IMMUNOGLOBULIN A and ALPHA 1-ANTITRYPSIN IN THE BREAST MILK FROM MOTHERS OF PRETERM AND FULLTERM INFANTS

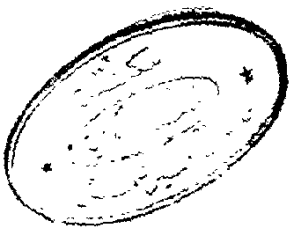
Thesis

Submitted for the Partial Fulfilment of the M.Sc. Degree in Pediatrics

By

ABBAS MOHAMED HEFNI AHMED

M.B.; B.Ch.



Supervised by

Prof. Dr. RABAH MOHAMED SHAWKI

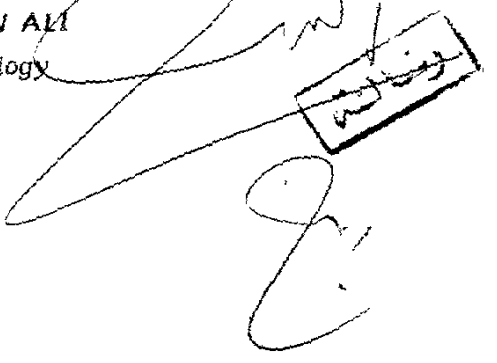
Professor of Pediatrics
Faculty of Medicine
Ain Shams University

