

THE YEAR BOOK *of* OBSTETRICS *and* GYNECOLOGY

(1955-1956 YEAR BOOK Series)

EDITED BY

J. P. GREENHILL, B.S., M.D., F.A.C.S.

Professor of Gynecology, Cook County Graduate School of Medicine; Attending Gynecologist, Cook County Hospital; Attending Obstetrician and Gynecologist, Michael Reese Hospital; Associate Staff, Chicago Lying-in Hospital; Author of OFFICE GYNECOLOGY, OBSTETRICS IN GENERAL PRACTICE and PRINCIPLES AND PRACTICE OF OBSTETRICS

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THE PRACTICAL MEDICINE YEAR BOOKS

This volume is one of the 13 comprising the Practical Medicine Series of Year Books founded in 1900 by G. P. Head, M.D., and C. J. Head, and published continuously since then. The complete list follows:

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OBSTETRICS

PREGNANCY

PHYSIOLOGY

Vanderbilt Co-operative Study of Maternal and Infant Nutrition: IX. Some Obstetric Implications are reported by William J. Darby, Edwin Bridgforth, Margaret P. Martin and William J. McGanity.¹ The prenatal clinic population of 2,338 women consecutively registered at Vanderbilt University Hospital was investigated. Socioeconomic status ranged from low to low-moderate. Diets were varied, included frequent consumption of necessary basic nutrients, as supplied by milk and eggs, green and other vegetables, citrus and other fruits, and revealed no widespread, disturbing food prejudice with pregnancy. Average caloric intake was below that expected from widely accepted standards, suggesting that standards of caloric intake during pregnancy are too high for present day steam-heated, motorized, mechanized culture.

In 466 unselected patients, iron metabolism was studied. During early pregnancy, relatively little administered iron was absorbed and utilized by the average patient, but uptake increased as gestation progressed. From the 30th week, three or more times as much iron was absorbed as before the 15th week, indicating that early in gestation and in absence of iron deficiency anemia, so-called preventive or protective iron therapy is relatively inefficient.

Two general deductions were made. (1) More abundant nutrient intake as determined by caloric level above the mean was not associated with decrease in obstetric or fetal complications, laboratory results or physical findings. (2) When nutrient intake level fell 1 standard deviation or more below the mean, there were no significant variations in laboratory data or physical findings, but a significant increase in incidence of associated medical diseases and of toxemia

(1) *Obst. & Gynec.* 5:528-537, April, 1955.

occurred. However, further analysis indicated that these complications were responsible for the lowered intake, not vice versa. Data indicating a relation between obstetric and pediatric abnormalities and nutrition revealed that women with associated medical disorders had lowered caloric and nutrient intake and elevated levels of total serum protein throughout pregnancy. These deviations in nutrition and laboratory data were minimal and were not accompanied by physical signs of deficiency. They are consistent with chronic illness.

Women with protein intake of less than 50 Gm./day had no increased incidence of toxemia. Pre-eclampsia and eclampsia are probably not the result of protein deficiency, and heavier and longer babies probably do not result from greater caloric and protein intake by the mother.

Epiphysial Maturation in Newborn as Related to Maternal Nutritional Status. Prenatal factors influencing maturation of the ossification centers typically appearing at or near term are not clear. X-rays of epiphysial centers in the knee and heel were studied in 300 term babies by Winslow T. Tompkins and Dorothy G. Wiehl¹² (Philadelphia). Prenatal patients of 16 or less weeks' gestation, without complicating illnesses were divided into a control group and into groups supplemented with either vitamins, proteins or both.

It appears that dominant factors are operating, associated with sex (striking incidence of delayed maturation of the os calcis in white male babies) and race (os calcis absent at birth in about one half of white babies and in only one third of Negro babies). Although supplementation during pregnancy is associated with improved maternal status and a lower incidence of prematurity, a statistically significant difference in the maturation process was not found. In the supplemented groups, there was a smaller number of both male and female babies with delayed maturation than in the controls, but in the combined supplemented groups, a significant difference was noted only among female babies. Sex and race differences were much less at one month, although degree of maturation in females was slightly ahead. In an ossification center well developed at birth, progress during the first four weeks was less rapid than

in a center just beginning to develop, suggesting that growth rate may be rapid until a certain stage, after which it decreases.

