Brief Reports

Antioxidant Micronutrient Profile (Vitamin E, C, A, Copper, Zinc, Iron) of Colostrum: Association with Maternal Characteristics

by L. Ahmed,[a] SK. Nazrul Islam,[a] M. N. I. Khan,[a] S. Huque, *and* M. Ahsan[b]
[a]*Institute of Nutrition and Food Science, University of Dhaka, Dhaka, Bangladesh*
[b]*Department of Pharmacy, University of Dhaka, Dhaka, Bangladesh*

Summary

The study was conducted to investigate the micronutrient profile of human colostrum, and to assess the association of maternal characteristics to the micronutrients. Colostral concentrations of antioxidant vitamins E, C, and A were 21.34 ± 8.47, 148.92 ± 43.64, 0.79 ± 0.42 µmol/l, respectively. The antioxidant minerals copper, zinc, and iron contents were 19.17 ± 11.73, 63.69 ± 12.82, 11.44 ± 1.46 µmol/l, respectively. Maternal characteristics did not have any influence on the colostral micronutrients.

Introduction

Human colostrum contains all of the constituents that are required for the optimal growth and development of a neonate. It supports the development of brain, immune, and physiological systems. Colostrum has a unique protective effect against acute infections.[1–4] In addition to the non-nutritive immune components, colostrum contains a large number of immunoactive nutrients including antioxidant micronutrients. Antioxidant vitamins and minerals play an important role in immunophysiological functions acting as potential immunoenhancers and antioxidants,[5,6] deficiencies of which downregulate immune function, but their overload is immunotoxic.[7] In view of their important role in the immunophysiological system, colostral concentrations of antioxidant vitamins E, C, and A, and minerals like copper, zinc, and iron were investigated among selected Bangladeshi mothers.

Materials and Methods

The study was conducted amongst 105 post-partum mothers aged 16–40 years. Colostrums (2 ml) were collected manually on the second post-partum day. Anthropometric data and socioeconomic information of each of the mothers were recorded. Reversed phase HPLC was used for simultaneous determination of retinol and α-tocopherol in the sera as described by Islam, *et al*.[5] The concentration of ascorbic acid in the colostrum was determined by spectrophotometric method using phenyl hydrazine indicator.[5] Colostral mineral contents were determined by an atomic absorption flame emission spectrophotometer.[8] SPSS software package (version 10.0) was used to analyse the data.

Results and Discussion

The mean maternal age, monthly income, BMI, and parity were 23.07 ± 4.40 years, 105.9 ± 87.75 US$, 22.23 ± 3.56, and 2.1 ± 1.3, respectively (Table 1). The colostral concentrations of antioxidant vitamins E, C, and A were 21.34 ± 8.47, 148.92 ± 43.64, and 0.79 ± 0.42 µmol/l and the microminerals Cu, Zn, and Fe were 19.17 ± 11.73, 63.69 ± 12.82, and 11.44 ± 1.46 µmol/l, respectively (Table 2). Non-parametric analysis (χ^2) showed no significant relationship between maternal age, income, BMI, and parity, and the micronutrient contents of colostrum (Table 3). The vitamin E content in colostrum was found to be in agreement claimed elsewhere for colostrum.[9] Concentrations of vitamins C and A in the colostrum were equivalent to those reported for Bangladesh[10] and India,[11] but the vitamin A content was lower than that noted for developed and developing countries.[11] However, the mineral contents obtained in this study were consistent with the reported data.[12]

Conclusion

Our findings confirm the optimum levels of antioxidant micronutrients in the colostrum of

Acknowledgement

The authors thank the financial support by the Bangladesh Breastfeeding Foundation.

Correspondence: SK. Nazrul Islam, Institute of Nutrition and Food Science, Unviersity of Dhaka, Dhaka 1000, Bangladesh. E-mail <snislam@bangla.net>.

TABLE 1
Socio-demographic characteristics of the studied mothers

Characteristic	Number (%)	Mean	SD
Age (years)			
16–22	47 (45)		
22–28	42 (40)	23.07	4.40
> 28	16 (15)		
Monthly income (US $)			
90.00	66 (63)		
90.00–120.00	31 (29)	105.90	87.75
> 120	8 (8)		
BMI			
16–18	11 (11)		
18–20	18 (17)	22.23	3.56
> 20	76 (72)		
Parity			
< 2	75 (72)		
2–3	18 (17)	2.10	1.30
> 3	11 (11)		

TABLE 2
Micronutrient profile of human colostrum

Micronutrient in μmol/l	Number (%)	Mean	SD
Vitamin E			
6.00–18.80	37 (35)		
18.80–30.00	52 (50)	21.34	8.47
30.00 and above	16 (15)		
Vitamin C			
70.00–116.00	29 (28)		
116.00–162.00	35 (33)	148.92	43.64
162 and above	41 (39)		
Vitamin A			
0.28–0.81	67 (64)		
0.81–1.34	28 (27)	0.79	0.42
134 and above	10 (9)		
Copper			
3.00–15.00	50 (48)		
15.00–27.00	34 (32)	19.17	11.73
27.00 and above	21 (20)		
Zinc			
< 62.00	44 (42)		
62.00-77.00	44 (42)	63.69	12.82
77.00–92.00	17 (16)		
Iron			
< 10.60	45 (42)		
10.60–12.50	30 (29)	11.44	1.46
12.5–11–4.40	30 (29)		

TABLE 3
Correlation (χ^2) of colostral micronutrient profile with maternal characteristics

Maternal characteristic	Vitamin E	Vitamin C	Vitamin A	Copper	Zinc	Iron
Age	8.04	5.78	3.73	4.61	0.26	2.89
Income	9.01	0.91	9.12	3.02	4.85	2.21
BMI	2.56	9.35	5.37	0.27	3.42	3.78
Parity	2.72	2.73	1.96	1.95	0.66	1.08

$\chi^2 \geq 9.488$ at 4 d.f. (degrees of freedom) is significant.

Bangladeshi mothers. The results further revealed that colostral concentration of micronutrients is independent of income, nutritional status, age, or parity of the mothers. This association may be exploited for the promotion of colostrum feeding in developing countries like Bangladesh, where a higher rate of colostrum rejection is registered.

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