Journal of Multidisciplinary Healthcare

Dovepress
open access to scientific and medical research

Open Access Full Text Article

ORIGINAL RESEARCH

Factors Affecting Awareness of Pregnancy Screening for Group B Streptococcus Infection Among Women of Reproductive Age in Jazan Province, Saudi Arabia

Shahad I Zoli[1], Maisa A Baiti[1], Atyaf A Alhazmi[1], Raud M Khormi[1], Maram A Sayegh[1], Tahani Altubayqi[1], Afnan M Darisi[1], Raffan A Alhasani[1], Saleha H Alhazmi[1], Sarah O Gharawi[1], Abdulrahman A Muhajir[2], Abdulaziz H Alhazmi[1]

[1]Faculty of Medicine, Jazan University, Jazan, Saudi Arabia; [2]General Directorate of Health Affairs, Jazan, Saudi Arabia

Correspondence: Abdulaziz H Alhazmi, Tel +966-7-3295000, Email abalhazmi@jazanu.edu.sa

Background: Group B streptococcus (GBS) infection is one of the leading causes of neonatal sepsis and meningitis. GBS screening and intrapartum antibiotic prophylaxis can effectively prevent early-onset GBS disease. This study aimed to assess the awareness of the risks of GBS infection and screening in Jazan Province, Saudi Arabia.

Methodology: A cross-sectional study was conducted using a survey of 995 women aged 18–45 in Jazan, Saudi Arabia. Data were collected between January to April 2023 and included information on sociodemographic characteristics, awareness of GBS infection, and perspectives on GBS screening.

Results: The response rate was 97.45%, and the mean age of the participants was 31.50 ± 9.80 years. Most were married (60.2%), had a university education (81.11%), and 59% were pregnant or had a pregnancy history. Only 23% had heard of GBS, associated with age, marital status, job, pregnancy status, awareness of GBS risk factors, and pregnancy follow-up ($p < 0.05$). Women most aware were students (55.9%), married (55.46%), pregnant or had a pregnancy history (51.09%), knew risk factors of GBS (38.86%), and were followed by a specialist (88.14%). Regarding GBS screening preferences, 40% preferred universal screening without consent, 31% with consent, 16% for high-risk pregnancies with consent, and 13% for high-risk pregnancies without consent.

Conclusion: The study found low awareness of GBS among women residing in Jazan, Saudi Arabia. Factors related to demographic details and obstetric follow-up were associated with better understanding. Most women preferred universal screening for GBS, with or without consent. Effective health education is needed to raise women's awareness of screening benefits and risks. This education can help women make informed decisions and improve prevention and care. Future studies may evaluate healthcare providers' awareness of GBS.

Keywords: group B streptococcus, GBS screening, women's awareness, Jazan, Saudi Arabia

Introduction

Group B streptococcus (GBS) infection is one of the newborns' most common and potentially fatal bacterial infections.[1,2] GBS, also known as Streptococcus agalactiae, is a gram-positive streptococcus bacterium often found in human gastrointestinal and sexual organs and can be vertically transmitted during birth. GBS thrives in the vaginal environment and rarely causes outward symptoms.[3,4] However, it can contribute to pregnancy-related diseases and death in both the mother and child.[5,6] The condition can occur early or later. Although late-onset infections can occur up to three months after birth, most neonatal GBS diseases are caused by infections that manifest during the first week of life.[7] It is well-established that GBS significantly contributes to neonatal sepsis.[7,8] Pneumonia, dyspnea, and other indications of sepsis are common in newborns with GBS disease during the first 48 hours after birth; meningitis is less common in early-onset infections.[2,9] There is also a high probability of complications with the heart, blood pressure, gastrointestinal system, and

Received: 15 May 2023
Accepted: 17 July 2023
Published: 26 July 2023

kidneys.[1] Preterm infant mortality rates are around 20% and up to 30% for babies born at or before 33 weeks of gestation compared to full-term infant mortality rates.[9]

