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International Journal of Current Research
Vol. 10, Issue, 05, pp.68982-68985, May, 2018

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

ISSN: 0975-833X

RESEARCH ARTICLE

ASSESSMENT OF EFFECT OF THE MATERNAL DIETARY ZINC INTAKE ON ITS LEVEL IN BREAST MILK AMONG NURSING MOTHERS IN BAQUBAH CITY

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ARTICLE INFO

Article History:
Received 17th February, 2018
Received in revised form
20th March, 2018
Accepted 28th April, 2018
Published online 23rd May, 2018

Key words:
Dietary zinc intake,
Breast milk,
24 – Hours food recalls,
Nursing mothers.

ABSTRACT

Background: Daily dietary intake of zinc that absorbed by the nursing mother is always associated with good lactation and with the quantity and quality of the milk produced**.**
Objective: The purpose of this study is to estimate the effect of dietary zinc intake on zinc content of breast milk and determine the association between maternal dietary zinc intake of zinc and content of zinc in breast milk.
Methods: Nursing mothers of (infants) volunteered to take part in this study selected from those who were cared for at Al-Takiah Maternal and Child Health Center, Baqubah city- Diyala Governorate, during July 2015 till February 2016. Individual samples of breast milk were obtained from 50 mothers at different times postpartum for zinc estimation, dietary intake were collected using quantitative 24 – hours food recalls.
Results: The result revealed that the mean zinc distribution (zinc intake) of the nursing mothers in this study was (11.26± 2.13 mg/day) and its' mean concentration in brunt milk was (0.6± 0.2 mg/100 ml. The relationships between maternal zinc intake and milk zinc content was obtained with a significant positive correlation ($r = 0.61$ $p < 0.01$).
Conclusion: The results show that there is a need to increase the consumption of food rich with zinc content. Thus a regular monitoring of zinc breast milk level is the appropriate application.

Citation: Loay M.Mohammd Altaay and Najlaa Najat Al-Baety, 2018. "Assessment of effect of the maternal dietary zinc intake on its level in Breast milk among nursing mothers in Baqubah city", *International Journal of Current Research*, 10, (05), 68982-68985.

INTRODUCTION

The Eastern Mediterranean Regional Office of WHO (EMRO) has reported high rates (>60%) of early breastfeeding initiation with 60% of mothers continuing to breastfeed to 12 months in the Middle East and North Africa (MENA) countries. Despite these recent reports of high rates, previously low rates of exclusive breastfeeding had been reported from this region where only 40% or less of infants under six months were being exclusively breastfed specially in the Middle East region is 24%, including Lebanon (7%), Yemen (15%), Pakistan (16%), Jordan(32%), Iraq (41%) and Iran (48%)(EMRO, 2012). Breast milk zinc, an important source of bio-available zinc for infants shows a faster rate of decline postpartum. In developed countries, breast milk zinc concentrations have yielded inconsistent results with maternal zinc supplementation (Sazawal *et al.,* 2013). In the last decade there has been a progressive increase in understanding of the occurrence of zinc deficiency in infants and preschool children and its impact on morbidity, growth and mortality (Bhutta *et al.,* 1999 and Shankar *et al.,* 2000).

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Zinc deficiency may occur early in life, especially among low birth weight infants. Joint WHO/IAEA collaborative study reports that zinc body storages are not extensive, and it should be taken in adequate quantities for optimal growth and development (WHO, 2013). The amount of zinc transferred. In breast milk to partially breastfed infants less than 6 months of age is approximately 15% less than that described above for exclusively breastfed infants, because of the smaller volumes of milk consumed by partially breastfed infants. The age-related pattern of change in milk zinc intakes is similar for both groups of infants. After 6 months of age, breast milk continues to be an important source of zinc, providing ~0,5 mg/day from 6 to 8 months and ~0.4 to 0.3 mg/day thereafter, a time when the estimated physiological requirements for absorbed zinc range from 0.84 to 0.5 mg/day, depending on age and the source of these estimates (Kenneth *et al.,* 2009). Maternal zinc deficiency can have adverse effects on reproduction, including infertility, congenital anomalies, fetal growth retardation, prolonged labor, embryonic or fetal death, and early postnatal infant immune dysfunction. The possible mechanisms and pathways of maternal zinc deficiency and adverse health effects on the mother and fetus were previously reviewed (Caulfield *et al.,* 1998). Zinc requirements during

