

STUDIES IN HUMAN LACTATION: EFFECTS OF CAESARIAN SECTION ON LACTATION FUNCTION IN POSTPARTUM NIGERIAN WOMEN. *

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SUMMARY The effects of caesarian section (c/s) on lactation were investigated in 31 postpartum women of term gestation. Their age range was 27-32 yrs. Mean concentrations of the breast milk macronutrients and ions were: Total protein, 3.29 ± 0.15 g/100ml in colostrum and transitional milk and 1.47 ± 0.16 g/100ml in the mature milk; total cholesterol, 16.0 ± 1.01 mg/100ml in colostrum and transitional milk and 15.78 ± 1.84 mg/100ml in the mature milk; Lactose, 6.72 ± 0.25 g/100ml in colostrum and transitional milk and 5.99 ± 1.19 g/100ml in the mature milk; Na^+ 16.3 ± 0.46 mmol/L in colostrum and transitional milk and 13.63 ± 0.57 mmol/L in the mature milk; K^+ 31.89 ± 1.37 mmol/L in colostrum and transitional milk and 28.8 ± 1.73 mmol/L in the mature milk. Mean concentration of total cholesterol was significantly higher than that of the normal controls that delivered vaginally ($p < 0.015$), while mean concentration of lactose was significant lower ($p < 0.007$). However, analysis of the daily macronutrient levels showed that in the c/s subjects, there was early depression in total cholesterol and lactose levels that lasted for about 7 weeks. These results suggest that caesarian section procedure can induce a significant alteration in lactation function.

Key words: Caesarian section, prolactin activity, lactation function.

Introduction.

Current evidence indicates that the liver may participate in the mammatrophic action of prolactin, possibly through the secretion of an hepatic factor that acts synergistically with prolactin (English et al, 1990). An hepatic factor called the liver lactogenic factor (LLF) has been shown to mimic the lactogenic component of prolactin action and is actually more potent than the hormone in this regard (Hoeffler et al, 1987). Evidence indicates that this substance is stimulated by prolactin (Frawley et al, 1987), is present in serum and can even substitute for prolactin in maintaining milk production (English et al, 1990). LLF can act directly at the pituitary level to exert positive effects on both prolactin release and prolactin gene expression (Frawley et al, 1988). A variety of stressful stimuli such as skin incision, subcutaneous inflammation as well as endotoxin injection or related pharmacological insults are known to cause a significant decrease (30-86%) in the capacity of the hepatic cell membranes to specifically bind ovine prolactin (Goodman et al, 1985). The physiological response to stress therefore involves among other possibilities, a modification of the prolactin activity, especially through an indirect effect on the liver function.

The increased use of caesarian section and anaesthesia at delivery has raised serious questions concerning the effects of these stressful stimuli on the lactation function. In the present study, therefore, we examined the effect of caesarian procedures on the lactation function in postpartum women, and discussed the possible physiological significance of the findings.

Subjects and Methods

Subjects

The study involved 31 postpartum women who were delivered at term by c/s under general anaesthesia. Mean age of the subjects was 30.17 years; range, 27-32 years and 83 postpartum women who delivered at term through the normal parturition process; mean age of these subjects was 26.95 years; range, 25-29 years. The subjects showed no significant group variation in the overall nutritional status as measured by the body mass index. All the subjects gave their consent for participation in the study. The study was approved by the local ethical committee (Reff: ADM/R.5/VOL./262. Department of clinical services and training, University of Benin teaching hospital, Benin-City).

Sample collection:

Breast milk samples were obtained by manual expression between 08-010 hrs. each day. Opinions differ about the best technique for manual expression. The procedure used in this study was based on the techniques described by Applebaun(1970) and Gunther(1973).

Analysis of sample:

The concentration of total protein in each sample was estimated according to Biuret technique (Kingsley, 1972) with little modifications, and bovine serum albumin (BSA) product of Laboratory Diagnostic products Ltd (LDP) was used as standard.

Total cholesterol concentration in each sample was estimated according to the method of Liberman-Burchard reaction (Searcy et al, 1960) using a commercial kit supplied by G.T. Laboratorio Srl, Rosario-Argentina.

Lactose concentration was estimated using spectrophotometric method (Fearon, 1947). Reagents: methylamine hydrochloride (BDH laboratories England); Lactose standard (Merck Laboratories: Canada). NaOH is of reagent grade.

Na^+ and K^+ concentrations were estimated using flame photometric technique.

Analysis of Result:

Result was compared to those obtained from women delivered vaginally using a t-test for independent sample studies on an 'SPSS' program (version 10.0).

The secretory pattern of the breast milk macronutrients and ions were also analyzed using the same model.

Results:

Mean concentration of the breast milk macronutrients and ions are shown in tables 1 and 2 for the c/s and control subjects, respectively. Mean concentration of total cholesterol was significantly higher than that of the controls ($P<0.015$) while mean concentration of lactose was significantly lower ($P<0.007$). The mean concentrations of total protein and ions were not statistically significant. The secretory dynamics, shown in daily levels of the total cholesterol and lactose in the c/s subjects are shown in figure 1 and 2 respectively; and in figures 3 and 4 respectively, for the control.

