Maternal Nutritional Status and its Effect on the Newborn*

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The dietary, clinical and biochemical investigations reported in this paper revealed that the large majority of the subjects—pregnant women of the low socio-economic group in South India—underwent the nutritional stress of gestation without adequate preparation or protection either before or during pregnancy. The subjects suffered from varying degrees of calorie-protein deficiency and a large number showed manifestations of vitamin B complex deficiency and anaemia.

Their nutritional status was possibly reflected in the high percentage of premature termination of pregnancy. Those babies born alive at term had a low average birth weight, nearly one-third of them weighing less than 2500 g at birth. It is suggested that these small-sized under-weight infants, even if they are physiologically and functionally mature and manage to live, probably possess very little nutritional reserves and become potential subjects for the development of nutritional deficiency and its consequences during the early months of life.

The state of maternal nutrition is one of the important environmental factors which might be expected to influence the course of pregnancy. The growth of foetal tissues and the other products of conception and the metabolic alterations consequent on pregnancy impose great stress and result in an increase in the expectant mother’s nutritional requirements. Workers in the fields of nutrition and maternal and child health from different parts of the world have from time to time indicated the close association between the maternal nutritional status on the one hand and the health of the pregnant woman and her offspring on the other.

During the last few years studies on the nutritional status of pregnant Indian women and its effects on the newborn have been carried out in the Nutrition Research Laboratories, Hyderabad (formerly Coonoor). These investigations, the results of which are briefly reviewed in the following pages, were conducted in three different areas of South India—Coonoor, Hyderabad and Madras. While this necessarily involved the study of different groups of subjects, it is considered that the results are applicable for the whole region, since the social, economic and living conditions of the subjects were nearly similar and representative of the pattern observed among the large majority of the general population in this part of India.

NUTRITIONAL STATUS OF PREGNANT WOMEN IN SOUTH INDIA

All the subjects belonged to the low socio-economic group, with a mean family size of five. It is among such families that cases of kwashiorkor and other nutritional deficiency diseases of children occur. The majority of the pregnant subjects were engaged in some form of manual labour throughout pregnancy. The age of the subjects ranged from 15 to 40 years and the average monthly income of the family rarely exceeded one hundred rupees (about US $20.00). The nutritional status of the subjects was assessed by dietary, clinical and biochemical studies.

Nutrient intake

The dietary habits of the subjects were more or less uniform and the food items consumed in the daily diet were extremely limited. A dietary survey was

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carried out, by means of a detailed oral questionnaire, on 352 subjects—100 from Coonoor (Pasricha, 1958), 54 from Hyderabad and 198 from Madras—and the nutritive value of the diets was calculated using data on the chemical composition of raw foods. All except 14 subjects were beyond the 24th week of gestation at the time of the survey.

The mean daily intake of calories and protein was found to be 1408 g and 38 g respectively. While the mean protein intake in the three areas was very nearly similar, the mean intake of calories by the pregnant women in Hyderabad and Madras was only about 72% of that consumed by subjects in Coonoor. There were wide variations in the individual values for intake of the above nutrients. The mean daily intake of calcium, iron and vitamin A, calculated only for Hyderabad subjects, was 315 mg, 18 mg and 912 I.U. respectively.

These results indicate that, in the majority of the pregnant women, the intake of all the nutrients except iron is grossly inadequate even on the basis of the recommended non-pregnant allowances. In a large number of subjects, the bulk of the protein was derived from a single source of cereal. The protein and calorie intake showed a significant relationship with the income per caput of the families. It was interesting that the subjects, with a few exceptions, were unaware of the increased food needs during pregnancy and a few actually believed that food restriction would facilitate easy delivery.

\textit{Prevalence of malnutrition}

The vast majority of the pregnant subjects complained of long-standing general weakness, fatigability and vague body pains. The nutritional significance of these complaints is not clear.

From a nutritional survey conducted on 198 pregnant women in the third trimester of pregnancy it was found that 44% of them showed clinical manifestations of vitamin B complex deficiency, 14.5% showed signs of hypovitaminosis A and 9.5% had oedema of the lower extremities. The high prevalence of clinical manifestations of vitamin B complex deficiency among pregnant women in this part of India is substantiated by the results of the nutrition survey.