Great variation was noted among infants in maturation of epiphysial centers at birth. Because of the changing rate in the maturation process, this variation decreases as time after initial formation of the center increases. At birth, the least difference by race and sex was found for the center at the distal end of the femur which is most advanced; the greatest in the least advanced os calcis center. Negroes tend to develop the centers earlier than whites, and in each racial group the female is more precocious than the male. The tibial epiphysial center in the knee, which should be present at birth, is a more sensitive index of infant maturity than the os calcis or femur. Among supplemented patients, there was a significantly greater probability that the tibial epiphysial center of the knee would be present at birth, especially for female babies.

The evidence suggests that nutritional factors may affect the efficiency of the mechanism of skeletal growth and maturation.

Implications of Nutrition in Life Cycle of Woman. Icie G. Macy and Harold C. Mack³ (Detroit) feel that those who give preconception and antepartum medical care have a great responsibility not only to protect the immediate and future health of the woman but to protect the child from metabolic imbalances and deficiencies, the residual effects of which might constitute systemic or teratologic scars which would plague his future health and that of his descendants.

Surveys show that in the United States, where food is produced in abundance, $\frac{1}{2}$ - $\frac{2}{3}$ of the population is underfed or poorly fed; and $\frac{2}{3}$ of the world's population is undernourished. Obesity, a form of malnutrition due to overeating, unbalanced diet or other causes, is a national problem in the United States. There is reason to believe that many adolescent girls get less than 50% of the essential nutrients for optimal health.

Both dietary intake and physiologic state of the mother may be directly reflected in retention and utilization of nutrients during pregnancy. Maternal physiologic responsibil-

(3) Am. J. Obst. & Gynec. 68:131-150, July, 1954.

ity does not terminate with parturition but proceeds in even greater degree during lactation. The physiologic processes motivated by lactation are accompanied by increased requirements for minerals and other food essentials. Significant losses of calcium, despite a seemingly adequate intake and vitamin supplements, indicate the need for more thorough knowledge of the physiologic processes of reproduction.

Malnutrition may occur with adequate diet. Some deficiencies are caused by factors that interfere with the ingestion, absorption or utilization of essential nutrients or that increase the requirement for them, destroy them in the body or cause their excretion. Poverty is the greatest contributor to underfeeding. Misfeeding is a much larger problem and may continue for months or years without causing deficiency disease or specific symptoms of dietary failure.

There is an intimate inter-relationship between nutritional status of mothers before and during pregnancy and the health of their children. Eating the right kinds and amounts of food is reflected in better maternal health throughout pregnancy and during lactation. A girl who has not completed growth and whose body is not nutritionally provided for cannot be expected to develop a nutritionally sound fetus without careful medical supervision throughout pregnancy.

[The Detroit group of investigators, particularly Macy, has made many important contributions in the field of nutrition in pregnancy, including their valuable monograph, *Physiological adaptation and nutritional status during and after pregnancy* (J. Nutrition, vol. 52, supp. 1, April, 1954), the last sentence of which reads: "The increasing number of teen-age girls who are assuming the responsibility of motherhood today poses a real challenge to parents, doctors and health authorities, to see that nutritive needs are met in full measure during each epoch of life, that the forthcoming generations may be healthy in mind and in body."

In the 1953-54 YEAR BOOK, page 50, Page and Page reported that in obstetric patients urged to drink more milk and given dicalcium phosphate leg cramps were induced, whereas substitution of calcium lactate or calcium gluconate relieved the cramps. They suggested that efficiency of intestinal absorption of phosphates might increase during gestation, with resultant depression of ionized calcium in the blood, and advocated the addition of aluminum hydroxide gel to the diet for patients who drink large amounts of milk and have leg cramps. Hawker (Missouri Med. 51:727, September, 1954) found that leg cramps are not as common in clinic patients with a diet poor in proteins as in patients seen in private practice. Aluminum hydroxide gel and large amounts of vitamin D relieved the painful muscle contractions. Wolff (Illinois M. J. 105:305, June, 1954) also found that leg cramps may be prevented by augmenting

the diet with a vitamin and mineral supplement containing a calcium salt free from phosphorus plus an aluminum hydroxide gel which eliminates dietary phosphorus. Only 4% of the patients developed leg cramps while on such a regime, compared to 51% of the controls.

McCarthy *et al.* (*Gastroenterology* 27:275, September, 1954) found that quantitative collections of gastric secretion over long periods from female dogs provided with accessory stomach pouches showed that pregnancy had no consistent effect in stimulating or inhibiting gastric secretion but that a considerable and continued hypersecretion of gastric juice occurred during lactation.

