

**PREVALENCE OF STREPTOCOCCUS OF GROUP B IN PREGNANT WOMEN
AND THE RELATION WITH NEONATAL INFECTION****PREVALÊNCIA DO ESTREPTOCOCO DO GRUPO B EM GESTANTES E SUA
RELAÇÃO COM A INFECÇÃO NEONATAL****PREVALENCIA DEL ESTREPTOCOCO DEL GRUPO B EN MUJERES
EMBARAZADAS Y SU RELACIÓN CON LA INFECCIÓN NEONATAL**

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ABSTRACT

Objective: Find out about the prevalence and the maternal and perinatal results caused by the streptococcus colonization of group B in pregnant women. Method: Descriptive and retrospective study developed from the secondary data obtained in the record book and medical record of the mother and of the newborn. The sample was composed by 130 record books of mother/newborn. Results: The prevalence of maternal colonization by the streptococcus of group B was 193 (11, 24%). Seven (5, 4%) newborn children evolved with the neonatal sepsis diagnosis, but the hemoculture result was negative. The Mann-Whitney tests and the likelihood method were used for the analysis of the interest group. Conclusion: The prevalence of the colonization by streptococcus of group B among pregnant women that were evaluated was in accordance with the values found in the literature. We emphasized that the tracking must be encouraged in the protocols of attention to the prenatal.

Keywords: *Streptococcus agalactiae*. Antibiotic prophylaxis. Prenatal Care. Perinatal Assistance.

RESUMO

Objetivo: Conhecer a prevalência e os resultados maternos e perinatais causados pela colonização estreptococo do grupo B em gestantes. Método: Estudo descritivo e retrospectivo desenvolvido a partir de dados secundários obtidos no livro de registro e prontuários clínicos das mães e recém-nascidos. A amostra foi composta por 130 prontuários do binômio mãe/recém-nascido. Resultados: A prevalência da colonização materna pelo estreptococo do grupo B foi de 193 (11,24%). Sete (5,4%) recém-nascidos evoluíram com o diagnóstico de sepsis neonatal, porém com resultado de hemocultura negativa. Foram utilizados os testes de Mann-Whitney e da razão de Verossimilhança para as análises dos grupos de interesse. Conclusão: A prevalência da colonização pelo estreptococo do grupo B entre as gestantes avaliadas foi em concordância com os valores encontrados na literatura. Enfatizamos que o rastreamento deve ser incentivado nos protocolos de atenção ao pré-natal.

Palavras-chave: *Streptococcus agalactiae*. Antibioticoprofilaxia. Cuidado Pré-Natal. Assistência Perinatal.

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RESUMEN

Objetivo: Conocer la prevalencia y los resultados maternos y perinatales causados por la colonización por estreptococo del grupo B en las mujeres embarazadas. **Método:** Estudio descriptivo y retrospectivo desarrollado a partir de datos secundarios en el libro de registro clínico y registros médicos de madres/recién nacidos. La muestra consistió en 130 historias clínicas de la madre / recién nacido. **Resultados:** La prevalencia de colonización por estreptococo del grupo B materna ocurrió en 193 (11,24%). Las profilaxis antibiótica intraparto para estreptococo B, se realizó en 86 mujeres embarazadas (66,2%). Siete (5,4%) evolucionaron con el diagnóstico de sepsis neonatal, sin embargo, todas presentaron resultados de los cultivos de sangre negativo. Mann-Whitney y la razón de verosimilitud fueron utilizados para el análisis de los grupos de interés. **Conclusión:** La prevalencia de colonización por estreptococo del grupo B en mujeres embarazadas se evaluó de acuerdo con los valores encontrados en la literatura. Hacemos hincapié en que el examen de rutina para la detección del estreptococo del grupo B debería fomentarse en los protocolos de atención

Descriptor: *Streptococcus agalactiae*. Profilaxis antibiótica. Atención prenatal. Atención perinatal.

INTRODUCTION

The studies about prevalence of streptococcus colonization of group B (GBS) or *Streptococcus agalactiae* reflect on the concern about the complications associated with this agent. It is about a gram positive diplococcus that has as reservoir in humans the gastrointestinal tract.¹ In the pregnancy puerperium cycle the colonization can cause infections in the urine tract, chorioamnionitis, endometritis, sepsis¹⁻², as well as jeopardize the pregnancy evolution what can cause the premature birth, abortion, intrauterine fetal death and premature rupture of the membranes³ and strong association with the puerperium maternal infection.

