based surveys including underreporting due social stigma attached with asthma and poor perception of symptoms and also the exercise induced asthma and mild episodic cases where symptoms may not be present and physical examinations, PEFR and spirometry may be normal.

BHAGWAN SAHAI SHARMA *MUKESH KUMAR GUPTA AND RAJENDRA CHANDEL
*Departments of Pediatrics, SPMCHI, SMS Medical College and
Mahatma Gandhi Medical College, Sitapura, Jaipur, Rajasthan, India.
drrajendrachandelpediatrics@gmail.com

REFERENCES

1. Pearce N, Aït-Khaled N, Beasley R, Mallol J, Keil U, Mitchell E, *et al*. Worldwide trends in the prevalence of asthma symptoms: phase III of the International Study of Asthma and Allergies in Childhood (ISAAC). Thorax. 2007;62:758-66.
2. Pal R, Dahal S, Pal S. Prevalence of bronchial asthma in Indian children. Indian J Community Med. 2009;34:310-6.
3. Paramesh H. Epidemiology of asthma in India. Indian J Pediatr. 2002;69:309-12.
4. Shah JR, Amdekar YK, Mathur RS. Nationwide variation in prevalence of bronchial asthma- (part of the international study of asthma and allergies in childhood-ISAAC). Indian J Med Sci. 2000;54:213-20.
5. Sharma S, Gupta RC, Dixit R, Sharma S, Gupta N. Prevalence of asthma in school children with allergic condition in rural areas of Ajmer, India. Chest. 2008 134: p54001.
6. Chhabra SK, Gupta CK, Chhabra P, Rajpal S. Risk factors for development of bronchial asthma in children in Delhi. Ann Allergy Asthma Immunol. 1999;83:385-90.
7. The International Study of Asthma and Allergies in Childhood (ISAAC) Steering Committee. Worldwide variations in the prevalence of asthma symptoms: the International Study of Asthma and Allergies in Childhood (ISAAC). Eur Respir J. 1998;12:315-35.

Changes in Biochemical Contents of Expressed Breast Milk on Refrigerator Storage

To determine the biochemical integrity of refrigerated breast milk for 96 hours at 4ºC, a longitudinal observational study done with fresh milk samples. It is found that there were significant changes in pH, serum albumin and lactose concentrations in breast milk though within normal range.

Key words: *Expressed breastmilk, Lactose, Storage, Temperature.*

In this observational study the integrity of human breast milk (HBM) in terms of pH, total proteins, serum albumin, triglycerides and lactose in stored breast milk were determined with the aim of providing guidelines for storage of expressed breast milk in home refrigerators for working mothers as well as in neonatal intensive care unit.

25 mL of aseptically obtained HBM samples were analysed at 0 (reading taken as control), 24, 48, 72, and 96 hours for the said parameters. (*Table* I). A convenience sample of 26 mothers was chosen to detect a difference of 1 SD from the mean for each analysis. To determine changes over time, the data were analyzed by repeated-measures ANOVA. Significant differences were defined as $P<.01$ due to multiple comparisons.

We found that the drop in pH ($6.99\pm.12$ to $6.13\pm.17$) ($P<0.001$) and albumin were significant ($.55\pm.16$ to $.29\pm.17$ g/dL) ($P<0.001$). However, the albumin content even on day four was within the recommended range. Total protein in breast milk also decreased ($1.60\pm.32$ to $1.41\pm.44$ g/dL), however not significantly. Triglycerides content decreases with time (2325.52 ± 566.72 to 1896.40 ± 840.30 mg/dL), though the difference was not significant. Lactose content significantly decreased over time. (6077.36 ± 816.82 to 5462.24 ± 771.5 mg/dL) ($P<.01$).

The observed change in pH will not alter the functions of the enzymes of the breast milk [1] and may be due to the lipolysis and release of free fatty acids occurring in the breast milk during storage at temperatures at or above -20ºC [2]. The greater fall in pH with increase in duration of storage could be justified by the increased time available for lipolysis to occur. Slutzah, *et al*. found an inverse relationship between free fatty acid concentration and pH on milk storage [3]. The change in free fatty acid and pH may be due to bacterial proliferation as ,the pasteurised milk sample which remain sterile after 3rd day of storage did not show any change of pH or free fatty acid [3]. We also observed that the lactose concentration in milk in our mothers is less than the international standards, though it is

