

STUDY OF INTESTINAL COLONISATION PATTERN IN VLBW INFANTS IN THE FIRST WEEK OF LIFESwarupa Panda¹, Arakhita Swain*² and Dr. Saiprasanna Behera³¹Associate Prof., Dept. of Paediatrics, SLN MCH, Koraput.²Professor & HOD, Dept. of Paediatrics, SLN MCH, Koraput.³Research Associate, Dept. of Pediatrics, SLN MCH, Koraput.**Corresponding Author: Arakhita Swain**

Associate Prof., Dept. of Paediatrics, SLN MCH, Koraput.

Article Received on 24/07/2018

Article Revised on 14/08/2018

Article Accepted on 04/09/2018

ABSTRACT

Background: Very low birth weight (VLBW) preterm infants have different colonization pattern in comparison to the healthy, breast-fed, term infants. There is a paucity of reports on intestinal colonization pattern of VLBW preterm infants. This study was conducted to establish the understanding of any aberrant colonization pattern in VLBW infants. **Aim:** To study intestinal colonization patterns in VLBW infants in the first week of life, admitted to SNCU. **Participants:** All newborn newborns with birth weight less than 1500 grams admitted to SNCU of SLN MCH, Koraput within 8 hrs of birth. **Setting:** SNCU of a tertiary care hospital of Eastern India. **Method:** Meconium specimens / Rectal Swab were obtained on days 1, 3, 5, 7 from 76 VLBW infants admitted in SNCU of a tertiary care hospital. **Results:** On day 1, 45% had sterile guts, and by day 3 all infants were colonized. E.Coli, Klebsiella pneumoniae and Enterococcus faecalis were prominent organisms encountered. Lactobacilli was found in 2 cases and Bifidobacterium was not detected during the study period. E.Coli colonization has an association with formula feeding. **Conclusion:** VLBW infants admitted in SNCU had abnormal / different colonization pattern.

KEYWORDS: Intestine, Colonization, Neonate, Very Low Birth Weight.**INTRODUCTION**

Very Low Birth Weight (VLBW) preterm infants admitted in SNCU do not follow the normal pattern of colonization followed by healthy, breast-fed, term infants.^[1-3] New laboratory techniques have enabled a more detailed understanding of the aberrant colonization pattern in preterm infants.^[4-6] There is a paucity of reports on intestinal cases in SNCU and NICU's in developing countries. The type of environmental flora, bacterial load and antibiotic usage being different in these countries, so the colonization patterns is expected to differ from that of developed countries.

AIM

The aim is to study the intestinal colonization patterns in VLBW infants admitted to SNCU in their first 7 days of life and know how the pattern differs from that of term healthy breast-feeding newborns.

MATERIAL METHODS

The present study was conducted in SNCU of SLNMCH, Koraput, in one year period extending from March 2017 to March 2018.

Inclusion Criteria: All consecutive newborn infants with birth weight less than 1500 grams, admitted to SNCU within 8 hours of birth.

Exclusion Criteria

- Any newborn with gastro-intestinal malformation.
- Any newborn with major malformation that might limit life expectancy to less than 7days.
- Any newborn with a anticipated SNCU stay for less than 7 days.
- Death before 7 days.

Meconium specimens were obtained for culture on day 1 (24±2hrs), day 3 (72±2hrs), day 5 (120±2hrs) and day 7 (168±2hrs) after birth. The meconium sample or the rectal swab sample in case of non-passage of stool of approx 1 gm was taken in sterile cotton swab and transported in screw capped sterile container with Cany-Blair Medium to the microbiology laboratory and processed immediately. For aerobic culture the sample was plated on McConkey agar and blood agar. For anaerobic culture it was plated on blood agar and de Mon Rogosa Sharpe (MRS) agar for lactobacillus and incubated under anaerobic conditions. The lab identified species using conventional tests. Other data collected included maternal and neonatal demographic details,

mode of delivery, risk factors for sepsis, intrapartum use of antibiotics, postnatal antibiotics, details of feeding and

steel pattern and chance of necrotizing enterocolitis.

RESULTS

Table I: Organisms isolated from stool in 1st week of life.

Organism	Day 1	Day 3	Day 5	Day 7
Echerichia Coli	12	50	52	54
Websiella pneumonia	18	46	28	32
Acinetobacter	4	8	8	4
Pseudomonas aeruginoss	0	2	0	0
Proteus vulganis	0	2	2	2
Gr-ve Bacteria	2	0	0	0
Enterococcus fecalis	14	28	18	2
Staphylococcus aureus	6	8	12	8
Coagulase-ve Staph	0	0	0	2
Liptheroids	0	2	2	8
Laetobacillus	0	0	0	2

We enrolled 76 neonates (52 male, 24 females) and followed them till 7 days in SNCU. The mean / SD birth wt was 1120 grams and range (750-1400 grams), gestational age in weeks were 32 wks (28-34 wks) and median 5 minutes Apgar Score was 8 (range 6-9). Thirtyfour (45%) participants were small for gestational age; 30 (37%) were delivered by LSCS; 18 (24%) after prolonged rupture of membrane (>18 hrs) and 14 after preterm onset of labour. All mothers had intrapartum antibiotics and 46 (60.5%) neonates receive antibiotics within first 7 days. Intrapartum antibiotics include ampicillin alone in 30 (39.5%) Cefforioxane to 42 (55.3%) and combination of Cefforioxone and metronidazole to 2 mothers.

Thirty-four neonates (45%) had sterile meconium on day – 1 of life. No subjects had sterile stool / rectal swab cultures on days 3 & 5 of life. One culture was sterile on day 7 of life.