The severity of newborn infections is mainly determined by the location of the infections and the health status of the mother and child. During the perinatal period, newborns are more susceptible to becoming sick as they are prone to microbes and generally possess an immature immune system. Risk factors for early-onset newborn sepsis include preterm birth, immunologic immaturity, maternal colonization, maternal intraamniotic infection, and prolonged membrane rupture.[8,10] GBS colonization affects 15% and 30% of pregnant women worldwide.[11] Invasive infections cause more than 1.4 million neonatal deaths each year, and in Saudi Arabia, the rate ranges from 9.2% to 31.6%, depending on the region.[7,10,12] The Centers for Disease Control and Prevention (CDC) recommends regular screening of pregnant women between 35 and 37 weeks to detect colonized mothers and treat those infected with antibiotics.[7,13]

For GBS pregnancy screening, universal culture-based and risk-based screening are viable options.[3] Reducing the occurrence of early-onset neonatal sepsis and preventing death are related to a universal culture-based screening program and early delivery of intrapartum antibiotics. Another method is to use a risk-based strategy, in which pregnant women with specific risk characteristics receive intrapartum antibiotic prophylaxis.[3,14] The incidence of GBS may be reduced with early detection and treatment, which also helps reduce mortality.[7] Pregnancy GBS screening recommendations are unavailable nationally in Saudi Arabia (ie, universal, culture-based, vs risk-based). Thus, screening procedures differ considerably amongst establishments. Pregnant women in Saudi Arabia can receive prenatal care in any country's healthcare facilities (including primary care clinics, private clinics, and public hospitals). The procedure is overseen by family physicians, obstetricians, and gynecologists.[3] Although awareness of GBS screening is an important topic, few studies have been conducted in Saudi Arabia, and none were shown in Jazan. Therefore, the study aimed to assess the awareness of women of productive age about the screening for GBS during pregnancy in Jazan, Saudi Arabia.

Methodology

Study Design, Settings, and Population

A descriptive cross-sectional study using a survey was conducted in the Jazan region from January to April 2023. The Jazan region is one of the 13 major regions in Saudi Arabia. Jazan's population is 1.568 million, based on the last census survey. Females who met the inclusion criteria were involved in the study. The women included were: adult women in the Jazan region, aged 18 to 45 years, including pregnant and lactating women. Females under 18 years of age or over the age of 45 years of age or who refused to participate or lived outside the Jazan region were excluded.

Sample Size and Design

The study's sample size was calculated using the Raosoft sample size calculator (Raosoft Inc., Seattle, WA, USA (http://www.raosoft.com/samplesize.html, accessed on NOV 1 2022). We used a 95% confidence interval, a 5% margin of error, and a 50% response distribution. The minimum sample size was 385. Considering a 10% non-response rate, the required sample size was 425 participants. We used a simple random sampling technique to select 425 participants at random from the general population.

Data Collection Tools and Processes

Data were collected from multiple trained data collectors from women living in the Jazan region using an online self-administered questionnaire. The questionnaire was designed after an extensive review of the literature of relevant studies and consultation with an expert in the field. The first part of the questionnaire collected sociodemographic factors such as age, marital status, monthly income, and education. The second section included questions to assess women's knowledge and awareness of GBS screening and their prior experience.

Pilot Study

Twenty people participated in a pilot study to determine if the wording of the questionnaire was clear and easy to understand. The pilot study's data were analyzed but not included in the main study.

Data Analysis

Data management and analysis were performed using SPSS version 23 (Armonk, NY: IBM Corp.). Frequencies and percentages were used to analyze categorical data, while means and standard deviations were used for quantitative data. The Chi-square test was used to compare categorical data, and a P-value of 0.05 was used to indicate a statistically significant difference between variables. Tables and figures were used to express the results.

Ethical Consideration

The Scientific Research Ethics Committee of Jazan University in Saudi Arabia approved the research with approval number REC-44/05/420. All data collected from participants through the questionnaire was kept in a secure location with strict confidentiality and were not viewed by anyone except the principal investigator and the research supervisor. The anonymity of the individuals and organizations that participated in the research was ensured. All authors confirm that this study complies with the Declaration of Helsinki.

