https://doi.org/10.22491/2357-9730.138856

Original Article

Prevalence of Group B Streptococcus colonization and association with risk factors in a High-Risk Prenatal population

Patrícia Rodrigues Miranda[1], Fernanda Bordignon Nunes[1], Petrus Lee[1], Matheus Henrique Ramos Voos[2], Gisele Branchini[1]*

ABSTRACT

Introduction: *Streptococcus agalactiae* (Group B Streptococcus, GBS) colonization among pregnant women is a significant concern due to its potential impact on maternal and neonatal health outcomes. This study aimed to assess the prevalence of *Streptococcus agalactiae* colonization among pregnant women at a High-Risk Antenatal Service of a Public Health Foundation and analyze associated pregnancy and neonatal events. **Methods**: This observational, descriptive, retrospective study analyzed 240 laboratory and medical records of a Health Foundation in Esteio/RS, from March 2015 to December 2018, searching for *S. agalactiae* screening and gestational and neonatal outcomes. **Results**: Most women were pregnant with a single fetus (97.1%), had no history of abortions (79.2%), were of white ethnicity (79.2%), and had an average age of 28 years. *Streptococcus agalactiae* colonization prevalence was 12.9%, with 83.9% receiving appropriate treatment. No association with other serological screenings was observed (cytomegalovirus, hepatitis, HIV, rubella, syphilis, and toxoplasmosis). **Conclusions**: The observed maternal GBS colonization prevalence aligned with regional rates. Understanding risk factors for GBS infections is crucial for developing prophylactic measures and emphasizing universal screening of pregnant women to prevent adverse outcomes for both mother and neonate.

Keywords: *High-Risk pregnancy; antenatal care; Group B Streptococcus; Streptococcus agalactiae*.

Clin Biomed Res. 2025;45:1-8

[1] Graduate Program in Pathology, Universidade Federal de Ciências da Saúde de Porto Alegre - Porto Alegre/RS, Brazil.

[2] Universidade Federal de Ciências da Saúde de Porto Alegre - Porto Alegre/RS, Brazil.

Corresponding author:
Gisele Branchini
E-mail address: giseleb@ufcspa.edu.br
Universidade Federal de Ciências da Saúde de Porto Alegre - Sarmento Leite, 245, Porto Alegre, Brazil, Postcode 90050170.

INTRODUCTION

Streptococcus agalactiae is characterized as an opportunistic bacterium, beta-hemolytic, belonging to Lancefield's Group B, and pyogenic. It is classified into nine serotypes[1,2]. Its infections may be transitory, chronic, or intermittent, and it is associated with maternal, perinatal, and neonatal infections, which can be prevented through the identification and proper treatment of colonized pregnant women[3].

The prevalence of Group B Streptococcus maternal colonization varies between 14.1% and 27.6% in Brazil[4–8] and between 1.6% and 36% worldwide[9–11]. In Brazil, GBS screening was standardized in 2022 only for high-risk pregnant women, leaving out other pregnant women[9]; and the state of Rio Grande do Sul standardized universal screening in 2024[8]. The culture exam is not readily available in laboratories associated with the Sistema Único de Saúde, and the identification of *S. agalactiae* serotypes is not performed for diagnostic purposes, limiting the real prevalence of this infection[1,12].

Public strategies for diagnosing, preventing, and treating maternal and newborn complications caused by Group B Streptococcus infection are necessary for a more effective health program. Our study aims to describe a population attending the High-Risk Antenatal Service and their newborns, assessing the prevalence of *S. agalactiae* and exploring factors possibly associated with this colonization, along with their gestational and neonatal outcomes. Through this research, we aim to contribute to enhancing public health strategies implemented by the municipal health service and provide

new data regarding the prevalence of *Streptococcus agalactiae* colonization in this population.

METHOD

Ethical concerns

This research was conducted by reviewing medical records, including clinical and laboratory information available at the institution, without identifying the patients involved. Therefore, the requirement for informed consent was waived, and all researchers involved signed a Consent Form for the Use of Data.

Study Design and Population

Our study was characterized as observational, descriptive, and retrospective research with a quantitative approach, based on documentary sources and convenience sampling.

