# STUDIES ON LOW BIRTH WEIGHT EGYPTIAN INFANTS (PRETERMS & SMALL FOR DATES)



لجنة المناقشة

THESIS

Submitted In Partial Fulfilment For the Degree of M.D. (Paediatrics)

By

NAGIA MUSTAPHA BAHGAT BADAWY

*(M.B., B.Ch., D.Ch.)*



SUPERVISED BY:

Prof. Dr. SALAH AWAAD, *Professor of Paediatrics, Faculty of Medicine, AIM SHAMS UNIVERSITY.*

Prof. Dr. KHALIL ABD EL HADY MOURAD, *Professor of Paediatrics, Faculty of Medicine, AIN SHAMS UNIVERSITY.*

Prof. Dr. SAWSAN HOSNY, *Professor of Clinical Pathology, Faculty of Medicine, AIM SHAMS UNIVERSITY.*

Faculty of Medicine
AIN SHAMS UNIVERSITY
Cairo

1981

## ACKNOWLEDGMENT

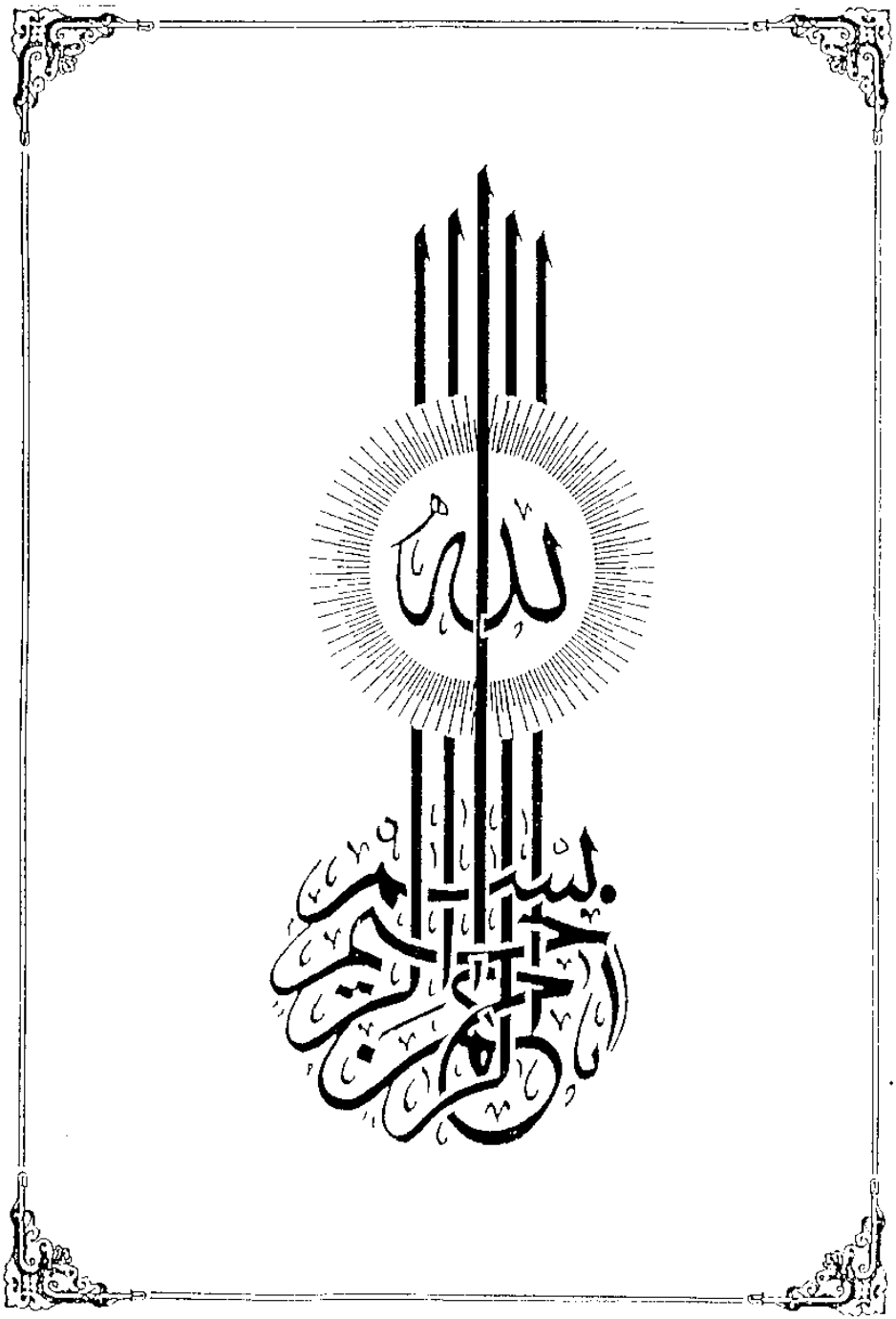
I would like to express my sincere gratitude to Prof. Dr. Salah Awaad, Professor of Paediatrics, Ain Shams University for his guidance, attention, consultation and continuous encouragement throughout this study.

