Research Square

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Influences of Consumption of Herbal Tea Containing Galactagogue on Composition of Human Milk Macronutrients

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Abstract

Background

The aim of this study was to determine the influences of herbal tea consumption containing galactagogues on the composition of human milk energy and macro nutrients.

Methods

It was a cross-sectional study conducted between March and May 2018, involving mothers having 0-4 month old infants consuming (n=43) and non-consuming (n=56) herbal tea containing galactagogue. Energy and macronutrients of human milks collected from mothers by hand expression were measured using a human milk analyzer, and retrospective 1-day food consumption records were obtained. Significance level was accepted as $p < 0.05$.

Results

Most preferred herbal tea type consumed by mothers was fennel (58.1%); followed by herbal tea mixture (34.9%) and cumin fennel (4.7%) respectively. It was determined that the consumption of herbal tea containing galactagogues did not affect the energy and macro nutrient content of the human milk ($p > 0.05$). No statistically significant difference was found between the type of herbal tea containing galactagogue and the content of human milk ($p > 0.05$).

Conclusion

It was determined that the herbal tea containing galactagogue did not affect the content of breast milk energy and macronutrients. Also; it was proposed that the safety, efficacy and possible side effects of these teas should be assessed in larger sample groups and randomized controlled trials.

Background

Human milk is the most suitable and natural food that contains the energy and macro-micronutrients and bioactive components required for the optimal growth of fetal newborns with sufficient fetal storage [1]. World Health Organization (WHO) and United Nations Children's Fund (UNICEF) recommended that breastfeeding should be started within 1 hour after birth, exclusive breastfeeding for the the first 6 months and to continue breastfeeding with appropriate complementary feeding for 2 years of age and onwards [2].

Human milk production is a complex process that need physical (absorption reflex), emotional (stress, anxiety and fatigue) and hormonal arrangements [3]. Milk volume, sucking time, time between two breastfeeding, maternal age, ethnic origin, weight gain during pregnancy, birth weight of the baby and nutrition of mother may affect the mother's milk composition [4]. Environmental factors such as cultural factors, home and work environment and social life have a positive effect on successful breastfeeding

and milk production can be increased in various ways such as psychological support and relaxation techniques [5, 6, 7]. Mothers usually consume foods such as onion, bulgur pilaf, milk, rice soup and traditionally herbal teas to induce lactation [8].

In Greek, the word "galactose" means "milk secretion-enhancing substance" (galactose-milk, agro-secretion), termed herbal origin, synthetic or endogenous substance that induces and increases the secretion of human milk. Many nutrients, plants and medicines are used as galactactogogues from past to present [9].

Herbal galactagogues are used by lactating womens to increase milk production [10]. Bingel and Farnsworth (1994) have identified more than 400 plants, which have been clinical purpose until today and accepted as galactagogues. However, 10% of these plants have not been scientifically studied [11]. Although there are few clinical data on their use in humans, fenugreek, milk thistle and asparagus are herbal galactagogues that are frequently recommended to mothers. Apart from these plants, goat's rue, fennel, verbena, anise, linden, sage, rosehip, nettle are also used to start and increase milk production [5]. It is thought that the herbal galactagogues increase estrogenic or oxytocic activity, stimulate the milk glands, increase breast tissue or have a placebo effect [12]. Herbal galactagogues have an effect on estrogenic activity mainly by increasing prolactin production and the expansion of milk channels in the breast [13]. The oxytocin effect is caused by the stimulation of the milk channels in the breast by oxytocin hormone and by the contraction of the cells here [5]. It is also stated that by regulating blood flow in the mammary glands and triggering sweating with the phytoestrogens they contain, it has the potential to increase milk production by stimulating the mammary glands with a kind of sweat gland [14].