TABLE I SHOWING THE PARAMETERS MEASURED IN THE STORED MILK

Parameter	Day 1	Day 2	Day 3	Day 4
pH	6.99 ± .12	6.15 ±.12	6.14 ± 00	6.13 ± .17
Total protein(g/dL)	1.60 ±.32	1.7 ± 00	1.64 ± .61	1.41 ± .44
Albumin(g/dL)	.5512 ±.16	0.87 ± 00	0.27 ± .21	.2884 ± .17
Lactose(mg/dL)	6077.36 ± 816.82	6000 ± .88	5845 ± .455	5462.24 ± 771.5
Triglyceride(mg/dL)	2325.52 ± 566.72	2290 ± 670	1980 ± 780.78	1896.40 ± 840.30

said that, race, age, parity, or diets do not greatly affect milk composition [4]. However in an Indian study it is found that the lactose content of breast milk of term Indian mothers is lower, similar to our study [5]. Since it would be unethical to perform a controlled study to find out side effects of "expired human milk" on newborns, we have to rely on such biochemical changes and laboratory parameters to determine the duration of safe storage of human milk.

In conclusion, we can store mother's milk at refrigerator temperature of 4°C for 96 hours without changing its overall integrity in the form of pH, serum albumin, total protein, lipid and lactose content and can use it for feeding neonates and infants.

**BHASWATI GHOSHAL, SUBHRAJIT LAHIRI,
*KAUSHIK KAR AND NIRMALYA SARKAR,**

*From the Departments of Pediatric Medicine,
Calcutta National Medical College and
*Department of Biochemistry,
Calcutta National Medical College, Kolkata,
West Bengal, India. Subhrajitlahiri@ymail.com*

REFERENCES

1. Hamosh M, Henderson T, Ellis L, Mae J, Hamosh P. Digestive enzymes in human milk: stability at suboptimal storage temperatures. J Pediatr Gastroenterol Nutr. 1997; 24:38-43.
2. Hegde AM, Vikyath R. Cariogenic potential of stored human milk an in vitro study. J Clin Pediatric Dentistry. 2007;32:27-32.
3. Slutzah M, Codipilly CN, Potak D, Clark RM, Schanler RJ. Refrigerator storage of expressed human milk in the neonatal intensive care unit. J Pediatr. 2010; 156:26-8.
4. JR. The composition of human milk. Semin Perinatol. 1979;3:225-39.
5. Narang APS, Bains HS, Kansal S,Singh D. Serial composition of human milk in preterm and term mothers. Indian Journal of Clinical Biochemistry. 2006; 21: 89-94.

Profile of EBV- Associated Infectious Mononucleosis

During a 5 year period, 33 children (22 males) were diagnosed to have infectious mononucleosis (M:F::2:1; age 9 mo-15 y). The common clinical features observed were fever (100%), lymphadenopathy (84%) hepatosplenomegaly (81%), tonsillar enlargement (45%), neck swelling (30%), upper respiratory symptoms (21%), epitrochlear node enlargement (20%), vomiting and diarrhea (1%). Ten children had complications; upper airway obstruction and hemophagocytic lymphohistocytosis occurred in four each and septic shock in two. EBV associated infectious mononucleosis in hospitalized children was found to affect mainly preschool children and had a favorable prognosis.

Key Words: *Children, EBV, Infectious mononucleosis.*

We conducted a retrospective analysis of case records of children hospitalized with a diagnosis of infectious mononucleosis between January 2003 to December 2008 in Kanchi Kamakoti CHILDS Trust hospital, Chennai. A case of IM was defined by the presence of (*i*) fever, tonsillopharyngitis, cervical lymphadenopathy, hepatomegaly or splenomegaly, and (*ii*) serologic evidence of EBV infection *i.e*.,: IgM antibodies to EBV viral capsid antigen (VCA) (ELISA, D-Meditec Kit , OFB agency) and a titer >12μ/mL was considered as positive.

During the six year study period, 33 children were diagnosed to have IM out of a total 46,873 (0.07%) hospitalized children. Most of the cases were between 1 and 5 years old (22) (age range 9 months-15 years). The common clinical features and laboratory features observed are shown in ***Table*** I. Children who had fever > 14 days had a high risk of development of complications in our series (Fisher's exact, *P*<0.05). The EBV VCA IgM titers ranged from 12 to 158 μ/mL. Children with high titers of VCA IgM (>100) had complications like septic shock.