The study population consisted of all pregnant women assisted by the High-Risk Prenatal Service of the Public Health Foundation of Esteio/RS from March 2015 to December 2018 who had been tested for *Streptococcus agalactiae*. The Municipal Health Department referred all pregnant women to the High-Risk Antenatal Service following their initial care at primary care health services.

Data collection

The information about pregnancy follow-up, comorbidities, laboratory data, SGB treatment, and newborns was obtained from the service's medical and laboratory records. Figure 1 shows the flow diagram for data collection.

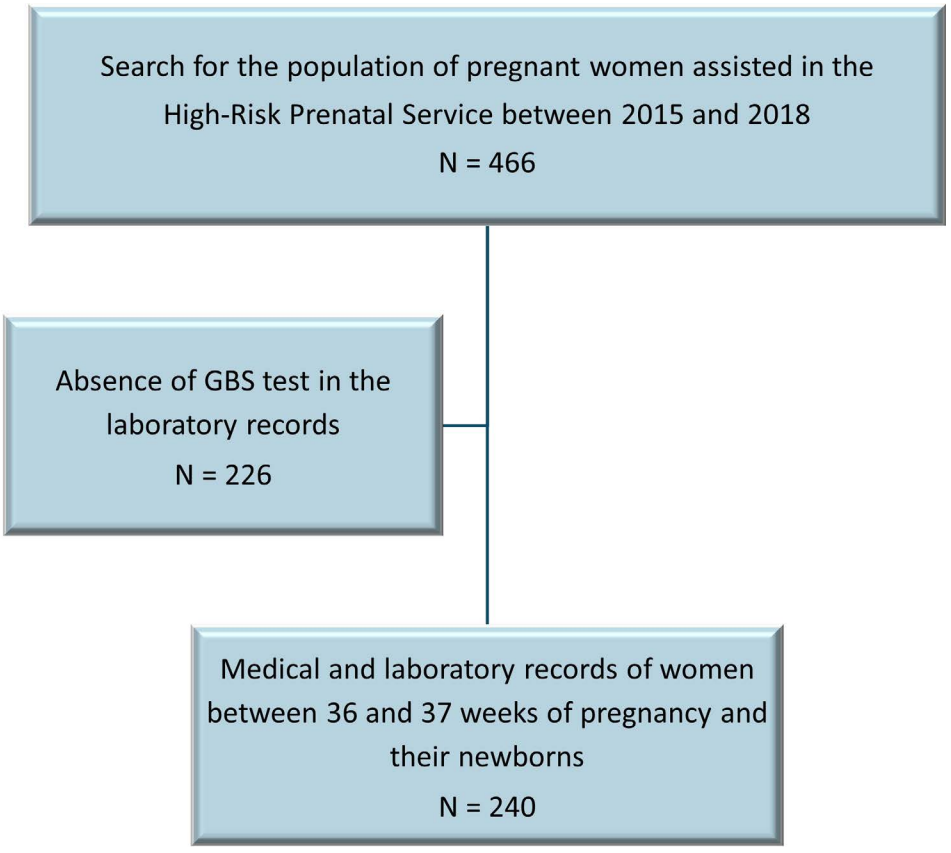

Figure 1: Flow diagram for data collection.

The initial search retrieved 466 medical records of pregnant women attended by the High-Risk Prenatal Service during the established timeframe. From those, 226 were excluded due to the absence of GBS test for various reasons: the absence of laboratory data in the medical records (5 – 1.1%), premature birth (62 – 13.3%), service transfers (96 – 20.6%), abortions (13 – 2.8%), evasions (46 – 9.9%), and postpartum women (4 – 0.8%).

The remaining records (N = 240) were related to pregnant women between 36 and 37 weeks of pregnancy who were tested for GBS. We collected and analyzed the data related to the *S. agalactiae*

test results, pregnancy and newborn characteristics, and GBS treatment.

It is essential to mention that the *Streptococcus agalactiae* test was performed during the antenatal consultation following the Guidelines of the American College of Obstetricians and Gynecologists and the swab samples were evaluated by an independent laboratory, according to the protocols described by Verani et al (2010) and Costa et al (2010)[9,10,13]. Briefly: all the collections were made by the same physician; women cannot have taken a bath or evacuated before the examination; the material was collected from the vaginal and endoanal cavity for better sensitivity; only one swab could be used; material inoculation in Todd Hewitt selective broth for 18 - 24 hours at 35 - 37ºC and subculture in Chromid ID Strepto B chromogenic medium; inspection after 24h for colony growth (if there is no growth, the plates were incubated for another 24 hours and the final reading was performed in 48 hours); "Christie-Atkins-Munch-Petersen" CAMP test was done for all colonies suspected of *S. agalactiae*[9,14].