The use of galactagogues is not recommended by the ABM (Academy of Breastfeeding Medicine) at present due to the lack of proven efficacy and potential side effects [15, 16]. Although there are researches about breastfeeding practices, consumed foods and herbal teas in Turkey, there is no research on the effect of galactagogue consumption on human milk composition in full-term healthy infants [17, 18, 19, 20]. The aim of this study is to determine the effects of herbal tea containing galactagogue consumption on energy and macronutrients composition.

Methods

The study is a cross-sectional study carried out at Marmara University Pendik Training and Research Hospital with breastfeeding volunteer mothers who applied to pediatric well child outpatient clinic. In order to carry out the study, ethics committee approval from Marmara University Faculty of Medicine Ethics Committee (Protocol No: 09.2018.057), institution permit from Ministry of Health Marmara University Pendik Education and Research Hospital and mothers' Informed Consent was obtained.

The questionnaire developed by the researchers was conducted in 2018 between 12 March and 30 June 2018. The study was carried out with mothers who consumed herbal tea containing galactagogue, who had a singleton pregnancy, fed only with human milk, and who started to breastfeed on the first postpartum day. Forty-three mothers who consume herbal tea containing galactagogue 3 cups per day

(within the last 24 hours) and who give only human milk to their baby constituted the study group and 56 mothers who do not consume fenugreek or fenugreek extract, fennel extract, fennel oil, milk thistle or any nutrients or beverages which contain galactagogue constituted the control group.

Mothers who consumed herbal tea containing galactagogue, had a single pregnancy, fed their babies only with breast milk from the first postpartum day, did not use drugs or any nutritional supplements, did not smoke and alcohol, and signed a voluntary consent form were included in the study.

During the comparison of herbal tea type and breast milk content, herbal tea or herbal tea mixture specified by the mothers in 24-hour recall were used [20]. In the questionnaire form, the consumed teas and these content were questioned. Herbal tea mixture consumed by mothers belongs to a brand that mothers bought from the market. That mixture include sucrose, maltodextrin, roselle extract (%2.6), L-ascorbic acid (%0.5), raspberry leaf extract (%0.2), fennel extract (%0.2), fenugreek extract (%0.1), goat's rue extract (%0.1) and fennel oil (%0.02) [21]. Cumin fennel and fennel herbal tea were bought and consumed by mothers from herbalist.

A questionnaire including questions such as demographic characteristics of the mothers, type of delivery, weight gain during pregnancy, time to start breastfeeding was applied by face-to-face interviews and 24-hour recall was recorded.

Four ml of mature human milk was obtained from all mothers and the analysis was repeated 2 times for the reliability of the results. After feeding the babies, the hind milk obtained by hand expression from the right breast was placed in Eppendorf tubes and analyzed with Miris® HMA (Human Milk Analyzer) ^{TM} in 2 hours on the 24-hour recall day. Protein, fat, carbohydrate and energy values were determined. Miris® HMA™ (Uppsala, Sweden) is approved by International Standards Organization (ISO) 9622: 1999.

Energy, macro nutrient intake of mothers' 24-hour recall were calculated by the BeBis program. The body weight and height of the mothers were measured according to the standards. Body weight was measured using the InBody 120 and height was measured using the stadiometer. The Body Mass Index (BMI) value was calculated by dividing body weight (kg) by the square of height (cm). For the evaluation of the results WHO's classification was used [22].

The data were evaluated statistically in SPSS (version 16.0.Ink) package program. Descriptive statistics include number, percentage, mean, and upper and lower values, as well as the standard deviation. Data were controlled by Kolmogorov Smirnov test for normal distribution. If data within the normal distribution Chi square test and T test for independent groups were performed. Chi-square test, Mann-Whitney U test and Kruskal-Wallis test were applied for the analysis of data which are not with normal distribution. Chi-Square test, Student's T test and One-Way ANOVA were used for multiple comparisons. Statistical significance of all analyzes was accepted as $p < 0.05$.