In the neonatal period the streptococcal disease is defined as early when the clinical signs occur on the first six days after the baby is born. The studies

show high prevalence affecting 2/3 of the cases and 80% on the first days of life.^{2,4}

And the disease signs defined as late appear between seven and ninety days after the baby is born and the most common ways in the newborn babies are the sepsis, pneumonia and meningitis.⁴ The main risk factor for the infection occurrence by GBS is the colonization of the maternal genital tract; the neonatal death rate is more significant in pre-terms^{2,5}, about 20%, getting to the 30% in gestational age less than or equal to 33 weeks when compared to the term infant that does not go beyond 2 to 3%.⁵

Before antibiotic prophylaxis introduction in the time of delivery, the disease rate of early onset varied from 2 to 3 per 1.000 born alive. Nowadays, due to the tracking carried out in the third semester of the pregnancy, the incidence

lowers to 0, 34–37 for cases per 1.000 born alive.⁵ In 1996 it was prepared by the Centers for Disease Control and Prevention (CDC) with other entities such as American Congress of Obstetricians and Gynecologists (ACOG) the first proposal for the prevention of the fetal maternal infection based on the risk factor survey for GBS.⁶ It was reviewed and prepared again in 2002 and it was set up as essential preventive strategy to the routine investigation of GBS in the vaginal and anal discharge between 35 and 37 weeks of gestation.⁷

The last publication of CDC in 2010 keeps the tracking in the prenatal and the use of antibiotics for the prophylaxis in: women with the bacteria isolated in the urine at any time of the pregnancy; culture of vaginal and/or anal swab with positive result in the current pregnancy and previous children that had the disease by GBS. If the culture is not done or unknown the prophylaxis is indicated for the premature birth; premature rupture of the membrane higher than or equal to 18 hours, intrapartum temperature higher than or equal to 38 °C and positive tracking in the prenatal⁵.

The Royal College of Obstetricians and Gynecologist (RCOG), in the update of the last guideline for the disease prevention of early onset caused by GBS in 2012 it is not recommended the routine

bacteriological tracking in the prenatal because there is no proof of the cost-effectiveness of the procedure performance.⁸ In Brazil there is no consensus or technical recommendation. The Health Ministry in the last manual of “Attention to Low Risk Prenatal 2012” does not recommend the tracking in the GBS prenatal routine as long as there are more evidences of its benefits.⁹ However, the Health Secretary of São Paulo state through the Technical Manual of Prenatal and Puerperium of 2010 keeps the recommendation about the procedure performance.¹⁰ It was also set in the Technical Booklet of the Obstetric Care and Perinatal, Protection Net to Mothers from São Paulo from the Health Municipal Secretary of 2007.¹¹

Thus, the study has as goal to know the prevalence of streptococcus colonization of group B and evaluate the maternal and perinatal results caused by the same agent in pregnant women admitted in the maternity hospital of São Paulo City.

METHODS

Retrospective descriptive study with quantitative approach carried out in the Maternity Hospital Leonor Mendes de Barros in São Paulo. The data collection occurred from June, 2014 to September, 2014 in two steps: analysis of information

that is in the Register Book of the Culture Collection of GBS in order to evaluate the prevalence of GBS; analysis of the medical records of the puerpera and newborns that had the result of the culture for positive GBS during the prenatal.

