ORIGINAL ARTICLE

Correlation of Mother Milk Sodium Levels in Term Mothers with Neonatal Hyperbilirubinemia

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ABSTRACT

Aims: To estimate the mean breast milk sodium levels in term Pakistani mothers and to study the correlation between breast milk sodium levels and transcutaneous bilirubin levels in their exclusively breast fed term neonates.

Methods: In the present study, 101 healthy mothers and their full term, exclusively breast fed neonates born by normal delivery or Lower Segment Caesarean Section, admitted in BVH, Bahawalpur were included. The testing procedure and protocol were explained to the mothers and informed consent was obtained. A detailed history regarding age, parity, demography, mode of delivery and breast related problems were noted. A volume of 5ml of breast milk was expressed manually between 48 to 72 hours of delivery and analysed for sodium levels using flame photometry. Transcutaneous bilirubin levels of each neonate were tested using Drager Jaundice Meter JM-103 between 48 to 72 hours of birth. Breast milk sodium levels and transcutaneous bilirubin levels were analysed statistically to find out the correlation between the two.

Results: The mean age of the mothers was 25±3.8 yrs . 55 mothers were primipara while the rest were multipara. 64 mothers had full term normal delivery and 37 delivered by Lower Segment Caesarean Section. The mean birth weight of the new born was 2.91±0.44 kg. The mean breast milk sodium levels were found to be 2.73±2.10 mEq/dl with a range between 0.02 to 8.85 mEq/dl. The level of TcB was found to be 11.20±3.35 mg/dl with a range of 2.9 to 19.9 mg/dl. A positive correlation was found between BMNa and TcB, but it was not statistically significant.

Key words: Breast milk sodium, term neonates, physiologic jaundice.

INTRODUCTION

The importance of breast milk for a new born cannot be overemphasized. In developing countries like Pakistan, it is the most important source of nutrition for a neonate. The consequences of exclusive breastfeeding in neonates are of dominant interest in this study. The composition of breast milk varies considerably with the stage of lactation, demography, maternal nutrition and various seasons. Breast milk contains carbohydrates, lipids, proteins and minerals like sodium, potassium and calcium. Sodium present in the breast milk is essential for normal development of the neonate. As not much has been documented on breast milk sodium levels in Pakistani mothers, in this study, efforts are made to establish normative data for breast milk sodium levels in Pakistani mothers. In addition, recent studies have shown an increase in the incidence of hypernatremia, dehydration and hyperbilirubinemia in exclusively breastfed infants. This has been attributed to either inadequate lactation or high breast milk sodium[1, 2], but the exact cause is still unclear. The present work has been undertaken to study the breast milk sodium levels in term mothers to establish data and also to assess its correlation with neonatal hyperbilirubinemia.

It is a well-known fact today that there is no better nutrition for infants than the breast milk of mothers. Breastfeeding has many advantages. It is microbiologically clean, natural and confers lot of benefits, many of which science is yet to discover. Allergic reactions are unlikely. Mother's milk is always at the right temperature. It has anti-infective components like immunoglobulins, lactoferrin, lysozyme, complements, oligosaccharides, growth factors and modulators. Breastfeeding fosters mother-child relationship[3]. Of late, many studies have highlighted the importance of sodium in breast milk in both term and preterm mothers. Physiologically, sodium is an important extracellular cation which plays a pivotal role in maintaining osmolarity of the extracellular fluid[4].

Recently it has been found that there is an increase in the number of hospital admissions of exclusively breastfed term infants in the first week of life[5]. Many of these infants had high serum sodium levels and had presented with varying

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degrees of dehydration and jaundice. Since these symptoms were found in exclusively breastfed term infants, attention was drawn towards its causation. Some authors have attributed them to a high maternal breast milk sodium levels due to lactation failure and subsequently decreased feeding by the infant leading to hypernatremic dehydration[6]. Physiological jaundice is found to be exaggerated in most of the infants with hypernatremic dehydration[7].

METHODOLOGY

A total of 101 lactating mothers with their exclusively breastfed, term neonates born by normal vaginal delivery (FTND) or Lower Segment Caesarean Section (LSCS) admitted at Department of Gynae and Obstetrics and Department of pediatrics Bahawal Victoria Hospital Bahawalpur from January 2014 to December 2014. An approval was taken from institutional review committee and written consent was taken from every mother. Mothers refusing to give consent, mothers with breastfeeding feeding problems due to mastitis, breast abscess and other inflammatory or infectious conditions, mothers with severe pregnancy induced hypertension, mothers on intravenous fluids beyond 24 hours, mothers on antihypertensives, diuretics, cardiac glycosides, antipsychotics, antidiabetic agents, neonates with pathological jaundice, neonates on IV fluids or formula feeds, neonates with cephal haematoma and subgaleal haematoma were excluded from the study. Detailed history of mother and neonate was taken.