\textit{Gain in body-weight during pregnancy}

The body-weight of the average non-pregnant woman in South India is very low. The mean body-weight of a group of 498 non-pregnant women of different ages from the low socio-economic group was found to be 42.4 kg. When the body-weights of the women were grouped on the basis of (a) number of children and (b) age, it was found that an increase in the number of children or an increase in age was not associated with an increase in body-weight, a phenomenon reported to occur in Caucasian women.

The growth of the foetus, the enlargement and hypertrophy of the organs of reproduction and lactation and the increase in the volume of body fluids and other physiological changes taking place during pregnancy are reflected to some extent in a progressive increase in body-weight. While there appears to be no unanimity regarding the "ideal" weight gain in pregnancy, the usual weight increase is stated to be about 25% of the initial body-weight. Thus, if the normal pregnant woman has to gain on an average 25% of her initial body-weight, the expectant Indian mother should put on over 10 kg during gestation. The mean gain in body-weight from the 12th to the 40th week of gestation in 48 pregnant women was, however, found to be only 6.02 kg $\pm$ 0.377 kg (Venkatachalam, Kalpakam Shankar & Gopalan, 1960). The age of the subjects or the body-weight at the 12th week of gestation did not appear to influence the weight increase. The extent and rate of gain were nearly the same in both the primigravidae and the multigravidae, with a maximum increase between the 20th and 24th week of gestation (Table 1).

As pregnancy advanced there was a progressive increase in the number of subjects who failed to gain weight for four weeks at a stretch. While in only 13% of the 130 women the body-weight remained stationary between the 20th and 24th week, nearly 50% failed to put on weight between the 32nd and 36th week and thereafter. Three pregnant women not included in this series failed to gain weight from the 18th week till the end of the 36th week.

The comparatively small gain in body-weight in the subjects raises the important question as to how far this may be a reflection of the poor nutritive status. The weight gained during pregnancy represents the sum total of the weight increase of the individual constituents of the body, such as cell mass, extracellular water, fat and minerals. The contribution made by the accumulation of minerals towards an increase in body-weight, though physiologically of great significance, is negligible.

In 18 subjects, between the 9th and 36th week of gestation, a single estimate of the total body fluids was made using the urea dilution technique (Ven-
katachalam, Kalpakam Shankar & Gopalan, 1960). In six subjects, between the 9th and the 14th week, the fluid space was 56.1% of the body-weight. This value was nearly the same as that observed in normal, non-pregnant women. In seven subjects, between the 20th and the 28th week of gestation, the fluid space was 66.4%, and in five subjects, after the 28th week, it was 70.9% of the body-weight. The latter two values were significantly higher than that between the 9th and the 14th week, indicating a substantial increase in body water with the advance of pregnancy. On a theoretical calculation the increase in body-weight that may be expected from the increase in body water between the first and the third trimester is 10 kg or more, which is greater than the mean weight increase during pregnancy. Nitrogen-balance studies in pregnant Indian women at different levels of protein intake have shown nitrogen retention or nitrogen equilibrium at levels of protein intake obtaining in these subjects (Jayalakshmi, Venkatachalam & Gopalan, 1959). In the light of this the only way in which the increase in total body-weight could be less than the increase in total body water is through a simultaneous loss of body fat. The low gain in body-weight in the subjects is probably due to a smaller gain of cell solids or a greater loss of body fat, or both, operating through a low intake of protein and calories. Further studies are necessary in order to arrive at the answer to some of these problems.

### Haemoglobin

Haemoglobin values were determined on 394 subjects at different terms of pregnancy. The mean haemoglobin concentration in 42 subjects between the 9th and the 14th week of gestation was 12.82 g/100 ml ± 0.199 g; in 116 subjects between the 15th and the 24th week of gestation it was 11.63 g ± 0.144 g; and in 236 subjects between the 25th and the 36th week it was 11.20 g ± 0.107 g. The mean figures do not, however, indicate the prevalence of anaemia at different trimesters. In order to assess this it was necessary to determine the number of subjects showing different levels of haemoglobin (Table 2).

Assuming that a haemoglobin value of less than 10 g represents anaemia, it was found that nearly 20% of all the subjects suffered from anaemia to some degree. The prevalence of anaemia was greater in those in an advanced state of pregnancy. While nearly one-quarter of the subjects in the third trimester had haemoglobin values of less than 10 g, only 2% and 16% showed values of less than 10 g in the first and second trimesters respectively.