The institution protocol offers the culture collection for vaginal and anal discharge to pregnant women from 35 to 37 gestation weeks and antibiotic prophylaxis during the admission for labor in the following cases: pregnant women with culture of positive vaginal discharge; pregnant women with isolated GBS in the urine in any concentration during the pregnancy; and having a previous newborn affected by the GBS disease. In cases in which the results of the culture are not known, it is recommended the antibiotic prophylaxis where there is one of the risk factors that include: labor in gestation of less than 37 weeks; rupture of the membranes more than or equal to 18 hours; intrapartum temperature higher than or equal to 38 °C; and previous neonatal death by sepsis or pulmonary hypertension in the first 48 hours.¹¹

The antibiotics chosen for the prophylaxis is the crystal penicillin in the dosage of 5 million UI intravenous as loading dose followed by 2,5 million UI intravenous (EVE) every 4 hours until the time of delivery. In cases of allergy the drug can be changed to Erythromycin Eve

500 mg every 6 hours or clindamycin 900mg EV every 8 hours. The handling of 2 doses of any antibiotic is considered proper prophylaxis.¹¹

The sample collection for the tracking of GBS was done by a nurse responsible for the sector and two sterile swabs were used: one for the vaginal culture obtained with the introduction of a swab through the vagina in order to carry out the sample collection of the distal third of the vagina without the speculum use; and a second swab for the anorectal culture obtained through the anal orifice for the sample collection of the distal wall of the rectum.^{10,1} Each swab was inoculated in individual test tube properly labeled with the specific culture and sent to the Laboratory “Association Research Incentive Fund (AFIP)” which is responsible for the reading and for the exam report.

Criteria of inclusion were registered in the Collection Book for the culture of streptococcus B and the medical reports of women and newborns with positive culture for the bacteria during the prenatal from January, 2012 to January, 2014 which matches the time of the GBS collection in the prenatal sector. The medical reports of pregnant women that were not assisted during the labor at the referring maternity were excluded.

In the first step of data collection

through analysis of information that is in the Record Book of collection for GBS culture 193 pregnant women were identified with positive culture for GBS, so the second step of data collection occurred in about 193 medical reports. During the search and evaluation of 193 medical reports of the puerpera with positive culture for the streptococcus B and of the newborns 63 medical reports were excluded, 54 were related to the pregnant women that did not have the child in the institution, 6 medical reports were not found and 3 were incomplete. The sample, therefore, was composed by 130 medical reports.

In the first step of the data collection the information from the Record Book was registered in the specific form and the “gestational age by ultrasound in the exam collection moment” and “the result of the culture for GBS” were analyzed.

In the second step the data collected in the medical reports were registered in the specific form and the variables that were studied were related to the sociodemographic characteristics: “age”, “marital status”, “skin color”, “education and activity condition”, reproductive history: “number of pregnancies”, “parity” and “abortions”, “previous history of preterm infant” and previous history of perinatal death”; “current pregnancy”: gestational age

calculated by the ultrasound in the labor moment”, “prenatal performance” and “number of appointments”, “antibiotic prophylaxis practice for the colonization of streptococcus B with the identification of the antibiotics” and “the number of doses”, “presence of ovular membrane rupture” and “how long it has been broken” “maternal morbidity” (intrapartum fever, urinary tract infection, chorioamnionitis, endometritis, sepsis and meningitis) and data of the puerperia: “collection of laboratory examination of the newborn”, “laboratory examination of the newborn with altered results”, newborn morbidity” (pneumonia, meningitis or early neonatal sepsis), “antibiotic treatment in the newborn”, “confirmation of the infection by streptococcus B in the newborn”, hemoculture” and “neonatal death”, neonatal hospitalization” and “puerpera hospitalization”.

Data were tabulated in the spreadsheet of Microsoft Excel® for the Statistical Package for the Social Sciences, version 20 for Windows® and descriptive analysis was done. In the comparison between interest groups, neonatal hospitalization days by early neonatal sepsis and between the variable number of doses of antibiotic prophylaxis compared with the laboratory examination of newborns that was altered, the Mann-Whitney test and likelihood test were used

with confidence interval of 95%.

The development of the study met the national and international standards of ethics in researches involving human beings approved by the Ethical Committee in Research from the Federal University of São Paulo under the number 655.820/2014, meeting all the recommendation from the Resolution 466/2012, from the National Health Board.

RESULTS

Out of the 1.717 samples that were collected of streptococcus of group B positive culture result for the bacteria was obtained, where the present prevalence of maternal colonization by ECG is 11, 24%

Regarding the gestational age 1.334 (77.7%) pregnant women carried out the examination with proper gestational age according to the recommendation of the protocols from the Health Ministry and Health Secretary from São Paulo state and 383 pregnant women (22.3%) carried out the examination with inappropriate gestational age, 281 before 35 gestational weeks and 102 after the 37th week.