Results

Table 1
Demographic Information about Mother and Baby

Demographic information	Consuming herbal tea containing galactagogue		Non - consuming herbal tea containing galactagogue		Total	
	n	%	n	%	n	%
About the baby						
Birth type						
Normal	21	48.8	27	48.2	48	48.5
Cesarean	22	51.2	29	51.8	51	51.5
Gestational age (weeks)						
36–40	40	93.0	48	85.7	88	88.9
> 40	3	7.0	8	14.3	11	11.1
About the mother						
Age (year)						
19–24	7	16.3	11	19.6	18	18.2
25–29	14	32.6	17	30.4	31	31.3
30–34	8	18.6	17	30.4	25	25.3
≥ 35	14	32.5	11	19.6	25	25.2
Education level						
Illiterate	0	0.0	2	4.7	2	2.0
Literate	0	0.0	0	0.0	0	0.0
Primary school	7	16.3	19	33.9	26	26.3
Middle school	7	16.3	16	28.6	23	23.2
High school	15	34.8	8	14.3	23	23.2
University	11	25.6	10	17.9	21	21.3
Post-graduate	3	7.0	1	1.8	4	4.0
Working Status						
Working	16	37.2	10	17.9	43	43.4
Not working	27	62.8	46	82.1	56	56.6

Demographic information	Consuming herbal tea containing galactagogue		Non - consuming herbal tea containing galactagogue		Total	
	n	%	n	%	n	%
BMI						
Normal	22	51.2	23	41.1	45	45.5
Overweight	15	34.8	19	33,9	34	34.3
Obese	6	14.0	14	25.0	20	20.2

It was found that mothers consuming herbal tea containing galactagogues although non-significant were frequently in the 25–29 age group (32.6%) and the mothers not consuming 30.4% in the 25–29 and 30–34 age group. When the education level of the mothers was examined, it was found that 34.8% of the mothers consuming herbal tea containing galactagogue are high school gradute, and 26.3% of the mothers the control group are primary school graduate (*p = 0.016*). Demographic data of mother-infants dyads are given in Table 1.

Table 2
Comparison of Maternal Demographic Characteristics and Herbal Tea Containing Galactagogue Consumption

Demographic characteristics	Consuming herbal tea containing galactagogue		Non - consuming herbal tea containing galactagogue		X^2	p
	n	%	n	%		
Age group (year)					3.126	**0.373**
19–24	7	38.9	11	61.1		
25–29	14	45.2	17	54.8		
30–34	8	32.0	17	68.0		
≥ 35	14	56.0	11	44.0		
Education level						
Illiterate-Literate-Primary school	7	26.9	21	73.1	12.203	**0.016***
Middle school	7	30.4	16	69.6		
High school	15	65.2	8	34.8		
University	11	52.4	10	47.6		
Post-graduate	3	75.0	1	25.0		
Working Status						
Working	16	61.5	10	38.5	4.704	**0.053**
Not working	27	37.0	46	63.0		
BMI						
Normal	22	51.2	23	41.1	2.021	**0.364**
Overweight	15	34.9	19	33.9		
Obese	6	14.0	14	25.0		
*$p < 0.05$						

Chi-square test

Table 2 shows comparison of demographic characteristics of the mothers. No statistically significant difference was found in age, working status, and BMI according to consumption of herbal tea ($p > 0.05$).

It is found that majority (60.5%) of herbal tea containing galactagogues consumed by the mothers were obtained as non-manufactured products.

Table 3
Comparison of Human Milk Content according to Consumption of Herbal Tea Containing Galactogogue

	Consuming herbal tea containing galactagogue			Non - consuming herbal tea containing galactagogue				
	n	Mean ± SD		n	Mean ± SD		t	p
Milk energy (kcal)	43	67.4 ± 17.2		56	72.5 ± 15.4		-1.378	0.168*
Milk fat (g)	43	3.7 ± 1.8		56	1.7 ± 0.2		-1.538	0.122*
	n	Median (25.-75. quartile)	Mean rank	n	Median (25.-75. quartile)	Mean rank	Z	p
Milk protein (g)	43	1.2 (1.0-1.3)	46.51	56	1.2 (1.1–1.4)	52.68	-1.067	0.286**
Milk lactose (g)	43	7.0 (6.8–7.2)	52.53	56	7.0 (6.8–7.2)	48.05	-0.775	0.438**
Independent- Samples T Test *, Mann - Whitney U Test **								