Statistical analysis

The results of qualitative variables were presented in absolute and relative frequencies, while quantitative variables were described using mean and standard deviation. The normality of the variables was assessed using the Kolmogorov-Smirnov Test. Group comparisons involving symmetric quantitative variables were evaluated using Student's *t* Test, whereas variables with asymmetric distribution were analyzed using Mann-Whitney's Test. We employed the Chi-Square or Fisher's Exact Test for qualitative data when appropriate. The significance level adopted was set at $p < 0.05$.

Data was collected and stored using Microsoft Excel 2007®, and statistical analyses were performed using the Statistical Package for Social Sciences for Windows, version 25.0 software.

RESULTS

The Group B Streptococcus screening was performed on 240 (51.5%) pregnant women, among whom 31 patients tested positive for *Streptococcus agalactiae*, while 209 were GBS-negative. Thus, the prevalence in the studied population corresponded to a 12.9%.

The analyzed sample and characteristics of pregnant women assisted in the High-Risk Prenatal Service are presented in Table 1. The average age and gestational age were 28 years (SD= 7.1) and 38 weeks + 4 days (SD= 1 day + 3 days), respectively. Arterial hypertension and advanced age were the most prevalent known characteristics (33.3% and 26.7%, respectively). Additionally, 17.9% experienced a previous miscarriage, and 56 patients had preterm labor (23.3%).

Table 1: Maternal characterization of the studied population and association with screening for *Streptococcus agalactiae*.

	N (%)	GBS Positive (%)	GBS Negative (%)	P value
	240 (100%)	**31 (12.9%)**	**209 (87.1%)**	
Age (Years), *mean* ± SD[b]	28.4 ± 7.1	30.3 ± 6.4	28.1 ± 7.2	0.114
Number of non-HRPC consultations, *median* (IQR)[a]	7 (5; 9)	7 (5; 10)	7 (5; 9)	0.679
Pregnancy outcome (Weeks+Days), *mean* ± SD[b]	38w+4d ± 1in+3d	38w+2d ± 1in+3d	38w+4d ± 1in+3d	0.311
Skin color[c]				
White color	190 (79.2%)	25 (80.6%)	165 (78.9%)	0.918
Black color	17 (7.1%)	2 (6.5%)	15 (7.2%)	
Brown color	33 (13.8%)	4 (12.9%)	29 (13.9%)	
Parity[c]				
0	71 (29.6%)	9 (29.0%)	62 (29.7%)	0.684
1	69 (28.8%)	11 (25.5%)	58 (27.8%)	
2	38 (15.8%)	6 (19.4%)	32 (15.3%)	
3 or more	55 (22.9%)	5 (16.1%)	50 (23.9%)	
Not informed	7 (2.9%)	0 (0.0%)	7 (3.3%)	

Continues...

Table 1: Continuation.

