Lactation and Pregnancy: A Hypothesis[1]

The possibility that a relationship exists between lactation and non-ovulation has long been considered, not only in native folklore, but by science in general. Slater, in discussing the origin of incest in the *American Anthropologist*, theorized that the prolonged nursing of infants in very primitive societies lowered the birth rate and restricted the number of children a woman might bear (1959:1052). This view was criticized by Kehoe who stated, "The medical school did teach, for a number of years, that lactogenic hormone inhibits the ovulation cycle. But the increasing incidence of breast feeding among better-educated American women . . . has demonstrated that, whatever the laboratory behavior of hormones, it is by no means rare for a nursing mother to become pregnant" (1960:880). This paper will present a hypothesis by which these two apparently contradictory views may be reconciled, using ethnographic data collected by the author in peasant populations of Guatemala in conjunction with materials from the literature in nutrition and endocrinology.

In many underdeveloped areas, studies on breast-feeding and weaning have brought to light the following information: 1) a long nursing period, lasting from 18 months to three years in some areas, is customary for almost 100 percent of the children born (Dods 1952; Goodman 1951; Sénécal 1959; Jelliffe 1955 and 1962; Oomen & Malcolm 1958; Solien de González 1963). 2) Solid or other supplementary foods are added to the infants' diets at a fairly late age—usually not until the latter part of the first year (Jelliffe and Bennett 1961; Gopalan and Belavady 1961; Watt 1959; INCAP Nutrition-Infection Study). 3) The lactation performance of even poorly nourished women in such areas is remarkably good from the point of view of both quantity and quality, although breast milk is not sufficient for optimum growth of the infant after six months of age unless supplemented with other food (Bassir 1957, 1958; Gallez 1960; Gopalan 1958; Jansen 1960; Sénécal 1959). 4) The onset of post-partum menstruation in low-income lactating women appears to be later than in well-to-do women in the same areas or in U. S. populations (Gopalan and Belavady 1961; Kurzrok et al. 1937; Peckham 1934). In Guatemala, for example, it appears from my data that the onset occurs about 12 months or more after birth in rural low-income populations. 5) The interval between births in these populations appears to be fairly long, i.e. from 2–3 years. Although in some areas, notably many parts of Africa, the culture prohibits intercourse during the lactation period; in others the long interval between pregnancies does not seem to be the result of abstinence from intercourse or the use of contraceptives (Solien de González 1962; Stahlie 1960).

All studies seen to date on lactation amenorrhea have been conducted in the U. S. or in parts of Europe where the incidence of breast-feeding is much lower, the duration shorter, and solids introduced earlier than among primitive and peasant populations. Peckham in 1934 studied the onset of post-partum menstruation in 2,885 lactating women. In 34 percent the menses occurred two months after delivery. By the end of the 6th post-partum month, 70

percent had started menstruation. Although Peckham did not study ovulation, in 1937 Kurzrok et al. found that 42–63 percent of the lactating women who bled at fairly regular intervals had an ovulatory or sterile cycle. In 1950, Udesky took 200 endometrial biopsies from 85 normal lactating women who were amenorrheic. Of these biopsies, 98.5 percent were estrogenic and 1.5 percent were luteal in character. He also took biopsies from 36 lactating women just before or following the onset of the first periods. Of these, 88 percent showed no evidence of ovulation. He concluded that in lactation amenorrhea the suppression of the ovarian cycle is almost complete, and that when ovulation did occur it usually was in the patient in whom lactation had been present for three or four months at least. He suggested that the intensity of the suckling process was directly related to the non-occurrence of ovulation and that there was an increase incidence of ovulation as soon as the weaning process went into effect (1950).

Gioiosa, who studied the incidence of pregnancy in lactating women in New Mexico, found that only 9.2 percent of 500 pregnancies occurred during lactation, and that 87 percent of these occurred during the process of weaning. She states, "Lactation does not offer the same degree of protection (i.e., against pregnancy) when supplementary feedings are given" (1955:170). Garbelli and Vercellino (1960) studied menstruation and conception in relation to lactation in Italy. They found that of 1,000 women, 69.4 percent did not begin menstruating until the end of the period of lactation.

It is also interesting to note that as long ago as 1927 Parkes and Bellerby concluded that lactation in mice suckling normal-sized litters somehow caused the corpora lutea of the post-partum ovulation to persist and inhibit estrus. Estrus would occur with estrogen injections, the amount necessary varying directly with the number of young sucklings (1927). Hooton (1947: 258) quotes the observations of Yerkes and Abreu which indicate that menstruation does not recur in the chimpanzee until after the infant is weaned, although he also notes that there is some disagreement of observers with respect to this.