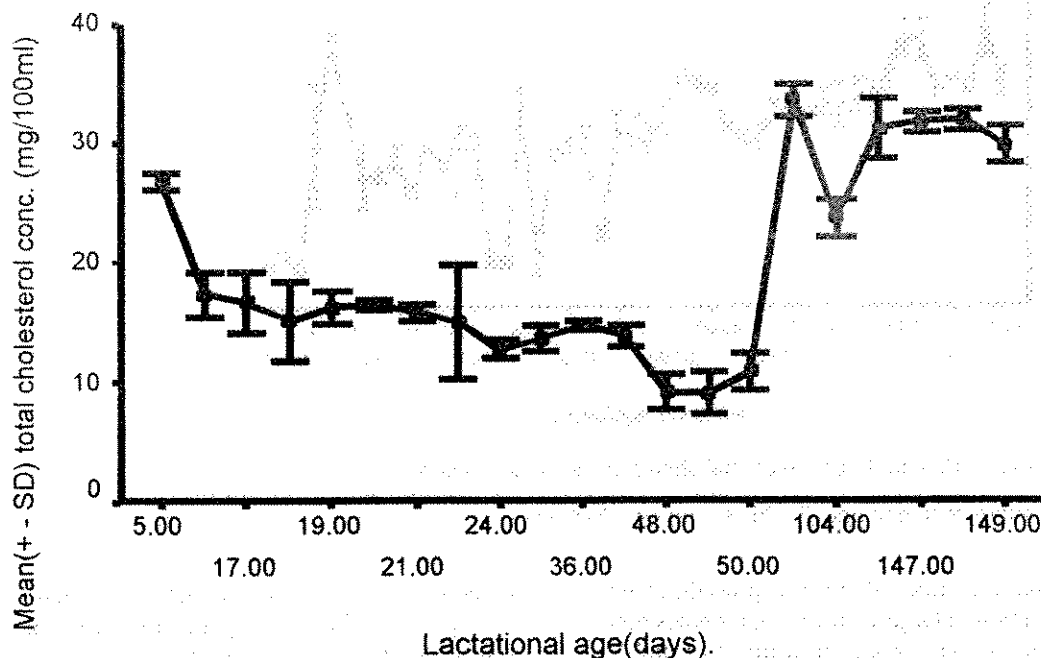


Fig. 1: six-month profile of total cholesterol secretion in term women delivered by caesarian section.

Table 1: Mean concentrations of breast milk nutrient and ionic constituents in the c/s subjects (\pm SEM, n=31).

Lactational age (Days).	T. Protein (g/100ml)	T. Cholesterol (mg/100ml)	Lactose (g/100ml)	Na ⁺ (mmol/L)	K ⁺ (mmol/L)
1-30	3.29 \pm 0.15	16.0 \pm 1.01	6.72 \pm 0.25	16.3 \pm 0.46	31.89 \pm 1.37
31-over (Mature milk)	1.47 \pm 0.16	15.78 \pm 1.84	5.99 \pm 1.19	13.63 \pm 0.57	28.8 \pm 1.73

Table 2: mean concentrations of breast milk nutrient and ionic constituents in the control subjects-vaginal delivery (\pm SEM, n =83).

Lactational Age (Days)	T. Protein (g/100ml)	T. Cholesterol (mg/100ml)	Lactose (g/100ml)	Na ⁺ (mmol/L)	K ⁺ (mmol/L)
1-30	3.26 \pm 0.2	17.9 \pm 1.0	8.37 \pm 0.71	18.14 \pm 0.64	38.63 \pm 1.71
31-over (mature milk)	1.75 \pm 0.19	10.46 \pm 1.15	7.96 \pm 0.63	112.47 \pm 0.36	25.16 \pm 1.1

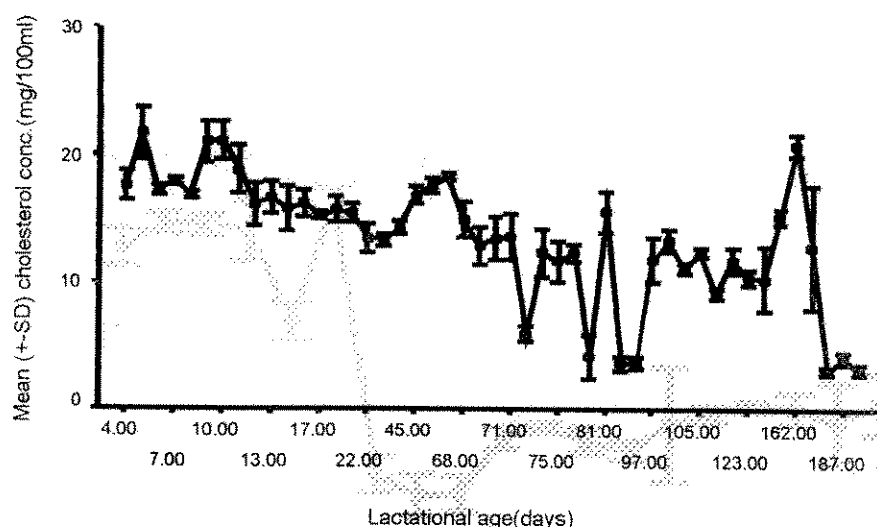


Fig. 2: Six-month profile of total cholesterol secretion in control subjects (mean age: 26.95yrs., range: 25-29 yrs.).

