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Prevalence of Recto-Vaginal Group B Streptococcus Colonization in the Third Trimester of Pregnancy in a Tertiary Hospital in Nepal: A Cross-Sectional Study

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ABSTRACT

Introduction:

Group B streptococcus (GBS), a gram-positive streptococcus is a major cause of bacterial infections in mothers and neonates in the peripartum period.[1,6,12] 50-65% of infants born to mothers with recto-vaginal GBS colonization have positive cultures at birth. Only 1-2% of colonized newborns develop invasive disease.[1,3,19] Prevalence of maternal GBS colonization is highly variable worldwide (11%-35%) with a lower prevalence in Southern Asia (12.5%)[6]. There is a lack of published data on this issue in Nepal. There is also variation in the approach for preventing GBS transmission to neonates using either the risk-based or routine screening-based approach.[3,7,8,12,20] Therefore this study aimed to determine the magnitude of GBS colonization and its impact on pregnant women and their neonates using the routine screening of recto-vaginal swabs in pregnant women at 35-37 weeks of gestation.

Methods:

A cross-sectional study at Patan Hospital, Nepal was carried out to evaluate the prevalence and maternal and neonatal outcomes of women with positive GBS recto-vaginal colonization. The sample size was based on a regional prevalence of 12.5%[6.] Women on antenatal visits were routinely screened for GBS with a culture of recto-vaginal swab at 35-37 weeks of gestation. Women with positive culture were planned to be treated with Intrapartum prophylactic antibiotics at the onset of labor and the maternal and neonatal complications associated with GBS colonization were recorded.

Results:

A total of 154 eligible women were screened. None of the women tested positive for Group B streptococcal culture. The majority of the population were of young age (25-29) group (45%) and multigravida (65%).

Conclusions:

The prevalence of recto-vaginal GBS colonization in pregnant women in our region is probably low enough to warrant a universal screening approach.

Keywords: Group B streptococcus, rectovaginal colonization, Intrapartum prophylactic antibiotics.

INTRODUCTION

GBS is a normal flora of the human gastrointestinal tract.[1,2,3] Throughout pregnancy GBS is isolated in a transient, intermittent, or chronic fashion.[1,2] The prevalence of GBS colonization in the vagina or rectum

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ranges from 10 to 40%. These women with recto-vaginal colonization are at risk of ascending infection and transmission of GBS to the newborn during delivery. In the absence of intrapartum antibiotic prophylaxis, approximately 60% of neonates born to colonized mothers carry GBS and 1 to 2% of colonized newborns develop early-onset sepsis.[1,3,19] Pneumonia is the most common manifestation (90%), followed by meningitis (10%).[8] Maternal complications include preterm delivery, chorioamnionitis, pre-labor rupture of membranes, and maternal GBS bacteriuria. In the postpartum period, GBS can cause endometritis, sepsis, and urinary tract infections.[2,3,8]

Administration of intrapartum antibiotic prophylaxis (IAP) has been universally accepted for the prevention of neonatal invasive disease.[4,7] However the approach to administering IAP is not uniform worldwide.[3,7,8,12,20] Some suggest antibiotics administration based on risk factors at the onset of active labor while others suggest routine culture-based screening at 35-37 weeks of gestation and administration of antibiotics at the onset of active phase of labor[3]. The risk factors indicated for IAP are any of the following: (a) previous infant with invasive GBS disease, or (b) GBS bacteriuria during any trimester of the current pregnancy, or (c) any one of the following: Delivery at < 37 weeks of gestation or Amniotic membrane rupture ≥18 hours or Intrapartum temperature ≥100.4°F (≥38.0°C) or Intrapartum Nucleic acid amplification test (NAAT) positive for GBS.[4] Each strategy has differing costs and consequences.[22]

Currently, at our institution, a risk-based strategy is in practice. However, no studies have been conducted to measure the magnitude and effectiveness of this strategy. This study uses the screening strategy to find the prevalence of GBS colonization and its perinatal effects in pregnant women and their newborns.

METHODS

Hypothesis:

There is a low prevalence of recto-vaginal GBS colonization in pregnant women at 35-37 weeks of gestational age and routine screening is not needed.

General Objective:

- To determine the prevalence of GBS colonization in the third trimester of pregnancy and the perinatal outcome within 24 hours postpartum.

