International Journal of Research and Reports in Gynaecology

5(3): 153-160, 2022; Article no.IJRRGY.92477

Carriage of Group B Streptococcus in Pregnant Women in Dakar, Senegal: Prevalence and Associated Factors

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

Open Peer Review History:
This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: https://www.sdiarticle5.com/review-history/92477

Original Research Article

Received 01 August 2022
Accepted 02 October 2022
Published 10 October 2022

ABSTRACT

Background: Beta-hemolytic group B streptococcus (GBS) is a germ responsible for vaginal carriage which can be responsible for serious maternal-fetal disorders. The frequency, intermittency and consequences of this carriage are the main reasons for its research in pregnant women. The objective of this study was to assess this carriage and identify associated factors.
Method: A vaginal sample was taken from 158 pregnant women and inoculated on GRP.B STREP_DIFF.AGAR (Granada) chromomeric medium from Beckton Dickinson (BD) and then incubated in an oven at 37°C. The reading took place at 24 and 48 hours. Group B Streptococcus

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appears in orange colonies. The data were collected, entered by Excel (version 2010) then analyzed by the SPSS software. 20.0. Chi-square test was used to analyze contingency tables with a significant difference if p <0.05.

Results: In sum, 158 pregnant women were included with a median age of 32 years. The carry rate was 25.7%. This carriage was variable according to the age of the patients (28.5% between 20 and 29 years and 21.0% after 40 years), the gestational age (27.4% in the second trimester and 27.2% in the third trimester), flora balance (39.3% intermediate flora and 24.1% unbalanced flora or vaginosis), parity (25.2% in nulliparas and primiparas), vulvovaginal candidiasis (25.5%) and a history of vaginal infections (26.0%). However, no significant difference was found between carrying GBS and these latter situations.

Conclusion: The intermittent nature and the potential complications of this carriage of GBS require its screening at the end of pregnancy in order to prevent any maternal-fetal disease.

Keywords: Group B streptococcus; vaginal carriage; prevalence.

1. INTRODUCTION

The carriage of high-risk vaginal bacteria is an exclusive problem for pregnant women. The most common germ is Group B beta-hemolytic streptococcus (GBS) or Streptococcus agalactiae which is an encapsulated Gram-positive cocci whose human reservoir is digestive.

It is also found in the vagina and this often-asymptomatic vaginal carriage can occasionally be responsible for genital infections of varying severity [1].

Indeed, it can be responsible for chorio-amnionitis, endometritis and urinary tract infection in pregnant or postpartum women [2].

It is also implicated in pregnant women in premature rupture of membranes and low birth weight [3,4].

In addition, its role in neonatal mortality and morbidity as well as in serious neonatal infections such as sepsis, meningitis and pneumonia are the reasons for its screening in pregnant women [1,5].

The prevalence of GBS colonization in pregnant women is variable around the world and approximately 40 to 75% of these mothers will pass the germ to their newborn [6].

In sub-Saharan Africa, a meta-analysis published in 2016 showed that 21.8% of pregnant women were colonised with GBS, with an incidence of early-onset GBS disease of 1.3 per 1000 births and late-onset GBS disease of 0.73 per 1000 births [7].

Given the importance of maternal colonization and the pathogenicity of this bacterium, screening, prevention and treatment strategies must be implemented in each country [8].

Thus in Senegal, few data concerning the prevalence of carriage of *S. agalactiae* in pregnant women is available.

It is in this context that we initiated this work with the aim to determine prevalence of carriage of GBS in pregnant women and identify contributing factors.

2. METHODOLOGY

This was a descriptive cross-sectional retrospective study carried out at the Laboratory of Medical Biology (LBM) of the Pasteur Institute in Dakar between September and November 2020.

2.1 Study Population

It consisted of pregnant women who had come to the LBM of the Pasteur Institute in Dakar for a prenatal check-up. Women who were not pregnant or refused to give consent were not included.

2.2 Taking of the Samples

In women in a gynecological position respecting the conditions for taking a vaginal sample, a speculum was placed and samples from the exocervix and endocervix were taken.

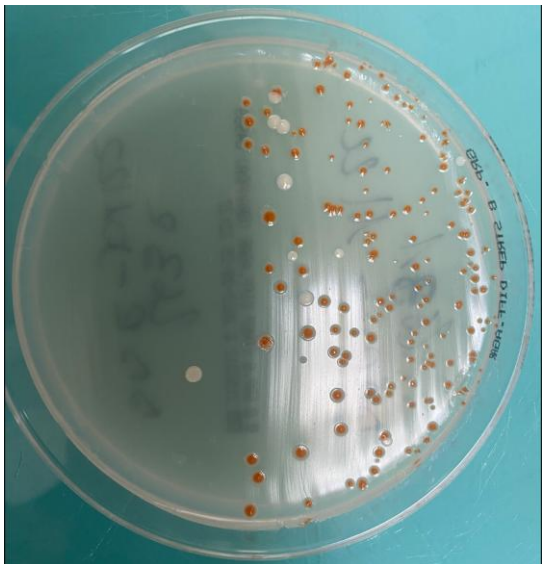

Fig. 1. Identification of *Streptococcus agalactiae* by chromogenic medium GRP.B STREP_DIFF.AGAR (Beckton Dickinson)

For the exocervix sample, a vaginal swab was carried out for the detection of group B streptococcus. Also, another swab was carried out and then soaked in physiological water for the search for other pathogens and for the typing of the bacterial flora.