In Day 1 of life, 34.2% and 21% neonates were colonized with 1 & 2 bacterial species respectively. On Day 3 of life 37%, 32%, 29% and 3% were colonized with 1, 2, 3 and 4 bacterial species.

On Day 5, 45%, 50% and 5% were colonized with 1, 2 & 3 bacterial species respectively.

On Day 7, 55%, 32% and 11% were colonized with 1, 2, 3 species respectively. In the entire study Lactobacilli was found only in 2 isolates. E.Coli was the major colonizer.

Enteral feeding was started in 48 (63.2%), 60 (78.9%), 64 (84.2%) and 66 (86.8%) neonates by day 1, 3, 5 & 7 respectively. Although expressed breast milk was preferred but some used preterm formula where it was unavailable or insufficient. Most of the formula feed neonates showed E.Coli Colonisation.

There was no significant association between antibiotics use and colonization by E.Coli and Klebsiella 6 infants developed NEC & none of them were colonized by lactobacilli.

DISCUSSION

The study shows that the gut colonization of VLBW infants is different from normal term infants. E.Coli was the largest colonizer followed by Klebsiella and Enterococcus. Predominance of pathogenic bacteria and paucity of organisms characterize the pattern.

The paucity of organisms could be due to short study period i.e. 7 days and administration of antibiotics to almost 2/3rd neonates. A lower intestinal biodiversity in preterm infants was reported in earlier studies.^[7-10] The lac of normal flora predisposes to overgrowth of pathogenic species, more so under pressure of antibiotics gut immunity is hampered.^[11,12] Colonization of Lactobacilli and Bifidobacterium increases after the 1st week. Use of formula milk and antibiotics in preterm infant also leads to smaller no.of Lactobacilli.^[14,15]

LIMITATION

Limitation of study was:

- Strain of bacterial species could not be identified.
- Colony count could be not done.
- The resistance pattern of organism could not be done.
- Study period was too short.
- The absence of control group of healthy breast fed healthy term infants in SNCU set up precludes comparison.

CONCLUSION

The main outcome of the study was that in preterm VLBW infants in SNCU set up the gut and colonized with potentially pathogenic organisms and also there is oligocolonisation.

REFERENCES

1. Gewolb IH, Schwalbe RS, Taciak VL, Harrison TS, Panigrahi P. Stool microflora in extremely low birthweight infants. *Arch Dis Child Fetal Neonatal Ed*, 1999; 80: F167-173.
2. Sakata H, Yoshioka H, Fujita K. Development of the intestinal flora in very low birth weight infants compared to normal full-term newborns. *Eur J Pediatr*, 1985; 144: 186-90.
3. Westerbeek EA, van den BA, Lefeber HN, Knol J, Fetter WP, van Elburg RM. The intestinal bacterial colonization in preterm infants: a review of the literature. *Clin Nutr*, 2006; 25: 361-8.
4. Arboleya S, Binetti A, Salazar N, Fernandez N, Solis G, Hernandez-Barranco A, *et al.* Establishment and development of intestinal microbiota in preterm neonates. *FEMS Microbiol Ecol*, 2012; 79: 763-72.
5. Bjorkstrom MV, Hall L, Soderlung S, Hakansson EG, Hakansson S, Domellof M. Intestinal flora in very lowbirth weight infants. *Acta Paediatr*, 2009; 98: 1762-7.
6. Rouge C, Goldenberg O, Ferraris L, Berger B, Rochat F, Legrand A, *et al.* Investigation of the intestinal microbiota in preterm infants using different methods. *Anaerobe*, 2010; 16: 362-70.
7. Bonnemaïson E, Lanotte P, Cantagrel S, Thionis S, Quentin R, Chambouz C, *et al.* Comparison of fecal flora following administration of two antibiotic protocols for suspected maternofetal infection. *Biol Neonate*, 2003; 84: 304-10.
8. Parm U, Metsvaht T, Sepp E, Ilmoja ML, Pisarev H, Pauskar M, *et al.* Impact of experic antibiotic regimen on bowel colonization in neonates with suspected early onset sepsis. *Eur J Clin Microbiol Infect Dis*, 2010; 29: 807-16.
9. Sullivan A, Edlund C, Nord CE. Effect of antimicrobial agents on the ecological balance of human microflora. *Lancet Infect Dis*, 2001; 1: 101-14.
10. Hallab JC, Leach St, Zhang L, Mitchell HM, Oei J, Lui K, *et al.* Molecular characterization of bacterial colonization in the preterm and term infant's intestine. *Indian J Pediatr*, 2012; 80: 1-5.
11. Rakoff-Nahoum S, Medzhitov R. Role of the innate immune system and host-commensal mutualism. *Curr Top Microbiol Immunol*, 2006; 308: 1-18.
12. Umenai T, Hirai H, Shime N, Nakaya T, Asahara T, Nomoto K, *et al.* Eradication of the commensal intestinal microflora by oral antimicrobials interferes with the host response to lipopolysaccharide. *Eur J Clin Microbiol Infect Dis*, 2010; 29: 633-41.
13. Wang Y, Hoenig JD, Malin KJ, Qamar S, Petrof EO, Sun J, *et al.* 16S rRNA gene-based analysis of fecal microbiota from preterm infants with the without necrotizing enterocolitis. *ISME J.*, 2009; 3: 944-54.
14. Bedford Russel AR, Murch SH. Could peripartum antibiotics have delayed health consequences for the infant? *BJOG*, 2006; 113: 758-65.
15. Bennet R, Nord CE, Zetterstrom R. Transient colonization of the gut of newborn infants by orally administered bifidobacteria and lactobacilli. *Acta Paediatr*, 1992; 81: 784-7.