Original Research Paper

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AN OBSERVATIONAL ANALYSIS ON THE ASSOCIATION OF GROUP B STREPTOCOCCUS COLONIZATION IN NEWBORN WITH MATERNAL GROUP B STREPTOCOCCAL VAGINAL COLONIZATION IN THE DEPARTMENT OF OBSTETRICS AND GYNAECOLOGY, SMS MEDICAL COLLEGE, JAIPUR

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ABSTRACT **Background:** Group B Streptococcus (GBS) is a Gram-positive bacterium that can cause sepsis and meningitis in newborns, often transmitted from mother to baby during childbirth. About 20-30% of women carry GBS, with 50-70% of their infants becoming colonized during delivery. GBS can lead to neonatal sepsis, pneumonia, or meningitis. Early-onset occurs during delivery, while late-onset is from environmental sources. Preventive measures include screening pregnant women for GBS and administering antibiotics during labor. This study aims to assess the incidence of umbilical GBS colonization in newborns to guide screening practices. **Methods:** This prospective observational study was conducted at SMS Medical College, Jaipur, on pregnant women attending ANC. After informed consent, women were divided into two groups: those positive (Group A) and negative (Group B) for vaginal GBS colonization. Vaginal swabs were collected at admission to the labor room and processed for GBS using the CAMP test. Newborns were swabbed from the ear, nose, throat, and umbilical region post-delivery for GBS analysis. Outcomes, including NICU care, were monitored for GBS-positive women and their neonates. **Results:** The study observed a mean maternal age of 26.76 years, with 81.5% in the 21-30 age group. The majority were Hindu (80.5%), multiparous (54.5%), and from urban areas (63.5%). GBS colonization was present in 6% of mothers and 2.5% of babies, with higher positivity in multiparous (9%) and rural mothers (11%). Preterm labor and PROM were significantly associated with GBS colonization ($p < 0.05$). NICU admissions were significantly higher in GBS-positive babies (20%) compared to GBS-negative (2.05%), indicating a link between GBS positivity and adverse neonatal outcomes. **Conclusion:** The study found a 6% prevalence of GBS colonization in term pregnant women, highlighting the need for targeted interventions to manage GBS in India.

KEYWORDS : GBS, PROM, NICU, Neonatal Outcome, Preterm Labour.

INTRODUCTION

Group B Streptococcus (GBS) is a Gram-positive bacterium that can cause sepsis and meningitis in infants. It is often transmitted from mother to baby during childbirth. Around 20-30% of healthy women carry GBS in their urogenital tract, and 50-70% of their infants may become colonized through vertical transmission during delivery.1,2 GBS is a dangerous pathogen due to its potential for vertical transmission, leading to neonatal sepsis, pneumonia, or meningitis, classified as early- or late-onset infection.2 GBS symptoms in newborns include fever, irritability, lethargy, breathing issues, and bluish skin. If symptoms appear at birth, it's early-onset GBS; if they appear after the first week to three months, it's late-onset. Both forms can lead to neurological issues like sight or hearing loss and cerebral palsy.3 In new-borns, the bacterium spreads through intrapartum transmission.4 Early-onset GBS occurs during or before delivery and late-onset GBS occurs from environmental sources or maternal mastitis.5 The umbilical cord is the first site of bacterial colonization in newborns. The disease can lead to sepsis, pneumonia, and meningitis, with meningitis being more common in late-onset GBS than early-onset GBS.6,7 In pregnant females, it may also cause amnionitis, urinary tract infection, and stillbirth.8 Prevention of early-onset GBS in newborns includes universal screening or a risk-based approach. In universal screening, all pregnant women are screened between 35-37 weeks, while the risk-based method focuses on high-risk cases. Some guidelines recommend universal screening, but limited resources in low-income countries make this difficult. Women who test positive receive antibiotics during labour to prevent transmission.3,4 This study aims to determine the incidence of umbilical GBS colonization in neonates. Understanding prevalence will guide clinicians on whether to screen for anogenital GBS in pregnant women and help identify high-risk cases, potentially reducing neonatal sepsis from GBS.

