FOETAL AND PLACENTAL WEIGHT ALTERATION IN NORMAL AND PATHOLOGIC GESTATIONS

A Thesis

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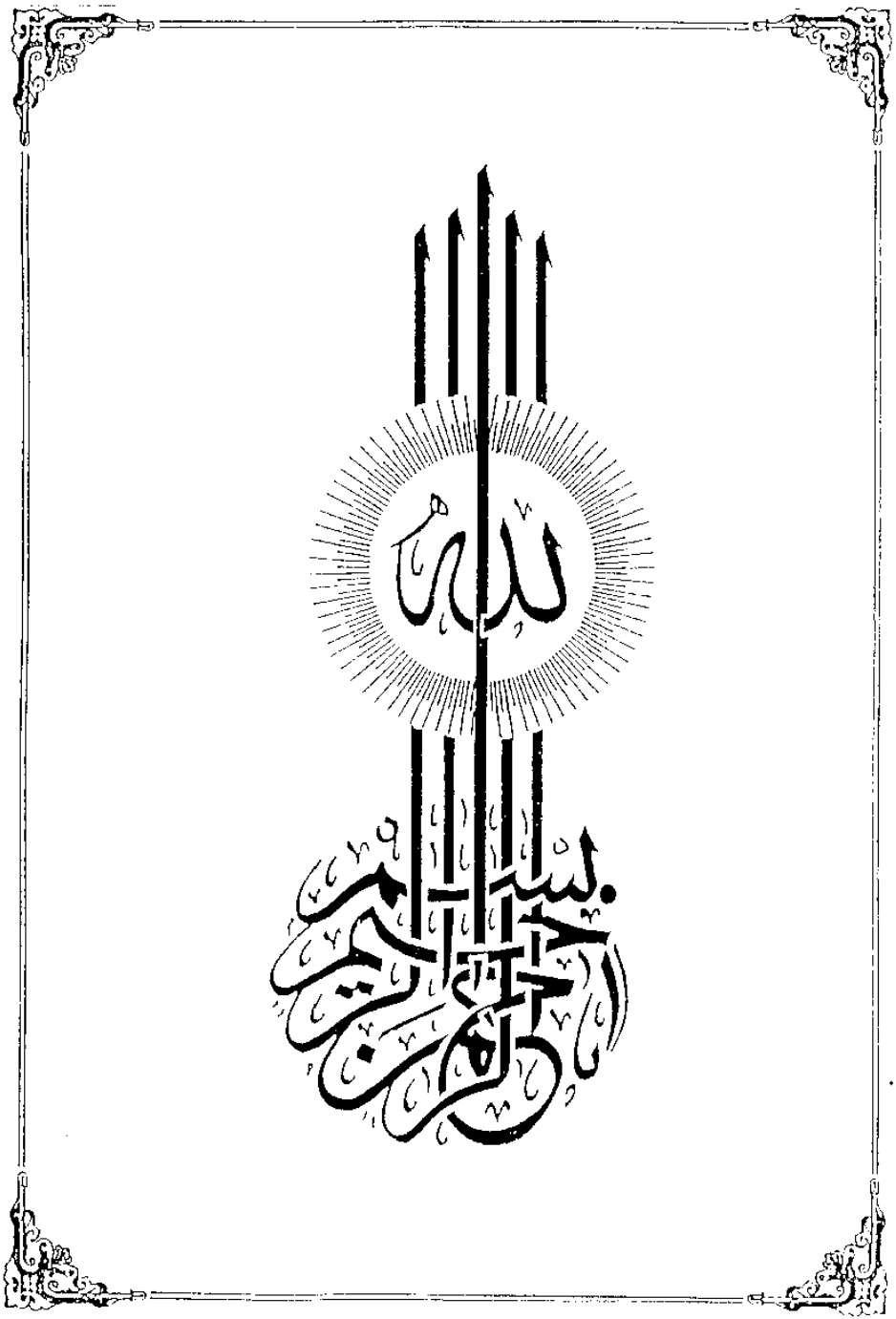
T O M Y P A R E N T S



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INTRODUCTION

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The weight of the infant is a measurement of the adequacy of the total development achieved by the infant by the time he is born. It has long been accepted that prematurity is a birth weight definition ignoring the weeks of gestation achieved at the time of birth.

. Many factors have been suggested to affect birth weight. Dougherty and Jones (1982), considered the sex of the baby, parity, maternal smoking during pregnancy, social status, maternal weight and height as important factors affecting birth weight.

. Aherne (1966), considered the weight of the placenta to be functionally significant because it is related to villous surface area and to total foetal metabolism. So it is expected that placental weight is also affected by factors affecting birth weight.

. According to Dawes (1966), "If the placenta is very small or, as sometimes in man, extensively infarcted, placental size may become the most important single factor in limiting foetal growth".

