Original Research Article

Comparative study of microflora between birth canal and new born oral cavity

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Abstract

Background: New-born acquires mother's microbiome from the birth canal during the delivery process and these bacteria then colonize in the gut. Studying the oral microbiome of infants offer a good perspective for us to understand the gut microbiome disruption caused by C-section. A previous study of three-month-old infants reported a higher amount of bacterial taxa of the oral microbiota in vaginally delivered infants than the ones with another birth mode.
Aim: Comparison of microflora between the birth canal and the oral cavity of a newborn in Caesarean delivery.
Materials and methods: 30 pregnant women selected for the study. Parturient canal samples obtained prior to delivery and infant's oral cavity oral samples obtained immediately after birth. Samples transported to the lab for microbiological assays and data tabulated and statistically analyzed using Chi-Square Test.
Results: E.coli was observed in 21.1% (N=7) in the vaginal swab whereas its occurrence in buccal smear was 10.3% (N=3). The chi-square test of independence was statistically insignificant ($p > 0.05$). The staphylococcus was observed in 44.8 (N= 13) of vaginal swab and 37.9% (N=11) of buccal smear and again the difference was statistically insignificant. The presence of pus cells was 31% (N=9) in vaginal swab and 10.3% (N=3) in the buccal smear.
Conclusion: A significant number of mother-child pairs showed the presence of Staphylococcus aureus, Klebsiella, and E.coli. However, Klebsiella and pus cells were occasionally found.

Key words

E.Coli, Vaginal Swab, Pus Cells, Staphylococcus.

Introduction

Bacteria constitute the normal microflora and populate the mucosal surfaces of the oral cavity, urogenital tract, and the skin surface. Microflora of vagina varies during different phases of a woman's life: strikingly different in an individual woman during the fertile age [1]. The normal or physiologic pattern in birth canal dominated by facultative lactobacilli. The other major pattern synonymous with a clinical entity known as bacterial vaginitis [2]. New born acquires mother's microbiome from the birth canal during the delivery process and these bacteria then colonize in the gut [3]. Studying the oral microbiome of infants offer a good perspective for us to understand the gut microbiome disruption caused by C-section. A previous study of three-month-old infants reported a higher amount of bacterial taxa of the oral microbiota in vaginally delivered infants than the ones with other birth modes [4]. Pacifier use and other feeding modes may also affect infant's oral microbiota composition. Therefore, the timing of the sample collection is critical [5]. In this study, we collected the samples immediately after birth, and we compared the differences in colonization patterns of the oral microbiota between the infants born via different delivery modes to study the possible factors that may affect the infant's oral microflora [6]. It has been identified that the delivery mode is a significant factor influence the colonization and composition of the intestinal microbiota. Compared with the infants delivered by vaginal delivery, those by cesarean section (C-section) have less diverse intestinal microbiome and are more likely to develop diseases such as asthma, obesity, and diabetes. Nevertheless, it has been reported that some vaginally delivered infants lack Bifidobacteria in their guts, suggesting that other factors may also interfere with the intestinal microbiota [7].

Materials and methods

The Study was conducted in the obstetrics and gynecology department of RMMCH Annamalai university after obtaining ethical clearance. This was a descriptive study in which new born's oral cavity was observed for microorganism transfer from pregnant women via cesarean delivery. The present study involved 30 healthy pregnant women with no history of antibiotic usage. Parturient canal sample obtained from 30 pregnant term subjects with intact membranes by sterile cotton swab. Oral cavity of newborn obtained immediately the following birth with a sterile swab. Both swab stored on ice and transported to the microbiological laboratory for analysis.

Results

E.coli was observed in 21.1% (N=7) in the vaginal swab whereas its occurrence in buccal smear was 10.3% (N=3). The chi-square test of independence is statistically insignificant ($p > 0.05$). Therefore the presence of E.coli does not differ significantly in the vaginal swab and buccal smear. The staphylococcus was observed in 44.8 (N= 13) of vaginal swab and 37.9% (N=11) of buccal smear and again the difference is statistically insignificant. The presence of pus cells was 31% (N=9) in vaginal swab and 10.3% (N=3) in the buccal smear. The difference was statistically significant ($p<0.05$) and hence pus cell findings is significantly different between the vaginal swab and buccal smear examinations. Klebsiella growth was 6.9% (N=2) in vaginal swab and nil in the buccal smear. The difference was statistically insignificant (**Table – 1**).

The overall growth in vaginal swab was 75.9% (N=22) and it was 51.7% (N=15) in the buccal smear. The chi-square test of independence was statistically insignificant ($p>0.05$) and hence the growth occurrence rate was not statistically differed between vaginal and buccal smear (**Table – 2**).

Discussions

Staphylococcus aureus, E.coli, candida, enterococci, found in high concentration in the birth canal in this study [8]. In this study, the oral cavity was sterile of 50% newborn. This difference could be because of the maintenance of a sterile operation theatre [9]. Sterilization

methods employed in the operation theatre, surgical instruments and equipment could also be considered. Staphylococcus aureus, Staphylococcus epidermidis, Klebsiella, Escherichia coli, Candida species, enterococci, and Pseudomonas were found in relatively high concentrations in the birth canal when compared with the oral cavity of the neonates [10]. Lactobacilli, diphtheroids, and Bacteroides species were found in greater numbers in the mother's birth canal when compared with the infant's mouth [11]. This could be because the microorganisms residing in the birth canal and their transfer to the oral cavity were eliminated [12]. A possible reason is that delivery by cesarean section could have eliminated the acquisition of the microbiota through the birth canal, as the birth is via the abdominal route. Lactobacilli were not present in the oral cavity of the newborns at birth, born by this type of delivery. Similar findings were also reported by Mandara, et al. [13].

Table – 1: Comparison of microflora between vaginal swab and buccal smear in caesarean delivery.

Microorganism	Vaginal Swab		Buccal Smear		The difference in the transfer of microorganisms		P value
	N	%	N	%	N	%	
E.coli	7	24.1	3	10.3	4	13.8	0.164 (NS)
Staphylococcus	13	44.8	11	37.9	2	6.9	0.594(NS)
Pus cells	9	31	3	10.3	6	20.7	0.048(S)
Klebsiella	2	6.9	-	-	-	-	0.150(NS)

Table – 2: Growth comparison between vaginal and buccal smear.

Overall growth	Vaginal Swab		Buccal smear		Difference		P value
	N	%	N	%	N	%	
Presence	22	75.9	15	51.7	7	24.2	0.056(NS)

Conclusion

In our study babies colonized more with staph aureus didn't necessarily from the mother's birth canal since birth via the abdominal route. Otherwise, these c section babies could have picked their bacteria either from skin contact or from the hospital environment. Babies born via Elective C-section could have acquired the infection through skin contact, hospital equipment. Microbes transfer from the birth canal to the oral cavity of a newborn can occur in emergency C-section which is done after a failed induction, non-progress of labor due to repeated pelvic examinations. maintaining sterility of theatre, surgical equipment, personal hygiene can decrease neonatal infection and neonatal sepsis.

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