



Determination of creatinocrit and energy values of human breast milk in relation to term and preterm gestation

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Abstract

Creatinocrit and energy values of preterm mothers are significantly higher than term mothers. But there is no correlation found between the creatinocrit and energy values with parity and mode of delivery.

Keywords: Human Milk, Creatinocrit, breast Milk

Objectives of study:

1. To determine creatinocrit and energy values of breast milk of Indian mothers at each stage of lactation.
2. To find a correlation between the creatinocrit and energy values with gestation (term and preterm), parity and mode of delivery.

Materials and methods:

1. **Study area:** NICU, nursing home and obstetric ward, KEM Hospital, Pune. KEM hospital is a tertiary care centre for Paediatrics and Neonatology. All kind of complicated and uncomplicated deliveries are managed with good facilities for postnatal care of preterm and term babies.
2. **Study population:** All new-born babies admitted in NICU, obstetric ward, nursing home, KEM hospital, Pune within the given duration.
3. **Sample size and sample technique:** Simple random sampling without replacement is used to select a total of 124 cases who delivered in NICU ward of KEM hospital during February 2011 to March 2012. Informed consent was taken from all the sampled participants before taking their breast milk sample.
4. **Data collection technique and tools:** 127 human breast milk samples from mothers whose babies were admitted in NICU, Obstetric ward and nursing home are taken in which 122 was preterm and 22 was full term. Breast milk were taken at 3 stages of lactation (1 to 3rd day, 6 to 9th day, and 13 to 15th day) for calculation of creatinocrit and energy values. Samples are centrifuged as per hematocrit method. Creatinocrit is calculated as percentage of cream column to total height of the column. The Energy values calculated by formula derived by wang et al.



Data analysis:

The values on quantitative characteristics (such as Creatocrit and Energy value) are shown as mean \pm standard deviation for each follow-up.

The statistical comparison of Creatocrit and Energy value across two groups of cases (Pre term v/s Full term, Vaginal delivery v/s LSCS delivery etc) is done using independent sample 't' test, after confirming the underlying normality assumption of the respective parameter. The statistical comparison of Creatocrit and Energy value across three groups of duration of hospital stay is done using one-way analysis of variance (ANOVA) with Tukey's correction for multiple group comparisons, after confirming the underlying normality assumption of the respective parameter.

The entire data was entered and cleaned in MS Excel before it was statistically analyzed in SPSS. All the results are shown in tabular as well as graphical format to visualize the statistically significant difference more clearly. The p-values less than 0.05 were considered statistically significant. All the hypotheses were formulated using two tailed alternatives against each null hypothesis. The entire data was analyzed using Statistical Package for Social Sciences (SPSS ver 11.5, Inc. Chicago, USA) for MS Windows.

Salient findings:

Present study was conducted in level 3 NICU, Obstetric ward and nursing home, KEM hospital, Pune. The study was done for a period of 13 months from February 2011 to March 2012. In this study, we included all term and preterm neonates who were admitted in KEM hospital Pune. In this study samples of 124 mother's breast milk were taken at 3 times (1st to 3rd day, 6th to 9th day, and 13th to 15th day) for calculation of creatocrit and energy value. In the present study it has been tried to compare the creatocrit and energy values of preterm and term mother's milk. It has been also tried to correlate creatocrit and energy values to the mode of delivery and parity of the mother. Major findings were: -

1. 122 were preterm and 22 were full term mothers. From day 1 to Day 3 (colostrum) mean value of creatocrit in preterm babies were 3.97 ± 1.46 . From day 6 to 9 (transitional milk) the mean values were 2.88 ± 1.50 . From day 13 to 15 (mature milk) mean values were 3.36 ± 1.49 in comparison to term babies where mean values were 3.03 ± 1.55 (1 to 3 day), 2.88 ± 1.50 (from day 6 to 9), 3.36 ± 1.49 (from day 13 to 15). Average creatocrit levels at each stage were significantly higher among the cases that had pre-term delivery compared to the cases that had full term delivery. Similar trends were observed for energy values.
2. Creatocrit values for preterm for colostrum were 3.97, which showed a dip at day 6 to 9 (transitional milk) with mean of 3.76. Creatocrit showed a rise with mean of 4.28 for mature milk. Similarly for term gestation values were dipping initially with



transitional milk and showing a rise afterwards. Similar trends were observed for energy values.

3. Scatter diagrams has been drawn from gestational age of 26 week to 40 weeks in comparison to mean values of creatatocrit. There is significant inverse relationship between gestational age and creatatocrit. from day 1 to 3. Same has been observed from day 6 to 9 and day 13 to 15. Similar trends were observed for energy values.
4. Scatter plots has been drawn for creatatocrit and birth weight to find a correlation between the two. Birth weight of 700 grams to 2500 grams has been included on this study, which has been plotted against mean creatatocrit values for each stage of lactation. There is significant inverse relationship has been found from day 1 to 3. Same results found from day 6 to 9 and day 13 to 15. Similar trends were observed for energy values.
5. In present study 39 delivery was normal vaginal and 85 were LSCS. In normally delivered babies from day 1 to 3 (colostrums) mean values of creatatocrit were 3.48 ± 1.35 , in LSCS the values were slightly higher with mean of 3.96 ± 1.57 . Mean values of creatatocrit from day 6 to 9 (transitional milk) for normal delivery were 3.27 ± 1.34 and for LSCS 3.76 ± 1.51 . In 3rd stage of lactation (mature milk) for normal delivery the values were 3.79 ± 1.36 and slightly higher 4.27 ± 1.57 for LSCS. Average Creatatocrit levels at each stage did not differ significantly between vaginal and LSCS modes of delivery. Similar findings were observed for energy values.
6. In present study 75 mothers were primipara and 49 mothers were multipara. In primipara from day 1 to 3 (colostrum) mean values of creatatocrit were 3.63 ± 1.42 , in multipara the values were slightly higher with mean of 4.08 ± 1.62 . Mean values of creatatocrit from day 6 to 9 (transitional milk) for primipara were 3.41 ± 1.36 and for multipara 3.89 ± 1.60 . In 3rd stage of lactation (mature milk) for primipara the values were 3.95 ± 1.43 and slightly higher, 4.39 ± 1.63 for multipara (table 3a). Average Creatatocrit levels at each stage did not differ significantly between primipara and Multiparity. P values for creatatocrit from day 1 to 3 (0.105), from day 6 to 9 (0.073) and from day 13 to 15 (0.115) were not significant. Similar trends were observed for energy values.

Conclusions:

Creatatocrit and energy values of preterm mothers are significantly higher than term mothers. But there is no correlation found between the creatatocrit and energy values with parity and mode of delivery. Creatatocrit is cheap and easy method to calculate the amount of energy from 24 hours feeding given to the baby. and advice feeding and expressing milk accordingly. With newer advances and newer equipment available this technique can be easily applied practically in NICU particularly preterm babies and IUGR for proper growth and better outcomes.



Recommendations:

1. Creamatocrit is a cheap and easy method to calculate the amount of energy present in the human breast milk.
2. Creamatocrit method can be easily applied in NICU to calculate calories produced by the human milk given to neonate in 24 hours and modify the feeding practices accordingly.
3. Breast milk of higher creamtocrit and energy value can be saved and utilized later for preterm and IUGR babies for proper growth and better outcomes.
4. Creamatocrit is ideal to guide the separation of fore-milk and hind-milk when short term accelerated weight gain in the infant is desired.
5. Creamatocrit can be used to measure the variation (circadian variation and hindmilk / foremilk) in energy values of human milk and then be used to correct milk expression or storage technique so that the calories are optimized.

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