

Tea drinking and its co-occurrence with anemia in pregnant females

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Objective: To investigate during pregnancy maternal tea consumption and risk of developing iron deficiency anemia.

Methodology: This comparative cross sectional study was carried out at Department of Gynecology and Obstetrics, Liaquat University of Medical and Health Sciences from Jamshoro/Hyderabad from September 2018 to February 2019 and included 400 pregnant females. After a through general physical examination, blood was drawn and questionnaires were filled. Information on types of tea (black, with milk) and amount of tea consumed in relation to number of cups/day were noted.

Results: Out of 400 females, 200 drank tea and 200 did not. We found that 206(51.5%) women

were anemic. Out of these, 47(11.75%) were mildly anemic, 103(25.75%) moderately and 56 (14%) were severely anemic. Serum iron and ferritin were significantly high in non tea drinkers, whereas total iron binding capacity was significantly increased in tea drinkers. Those having less than 4.2 million/mm³ Red cell count was 162(40.5%) whereas normal RBC count was observed in 238(59.5%) women. Out of 400 women, 244(61%) had microcytosis while 156(39%) had normocytes. Hematocrit value less than 33% were observed in 197(49.25%) women.

Conclusion: In this study, anemia was found in tea drinking pregnant women. (Rawal Med J 202;45:163-167).

Keywords: Tea, pregnancy, anemia, hemoglobin.

INTRODUCTION

There are cumulative suggestions that dietary habits of mothers can enhance the hazards for pregnancy.¹ Anemia is the most common disorder during pregnancy.² Tea is among the extensively consumed drink after water around the world.³ Black tea is the highly oxidized product of camellia sinensis plant,⁴ containing polyphenols as flavonoids, which have proven their positive effect in lowering the blood lipids, protect hypertension and also reduce the risk of stroke.⁵ Other products having protective effect against cancer and neurodegenerative diseases includes theaflavins(TF₁), Theaflavin-3-gallate(TF₂B), and theaflavin-3,3'-digallate(TF).⁶

Tea also contains caffeine whose consumption of ≥180 mg is associated with increased risk of about 38% for small for gestational age infants.⁷ Tannins, a compound present in large amount in tea contributes to the high incidence of iron deficiency anemia (IDA). They delay iron absorption when used with meals.⁸ Tannins when used at normal concentrations are associated with iron status

fluctuations⁹ decreasing bioavailability of iron by acting as chelating agent¹⁰ and forming insoluble antinutritional-mineral compounds, and precipitates causing increased risk for IDA.¹¹ One cup of tea equals 30 mg of tannic acid.¹²

Heavy metals like lead, mercury, cadmium and arsenic were found in detectable amount in tea leaves when grown in regions with contaminated soil.¹³ Consumption of 1 cup of tea daily during pre pregnancy period was found to have more chances of neural tube defects in the fetus.¹⁴ Pregnant mothers should decrease use of tea, which begins from prenatal period, during which there must be limiting the use of caffeine to less than 300 mg per day.¹⁵ The current study was aimed to study tea drinking and occurrence of anemia in pregnant women of our area.

METHODOLOGY

This cross sectional study was conducted from September 2018 to February 2019 at the Department of Physiology, University of Sindh in collaboration with Liaquat University Hospital, Hyderabad. A

total of 400 pregnant females were selected by convenient random sampling, aged between 18 to 40 years. Women with the history of chronic disease, threatened abortion, multiple pregnancies, still births and drug abuse were excluded. A written informed consent was obtained from all women.