	N (%)	GBS Positive (%)	GBS Negative (%)	P value
	240 (100%)	31 (12.9%)	209 (87.1%)	
Type of pregnancy[d]				
Simple	233 (97.1%)	31 (100.0%)	202 (96.7%)	0.599
Multiple	7 (2.9%)	0 (0.0%)	7 (3.3%)	
Diagnosis of referral to HRPC[c]				
Gestational diabetes	57 (23.8%)	6 (19.4%)	51 (24.4%)	0.696
Systemic arterial hypertension	80 (33.3%)	15 (48.4%)	65 (31.1%)	0.089
Hypothyroidism	51 (21.3%)	6 (19.4%)	45 (21.5%)	0.967
Advanced maternal age	64 (26.7%)	9 (29.0%)	55 (26.3%)	0.919
Obesity	42 (17.5%)	5 (16.1%)	37 (17.7%)	1
Other comorbidities	109 (45.4%)	14 (45.2%)	95 (45.5%)	1
Previous abortions[c]				
Yes	190 (79.2%)	26 (83.9%)	164 (78.5%)	0.720
No	43 (17.9%)	5 (16.1%)	38 (18.2%)	
Not Informed	7 (2.9%)	0 (0.0%)	7 (3.3%)	
Urinary tract infections[c]				
Negative	152 (63.3%)	17 (54.8%)	135 (64.6%)	0.195
Positive	51 (21.3%)	10 (32.3%)	41 (19.6%)	
Not informed	37 (15.4%)	4 (12.9%)	33 (15.8%)	
Mode of delivery[c]				
Cesarean section	138 (57.5%)	19 (61.3%)	119 (56.9%)	1
Vaginal delivery	83 (34.6%)	11 (35.5%)	72 (34.4%)	
Not informed*	19 (7.9%)	1 (3.2%)	18 (8.6%)	
Adverse neonatal outcomes[c]				
Premature labor	56 (23.3%)	10 (32.3%)	46 (22.0%)	
Fetal death	1 (0.4%)	0 (0.0%)	1 (0.5%)	>0.999
Without adverse neonatal outcomes	183 (76.3%)	21 (76.4%)	162 (77.5%)	

[a]Mann-Whitney's test,[b]Student's *t* test,[c]Chi-Square test, [d]Fisher's Exact test

*The delivery occurred in other hospitals or health institutions

Colonization positivity was not associated with age, number of consultations, gestational age at delivery, skin color, parity, type of pregnancy, or urinary tract infections.

There was no association of other serological screenings, such as cytomegalovirus, hepatitis, HIV, rubella, syphilis, and toxoplasmosis, with positivity for GBS.

There was no association between GBS colonization and the type of gestational outcome (birth via cesarian section or vaginal delivery).

Table 2 details the characteristics of the newborns, neonatal outcomes, and their association with GBS positivity. Notably, we observed a hospitalization rate of 22.6% in the neonatal intensive care unit for babies born to colonized mothers, with 57.1% attributed to prematurity and 28.6% to neonatal sepsis.

Table 3 outlines the intrapartum treatments administered to pregnant women with a positive result for *S. agalactiae*, revealing a high rate of appropriate therapies (83.9%).

Table 2: Characterization of newborns in the population studied and association with Group B Streptococcus screening.

	GBS screening test			P-value
	N (%)	GBS Positive (%)	GBS Negative (%)	
	245 (100%)	**31 (12.7%)**	**214 (87.3%)**	
Sexual newborns[c]				
Male	115 (46.9%)	14 (45.2%)	101 (47.2%)	0.750
Female	103 (42.0%)	15 (48.4%)	88 (41.1%)	
Not informed	27 (11.0%)	2 (6.5%)	25 (11.7%)	
Newborns weighing (Grams), *mean* ± SD[b]	3248.9 ± 515.6	3189,3 ± 541.9	3257.9 ± 512.3	0.506
Newborns in length (Centimeters), *mean* ± SD[b]	48.4 ± 2.3	47.7 ± 2.3	48.6 ± 2.3	0.068
Newborns of head circumference (Centimeters), *mean* ± SD[b]	34.3 ± 1.7	34.6 ± 1.8	34.3 ± 1.7	0.332
Apgar 1st Minute, *mean* ± SD[b]	8.2 ± 0.9	8.1 ± 0.5	8.2 ± 0.9	0.695
Apgar 5th Minute, *mean* ± SD[b]	9.0 ± 0.8	9.0 ± 0.5	9.0 ± 0,8	0.626
Neonatal outcome[d]				
No need for Neonatal Intensive Care	187 (76.3%)	20 (64.5%)	167 (79.9%)	0.064
Need for Neonatal Intensive Care	29 (11.8%)	7 (22.6%)	22 (10.5%)	
Not informed*	29 (11.8%)	4 (12.9%)	25 (12.0%)	
Diagnosis Neonatal Intensive Care Unit[c]	**N = 29 (100%)**	**N = 7 (24,1%)**	**N = 22 (75,9%)**	
Prematurity	13 (44.8%)	4 (57.1%)	9 (40.9%)	
Hypoglycemia	2 (6.9%)	0 (0.0%)	2 (9.1%)	0.611
Sepsis	6 (20.1%)	2 (28.6%)	4 (18.2%)	
Respiratory Dysfunction	8 (27.6%)	1 (14.3%)	7 (31.8%)	

[a]Mann-Whitney's test,[b]*Student's t* test,[c]Chi-Square test, [d]Fisher's Exact test

*The delivery occurred in other hospitals or health institutions

Table 3: Treatments used in pregnant women positive for *S. agalactiae*.