Discussion

It appears that the effect of surgical procedures on lactation function is largely on the total cholesterol and lactose secretion. As shown in figures 1 and 2, there was early depression in the macronutrient levels that lasted for about 7 weeks. It is possible that this attenuated response is due to the effect of surgical procedures (and anaesthetic insult) on prolactin activity. The attenuation of prolactin activity by surgical procedures had already been

demonstrated in animal models (Goodman et al, 1985) and is believed to operate through an indirect effect on the hepatic-prolactin interaction. Other reports (Sozmen, 1992) further suggest attenuation of lactation function by caesarian section and lactation function in such subjects was actually improved by early suckling of the maternal milk. Surgery-bromocriptine synergism in attenuation of

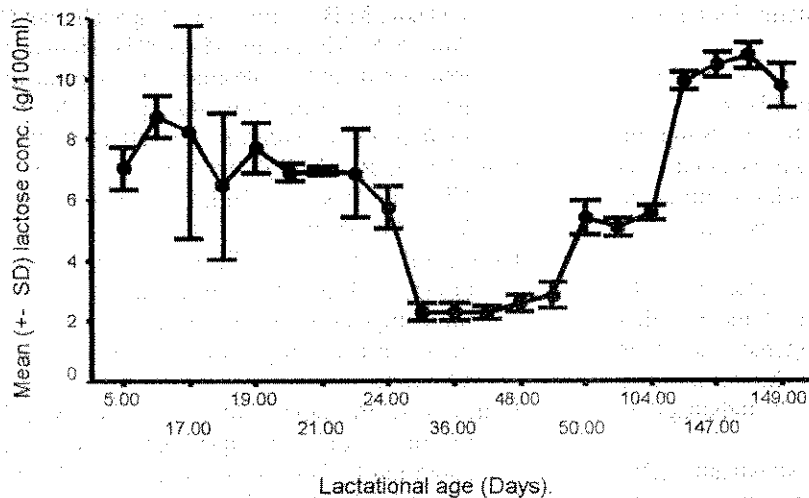


Fig. 3: Six-month profile of lactose secretion in term women delivered by caesarian section.

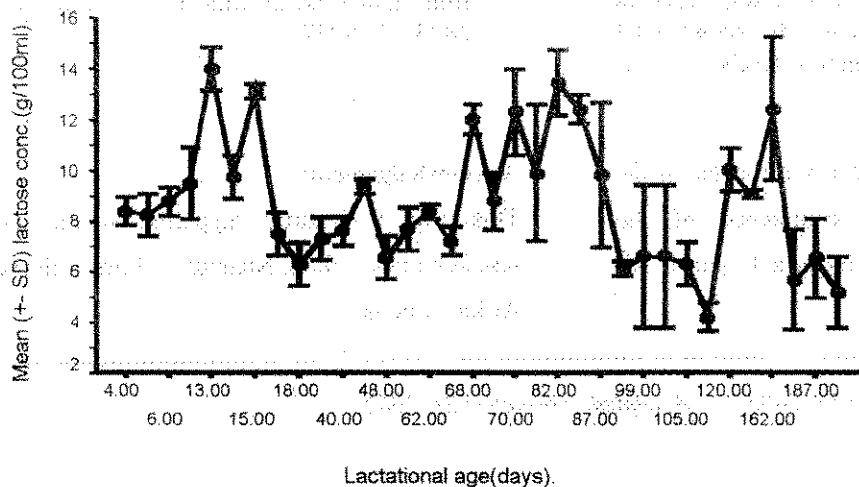


Fig. 4: Six-month profile of lactose secretion in control subjects (mean age: 26.95yrs.; range: 25-29yrs.)

lactogenesis has been demonstrated in the rat (Caron et al, 1994). Alterations in prolactin activity are expected to induce corresponding alterations in macronutrient secretion and levels in breast milk. Previous studies (Hearly et al, 1980; Kulsk et al, 1978; Jenssen et al, 1995; Stafford et al, 1994) have shown that the secretion of macronutrients, including total cholesterol and lactose in human breast milk depend largely on prolactin action.

We therefore conclude that caesarian procedures can induce significant alteration in lactation function in postpartum women. A critical reassessment of the nutritional requirements of

infants delivered by c/s and the status of prolactin secretion in their mothers is necessary. The adequacy or otherwise of macronutrients in breast milk following c/s can then be determined vis-à-vis the need of the infants especially in the first few months post-delivery.

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