With respect to the sociodemographic data, the average age was 29.07 years (DP 8, 03), from 15(minimum) to 47 (maximum) years old, 33, 1% married, 58, 5% white, 56, 9% finished high school and 57% are not working (Table 1).

Table 1. Sociodemographic characteristics of women with positive culture for the streptococcus of group B – São Paulo SP, Brazil, 2014.

Variables	N	%
Marital Status		
Situation		
Single	39	30.0
Married	43	33.1
Stable Union	42	32.3
Divorced	3	2.3
Widow	1	0.8
Without register	2	1.5
Skin color		
White	76	58.5
Brown	16	12.3
Black	28	21.5
Yellow	8	6.2
Without register	2	1.5
Education		
Illiterate	1	0.8
Elementary School	30	23.1
High School	74	56.9
College education	8	6.2
Without register	17	13.1
Activity Condition		
Not working	75	57.7
Working	53	40.8
Without register	2	1.5
Total	130	100

Regarding the reproduction history the average was of 2.39 pregnant women (DP 1.37), the minimum is one and the maximum is six; regarding the parity the average was 1.06 (DP 1.15), minimum of one and maximum of four labors; regarding abortion the average was of 0.33 (DP 0.65), the minimum is zero the maximum of three abortions; about the previous history of premature birth 129

(99,2%) deny and five (3,8%) described the previous perinatal death.

Gestational age average was of 39.24 weeks by the ultrasound (DP 1.03), 7.21 (DP 2.42) the average number of prenatal appointments, minimum of one and maximum of 15 appointments.

During birth the prophylaxis for the streptococcus B was done in 86 parturient (66.2%), crystal penicillin was the most used antibiotics (80%–93.0%). Regarding the number of doses, only one was handled in more than half of parturient (49% – 57.0%). Regarding the rupture of the ovular membrane (65%–50.0%), there was a rupture with the average time of 259.78 minutes (DP 404.62).

Presence of GBS did not cause any morbidity in the puerpera and the average for hospitalization was of 2.94 days (DP 0.98), minimum of one day and maximum of seven days.

Concerning data of newborns it was noticed that 104 (80.0%) underwent collection of laboratory examination and 20 (19.2%) with altered results, the C reactive protein examination altered in 12 newborns (60.0%). It was necessary the use of antibiotic treatment, gentamicin and Ampicillin in 8 newborns (6.2%). Out of these 8 newborns that were given antibiotics seven (5.4%) evolved with the diagnosis of early neonatal sepsis and with a diagnosis of severe perinatal asphyxia,

encephalopathy, hypoxic ischemic, convulsive syndrome and renal failure with death outcome (Table 2)

It was not confirmed the infection by streptococcus B or any other pathogenic agent in any of the cases of early neonatal sepsis. All of them presented negative hemoculture result and the average for neonatal hospitalization was 3.28 days and maternal of 2.94 days with a minimum of one day for the newborn and mother, and the maximum of 10 and 7 days.

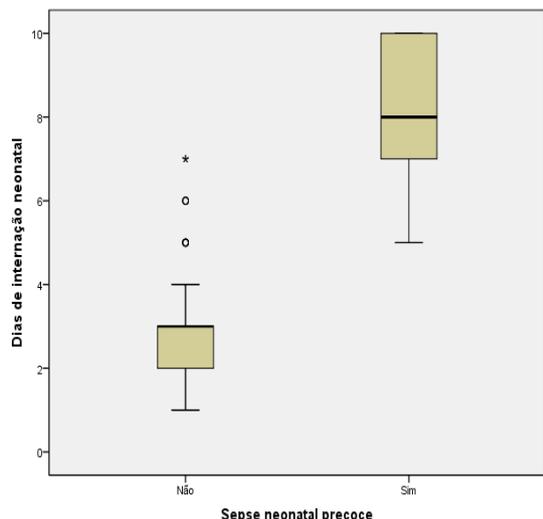
Table 2. Description of newborns according to the collection of laboratory examination, presence of antibiotic treatment and morbidity - São Paulo SP, Brazil, 2014.