	N (%)
	31 (100.0%)
Type of treatment used in GBS-positive patients	
None	3 (9.7%)
Childbirth via cesarean section	11 (35.5%)
Intrapartum antibiotic therapy	8 (25.8%)
Intrapartum antibiotic therapy + Childbirth via cesarean section	7 (22.6%)
Unknown treatment	2 (6.5%)

DISCUSSION

The variations in prevalence, rates, and risk factors for maternal and neonatal colonization by *Streptococcus agalactiae* can be attributed to regional differences and the distribution of serotyping and individual immunity. Until a few years ago, the absence of official recommendations from federal health authorities outlining guidelines and protocols for screening pregnant women for *S. agalactiae* in both national public and private clinics could have been contributing to these differences, hindering the selection of the most appropriate preventive strategies[15,16]. However, in 2022, Brazil's Health Ministry released a guideline establishing the recommendations for GBS screening so that this scenario may be impacted in the following years[9].

In São Paulo, Função et al. (2013) reported that only 76.7% of women underwent screening for Group B Streptococcus[17], while Szylit et al. (2020) found a prevalence of *S. agalactiae* colonization of 23.3% [18]. The prevalence found in our study (12.9%) is similar to rates described in national and international literature[4–7,10,11]. It is important to note that one of the strengths of our research lies in the fact that prenatal screening has been deemed cost-effective when maternal Group B Streptococcus colonization rates exceed 10%[19].

As described in the literature, our study did not find a clear correlation between colonization and gestational age, maternal age, socioeconomic status, or ethnicity[3,20]. Risk factors for GBS colonization commonly utilized in clinical practice are outlined in the American College of Obstetricians and Gynecologists guidelines. These include prematurity, very low birth weight, prolonged membrane rupture, intraamniotic infection, young maternal age, and maternal Black race[9,21,22]. Risk factors described by the Centers for Disease Control and Prevention include intrapartum fever, previous delivery of a baby with invasive GBS disease, and bacteriuria by *S. agalactiae* during the current pregnancy[9,23]. Additionally, diabetes mellitus, previous miscarriage, chorioamnionitis, premature detachment of membranes without a traceable cause, and meconium-stained amniotic fluid leading to preterm delivery are considered risk factors by some authors[13,20–22]. However, it is important to note that none of these risk factors demonstrated a statistically significant association with GBS colonization in our study.

The presence of pregnancy risk factors increases the risk of early-onset neonatal sepsis by 6.5 times, and neurological deterioration in colonized newborns may reach 16%, or up to 30% if the patient subsequently develops meningitis[24–26]. However, identifying the population at risk of colonization remains challenging, as 25-30% of neonatal infections occur in newborns of mothers without known risk factors[16]. This scenario highlighted the need for new guidelines and studies on Group B Streptococcus screening to identify new correlations between comorbidities and unforeseen outcomes a priori, which were released in Brazil in 2022.

Before proposing a new diagnostic methodology, the local socioeconomic context, costs, and resource availability should be carefully considered. While the gold standard method of screening via swab and bacterial culture is reliable, it is also time-consuming. It may have a lower performance in identifying Positive *Streptococcus agalactiae* (3.8%) compared to techniques such as Polymerase Chain Reaction (17.7%) and Quantitative Polymerase Chain Reaction (29.2%). These alternative techniques provide results in considerably shorter timeframes and promote the rational use of antimicrobial prophylaxis, albeit with increased costs[27,28], especially in high-risk pregnancies, in which there is a risk of premature labor before the test result is available. Therefore, the decision to adopt a new diagnostic methodology should consider the test accuracy, its cost-effectiveness, and feasibility within the local healthcare system.