Pope (*Postgrad. Med.* 16:58, July, 1954) wrote an extensive article showing the profound effect of pregnancy on the gastrointestinal tract.

De Watteville *et al.* (*Schweiz. med. Wchnschr.* 84:875, July 24, 1954) emphasize the significance of vitamins for the normal course of pregnancy. Female rats in which the vitamins B₁, B₂, and B₆, pantothenic acid or A are omitted from the diet before and during pregnancy and during lactation present markedly decreased fertility even if there are no deficiency symptoms. In the fetus, abnormalities and malformations frequently occur. The birth rate is lowered and the mortality is increased. Silbernagel and Patterson (*J. Internat. Coll. Surgeons* 23:719, June, 1955) believe that sterility and fetal loss from spontaneous abortion and preivable premature births may be nutritional in origin. Since the modern diet is lacking in natural oils derived from grain, it may be deficient in substances necessary to protect the mother and fetus. The authors recommend the oral administration of wheat germ oil concentrate, a natural and stable product which aids the women with problems of infertility, abortion and habitual premature labor to lead normal reproductive lives.

Ingelman-Sundberg (*Acta endocrinol.* 17:165, 1954) found that vitamin E deficiency in guinea pigs produces infertility and that this can be remedied by supplying an adequate amount of vitamin E. I have not found vitamin E helpful in women.—Ed.]

Maternity Minus Marriage. Illegitimate live births per year in the United States increased from 88,000 in 1938 to 142,000 in 1950. Physicians are in charge of an increasing number of these cases. Education, socializing influences and the more even distribution of incomes among the various social strata have enabled young women to seek confidential assistance from physicians of their choice.

Most patients seen in private practice are under age 20. According to recent statistics, 44% of illegitimate births were to girls aged 15-20. About 32,000 of the illegitimate livebirths in 1950 were to girls younger than 17. Goodrich C. Schaufler⁴ (Portland, Ore.) emphasizes that this calls for more than ordinary solicitude in the physician and special information about teen-age obstetrics.

Precocious sex activity of young people arises from greatly increased awareness of sex in this group, stimulated and maintained by sex hysteria—a calculated instrument of modern journalism and so-called entertainment trends

(4) GP 11:74-77, February, 1955.

(movies, radio, television, theater). Also, loose practices, bad examples and lack of supervision in parental and home influences, liquor and narcotics, automobiles and auto-courts, and gang influences tend, in certain groups, almost to enforce premarital sex practices. The unwillingness of a young man to assume his obligation—a consistent component of this problem—is another facet of present day adolescent ethics.

The physician faced with an unmarried pregnant girl should obtain the legal opinion of authoritative social welfare agencies at once. Court action should be undertaken only after long thought. The law is clumsy and inadequate. Whatever a girl may attain from legal exactions, she is apt to lose far more by the harrowing course of subsequent events. The rights of the mother are, fortunately, sedulously protected. At present, she has complete power of decision about her own and the child's disposal and, unless court complications have arisen, is not at all legally impugned.

Regardless of religious or ethical considerations, common sense and broad experience indicate that abortion is not the best way out of the situation. Illegal abortion is dangerous in any circumstance. Danger to the patient's fertility is considerable. Abortion often causes a permanent and serious psychic stigma, whereas proper conduct of pregnancy and labor is less apt to do so and may even prove to be a maturing experience. There may even be some spiritual compensation if the patient can confer a healthy adoptive child on a deserving childless couple. Forced marriage, in the absence of affection or mutual respect, is not a sound solution.

Causes of Histidinuria in Normal Pregnancy. Ernest W. Page, Mary Beth Glendening, William Dignam and Harold A. Harper⁵ (Univ. of California) conducted renal clearance studies on 10 normal pregnant women receiving intravenous infusions of inulin and l-histidine at a constant rate. Plasma and urinary levels of the amino acid were determined microbiologically. Identical studies were repeated on the same persons four to seven weeks after delivery.

All subjects had increased histidinuria while pregnant,

(5) *Am. J. Obst. & Gynec.* 68:110-118, July, 1954.

with marked increases in histidine clearance. The following factors were found to account for this. (1) Rate of glomerular filtration was increased in all 10 subjects from a nonpregnant mean of 104 to a pregnancy mean of 171 ml./minute/1.73 sq. m. of body surface. This change accounted for about half of the excess histidine excreted. (2) Percentage of filtered histidine reabsorbed by the renal tubules was decreased during pregnancy in every subject, accounting for about one fourth of the excess histidine excreted. (3) Rate at which injected histidine entered the intracellular compartment of the body was decreased by pregnancy from a mean of 1.015 ± 0.04 to a mean of 0.81 ± 0.15 Gm./hour. This reduction, statistically significant, causes an elevation of the plasma histidine level sufficient to account for the remainder of the excess histidine excreted. It is not known whether the altered metabolism is due to a decrease in rate of histidine breakdown or in rate of histidine utilization or both.

