Serum Transforming Growth Factor beta 2 in Breast-fed versus Hydrolyzed formula-fed preterm Neonates

Thesis

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Abb.	Full term
AAP	American academy of pediatrics
BF	Breast-Fed
CBC	Complete blood count
CPAP	Continuous positive airway pressure
CRP	C-Reactive protein
CS	Cesarean section
CSF	Cerebro spinal fluid
DHM	Donor human milk
DM	Diabetes Mellitus
ELBW	Extremely low birth weight
FI	Feeding intolerance
GA	Gestational age
GIT	Gastrointestinal tract
HGS	Hepatocyte growth factor substrate
HPF	Hydrolyzed protein formula
Ig	Immunogloblin
IUGR	Intrauterine growth retardation
LBW	Low birth weight
MV	Mechanical ventilation
NEC	Necrotizing enterococitis
NICU	Neonatal intensive care unit
NS	Neonatal sepsis
NVD	Norma vaginal deliver
PDA	Patent ductus arteriosus

List of Abbreviations (Cont...)

Abb.	Full term
RDS	Respiratory distress syndrome
SIP	Spontaneous intestinal perforation
TGF-β	Transforming growth factor-β
TPN	Total parental nutrition
VLBW	Very low birth weight

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Abstract

TGF-β2 was not significantly related to gender, maternal illness or mode of delivery between the 2 groups. There was a highly significant correlation between the TGF-β2 serum level and birth weight, gestational age and HB% level. On the other hand, there was a highly significant negative correlation between TGF-β2 serum level and N.sepsis, mortality.

Finally, the study support our hypothesis that BF preterm neonates exhibit higher level of serum TGF-β2 and lower incidence of FI compared to HPF preterm neonates.

Key words: Necrotizing enterocolitis - Very-low-birth-weight- Intra-Uterine growth retardation- Low birth weight infants

INTRODUCTION

It is well established that breast-feeding confers protection against infectious diseases, particularly those of the gastrointestinal tract, via antimicrobial molecules such as immunoglobulins, lysozyme, lactoferrin, defensins, and oligosaccharides ***(Newberg and Walker, 2007).***

Accumulating evidence suggests that in addition to this passive immunoprotection, bioactive molecules in breast milk modulate the infant's mucosal and systemic immune responses and may thereby promote adequate and appropriate immune responsiveness against both potentially pathogenic and indigenous microbes and harmless environmental and dietary antigens ***(Rautava and Walker, 2009).***

One of the most striking differences between breast-fed and formula-fed infants was evident in the serum concentrations of the Transforming Growth Factor beta 2 (TGF-β2) isoform, TGF-β2, with breast-fed infants exhibiting significantly higher levels of this anti inflammatory cytokine. Breast milk provides infants with direct anti-pathogenic effects via maternal microbe-specific Ig and various other antimicrobial substances ***(Newberg and walker, 2007).***

TGF-β2 is an important growth factor present in human and bovine milk ***(Gauthier et al., 2006; Chatterton et al., 2013)***. TGF-β is an immunomodulatory cytokine that is

secreted in breast milk in significant quantities. Of the 3 human TGF-β isoforms (TGF-β1, 2, and 3), TGF-β2 is most abundant in breast milk. Breast milk TGF-β2 may be an important source of TGF-β during the neonatal period when endogenous production of TGF-β in the gut is still inadequate ***(Maheshwari et al., 2011; Zhang et al., 1999).***

In the intestine, TGF-β2 is decreased in premature infants and especially in those experiencing necrotizing enterocolitis (NEC) as compared with term infants ***(Maheshwari et al., 2011).*** TGF-β2 may promote intestinal immune responses and gut functions, such as the intestinal adaptation to bacterial colonization and establishing oral tolerance by regulatory T cells, inducing IgA production and enhancing the intestinal epithelial barrier function, in newborn infants ***(Gauthier et al., 2006; Chatterton et al., 2013)***.

The deficiency of TGF-β2 may partly account for intestinal disorders, for instance the high incidence of NEC in formula-fed preterm infants ***(Boyd et al., 2007).***

In neonates, extensively hydrolyzed protein formula has been shown to reduce gastro- esophageal reflux ***(Corvaglia et al., 2013)***, to treat allergy and food intolerance ***(Osborn and Sinn, 2006)*** and to accelerate gastrointestinal transit of milk and stools ***(Mihatsch et al., 2001)***.

In NICU, hydrolyzed protein formula has been used to feed the preterm infants when breast milk is not available ***(Obsorn and sinn, 2006)***. Whether it enables a more rapid establishment of full enteral feeding in preterm infants needs to be investigated ***(Mihatsch et al., 2001).***

We hypothesis that breast fed preterm neonates exhibit higher level of serum TGF-β2 and lower incidence of feeding intolerance compared to hydrolyzed formula fed preterm neonates.

AIM OF THE WORK

To study the feeding tolerance and its relation to serum TGF-β2 in breast fed versus hydrolyzed formula fed in preterm neonates.

Chapter 1

PREMATURITY

Definition

Premature infants are live born infants delivered before completed 37 weeks from the first day of the last menstrual period ***(Stoll and Kliegman, 2004)***. Low birth weight infants (LBW)are infants weighing 2500 gm or less at birth, may be caused by a short gestation (prematurity), intra-uterine growth retardation (IUGR) or both ***(Beherman et al., 2000)***. Very-low-birth-weight (VLBW) infants are those who weigh less than 1500 gm at birth, while extremely low birth weight (ELBW) are infants who weigh less than 1000gm at birth ***(Cockburn, 2000)***.

Incidence

In developing countries, approximately 70% of LBW infants have IUGR, while in developed countries 30 % of LBW infants have IUGR. Infants with IUGR have greater morbidity and mortality than appropriate for gestational age ***(Beherman et al., 2000).***

In Egypt, only 42% of mothers were able to provide birth weight information about their babies. Amongst those births, 11% were classified as LBW, the percentage of children with LBW was higher in urban areas than in rural ones (12%in urban