Specific Objective:

- To find the prevalence of recto-vaginal colonization of GBS at 35-37 weeks of pregnancy.
- To study the association of maternal GBS colonization with preterm labor, chorioamnionitis, premature rupture of membranes, and early onset neonatal sepsis (EONNS).

This cross-sectional study was done at the Department of Obstetrics and Gynecology, Patan Hospital, PAHS located in Kathmandu Valley, Nepal from March 2020 to August 2020. Ethical approval was obtained from the Institutional Review Committee of Patan Academy of Health Sciences.

Inclusion Criteria:

- All pregnant women at 35-37 weeks of pregnancy attending the antenatal clinic in Patan Hospital within the study period.

Exclusion Criteria:

- History of topical or systemic antibiotic use in the last 4 weeks.
- Women in labor (regular painful uterine contractions with cervical change).
- Women who have undergone pelvic examination before vaginal swab.
- Women with antepartum hemorrhage.

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- Women with previous cesarean sections as repeat cesarean section was more likely.
- Women with preterm rupture of membranes.
- Women noted to have sexually transmitted infections and genital ulcers on examination.
- Women presenting ≥ 5 weeks after the prenatal culture.

A total of 162 eligible women were selected when they visited for routine antenatal follow-up at 35-37 weeks of gestation. The lower vagina (vaginal introitus), followed by the rectum (i.e., insert swab through the anal sphincter) using the same swab (cotton swab) was taken without aseptic precaution and speculum. The swab was collected and transported in an enrichment medium (Todd-Hewitt broth) and sent to a laboratory for culture. Culture was done after supplementation of gentamicin (8µg/ml) to the broth. Women with a positive culture and their neonates were followed up till delivery and 24 hours postpartum. GBS colonization-positive women were treated with IAP as per CDC recommendations.[4] Preterm labor, premature rupture of membrane, chorioamnionitis, and neonatal admission for GBS sepsis or suspected sepsis were observed and recorded. Neonates born to GBS colonization women were followed for 24 hours of life for signs and symptoms of infection.

The data were collected using a preformed proforma and after explaining the study protocol and informed written consent from the patients. The statistics were analyzed using epi-info.

RESULTS

A total of 162 patients were selected, out of which 8 patients did not submit their samples at the lab. Therefore 154 samples were available. None of the samples showed growth of beta-hemolytic streptococci. The mean age group of women was 24.87 years and most of the women were multigravidas (65%).

Table 1: prevalence of GBS prevalence in study population.

Total study population	GBS positive		GBS negative	
	No.	%	No.	%
154	0	0%	154	100%

Table 2: **Age distribution and colonization rates in study population.**

Age (Years)	GBS negative (n=)		Total Pregnant women	
	No.	%	No.	%
15-19	8	5.2	8	5.2
20-24	53	34	53	34
25-29	70	44.8	70	44.8
30-34	23	14	23	14
≥ 34	3	2	3	2

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Table 3: pregnancy status and colonization rates in the study population

Gravida status	GBS negative (n=)		Total pregnant women	
	No.	%	No.	%
1	54	35	54	35
2	86	56	86	56
3	13	8.35	13	8.35
≥4	1	0.65	1	0.65

DISCUSSION

Group B Streptococci (GBS) are known to cause a wide variety of infections in adults during pregnancy and postpartum. However clinical interest in these bacteria mainly relates to their ability to cause serious neonatal illness, especially meningitis and sepsis with their long-term morbidity and mortality.[8,9] Developed countries have well-formulated guidelines for prenatal screening and Intrapartum antibiotic prophylaxis,[4] of which are lacking in Nepal. There are no valid reports addressing the prevalence of GBS colonization in pregnant women in the country.

There is a significant international and regional variation in the prevalence of maternal GBS colonization which can be attributed to factors like the characteristics of the study population, serotype prevalent in the region, and differences in culture media and bacterial detection techniques.[1,8,9,12]

