THE PROBLEM OF HYPOGLYCEMIA IN THE NEONATES

ESSAY

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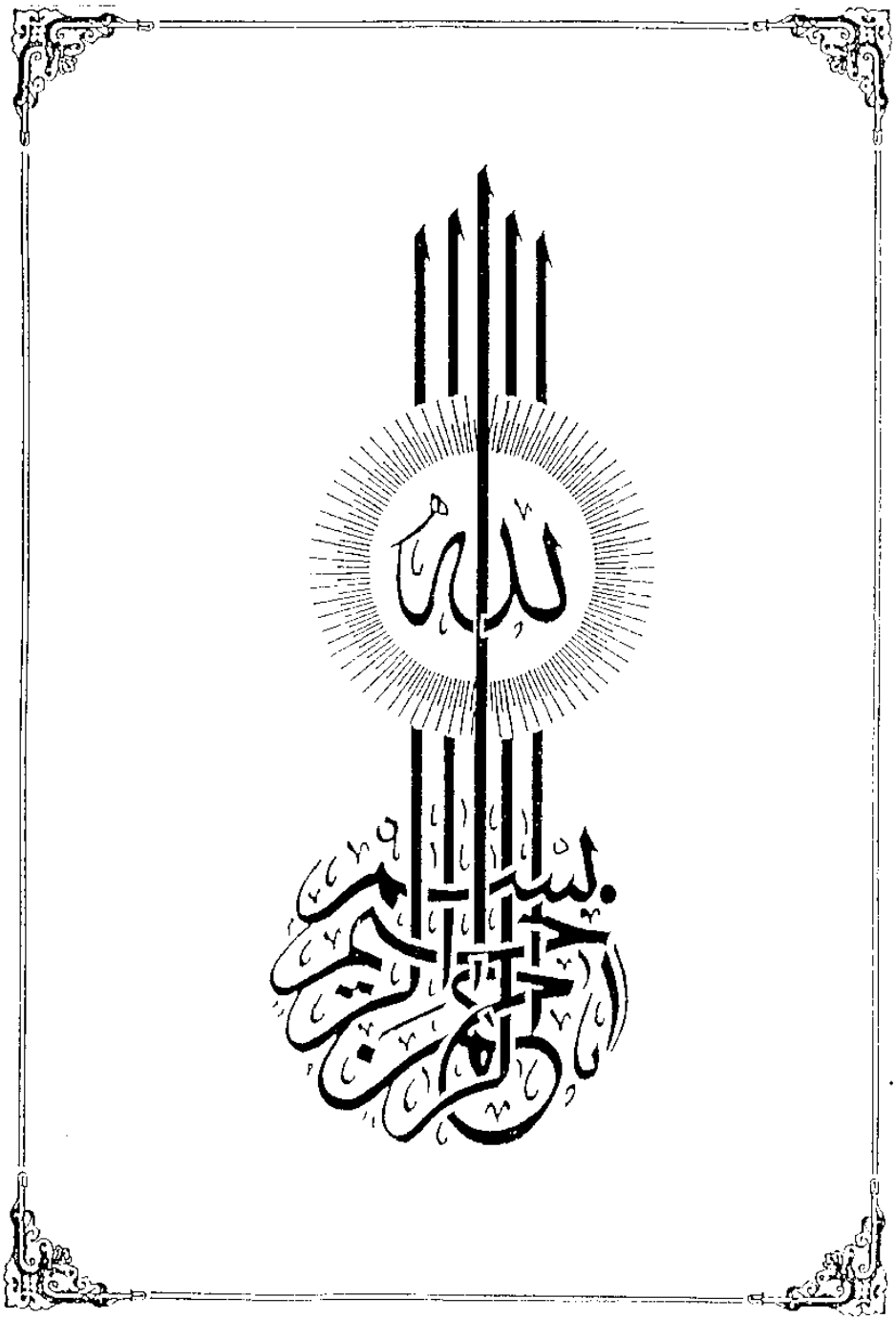

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INTRODUCTION AND AIM OF THE WORK

I. INTRODUCTION AND AIM OF THE WORK

The problem of "neonatal hypoglycemia" is one of the most important problems in pediatric medicine *(Aynsely-Green, 1992)*.

Glucose homeostasis in the neonate represents a complex balance between the need of his different body organs and his capability to produce and regulate glucose. This balance is likely to be disturbed by a number of disorders in the neonate, and even, under normal circumstances *(Ogata, 1986)*.

The developmental aspects in the neonatal period are unique with respect to the carbohydrate balance, because antecedent intrauterine events can directly influence and alter the development of the glucoregulatory capabilities of the fetus and the newborn. Even under normal circumstances the ability of the newborn to maintain glucose homeostasis constantly changes, as enzyme induction continues and the ability to secrete glucoregulatory hormones matures during the postnatal period. Alterations of these processes can disrupt glucose homeostasis in the neonate *(Ogata, 1986)*.