METHODS

A prospective hospital based observational study titled “An Observational Analysis on The Association of Group B Streptococcus Colonization in Newborn with Maternal Group B Streptococcal Vaginal Colonization” was conducted on pregnant women attending ANC at the Department of Obstetrics and Gynaecology, SMS Medical College, Jaipur. Women fulfilling the inclusion criteria were explained the purpose of the study, and were included in the study after taking a written informed consent. Women were divided into two groups on the basis of sampling procedure i.e., Group 'A' Women who test positive for vaginal colonization with Group B Streptococcus and Group 'B' Women who test negative for vaginal colonization with Group B Streptococcus. At admission to the Labour Room, vaginal swabs were collected from pregnant women with labour pain, preterm labour, or premature rupture of membranes, following specific criteria. After informed consent and counselling, the principal investigator, assisted by a research assistant and in the presence of a female nurse, collected swabs from the lower vagina and placed them in Amies transport medium. The swabs were then inoculated in Todd-Hewitt broth with nalidixic acid and gentamicin to identify Group B Streptococci using the CAMP test. Patients testing positive were monitored throughout the perinatal period to assess outcomes, including whether their neonates required NICU care. Additionally, four swabs were collected from each newborn's external ear, nose, throat, and umbilical region immediately after birth and transported in Todd-Hewitt broth for analysis.

STATISTICALANALYSIS

Continuous data was summarized in form of mean and standard deviation. Difference in mean of the two groups was analysed using Student's T Test. Count data was expressed in terms of proportions, difference in proportions was analysed using Chi Square Test. The level of significance was kept at 95% for all statistical analysis.

RESULTS

The mean age of cases was 26.76 years with majority of cases (81.5%) were in age group 21-30 years followed by 14.5% were in age group ≥31 years. There were 80.5% were Hindu followed by 18.5% were Muslims and only 1%were Sikh women. There were 54.5% were multiparous followed by 45.5% were primiparous. There were majority (37%) were belonged from class-IV followed by 35% belongs to class-III, 18% belongs to class-V and 10% belong to class-II. There were majority (63.5%) were belonged to urban area and 36.5% belong to rural area. 92.5% deliveries were term at labour onset while 7.5% were preterm cases at labour onset.

Table 1: GBS positivity rates among primiparous versus multiparous mothers

Parity	GBS Positive	GBS Negative	%Positivity
Multiparous	9	100	9%
Primiparous	3	88	3.4%
Total	12	188	6.3%

9% multiparous mothers were GBS swab positive whereas 3.4% primiparous mothers were GBS positive. Therefore, positivity rates were higher in multiparous mothers. Statistically, p value is found to be 0.24 which is not significant at p <0.05.

Table 2: GBS positivity rates among Upper and Middle Socioeconomic group versus Lower Socioeconomic Group

Socioeconomic Status	GBS Positive	GBS Negative	Total
SES II & III	3	87	90
SES IV & V	9	101	110
Total	12	188	200

The swab positivity rate was found to be higher among the lower socioeconomic status, but the difference was not statistically significant. P value 0.25, not significant at p <0.05.

Table 3: GBS positivity rates according to residence

Socioeconomic Status	GBS Positive	GBS Negative	Total	Percentage
Rural	9	67	76	11%
Urban	3	121	124	2.4%
Total	12	188	200	

GBS Positivity was found to be higher in the Rural mothers, at positivity rate of 11% vs 2.4% among Urban mothers. The difference was found to be statistically significant, with a P value of 0.015.

Table 4: Comparison of preterm labour onset between GBS Positive versus GBS Negative mothers

Labour Onset	GBS Positive	GBS Negative
Preterm	4	11
Term	8	177
Percentage of Preterm Labour	33%	5.8%

The cases of preterm labour were found to be significantly higher in the colonized mothers in comparison to the mothers who were not colonized by GBS. The difference was statistically significant with p-value 0.0033. Significant at p < 0.05.

Table 5: Association of PROM with GBS Positive vs GBS Negative mothers

PROM	GBS Positive	GBS Negative	Total
Present	7	12	19
Absent	5	176	181
Percentage	58.3%	6.3%	200

Cases of PROM was much higher in GBS positive women as compared to GBS negative women. The difference was statistically significant at P value 0.00001, significant at p <0.05.

