

LONGITUDINAL STUDY OF HUMAN MILK CREAMATOCRIT AND WEIGHT GAIN IN EXCLUSIVELY BREASTFED INFANTS

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Objective: To determine the creatatocrit values of breastmilk at different lactational periods during the first 6 months after delivery and its relation to infant growth. **Design:** Prospective follow-up study. **Setting:** Maternity and well baby clinics of a metropolitan teaching, a rural teaching and a suburban municipal hospital. **Subjects:** 1322 exclusively breastfed infants and their mothers. There were 160 preterm, 281 term low birth weight (LBW) and 881 term appropriate for date (AFD) babies. **Methods:** Creatatocrit of breastmilk and infant's body weight were recorded at 4,8,12,16,20 and 24 weeks after birth. **Results:** Creatatocrit values of breastmilk in all mothers increased upto 16 post partum weeks and then declined. There were no significant differences in creatatocrit values of breastmilk of mothers of preterm, term LBW and term non-LBW infants. Preterm and term LBW infants showed a catch up in body weight with the term AFD group by 20 weeks post-partum. **Conclusions:** The breastmilk creatatocrit progressively rises upto the fourth month of lactation but is not influenced by gestation or intra uterine growth retardation. There is no relationship between breastmilk creatatocrit and infant growth. Exclusive breast feeding adequately supports growth of LBW infants in comparison to their normal peers during the first 6 months of life.

Key words: Breastmilk creatatocrit, Exclusive breastfeeding, Low birth weight, Preterm.

CREAMATOCRIT (cream/fat) measurements have been reported as a simple method of estimating the calorific value of breastmilk(1,2). However there is scarce literature on creatatocrit values followed longitudinally amongst exclusively breastfeeding women in India. This prospective study was therefore undertaken to determine the creatatocrit values of human milk in women exclusively breastfeeding their infants and observe for its relation to infant growth.

Subjects and Methods

The study was conducted simultaneously in three settings, namely a teaching hospital in a metropolitan city, another teaching hospital in a rural area and a suburban municipality hospital. Apparently normal lactating mothers who were exclusively breastfeeding their newborn infants after delivery were selected at random for enrollment into the study. Information on birth weight and gestation of the infant was

available in all. The infants with their mothers were followed up at 4,8,12,16,20 and 24 weeks after birth at the Well Baby Clinic of each of the participating hospital. At each visit, the infant's weight was recorded. At these visits, the mother's breastmilk creatmatocrit values were also measured.

Creatmatocrit Measurement

Expressed breastmilk (hind milk) was collected from each mother and poured into a hematocrit tube and immediately centrifuged at 3000 rpm for 30 minutes. The tube was placed vertically in a stand and the length of the packed cream layer at the top of the tube was read directly within one hour of centrifugation. This cream layer was expressed as percentage of milk column to indicate the creatmatocrit value(1,2).

Statistical Analysis

For analytical purposes the infants were categorized into three groups: (i) *Group I* comprised preterms < 37 weeks. There were 160 preterm (33 wks-36 wks) babies (62,47 and 51 babies were enrolled from

urban teaching, rural teaching and suburban municipal hospitals, respectively); (ii) *Group II* comprised low birth weight (LBW) newborns. There were 281 term babies weighing < 2.5 Kg (106, 77 and 98 from urban teaching, rural teaching and suburban municipal hospitals respectively); and (iii) *Group III* comprised term appropriate for date (AFD) infants. There were 881 term AFD babies with body weight > 2.5 kg (340, 252 and 289 in urban teaching, rural teaching and suburban municipal hospitals, respectively).

The group mean differences for creatmatocrit and weight increment at the various time points were compared using ANOVA. A p value below 0.05 was taken to be significant.

Results

The serial creatmatocrit values of breastmilk at 4,8,12,16,20 and 24 weeks are shown in *Table I*. The creatmatocrit values of breastmilk in all mothers were seen to rise upto 16 weeks and decline thereafter. However, there were no statistically significant differences in creatmatocrit values between the groups from 4-24 weeks.

TABLE I - Per cent Creatmatocrit Values (Mean \pm SD) Till 24 Weeks,

Groups	4 wks	8 wks	12 wks	16 wks	20 wks	24 wks
I	5.39 ± 1.78 (160)	7.41 ± 2.28 (151)	9.22 ± 1.74 (138)	9.21 ± 1.49 (144)	8.32 ± 2.23 (135)	6.90 ± 3.03 (121)
II	5.27 ± 1.44 (281)	7.27 ± 2.25 (252)	8.51 ± 2.22 (241)	8.97 ± 2.61 (217)	8.21 ± 2.52 (201)	6.62 ± 2.68 (187)
III	4.9 ± 1.4 (881)	6.2 ± 2.4 (819)	7.9 ± 2.3 (792)	8.5 ± 2.5 (756)	8.0 ± 2.1 (721)	6.3 ± 2.6 (694)

Differences between groups were not statistically significant at any time point.