I also wish to express my indebtedness to Prof. Dr. Khalil Abd El Hady, Professor of Paediatrics, Ain Shams University for his guidance, assistance encouragement and support.

I am sincerely grateful to Prof. Dr. Sawsan Hosny, Professor of Clinical Pathology, Ain Shams University for her kind supervision and helpful directions.

My sincere thanks are due to my husband Dr. Mohammed Abd El Aziz, Lecturer of Paediatrics, Al Azhar University for his encouragement, guidance and for his kind care throughout this study.

My sincere thanks are also due to Mr. Ahmad Nabil from the Department of Clinical Pathology for his valuable help in the practical part of this work.



CONTENTS

# AIM OF THE WORK

## AIM OF THE WORK

The principal object of this study is to compare preterm and small for date Egyptian infants with regards their relative frequency, maternal and gestational features, perinatal survival and important neonatal complications specially hypoglycemia and hyperbilirubinemia.

# REVIEW OF LITERATURE

# STUDIES ON LOW BIRTH WEIGHT EGYPTIAN INFANTS

## REVIEW OF LITERATURE

Until recently, birth weight alone was used to classify newborn infants and to identify those with a high risk of morbidity. Maturity was known to be an equally important factor but methods for the routine determination of gestational age had yet to be developed.

### Nomenclature for duration of gestation, birth weight and intrauterine growth :

The weight criterion of 2,500 gm was used as a basis for distinguishing prematurity as suggested by the World Health Organisation (WHO) in 1950. However, the classification based on weight alone and the international definition of prematurity ( $\leqslant$ 2,500 gm) which equated birth size and fetal age, have had the effect of obscuring medically important differences between like-size infants of dissimilar gestational ages.

In view of the evidence indicating that many of the neonates included within the limits of the international definition of prematurity are not born prematurely, the Expert Committee on Maternal and Child Health of the

World Health Organization (1961) recommended that the concept of "prematurity in the definition should give way to that of "Low Birth Weight". Although the primary axis of classification (birth weight) remained unchanged, the new recommendation emphasized the need to use terms which make a clear distinction between birth weight and duration of gestation.

Low birth weight infants :

Low birth weight is presently defined as a birth weight of 2,500 gm or less irrespective of gestational age.

Preterm infants :

Are live born infants delivered before the 37th weeks of gestation calculated from the first day of the last menstrual period (WHO, 1961). This definition has been adopted by the American Academy of Pediatrics in 1967.

Small for date infants :

Are those neonates born below the 10th percentile for any given period of gestation.

The relationship of birth weight to gestational age

expressed as percentile reflects the quality of fetal growth and is at present the standard for defining deviant fetal growth.

Strictly speaking each neonate should be compared with a population of similar racial, ethnic, socio-culturo-economic, perinatal background.

The American Academy of Pediatrics (1967) recognised that although a single standard of intrauterine growth curve is unlikely to be equally efficient in all populations, yet recognition of an infant who has grown at an unusually slow rate in utero can be made with equal reliability using any of the published standards of intrauterine growth curve (Lubchenco et al., 1963, Gruenwald, 1966, Battaglia et al., 1966). Cassady (1970), regards birth weights below the tenth percentile to be indicative of moderate intrauterine growth retardation and those below the third percentile to be indicative of severe growth retardation.

It is now well recognised that infants of similar low birth weight do not constitute homogeneous groups, some are small because of premature delivery, some because of retarded intrauterine growth and others because of both these factors in combination. These groups vary with respect to etiology, mortality rate, risk of different neonatal complications, as well as their later progress (Winich, 1969, Drillien, 1970).

Incidence of low birth weight :

The incidence of low birth weight varies widely in different areas and populations.

There is an increased incidence of infants of low birth weight among countries where unfavorable circumstances as low socioeconomic standard and malnutrition prevail (Rosa and Turshen,1970).