A general physical examination was performed. The questionnaire consisted of demographic and socioeconomic information including reproductive history, health conditions and medicines used, and also personal preferences. Questions on types of tea (green black, or with milk), regularity of drinking tea in number of cups/day (one cup equals 150 ml, or 6 ounce) were asked. Tea drinkers group were pregnant women drinking at least 3 cups/day of tea daily, those who did not comply this criteria were placed in never tea drinkers group.⁷

The participants were classified on the basis of their tea drinking habits into following categories: maternal age (<26, 26–28, 28–31, >31 years), education status (primary, secondary, uneducated), job during pregnancy (yes or no) and monthly income (≤5000, 5000–10000, >10000 rupees). A morning blood samples of 5 ml was drawn and 2 ml stored in tubes (Atlas-Labovac, Itliano) containing EDTA (AK3EDTA) as an anticoagulant, for complete blood picture (CBC), whereas 3 ml was kept in plain tubes for serum iron, total iron binding capacity and serum ferritin. CBC was performed by using CBC hematology analyzer Celltac Alpha MEK-6500 (Nihon Kohden Germany), serum iron and TIBC was done on COBAS 600. The serum ferritin levels were measured by COBAS e411.

Statistical analysis: Data were assessed by using SPSS version 21.0. The χ^2 test was used to see the association between selected characteristics and tea drinking habits. Linear regression analysis of Hb and tea/cups was done to assess significance between consumption of tea iron deficiency anemia. $P < 0.05$ was considered statistically significant.

RESULTS

Out of 400 females, 200(50%) were tea drinkers (TD) and 200(50%) were non tea drinkers (NTD). Compared to NTD group, women in TD group

were more likely to be younger, were rural joint family residents, less educated, and have ≤5000 RS household income (Table 1). Out of 400 pregnant females, 194(48.5%) were non-anemic and 206(51.5%) were anemic. Out of these, most had mild anemia (Table 2). Those having less than 4.2 million/mm³ Red cell count were 40.5%(162/400) whereas normal RBC count was observed in 59.5% (238/400) participants.

Table 1. Characteristics of women depending on never and ever drink tea (≥3 times/day).

Characteristics	TD (n = 200)		NTD (n = 200)		P value
	n	%	n	%	
Age, years					0.0470
< 26	108	54	87	43.5	
26–28	42	21	39	19.5	
29–31	36	18	47	23.5	
> 31	14	7	27	13.5	
Address					0.0002
Rural	138	69	96	48	
urban	62	31	104	52	
Education					0.09 NS
uneducated	81	40.5	62	31	
primary	44	22	58	29	
secondary	75	37.5	80	40	
Type pf family					0.04
nuclear	75	37.5	104	52	
joint	125	62.5	96	48	
Employment during pregnancy					0.2 NS
Yes	112	56	98	49	
No	88	44	102	51	
Monthly income (Rs)					0.0002
≤ 5000	83	41.5	46	23	
5000–10000	65	32.5	95	47.5	
> 10000	52	26	59	29.5	

Table 2. Hemoglobin level (n=400).

Non Anemic Hb ≥11g/dl	Anemic			
	Overall Hb<11	Mild (Hb10-10.9)	Moderate (Hb7-9.9)	Severe (Hb<7)
194(48.5%)	206(51.5%)	47(11.75%)	103(25.75%)	56(14%)

Table 3. Frequency of participants having anemic indicators (n=400).

ANEMIA	TD		NTD		X ²	P
	n	%	n	%		
A) Hemoglobin (g/dl)						
Hb<11=	156	78%	45	22.5%	123.2	0.00001
Hb≥11=	44	22%	155	77.5%		
B) Red blood cells count (million/mm ³)						
RBCs<4.2=	123	61.5%	39	19.5	73.2	0.00001
RBCs≥4.2=	77	38.5%	161	80.5%		
C) Morphology: MCV(μm ³)						
MCV<80=	149	74.5	98	49%	27.5	0.00001
MCV≥80=	51	25.5	102	51%		
D) Volume % OF RBC						
HCT<33% =	153	76.5%	41	20.5	125.5	0.00001
HCT ≥33%=	47	23.5%	159	79.5		

Table 4. Hematological parameters (mean±SD and p value).