lactation have been estimated from the zinc content of milk secreted during lactation (King and Turnlund, 1989). However, the ability of these homeostatic mechanisms to compensate for diets that are low in total zinc or in bioavailable zinc appears to be limited so reproductive function may be compromised under these circumstances. In these cases, supplementation of women with low zinc intakes may be necessary to ensure optimal reproductive outcomes and lactation(WHO, 2006).The body doesn't readily store zinc, so you need to get some every day—but only a small amount. The recommended daily allowance (RDA) is 10 mg per day for women. That number rises to 16 mg for pregnant women, and 20 mg for nursing mothers. Meanwhile, vegetarians may need to take in as much as 50% more than the RDA—the body absorbs less zinc from plant-based foods than from meat sources (a term called bioavailability) (Fareeha *et al.,* 2014).Good dietary source of zinc are meat, poultry ,eggs and seafood. Oysters are the richest source of zinc. Cereals and legumes also contain significant amount of zinc, but because of the presence of Phytic acid in these foods, zinc is less available than that supplied by foods of animal origin (Vishwanath, 1998).

MATERIALS AND METHODS

Subjects: The fifty mothers, who took part in the study, were selected from those who attending the Maternal and Child Health Center in Baqubah. The study design is cross-sectional, all project protocols, questioners, procedures and informed consent forms were approved by the committee of Medical Research at the Ministry of Health and the Medical Committee at Al-Takiah Maternal and Child Health Center, Baqubah city-Diyala governorate. Mothers were screened for study eligibility. Eligible mothers were approached by project – trained nutritionist who discussed all aspect of project with them. Mothers were referred to the clinic nurses and doctors when health related questions arose. During July 2015 till February 2016 the following eligibility requirements were fulfilled by each woman: the women were (1) lactating 1-26 weeks postpartum (2) between 18 and 38 years of age (3) healthy (4) non-smokers (5) not on zinc supplement and (6) not taking any medicine that had an effect on zinc requirements.

Milk samples and processing: Individual samples of midstream breast milk (2-5 ml) were obtained from each mother. All breast milk samples collected between 10.00 and 12.00 A.M. samples were manually expressed by the donor into clean test tube, refrigerated ,transported to the laboratory and freeze at.-20 C˚until processed individually.

Estimation of Zinc content: The determination of Zinc was based on a methodology of Egan's skilled helper model (Egan, 2006), using atomic absorption spectrophotometry. Zinc standards and samples were aspirated at a wave length of 213.9nm.Appropriate standards and calibration curves were used. Duplicate samples were run with each assay. All standards were from Fluka (Milwaukee, WI) (Mittal, 2009).

Instrument: The instruments used in this study were 35 shimadza atomic absorption flame emission spectrophotometer model AA 670 – 20, Japan.

Data Collection: Socio – demographic data (age and educational level attained) were collected. Dietary intakes were obtained using 24 hour food recalls by the same interviewers. Food models and measuring instruments, like those used in home kitchens for food preparation were employed to assist in the recall of the quantities of foods and beverages consumed the previous day, in order to variety the information registered by subjects the trained nutritionist checked the food record in detail with each subject, the diets were scored for the content of zinc using food tables (Charrondiere *et al.,* 2013). The daily zinc intake was expressed as percentage of the established FAO/WHO requirement Intakes were considered acceptable if they were 66% greater of the FAO/WHO requirements, marginal if they 50 to 66 % and low if they were less than 50% of the FAO/WHO requirements (FAO, 2002).