Dr. MOHAMED SALAH EL-KHOLY

Lecturer of Pediatrics
Faculty of Medicine
Ain Shams University

Dr. GIHAN KAMAL HASSAN ALI

Lecturer of Clinical Pathology
Faculty of Medicine
Ain Shams University



Faculty of Medicine

Ain Shams University

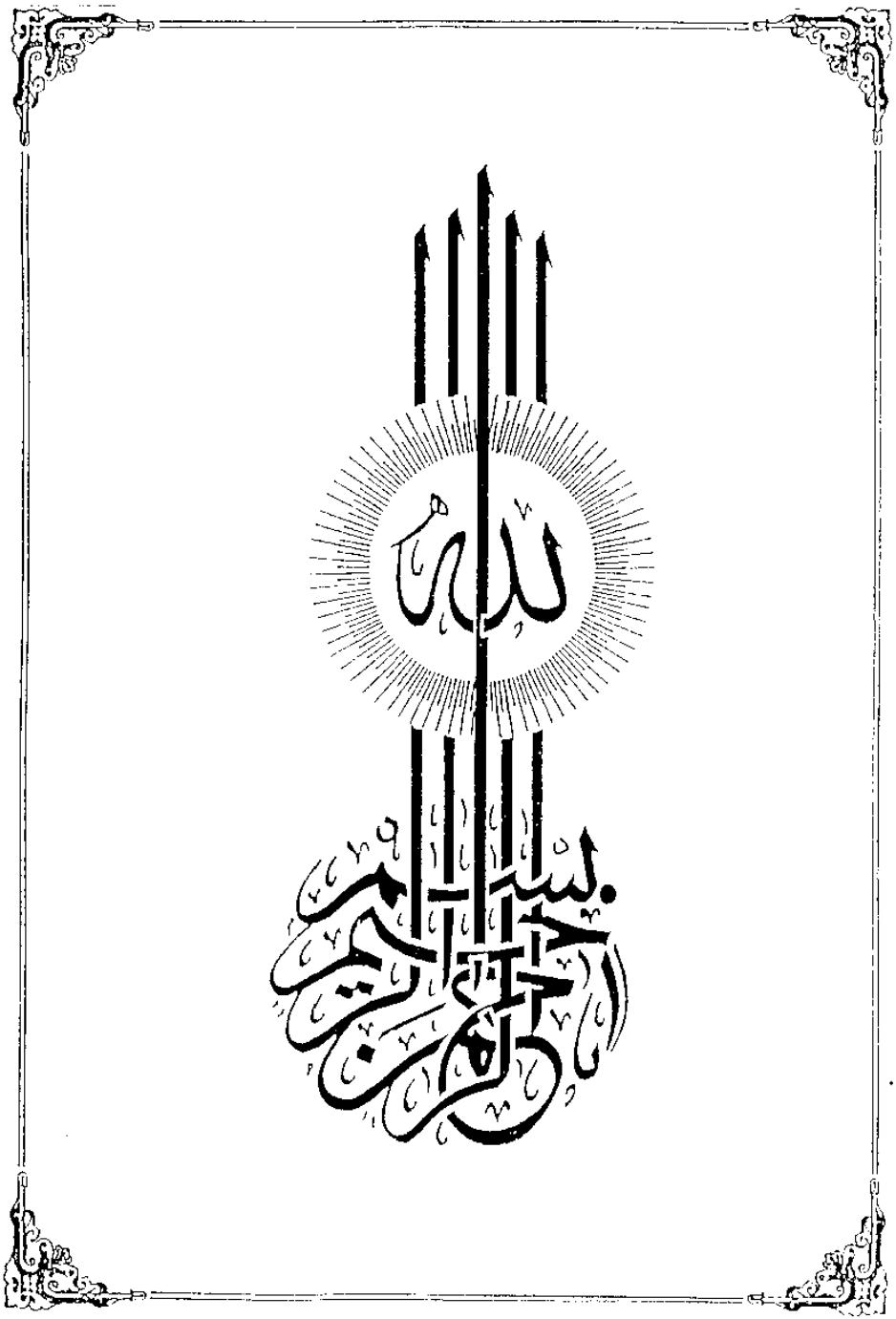
1987

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

" والوالـدات يرضعـن أولادهن حولين كاملـين لمن أراد أن يتم الرضاعة"

صدق الله العظيم

(٢٣٣ البقـــرة)



ACKNOWLEDGEMENT

It has been a great honour and extreme pleasure for me to proceed with this work under the supervision of **Prof. Dr. RABAH MOHAMED SHAWKI,** *Professor of Pediatrics, Ain Shams University, Her kind Supervision, valuable guidance, and generous advice have been a great help to me to harmonize the style throughout the entire thesis.*

I have no adequate words to express my gratitude and indebtedness for the close supervision tremendous effort, active participation and kind encouragement of **Dr. MOHAMED SALAH EL-KHOLY,** *Lecturer of Pediatrics, Ain Shams University and my thanks also goes to* **Dr. GIHAN KAMAL HASSAN ALI.** *Lecturer of Clinical Pathology, Ain Shams University.*

Page

List of Contents

List of Tables

List of Figures

INTRODUCTION AND AIM OF THE WORK

1. INTRODUCTION & AIM OF THE WORK

Breast milk is not merely the best but a must in the developing world, and to the highly vulnerable low birth weight infants in underprivileged areas. Human milk is truly a passport to life (**Narayanan, 1986**).

Modern techniques of analysis have shown that in many respects human milk is unique and it has become clear that it is not possible to know its exact composition. As a nutrient, breast milk can be considered a complete diet as it contains the essential elements for infant's nutrition viz; carbohydrates, proteins, fats (Lipids), vitamins and minerals. Breast milk remains unrivaled in its ability to support the growth of the infant especially in the first two years of life (**Young et al., 1982**).

Breast milk provides immunological protection for the baby, even in developed countries where contamination of infant formula is rare. Immediatly after delivery the immunological system of the baby is not fully developed. Hence, mother's milk particularly that which is secreted in the first few days after delivery (colostrum), contains immunoglobulins which protect the baby against the pathogen and external allergic agents that exist in the food and environment. Therefore breast-fed babies are more protected against gastro-intestinal and respiratory diseases, including middle ear infection, common cold and allergic conditions such as eczema than bottle-fed babies (**Armond, 1982**).