The mean weight of the babies was 2728 gm with majority of babies (68.5%) were normal in weight followed by 31.5% were low birth weight. 72% cases had normal delivery followed by 28% were caesarean delivery.

Table 6: Association between Incidence of Low Birth Weight Babies in GBS Positive versus GBS Negative mothers

PROM	GBS Positive	GBS Negative	Total
Weight <2.5 Kg	4	59	63
Weight >2.5 Kg	8	129	137
Percentage	33.3%	31.3%	200

The incidence of Low Birth Weight babies is almost comparable in both GBS positive and GBS negative mothers. The difference was not statistically significant with P value 0.032 (significant at p <0.05)

Table 7: Distribution according to Group B Streptococcus colonization in mother and babies.

Report of GBS Swab	N	%
Mother		
GBS Positive	12	6%
GBS Negative	188	94%
Baby		
GBS Positive	5	2.5%
GBS Negative	195	97.5%

Group B Streptococcus colonization was present in 6% mothers and in 2.5% babies in the entire sample population.

Table 8: Association of GBS Positive and GBS Negative babies with Mode of Delivery

GBS Report of Baby	GBS Positive	GBS Negative	Total
Positive	5	0	5
Negetive	139	56	195

100% GBS Positive babies were delivered vaginally, therefore vaginal delivery in GBS positive mothers can be a significant risk factor for transmission into the infant.

Table 9: Association between post-partum complications and Group B Streptococcus colonization in mothers

Post-partum complications	Report of GBS swab for baby			
	Positive (n=12)		Negative (n=188)	
	N	%	N	%
Fever	0	0	2	1.06%
UTI	1	8.3%	4	2.13%
Foul smelling Lochia	0	0	0	0

Out of 12 cases having Group B Streptococcus colonization only 1 case had urinary tract infection. Comparison of UTI cases between the two groups showed no significant difference. P value 0.7 (Not significant at p<0.05).

Table 10: Association between NICU Admissions and Group B Streptococcus colonization in baby

NICU Admissions	Report of GBS swab for baby			
	Positive (n=5)		Negative (n=195)	
	N	%	N	%
Yes	1	20%	4	2.05%
No	4	80%	191	97.95%
Total	5	100%	195	100%

Out of 5 babies having Group B Streptococcus colonization 2 babies required NICU admission I.e., 20% of the GBS Positive babies needed NICU admission while only 2.05% of the GBS Negative babies required NICU admission. This shows the results to be significant, thus, swab positivity in the babies is associated with much higher rates of NICU admissions. The p-value is < 0.0111. Significant at p <0.05.

Table 11: Association between PROM and Group B Streptococcus colonization in baby

PROM	Report of GBS swab for baby			
	Positive (n=5)		Negative (n=195)	
	N	%	N	%
Yes	3	60%	16	8.21%
No	2	40%	179	91.79%
Total	5	100%	195	100%

Out of 5 babies having Group B Streptococcus colonization 3 cases were PROM. Thus, it can be inferred that mothers who had PROM gave birth to babies with higher rates of GBS Positivity. PROM can therefore be considered as a significant risk factor for GBS positivity in the baby. The p-value is .001761. Significant at p < 0.05.

Table 12: Association between Birth Weight of baby and Group B Streptococcus colonization in baby

Weight of Baby (gm)	Report of GBS swab for baby			
	Positive (n=5)		Negative (n=195)	
	N	%	N	%
Normal (2500-4000 gm)	3	60%	134	68.72%
Low Birth Weight (1500-2500 gm)	2	40%	61	31.28%
Very Low Birth Weight (<1500 gm)	0	0%	0	0%

Out of 5 babies having Group B Streptococcus colonization at birth, 3 babies had normal birth weight and 2 babies were low birth weight. The p-value is 0.941706, thus, statistically not significant at p < 0.05.

DISCUSSION

Group B streptococci (GBS) primarily cause serious neonatal infections like meningitis and sepsis. While developed countries have standardized antenatal screening and prevention (Debbarman et al)[9], India's approach is inconsistent, with limited data on GBS prevalence in pregnant women and neonates.