The mean age of participating women in our study was 24.87 years. In a similar study by Anne-Marie Rick *et al,* where the GBS prevalence rate was 4.9%, the highest prevalence (5.5%) was in the age group 25-29 years.[15] Similarly parity may also be a covariant for prevalence of GBS colonization.[14,18,20] In the study by Shahrzad Hadavand *et al,* although statistically not significant, the risk of colonization decreased with increasing parity.[14] Eun Ju Kim *et al,* reported that women with one or more children or a history of two or more abortions had a significantly lower prevalence of GBS colonization.[18] In our study most of the women were multiparous (65%) and nulliparous were only 35%. The microbiological method used for specimen transport and culture affects detection substantially.[1,16,19] Measures to increase the recovery of GBS include addition of selective broths such as Todd-Hewitt broth, supplementation with gentamicin and nalidixic acid, and the addition of 5% sheep blood.[4,16] Recently more rapid techniques have been developed which include DNA probes and nucleic acid amplification tests (NAAT). Gavino *et al* found intrapartum NAAT to be more sensitive (95.8%) versus antepartum culture (83.3%).[16,23] The difference in international and regional prevalence may also be due to the prevalence of different serotypes in various regions.[10] In a meta-analysis, Neal J *et al* reported that bacterial serotypes I-V account for 98% of identified colonizing GBS isolates worldwide and serotype III was the most common (25%) serotype but in Asia, serotypes VI-IX were more common.[5,6]

In our study, none of the swabs yielded a positive culture for GBS colonization. Differences in demographic characteristics of the studied population, prevalent serotype, media, techniques for bacterial isolation and identification, and laboratory expertise can probably explain the differences in this prevalence. The sensitivity of screening methods based on the culture identification of maternal carriage of GBS also depends on the timing of specimen collection and the source of the specimen.[4,11] Our study had a small number of sample size

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(154). This sample size was inadequate, considering the possibility of low prevalence in our context.

LIMITATIONS

The prevalence of maternal GBS colonization is widely variable worldwide ranging from as low as 1.33% to as high as 34.7%.[5,14] Therefore a large sample size was required to determine the statistical significance which is not feasible for this study. The number of patients enrolled in this study was only 154, so the study results cannot be materialized in the whole population. Further, a more sophisticated laboratory with a higher culture yield could have detected positive cultures of GBS in our study. In the absence of positive culture, it was not possible to study the maternal and neonatal complications associated with GBS colonization.

CONCLUSIONS

The result of our study did not yield a positive culture for maternal recto-vaginal GBS colonization. Culture-based screening might not be the appropriate method of preventing neonatal GBS infection in our setting, especially if the prevalence is low. The research result can help optimize resource use, contribute to antibiotic stewardship, and guide future research efforts by potentially supporting a shift from a universal to a more targeted risk-based screening approach. However, this finding may be a direct or indirect result of population demographics, small sample size, and limitations of laboratory detection performance. While the study itself has limitations, it provides valuable preliminary data that can influence public health strategies related to GBS screening in pregnancy. Further research with a larger and more diverse population is necessary to draw more definitive conclusions.

REFERENCES

1. Jay Vornhagen, Kristina M. Adams Waldorf and Lakshmi Rajagopal. Perinatal Group B Streptococcal Infections: Virulence Factors, Immunity, and Prevention Strategies. Trends in Microbiology. 2017; 25(11):919-931. http://dx.doi.org/10.1016/j.tim.2017.05.013.
2. F. Gary Cunningham, Kenneth J. Levono, Steven L. Bloom, Catherine Y. Spong, Jodi S. Dashe, Barbara L. Hoffman, Brian M. Casey, Jeanne S. Sheffield. Williams Obstetrics. 24th ed. McGraw Hill Education. p. 1248-1251.
3. Amarnath Bhide, Sabaratnam Arulkumaran, Kaizad R. Damania, Shirish N. Daftary. Arias' Practical Guide to High-Risk Pregnancy and Delivery, A South Asian Perspective.4th ed. RELX India Private Limited. p. 65-69.
4. Centers for Disease Control and Prevention. Prevention of Perinatal Group B Streptococcal Disease Revised Guidelines from CDC, 2010. MMWR 2010;59: p1-31.
5. Neal J. Russel. Anna C. Seale, Megan O'Driscoll et al. Maternal Colonization With Group B Streptococcus and Serotype Distribution Worldwide: Systematic Review and Meta-analyses. Clin Infect Dis. 2017;65(S2):S100–11.
6. Lawn JE, Bianchi-Jassir F, Russell N, et al. Group B streptococcal disease worldwide for pregnant women, stillbirths, and children: why, what, and how to undertake estimates? Clin Infect Dis 2017; 65(suppl 2):S89–99.
7. Melissa K. Van Dyke, Ph.D., Christina R. Phares, Ph.D., Ruth Lynfield, M.D et al. Evaluation of Universal Antenatal Screening for Group B Streptococcus. N Engl J Med 2009; 360:2626-36.
8. Anita Shet, Patricia Ferrieri. Neonatal & maternal group B streptococcal infections: A comprehensive review. Indian J Med Res 120, September 2004, p 141-150.
9. William E. Benitz, Jeffrey B. Gould, Maurice L. Druzin. Risk Factors for Early-onset Group B Streptococcal Sepsis: Estimation of Odds Ratios by Critical Literature Review. PEDIATRICS;1999;103(6):1-14. http://www.pediatrics.org/cgi/content/full/103/6/e77.
10. Samir K. Saha, Zabed B. Ahmed, Jayanta K. Modak et al. Group B Streptococcus among Pregnant Women and Newborns in Mirzapur, Bangladesh: Colonization, Vertical Transmission, and Serotype Distribution. J Clin Microbiol 55:2406 –2412. https://doi.org/10.1128/JCM.00380-17.
11. F. Bianchi-Jassir et al. Preterm Birth Associated with Group B Streptococcus Maternal Colonization Worldwide: Systematic Review and Meta-analyses. Clinical Infectious Diseases 2017;65(S2):S133–42. DOI: 10.1093/cid/cix661.