2.3 Isolation and Identification of *Streptococcus agalactiae*

Samples taken were immediately sent to the laboratory and immediately the swab taken from the vagina was inoculated on, Unit Kingdom) then incubated in the oven at 37 ° C for 18 to 24 hours.

The identification of *Streptococcus agalactiae* was made based on the orange color of the colonies on the medium but also by studying their morphological, cultural and biochemical characters (Fig. 1).

Also the other swab taken from the exocervix was used for the typing of the bacterial forebore at the vaginal level but also for the search for other agents with high infectious risk.

2.4 Data Analysis

The data (age, type of flora, carriage of Streptococcus B, associated infections, pregnancy, parity, history of infections, antibiotic treatment) were collected, entered by Excel (version 2010) then analyzed by the SPSS software. 20.0. Chi-square test was used to analyze contingency tables with a significant difference if $p < 0.05$.

3. RESULTS

The study was conducted among 158 pregnant women with a median age of 32 years. The age group [30-39 years] was the most represented with 52.5% followed by that [20-29 years] with 35.4%.

Women in the 3rd trimester of pregnancy were in the majority in our population with a prevalence of 48.7% followed by those in the 2nd trimester with 32.3%.

Our study population consisted mostly of women with less than 2 children (nulliparous or first-time mothers) with 65.2% (Table 1).

We looked for pathologies such as candidiasis and bacterial vaginosis which were 32.3% and 18.4% respectively.

Notions of a history of infections and antibiotic treatment were reported in 77.8% and 6.3% respectively.

The carriage of Group B Streptococcus was found in our population at 25.7% (Table 2).

Table 1. Socio-demographics characteristics

Socio-demographics characteristics	Number	*percentage %*
Age group (years)		
[20-29]	56	35,4
[30-39]	83	52,5
>=40	19	12,0
Parity		
≤ 1	103	65,2
≥ 2	55	34,8
Age of pregnancy		
1st trimester	30	19,0
2nd trimester	51	32,3
3rd trimester	77	48,7
History of infections		
No	35	*22,2*
Yes	123	*77,8*
Treatment Antibiotics		
No	148	*93,7*
Yes	10	*6,3*

Table 2. Vaginal pathologies

Pathologies	Number	Percentage %
Carriage of group B Streptococcus		
No	119	*74,3*
Yes	39	*25,7*
Candidiasis		
No	107	*67,7*
Yes	51	*32,3*
Type of flora (Nugent's score)		
Normal (0-3)	101	63,9
Intermediate (4-6)	28	17,7
Vaginosis (7-10)	29	18,4

Depending on the age groups, this carry was estimated at 28.5% for the age group [20-29 years] while it was respectively 22.9% and 21.0% for the [30- 39 years] and those over 40 years old. We did not observe a statistically significant difference between the carriage of Streptococcus B and the age of the patients (p = 0.693).

This carriage was noted almost similarly in multiparous women (P> = 2) and nulliparas or first-time mothers (P <2) without any significant difference (p = 0.823).

We noted that carry occurred almost in the second and third quarter with prevalence of 27.4% and 27.2% respectively. We did not find a significant difference between the age of pregnancy and carriage of Streptococcus B (p = 0.277).

Concerning the balance of the vaginal flora, the carriage of Streptococcus B occurred more on an intermediate or unbalanced flora (vaginosis) with prevalences of 39.3% and 24.1% respectively without significant difference (p = 0.133).

Streptococcus B carriage was associated with candidiasis in 25.5% of cases, antibiotic treatment in 40.0% and history of infections in 26.0% of cases. There was no significant difference between this carry and these different situations (Table 3).