Result

The response rate to the survey was 97.45%. Out of the 1021 women who were invited to participate in the study, 995 agreed, completed the survey, and met the inclusion requirements. The mean age was 31.50 ± 9.80. Most of the participants were married (599; 60.20%), had a university education (807; 81.11%), and worked (364; 36.58%). Additionally, almost (328; 32.96%) of the respondents had a monthly income of 5000 to 10,000 SAR (Table 1).

Most respondents were pregnant or had a pregnancy history (548; 59%) (Figure 1). Almost half of the participants (552; 55%) had not heard of GBS, and only 229(23%) had heard of it (Figure 2). Our result revealed an association

Table 1 Sociodemographic Characteristics of 995 of the Respondents

Characteristic		**N**	**%**
Age by year; mean (SD)		31.50 ± 9.80	
Marital status	Single	332	33.37%
	Married	599	60.20%
	Widow	21	2.11%
	Divorced	43	4.32%
Education	Informal education	9	0.90%
	High school	142	14.27%
	University	807	81.11%
	Postgraduate	37	3.72%
Job	Student	349	35.08%
	Employed	364	36.58%
	Housewife	260	26.13%
	Retired	22	2.21%
Monthly income in Saudi Riyals	Less than 5000	209	21.01%
	5000 to 10,000	328	32.96%
	10,000 to 15,000	247	24.82%
	More than 15,000	211	21.21%

Abbreviation: SD, standard deviation.

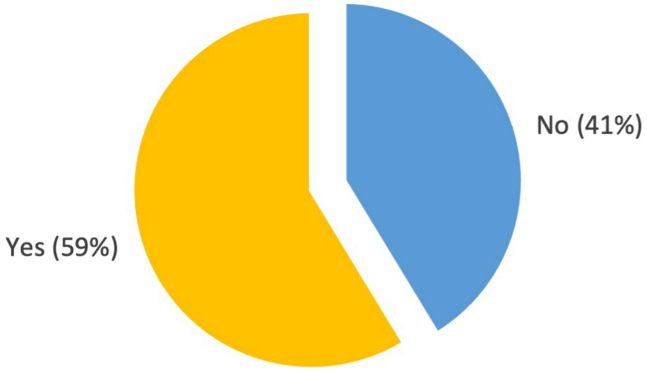

Figure 1 Shows the percentage of women who were pregnant or had a history of pregnancy.

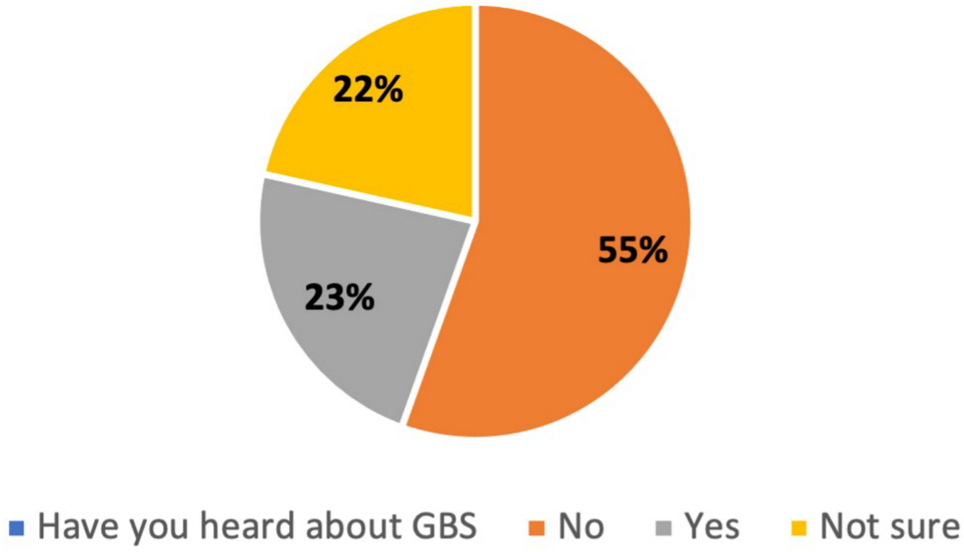

Figure 2 Shows the percentage of respondents who heard about GBS.

