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Group B Streptococcal Carriage Rate in Vagina of Pregnant Women in Third Trimester in Lomé, Togo

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Abstract **Background:** Transmission of Group B Streptococci (GBS) to newborns occurs in the perinatal period through direct channels in utero. GBS is one of the main bacteria responsible for neonatal infections. Objective: measure the prevalence of GBS genital carriage among pregnant women in the third trimester at the Sylvanus Olympio University Teaching Hospital. **Materials and Methods:** Vaginal swabs were obtained from 200 women between 34 and 38 weeks of pregnancy. The samples were seeded on sheep blood agar at 37° C for 16 to 18h. After incubation, suspected GBS colonies were identified by using a Latex Agglutination Test (LAT). Susceptibility test to antibiotics was performed by agar diffusion assay. **Results**: A total of 200 pregnant women with an average age of 28 years, were screened for GBS infection. The age group of 25-29 year olds was the highest (33.5%). The women as retailers were the majority (36.5%). Regarding the level of education, the percentage was 12.5%, 30.5%, 49% and 8% corresponding to uneducated, primary, secondary and university level respectively. The carriage rate was 2.5% (n = 5/200), 95% CI (0.3-4.7). No risk factors associated with the carriage rate identified. The isolated GBS strains were susceptible to penicillin G, erythromycin, co-amoxiclav and levofloxacin. The five GBS carriers were delivered by cesarean section for various reasons. **Conclusion:** Although a low carriage (2.5%) rate of GBS found in this study, a policy of systematic screening of pregnant women at least in the third trimester must be promoted.

Keywords: *pregnancy screening, group B streptococcus, women, Latex Agglutination Test*

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1. Background

Streptococcus agalactiae (S. agalactiae), also known as group B *Streptococcus* (GBS) is a commensal bacteria of human intestine and genital tract. It can intermittently colonialize the vaginal cavity and women's bladder. Infections with group B streptococcus in women are mild (urinary infections). However, this bacterium could be responsible for serious infections in pregnant women, foetuses and the newborns. The first cases of GBS neonatal infections have been reported by Eickhoff [1]. Group B *Streptococcus* infection represents a major cause of neonatal mortality and morbidity [2]. The public health burden of these infections on newborns as well as on women is important. That is mainly, neurological sequelae for the newborn and maternal sterility following postpartum endometritis. Because of its frequency and complications, GBS foetomaternal infection remains a major concern for perinatal care professionals. Its (GBS) mother-to-child transmission depends on the presence of the bacteria during the pregnancy [2,3,4]. The prevalence of vaginal colonization by GBS among women varies across the world: 19% - 35% in North America, 20% in Africa and 8% - 15% in Europe. The frequency of vertical mother-to-child transmission ranges from 40 to 70% [4].

Confronted with the importance of maternal colonization and the pathogenic power potential of this bacterium, screening, prevention and treatment strategies have been developed. The goal was to identify the GBS carrying patients at the third trimester of pregnancy and offer them an antibiotherapy, the only effective mean to prevent neonatal infections [5].

In Togo, there is no national guideline for systematic screening of GBS in pregnant women receiving for prenatal care. The objective of this study was to measure the prevalence of GBS genital carriage among pregnant women in Lomé, and to treat the bacteria carrying – patients.

2. Materials and Methods

Design of the study. Our study took place in the Sylvanus Olympio University Hospital *(CHU-SO)*, Service of Obstetrics – Gynecology and Microbiology Laboratory Service.

We conducted a cross-sectional study during the period of March 2012 through Mai 2012. We included all pregnant women received for their third trimester consultation and who had a gestational age ranging from 34 to 38 weeks of amenorrhea.

Samples have been collected in a prenatal consultation room and have been processed in the microbiology laboratory of the hospital.

Laboratory method. In the laboratory, vaginal swabs were seeded in petri dishes containing sheep blood agar and incubated at 37°C during 24 hours. The serogrouping has been performed on suspected bacteria colonies after incubation. This serogrouping consisted of a latex particles agglutination test for the identification of streptococcus groups A, B, C, D, E, F and G according to the Lancefield classification [6,7]. The streptococcal extracts were prepared using the method set-up by Maxted [8]. The reaction was considered positive when agglutination appeared with one of the reagents or when agglutination was more important with one of the reagents than the five others. When no agglutination appeared, the reaction was considered negative.

We performed the antibiogram by using the agar diffusion assay also known as disc diffusion method, which consisted in dropping antibiotic discs on an agar media previously inoculated with an isolated GBS strain. Petri dishes are incubated between 35 and 37^{o} C for 16 to 18h. Once the incubation completed, the diameters of inhibition areas were measured. The reading and interpretation of the antibiogram was performed according to The French Society of Microbiology guidelines [9].

Statistical analysis. We collected and analyzed the following variables: age, gestational age, education level, marital status, religion and pregnancy, medical, gyneco-obstetric and chirurgical history.

