

Original Research Article

Maternal vaginal flora during labor and its effect on gestational age and birthweight of neonates

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ABSTRACT

Background: Identification of the abnormal colonization of the genital tract by a culture based approach has been recommended by the CDC 2000. This will definitely aid in the early recognition of mothers who need to be effectively treated which in turn will prevent newborn infections. Objectives were to study the pattern of maternal vaginal flora in labor and to study the outcome in the neonate.

Methods: This study was conducted on 250 mothers in labor and their babies followed up till discharge in the departments of OBG and neonatology in a tertiary care medical college hospital, Deliveries by caesarean section were excluded.

Results: Of the 250 babies, 70 were small for gestational age (SGA) and of these 60 (85.71%) were born to colonized mothers; whereas among the appropriate for gestation (AGA) babies, 110 (61.11%) were those born to non-colonised mothers. A statistically significant association was found between SGA babies and maternal colonization. Whereas relation between maternal colonization and gestational age did not show a statistically significant difference.

Conclusions: This study shows us that maternal vaginal colonisation in labor significantly impacted the baby's weight with increase in small for gestational age babies being more among the colonised mothers. Hence, finding the organism in the maternal vaginal flora and treating it as per sensitivity might result in lesser incidence of SGA babies.

Keywords: Gestational age, Maternal vaginal flora, SGA babies, Vaginal colonization

INTRODUCTION

Abnormal bacterial colonization of the rectum and anus during pregnancy may create an abnormal vaginal and cervical microbial environment. Studies in the West have revealed Group B Streptococcus (GBS) causing infection among 1-2/1000 live births with mortality rates up to 20% in affected neonates due to preterm labor, sepsis, respiratory distress and meningitis or sometimes benign asymptomatic colonization.¹

Identification of the abnormal colonization of the genital tract by a culture based approach has been recommended by the CDC 2000. This will definitely aid in the early

recognition of mothers who need to be effectively treated which in turn will prevent newborn infections.² Furthermore, a baseline knowledge of empirical antibiotic therapy in clinically suspected sepsis of early onset can be standardized and established in our situation. In the long run reduction in neonatal mortality and morbidity can be achieved. Objectives were to study the pattern of maternal vaginal flora in labor and to study the outcome in the neonate.

METHODS

This study was conducted on all mothers in labor and their newborns followed up till discharge in the

departments of OBG and Neonatology in a tertiary care medical college hospital.

The study was a cross sectional study conducted between September 2007 to August 2008.

The aims and objectives of the study were explained to the mothers and the study was conducted after obtaining their consent. Deliveries by caesarean section were excluded

All mothers in labor were interviewed and detailed history taken regarding age, parity, socioeconomic status, antenatal problems as mentioned in the proforma. High vaginal swab was taken without local cleaning using Gusco's speculum from the posterior fornix as per CDC recommendations.

The swab was then immediately transported to the microbiology lab and swabs were cultured using standard culture methods. The swabs were inoculated onto Blood agar, Chocolate agar, Mc Conkey's agar and Thioglycolate medium and incubated and results evaluated at the end of 48-72 hrs with the help of a qualified microbiologist. Group B Streptococcus was looked for by watching for lysis on blood agar.

The babies of these mothers were evaluated twice daily with regard to temperature, skin colour, feeding, activity and those babies with suspected sepsis were identified. These babies were then subjected to Blood culture which is the gold standard for neonatal sepsis and other tests as the need demanded. These babies were given an empirical treatment with I.V antibiotics Ampicillin and Amikacin, the duration of which was determined by the culture reports. All the babies completed treatment successfully and were discharged in a healthy condition.

The effect of various maternal parameters on vaginal colonization and the effect of maternal colonization on various neonatal parameters were studied.

Statistical analysis

Data analysis was done using Microsoft XL and Epi Info. Chi square test was used to assess the significance and 'p value' of <0.05 was considered to be significant.

RESULTS

250 mothers and their newborns were studied, out of which 130(52%) of them showed colonization and remaining 120(48%) did not show any colonization.

Out of 130, 84.6% of them showed colonization of single organism remaining 15.4% showed mixed growth.

Total number of organisms identified were 150. Individual organisms and their distribution is show in Table 1.

Table 1: Distribution of various organisms.

Name of the organisms	Total number n=150	Percent
Coagulase negative <i>Staphylococcus</i>	30	20
<i>E. coli</i>	20	13.3
<i>Klebsiella</i>	20	13.3
Non-albicans Candida	20	13.3
<i>Candida albicans</i>	20	13.3
<i>Staphylococcus aureus</i>	11	7.33
<i>Enterococcus</i>	10	6.66
<i>Pseudomonas</i>	10	6.66
Non-fermenting GNB	9	6

Table 2: Relation between age and vaginal colonization.

Age	Growth	No growth	Total n=250
<20 yrs	10 (100%)	0	10
20-30 yrs	100 (52.63%)	90 (47.37%)	190
>30 yrs	20 (40%)	30 (60%)	50

Table 2 shows the effect of age on vaginal colonization. Of the 250 mothers 10 were below 20 years and all of them (100%) were found to have vaginal colonization with a statistically significant ($p<0.05$) decrease in colonization with increasing age.

Table 3: Relation between parity and vaginal colonization.