between hearing about GBS and age (p = 0.0001), marital status (p = 0.038), job (p = 0.0001), pregnancy or having a history of pregnancy (p = 0.009), being aware of the risk factors for GBS (p = 0.0001) and having a specialist follow-up on them (p = 0.001). All these variables were statistically significant (p < 0.05). In contrast, there was no association between hearing about GBS and education (p = 0.187), monthly income (p = 0.418), or where to follow up on pregnancy (p = 0.566). All of these variables were not statistically significant (p > 0.05) (Table 2).

Almost all women who heard about GBS were students (55.90%), married (55.46%), pregnant or had a history of pregnancy (51.09%), aware of risk factors for GBS (38.86%), and obstetrics and gynecology specialists followed them (88.14%) (Table 2).

According to the GBS screening, the respondents responded as follows: 39.70% for all pregnancies without consent, 30.75% obligatory consent for all women, 16.38% for high-risk pregnancies with required consent, and 13.17% for high-risk pregnancies without mandatory consent (Figure 3).

Discussion

This study investigated the awareness of the pregnancy screening for GBS infection among women of reproductive age in Jazan, Saudi Arabia, the response rate was notable, 97.45%, and our results indicate low awareness of the GBS, with 55% of participants reporting that they had not heard about it and only 23% stating that they had. Our analysis revealed notable correlations between GBS awareness and several factors, including younger age, being single, a student with

Table 2 Association Between Sociodemographic Characteristics and Hearing About GBS

Characteristic		Heard About GBS				P-value
		No	%	Yes	%	
		766	**76.98%**	**229**	**23.02%**	**0.0001***
Age (mean|SD)		32.30	10.07	28.79	08.47	0.0001*
Marital status	Single	240	31.33%	92	40.17%	0.038*
	Married	472	61.62%	127	55.46%	
	Widow	16	2.09%	5	2.18%	
	Divorced	38	4.96%	5	2.18%	
Education	Informal education	6	0.78%	3	1.31%	0.187
	High school	116	15.14%	26	11.35%	
	University	612	79.90%	195	85.15%	
	Postgraduate	32	4.18%	5	2.18%	
Job	Student	221	28.85%	128	55.90%	0.0001*
	Employed	307	40.08%	57	24.89%	
	Housewife	220	28.72%	40	17.47%	
	Retired	18	2.35%	4	1.75%	
Monthly income in Saudi Riyals	Less than 5k	158	20.63%	51	22.27%	0.418
	5k to 10k	257	33.55%	71	31.00%	
	10k to 15k	196	25.59%	51	22.27%	
	More than 15k	155	20.23%	56	24.45%	
Are you pregnant or with a history of pregnancy	No	299	39.03%	112	48.91%	0.009*
	Yes	467	60.97%	117	51.09%	
Aware of risk factors of GBS	No	513	66.97%	77	33.62%	0.0001*
	Yes	50	6.53%	89	38.86%	
	Not sure	203	26.50%	63	27.51%	
With whom do you follow up?	Do not know	31	6.65%	0	0.00%	0.001*
	General Practitioner	15	3.22%	14	11.86%	
	Obstetrics and Gynecology	420	90.13%	104	88.14%	
Where do you follow up on the pregnancy	I did not receive care	10	2.15%	0	0.00%	0.566
	Governmental	197	42.27%	49	41.53%	
	Private	259	55.58%	69	58.47%	

Note: *Significant when the alpha criterion for p-value was set to 0.05.
Abbreviations: SD, Standard deviation; GBS, Group B streptococcus; SAR, Saudi Riyals.

a pregnancy history, better awareness of risk factors, and regular visits to obstetrics and gynecology specialists. However, variables such as education, monthly income, and location of pregnancy follow-up showed no significant association with GBS awareness. While the impact of internet access and social media on GBS awareness was not directly examined in