Table 3. Streptococcus B vaginal carriage and associated factors

Characteristics	Carriage of Group B Streptococcus		*p-value*
	n/N	%	
Age group (years)			
[20-29]	16/56	28,5	
[30 - 39]	19/83	22,9	0,693
≥ 40	4/19	21,0	
Parity			
≤ 1	26/103	25,2	
≥ 2	13/55	23,6	0,823
Type of flora			
Normale	21/101	20,8	
Intermediate	11/28	39,3	0,133
Unbalanced (vaginosis)	7/29	24,1	
Age of pregnancy			
1st trimester	4/30	13,3	
2nd trimester	14/51	27,4	0,277
3rd trimester	21/77	27,2	
Candidiasis			
Yes	13/51	25,5	0,871
No	26/107	24,3	
Treatment antibiotics			
Yes	4/10	40,0	0,246
No	35/148	23,6	
History of infections			
Yes	32/123	26,0	0,466
No	7/35	20,0	

4. DISCUSSION

Our study showed a prevalence of *Streptococcus agalactiae* carriage of 25.7%. Similar prevalences have been reported in other countries such as Morocco and Tanzania with respectively 20.2% and 23% [9,10]. In the United States, asymptomatic vaginal carriage of GBS has been estimated in 20-30% of pregnant women in late pregnancy [11].

However, low prevalence has been reported in other countries including Cameroon, Nigeria and Ethiopia with respectively 6.70%, 2.3% and 7.2% [12-14].

The variation in the prevalence of *Streptococcus agalactiae* in the different countries could be due to differences in sampling size but also to differences observed in the sampling or diagnostic technique used.

Concerning the sampling technique, it plays an important role in the isolation of *Streptococcus agalactiae*. Indeed, the most important colonization of GBS being at the level of the lower third, the use of the speculum will mask the anterior and posterior surface of the vagina thus reducing the surface studied.

Thus, during the sample, it is recommended to stress the importance of scanning the interior of the vagina to the vestibule and the vulva as recommended by the National Agency for Accreditation and Assessment in Health (ANAES) hence the technique of introducing the swab without a speculum [15].

Also, a rectal sample would increase the sensitivity of the screening [16,17].

The rate of carriage is also correlated with the bacteriological technique employed. In fact, a vaginal sample seeded without selective enrichment, as recommended by ANAES, makes it possible to find GBS in 10% of pregnant women. On the other hand, inoculation with selective enrichment increases the positivity rate reaching 15% [18].

In the present study GBS was isolated more frequently from women of age group 20-29 (28.5%). High isolation frequencies were shown in women at this age in Nigeria in 2015 and

Tanzania in 2013 with respectively 50% and 43.6% [19,20].

In our study, this carriage was found almost similarly in multiparous women (P> = 2) and nulliparas or first-time mothers (P <2) with an average of 24.4%.

In Nigeria, a prevalence quite similar to ours was observed in first-time mothers by Ezeonu et al. (25.5%) [21].

Musa Mohammed found in Ethiopia in 2010 a higher colonization rate among multiparas (22%) compared to first-time mothers (17.9%) [22].

However, in India Hajare reported in 2016 a higher prevalence among first-time mothers (46.7%) without any statistically significant difference as we observed in our study [23].

Our study also showed that carriage occurred almost in the second and third trimester with prevalence of around 27%.

An almost similar prevalence was observed by Rabiei in a multicenter study conducted in 2006 where the prevalence of Streptococcus B carriage was 26.65% in women after the 20th week of amenorrhea (WA) [24].

On the other hand, Rohi had reported in 2011 in Ardabil (Iran) a carrying level estimated at 18.0% in women between 8 and 40 weeks of amenorrhea [25].

Some countries have adopted universal screening of all pregnant women by rectovaginal culture between 35 and 37 weeks of gestation, which has made it possible to reduce the incidence of *Streptococcus agalactiae* by 80% [26]. On the other hand, other countries such as France, Denmark, the Netherlands and Australia do not recommend universal screening between 35 and 37 weeks because it can be effective in terms of cost and impact on the carrying of *Streptococcus agalactiae* [27,28].

Regarding conditions such as vaginosis and candidiasis, no connection with the carriage of Streptococcus B was found in our study.

Vaginosis, which is an imbalance of the vaginal flora, often creates an environment favorable to the multiplication of other bacteria.

We investigated other potential associated factors such as history of vaginal infections, treatment with antibiotics. However, we found no statistically significant difference.

A study carried out in Senegal and Madagascar published in 2021 reported no factors among sociodemographic characteristics, living conditions, and obstetric history were found to be associated independently with GBS colonization in both countries [29].

5. CONCLUSION

The carriage of *Streptococcus agalactiae* is relatively high in pregnant women in our study. Thus, due to these formidable complications in the mother, effective screening and management strategies should be put in place and harmonized in order to limit any pathological situation that may be linked to this germ during pregnancy.

DATA AVAILABILITY

The data used to support the conclusions of this study are included in the manuscript and are available from the corresponding author on reasonable request.

CONSENT

As per international standard or university standard, patients' written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

ACKNOWLEDGEMENT

We would like to thank all colleagues in the medical biology laboratory for their unwavering investment in carrying out this work, particularly the bacteriology unit. We would also like to thank all of the study participants.

Special mention to employees of the bacteriology virology department of Aristide Le Dantec Hospital.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Peer-review history:
The peer review history for this paper can be accessed here:
https://www.sdiarticle5.com/review-history/92477