12. G.C.Di Renzo. Intrapartum GBS screening and antibiotic prophylaxis: a European consensus conference. J Matern Fetal Neonatal Med, 2015; 28(7): 766–782: 2014 Informa UK Ltd. DOI: 10.3109/14767058.2014.934804.
13. I. A Onwuezobe, R. A. Effiom, Prevalence and associated risk factors of Group B streptococcus in pregnant women attending antenatal care in a Nigerian urban hospital. Ibom Medical Journal February, 2016;9(1):1-7.
14. Shahrzad Hadavand, Fatemeh Ghafoorimehr, Leila Rajabi, et al, Frequency of Group B Streptococcal Colonization in Pregnant Women Aged 35- 37 Weeks in Clinical Centers of Shahed University, Tehran, Iran. Iranian Journal of Pathology; 2015:10(2):p.120-126.
15. Anne-Marie Rick, Angie Aguilar, Rosita Cortes et al, Group B Streptococci Colonization in Pregnant Guatemalan Women: Prevalence, Risk Factors, and Vaginal Microbiome. Open Forum Infectious Diseases; 2017:10(6):p.1-8. DOI: 10.1093/ofid/ofx020.
16. Manuel Rosa-Fraile, Barbara Spellerberg. Reliable Detection of Group B Streptococcus in the Clinical Laboratory. Journal of Clinical Microbiology; September 2017:55(9).p.2590-2598. https://doi.org/10.1128/JCM.00582-17.
17. Kwatra G, Adrian PV, Shiri T, Buchmann EJ, Cutland CL, et al. (2014) Serotype-Specific Acquisition and Loss of Group B Streptococcus Recto-Vaginal Colonization in Late Pregnancy. PLOS ONE 9(6): e98778. doi:10.1371/journal.pone.0098778.
18. Eun Ju Kim, Kwan Young Oh, Moon Young Kim, et al, Risk Factors for Group B Streptococcus Colonization Among Pregnant Women in Korea. Epidemiology and Health; October 2009:33.p.1-7. http://dx.doi.org/10.4178/epih/e2011010.
19. Shabayek S and Spellerberg B (2018) Group B Streptococcal Colonization, Molecular Characteristics, and Epidemiology. Front. Microbiol. 9:437. doi: 10.3389/fmicb.2018.00437
20. Kurz and Davis. Routine culture-based screening versus risk-based management for the prevention of early onset group B streptococcus disease in the neonate: a systematic review; 2015 doi:10.11124/jbisrir-2015-1876.
21. Sridhar Santhanam, Ruby Jose, Rani Diana Sahni, et al, Prevalence of group B Streptococcal colonization among pregnant women and neonates in a tertiary hospital in India. Journal of the Turkish-German Gynecological Association; DOI: 10.4274/jtgga.2017.0032.
22. The Centre for International Economics, Cost-effectiveness of strategies to prevent infection of group B streptococcus in neonates from maternal colonization. commercial in confidence. http://www.thecie.com.au/.
23. Nabil A El Aila, Inge Tency, Geert Claeys, et al, Comparison of different sampling techniques and of different culture methods for detection of group B streptococcus carriage in pregnant women. BMC Infectious Diseases 2010, 10:285. http://www.biomedcentral.com/1471-2334/10/285.