ISSN : 0974 - 7427 Volume 5 Issue 2

Trade Science Inc.

BIOCHEMISTRY
An Indian Journal

Short Communication

BCAIJ, 5(2), 2011 [137-139]

Breast milk of Jewish and Bedouin ethnic origins have a higher resistance against lipid peroxidation compare to milk substitutes

Oshra Saphier[1]*, Tali Silberstein[2], Eldad Silberstein[3], Jeanine Blumenfeld[1], Tamar Tzur[2], Boaz Sheizaf[2], Ariela Burg[1]

[1]Department of Chemical Engineering, Faculty of Chemical Engineering, Sami Shamoon College of Engineering, Beer-Sheva Campus: Bialik/Basel Sts., Beer-Sheva 84100, (ISRAEL)

[2]Department of Gynecology and Obstetrics, Soroka University Hospital, Ben-Gurion University of the Negev, Beer-Sheva, (ISRAEL)

[3]Plastic Surgery Departement, Soroka University, Medical Center, (ISRAEL)

E-mail : oshras@sce.ac.il

Received: 30th October, 2010 ; Accepted: 9th November, 2010

ABSTRACT

Aims: 1. To measure and compare levels of lipid peroxidation, as detected by Malondialdehyde (MDA) concentration, in breast milk taken from two different populations in Israel, Jewish and Bedouin. 2. To compare levels of MDA in commercial dairy newborn formulas to MDA levels in breast milk. **Methods:** Milk samples were collected from 60 mothers of term infants, 40 Jewish and 20 Bedouin mothers. MDA levels were measured spectroscopically and compared between groups. **Results:** The levels of MDA in the Bedouin group were higher in about 20% then in the Jewish group. The commercials milk powders were found to be more susceptible ($P<0.0001$) to an oxidative stress than breast milk from both ethnic groups**. Conclusions:** Anti oxidant ingredient exist in the breast milk, with no relation to ethnic group**.** Although higher in the Jewish group, no statistically significant difference was found in milk lipid peroxide level between the ethnic groups.

KEYWORDS

Breast milk;
Lipid peroxidation;
Baby milk substitute;
Ethnic groups.

INTRODUCTION

Mother's milk is the gold standard of human nutrition and its advantages in physical and neurodevelopmental aspects clearly recognized[1]. In addition, breast milk from term and preterm infants has important antioxidant properties compared with formula milk[2,3]. in examining the effect of breast milk on plasma total antioxidant capacity, total peroxide, and oxidative stress index, which are biomarkers of oxidative status, it was found that breast milk provides better antioxidant power than does formula[4]. It has been reported that compared to formula, breast milk can suppress the oxidative DNA damage in premature[5]. Human milk contains various antioxidants[6]. Superoxide dismutase and glutathione peroxidase are two important antioxidant enzymes found in human milk[7]. Major antioxidants in commercially available brands of formula milk

Short Communication

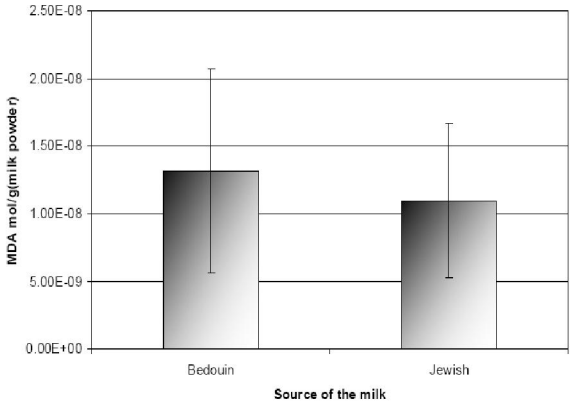

Figure 1 : MDA levels in breast milk from Bedouin (n=20) and Jewish mothers (n=40). Results are average ± SD

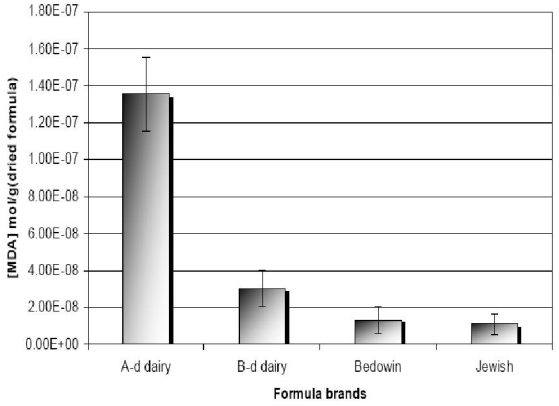

Figure 2 : comparison between MDA levels in breast milk to commercial dairy milk powder

are vitamins E and A which are added in relatively high amounts, depending on the manufacturer. It was also reported that antioxidant properties of both breast milk and formula are sufficient to prevent significant lipid peroxidation in healthy premature infants[8].

Malondialdehyde (MDA) is one of several low-molecular-weight end products formed via the decomposition of certain primary and secondary lipid peroxidation products. At low pH and elevated temperature, MDA readily reacts with 2-thiobarbituric acid (TBA), generating a red, fluorescent 1:2 MDA: TBA adducts[9]. In this study we measured the levels of lipid peroxidation in breast milk taken from two different populations in Israel, Jewish and Bedouin, from the south region of Israel. The two populations differ in living region and culture. The Bedouin group that participate in the study has low socioeconomically conditions compared to the Jewish study population.