Parity	Growth	No growth	Total n=250
Primi	110 (64.7%)	60 (35.3%)	170
Non-primi	20 (25%)	60 (75%)	80

Table 3 shows the relation between parity and vaginal colonization. Out of the 250 mothers in labor, 170 were primigravida with 110 (64.7%) of them having vaginal colonization, whereas among the non-primi mothers 25% showed colonization. This study showed a statistically significant ($p<0.05$) association between primi mothers and vaginal colonization.

Table 4: Relation between socio-economic status and vaginal colonization.

Socioeconomic class	Growth	No growth	Total n=250
Upper	70 (70%)	30 (30%)	100
Middle	30 (33.33%)	60 (66.67%)	90
Lower	30 (50%)	30 (50%)	60

Table 4 shows that most of the mothers in this study were of the upper class and 70% of them had colonization followed by middle and lower class mothers and this

association was found to be statistically significant ($p < 0.05$).

Table 5: Relation between maternal colonization and gestational age.

	Term	Preterm	Total n=250
Growth	120 (92.3%)	10 (7.7%)	130
No growth	110 (91.67%)	10 (8.33%)	120

Table 5 shows the relation between maternal colonization and gestational age. In this study, of the 130 mothers with vaginal colonization 120 (92.3%) had term deliveries and only 7.7% had preterm deliveries which did not show a statistically significant difference when compared to the rates in non-colonised mothers.

Table 6: Relation between birth weight and maternal colonization.

	Growth	No growth	Total N=250
SGA	60 (85.71%)	10 (14.29%)	70
AGA	70 (38.89%)	110 (61.11%)	180

SGA: small for gestation age, AGA: appropriate for gestation age

Table 6 shows the relation between birth weight and maternal vaginal colonization. Of the 250 babies, 70 were small for gestational age and of these 60 (85.71%) were born to colonized mothers; whereas among the AGA babies, 110 (61.11%) were those born to non-colonised mothers. A statistically significant ($p < 0.05$) association was found between SGA babies and maternal colonization.

DISCUSSION

The present study conducted in 250 pregnant women and their newborns conforms to previous studies in some aspects and points to some interesting observations contrary to previous studies in others.

The present study yielded Coagulase Negative Staphylococcus (CoNS) in 20% of the cases, followed by *Escherichia coli*, *Klebsiella*, and *Candida spp.* In 13.3% of the cases. This is comparable to the Hall et al study which also grew CoNS as the predominant colonizer.³ No Group B Streptococcus (GBS) was found in the present study. This is comparable to other Indian studies like Ayengar V et al, Ahmedabad which also did not yield GBS as the incidence of GBS colonization in India is quite low (19%) Barbara S et al.^{4,5}

Relation between age and vaginal colonization

Table 2 shows that 100% of mothers <20 years had colonization, whereas, it was 52.63% in 20-30 years and 40% in >30 years, showing a statistically significant

decreasing trend of colonization with increasing maternal age. This is comparable to the observations of Singh M et al which names maternal age of <20 years as one of the predisposing factors for vaginal colonization.⁶

The possible explanations could be either decreased local resistance due to thin vaginal epithelium or a relatively higher pH; predisposing to colonization.

Relation between parity and vaginal colonization

From Table 3, vaginal colonization seems to be more in primipara (64.7%) which conforms to the study by Singh M et al wherein primipara are said to be at an increased risk of colonization.⁶

Relation between socio-economic status and vaginal colonization

The present study showed statistically significant colonization in upper class mothers (70%), followed by lower class mothers (50%). Middle class mothers (33.33%) were least affected. This is comparable to the study by Tsolia et al.⁷

This shows that the risk of colonization increases in the extremes of socioeconomic strata. The high incidence in upper classes is hypothesized to be possibly due to douching which could increase colonization by destroying the normal protective flora. Lower classes are predisposed due to poor local hygiene which has been identified as a risk factor in the Singh M et al study.⁶

Effect of maternal colonization on the babies

Relation between colonization and gestational age

The present study showed that 92.3% of the colonized mothers had term deliveries, contrary to other studies which showed an increased incidence of prematurity with colonization.⁸ The reason for this could be the exclusion of deliveries by caesarean section which may have been affected by silent ascending infection, or the absence of chorioamnionitis which is more likely to predispose to preterm labor.⁹

Relation between birth weight and maternal colonization

Table 6 showed that of the 70 small for gestational age babies, 60 (85.71%) were born to colonized mothers, whereas 61.11% of appropriate for gestational age babies were born to non-colonised mothers showing that the proportion of SGA babies among colonized mothers were higher than among non-colonised mothers. This is comparable to the study by Marijane A et al, Joachim A et al and McDonald et al.¹⁰⁻¹²

There are a number of parallels between maternal genital colonization with group B streptococcus and with *E. coli*. Both bacteria probably colonize the vagina from a rectal

source and do not usually cause an infection of the vaginal epithelium. These two bacteria are of interest and concern because of their vertical transmission to the neonate and their role in neonatal sepsis, meningitis, and death.¹⁰

CONCLUSION

250 mothers in labor were evaluated, Maternal vaginal colonization was found in 130 (52%) of the 250 mothers. Predominant colonizers are CoNS (20%), followed by *E. coli*, *Klebsiella* and *Candida spp.* in 13.3%. Primi parity increases the presence of vaginal colonization. The incidence of vaginal colonization was 70%, 50% and 33.33% in upper, lower and middle socioeconomic class mothers. Maternal vaginal colonization did not significantly lead to prematurity in the newborn. Of the SGA babies, 85% were born to colonized mothers.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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