. Little (1960), considered that perinatal adversity is caused only if the ratio of placental to foetal weight is exceptionally large or small. So placental/foetal

weight ratio may thus play a considerable role regarding pregnancy outcome.

. In this work , we try to study some variables which may have an influence on birth weight, placental weight, placental/foetal weight ratio and placental diameter. The study also includes the effect of some maternal diseases which may be present in association with pregnancy on the same 4 parameters. The obtained results will be compared with the control.

. The study also deals with the effects of smoking on the 4 parameters under investigation and a comparison will be held between smokers and non smokers.

We hope that this work will provide a coherent, integrated account of the field we have attempted to cover.

REVIEW OF LITERATURE

The Factors Affecting Birth Weight and Its Relation to Neonatal Outcome

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I. Influence of maternal nutrition on birth weight:

. Dietary supplementation of pregnant women may be an efficient and cost-effective form of nutritional intervention aimed at improving child growth and survival prospects in chronically undernourished populations. However, the maximum achievable benefit of prenatal supplementation has not yet been defined (Prentice et al, 1983).

Assertions have been made that food supplementation is most effective during the last trimester of pregnancy. This recommendation is based on the increased nutritional requirements of the foetus during the last month of gestation since the rate of foetal growth increases exponentially up to the 38th week (Payne and Wheeler 1978).

Picone et al. (1982), reported that the birth weight was most strongly correlated with maternal gain in the 3rd trimester. Of potentially greater importance, however, is the fact that maternal weight gain in the 2nd trimester accounted for most of the performance changes at birth. The 2nd trimester may be the most rapid period of neuronal cell division. Low weight gain during this period appears to have the most harmful effect on neonatal behaviour. While improving maternal food intake during the 3rd trimester may have beneficial effects on infant anthropometric measures,

adequate intake during the 2nd trimester may be most important for optimal behavioural development.

. The maternal weight gain during pregnancy reveals a linear pattern during the last 2 trimesters. One of the functions of weight gain during pregnancy is to provide stores of energy for the growth of the foetus and for lactation. These stores buffer changes in maternal diet and serve as a protective mechanism against heavy physical activity. Mothers can store calories early in pregnancy and transfer these reserves to the foetus as they are needed. So the earlier in pregnancy a woman begins supplementation, the more likely she will consume enough calories to produce an important increase in birth weight (Lechtig et al, 1975).

. Prentice et al. (1983), suggested that the women's state of energy balance would determine the outcome of pregnancy. When the women under the study were in a marked negative energy balance due to food shortage and a high work load, the supplementation improved birth weight by a mean of 224 grams and reduced the incidence of low birth weight from 28.2 % to 4.7 %. When the women were previously in a positive energy balance they drived no benefit from dietary supplementation in terms of birth

outcome . The negative energy balance was judged by a mean monthly weight gain of only 0.3 kg. and rapid loss of subcutaneous fat therefore the mean monthly weight gain during pregnancy could be used to determine which communities would benefit most from prenatal supplementation.

.The relative contribution of calories and proteins to an increase in birth weight depends on which is the limiting nutrient in the diet. Other factors like physical activity, prevelance of disease, and nutrient availability from the maternal stores before pregnancy are also important. One of these factors is the different capability of the human placenta to adapt itself to protein deficiency as compared to caloric deficiency. The human placenta is better able to buffer deficiencies in protein as compared to calories in maternal diet (Lechtig et al., 1975).

.The anticipated input of nutritional intervention on birth weight should range between 25 and 48 grams of birth weight/10,000 Kcal ingested during pregnancy (Lechtig et al., 1975).

.McDonald et al. (1981), showed that there was no overt evidence of a beneficial effect of protein supplementation of pregnant women on birth weight, calorie supplementation did result in some meaningful increment in birth weight.

. Mora et al. (1979), reported that the supplementation had a significant effect on the mean birth weight of male infants, but not that of female infants. The mechanisms responsible for the sex differences remain to be elucidated.

II. Maternal Smoking and Birth Weight:

The problem of women who smoke during pregnancy has escalated in recent years. It was estimated that approximately one of every three women in the child bearing years smokes. The relationship between maternal smoking and decreased infant birth weight has been demonstrated by many investigators. When the effects of smoking are combined with low birth weight, these factors lead to greater perinatal morbidity and mortality (Luke et al., 1981).

. The new born infants of mothers who smoke cigarettes reportedly weighed 150 to 400 grams less than newborn infants of non smokers due to growth retardation and shorter gestations in the offspring of the smokers (Yerushalmy, 1971).

. Mothers who smoked during one pregnancy but not another had smaller infants in the pregnancy in which they smoked, irrespective of birth order and a variety of other maternal and foetal factors known to affect foetal growth. Thus smoking appears to have an independent influence on foetal growth. (Naeye 1978).

. Wainright (1983), reported that while successive birth weights for the non smokers increased by an average of 30 grams, birth weight for the smokers decreased by an average of 64 grams. This suggested a cumulative effect