Since no subject who was frankly anaemic and could be clinically diagnosed as suffering from anaemia without a haemoglobin determination was included in the study, it is felt that the above findings are an underestimate of the prevalence of anaemia among pregnant women. The results of a haemoglobin survey of 198 pregnant women selected at

### Table 1

**WEIGHT INCREASE (IN KILOGRAMS) AT FOUR-WEEKLY INTERVALS**

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<td>Standard error</td>
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random in the third trimester showed that nearly 56% of them had haemoglobin values of less than 10 g. The haemoglobin determinations in all subjects were made by Wong’s method using a photoelectric colorimeter.

Serum proteins

The total serum protein and albumin values in different trimesters of pregnancy are given in Table 3. The determinations were made by Kjeldahl’s method. The globulins were precipitated using a 28% sodium sulfite solution. The mean serum albumin in the non-pregnant and the pregnant women was low. There was a decline in the albumin concentration as pregnancy advanced. The presence of hypoalbuminaemia, even among the non-pregnant women, suggested that the subjects suffered from varying degrees of protein deficiency right through their child-bearing life.

Serum carotene and vitamin A

The mean carotene concentration in the serum of 33 subjects in the third trimester was 99.0 μg/100 ml. The mean value in the 1st and 2nd trimester was 87.9 μg and 75.4 μg per 100 ml in 10 and 8 subjects respectively. The differences in the carotene values at different trimesters were not statistically significant. The mean values for serum vitamin A were 67.2 I.U., 88.2 I.U. and 104.3 I.U. per 100 ml in the third, second and first trimesters respectively. The value in the third trimester was thus significantly lower than those in the first and second trimesters. Both the carotene and the vitamin A concentrations in serum were low compared with figures reported from Western countries.

STUDIES ON NEWBORN INFANTS

The results of the dietary, clinical and biochemical studies on pregnant women of the low socio-eco-
nomic group in South India reported above indicated that the large majority of the women experienced the nutritional stress of gestation without adequate preparation or protection either before or during pregnancy. What were the effects of this poor nutritional status of the South Indian mother on the status of the offspring? The question was approached from two angles—first, by studies of the birth weight of babies and, secondly, by studies of certain blood constituents of the mother and the newborn.

**Birth weight**

The figures for birth weight of a series of infants born to women of low and high socio-economic groups from three areas are presented in Table 4. The diet and nutritional status of the mothers in the low socio-economic group were similar to those outlined earlier. Though there were no quantitative data on the diet and nutritional status of the mothers in the high socio-economic group, it was confirmed that all the women belonged to the wealthy class of the population and were invariably wives of civilian officers or officers of the armed services. All the babies from both the groups were born in hospital and the birth weight was recorded by trained hospital staff. Only the weights of those infants born alive at term were included in the series.

The mean birth weight of babies born to women of the low socio-economic group in the Coonoor-

Hyderabad sample was 2778 g ± 11.3 g and that of babies born to mothers of the high socio-economic group was 3055 g ± 24.8 g. The difference was statistically significant. The birth weight of male and female babies in the two groups showed slight but not significant differences. The results for the two sexes are not presented separately, since each of the two groups contained equal numbers of male and female babies. When the frequency distribution of the birth weight of babies in the two groups was compared, it was found that with improvement in socio-economic status, there was a shift of the birth weight curve to the right.

**Prevalence of immaturity**

Using the minimum of 2500 g for full-term babies established by WHO, the prevalence of immaturity among the infants of the low socio-economic group was found to be 29.3%, while among those of the high socio-economic group it was 13.8%. While less than 2% of babies born to mothers of the upper socio-economic group recorded a birth weight of less than 2000 g, nearly 9.2% of the neonates in the low socio-economic group were under this weight.

Thus on the basis of birth weight in relation to the WHO standard, nearly a third of the infants born to mothers with poor nutritional status were immature. It was observed, however, that practically all the babies weighing 2000 g or more at birth, apart from being small in size, did not exhibit the clinical picture of prematurity and did not reveal any evidence of functional or physiological immaturity during the first three or four days of the period during which observation is normally possible in hospital. Since the mother and infant were sent away from the hospital within four days of the birth, and because of the inherent difficulties in the follow-up of these infants, it was not possible to ascertain their subsequent progress. It is essential that such infants be followed up regularly for several weeks or months before a relationship, if any, between low birth weight and functional immaturity is established. On the other hand, it may be safely suggested that all the infants with a low birth weight are nutritionally immature, and that the effects of this may become apparent only during the early months of life.

