

Relation between tea drinking and anemia in infants

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Abstract

To evaluate the effect of tea drinking on the occurrence of microcytic anemia in infants, we studied 100 infants who underwent routine blood counts at the age of 6-12 months. An overall high frequency of anemia (Hb < 11 gm/dl-49%), microcytosis (MCV <70 Mm³-26%) and microcytic anemia (22%) was found in the whole group. The percentage of tea drinking infants with microcytic anemia (34%) was significantly higher than that of the non-tea drinkers. The tea drinkers had significantly lower mean levels of hemoglobin than that of the non-tea drinkers (10.5 ± 1.2 gm/dl vs 11.2 ± 0.8 gm/dl, respectively) and significantly lower mean levels of mean corpuscular volume than that of the non-tea drinkers ($71.5 \pm 7.1 \mu\text{m}^3$ vs $76.1 \pm 4.6 \mu\text{m}^3$). There were no significant differences between the two groups in their sex distribution and in the duration of breast feeding. The two groups differed with regard to their ages but there is no statistical effect of these differences on the hematological results.

Introduction

Iron deficiency anemia is common among infants in various populations (1-3). The occurrence of iron deficiency anemia in infants has been associated with intake of whole cow's milk (4), inadequate iron sources in the diet (3) and low socio-economic status (2). It has been demonstrated that tea drinking reduces the iron absorption from the gut in healthy adults (5-6) and in patients with thalassemia (7). Tea is one of the common beverages introduced into the infant's diet in our population. This study investigates the association between tea drinking and microcytic anemia in a group of 100 healthy infants in al-alam area.

The mechanism by which tea reduces iron absorption is thought to be by the chelating effect of the tannins on metallic iron (6). This phenomenon causes discoloration of the tea by the iron with the formation of insoluble complexes which are less readily absorbed. This occurs with iron from milk and vegetable sources as well as medicinal iron. Heme derived iron is absorbed by a different mechanism which is not affected by tea (5). Since the iron sources in the diets of many infants are mainly from non-heme foods (2), infants are more susceptible than other age groups to the effect of tea on iron absorption.

Patients and methods

This cross-sectional study conducted for evaluating the effect of tea drinking on the hematological problems that might be occurred due to tea consumption. The subjects of this study were 100 infants from Al-Alam area referred for routine blood counts. They were 6-12 months of age. All infants examined between 16th of October to the 27th of November 2007. The following data were collected by a formatted questionnaire about the infants from an interview with the mothers: age, sex, birth order, and weight at the time of examination, years of formal schooling of both parents and occupation of the father.

Infants with the following conditions were excluded: maternal history of vaginal bleeding in the third trimester, twins and other multiple pregnancies, premature delivery, diarrhea of more than three weeks duration and underlying chronic diseases. Blood tests were performed by using the microcapillary method on capillary blood. The blood counts were performed by autoanalyzer which gives a direct reading of hemoglobin (Hb), hematocrit and mean corpuscular volume (MCV).

Dietary intake was studied by the 24 h recall method and in addition specific questions were included about breast feeding practices and frequency of fruit, poultry and beef intake and tea drinking habits. We recorded the daily amount of tea consumed

and the age at which tea was added to the diet. The interviewer was not aware of the results of the blood counts. For the evaluation of the hematological data, anemia was defined according to the definition used by Dallman (12) as $\text{Hb} < 11 \text{ gm/dl}$ and microcytosis was defined as $\text{MCV} < 70 \text{ fm}^3$. The patients were classified into two groups: Group A-Tea drinkers (TD) and Group B-non-Tea drinkers. Differences between the two groups were tested by the χ^2 or the student t test as appropriate. P-value was used to indicate significant findings.

Results

Group A consisted of 56 patients who received tea for periods of about 4 months. The daily amount of tea consumed by this group was in the range of 100-250 ml /day. Group B consisted of 44 infants who never received tea. Personal and family details of the two groups are given in Table (1).

There were no significant differences in birth order, maternal age, sex, duration of breast feeding or present weight. There were significant differences in present age, parental education and duration of beef and poultry feeding. The tea drinkers came, on average, from families of lower social class and poorer education. The TD group received poultry and meat for longer periods than the NTD group, but this was probably because they were also a little older.