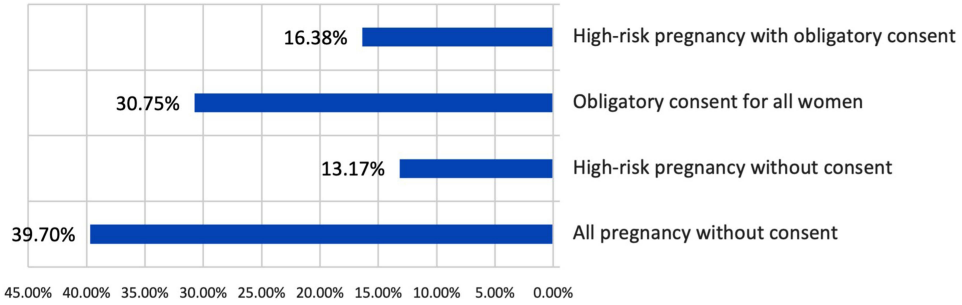

Figure 3 Respondents' opinions about GBS screening.

our study, it is crucial to acknowledge their potential influence in disseminating information and conducting awareness campaigns, which may contribute to variations in GBS awareness across diverse populations.

Our study population's low awareness of GBS is alarming, given its potential impact on maternal and neonatal health.[9,15] However, as other studies suggested, this low level of understanding seems to be a national problem in Saudi Arabia. For example, according to a previous survey, in Al-Madinah published in 2020, most women (66.8%) had never heard of GBS bacteria.[3] Another study in Jeddah conducted in 2021 found that most of the included women did not know about GBS (85.3%).[7] Low awareness of GBS and its detection among our study population suggests that many women may not know their GBS status or the importance of undergoing screening during pregnancy. This lack of knowledge could lead to missed diagnoses for the timely detection and management of colonization with GBS, which could lead to adverse maternal and neonatal health outcomes.[6,15]

This study revealed significant associations between awareness of GBS and various demographic factors, suggesting that targeted interventions can be particularly beneficial for specific subgroups, such as older women, those who are married, or those with a history of pregnancy. The lack of significant associations with education, monthly income, or location of pregnancy follow-up indicates that these factors may not be strong determinants of awareness of GBS in our population. Interestingly, most respondents who had heard about GBS were students, suggesting that educational institutions may be effective venues for disseminating information about GBS and its screening, or it may indicate the selection bias of our data collectors as most of them were medical students. Furthermore, a follow-up with a specialist or general practitioner is strongly associated with better awareness of GBS, indicating the importance of healthcare providers in promoting the knowledge of GBS screening.[16,17] On the contrary, a different study has shown that despite having an excellent educational background, women had inadequate knowledge regarding GBS screening. The participants of this study predominantly held a diploma degree, with only two having completed a bachelor's degree. According to this research, numerous women had restricted knowledge and comprehension of group B streptococcus and frequently sought information from the personal experiences of acquaintances or family members. The significance and implications, both physical and ethical, of the disease for both the baby and mother were difficult for women to understand.[18]

In our study, most women preferred universal GBS screening, with or without consent. There are no specific guidelines for the screening for GBS in Saudi Arabia. However, the Saudi Ministry of Health adopted the CDC guidelines in the United States, which are as follows. All pregnant women should undergo screening for GBS colonization between 35 and 37 weeks of gestation. Pregnant women who test positive for GBS colonization should receive intravenous antibiotics during labor to reduce the risk of transmitting the infection to their newborns.[8,14,15] Screening for GBS at the universal level reduces GBS morbidity more effectively than screening based solely on risk factors.[7,19] Therefore, health officials in Saudi Arabia may be required to establish a universal guideline on GBS screening in terms of local and national epidemiology of GBS. This action would improve the awareness of healthcare providers and the general population in the country.