A recent study by Keettel and Bradbury (1961) indicates that lactation *per se* delays the response of the ovaries to gonadotrophins. The ovaries appear to be in a refractory state in all post-partum women, but the state is prolonged in lactators. In addition to the effect of lactation *per se*, it is also possible that ovulation may be inhibited if the woman's physical status is poor (Hignett 1960; Sure 1941; studies on animals only, but also see Srebnik et al. 1958 for evidence to the contraty). We know also that an inadequate maternal diet will be reflected in the woman's physical status and not in the quantity or quality of her milk (Gopalan 1958; Gopalan and Belavady 1961; Janz, Demreyer, Close 1957b; Thomson and Hytten 1960). It is, therefore, possible that in undernourished populations the additional stress of lactation may contribute to the length of time noted between births.

It seems well accepted that a direct relationship exists between the amount of sucking done by the infant and the output of milk (Egli et al. 1961; Hytten

1954; Janz, Demreyer, Close 1957a; Macy 1949; Stewart and Pratt 1941). It is also apparent that an infant whose hunger has been partially satisfied by supplementary feedings will not suck as long or as hard on the breast, thereby probably tending to decrease the supply.

In view of the above evidence, I would like to suggest that the process of lactation as it occurs among primitive and peasant populations is generally not comparable to that which occurs in highly industrialized civilizations such as those found today in the United States and Europe. Lactation in the former groups tends to be a long-term, intensive process which includes frequent, non-scheduled stimulations of the breast, and which could very well inhibit ovulation until the later months when the child begins to be weaned onto other foods. In the U. S. and European populations who have access to modern pediatric consultation, breast-feeding tends to be supplemented with other foods at an early age, is scheduled to occur at relatively infrequent intervals (in comparison with primitives and peasants), and generally terminates well before the age of one year (see Bain 1948; Norris and Jeffereys 1957; Salber et al. 1959; Yankauer et al. 1958). Under such conditions we could expect that decreased sucking would have the effect of reactivating ovarian functions and that a certain percentage of women still partially breast-feeding a child would become pregnant. This would account for the fact that in modern studies such as those quoted above, the relationship between sterility and lactation might be obscured.

The confirmation or rejection of this hypothesis must await field testing in an area where intensive long-term lactation is the rule, but unfortunately, the known tests for determining ovulation are of such a nature that their use is impractical under field conditions. Nevertheless, some contributory data might be secured by controlled observations on the return of the post-partum menses in such populations. If the hypothesis is correct, earlier supplementation of breast-milk in underdeveloped areas, in the absence of contraceptive techniques, might be observed to increase local birth rates. In some parts of the world, data of this sort are probably already available.

Anthropologists should keep in mind the distinctions made here between supplemented and unsupplemented lactation when discussing child-rearing, child-bearing and fertility (e.g. Slater and Kehoe). They could be of great help in the collection of potentially valuable data in helping to solve the question because of their unique opportunities to study in non-Western cultures.

NANCIE L. SOLIEN DE GONZÁLEZ
Institute of Nutrition of Central American and Panama (INCAP), Guatemala, C.A.

NOTE

[1] INCAP Publication I-292.

REFERENCES CITED

BAIN, KATHERINE
1948 The incidence of breast feeding in hospitals in the United States. Pediatrics 2:313–320.

BASSIR, OLUMBE
1957 Nutritional studies on breast milk of Nigerian women. Determination of the output of breast milk. West African Journal of Biological Chemistry 1:15–20.
1958 Nutritional studies on breast milk of Nigerian women. (The constitution of breast milk in the third year of lactation.) West African Journal of Biological Chemistry 2:74–76.

DODS, LORIMER
1952 Some aspects of Australian pediatrics. Pediatrics. 10:364–372.

EGLI, G. E., EGLI, N. S., and NEWTON, M.
1961 The influence of the number of breast feedings on milk production. Pediatrics 27: 314–317.

GALLEZ, A.
1960 Contribution a l'étude des populations indigénes Congolaises en milieu sous-développé. III. Etude longitudinale du poids du nourrisson pendant les deux premieres annes de la vie. Annales de la Societe Belge de Medicine Tropicale 40:498–510.

GARBELLI, G. B. and VERCELLINO, G. F.
1960 Mestruazioni e concepimento durante l'allattamento al seno. Riv. Ostet. Ginec. Prat. (Italy) 42:650–653.

GIOIOSA, ROSE
1955 Incidence of pregnancy during lactation in 500 cases. American Journal of Obstetrics and Gynecology 70:162–174.

GOODMAN, LEONARD
1951 Obstetrics in a primitive African community. American Journal of Public Health 41 (Supplement) p. 56–64.

GOPALAN, C.
1958 Studies on lactation in poor Indian communities. Journal of Tropical Pediatrics 4:87–97.

GOPALAN, C. and Belavady, B.
1961 Nutrition and lactation. Federation Proceedings 20 (Supplement No. 7) pp. 177–184.

HIGNETT, S. L.
1960 The influence of nutrition on female fertility in some of the large domestic animals. Proceedings of the Nutrition Society 19:8–15.