In our study, the mean age of patients was 26.76 years, with 81.5% in the 21–30 age group and 14.5% aged 31 or older. Musleh and Al Qahtani[10] reported a mean age of 29.6 years, while Namugongo et al[8] noted that 40% of participants were aged 21–25. Debbarman et al[9] found a mean age of 20.6 years, with 74.4% aged 21–30. Ge et al[11] reported the highest prevalence in the 25–29 age group, possibly due to factors like sexual activity, history of induced abortion, and higher estrogen levels during pregnancy causing genital tract bacterial changes.

In our study, 54.5% were multiparous and 45.5% primiparous. Musleh and Al Qahtani[10] found 108 primigravida and 349 multigravida women. While Khatoon et al[12] reported increased GBS colonization with higher parity, Dechen TC et al[13] found no such link. Namugongo et al[8] reported 72.8% had multiple pregnancies.

The majority of patients (63.5%) were from urban areas, while 36.5% were from rural areas, consistent with Namugongo et al's[8] findings of 68% urban and 32% rural patients. In this study, 9% of multiparous mothers were GBS positive compared to 3.4% of primiparous mothers, indicating higher positivity rates in multiparous mothers, though the difference was not statistically significant.

In this study, 92.5% of cases were term at labor onset and 7.5% were preterm. Normal delivery occurred in 72% of cases, while 28% had caesarean delivery. Musleh and Al Qahtani[10] reported gestational ages ranging from 25 to 42 weeks, while Saha et al[14] noted an average of 34.6 weeks. Debbarman et al[9] found that 68.8% of patients were at 38-39 weeks, with 55.6% undergoing caesarean section compared to 44.6% having vaginal delivery.

In this study, 50.5% of infants were male, and 49.5% were female, with a mean birth weight of 2728 gm. Most babies (68.5%) had normal weight, while 31.5% were low birth weight. No significant difference in birth weight was found between Group B Streptococcus positive and negative mothers. Debbarman et al[9] reported 1% low birth weight and 3% preterm deliveries.

In this study, 33% of GBS-positive mothers had preterm labor, compared to 5.8% of GBS-negative mothers, showing a significant association between GBS positivity and preterm labor. Helen Mc Donald et al[15] reported similar findings, with 18.7% of GBS-positive women experiencing preterm labor compared to 5.5% of GBS-negative women, consistent with our results.

In this study, GBS colonization was found in 6% of mothers and 2.5% of babies. Saha et al[14] reported GBS in 17% of mothers and 7% of babies, while Musleh and Al Qahtani[10] found 19% of mothers positive for GBS. Khatoon et al[12] observed GBS colonization in 33.33% of vaginal, rectal, and both vaginal/rectal swabs. Takahashi et al[16] noted a 4.2% GBS positivity rate in umbilical swabs, with a 4.8% transmission rate from GBS-positive mothers. Toyofuku et al[17] reported 3.7% GBS colonization in Japanese infants. Chan et al[18] found GBS in 37.2% of mothers, with U.S. studies estimating a 28% prevalence. Chaudhary et al[19] and Mani et al[20] noted 6-9% prevalence.

In our study, 2.5% had urinary tract infection and only 1% had fever. 96.5% had no post-partum complications.

In our study, of the 5 babies with GBS colonization, 2 were admitted to the NICU, 3 had PROM, and 1 was preterm. Debbarman et al[9] reported that 42.8% of preterm deliveries were associated with GBS, compared to 7.82% without. In our study, among the 5 GBS-positive cases, 3 babies had normal weight and 2 were low birth weight. Debbarman et al[9] found that 100% of low-birth-weight neonates were associated with GBS, while 7.69% of low-birth-weight cases were not.

CONCLUSION

Epidemiological spectrum of Group B Streptococcus is underestimated in India; hence, the present study was undertaken to determine the prevalence, risk factors and neonatal outcome associated with colonization by GBS in pregnant women. Prevalence of colonization of GBS was found to be 6 % in the pregnant women after term gestational age. Such data could guide interventions to control the prevalence of GBS.

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