Infant mortality statistics are revealing in this respect. For example, in Madras City the infant mortality per 1000 live births was 136 in the year 1954 (Gopalan, 1957). Nearly 25% of these deaths occurred within seven days and 38% within the first

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<td>Coonoor and Hyderabad:</td>
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<td>Coonoor, Hyderabad and Madras d</td>
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<td>Immaturity (based on WHO standard)</td>
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* The pooled figures for Coonoor, Hyderabad and Madras are given separately, since the standard error for the Madras data is not available.
month after birth. Neonatal mortality thus contributed to the bulk of the deaths occurring during infancy. An analysis of the causes of death revealed the startling information that nearly 73% of all deaths within one month of age were the direct result of "debility and prematurity".

Relation of birth weight to occurrence of kwashiorkor

Though kwashiorkor has been rarely reported in children under one year of age in South India (a prevalence of less than 2%), the possible role of maternal malnutrition and consequent neonatal malnutrition in predisposing to the disease had to be assessed. From a careful tracing back of the records of a large series of kwashiorkor patients investigated in the nutrition wards it was possible to obtain the birth weights of 34 patients (Varkki et al., 1955). The age of the babies at the time when they developed kwashiorkor was between 1 and 3 years. The mean birth weight of the 34 children was 2724 g. Eighty per cent. of the babies weighed more than 2500 g at birth. There was no significant difference between the birth weight of babies with kwashiorkor and that of other infants of the same socio-economic group. There was no correlation between the birth weight and the age of onset of the disease. On the basis of the above, it is suggested that in the development of clinical protein malnutrition in children the birth weight and possibly the poor maternal nutritional status are not direct contributory factors.

Birth weight in relation to weight gain during pregnancy

The weight gain during pregnancy from the 12th week of gestation till term and the birth weight of the newborn infant were obtained in 15 subjects (Venkatachalam, Kalpakam Shankar & Gopalan, 1960). The mean weight gain of the 15 pregnant women was 5.57 kg ± 0.803 kg and the mean birth weight of the infants was 3120 g ± 79.0 g. The gain in body-weight failed to show a significant correlation with the infant's birth weight in this limited number of subjects. However, in view of the significance and implications of changes in body-weight during pregnancy discussed earlier, it is felt that data on a large number of subjects are necessary before any conclusions can be drawn about this relationship.

Birth weight of infants born to mothers hospitalized for a minimum period of four weeks before delivery

In the course of some investigations on vitamin A metabolism in the mother and the newborn infant, a randomly selected group of pregnant women belonging to the low socio-economic group were admitted into the nutrition ward in about the 36th week of gestation. Twenty-three of the subjects were able to remain in the hospital for more than four weeks before going into labour. During their stay in the nutrition ward, the subjects were given an adequate, balanced diet containing nearly 85 g of protein and over 2500 calories per day. In addition, they were able to enjoy complete physical rest.

The mean birth weight of the babies born to these women was 2986 g ± 86 g. The mean birth weight of infants born about the same time to another group of 394 women who had not received any sustained antenatal care and arrived in the hospital with labour pains straight from their homes was 2794 g ± 21.6 g. The difference in the mean birth weight in the two groups was statistically significant.

It is not, however, possible to dissociate the effects on birth weight brought about by the physical rest during the last few weeks of pregnancy from those resulting from a vastly improved diet.

Loss of weight in the neonate during the early days of life

In 65 infants in which birth weight was noted immediately after delivery, the body-weight was recorded daily in the morning for the first 10 days. The infants were divided into two groups—25 with a birth weight of over 2750 g and 40 with a birth weight of less than this figure. The mean birth weight of the 25 infants (group I) was 3067 g (range 2752-3519 g) and that of the 40 infants (group II) was 2305 g (range 1603-2710 g).

The maximum weight loss in both groups took place between the 2nd and 3rd day after delivery. The babies in group I regained their birth weight between the 5th and 6th day, while those in group II regained it between the 4th and 5th day. The most interesting difference, however, was found in the extent of weight loss in the two groups. The mean loss of weight in the larger infants (group I) was 102 g ± 9.41 g and that in the smaller infants (group II) was 75.8 g ± 7.82 g. This difference was found to be statistically significant at the 5% level, suggesting that loss in body-weight in the neonate in the early days of life is to some extent influenced by the weight at birth.