Adequate chemoprophylaxis for all colonized pregnant women should ideally consist of at least one dose of intrapartum antimicrobial agents, primarily β-lactams, due to their transplacental transfer properties. Chemoprophylaxis should be administered a minimum of 4 hours before labor, or an elective cesarean section should be considered if the amniotic membrane is intact and there is no evidence of labor[9,13,23]. A high proportion of patients in our study received intrapartum adequate treatment for colonization by *S. agalactiae* (83.9%), which is a positive finding. However, it is concerning that 9.7% of patients did not receive adequate treatment and, in 6.5%, data regarding the treatment used were not available. This proportion of untreated patients could be due to a lack of a standardized Brazilian protocol in the therapeutic management of these patients during the period of analysis, which might be improved since the publication of a guideline for high-risk pregnancy in 2022[9].

Currently, there is a broad discussion surrounding the challenge of identifying more effective approaches for colonized patients, including the debate on the efficacy of intrapartum therapy[29], universal screening[30], and the emergence of antibiotic treatment resistance[31]. This prompts us to reevaluate the validity of screening and treatment practices described in the last decade[10,32–34]. It is worth noting that GBS infection might be widely underestimated, as more than half of positive newborns may not have detectable levels of the bacterium[35]. Moreover, the unnecessary use of antibiotic treatment may contribute to the development of more resistant strains[36], negatively affect newborn microbiota[37, 35], and lead to more extended hospitalization periods[16]. However, further studies are needed to increase the effectiveness of existing intrapartum treatments and improve prophylactic recommendations.

The development of vaccines targeting pregnant women holds promise for treating GBS, once the maternal IgG can pass through the placenta and immunize the fetus, inducing specific antibodies against the polysaccharide capsule[36–39]. However, this immunization method raises several questions, such as which serotype should be targeted, the feasibility of implementing vaccination on a global scale, defining the risk group eligible for vaccination, and establishing vaccination protocols[39]. These considerations must be addressed in developing and implementing effective vaccination strategies against Group B Streptococcus.

There are few Brazilian studies on newborn morbidity and mortality caused by *S. agalactiae*, with estimates hinting at around 20% to 30%[9,20]. Although we did not observe an association between GBS colonization and gestational and neonatal outcomes, and considering that rate maternal colonization based on risk factors was described as considerably imprecise compared to intrapartum diagnosis[9], one might suggest that a screening for GBS colonization in patients with low gestational age, preterm births or abortions could provide a more accurate prevalence in the population. In this way, a methodology with faster results could be effective to bring benefits regarding the rational use of antibiotics and the adequate diagnosis of sepsis in neonates.

Our study found similarities between the prevalence of colonization by *Streptococcus agalactiae* in the studied population and those found in other studies conducted in Brazil. However, no relevant associations were found between *S. agalactiae* colonization and socioeconomic, clinical, reproductive, gynecology-obstetric, or newborn history in our population. A more comprehensive understanding of the profile of Group B Streptococcus colonized patients, as well as risk factors, and standardized screening and therapeutic measures, may improve the screening for this condition. The diagnostic and treatment improvement could make it more accessible to public health services and, consequently, to more vulnerable populations, enabling changes in public health policies.