The findings suggest the need for targeted educational interventions, especially for young, unmarried women and those without a pregnancy history. Ensuring that healthcare providers in the region, especially obstetricians and gynecologists, are well-informed about the importance of GBS screening and the latest guidelines for its treatment can help them communicate this information to their patients.[8,13] Making public-oriented and easy-to-understand educational materials on GBS infection and its detection can help raise awareness among women of reproductive age.[20] These

materials could be distributed through healthcare facilities, antenatal clinics, and community centers. Implementing public awareness campaigns through the media, such as television, radio, newspapers, and social networks, can help spread accurate information about GBS infection and its screening to a wider audience.[21] Incorporating topics related to GBS infection and its detection into school curricula, particularly in health education classes, can help raise awareness among young women before they reach reproductive age.[22] Organizing community educational programs and workshops on GBS infection and its screening can help increase awareness and promote dialogue among women of reproductive age and their families. By implementing these strategies, raising awareness of GBS screening among women of reproductive age is possible, ultimately contributing to improved maternal and newborn health outcomes.

Study Strengths and Limitations

The study has a good sample size (n = 995) and a high response rate (97.45%). The study results provide crucial information on the levels of awareness of GBS among women in Jazan, which can help in planning health education programs. However, we used a cross-sectional design, which can only find associations but cannot determine causality. Plus, although it agrees with previous studies in the region, the study was limited to women in the Jazan region of Saudi Arabia. The results may not be generalizable to other populations.

Qualitative research could have helped to understand the underlying factors. Further, we relied on self-reported data collected through a survey, which can lead to response bias. The study did not include other variables for the low awareness levels, which could have provided helpful information. Finally, we grouped all women aged 18 to 45, which can hide differences in awareness levels within different age groups.

Conclusion

Most women of reproductive age in Jazan have limited awareness of GBS infection and its screening during pregnancy. Age, marital status, occupation, pregnancy status, understanding of risk factors, and specialist follow-up were significantly associated with awareness of GBS. Most women aware of GBS were students, married, pregnant, or had a pregnancy history, aware of risk factors, and were followed up by specialists. Our study showed that most women preferred universal screening for GBS, with or without consent. Therefore, public health efforts are required to increase women's awareness of GBS and its potential risks during pregnancy. These efforts could include targeted educational campaigns, universal screening policies, and improved communication between healthcare providers and patients. Furthermore, more research is needed from the perspective of health professionals and at the national level to better understand this problem in Saudi Arabia.

Data Sharing Statement

Data are available upon a reasonable request from the corresponding author.

Informed Consent Statement

Informed consent was obtained from all subjects involved in the study.

Institutional Review Board Statement

The ethical approval was obtained from the Jazan Health Ethics Committee, Jazan, Saudi Arabia (Permission number REC-44/05/420, dated 1 September 2022).

Acknowledgments

We would like to thank the study participants and data collectors.

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis, and interpretation. All authors took part in drafting, revising, or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

Funding

No fund was secured for this project.

Disclosure

The authors declare no conflict of interest.