Overall frequency of anemia in the study population was 49% (49/100). The frequency of microcytosis was 26 (26/100). Twenty two percent (22/100) of the infants had both anemia and microcytosis. The frequency of anemia ($\text{Hb} < 11 \text{ gm/dl}$), microcytosis ($\text{MCV} < 70 \text{ fm}^3$) and combined anemia and microcytosis was significantly greater in the TD (Table 2 and 3). The mean Hb of the TD was $10.5 \pm 1.2 \text{ gm/dl}$ while that of the NTD was $11.2 \pm 0.8 \text{ gm/dl}$ ($p < 0.02$). The mean MCV of the TD was $71.5 \pm 7.1 \text{ fm}^3$ as compared with $76.1 \pm 4.6 \text{ fm}^3$ of the NTD ($p < 0.001$).

Discussion

The frequency of anemia among the infants studied is high (49%) but this is similar to the incidence of anemia in the

previous studies which had shown frequencies of 30-68% (Muriel Cornet et al).

There was no associated high incidence of microcytic anemia with respect to birth order, maternal age, sex, duration of breast feeding or present weight which is consistent with that of Simon Godfrey et al who found that there was no significant effect of these factors on the incidence of microcytic anemia among infants.

The present study demonstrated a high significant association between tea drinking and either anemia (63%), microcytosis (39%), or combined microcytic anemia (34%) as compared with non-tea drinking infants in whom there were only 32%, 9%, 7% for each of anemia, microcytosis, and microcytic anemia respectively. A high incidence of tea drinking and microcytic anemia was also demonstrated in the study of Merhav Hadar and others who explained that there were a high association between tea drinking and microcytic anemia (32%).

The mean Hb level in the tea drinking group of infants was significantly lower than that of the non-tea drinking group. This observation is in consistent with that of Simon Godfrey et al who shows the effect of tea drinking on the Hb level in children (low level of Hb value as compared with the control group). However, as compared with the NTD, the TD infants had a lower MCV level which is the same as Hadar Merhav found.

Based on our study, we suggest the possible role of tea as a cause of iron deficiency anemia in infants. In this age group, where the iron supply is mainly from non-heme iron, we suggest removing tea from the diet or at least only giving tea several hours before or after meals, we do not recommend giving tea to infants whose main source of iron is from milk, grains, vegetables or medicinal sources.

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Table (1) Demographic characteristics, weights, meat intake and mean duration of breast feeding of the tea drinkers (TD) and non-tea drinkers (NTD)

Variable	Group A (tea drinker)	Group B (non-tea drinker)	Statistical significance
Age(months)	9.2±1.8	8.6±1.7	P=0.05
Birth order	2.3±1.7	2.4±1.4	NS
Maternal age (years)	23.4±5	23.8±4.2	NS
Maternal education(years)	7.8±2.2	9.2±2.8	P<0.05
Paternal education	11.6±4.4	14.3±4.7	P<0.01
Weight at examination(gms)	7500±1250	7750±1250	NS
Sex male/female	23/33	19/25	NS
Duration of breast feeding(months)	2.4±2.2	2.3±2.1	NS
Duration of beef feeding(months)	2±1.8	1.3±1.7	P<0.01
Duration of poultry feeding	3.2±2.3	2.3±2.1	P<0.05

Table (2) Percent of an isolated anemia and microcytosis among TD and NTD

Anemia	Tea drinkers		Non-tea drinkers		P-value
	No.	%	No.	%	
Hb<11 gm/dl	35	63	14	32	P<0.001
Hb≥11 gm/dl	21	37	30	68	
Total	56	100	44	100	
Microcytosis	No.	%	No.	%	P<0.0005
	No.	%	No.	%	
MCV<70 μm ³	22	39	4	9	
MCV≥70 μm ³	34	61	40	91	
Total	56	100	44	100	

Table (3) Percent of anemia and microcytosis among TD and NTD

Anemia & Microcytosis	Tea drinker		Non-tea drinker		P-value
	No.	%	No.	%	
Hb<11 gm/dl+MCV<70 μm ³	19	34	3	7	P<0.0005
Hb≥11 gm/dl+MCV≥70 μm ³	37	66	41	93	
Total	56	100	44	100	