Variables	N	%
Laboratory Examinations		
Hemogram (CBC)	1	5.0
CBC and C Reactive Protein (CRP)	2	10.0
CRP	12	60.0
CRP, CBC and cerebrospinal fluid (CSF)	5,	25.0
Presence of Antibiotic Treatment		
No	122	93.8
Yes	8	6.2
Spectrum and Ampicillin		
Gentamicin	8	100.0
Morbidity		
No	122	93.8
Yes	8	6.2
Total	130	100

Data in Picture 1 show that the average hospitalization days of newborns with the diagnosis of early neonatal sepsis

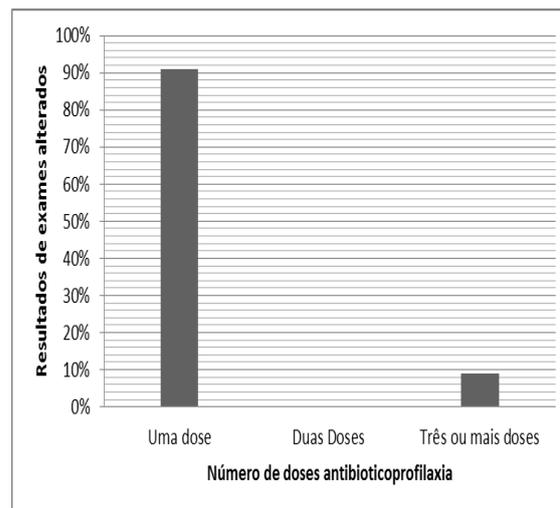
show a longer time of hospitalization when compared to healthy newborns (p-value < 0,001).

Picture 1. Days of neonatal hospitalization by early neonatal sepsis. São Paulo SP, Brazil, 2014.



Picture 2 shows the comparison between the variable “numbers of doses of antibiotic prophylaxis” compared with the laboratory examination of newborns. It is noted that 91.0% of newborns from parturient that received only one dose of antibiotic presented changes in the laboratory examination of C reactive protein (CRP), hemogram or cerebrospinal fluid. On the other hand only 9.0% of newborns’ mothers that carried out the correct intrapartum prophylaxis showed alterations in the laboratory examinations.

Picture 2 – Doses of antibiotic prophylaxis and altered examinations of newborns, São Paulo SP, Brazil, 2014.



DISCUSSION

Prevalence of maternal colonization by GBS was of 11.24%, in accordance with the values found in the literature between 10% a 30 %^{5,12}, and the world average of 20%.¹³ Studies carried out in several regions of Brazil such Northeast, South and Mid-West found prevalence in pregnant women of 17.4%, 23.1% and 15.2%¹⁴⁻¹⁶. A survey done by the Oswaldo Cruz Foundation in Rio de Janeiro with 3.929 women showed the rate of 4.7%, however, the low number is underestimated due to the microbiological techniques from the laboratory and the moment of the prenatal collection.¹⁷

Brazilian data are short, the average rate of maternal colonization can be considered in the country about 15% which places Brazil in a situation of risk because probably there is a great number of

colonized mothers as well as the rate of early neonatal infection without being identified.¹⁴ In order to make sure the tracking in the prenatal is cost-effectiveness the prevalence of maternal colonization must go beyond 10%.¹⁴

Regarding the gestational age in the swab collection moment for the agent survey 77, 7% of the pregnant women carried it out according to the guideline from the Health Secretary of São Paulo State.^{10,1} However, 22.3% of the pregnant women collected the examination with inappropriate gestational age, 281 before 35 weeks of pregnancy and 102 after the 37th week.

Culture collection for the streptococcus B carried out early, that is, before 35 weeks of pregnancy, does not ensure the maternal colonization until delivery time¹⁸, which can cause unnecessary interventions as well as the non-antibiotic handling in precise case since the culture specificity is better when it is done from four to five weeks before the childbirth.¹⁹ If the collection is late, after the 37th week of pregnancy, it is likely that in the labor the culture result is not with the parturient which can make hard the medical conduct. Causes for the tracking to be done in proper gestational age can result in calculation errors of the gestational age as well as the lack of knowledge or wrong interpretation of the

care protocols by the professional.¹⁸

Several likely risk factors for the colonization by GBS were found in the literature such as maternal age, parity, marital status, education, monthly income and even smoking; however, the study's results are inconclusive.^{14,18}