In addition, the results were compared to the two popular commercial dairy newborn formulas commonly used in Israel[10].

METHODS

This study received ethical approval from the Soroka medical center Research Ethics board according to the Helsinki declaration. Informed consent was received from all women participating in the study.

Milk collection, supplement preparation, and test reagents

Milk samples for this study were collected from 60 mothers of term infants (born between 37 and 41 weeks of gestation), during the third month of lactation, 40 Jewish (age 31 ± 6) and 20 Bedouin mothers (age 29 ± 5). Samples were collected by the mother using a breast pump or by hand expression after washing the nipple by sterilized distilled water, and transported on ice to the laboratory and immediately frozen and stored at –86°C until analysis.

All samples were lyophilized (freeze-drying) by Lyophilizer, to a dry powder.

MDA levels were measured spectroscopically according to a procedure already published by François Fenaille et al.[11] with minor modifications. In this work we used the 'TBA-test' to detect and quantify lipid peroxidation in breast milk and milk formula. The assay based on the thiobarbitoric acid (TBA) reaction; a reaction between oxidized lipids and solution of 2-thiobarbitoric acid under acidic conditions to yield a pink chromogen with a maximum absorbance at 532 nm.

Milk powder (after lyophilization) (0.3 g) was suspended in distilled water (10 ml). An aliquot of this slurry (3 ml) was transferred to a 15-ml tube, followed by successive additions of 1.2 ml TBA 0.67%, 1.2ml TCA 5% and BHT 0.8% in ethanol. The samples were then vortexed and centrifuged at 2700 g for 5 min to precipitate proteins. The supernatant was placed in glass test tubes and incubated in a 70 °C water bath for 20 min. Samples were subsequently cooled under tap water for 5 min and centrifuged for 5 min to separate flocculent material. The color produced by the chemical reaction was read at 532 nm against a blank reaction mixture and the amount of MDA formed was deter-

mined by using the molar extinction coefficient $\varepsilon_{532\,nm}$) = 1.56×10^{-5} cm $nmol^{-1}$[11].

RESULTS

As shown in figure 1, there is a difference between levels of MDA in the two study groups. The levels of MDA in the Bedouin group were higher in about 20% then in the Jewish group, however not statistically significant.

Comparison the MDA levels in the breast milk to MDA levels in dairy milk powder, showed that the commercials milk powders are much more susceptible ($P<0.0001$) to an oxidative stress than breast milk from both ethnic groups (Figure 2).

DISCUSSION

According to our measurements of lipid peroxide levels, commercials milk powders were found to be significantly more susceptible to an oxidative stress than breast milk from both ethnic groups. This fact suggests that a unique anti oxidant ingredient exist in the breast milk, with no relation to ethnic group, which protects the milk from an oxidative stress. The higher level of anti oxidants gives the infants better quality milk with no regard of living conditions.

Although there is a known socioeconomic difference between the two groups of breast feeding mothers, no difference was found in there milk lipid peroxide level. The harder living conditions did not affect the milk quality as seen by lipid susceptibility to oxidative stress. We think that this finding may indicate a higher antioxidant levels in breast milk in both ethnic groups.

ACKNOWLEDGEMENT

This work was supported by the Internal Funding Program of the Shamoon College of Engineering (SCE).

REFERENCES

[1] B.R.Vohr, B.B.Poindexter, A.M.Dusick; Pediatrics, **118**, e115-23 **(2006)**.
[2] J.K.Friel, S.M.Martin, M.Langdon, G.R.Herzberg, G.R.Buettner; Pediatr.Res., **51**, 612-8 **(2002)**.
[3] A.Aycicek, O.Erel, A.Kocyigit, S.Selek, M.R.Demirkol; Nutrition, **22**, 616-9 **(2006)**.
[4] A.Aycicek, O.Erel, A.Kocyigit, S.Selek, M.R.Demirkol; Nutrition, **22(6)**, 616-9 **(2006)**.
[5] H.Shoji, T.Shimizu, K.Shinohara; Arch.Dis. Child. Fetal.Neonatal.Ed., **89**, 136-138 **(2004)**.
[6] J.E.Chappell, T.Francis, M.T.Clandinin; Early Hum.Dev., **11**, 157-167 **(1985)**.
[7] M.R.L'Abbe, J.K.Friel; J.Pediatr.Gastroenterol. Nutr., **31**, 270-274 **(2000)**.
[8] O.Korchazhkina, E.Jones, M.Czauderna, S.A.Spencer; Arch.Dis.Child., **91(4)**, 327-329 **(2006)**.
[9] D.R.Janero; Free Radic.Biol.Med., **9(6)**, 515-40 **(1990)**.
[10] A.Burg, T.Silberstein, G.Yardeni, D.Tavor, J.Blumenfeld, I.Zilbermann, O.Saphier; J.Agric. Food Chem., **58(4)**, 2347-50 **(2010)**.
[11] F.Francois; Journal of Chromatography A, **921**, 237-245 **(2001)**.