REFERENCES

1. Johri AK, Lata H, Yadav P, Dua M, Yang Y, Xu X, et al. Epidemiology of group B Streptococcus in developing countries. Vaccine. 2013. p. D43 – D45.
2. Nogueira IMC do N, Gonçalves SC de A, Carreiro VM da S, Santos A dos. Estreptococos B Como Causa De Infecções Em Mulheres Grávidas : Revisão De Literatura. Revista UNINGÁ Review. 2013;16(3):36 – 41.
3. Boyer KM, Gotoff SP. Antimicrobial prophylaxis of neonatal group B streptococcal sepsis. Clin Perinatol. 1988;15:831 – 850.
4. Kiss FS, Rossato J da S, Graudenz MS, Gutierrez LLP. Prevalência da colonização por *Streptococcus agalactiae* em uma amostra de mulheres grávidas e não grávidas de Porto Alegre, estado do Rio Grande do Sul. Sci Med (Porto Alegre). 2013;23(3):169 – 174.
5. Norcia BM de M, Belei RA, Moraes UR de O, Reda CC, Capobiango JD. Prevenção da doença invasiva neonatal precoce pelo *Streptococcus agalactiae*: experiência de um hospital escola. Semina: Ciências Biológicas e da Saúde. 2014;35(1):105–14.
6. Morguette AEB, Biasi-Garbin RP, Otaguiri ES, Perugini MRE, Pelisson M, Carrara-Marroni FE, et al. Prevalence and antimicrobial susceptibility profile of *Streptococcus agalactiae* in pregnant women seen at the University Hospital of Londrina, Paraná, Brazil. Semina: Ciências Biológicas e da Saúde. 2018;39(1):77–84.
7. de Melo SCCS, Costa AB, da Silva FTR, Silva NMMG, Tashima CM, Cardoso RF, et al. Prevalence *of Streptococcus agalactiae* colonization in pregnant women from the 18th Health Region of Paraná State. Rev Inst Med Trop Sao Paulo. 2018;60:e2.
8. Bergmann A, Lucia A, Afonso Da Costa P, Lima Da Silva G, Adriana C, Franciele N, et al. Guia do Pré-natal e puerpério na Atenção Primária à Saúde (APS). Porto Alegre: Secretaria de Estado da Saúde do RS; 2024. p. 97.
9. Manual de gestação de alto risco [Internet]. Brasília: Ministério da Saúde, Secretaria de Atenção Primária à Saúde; 2022. p. 692. Available from: http://bvsms.saude.gov.br/bvs/publicacoes/manual_gestacao_alto_risco.pdf
10. Costa NDVL, De Carvalho M, Pone SM, Saint Clair G. Gestantes colonizadas pelo Streptococcus do grupo B e seus recémnascidos: Análise crítica da conduta adotada no Instituto Fernandes Figueira, Fundação Oswaldo Cruz. Revista Paulista de Pediatria. 2010;28:155–61.
11. Regan JA, Chao S, James LS. Premature rupture of membranes, preterm delivery, and group B streptococcal colonization of mothers. Am J Obstet Gynecol. 1981;141 – 184.
12. Medeiros RT de, Walty CMRF, Ribeiro CL. Prevalência de Rastreamento do Estreptococos do Grupo B: Implicações Maternas e Neonatais [Prevalence of screening of Group B Streptococcus: maternal and neonatal implications]. Enfermagem Obstétrica. 2016;3:26.
13. Verani JR, McGee L, Schrag SJ. Prevention of perinatal group B streptococcal disease revised guidelines from CDC, 2010. Morbidity and Mortality Weekly Report. 2010;59(RR10):1 – 36.
14. Prevention of Group B Streptococcal Early-Onset Disease in Newborns: ACOG Committee Opinion, Number 797. Obstetrics and gynecology. 2020;51–72.
15. do Nascimento CS, dos Santos NFB, Ferreira RCC, Taddei CR. *Streptococcus agalactiae* in pregnant women in Brazil: prevalence, serotypes, and antibiotic resistance. Brazilian Journal of Microbiology. 2019;50(4):943 – 952.
16. El Beitune P, Duarte G, Maffei CML. Colonization by *Streptococcus agalactiae* during pregnancy: Maternal and perinatal prognosis. Brazilian Journal of Infectious Diseases. 2005;9:276–82.
17. Função JM, Narchi NZ. Pesquisa do estreptococo do Grupo B em gestantes da Zona Leste de São Paulo. Revista da Escola de Enfermagem da USP. 2013;47(1):22 – 29.
18. Szylit NA, Malburg FL, Piccinato C de A, Ferreira LA de P, Podgaec S, Zlotnik E. Prevalence of rectovaginal colonization by group B Streptococcus in pregnant women seen at prenatal care program of a health organization. Einstein (Sao Paulo). 2020;
19. Johansen NR, Kjærbye-Thygesen A, Jønsson S, Westh H, Nilas L, Rørbye C. Prevalence and treatment of group B streptococcus colonization based on risk factors versus intrapartum culture screening. European Journal of Obstetrics and Gynecology and Reproductive Biology. 2019;240:178 – 181.

20. Vaciloto E, Richtmann R, de Paula Fiod Costa H, Kusano EJU, de Almeida MFB, Amaro ER. A survey of the incidence of neonatal sepsis by group B Streptococcus during a decade in a Brazilian maternity hospital. Braz J Infect Dis. 2002;6(2):55 – 62.

21. Schuchat A, Wenger JD. Epidemiology of group b streptococcal disease: Risk factors, prevention strategies, and vaccine development. Epidemiol Rev. 1994;16:374–402.

