

Kayseri 'de Emziren Anneler ve Yenidoğanların İyot ile Beslenme Durumu

Nutritional Iodine Status of Breast-Feeding Mothers and Their Neonates in Kayseri

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Submitted : January 15, 2008
Revised : September 17, 2008
Accepted : June 09, 2009

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Abstract

Purpose: Iodine deficiency, the most common cause of brain damage in children, remains a critical health problem in Kayseri, Central Anatolia. This study aimed to evaluate the iodine intake of breast-feeding mothers and their neonates and determine breast-milk iodine content after mandatory salt iodization in Kayseri.

Material and Methods: For the study, a total of 70 breast-feeding mothers and their neonates living in Kayseri or surrounding districts were selected. Their urine samples and breast-milk were obtained between 5-28th days after delivery.

Results: The mean age of the mothers was 26.0±5.0 years and 18.0±5.4 days for the neonates. The median urinary iodine concentrations of mothers and neonates were found as 70.2 µg/l and 100 µg/l, respectively which were markedly higher than those determined before salt iodization; 54.3% of the mothers and 31.4% of neonates were still at risk of iodine deficiency. UIC of neonates was not different from UIC of mothers (p>0.05). The mean breast-milk iodine content was determined as 3.25 µg/dl. Breast-milk iodine content was significantly different from urinary iodine concentration of neonates and mothers (p<0.001).

Conclusions: Iodine supplementation improved the iodine status of breast-feeding mothers and neonates but was insufficient to normalize levels. National salt iodization program needs to be strengthened and to ensure that women consume iodized salt during pregnancy and lactation.

Key Words: **Breast Feeding; Iodine; Milk, human; Neonates.**

Özet

Amaç: Çocuklarda beyin hasarının en yaygın nedeni olan iyot yetersizliği Kayseri'de hala kritik bir sağlık sorunudur. Bu çalışma, tuzun zorunlu olarak iyotlanmasından sonra Kayseri'de emziren anneler ve yenidoğanların iyot alımlarını değerlendirmek ve anne sütünün iyot içeriğini saptamak amacıyla yapılmıştır.

Gereç ve Yöntem: Çalışma için Kayseri ve çevre ilçelerde yaşayan toplam 70 emziren anne ve yenidoğan seçilmiştir. İdrar ve anne sütü örnekleri doğumdan sonra 5-28. günler arasında toplanmıştır.

Bulgular: Anne ve yenidoğanların yaşı sırasıyla ortalama 26.0±5.0 yıl ve 18.0±5.4 gündür. Anne ve yenidoğanların idrar iyot içeriği sırasıyla ortalama 70.2 µg/l ve 100.0 µg/l olarak tuz iyotlanmadan öncekinden belirgin derecede daha yüksektir. Annelerin % 54.3'ü ve yenidoğanların % 31.4'ü hala iyot yetersizliği riski altındadır. Yenidoğanların idrar iyot içeriği annelerinin idrar iyot içeriğinden farklı değildir (p>0.05). Anne sütünün iyot içeriği ise ortalama 3.25 µg/dl olarak ölçülmüştür. Anne sütünün iyot içeriği anne ve yenidoğanların idrar iyot içeriğinden farklıdır (p<0.001).

Sonuç: İyot desteği emzikli anneler ve yenidoğanların iyot durumunu iyileştirmekle beraber, normal düzeylere ulaşması için yeterli olmamıştır. Ulusal tuzun iyotlanması programının güçlendirilmesi ve kadınların gebelik ve emzilikte yeterli iyot aldıklarından emin olunmalıdır.

Anahtar sözcükler: **Emzirme; İyot; Anne sütü; Yenidoğan.**

Introduction

Iodine (I) is an essential element for the synthesis of thyroid hormones and plays a key role in the process of early growth and development of most organs, especially of the brain, which occurs in humans during fetal and early postnatal life (1-3). The main I source of breast-feeding infants is mother's milk. Sufficient content of breast-milk iodine is necessary for their optimum brain development (4, 5). Breast-feeding mothers who are not taking I supplementation are a risk group for iodine deficiency (ID). In addition, breast-feeding neonates of non-iodine supplemented mothers had a low urinary iodine concentration (UIC) and increased risk of neurological disorders (6-8).

Iodine deficiency disorders (IDD) are important public health problems in Kayseri, as in many parts of Turkey (9, 10). In 1994, a national program was initiated for eliminating IDD by increasing the consumption of iodized salt in Turkey. Therefore, the aims of this study were: (a) to evaluate I intake of breast-feeding mothers and their neonates, and (b) to determine breast-milk iodine content (BMIC) for neonates after national salt iodization.

Material and Methods

A total of 70 breast-feeding mothers and their full term and apparently healthy neonates lived in Kayseri Province or surrounding districts were selected for the study. The mothers were informed about the aims and design of the study at Erciyes University, Medical Faculty Hospital, Division of Social Paediatrics. All mothers were healthy and had no previous history of thyroid disease, not intake of goitrogenic drugs or thyroid hormones. They were exclusively breastfeeding their babies. Data relating to lifestyle factors and consumption of iodized salt were obtained by a questionnaire.

UIC is a good indicator for assessing the recent dietary I intake and the most practical bio-chemical marker for monitoring I supplementation of breast-feeding mothers (11-15). The urine samples of mothers and neonates were obtained between 5th-28th days after delivery. The samples were collected in deionized tubes with added hydrochloric acid and frozen at -20 °C until analysis. UIC was measured by using the Sandell-Kolthoff reaction in the laboratory of the Department of Biochemistry, Medical Faculty, Erciyes University (15, 16). Results were estimated as µg/l and compared with standard levels. Median UIC was

categorised and the level of ≥ 100 µg/l was accepted as normal I nutrition, between 50 and 99 µg/l as mild, between 20 and 49 µg/l as moderate and < 20 µg/l as severe ID (17).