In mothers consuming herbal tea containing galactagogue, human milk energy content for 100 ml was 67.4 ± 17.2 kcal, fat content was 3.5 ± 0.9 g, protein and lactose content was 1.1 ± 0.2 g and 7.1 ± 0.2 g, respectively. In the control group, human milk energy content was 72.5 ± 15.4 kcal, fat content was 1.7 ± 0.2 g, protein content was 1.4 ± 0.7 g and lactose content was 6.9 ± 0.6 g. It was determined that the consumption of herbal tea containing galactagogue did not affect neither the energy nor the composition of human milk macronutrient ($p > 0.05$) (Table 3).

Table 4
Relationship between Herbal Tea Type and Human Milk Content (n = 99)

		Mean ± SD	Minimum	Maximum	f	p
Milk energy (kcal)	Herbal tea mix	62.3 ± 19.3	39.0	99.0	0.668	0.577*
	Fennel	70.0 ± 16.5	46.0	102.0		
	Cumin fennel	72.0 ± 1.4	71.0	73.0		
Milk fat (g)	Herbal tea mix	3.2 ± 2.1	0.8	7.2	0.631	0.600*
	Fennel	3.9 ± 1.8	1.8	7.6		
	Cumin fennel	4.2 ± 0.0	4.2	4.2		
		n	Median (25. – 75. quartile)	Mean rank	X^2	p
Milk protein (g)	Herbal tea mix	15	1.3 (1.0–1.4)	22.0	0.053	0.974**
	Fennel	25	1.2 (1.1–1.3)	21.30		
	Cumin fennel	2	1.1 (0.8–1.4)	20.25		
Milk lactose (g)	Herbal tea mix	15	7.0 (6.8 – 7.2)	20.80	0.160	0.923**
	Fennel	25	7.0 (6.9–7.2)	22.08		
	Cumin fennel	2	6.9 (6.6–7.2)	19.50		
One- Way ANOVA Test*, Kruskal – Wallis Test**						

Table 4 shows the data on the comparison of the herbal tea type and the human milk composition. It was determined that there were no significant differences in milk composition between different types of herbal tea ($p > 0.05$).

Table 5
Comparison of Daily Intake of Mothers according to Herbal Tea Containing Galactogoue Consumption (n = 99)

Energy and Macro-nutrient	Consuming herbal tea containing galactagogue	Non - consuming herbal tea containing galactagogue	t	p
	Mean ± SD	Mean ± SD		
Energy (kcal)	1925.4 ± 747.4	1892.9 ± 546.0	0.250	0.811
Protein (g)	65.6 ± 26.2	65.6 ± 21.3	-0.011	0.991
Fat (g)	86.6 ± 36.5	87.8 ± 29.6	-0.184	0.855
Carbohydrate (g)	217.7 ± 106.9	206.3 ± 74.2	0.625	0.553
Mann - Whitney U Test				

In Table 5, energy and macro nutrient intake of mothers were compared according to consumption of herbal tea containing galactagogue. There was no statistically significant difference ($p > 0.05$).

Discussion

In this study which is carried out with 99 exclusively breastfeeding mothers, we did not find a difference in human milk energy and macro nutrient composition according to consumption of herbal tea containing galactagogues.

In a study investigating mothers' practices during lactation period, it was found that there was no significant difference between the age and education level of the mother and the use of a method to increase human milk [17]. In the study conducted by Derin and Özel (2016), it was found that the working status of the mothers did not affect the consumption of milk-enhancing foods or beverages [19]. In the study of Gökduman (2010), it was found that the working status increased herbal tea use [18]. In our study, age and BMI did not affect herbal tea consumption. There are conflicting results in the literature, in our study, it was found that working mothers consumed more galactagogue containing herbal tea.