22. Fargason CA, Peralta-Carcelen M, Rouse DJ, Cutter GR, Goldenberg RL. The pediatric costs of strategies for minimizing the risk of early- onset group B streptococcal disease. Obstetrics and Gynecology. 1997;90:347 – 52.

23. Schrag S, Gorwitz R, Fultz-Butts K, Schuchat A. Prevention of perinatal group B streptococcal disease. Revised guidelines from CDC. MMWR Recommendations and reports : Morbidity and mortality weekly report Recommendations and reports / Centers for Disease Control. 2002;51(RR11):1–22.

24. Matsubara K, Hoshina K, Kondo M, Miyairi I, Yukitake Y, Ito Y, et al. Group B streptococcal disease in infants in the first year of life: a nationwide surveillance study in Japan, 2011–2015. Infection. 2017;45:449–58.

25. Matsubara K, Hoshina K, Suzuki Y. Early-onset and late-onset group B streptococcal disease in Japan: A nationwide surveillance study, 2004-2010. International Journal of Infectious Diseases. 2013;17:e379-84.

26. Embleton N, Wariyar U, Hey E. Mortality from early onset group B streptococcal infection in the United Kingdom. Arch Dis Child Fetal Neonatal Ed. 1999;80(F1):39–41.

27. Ferreira MB, de-Paris F, Paiva RM, Nunes L de S. Assessment of conventional PCR and real-time PCR compared to the gold standard method for screening *Streptococcus agalactiae* in pregnant women. Brazilian Journal of Infectious Diseases. 2018;22(6):449–54.

28. Castellano-Filho DS, da Silva VL, Nascimento TC, Vieira M de T, Diniz CG. Detection of group B Streptococcus in Brazilian pregnant women and antimicrobial susceptibility patterns. Brazilian Journal of Microbiology. 2010;41(4):1047 – 1055.

29. Ohlsson A, Shah VS. Intrapartum antibiotics for known maternal Group B streptococcal colonization. Cochrane Database of Systematic Reviews. 2009.

30. Seedat F, Geppert J, Stinton C, Patterson J, Freeman K, Johnson SA, et al. Universal antenatal screening for group B streptococcus may cause more harm than good. BMJ (Online). 2019;364:l463.

31. Wilkie GL, Prabhu M, Ona S, Easter SR, Tuomala RE, Riley LE, et al. Microbiology and Antibiotic Resistance in Peripartum Bacteremia. Obstetrics and Gynecology. 2019;133(2):269 – 275.

32. Taminato M, Fram D, Torloni MR, Belasco AGS, Saconato H, Barbosa DA. Screening for group B Streptococcus in pregnant women: a systematic review and meta-analysis. Rev Lat Am Enfermagem. 2011;19.

33. Protocolo de Assistência ao Pré-natal de Baixo Risco. Prefeitura Municipal de Porto Alegre, Secretaria Municipal de Saúde de Porto Alegre; 2015.

34. Manual de consulta rápida para os profissionais da saúde - Pré-natal e puerpério. São Paulo: UNICAMP; 2017. p. 123.

35. Kenyon S, Brocklehurst P. Screening and management of early onset group B streptococcus during labour. BJOG. 2011;118(7):889.

36. Towers C V., Cart MH, Padilla G, Asrat T. Potential consequences of widespread antepartal use of ampicillin. In: American Journal of Obstetrics and Gynecology. 1998. p. 879 – 83.

37. Mazzola G, Murphy K, Ross RP, Di Gioia D, Biavati B, Corvaglia LT, et al. Early gut microbiota perturbations following intrapartum antibiotic prophylaxis to prevent group B streptococcal disease. PLoS One. 2016;11(6):e0157527.

38. Palmeira P, Quinello C, Silveira-Lessa AL, Zago CA, Carneiro-Sampaio M. IgG placental transfer in healthy and pathological pregnancies. Clinical and Developmental Immunology. 2012.

39. Johri AK, Paoletti LC, Glaser P, Dua M, Sharma PK, Grandi G, et al. Group B Streptococcus: Global incidence and vaccine development. Nat Rev Microbiol. 2006;4(12):932 – 942.

Received: Feb 29, 2024
Accepted: May 25, 2025