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RESEARCH ARTICLE

Prevalence of vaginal colonization of group B Streptococci and its effect on maternal and fetal outcome in antenatal women attending outpatient department of O&G, in a tertiary care centre

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ABSTRACT

Background: Group B Streptococcus or Streptococcus Agalactiae is a gram positive bacterium present in the normal flora in the female genitourinary tract, urethra and gastrointestinal tract. Its colonization in pregnant women is one of the primary etiologies of perinatal infections in the newborn. **Objective:** The aim is to study the prevalence of vaginal colonization of group B Streptococci and its effect on maternal, fetal outcome in antenatal women. **Methods:** A hospital based prospective observational study comprising 119 samples among the antenatal women attending the outpatient department. They were subjected to routine investigations and high vaginal swab culture and sensitivity (HVS C/S), followed up to analyse adverse outcomes among the mothers and the neonates, with positive and negative results for group B Streptococci. **Results:** 9(7.6%) women had positive for group B Streptococci (GBS) vaginal colonization and rest 110(92.4%) had negative results. A significant association with p value <0.05 was seen between the positive group B Streptococcus and the outcomes among the mothers like the raised temperature, increased total leucocyte count (TLC), increase incidence of premature rupture of membrane (PROM), puerperal infection and premature delivery. Fetal distress, neonatal asphyxia, neonatal sepsis and low birth weight are more in neonates born to these mothers. **Conclusion:** The transmission rate of GBS from the mother to the fetus was significantly high and was associated with various adverse outcomes among the neonates. Universal screening of pregnant women for GBS and risk based administration of antibiotic to mothers can prevent adverse outcome among the mothers and their newborn.

Keywords: Group B Streptococcus, fetomaternal outcome.

Group B Streptococcus or Streptococcus Agalactiae is a gram positive bacterium and is one of the primary etiologies of perinatal infections in the newborns [1]. It is present in the normal flora, mostly in the genitourinary tract, urethra and gastrointestinal tract of the female. Its colonization in the female can be intermittent or chronic [2]**.** Although its presence normally is non-alarming, its colonization in pregnant women has proven otherwise [3].

In the developed nations, the prevalence of group B Streptococcus in the pregnant women is higher as compared to the developing nations [4] and estimated to be approximately 15-40% [5]. The burden of GBS in neonates is estimated to be 0.49-0.53 per 1000 live births [6]. In India, the prevalence of group B Streptococcal infection lies between the estimated ranges of 2.3% to 5.8%. This prevalence varies as per the geography, race and ethnicity [7].

Group B Streptococcal infection has emerged as a leading cause of morbidity and mortality among the pregnant mothers as well as their neonates [8]. During the intrauterine and/or perinatal period, the group B Streptococcus can be

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transmitted to the neonate through the birth canal leading to poor outcomes in the newborns [9]. The transmission rate of these bacteria from the mother to the child is approximately between 40-73%. In the pregnant women of 35-37 weeks, the group B Streptococcus colonization can lead to infections like sepsis, pneumonia and meningitis in the new born infants. This can lead to multiple poor outcomes like low birth weight, preterm birth, stillbirths, poor cognition in newborns and neurodevelopmental disorders in the newborns[10].

In the mother, it is one of the major causes of postpartum endometritis, chorioamnionitis, post caesarean febrile illness, urinary tract infections, and rarely endocarditis [11].

To reduce the vertical transmission of the bacterial infection of GBS from the pregnant mother to the neonate or the fetus has been a priority since many decades now [12]. In the developed nations, universal screening of the pregnant mothers and intrapartum administration of antibiotics in the screened positive mothers has been proven to be effective [13]. In the developing nations however, only the pregnant mothers with risk factors leading to higher risk for the transmission of bacteria to the fetus are selectively administered the antibiotics during intra-partum period [14]. There is widespread use of intrapartum use of antibiotics to prevent the transfer of infection, however different school of thoughts have raised their concern on developing antibiotic resistance among the GBS isolates [15].

Although GBS is highly recognized as a risk factor for neonatal as well as maternal morbidity and mortality across the world, there are only a handful of studies on its prevalence and associated poor outcomes in India. Therefore, this study was planned to determine the prevalence and associated poor outcome of GBS colonization in pregnant women to fill the lacunae of information on GBS colonization in pregnant women.