Breast milk sodium (BMNa): A breast milk sample of 5ml volume was obtained from all mothers by manual expression from a single breast between 48 to 72 hours of delivery. The time of collection was from 3.00 to 4.00 PM, to minimize the effects of diurnal variations. The breast milk samples were collected in sterile plastic bullets and stored at -200C. Breast milk sodium levels were analyzed using a flame photometer and results were expressed as mEq/dl.

Transcutaneous Bilirubin (TcB): Transcutaneous bilirubin levels of each neonate was tested using Drager Jaundice Meter JM-103 at the same sitting. It was measured on the forehead as it is the most frequent site of TcB measurement in clinical practice and research studies. All the data was entered in SPSS version 16 and analyzed. Mean and standard deviation was calculated for numerical data. Frequencies and percentages were calculated for categorical data. Pearson Correlation(r) was applied to see the association between BMNa and Tcb. P. value ≤ 0.05 was considered as significant.

RESULTS

Mean age of the mothers was 25.05±3.86 years. There were 55 (54.46%) primipara and 46 (45.545) multipara. Among them 64 (63.37%) had full term normal delivery and the rest 37 (36.63) delivered by caesarian section (Table 1). All the infants were delivered at term. The mean birth weight was 2.91±0.44 kg. Mean BMNa levels was 2.73±2.10 mEq/dl and mean transcutaneous bilirubin levels (Tcb levels) was 11.20±3.35mg/dl. A positive correlation was established between BMNa and TcB by Pearson's correlation. However, it was not statistically significant (p<0.05). (Table 2, Fig1)

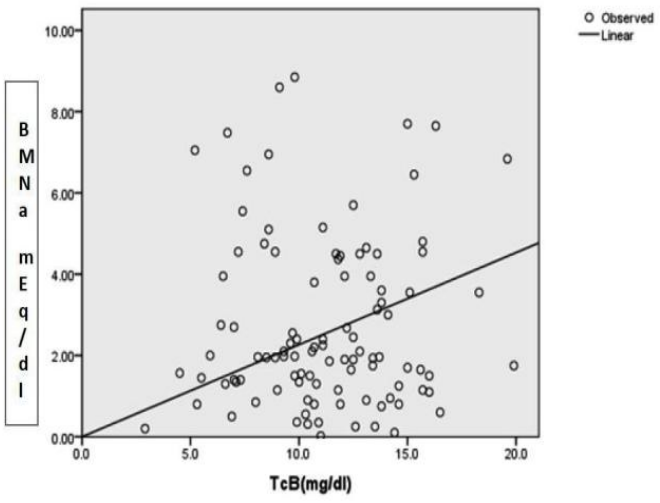
Table 1: General characteristics of mothers

Parameter	**Frequency**
Primipara	55
Multipara	46
Mode of delivery	
Normal delivery	64
Caesarian section	37

Table 2: Correlation between BMNa and Bilirubin Levels

		log_TcB
BMNa(mEq/dl)	Pearson Correlation(r)	0.04
	Sig. (2-tailed)	0.69
	N	101

Fig 1: Correlation between BMNa and TcB



DISCUSSION

Breastfeeding has a fundamental impact on the short term and long term health of infants and has an important impact on women's health too. There are not many studies on the pattern of BMNa levels in the

first postpartum month in Pakistan. As it is known that BMNa remains high immediately after delivery and falls precipitously by 3rd day, breast milk samples were collected from all the mothers on the 3rd postpartum day. It was found that BMNa levels vary over a wide range i.e., from 0.02 to 8.85mEq/dl. These values are comparable to the values obtained in the study conducted by Koo WW[9].

In this study, the level of bilirubin was assessed by estimating TcB. The TcB levels were found to be 11.20±3.35mg/dl. According to American Academy of Pediatrics' hour specific bilirubin normogram serum bilirubin in term neonates on 3rd day of life is 11 mg/dl[10]. The BMNa levels correlated positively with TcB, though not to a significant extent. Estimation of BMNa could be used as a simple test in the assessment of the possible risk of development of hypernatremia and its complications in the neonates.

Increased BMNa in mothers coupled with other factors like inadequate fluid intake, active fluid loss in the form of diuresis, electrolyte and acid imbalances or increased metabolic rate in the neonates might have resulted in hypovolemia and hemoconcentration leading to exaggerated physiologic jaundice which was reflected as increased TcB.

In the present study, the BMNa sample was not centrifuged but was analyzed directly post storage. The presence of lipid layer in the breast milk might have influenced the measurement of BMNa in our study. Manganaro R et al[5] centrifuged the breast milk sample immediately after collection to remove the lipid layer to eliminate false low BMNa values.

CONCLUSION

To conclude, exclusive breastfeeding is vital for the infants but adequate supplementation and augmentation of feeds should be considered when the fluid and caloric needs of the infants are not met with breastfeeding alone despite all the efforts to enhance breastfeeding so as to prevent complications like hypernatremic dehydration and exaggerated physiologic jaundice.

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