Fatty acid and multielement profile of breast milk over different lactation stages

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BACKGROUND

Breast milk represents the best food available for infants. Exclusive breast feeding is recommended for the first 6 month of life. Breast milk consists mainly of water, carbohydrates, lipids, proteins, vitamins and minerals. Lipids can account for only about 4% of breast milk, but the composition of cis fatty acids is one of their major components. The profile of fatty acids is influenced by various factors, such as: maternal age, stage of lactation, composition of maternal diet, etc. growth and development. In particular, trans fatty acids (TFAs) in human breast milk have raised concerns because of the possible adverse effects on infant's growth and development. The aim of our study was to evaluate the changes in fatty acid composition and multielement profile of breast milk over lactation stages.

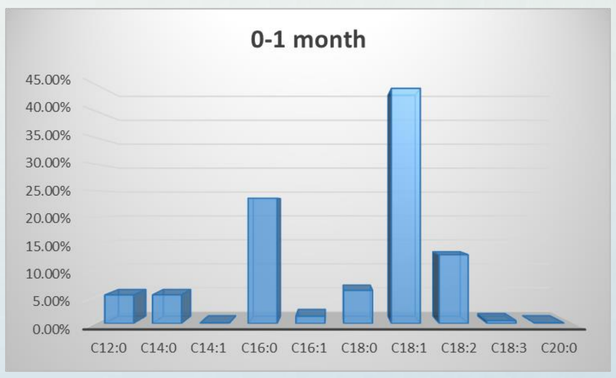
MATERIALS AND METHODS

- ✓ Analytical techniques such as gas chromatography with flame ionization detector (GC-FID) were employed to evaluate the fatty acid composition of breast milk fat.
- ✓ Prior the chromatographic analysis, samples was derivatization to allow volatilization of the interest compounds.
- ✓ Concentrations of macro, micro minerals and potentially toxic metals were analyzed by ICP-MS (ICP-MS ELAN DRC-e mass spectrometer).

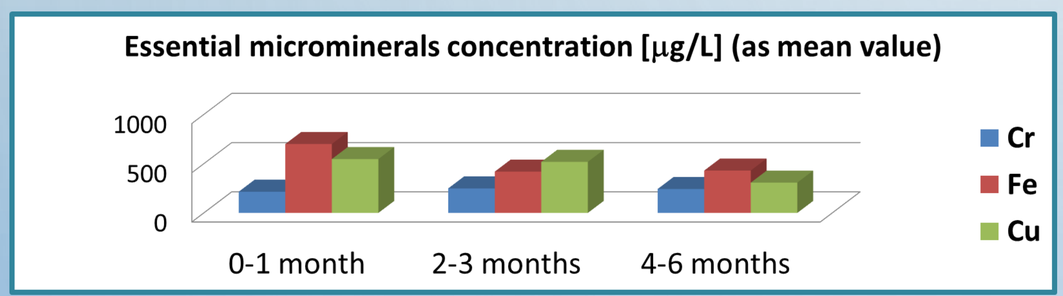
RESULTS AND DISCUSION

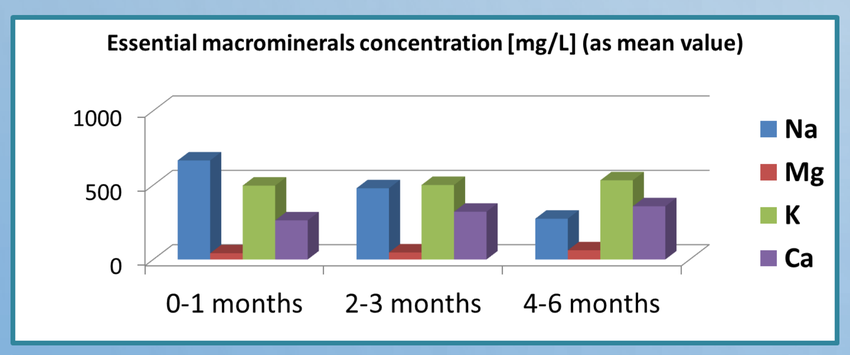
Composition of fatty acids (%) grouped by degree of saturations and lactation stages in breast milk samples.