HOOTON, E. A.
1947 Up from the ape. New York, Macmillan.

HYTTON, F. E.
1954 Clinical and chemical studies in human lactation. VIII. Relationship of the age, physique and nutritional status of the mother to the yield and composition of her milk. British Medical Journal 2:844–845.

JANSEN, A. A. J., LUYKEN, R., MALCOLM, S. H. and WILLEMS, J. J. L.
1960 Quantity and composition of breast milk in Biak Island (Netherlands, New Guinea) Tropical and Geographical Medicine 2:138–144.

JANZ, A. J., DEMREYER, E. M. and CLOSE, T.
1957a Nutrition and lactation in woman with particular reference to under-nutrition in the under-developed countries. West African Journal of Biological Chemistry 1:49–60.
1957b Nutrition and lactation in woman with particular reference to under-nutrition in the under-developed countries (Part II). West African Journal of Biological Chemistry 1.88–106.

JELLIFFE, D. B.
1955 Infant nutrition in the subtropics and tropics. World Health Organization Monograph No. 29. Geneva.
1962 Culture, social change and infant feeding. Current trends in tropical regions. American Journal of Clinical Nutrition 10:19–45.

JELLIFFE, D. B. and BENNETT F. J.
1961 Cultural and anthropological factors in infant and maternal nutrition. Federation Proceedings 20 (Supplement No. 7) pp. 185–187.
KEETTEL, W. C. and BRADBURY, J. T.
1961 Endocrine studies of lactation amenorrhea. American Journal of Obstetrics and Gnyecology 82:995–1002.
KEHOE, A. B.
1960 Lactation and pregnancy. American Anthropologist 62:880–881.
KURZROK, R., LASS, P. M. and SMELSER, J.
1937 Studies relating to time of human ovulation. II. During lactation. Proceedings of the Society for Experimental Biology and Medicine 36:356–359.
MACY, ICIE G.
1949 Composition of human colostrum and milk. American Journal of Diseases of Chil dren 78:589–603.
MORRIS, D. and JEFFEREYS, H.
1957 Breast feeding. A study of the incidence, duration and associated social factors. Living Conditions and Health 1:184–188.
OOMEN, H. A. P. C. and MALCOLM, S. H.
1958 Nutrition and the Papuan child: a study in human welfare. South Pacific Commission Technical Paper No. 118. Noumea, New Caledonia.
PARKES, A. S. and BELLERBY, C. W.
1927 Studies on the internal secretions of the ovary. III. The effects of injection of oestrin during lactation. Journal of Physiology 62:301–314.
PECKHAM, C. H.
1934 An investigation of some effects of pregnancy noted six weeks and one year after delivery. Bulletin of the Johns Hopkins Hospital 54:186–207.
SALBER, E. J. STITT, P. G. and BABBOTT, J. G.
1959 Patterns of breast feeding in a family health clinic. II. Duration of feeding and reasons for weaning. New England Journal of Medicine 260:310–315.
SÉNÉCAL, J.
1959 Alimentation de l'enfant dans les pays tropicaux et subtropicaux. Courrier 9:1–22.
SLATER, MIRIAM KREISELMAN
1959 Ecological factors in the origin of incest. American Anthropologist 61:1042–1059.
SOLIEN DE GONZÁLEZ, NANCIE
1962 Unpublished field notes.
1963 Breast feeding, weaning and acculturation. Journal of Pediatrics 62:577–581.
SREBNIK, H. H., NELSON, M. M. and SIMPSON, M. E.
1958 Response to exogenous gonadotrophins in absence of dietary protein. Proceedings of the Society for Experimental Biology and Medicine 99:57–61.
STAHLIE, T. D.
1960 Pregnancy and childbirth in Thailand. Tropical and Geographical Medicine 2:127–137.
STEWART, N. L. and PRATT, J. P.
1941 Influence of suckling stimulus on lactation. West Journal of Surgery 49:98–103.
SURE, BARNETT
1941 Dietary requirements for fertility and lactation. XXIX. The existence of a new dietary factor essential for lactation. Journal of Nutrition 22:499–514.
THOMSON, A. M. and HYTTEN, F. E.
1960 Body stores in human pregnancy and lactation Proceedings of the Nutrition Society 19:5–8.
UDESKY, ISADORE C.
1950 Ovulation in lactating women. American Journal of Obstetrics and Gynecology 59:843–851.

WATT, A.
1959 Assessment of growth of Lagos babies, Lagos, Nigeria. West African Medical Journal 8:53–61.

YANKAUER, A., BOEK, W. E., LAWSON, E. D., JANNI, F. A. J.
1958 Social stratification and health practices in child-bearing and child-rearing. American Journal of Public Health 48:733–741.

Reprinted from AMERICAN ANTHROPOLOGIST, Vol. 66, No. 4, Part 1
August, 1964