Breast-milk samples were obtained from mothers by manual expression into deionized tubes at the same time as the urine samples. BMIC was assessed by using a spectrophotometric method (UV-VIS Spectrophotometer-Hitachi 150-20, Japan) in the laboratory of Analytic Chemistry, Department of Chemistry, Erciyes University (18). All results were expressed in terms of µg/dl.

Data were presented as median (minimum-maximum) and also mean \pm SD. The comparisons of differences between urinary iodine concentrations of mothers and their neonates and also breast milk iodine content were examined by Wilcoxon test. A p-value of < 0.05 was regarded as statistically significant. Analyses were performed with the Statistical Package for the Social Sciences version 13.0 (SPSS Inc., Chicago, IL, USA).

The study was approved by Medical Faculty Ethics Committee, Erciyes University (04/258).

Results

Study was included a total of 70 breast-feeding mothers and their neonates living in Kayseri Province and surrounding districts. The mean age of the mothers was 26.0 \pm 5.0 years and 18.0 \pm 5.4 days for the neonates.

Median UIC of mothers, their neonates and BMIC of mothers are shown in Table I. Median UIC of mothers and their neonates values were 70.2 µg/l and 100.0 µg/l respectively. Median BMIC was 3.25 µg/dl. While UIC of neonates was not different from UIC of mothers ($p > 0.05$), BMIC was significantly differ from UIC of neonates and UIC of mothers ($p < 0.001$).

I status of mothers and neonates based on their UIC are given in Table 2. While 45.7% of mothers (n=16) and 68.6% of neonates (n=24) had normal UIC, 54.3% of mothers and 31.8% of neonates were at risk of different degree of ID. However, 31.4% of mothers (n=11) and 20.0% of neonates (n=7) was found to be mild ID; 14.3% of mothers (n=5) and 8.6% of neonates (n=3) had moderate ID; 8.6% of mothers (n=3) and 2.8% of neonates (n=1) had severe ID.

Table I. Median urinary iodine concentrations of breast-feeding mothers, their neonates and mean breast-milk iodine content.

	Mothers (n=35)				Neonates (n=35)			
	Median	Min	Max	Mean±SD	Median	Min	Max	Mean±SD
UIC (µg/l)	70.2 ^a	1.9	133.8	73.7±33.7	100.0 ^b	7.3	100.0	87.0±23.7
BMIC (µg/dl)	3.25	1.0	12.6	3.68 ± 2.25	-	-	-	-

UIC: urinary iodine concentration; BMIC: breast-milk iodine content. ^a significantly differ from BMIC (Z=4.21; p<0.001); ^b significantly differ from BMIC (Z=5.03; p<0.001); the comparison of UIC between mothers and neonates is not significant (Z=1.84; p>0.05)

Table II. Nutritional iodine status of mothers and their neonates based on their urinary iodine concentration.

Iodine status	Mothers (n=35)			Neonates (n=35)		
	n	%	Median UIC (µg/l)	n	%	Median UIC (µg/l)
Normal	16	45.7	100.0	24	68.6	100.0
Mild ID	11	31.4	57.9	7	20.0	72.9
Moderate ID	5	14.3	44.9	3	8.6	40.5
Severe ID	3	8.6	3.9	1	2.8	7.3

UIC: urinary iodine concentration

Discussion

Study included 70 breast-feeding mothers and their neonates living in Kayseri and aimed to evaluate the nutritional I status of mothers and neonates and also determine the BMIC after national salt iodization. Although, UIC of mothers indicated mild ID, UIC of neonates showed normal I nutrition, I intake during the lactation and neonatal periods were still not satisfactory. However, 54.3% of the mothers and 31.4% of neonates were still at risk of different degree of ID.

On the other hand, UIC of mothers and neonates were found markedly higher than those of reported before mandatory salt iodization in Kayseri. In 2004, Kurtoglu et al. (19) determined the median UIC of breast-feeding mothers and neonates as 30.2 /l and 23.8 /l, respectively. Only 2.0% severe ID was found among breast-feeding mothers and their neonates after 8 years of national iodized salt consumption program In Iran (20). While I supply

for neonates was very low in 1984, I intake improved markedly during 20 years with increasing of I intake in Germany (7, 21, 22). But especially I intake of the mothers is still not adequate in some region. For example, UIC of breast-feeding mothers and their neonates were sub-optimal in Slovakia (23). The median UIC of breast-feeding neonates was markedly higher than those of reported 14 years ago, but breast-feeding mothers remained I deficient in Belgium (24). 46% of postpartum women still excreted low I after national iodization program in Mongolia (25).

The BMIC varies considerably from country to country. We determined the mean BMIC as 3.682.25 µg/dl. This level was 34.2% of recommended dietary allowance for neonates (26). Also, mean BMIC was measured between 2.6 and 8.4 µg/dl in different countries (21-24, 27, 28). Our finding that BMIC was lower than UIC of mothers and UIC of neonates was consistent with the result of

Laurberg et al. (29). BMIC was influenced by dietary I intake of mother and it may be related to an increased I requirement during lactation but not enough daily consumption. However, approximately 23.0% of mothers declared not to use iodized salt in our study similar with Turkey Demographic and Health Survey 2003 (30).

In conclusion, national salt iodization program needs to be strengthened and to ensure that women consume iodized salt during pregnancy and lactation. The studies should be kept on to determine whether prophylaxis is providing enough I for lactating mothers and for neonates.

Acknowledgment

The authors would like to thank Dr. Ferhan ELMALI, Erciyes University, Medical Faculty, Department of Biostatistics, for his help in the statistical evaluation of the study.

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