Statistical Methods: Results are expressed as mean (standard, errors and standard deviation) or percentages. The unpaired t – test was used to compare means between groups. Linear regression was carried out $p < 0.01$ level was considered significant.

RESULTS

Table 1 shows summarizes the background socio – demographic characteristics of women who were subjected to this study. The majorities (50 %) of them where between 22-29 years old, with the average age being 28 years.

Table 1. Socio-demographic characteristics of the studied women

characteristics	No. of subject	%
Age range (years)		
18-21	5	10
22-25	14	30
26-29	10	20
30-33	11	22
34-37	7	14
>38	2	1
Educational level		
Lower school	20	40
High school	11	22
Some college	8	16
No school	11	22

Mean age = 28 years

Table 2. Distribution of subject with acceptable, marginal and low zinc intake

Zinc intake	No.	%
b)Acceptable	21	42
c)Marginal	20	40
d)Low	9	18

Mean ± SD = 11.26 ±2.13 mg/day.
> 66% of the FAO/WHO requirement for lactating woman.
50%-66% of the FAO/WHO requirement.
<50% of the FAO/WHO requirement.

Most subjects (40 %) had attended lower level of education, while (38 %) had attended higher school or had acquired college degree. Others (22%) with no school years. Mean value and distribution of acceptable marginal and low intake of zinc are given in. Table 2. shows 42% of the mothers consumed acceptable levels of the FOA/WHO requirements for lactating women (>66%). Table 3. shows the zinc continent in the breast milk of the lactating women at different stages of lactation. During the first week of lactation zinc content was (2.1 ± 0.8 mg /100 ml) and decreased to (0.05± 0.02 mg/100 ml) in the second half of lactation (around 6 months postpartum) Figure 1. shows that zinc content of breast milk was related to the mothers diet. A significant positive correlation was present ($r = 0.61$, $p = <0.01$).

Table 3. Distribution of lactation and zinc content (Mean ± SD) of breast milk

No. of subject	Duration of lactation (weeks)	Zinc (mg/100 ml)
5	<2	2.1 ± 0.8
11	3-6	1.2 ± 0.7
5	7-12	0.25±0.01
10	13-18	0.21 ±0.01
19	>18	0.05±0.02
Total 50		0.6±0.2

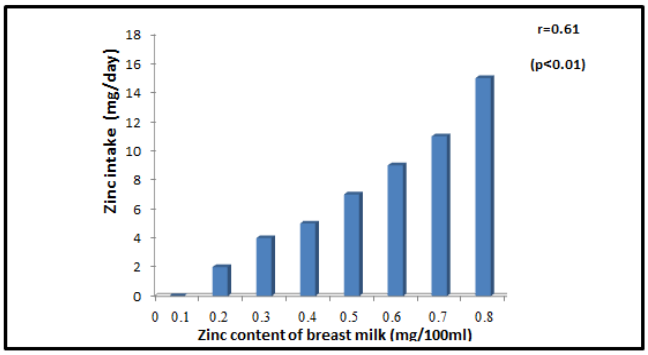

Figure 1. Relationship between mothers' zinc intake and zinc content of breast milk