AIM OF THE WORK:

The present study is a critical review on hypoglycemia in the neonates. It includes maternal carbohydrate metabolism during pregnancy, the developmental aspects of glucose homeostasis during perinatal life, the pathogenic mechanisms that cause hypoglycemia in the newborn, as well discusses the damaging effect of hypoglycemia on the central nervous system in the neonates, diagnosis and management of neonatal hypoglycemia.

HISTORICAL ACCOUNT

II. HISTORICAL ACCOUNT

Apparently, Hartmann and Jaudon (1937), were the first to arouse the interest of pediatricians in neonatal hypoglycemia, in their quotation: "the frequent occurrence in the normal newborn infants of cyanosis, irritability, listlessness, and muscular disorders, such as hypotonicity, hypertonicity and twitchings, might very well be due sometimes to hypoglycemia which is almost a 'normal' occurrence during the first few days of life".

In the years to follow, and up to 1959, their suggestion received ample confirmation, but only in isolated cases. Thenafter, small series of cases of symptomatic hypoglycemia have been described by several authors *(Cornblath et al., (1959), Cornblath et al., (1961), Haworth et al., (1963), Brown and Wallis, (1963); and Neligan et al., (1963)).* Such delay has largely been due to the fact that, blood sugar levels which would be expected to produce symptoms of hypoglycemia in older children, are regularly found during the first few days of life in babies who are perfectly well. Systemic use of a therapeutic test has been largely responsible for the clarification of the position. The idea which had to be accepted and used as a tool in studying the problem, was that if abnormal neurological signs can be

completely abolished by intravenous glucose in an adequate dose, this constitutes a good evidence that the abnormality was due to hypoglycemia, even in a newborn baby.

During (1964), some progress has been made towards understanding the conditions underwhich symptoms arise. There certainly need to be no further fall in the blood glucose level, which may have been very low indeed for as long as 48 hours previously. It seemed tempting to postulate that the brain may have been using an alternative metabolic fuel during this period, and that symptoms do not arise until this too, is exhausted.

Edwards (1964) has reported that in newborn calves rendered hypoglycemic by intravenous insulin, there is a compensatory rise in blood lactate levels which appears to prevent the development of symptoms. It seems possible that a similar mechanism exists in the human newborn.

Further studies in this direction confirmed this postulation *(Gerald Neligan, 1965).*

THE DEFINITION AND INCIDENCE OF NEONATAL HYPOGLYCEMIA

III. THE DEFINITION AND INCIDENCE OF NEONATAL HYPOGLYCEMIA

The definition of neonatal hypoglycemia used to be a confused subject and in this respect, widely different views were expressed in the literature *(Ansley-Green, 1992)*.

Virtually everyone now accepts the definition of neonatal hypoglycemia as a whole blood glucose level of less than 30 mg/dl (less than 35 mg/dl in serum or plasma) in the first 72 hours of life or of less than 40 mg/dl (less than 45 mg/dl in serum or plasma) after the third day in full term, full size infants. In infants of low birth weight, the lower limit of normal is set at 20 mg/dl in whole blood or 25 mg/dl in plasma or serum *(Ansley-Green, 1992)*.

A single low value accompained with hypoglycemic symptoms is adequate indication for initiating therapy, although a second blood analysis should be obtained. However, in asymptomatic infants, repeatedly low values should be obtained to establish definitive diagnosis *(Kenneth Gabbay, 1984)*.

The values reported in old studies as the normal for blood glucose levels in the neonates should be considered with much caution as up to 25 years ago, it was a routine practice to starve even normal full terms for many hours after birth in the belief that they were susceptible to aspiration pneumonia and food was withheld for longer periods for low birth weight infants. Nowadays, feeding of the newborn is started within 3 hours after birth and so, hypoglycemic blood levels are less likely to occur *(Ansley-Green, 1992).*

Incidence of neonatal hypoglycemia:

The incidence of neonatal hypoglycemia varies with the definition, method and timing of feeding, and type of glucose assay (serum levels are higher than whole blood values) *(Behrman and Kliegman, 1992).*

The over all incidence of neonatal hypoglycemia previously reported was 4.4/1000 live births. The frequency appears to be higher among infants with low birth weight (15.5/1000 low birth weight infants). *(Gutberlet and Cornblath, 1976 and Schwartz, 1987).*

Early feeding decreases the incidence of neonatal hypoglycemia, whereas the incidence increases in prematures

(15%), in infants of diabetic mothers (about 75% of IDMs develop neonatal hypoglycemia, but only 10-15% of them become symptomatic) and in infants with intrauterine growth retardation (67%). Also, hypothermia, hypoxia and maternal glucose infusion during labour increase the incidence of neonatal hypoglycemia *(Behrman and Kliegman, 1992).*

About 10-30% of neonates with erythroblastosis fetalis have been found to have hypoglycemia *(Haworth and Vidyasagar, 1971).*