The purpose of this work is to do a comparative study between preterm and fullterm breast milk as regards the concentrations of secretory immunoglobulin A (SIgA) and alpha l-antitrypsin in order to study the beneficial properties of breast milk in feeding preterm and term infants. Also, to evaluate the advantages of feeding preterm infants with their own mother's milk.

REVIEW OF LITERATURE

II. REVIEW OF LITERATURE

HUMAN MILK

There is no doubt that human milk is a unique food and the preferred first food for infants. It has special characteristics matched to their nutritional needs and physiologic limitations **(Anderson, 1985).**

The good nutrition aims at satisfying the rapid rate of growth and avoiding deficiency states during the period of infancy. The post-neonatal period is characterized by a period of rapid growth. The newborn for example, doubles the birth weight by the age of 6 months and tripples it by the age of one year. It is well known that a large proportion of babies, thrive well on breast milk alone for the first 4 to 6 months **(Hitchcock et al., 1985).**

The value of breast feeding for both term and preterm infants has been greatly stressed in recent years **(Goss et al., 1983). Chessex et al. (1983)** suggested that breast milk is the ideal for all babies including very low birth weight babies provided that each baby receives his own mother's milk.

All mammalian milks have highly specific biochemical composition. In general, their composition reflects on adaptation to species-specific physiologic needs to ensure optimal growth, development, and survival of the offspring **(Anderson, 1985).**

Heird (1977) observed that with similar caloric intake, prematures fed with human milk presented deficient growth when compared to prematures fed with modified cow's formula of high protein content. Consequently it has been suggested that inadequate growth in prematures was due to the low concentration of proteins in human milk.

On the other hand a dramatic change in feeding of low birth weight infants has taken place recently because a number of studies have shown that low birth weight infants can be adequately fed with their own mother's milk. Their mother's milk alone leads to a more rapid rate of growth in weight, length, and head circumference, as well as a shorter time to regain birth weight, than does milk from the mothers of term infants **(Gross, 1983).**

Now mixtures of whey-predominant protein, carbohydrate, calcium, phosphate, trace minerals, and vitamins have been developed by commercial formula manufacturers, in order to supplement breast milk for the feeding of prematures. The resultant nutrient, mineral, and vitamin concentrations approach those of the formulas developed for feeding premature infants **(Mauer et al., 1985).**

STAGES OF HUMAN MILK

Lactation is often divided into four periods with respect to the composition of human milk: Precolostrum, colostrum, transitional milk and mature milk.

- **Precolostrum:**

Precolostrum is common, occurs early in the antenatal period and may often be of considerable volume. Protein concentration in precolostrum is equal to or greater than those found in colostrum obtained during the first 12-48 hours following delivery. There is a difference in concentrations of these proteins in the precolostrum of different individuals and this seems to be related to the volume of precolostrum secreted, the highest concentration of antimicrobial proteins was associated with a low volume of precolostrum secretion and the lowest concentration was associated with a high volume of precolostrum secretion **(Lewis and Renolds, 1983).**

The antimicrobial proteins contained within this milk can be preserved intact by freezing. This represent an untapped pool of bacteriostatic proteins with specific activity against neonatal pathogens. A potential protective effect against serious infection may be obtained by administering precolostrum to "At risk" infants during the first few days of life **(Reynolds et al., 1982).**

- **Colostrum**

In the first postpartum week, mammary secretion consists of a yellow thick fluid called colostrum, its yellow colour is due to high content of B-carotene (**Lawrence, 1982**).

Human colostrum is known to differ from mature milk in its composition (Table 1 & 2). (**Fomon, 1974 and Royer, 1978**).

Table (1) Approximate composition of colostrum and mature human milk (**Fomon, 1974**).

Constituent gm/100 ml	Colostrum	Mature milk
Water	87	88
Protein	2.7	0.9
Fat	2.9	3.8
Lactose	2.3	7.0
Specific gravity	1.040-1.060	1.030
Ash	0.5	0.2
Energy	75	67