DISCUSSION

Nutritional privileges for pregnant women and lactating mothers have been recognized by most nations for hundreds of years and customs concerning them have been verbally transmitted from generation to generation. the results related that the reported zinc intake of the nursing women did not meet even the requirement of the non – lactate women (Franca *et al.,* 2016). The mean intake of the nursing women in this study were lower than the result obtained by other workers in some countries and it was much lower than reported by Tawfeek *et al*. In Baghdad, during 1990 – 1994. (Tawfeek and Salom, 1995). In this present study, the average inc content of breast milk was 0.6± 0.2 (SD) mg/100ml (table 3), and the range was 0.2 to 0.8 mg/100ml (fig. 1). The breast milk of 58% of the mothers was deficient in zinc. This is evidence that the diet of those women contains in adequate zinc, since the zinc content of the breast milk tends to vary according to the amount in the mothers diet. An increase zinc consumption (up to 14 mg/day) will increase zinc in the breast milk up to a certain level (0.8 mg/ml) beyond which additional zinc will make no difference (Oraporn *et al.,* 2014). The zinc content of the breast milk and the zinc intake of the mothers in our study were low, as compared with the findings of others (Ortega *et al.,* 1998). The mean content of zinc in the breast milk was 5.44 micrograms /ml at 1 week after delivery and it deceased significantly ($p<0.01$) to 2.73 mg/ml at 1 month after delivery (Sazawal *et al.,* 2013). Our findings agree with those reported in a systematic study of the composition of milk during lactating (Muehlhoff *et al.,* 2013). The mean content of zinc in the milk decreased as the milk become mature. Other study reported also that breast milk exhibited a dramatic decline in total zinc concentration with increasing duration of lactation (Bates *et al.,* 1990). Given that FOA/WHO – recommended dietary zinc intake for lactating women is 20 mg/day. it would appear that some women achieve this intake whereas other do not. The lower zinc intake were not due to underreporting of food or intake incomplete records, since there was no evidence of underreporting and all records were checked. On other hands there is little evidence that diet influences the minerals content of human milk very much (Fareeha *et al.,* 2014). In a recent study was carried out on women living in Ferrara and its surrounding area, lactating women eating a traditional Italian diet (Zn=12mg) without vitamin and mineral supplement, and lactating women enrolled in the nitrification program and given a nutritional supplement to their traditional diet. The supplement provided 20 mg zinc sulfate. Zinc milk concentration declined significantly over the study period for all lactating subjects, without differences in the rate of decline between women who started supplementation during lactation and those who did not (Cherici *et al.,* 1999). In contrast our findings support some findings that zinc intake influences the composition of breast milk (Ortega *et al.,* 1998). Further research and examination by longitudinal studies are needed to establish the exact relationship between the amount of zinc furnished to the nursing mother and the zinc content of human milk.

Conclusion

In conclusion, although the zinc content of breast – milk depends on maternal minerals intake in general, yet, the zinc content of breast – milk decreased to lower values during the first weeks of lactation.

Recommendations

A national nutrition education programs should be carried out to encourage mothers to increase their dietary intake to reach the recommended allowances for minerals by regular intake of meat, eggs, sea food, and cereals or legumes. Breast feeding babies as soon as possible after birth helps to supply infants with required amounts of zinc. Research on optimal nutritional requirement during lactation of Iraqi women is needed and Local studies should be carried out for maternal nutrition identify the most appropriate risk factors related.

REFERENCES

Bates, CJ. and Tsuchiya, H. 1990. Zinc in breast milk during prolonged lactation: comparison between the UK and the Gambia. *Eur J ClinNutr.,* 44(1):61-69.

Bhutta, ZA., Black, RE., Brown, KH., Gardner, JM., Gore, S., Hidaya, T A. *et al.* 1999. Prevention of diarrhea and pneumonia by zinc supplementation in children in developing countries: pooled analysis of randomized controlled trials. Zinc Investigators' Collaborative Group. *J Pediatr*., 135: 689-697.

Caulfield, LE., Zavaleta, N., Shankar, AH., Merialdi, M. 1998. Potential contribution of maternal zinc supplementation during pregnancy to maternal and child survival. *Am J Clin Nutr*., 68:499–508.

Charrondiere, UR., Stadlmayr, B., Rittenschober, D., Mouille, B., Nilsson, E. *et al.* 2013. FAO/INFOODS Food Composition Database for Biodiversity. *Food Chemistry,* 140 (3), 408–412.

Cherici, G., Saccomandi, D. and Vigi, V. 1999. Dietary supplements for the lactating mother: influence on the trace element content of milk.*ActaPaediatr Suppl.,* 88(430):7-13.