Haemoglobin

The mean haemoglobin content of venous blood of 50 newborn infants was 17.6 g/100 ml ± 0.280 g and that of their mothers, determined on the same
day, was 10.8 g/100 ml ± 0.270 g (Jayalakshmi, Ramanathan & Gopalan, 1957). No statistical relationship could be established between the infant and maternal haemoglobin levels. However, the neonatal haemoglobin concentration alone can provide no indication of the iron nutritional status of the infant, since factors such as total blood volume and iron stored in the liver are equally important. Thus a high haemoglobin value at birth, the result of intra-uterine anoxia, is no security against the development of anaemia later on, particularly in immature babies with poor iron reserves.

Serum proteins

The mean total serum proteins in 50 newborn infants was 5.55 g/100 ml ± 0.124 g and that of their mothers was 6.25 g/100 ml ± 0.073 g (Jayalakshmi, Ramanathan & Gopalan, 1957). The mean serum albumin was 3.13 g/100 ml ± 0.072 g and 2.96 g/100 ml ± 0.056 g respectively in the newborn and the mother. A significant correlation was observed between the maternal and the neonatal values, suggesting that maternal hypoaalbuminaemia is reflected in the blood of the newborn.

Serum carotene and vitamin A

The serum carotene and vitamin A values in the cord blood of 43 newborn infants were 24.1 μg/100 ml and 49.9 I.U./100 ml respectively. On the other hand, the serum carotene and vitamin A in the cord blood of 12 neonates whose mothers had received a daily oral supplement of 48,000 I.U. of vitamin A for periods ranging from 2 to 38 days before the onset of labour were 21.3 μg/100 ml and 84.2 I.U./100 ml respectively. The difference in the serum vitamin A in the two groups was significant.

COMMENTS

Sufficient evidence has been presented in the foregoing pages to indicate that the nutritional status of pregnant women of the low socio-economic group in South India was far from satisfactory. The subjects suffered from varying degrees of calorie-protein deficiency though they did not exhibit any gross clinical evidence of calorie-protein malnutrition. A large number of subjects showed manifestations of vitamin B complex deficiency and an equally large number showed evidence of anaemia. The very low intake of vitamin A in the diet, the low serum vitamin A values and the occurrence of vitamin A deficiency signs in some would suggest that vitamin A deficiency was also a problem among them. On the basis of the evidence produced, it might be surmised that the prevailing nutritional status of these women before pregnancy was also poor.

An inquiry into the conceptional history of a group of multigravidae among the subjects revealed that nearly 20% of all pregnancies had terminated in abortion, miscarriage or still birth. Though this high percentage of premature termination of pregnancy is not entirely attributable to preconceptional and prenatal malnutrition of the mother, the significance of maternal nutritional deficiency in causing it remains to be assessed. In pregnancies which had proceeded to term the effect of poor maternal nutritional status on the live-born baby was reflected in a low average birth weight, nearly one-third of the infants weighing less than 2500 g at birth. It is presumed that the small-sized under-weight infants, even if they are physiologically and functionally mature and manage to live, probably possess very little or no nutritional reserves and become potential subjects for the development of nutritional deficiency and its attendant consequences during the early months of life. It was indicated earlier that the major factor responsible for the high infant mortality rate was the high prevalence of "debility and prematurity" in the newborn infants.

While it is understandable that prolonged multiple nutritional deficiency in the mother, before and during pregnancy, is liable in many instances to result either in foetal death or in the birth of small under-weight infants which are in a state of physiological and/or nutritional immaturity, the question remains to be answered as to how, in spite of the poor nutritional status, a large number of these mothers were able to deliver normal infants of more than average birth weight. It would appear that possibly the pregnant woman brings into operation "adaptive mechanisms" in her own body facilitating the conservation and maximum utilization of the available nutrients in order to safeguard the developing foetus. If this is true, some of the recommended allowances of nutrients for pregnant women are grossly exaggerated.

The other factor which probably has to be taken into account is the functional capacity of the placenta. It is through the placenta that the nutrition of the foetus takes place. The placenta is considered to possess a vast reserve capacity, with the result that a small-sized organ is adequate for producing
infants of high as well as low birth weights. As a first step, information is needed regarding the size and weight of the placenta of full-term infants which are markedly under size and under weight, on the one hand, and of those which are of more than average birth weight, on the other. Further research is also necessary to determine the correct nutritional significance of the high perinatal and neonatal mortality among infants of different birth weights through the clinical follow-up of neonates for several weeks after birth and through studies and biochemical analysis of the organs and tissues of the infants of different birth weights which die during the early weeks after delivery.