Figures in parenthesis indicate number of subjects.

The gestational age, birth weights and subsequent body weights at 4,8,12,16,20 and 24 weeks for the three groups are shown in *Table II*. Till 16 weeks of age the preterm and term LBW babies has significantly lower weights than term AFD peers; thereafter the groups had comparable weights.

The incremental body weights till 24 weeks are shown in *Table III*. At 8 and 20 weeks the preterm and term LBW infants showed a significantly higher increment compared to term AFD infants, but not at other time points. These growth spurts probably reflect catch up growth in the LBW infants which can explain the lack of

TABLE II-Gestational Age and BodyWeight (Mean \pm SD) of Different Groups of Babies.

Groups	Gestational age (wks)	Birth weight (kg)	Weight					
			4 week	8 week	12 week	16 week	20 week	24 week
I	35.50	2.04	2.67	3.59	4.55	5.40	6.04	6.66
	± 1.04	± 0.28	± 0.36	± 0.55	± 0.72	± 0.80	± 0.77	± 0.73
	(160)	(160)	(160)	(151)	(138)	(144)	(135)	(121)
II	38.42	2.27	2.93	3.89	4.87	5.68	6.49	6.82
	± 1.14	± 0.11	$\pm 0.2\backslash 31$	± 0.47	± 0.62	± 0.64	± 0.61	± 0.62
	(281)	(281)	(281)	(252)	(241)	(217)	(201)	(187)
III	39.26	2.89	3.46	4.24	5.13	5.93	6.57	7.25
	± 1.21	± 0.39	± 0.46	± 0.55	± 0.63	± 0.61	± 0.58	± 0.38
	(881)	(881)	(881)	(819)	(792)	(756)	(721)	(694)
p value	<0.001	<0.001	<0.001	<0.001	<0.001	<0.05	NS	NS

NS = Not significant

Figures in parenthesis indicate number of subjects.

TABLE III-Incremental (Mean \pm SD) Weight (kg) Till 24 Weeks.

Groups	4 wks	8 wks	12 wks	16 wks	20 wks	24 wks
I	0.64	0.92	0.97	0.98	0.81	0.67
	± 0.27	± 0.29	± 0.24	± 0.17	± 0.18	± 0.24
	(160)	(151)	(138)	(144)	(135)	(121)
II	0.64	0.94	0.98	0.98	0.75	0.62
	± 0.26	± 0.29	± 0.31	± 0.91	± 0.23	± 0.15
	(281)	(252)	(241)	(217)	(201)	(187)
III	0.57	0.79	0.86	0.80	0.67	0.61
	± 0.38	± 0.26	± 0.24	± 0.17	± 0.17	± 0.29
	(881)	(819)	(792)	(756)	(721)	(694)
p value	> 0.005	< 0.01	> 0.05	> 0.05	< 0.05	> 0.05

Figures in parenthesis indicate number of subjects.

differences in body weight between the groups from 20 weeks post-partum onwards, as depicted in *Table II*.

Discussion

The current investigation documented the longitudinal creatatocrit values of human milk in Indian women exclusively breastfeeding their infants. Earlier studies have demonstrated a relationship between creatatocrit of breastmilk and its caloric value(1,2). However, its relationship to infant growth has been scarcely quantified. In the present study it was observed that creatatocrit value of breastmilk was comparable in mothers giving birth to term AGA, preterm and SFD babies during the first 6 months post-partum; yet growth spurts were observed in LBW infants. In the absence of differences in creatatocrit values despite significant changes in incremental weight, it may not be appropriate to equate creatatocrit with caloric values of breastmilk. It is evident that there are other factors that govern energy intake (for example, volume of milk consumed) and growth in infants. However, while this study fails to observe an association between creatatocrit and infant growth, it certainly underscores the fact that most LBW babies derive enough nutrition from breastmilk alone to maintain comparable growth to their normal peers during early infancy.

The timing of the growth spurt and catch up in physical growth amongst LBW

infants is variable in developing countries. While some workers have observed preterms to catch up in the preschool years (3) others have observed catch up to occur between 10-14 years (4). Term SFD infants have been reported to remain lighter even at school age. It is concluded that the breastmilk creatatocrit progressively rises upto the fourth month of lactation but is not influenced by gestation or intrauterine growth retardation. There is no relationship between breastmilk creatatocrit and infant growth. Exclusive breastfeeding adequately supports growth of LBW infants in comparison to their normal peers during the first six months of life.

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