Materials and methods

A hospital based prospective observational study conducted over a period of 12 months, between July 2020 and June 2021, comprising 119 samples among the antenatal women attending the outpatient department of Obstetrics and Gynaecology of our hospital. Sample size was calculated using Open Epi Version 3.03. Assuming prevalence of group B Streptococci among antenatal women to be 7.6% with allowable alpha error of 5% (95% confidence level), relative precision of 20% and loss to follow up of 10%, the sample size of 119 were required for the study and were interviewed during data collection. This study has been approved by our institutional ethics committee, with ethics committee regd. no. ECR/84/Inst/OR/2013/RR-20.

Inclusion criteria:

- Antenatal women with >24 weeks gestation who gave consent for the study.

Exclusion criteria:

- Any use of antibiotics in the 30 days preceding enrolment.
- Urinary tract infection
- Gestational Diabetes Mellitus
- Multiple pregnancies
- Chronic polyhydramnios
- Cervical incompetence
- Congenital anomalies
- Intrauterine fetal death (IUFD)

After obtaining the informed written consent in local language from patients attending OPD of O&G dept, all the participants satisfying the eligibility criteria were enrolled and interviewed in-person for the study. They had freedom to withdraw from the study at any time of the interview or examination. Detail history like age, height, weight, BMI, any past illness of diabetes mellitus or any chronic disease. Detail menstrual history was taken with LMP, cycle length, duration, regularity, flow and pain during cycle. Detail Obstetric history like gravida, parity, abortion, gestational age along with IFA, calcium, TT injection intake. Information regarding her toilet habits, appetite, and sleep was obtained. Vitals like pulse, blood pressure & temperature were recorded. They were subjected to routine investigations like haemoglobin, TLC, viral markers, high vaginal swab culture and sensitivity (HVS C/S). All were followed up. Adverse perinatal outcomes among the mothers and the neonates were analyzed in women with positive and negative results for vaginal colonization of group B Streptococci.

Data were analysed using SPSS 21.0. Continuous variables were summarized as Mean ± Standard deviation or median with inter-quartile range. Categorical variable was summarized in terms of frequency with proportions. Prevalence of GBS was expressed as proportion with 95% confidence interval. Univariate analysis was performed for effect of GBS on adverse perinatal outcome using Chi square test and unadjusted prevalence ratios with 95% CI. Multivariate regression analysis was performed to find independent risk factors and adjusted prevalence ratios with 95% CI. For all test p value< 0.05 was be considered as statistically significant.

Results

Out of 119 cases 9 (7.6%) women had positive result for vaginal colonization of group B Streptococci and 110 (92.4%) had negative results. Majority of the women, 107(89.9%) were below 25 years and 91(76.5%) had normal BMI. All 9 women positive for vaginal colonization of group B Streptococci were less than 25 years. Variables like patient's vitals, sleep, appetite, bowel bladder habits are comparable in both GBS positive and negative groups. 75 (63%) women had hemoglobin more than 12 gm%, out of which only 6(8%) had positive results for vaginal colonization of group B Streptococci. Four mothers with GBS positive in vaginal swab were detected hepatitis B (HBSAg) positive, incidentally during investigation.

Table 1: Association of GBS status and adverse effect among mothers (n=119)

Variables		Group B Streptococcus of mother		Adjusted PR (95% CI)	P value
		Positive N= 9 (7.6%)	Negative N=110 (92.4%)		
Temperature	Raised	8 (88.9%)	1 (11.1%)	0.3 (0.2-0.4)	0.00
	Normal	1 (0.9%)	109 (99.1%)		
Haemoglobin	<12	3(6.8%)	41(93.2%)	0.8 (0.2-3.5)	0.5
	>12 & above	6(8%)	69(92%)		
TLC	Raised	8 (88.9%)	1 (11.1%)	872.0 (49.7-15275)	0.00
	Normal	1(0.9%)	109(99.1%)		
Mode of delivery	C-section	9 (12.2%)	65 (87.8%)	0.01 (0.01-0.03)	0.60
	Vaginal	0 (0)	45 (100%)		
Premature Delivery	Yes	6 (40%)	9 (60%)	0.21 (0.07-0.27)	0.001
	No	3 (2.9%)	101 (97.1%)		
PROM	Present	7 (100%)	0 (0%)	56 (14.1-221.1)	0.00
	Absent	2 (1.8%)	110 (98.2%)		
Puerperal Infection	Yes	2 (100%)	0 (0%)	0.09 (0.05-0.32)	0.008
	No	7 (6.0%)	110 (94.0%)		
Postpartum hemorrhage	Present	1(100%)	0(0)	14 (7.5-28.7)	0.07
	Absent	8(6.8%)	110(93.2%)		