Table 1. Distribution of women according to marital status, religion and education level

Factors	Number (n)	%
Marital status	**n = 200**	
Married	176	88.0
Single	7	3.5
Live in partnership	17	8.5
Religion	**n = 200**	
Christian	170	85
Muslin	27	13.5
Animist	3	1.5
Education level	**n = 200**	
Primary school	61	30.5
Secondary school	98	49.0
University	16	8.0
Uneducated	25	12.5

3. Results

During the study, 200 pregnant women were screened, at a minimum, maximum and average age of 19, 40 and 28 years old respectively. Most of the women were married (88%) and christian (85%). With reference to the level of education, the percentage was 12.5%, 30.5%, 49% and 8% corresponding to uneducated, primary, secondary and university level respectively (Table 1). Upon bacteriological assay completion, five (5) strains of GBS have been isolated from 5 pregnant women, representing a bacterial carriage rate of 2.5% (5/200), 95% CI (0.3-4.7). The sociodemographic characteristics of GBS carriers (women) were shown on (Table 2). Any risk factor associated with the carriage was identified. The GBS strains isolated were susceptible to penicillin G, erythromycin, co-amoxiclav and levofloxacin (Table 3). The five GBS carriers delivered by cesarean section for various reasons (Table 4).

Table 2. Sociodemographic characteristics of GBS carriers (women)

Characteristics	Frequency (n = 5)
Age groups (Years)	
< 19	0
20 – 24	0
25 – 29	0
30 – 34	5
35 – 39	0
> 40	0
Marital status	
Married	4
Single	0
Live in partnership	1
Education level	
Primary school	0
Secondary school	4
University	0
Uneducated	1

Table 3. Reasons of cesarean among the GBS carriers

Reasons	Frequency (n = 5)
Shrunk pelvis	1
Cicatricial uterus	1
Post term pregnancy	1
HIV PMTCT(*)	2

(*) Prevention of mother-to-child transmission (PMTCT).

Table 4. Characteristics of antibiotics tested on GBS strains isolated

Antibiotics	Profile
Tetracyclines	Resistant
Phenicols	Resistant
Sulfonamides	Resistant
Penicillin G	Sensitive
Amoxicillin + Clavulanic acid	Sensitive
Levofloxacin	Sensitive
Erythromycin	Sensitive

4. Discussions

The GBS vaginal carriage is intermittent and transitory. The Centers for Disease Control and Prevention (CDC) recommends a screening between the 35thand 37thweeks of amenorrhea [10]; and the French *"Agence Nationale d'Accréditation et d'Evaluation en Santé (ANAES)"*, recommends a screening at the 34th and the 38th week of amenorrhea [11]. The vaginal colonization by GBS is estimated around 10 to 20% across the world. However this rate varies in great proportions according to the country, the study population, testing sites, the testing period, and the technic for bacterial isolation used [4].

In our study, we estimated the GBS vaginal carriage between the 34th and the 38th week of amenorrhea. We found a rate of 2.5%, which represents a low carriage. This rate is close to the 3.7% found in 1991 in the same Hospital of Lomé renamed nowadays Centre Hosptalier et Universitaire Sylvanus Olympio [12]. However, our finding is very low as compared to those reported in others African countries such as Nigeria (6.6-17.6%) [13-18], Côte d'Ivoire. (7.30-19%) [4,19]; Gambia (22%) [20], Zimbabwe (20-30%) [21], Malawi (16,5%) [22]. Tunisia (13%) [23]. In European countries, the prevalence of rectovaginal colonization varies from 6.5 to 36% [24]. Studies carried out in United Kingdom [25] and in Belgium [26] reported respectively 21.3% and 22%, data are higher than the carriage rate in this study. The prevalence of GBS carriage found in our study, remains low compared to data from India (16%) [27], south east Asia (12%) [28], Iran (6%) [29] Brazil (15,6%) [30] and USA(12.2%) [31]. Single vaginal culture and lack of rectal culture can partly explain the low prevalence in our study. Higher prevalence rates have been reported in studies that involved rectovaginal sample collections and also women with preterm rupture of membranes [32]. Although, this may not be a limitation of this study, one recent study showed that perianal and rectal cultures yield similar results [33]. There are various bacteriologic techniques for GBS identification. The low prevalence showed in this study can be also related to our culture methods for detection of group B streptococcus carriage in pregnant women [34]. The colonization rate by culture is low when compared with antigen detection method and PCR. Although we cannot rule out the possibility of detection of non viable GBS by antigen detection and PCR assays, several conditions can explain the false negative culture results. These include antibiotics, feminine hygiene products and scanty colonization, which would be difficult to obtain in culture [35,36]. Besides being time consuming, culture requires an experienced technician to identify the suspected colonies, which are not always beta-hemolytic [37] and effect of storage conditions can impact sensitivity and specificity GBS culture methods because detection of GBS by culture requires viable organisms [38].

Our sample size is small and we found a low GBS carriage rate. This fact does not give us the possibility to draw any conclusion regarding the characteristics (sociodemographic and medical) of the bacteria carriers and the antibiogram profile of GBS isolates

5. Conclusion

Through this research activity, we have been able to estimate the prevalence of GBS carriage among women at the last stage of pregnancy receiving prenatal care at the CHU-SO, Lomé. We found a carriage rate of 2.5%. In the settings of maternal and foetal infection by this bacterium, the greatest concern is to identify the quickest and most reliable diagnostic technique. Neonatal infection is a therapeutic emergency and the severe outcome resulting in neonatal meningitis justifies the need to screen the GBS vaginal carriage at the last stage of pregnancy and a preventive treatment in case of vaginal colonization by the bacteria.

Conflict of Interest

All authors declare that none of them have any conflict of interest

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