The incidence of low birth weight was estimated as 3.5% in Netherland and 5.9% in Ireland, while in India it reaches 28% (WHO study on birth weight,1961). In Egypt it has been estimated as 10.79% (Abassy et al., 1972). The most underdeveloped countries have the highest incidence of infants of low birth weight.

Normal fetal growth and maturation :

Growth refers to an increase in size. In the human, the magnitude of fetal growth is dependent upon transplacental growth support and the inherent growth potential of the fetus. Maturation, on the other hand, refers to function and is independent of growth. It is insensitive to deprivation.

Regulators of fetal growth :

The priority regulators of fetal growth are the

inherent growth potential of the fetus and the growth support provided by the mother transplacentally. Early in pregnancy growth support far exceeds fetal requirements and growth is predominantly determined by inherent fetal growth potential while later in pregnancy growth support is the priority and the limiting factor. Additional influences on fetal growth are many and are complex and probably interrelated.

Mechanisms of growth retardation :

The two basic mechanisms of intrauterine growth retardation are a reduction in fetal growth potential and a reduction in fetal growth support. Reduction of fetal growth potential constitutes one third of clinically recognised growth retardation (Campbell,1974). The majority of these neonates are small by virtue of constitutional limitation. However, a small percentage of them are abnormal fetuses with chromosomal malformations or with infections caused by agents such as rubella virus (Naeye & Blanc, 1965). A reduction in growth support is a form of growth slowing or cessation in a fetus with normal growth potential (Cook, 1977). The basic defect implies impairment in transplacental nutrients. This form of growth retardation. represents 60% of clinical growth retardation.

**Factors affecting fetal growth rate :**

I- Maternal factors :

1- Maternal age :

Maternal age has an influential role in fetal and neonatal morbidity and mortality. The most vulnerable groups are the teen-ages and the primiparas over thirty years (Battaglia et al.,1963 and Drillien, 1964). There is a higher incidence of prematurity, light for date infants, pneumonias and intracranial haemorrhages among infants born to such mothers (Baird, 1969).

At the end of the childbearing years the infants are also often small, but this is usually owing to intra-uterine growth retardation rather than to preterm delivery (Lubchenco, 1976).

2- Effect of maternal parity and period between each pregnancy and the other :

Repeated childbirth imposes several physical and nutritional demands on the mother so that the ideal environment for fetal growth does not exist.

If the period between subsequent pregnancies is short the mother may have no sufficient time to restore her supply of critical nutrients. The birth weight is reduced

considerably with every consecutive delivery (St.George et al., 1970). On the other hand, poor reproductive history draws the obstetricians' attention to the likelihood of occurrence of intrauterine growth retardation (Cockburn and Drillien, 1974).

3- Effect of maternal height :

The incidence of low birth weight infants born to mother with short stature, 61 inches and less, was found to be 8.6% compared with 4.3% in mothers with height of 65 inches and over (Cockburn and Drillien, 1974).

Several studies have shown a positive association between maternal stature and birth weight. In a study by Thomson et al., (1968), 56% of the babies born to the shortest and lightest group of mothers were below the 25th centile compared with only 7% of those whose mother were in the tallest and heaviest groups.

4- Effect of maternal nutrition :

It has been known for many years that in some species lowering the mother's nutrition towards the end of gestation can materially reduce the size of the newborn and, following nutritional setback before birth some young animals not only fail to catch up in stature but also tend

to lag further behind with increasing age (McCance, 1962).

The quality of the food plays also an important role. Animal experiments have amply illustrated the harmful effects of nutritional deficiencies in pregnancy. Restriction of protein intake in rat for example leads to reduced birth weight and reduced brain weight (Dobbing, 1968). In the human the connection between maternal nutrition and fetal growth as indicated by birth weight has been extensively investigated. During periods of severe food shortage such as occurred in the final stages of World War II in Netherlands, Smith (1947) reported a drop of 400 gm in the mean birth weight and during the siege of Leningrad the mean birth weight dropped by 500 gm (Antonov, 1947).

The dietary intake during 3rd trimester of pregnancy among privileged and nonprivileged primigravida in Addis-Ababa was compared and the effect on the newborn weight was studied (Medhin and Gobezie, 1975). The non privileged consumed a diet which was dificient in all nutrients while the privileged consumed a diet of high caloric value and specially rich in protein. Infants born to the non privileged had significantly lower mean birth weight when compared to infants born from privileged.