Mothers who are consuming herbal tea containing galactagogues are significantly more educated than those who don’t consume herbal tea. It was found that the nutrients consumed in order to increase human milk were affected by the education level of the mothers, and as the level of education increase, the consumption of nutrients became more frequent [18, 19]. In line with previous studies, it was found that the consumption of herbal tea containing galactagogue was significantly higher in mothers with university and postgraduate education [23, 24, 25].

Working status of the mother may affect herbal tea consumption. Derin found that working mothers consumed more herbal tea with to increase the milk supply [19]. In accordance with this study, herbal tea

containing galactagogue consumption of working mothers in our study was found to be higher than non-working mothers.

In the literature it was reported that BMI of mothers may affect energy and macro nutrient composition of human milk, but there are controversial results [23, 24]. Quinn et al. (2012) found that BMI of mothers did not affect total energy, fat and protein content of milk, but was inversely proportional to lactose content [23]. In a study conducted with 2632 mothers in Korea, the mother's BMI was positively correlated with the protein and fat content of the milk but lactose content was found to be negatively correlated [24]. In our study, it was found that the mother's BMI did not affect the energy and macro nutrient content of human milk.

In the literature human milk composition is analyzed by different methods. In a study conducted with 102 mothers the energy of 100 ml human milk was found to be 72.0 ± 15.0 kcal, fat 3.81 ± 1.5 g, protein 1.34 ± 0.48 g and lactose 7.31 ± 0.58 g. In another study conducted with 2632 lactating mothers, the energy of 100 ml milk was 61.1 ± 12.1 kcal, fat 3, 0 ± 1.4 g, protein 1.4 ± 0.3 g and lactose 7.1 ± 0.4 g [24]. In our study, in line with previous studies the energy, protein, fat and lactose content of 100 ml human milk were similar.

It was shown that mother’s energy and macro nutrient intake may affect the total energy and macro nutrient composition of human milk [4, 25, 26]. In the study conducted by Mohammad et al. with a small sample size, it was found that human milk fat content of the mothers fed with 55% fat was higher than the mothers fed with 25% fat.[25] There are also studies that determine that mother's energy and protein intake does not affect the composition of human milk macro nutrients [23, 27]. In our study, as the diet intake of mothers were similar in both groups, it was determined that mother’s diet did not affect the energy and macro nutrient of human milk. Limitations of the study include information on the consumption of galactagogue-containing herbal tea was based on maternal report. In addition, the analysis of human milk is performed at one occasion only and food consumption record is taken for one day retrospectively. The large sample size (n = 99) and the limited number of studies on the possible effects of galactagogue-containing herbal tea consumption on human milk energy and macronutrient composition were evaluated as strengths of the study. In addition the method used in the analysis of human milk is valid and all the analysis is uniformly performed by the principal investigator.

Conclusion

In brief, galactagogue consumption did not affect the composition of human milk. However, majority of herbal teas were non-manufactured products, so safety concerns should be addressed. Increased consumption of herbal tea in the more educated mothers should be taken into account in planning education and counseling services to pregnant and lactating mothers. Furthermore; consistent research results with strong evidence are needed in the future.

Abbreviations

WHO
World Health Organization
UNICEF
United Nations Children's Fund
ABM
Academy of Breastfeeding Medicine
HMA
Human Milk Analyzer
BeBis
Nutrition Composition System
BMI
Body Mass Index
SPSS
Statistical Package for the Social Sicences

Declarations

Ethics approval and consent to participate

In order to carry out the study, ethics committee approval from Marmara University Faculty of Medicine Ethics Committee (Protocol No: 09.2018.057), institution permit from Ministry of Health Marmara University Pendik Education and Research Hospital and mothers' Informed Consent was obtained.

Consent for publication

Informed Consent was obtained by all patients.

Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

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