RéSUMÉ

L'auteur rapporte les résultats d'une enquête sur l'état nutritionnel des femmes enceintes et son incidence sur le nouveau-né, enquête qui a été effectuée dans trois endroits du sud de l'Inde. La plupart de ces personnes, âgées de 15 à 40 ans, ont exercé un travail physique tout au long de leur grossesse. Selon le questionnaire soumis à 352 d'entre elles, leurs habitudes alimentaires étaient uniformes et la nourriture peu variée. La ration calorique était en moyenne de 1408 cal et celle de protéines de 38 g, avec d'importantes variations individuelles. La majeure partie des protéines provenaient uniquement de céréales; les quantités de protéines et de calories absorbées étaient en relation directe avec le revenu individuel. L'apport quotidien en calcium, fer et vitamine A a été dosé dans quelques cas: il était respectivement de 315 mg, 18 mg et 912 U.I.

Le poids corporel moyen de 498 femmes non enceintes appartenant à la classe pauvre, était de 42,4 kg. Le nombre d'enfants ou l'âge étaient sans influence sur ce chiffre.

Entre la 12e et la 40e semaine de grossesse, l'accroissement moyen du poids corporel a été peu marqué (6,02 kg ± 0.37). Cette valeur était indépendante de l'âge, de son niveau à la 12e semaine, et de l'ordre de la grossesse. La mesure de la phase humorale de l'organisme par le procédé utilisant la dilution de l'urée a montré que les liquides représentaient au total: 56,1% du poids corporel de la 9e à la 14e semaine (6 cas), 66,4% de la 20e à la 28e semaine (7 cas), et 70,9% au-delà de la 28e semaine (5 cas). Du 1er au 3e tiers de la grossesse, l'accroissement des liquides totaux de l'organisme a été significatif. Le calcul théorique a montré que, au total, le gain de poids corporel au cours de la grossesse était inférieur à l'augmentation totale des liquides de l'organisme. Cette disparité a été attribuée soit à une moindre augmentation des éléments cellulaires solides ou à une dépédition accrélée du tissu adipeux, soit à l'action simultanée de ces deux facteurs en raison du faible apport de protéines et de calories. Cette question devra faire l'objet de recherches plus approfondies.

En dehors de toutes complications obstétricales, une enquête nutritionnelle effectuée au dernier tiers de la grossesse chez 198 femmes a révélé — à côté de symp-
que le développement de ces petits enfants n'a pu être suivi ultérieurement, on ne peut qu'émettre l'hypothèse que les enfants de faible poids seraient immatures au point de vue nutritionnel et ne disposeraient que de faibles réserves.

Chez 34 enfants atteints de kwashiorkor à l'âge de 1-3 ans, le poids de naissance était de 2724 g. Mais, comme le poids de naissance de ces enfants ne se distinguait pas significativement de celui d'autres enfants du même groupe socio-économique et comme le poids corporel n'était pas en corrélation avec le début de la maladie, on est amené à penser que le poids de naissance et les mauvaises conditions d'alimentation de la mère ne sont pas des facteurs directement déterminants du tableau clinique de carence protidique. Le poids de naissance des enfants dont les mères avaient été traitées dans le service de nutrition au cours de leurs 4 derniers mois de grossesse était significativement plus élevé que celui des enfants dont les mères n'avaient pas reçu de soins prénataux. Cependant, il n'est pas possible de faire une discrimination entre les effets sur le poids de naissance du repos physique au cours des dernières semaines et l'influence du régime alimentaire très supérieur de l'hôpital.

La chute pondérale des nouveau-nés aux premiers jours de leur existence est en relation, dans une certaine mesure, avec le poids de naissance.

A défaut d'une relation statistique entre les taux d'hémoglobine du nouveau-né et de sa mère, une corrélation significative a été mise en évidence entre les valeurs sériques de l'albumine chez la mère et chez l'enfant. Chez 43 nouveau-nés, le taux sérique moyen de vitamine A mesuré après prélèvement au niveau de la veine ombilicale était de 49,9 U.I., tandis que 12 nouveau-nés dont les mères avaient reçu par voie orale un apport quotidien de vitamine A pendant des périodes variables avant le début de l'accouchement avaient un taux de 84,2 U.I. Cette différence était significative.

En conclusion, on peut admettre qu'un mauvais état nutritionnel de la mère, avant et pendant la grossesse, est responsable d'une mortalité élevée ou de la mise au monde d'enfants qui présentent de l'insuffisance pondérale et possèdent peu de réserves nutritionnelles.

REFERENCES