Identification of Small Quantities of Chorionic Hormone: Determination of Day of Nidation of Ovum. The standard reactions used for measuring gonadotropic effect are common to both hypophyseal and chorionic hormones. P. Simon, M. Robey and H. Simonnet⁶ (Paris), however, have worked out a method of determining when chorionic hormone, as distinct from hypophyseal gonadotropins, appears in the urine of a pregnant woman. Determination of the qualitative change in gonadotropic activity also establishes the day on which nidation of the ovum occurs.

Two technical procedures were available: selective extraction, not only to identify the hormones of chorionic and hypophyseal origin separately, but also to separate the elements of the hypophyseal complex; and nonselective extraction, to demonstrate the appearance of the chorionic hormone by biologic reactions in test animals. The authors chose the latter, with concentration by either ultrafiltration on suitably prepared collodion or adsorption on kaolin or a Chamberland bougie. Appropriate pharmacodynamic tests were devised, consisting in production, in the female rat or nonpubescent mouse (some hypophysectomized), of the follicular hypertrophy caused by the follicle-stimulating hormone. The hypertrophy so produced

(6) Gynec. et obst. 53:296-304, 1954.

can be distinguished from restoration of deficient cells of the interstitial ovarian tissue of the hypophysectomized rat, without follicle-maturing action, which characterizes the presence of chorionic hormone. Because of the distinguishing features, the moment at which chorionic hormone appears in the urine can be determined.

[Behrman and Niemann (Fertil. & Steril. 6:236, May-June, 1955) describe a method for using serum for quantitative and qualitative analysis of chorionic gonadotropin. Among 22 cases falling outside the established "normal" curve, there were 5 cases of hyperemesis, 2 of diabetes, 6 of twin pregnancies, 2 of pre-eclampsia, 3 of hydatid mole and 1 each of placenta previa, hydrocephaly and anencephaly. The earliest positive serum or urine chorionic gonadotropin hormone test was obtained on the 16th postconceptional day. When intrauterine death occurs or pregnancy is terminated by any method or at whatever stage of gestation, a negative serum rapid rat test for chorionic gonadotropin can be obtained from one to four days before the urinary rapid rat test becomes negative.

Burdick *et al.* (Endocrinology 55:369, October, 1954) found that neither DCA nor sesame oil, given by injection, interfered with the progress of early pregnancy in mice. Abortions usually occurred, however, if the injections were stopped before the 8th day of pregnancy. Corpora lutea of pregnancy usually retained their vascularity, and their degeneration was associated with the death of embryos. It is not known whether pregnancy was terminated because DCA had depressed luteal function or whether the embryos had become dependent upon a high titer of this progesterone-like hormone. Apparently these injections did not harm the ovary. Ovulation occurred in several mice four to seven days after the last injection.

Bayliss *et al.* (Lancet 1:62, Jan. 8, 1955) studied the plasma levels of 17-hydroxycorticosteroids at monthly intervals throughout normal pregnancy of 30 women and found that the levels rose progressively during pregnancy but that, after delivery, the levels fell, returning to normal after a week.

Zarrow *et al.* (J. Clin. Endocrinol. 15:22, January, 1955) found that relaxin appears in the blood of women during pregnancy and increases to a maximum at 38-42 weeks of pregnancy. The hormone disappears from the blood within 24 hours post partum.—Ed.]

Effect of Supine Position on Urinary Output in Pregnancy was studied by Charles H. Hendricks and Allan C. Barnes⁷ (Ohio State Univ.). Impact on urinary output of changes in intra-abdominal pressure and hence of venous flow has been studied by numerous workers, but application of such observations to the expanding human uterus during pregnancy has remained uninvestigated.

Urinary output was observed with changes in position in 10 pregnant (last trimester) women in 36 tests. Total output for the 3 hour test period was 105% greater if patient lay on her side rather than on her back; this was consistent in all subjects. In another test, a tight abdomi-

(7) Am. J. Obst. & Gynec. 69:1225-1232, June, 1955.