References

1. Almohaimeed M, Al-Arfaj G, Kofi MA. Awareness of primary care physicians about pregnancy screening of group B Streptococcus infection at prince sultan military Medical City, Riyadh, Saudi Arabia. *Int J Adv Community Med*. 2019;2:23–29. doi:10.33545/comed.2019.v2.i1a.06
2. Tevdorashvili G, Tevdorashvili D, Andghuladze M, Tevdorashvili M. Prevention and treatment strategy in pregnant women with group B streptococcal infection. *Georgian Med News*. 2015;25953932:15–23.
3. Alshengeti A, Alharbi A, Alraddadi S, Alawfi A, Aljohani B. Knowledge, attitude and current practices of pregnant women towards group B streptococcus screening: cross-sectional study, Al-Madinah, Saudi Arabia. *BMJ Open*. 2020;10(2):e032487. doi:10.1136/bmjopen-2019-032487
4. Santhanam S, Arun S, Rebekah G, et al. Perinatal risk factors for neonatal early-onset group B Streptococcal sepsis after initiation of risk-based maternal intrapartum antibiotic prophylaxis—a case control study. *J Trop Pediatr*. 2018;64(4):312–316. doi:10.1093/tropej/fmx068
5. Musleh J, Al Qahtani N. Group B Streptococcus colonization among Saudi women during labor. *Saudi J Med Med Sci*. 2018;6:18. doi:10.4103/sjmms.sjmms_175_16
6. Burcham LR, Spencer BL, Keeler LR, et al. Determinants of Group B streptococcal virulence potential amongst vaginal clinical isolates from pregnant women. *PLoS One*. 2019;14(12):e0226699. doi:10.1371/journal.pone.0226699
7. Alamri Y, Albasri S, Abduljabbar GH, Alghamdi H, Balkhair AM, AlAam R. Awareness of pregnancy screening for Group B Streptococcus infection among women of reproductive age and physicians in Jeddah, Saudi Arabia. *Cureus*. 2021. doi:10.7759/cureus.18765
8. Hanna M, Noor A. Streptococcus Group B; 2023.
9. Mei JY, Silverman NS. Group B Streptococcus in pregnancy. *Obstet Gynecol Clin*. 2023;50(2):375–387. doi:10.1016/j.ogc.2023.02.009
10. Shane AL, Stoll BJ. Neonatal sepsis: progress towards improved outcomes. *J Infect*. 2014;68:S24–S32. doi:10.1016/j.jinf.2013.09.011
11. Gopal Rao G, Nartey G, McAree T, et al. Outcome of a screening programme for the prevention of neonatal invasive early-onset group B Streptococcus infection in a UK maternity unit: an observational study. *BMJ Open*. 2017;7(4):e014634. doi:10.1136/bmjopen-2016-014634
12. Almudeer AH, Alibrahim MA, Gosadi IM. Epidemiology and risk factors associated with early onset neonatal sepsis in the south of KSA. *J Taibah Univ Medical Sci*. 2020;15(6):509–514. doi:10.1016/j.jtumed.2020.08.009
13. Procianoy RS, Silveira RC. The challenges of neonatal sepsis management. *J Pediatr*. 2020;96:80–86. doi:10.1016/j.jped.2019.10.004
14. Schrag SJ, Verani JR. Intrapartum antibiotic prophylaxis for the prevention of perinatal group B streptococcal disease: experience in the United States and implications for a potential group B streptococcal vaccine. *Vaccine*. 2013;31:D20–D26. doi:10.1016/j.vaccine.2012.11.056
15. Berardi A, Spada C, Vaccina E, Boncompagni A, Bedetti L, Lucaccioni L. Intrapartum beta-lactam antibiotics for preventing group B streptococcal early-onset disease: can we abandon the concept of 'inadequate' intrapartum antibiotic prophylaxis? *Expert Rev Anti Infect Ther*. 2020;18(1):37–46. doi:10.1080/14787210.2020.1697233
16. 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;38(3–4):357–361. doi:10.4103/ijmm.IJMM_20_333
17. Vornhagen J, Waldorf KM, Rajagopal L. Perinatal group B streptococcal infections: virulence factors, immunity, and prevention strategies. *Trends Microbiol*. 2017;25(11):919–931. doi:10.1016/j.tim.2017.05.013
18. Berardi A, Trevisani V, Di Caprio A, et al. Understanding factors in group B Streptococcus late-onset disease. *Infect Drug Resist*. 2021;17:3207–3218. doi:10.2147/IDR.S291511
19. Zhu Y, Lin XZ. Updates in prevention policies of early-onset group B streptococcal infection in newborns. *Pediatr Neonatol*. 2021;62(5):465–475. doi:10.1016/j.pedneo.2021.05.007
20. Gopal Rao G, Hiles S, Bassett P, Lamagni T. Differential rates of group B streptococcus (GBS) colonisation in pregnant women in a racially diverse area of London, UK: a cross-sectional study. *BJOG*. 2019;126(11):1347–1353. doi:10.1111/1471-0528.15648
21. de Mello DS, Tsunechiro MA, Mendelski CA, et al. Group B Streptococcus: compliance with the information in prenatal card records and knowledge of pregnant women. *Am J Infect Control*. 2015;43(4):400–401. doi:10.1016/j.ajic.2014.12.026
22. Baker CJ. The spectrum of perinatal group B streptococcal disease. *Vaccine*. 2013;31:D3–D6. doi:10.1016/j.vaccine.2013.02.030