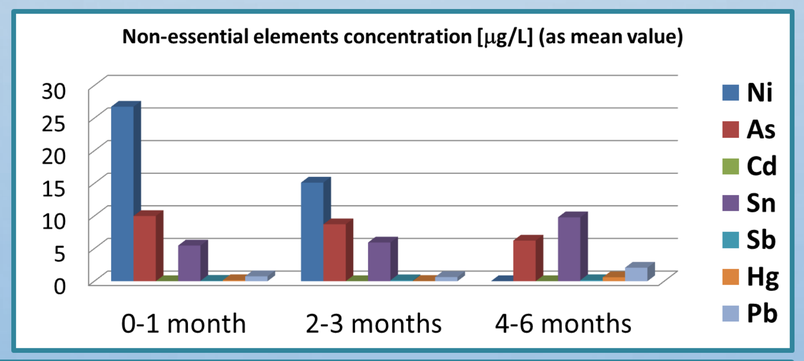
Age	Saturated Fatty Acids (SFA)			Monounsaturated Fatty Acids (MUFA)			Polyunsaturated Fatty Acids (PUFA)		
	Concentration (%)								
	min.	max.	Average	min.	max.	Average	min.	max.	Average
0-1 months	38.71	48.06	40.71	39.19	55.22	45.78	12.23	14.6	13.51
2-3 months	31.67	44.79	37.17	45.83	49.95	48.15	8.54	21.83	14.68
4-6 months	31.43	43.63	38.50	41.54	55.93	48.04	9.67	16.22	13.46

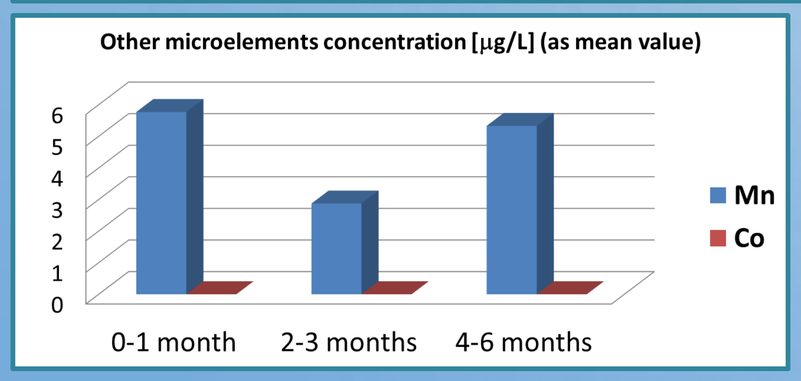


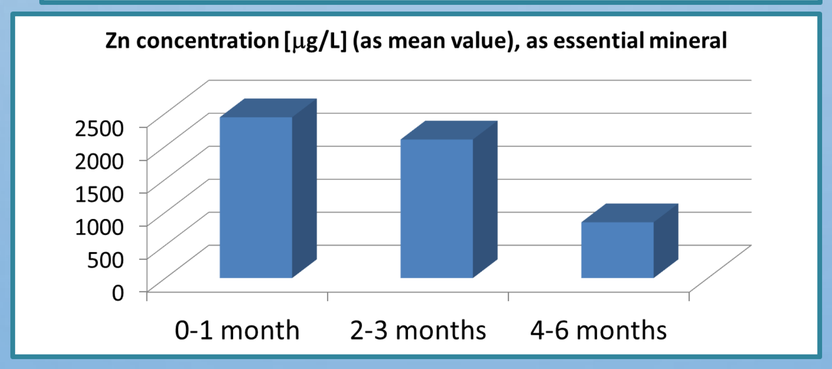
Distribution of fatty acids over lactation stages in breast milk samples (%)











Multielement profile of breast milk over lactation stages

C12:0 – Methyl laurate
C14:0 – Methyl myristate
C14:1 – Methyl myristoleate
C16:0 – Methyl palmitate
C16:1 – Methyl palmitoleate
C18:0 – Methyl stearate
C18:1 – Methyl cis-9 oleate
C18:2 – Methyl linoleate
C18:3 – Methyl-γ-linolenate
C20:0 – Methyl arachidiate

CONCLUSION

- ✓ The principal saturated fatty acid (SFA) in breast milk is the palmitic acid (16:0).
- ✓ The most significant fatty acids in breast milk are the long-chain polyunsaturated fatty acids (PUFA).
- ✓ There were no significant differences between of mean macromineral concentrations in breast milk during the investigated period (0-6 months).
- ✓ Median concentrations of Fe were significant different in the first stage of lactation (0-1 months) compared to next periods. But, Cu and Zn mean concentrations were significant different only in the third stage of lactation (3-6 months).

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