Hematological parameters	(NonTea Drinkers) NTDs n= 200	(Tea drinkers) TDs n=200	p Value
Hemoglobin (g/dl)	12.07±1.32	8.57±2.57	0.0001
Serum Iron(μg/dl)	105.92±15.2	62.5±29.9	0.0001
Total iron binding capacity(μg/dl)	281.2±38.2	365±78.9	0.0001
Serum ferritin(ng/dl)	48.9±18.2	32.1±11.3	0.045
Hematocrit (%)	36.86±3.92	23.56±10.65	0.0001
RBCs (million/mm ³)	4.67± 0.57	3.84±0.95	0.0001
MCV(μm ³)	79.44±7.54	70.75±13.32	0.0001
MCH(pg)	26.13 ± 3.03	22.63±5.21	0.0001
MCHC(%)	32.68±1.56	31.48±2.80	0.0001
WBCs(per mm ³)	10.15± 6.79	9.69±4.63	0.5
Neutrophils(%)	67.3±11.8	71.44±11.39	0.0005
Lymphocytes(%)	25.64 ±9.69	22.81±10.03	0.0043
Eosinophils(%)	2.89±2.01	2.46±3.20	0.0024
Monocytes(%)	3.17±1.93	2.72±1.43	0.0646
Platelets	299±102	298.65±138.7	0.937

Microcytosis was seen in 61% (244/400), while 39%(156/400) were normocytes. hematocrit less than 33% were observed in 49.25% (197/400) while 50.75% (203/400) were having normal hematocrit (Table 3). Hemoglobin of non tea drinking pregnant females was 12.08 mg/dl±1.32 and of tea drinking females 8.57±2.57 mg/dl ($p=0.0001$) Serum iron in NTD was 105.92±15.2 and in TD it was 62.5±29.9 ($p=0.0001$). TIBC of NTD was 281.2±38.2 and was TD 365±78.9 ($p=0.0001$). Serum ferritin in NTD

was 48.9±18.2 ($p=0.0001$) greater than TD (32.1ng/dl±11.3) (Table 4). The linear regression analysis of Hb and tea/cups showed significance between consumption of tea with incidence of iron deficiency anemia.

DISCUSSION

United Nations Food and Agriculture (FAO) unit report states Pakistanis are utilizing around 172,911 tons of tea, and the imports of tea have increased by 2.36% during 2017-18.¹⁶ Women during pregnancy are most susceptible candidates to develop anemia (Table 1). Age of TD mothers was less as compared to NTD group, which does not coincide with study by Huang et al¹⁷ according to which increasing age caused increase risk in tea drinking. The prevalence of the anemia in this study (Table 2) was found to be 51.5%, which is far greater than the other developing countries showing prevalence of 36.1%.¹⁸

Carlo et al¹⁹ suggested that approximately 50% of anemia during pregnancy is because of deficiency of iron, which coincides with our results (Table 4) showing decreased Hb, serum iron and ferritin and increased TIBC. Supplements during pregnancy may have a defensive effect in improving hematological status of mothers and birth weight of fetus.¹⁹ The tea drinkers in our study consumed 3-5 cups of tea throughout the day. According to Fatah et al most females in their sample reported twice daily tea intake or even more.²⁰ The same results were published in Baghdad previously.²¹

Around 98% of Ethiopian women drank tea before and after meals, and 59.5% of them have had tea more than two times a day.²² It was suggested by Baig-Ansari et al that pregnant women should consume less amount of tea during pregnancy, and proper spacing must be provided in tea consumption from mealtime.²³

When anemia was categorized according to its severity (Table 2), 22.8% had mild anemia, 50% had moderate and 27.1% had severe anemia. In Ethiopia, 63% had mild, 33% moderate and 4% had severe anemia.²⁴ The chances to develop anemia were amongst those females who don't have fruits, milk and meat in their diet and consume more tea, than their comparative group who have the same

socioeconomic conditions but avoids tea.

The major limitation of this study was remembrance bias, but the interview was taken utilizing the organized questionnaire, and the investigator is the medical professional that can make questions in a way to make the respondents recall the matter correctly.

CONCLUSION

Anemia was found in tea drinking pregnant women. This study suggests, reasonable methods of tea consumption can be recommended, and tea at which concentration should be avoided to prevent its harmful effects. To society it is useful to make population aware that the beverage that is next popular to water is not recommended when you are having a physiological change in your body, and giving birth to another human.

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Conception and design: Tazeen Shah, Jamshed Warsi
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Drafting of the article: Tazeen Shah
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