There is significant association of raised temperature, TLC, increased incidence of PROM, premature delivery, puerperal infection and mother positive for vaginal colonization for GBS (p value <0.05) (table 1). However, there is no significant association (p value > 0.05) on mode of delivery or incidence of postpartum hemorrhage.

There was statistically significant association of positive GBS vaginal colonization status of the mother and outcomes in neonates like fetal distress, neonatal asphyxia, neonatal sepsis and low birth weight were with (p value <0.05) (table2).

Table 2: Association of GBS status of mother and adverse effect their neonate (n=119)

Variables		Group B Streptococcus status of mother		Adjusted PR (95% CI)	P value
		Positive N= 9 (7.6%)	Negative N=110 (92.4%)		
Fetal distress	Yes	8 (100%)	0 (0)	111 (15.7-781.0)	0.00
	No	1 (0.9%)	110 (99.1%)		
Neonatal asphyxia	Yes	8 (100%)	0 (0)	0.6 (0.4-0.8)	0.00
	No	1 (0.9%)	110 (99.1%)		
Early onset neonatal sepsis	Yes	4 (100%)	0 (0%)	0.17 (0.05-0.45)	0.012
	No	5 (4.3%)	110 (95.7%)		
Birth weight	Low (< 2.5kg)	7 (100%)	0 (0)	0.15 (0.35-0.5)	0.05
	Normal (≥ 2.5 kg)	2 (1.8%)	110 (98.2%)		

Discussion

The GBS prevalence rate in our study is comparatively low (7.6%) in comparison to other studies. As per the study conducted by Santhanam et al [6] GBS is an identified cause of infection among the mother and the neonate in the perinatal period. Out of 305, eight mothers were GBS positive in 5% blood agar (2.6%) and 23 mothers showed GBS positivity in enriched media (7.6%). Sixteen of 238 babies (6.7%) were colonized. Various studies around the globe have shown different group B streptococcus prevalence rates ranging from 2.3% to as high as 60.3% [16]. Our study shows association of mother positive for vaginal colonization for GBS and raised temperature, TLC, increased incidence of PROM, premature delivery, puerperal infection with p value <0.05. Similar to study by Edwards et al[17] found that the GBS colonization rate was about 21.6%. GBS was found to be significantly associated with young maternal age, ethnicity, race, hypertension, tobacco use and diabetes. Increased incidence of chorioamnionitis, operative delivery, short cervix and wound infection was seen in screened positive pregnancies.

In our study, we measured outcomes like early onset neonatal sepsis. Neonatal asphyxia, low birth weight and fetal distress as poor outcomes of GBS among the neonates[18]. All these were found to be associated with the colonization of group B Streptococcus among the mothers [19]. A few studies focused extensively on the effects of GBS colonization among the neonates and found that GBS colonization was significantly related to adverse outcomes like early onset neonatal sepsis [20]. Study by Sridhar et al [21] the overall incidence of group B Streptococcal sepsis was 0.76/1000 live births with the incidence of early onset sepsis being 0.68 (95% confidence interval: 0.52–0.83)/1000 live births.

However, the limitations of our study, which include a small sample size, this limits our capacity to clearly conclude vaginal colonization of group B Streptococci in antenatal patient has definite adverse effect on maternal and fetal outcome. Further studies with large number of participants are needed for it.

Conclusion

The transmission rate of GBS from the mother to the fetus was significantly high and was associated with various adverse outcomes among the neonates of GBS positive mothers. The universal screening of pregnant women for GBS may be able to prove to be of high importance in countering the adverse effects of GBS colonization in the mothers and their neonates. Risk based administration of antibiotic to mothers and detailed examinations in newborn for sepsis can be another choice to prevent onset of GBS colonization among the mothers and their newborn.

Conflict of interest: None. **Disclaimer:** Nil.

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