
- Cheng P-J, Chueh H-Y, Liu C-M, Hsu J-J, Hsieh T-T, Soong Y-K. Risk Factors for Recurrence of Group B Streptococcus Colonization in a Subsequent Pregnancy. Obstet Gynecol. 2008;111:704-9.
- Ahmadzia HK, Heine RP. Diagnosis and Management of Group B Streptococcus in Pregnancy. Obstet Gynecol Clin North Am. 2014;41:629-47.
- Savoia D, Gottimer C, Crocilla' C, Zucca M. Streptococcus agalactiae in pregnant women: Phenotypic and genotypic characters. J Infect. 2008;56:120-5.
- Strus M, Pawlik D, Brzychczy-Włoch M, Gosiewski T, Rytlewski K, Lauterbach R, et al. Group B streptococcus colonization of pregnant women and their children observed on obstetric and neonatal wards of the University Hospital in Krakow, Poland. J Med Microbiol. 2009;58:228-33.
- Jones N. Carriage of group B streptococcus in pregnant women from Oxford, UK. J Clin Pathol. 2006;59:363-6.

17. Valkenburg-van den Berg AW, Sprij AJ, Oostvogel PM, Mutsaers JAEM, Renes WB, Rosendaal FR, et al. Prevalence of colonisation with group B Streptococci in pregnant women of a multi-ethnic population in The Netherlands. *Eur J Obstet Gynecol Reprod Biol*. 2006;124:178-83.
18. Schmidt J, Halle E, Halle H, Mohammed T, Gunther E. Colonization of pregnant women and their newborn infants with group B streptococci in the Gondar College of Medical Sciences. *Ethiop Med J*. 1989;27:115-9. Steenwinkel FDO De, Tak H V., Muller AE, Nouwen JL, Oostvogel PM, Mocumbi SM. Low carriage rate of group B streptococcus in pregnant women in Maputo, Mozambique. *Trop Med Int Heal*. 2008;13:427-9.
19. Musleh J, Qahtani N Al. Group B Streptococcus colonization among Saudi women during labor. *Saudi J Med Med Sci*. 2018;6:18.
20. Khan MA, Faiz A, Ashshi AM. Maternal colonization of group B streptococcus: prevalence, associated factors and antimicrobial resistance. *Ann Saudi Med*. 2015;35:423-7.
21. Stoll BJ, Schuchat A. Maternal carriage of group B streptococci in developing countries. *Pediatr Infect Dis J*. 1998;17:499-503.
22. Zamzami TY, Marzouki AM, Nasrat HA. Prevalence rate of group B streptococcal colonization among women in labor at King Abdul-Aziz University Hospital. *Arch Gynecol Obstet*. 2011;284:677-9.
23. El-Kersh TA, Al-Nuaim LA, Kharfy TA, Al-Shammary FJ, Al-Saleh SS, Al-Zamel FA. Detection of genital colonization of group B streptococci during late pregnancy. *Saudi Med J*. 2002;23:56-61.
24. Cools P, Jespers V, Hardy L, Crucitti T, Delany-Moretlwe S, Mwaura M, et al. A Multi-Country Cross-Sectional Study of Vaginal Carriage of Group B Streptococci (GBS) and Escherichia coli in Resource-Poor Settings: Prevalences and Risk Factors. Trotter CL, ed. *PLoS One*. 2016;11:e0148052.
25. Ahmad S. Asymptomatic group B streptococcal bacteriuria among pregnant women in Saudi Arabia. *Br J Biomed Sci*. 2015;72:135-9.
26. Hussain TZ. Epidemiology of Group B Streptococcus in Saudi Parturient Women in a Private Hospital. *Obstet Gynecol An Int J*. 2015;2015:1-7.

Cite this article as: Alshahrani MS, Aedh AI. Prevalence of positive group B streptococcal infections among pregnant women in Najran, Saudi Arabia. *Int J Community Med Public Health* 2023;10:3984-8.