Eastern Mediterranean Regional Office of WHO (EMRO), 2012. Breastfeeding inthe EMRO region. Available at: http://www.emro.who.int/health-topics/breastfeeding

Egan, G. 2006. The Skilled Helper: A Systematic Approach to Effective Helping, Fourth Edition, *Brooks/Cole Pub. Co*.ISBN 13: 9780534121389.

FAO/WHO, 2002. "Zinc." In Human Vitamin and Mineral Requirements: Report of a Joint FAO/WHO Expert Consultation edited by FAO/WHO, 257–270.Rome: FAO.

Fareeha, S., Fariha, Z., Rubina, H., Asher, F. and Akhtar, H. 2014. Maternal Dietary Intake and Anthropometric Measurements of Newborn at Birth. *The Open Diabetes Journal,* 7:14-19)

Franca, M., Irene, C., Elvira, V., Giuseppe, C., Marcello, G. *et al*. 2016. Maternal Diet and Nutrient Requirements in Pregnancy and Breastfeeding. An Italian Consensus Document. *Nutrients.,* 8(10): 629.

Kenneth, HB., Reina, ES., Nancy, F., Janet, M. 2009.Dietary intervention strategies to enhance zinc nutrition: Promotion and support of breastfeeding for infants and young children. *Food Nutr Bull*., 30(1): 7-8.

King, JC. and Turnlund, JR. 1989. Human zinc requirements. In: Mills CF, ed. Zinc in human biology. *London: Springer-Verlag.,* 19:335–350.

Mittal, KL. 2009. Polymer Surface Modification: Relevance to Adhesion. Volume 5, ISBN13: 9789004165908.

Muehlhoff, E., Bennett, A. and McMahon D. 2013.Milk and Dairy Products in Human Nutrition. Food and Agriculture Organisation of the United Nations (FAO), Rome. E-ISBN: 978-92-5-07864-8 (PDF).

Oraporn, D., Umaporn, S., Suthida, C., Phanphen, P., Areeporn, SM. *et al.* 2014. Maternal zinc status is associated with breast milk zinc concentration and zinc status in breastfed infants aged4-6months. *Asia Pac J ClinNutr.,* 24(2):273-280.

Ortega, RM., Lopez-Sobaler, AM., Quintas, ME., Martinez, RM. and Andres, P. 1998. The influence of smoking on vitaminC status during the third trimester of pregnancy and on vitamin C levels in maternal milk. *J Am Coll Nutr.,* 17:379–84 (1998).

Sazawal, S., Black, RE., Dhingra, P., Jalla, S., Krebs ,N. *et al.* 2013. Zinc Supplementation does not Affect the Breast Milk Zinc Concentration of Lactating Women Belonging to Low Socioeconomic Population. *J Hum Nutr Food Sci.,* 1(2): 1014.

Sazawal, S., Black, RE., Dhingra, P., Jalla, S., Krebs, N. *et al.* 2013. Zinc Supplementation does not Affect the Breast Milk Zinc Concentration of Lactating Women Belonging to Low Socioeconomic Population. *J Hum Nutr Food Sci.,* 1(2): 1014.

Shankar, AH., Genton, B., Baisor, M., Paino, J., Tamja, S., Adiguma, T. *et al.* 2000. The influence of zinc supplementation on morbidity due to Plasmodium falciparum: a randomized trial in preschool children in Papua New Guinea. *Am J Trop Med Hyg*., 62: 663-669.

Tawfeek, HI. and Salom, A. 1995. The Iraqi national nutritionsurvey. *Tech Res J.,* (12):17–20.

Vishwanath S. 1998. Introduction to Clinical Nutrition, Third Edition ISBN 9781138114470 - CAT# K35348 page :441-447.

World Health Organization (WHO), 2013. Report of a Joint WHO/IAEA Collaborative Study. Minor and Trace Elements in Breast Milk. World Health Organization Geneva. 1989 (accessed 10 September).

World Health Organization, 2006. Iron and folate supplementation. Integrated management of pregnancy and childbirth (IMPAC). Geneva: WHO.

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