Prenatal appointments average was of 7.2 meeting the minimum number of 06 appointments requested by the Health Ministry.⁹ The hospital where the study was carried out is reference for prenatal of high risk; Therefore, these pregnant women were assisted in the health care unit and they were sent to the service of high risk due to some problem that was identified and it shows the functionality and effectiveness of the reference and counter reference system of the national health service of the country.⁹

Antibiotic prophylaxis was handled in 66. 2% of the parturient and crystal penicillin was the most used one (93%). The result was expected because this drug was first choice according to the Health Municipal Secretary Manual from São Paulo. It is notable that many women did not have the intrapartum antibiotic prophylaxis (33.8%). Such factor can be justified by some parturient that got to the hospital at a late stage of labor and by cases of elective cesarean section in which the antimicrobial handling is not necessary.⁵

Only one dose of antibiotic was handled in more than half of the parturient (57.0%), which can be a decisive factor for the neonatal infections, because the antimicrobial protection occurs if the drug is circulating in the maternal organism for four hours or more.⁵ For the effectiveness of the intrapartum antibiotic prophylaxis (IAP) be about 90% in the prevention of early neonatal infection it is crucial that the recommended hours are complete.^{5,19}

Main risk factors for the early neonatal infection in the literature are: premature labor, maternal colonization by GBS, premature rupture of the membrane ≥ 18 hours, intrapartum fever ≥ 38 °C, bacteria by GBS in the current pregnancy and neonatal previous infection by GBS.^{5,19} Presence of these factors increase about six and a half times the probability of early neonatal morbidity by GBS in comparison with pregnant women that do not present any risk factor.¹⁹

Half of the women presented premature rupture of the ovular membranes with the average time of 259.78 minutes. Even though it is not a decisive risk factor due to the average time of the rupture is lower than the expected, it would increase the susceptibility of fetal contamination due to the bacteria increase until the amniotic cavity.

Out of the eight newborns that need the antimicrobial use right after the birth,

seven had the diagnosis of the early neonatal sepsis with negative hemoculture. Three mothers used one dose of penicillin and it was identified the ovular membrane rupture for 40, 45 and 108 minutes, and in four parturient the IAP was not carried out and there wasn't diagnosis of membrane rupture.

Rate of early neonatal sepsis of 5.4% is alarming and the use of antibiotic by the parturient can influence the negativity of the hemoculture exam and it also happens if the collection is done after the antibiotic treatment starts in the newborns.⁵ Even though it is considered gold standard only 30% of the cases show positive hemoculture, this way a likely neonatal infection caused by GBS cannot be totally excluded.

Newborns diagnosed with early neonatal sepsis were in hospital longer in neonatal intensive care unit if compared with the healthy ones what generates more costs to the government, workload and even overcrowding in the unit. This could probably be avoided if the IAP was done properly.

Recently, a study published in the Cochrane library evaluated the effects of the antibiotics handling in colonized women by GBS about the early neonatal sepsis and neonatal death due to infection including the reduction of the neonatal infection, but still there aren't sufficient

evidences to define which is the best strategy for the prevention, either the intrapartum antibiotic prophylaxis for all the women or only to the ones with identified risk factors.²⁰

CONCLUSION

Prevalence of colonization by streptococcus of group B among the evaluated pregnant women was in accordance with the values found in the literature. Taking into account that the scanning in the prenatal becomes effective cost when the prevalence of maternal infection goes beyond 10%, then there is no doubt that the scanning is beneficial and must encourage in the attention protocols to the prenatal. .

This study presented as limitation the incomplete notes done by the professionals in the medical reports. In spite of the negative results of the newborns hemoculture examination, the neonatal infection rate found in the study was high and it deserves attention as the contamination by GBS cannot be totally excluded. As such, the importance of the continuation of the intrapartum antibiotic prophylaxis came up in order to keep and improve the control of the neonatal contamination.

Therefore, it is necessary the performance of controlled studies with higher number of women and newborns in

order to determine the guidance protocols in Brazil for the tracking of GBS in the prenatal as well as the intrapartum antibiotic prophylaxis.

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