

بسم الله الرحمن الرحيم

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تم رفع هذه الرسالة بواسطة / سلوي محمود عقل

بقسم التوثيق الإلكتروني بمركز الشبكات وتكنولوجيا المعلومات دون أدنى مسئولية عن محتوى هذه الرسالة.

ملاحظات: لا يوجد

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Transforming Growth Factor beta 2 (TGF- β 2) in Breast-fed versus premature formula-fed preterm Neonates

Thesis

Submitted for Partial Fulfillment of Master Degree In Pediatrics

By

Mohamed Ali Mohamed Abou Warda

M.B.B.,ch Ain-Shams University, 2008

Under supervision of

Assist, Prof. Rania Ibrahim Hossni Ismail

Assistant Professor of Pediatrics & Neonatology Faculty of Medicine-Ain-Shams University

Dr. Wafaa Othman Ahmed

Lecturer of Pediatrics & Neonatology Faculty of Medicine-Ain-Shams University

> Faculty of Medicine Ain Shams University 2022



سورة البقرة الآية: ٣٢

Acknowledgment

First and foremost, I feel always indebted to ALLAH, the Most Kind and Most Merciful.

I'd like to express my respectful thanks and profound gratitude to Ass. Prof. Rania Ibrahim Ibossni Ismail, Assistant Professor of Pediatrics, Faculty of Medicine - Ain Shams University for her keen guidance, kind supervision, valuable advice and continuous encouragement, which made possible the completion of this work.

I am also delighted to express my deepest gratitude and thanks to **Dr. Wafaa Osman Ahmed,** Lecture of Pediatrics, Faculty of Medicine – Ain Shams University, for her kind care, continuous supervision, valuable instructions, constant help and great assistance, participation and guidance, throughout this work.

I would like to express my hearty thanks to all my family for their support till this work was completed.

Last but not least my sincere thanks and appreciation to all patients participated in this study.

Mohamed Ali

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List of Abbreviations

| Abb. | Full term |
|------|-------------------------------------|
| AAP | American academy of pediatrics |
| BF | |
| BM | Breast milk |
| 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 |

List of Abbreviations Cont...

| Abb. | Full term |
|-------|------------------------------------|
| PDA | Patent ductus arteriosus |
| PTF | Premature formula |
| 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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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 (*Lepage et al.*, 2012).

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 (*Guellec et al.*, 2016).

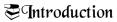
One of the most striking differences between breast-fed formula-fed infants was evident concentrations of the Transforming Growth Factor beta 2 (TGF- β 2) isoform, TGF- β 2, with breast-fed infants exhibiting significantly higher levels of this anti inflammatory cytokine. Breast milk provides infants with direct anti-pathogenic effects via maternal microbe-specific Ιg and various other antimicrobial substances (Lepage et al., 2012).

TGF- $\beta 2$ is an important growth factor present in human and bovine milk (*Rasmussen et al.*, 2016; *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- $\beta 1$, 2, and 3), TGF- $\beta 2$ is most abundant in breast milk. Breast milk TGF- $\beta 2$ 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).

In the intestine, TGF- β 2 is decreased in premature infants and especially in those experiencing necrotizing enterocolitis (NEC) as compared with term infants (*Maheshwari et al., 2011*). TGF- β 2 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 (*Rasmussen et al., 2016; Chatterton et al., 2013*).

The deficiency of TGF- β 2 may partly account for intestinal disorders, for instance the high incidence of NEC in formula-fed preterm infants (*Nguyen et al.*, 2015).

In NICU, premature 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- $\beta 2$ and lower incidence of feeding intolerance compared to premature formula fed preterm neonates.

AIM OF THE STUDY

To study the feeding tolerance and its relation to serum TGF- $\beta 2$ in breast fed versus premature formula fed in preterm neonates.