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The Relationship Between the Characteristics of the Newborn and the Nutrient Content of Breast Milk

Yenidoğanın Özellikleri ile Anne Sütü Besin İçeriği ilişkisi

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Abstract

This study aimed to examine the relationship between newborn characteristics and breast milk nutritional content. The sample of the descriptive study consisted of n:46 mothers and babies. The data was obtained by the data collection form created by the researcher. On the 1st, 5th and 15th days after delivery, a 2 ml breast milk sample taken from the right breast by hand milking method was analyzed with Miris HMATM device and newborns were weighed with Neck weighing device. The mothers in the study group were 28.6 ±5.5 years old, 60.8% gave birth by cesarean section, 65.2% of the babies were male, the mean gestational age was 38.9±1.1 weeks, the mean birth weight was 3389±406.4 g and according to the Lubcenko curve, 82.6% of the babies were on the scale appropriate to gestational age. It was found that there was a significant positive relationship between the baby's weight and breast milk macronutrients. There was a significant positive relationship between the baby's head and chest circumference and breast milk macronutrients ($p<0.05$). In repeated measurements, it was found that the amount of carbohydrates and fats in breast milk gradually increased, and the protein decreased.

Keywords: Breast milk, blood gas, newborn, nutrient

Özet

Bu çalışmanın amacı, yenidoğanın özellikleri ile anne sütü besin içeriği ilişkisini incelenmektir. Tanımlayıcı özellikteki araştırmanın örneklemini n:46 anne ile bebeği oluşturdu. Veriler araştırmacı tarafından oluşturulan veri toplama formu ile elde edildi. Annelerden doğum sonra 1., 5. ve 15. gün, sağ memeden, elle sağma yöntemi ile alınan 2 ml. Anne sütü örneği Miris HMATM cihazı ile analiz edildi ve yenidoğanların Neck tartı aleti ile tartıldı. Araştırma grubundaki anneler ortalama 28,6 ±5,5 yaşında, %60,8'i sezaryen ile doğum yaptığı, bebeklerin %65,2'si erkek, gestasyon yaş ortalaması 38,9±1,1 ay, doğum kilosu ortalama 3389±406,4 g ve Lubcenko eğrisine göre bebeklerin %82,6'sı gestasyon yaşına uygun tartıda olduğu belirlendi. Bebeğin tartısı ile anne sütü makro besin öğeleri arasında pozitif yönde anlamlı ilişki olduğu saptandı. Bebeğin baş ve göğüs çevresi ile anne sütü makro besin öğeleri arasında pozitif yönde anlamlı ilişki olduğu görüldü ($p<0,05$). Tekrarlayan ölçümlerde, anne sütü karbonhidrat ve yağ miktarının giderek arttığı, proteinin ise düştüğü saptandı.

Anahtar Kelimeler: Anne sütü, besin, kan gazı, yenidoğan

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1. Introduction

Breast milk is recommended as the gold standard in baby feeding with its unique biochemical content. Breast milk is a dynamic liquid whose content varies according to the mother and baby in the process of breastfeeding (from the beginning to the end, from the first days to the days after). In addition to macronutrients such as water, protein, fat and carbohydrates, breast milk contains many micronutrients such as cytokines, enzymes, growth factors, hormones, glycoproteins, glycolipids, oligosaccharides, vitamins and minerals (Galante et al., 2018; Kilci Erciyas, 2021).

The nutritional content of breast milk varies according to the needs of the baby at that moment, and each mother produces the most suitable milk for her baby (Isaacs et al., 2010). Macro and micronutrient content in breast milk; social differences, mother's nutrition, baby's gender, age, socio-demographic factors such as birth weight, baby's health status, lactation time, breastfeeding time, food consumed by the mother and pre-milk/last milk (Bravi et al., 2016; Galante et al., 2018; Hinde et al., 2012; Kilci Erciyas, 2021).

Breast milk varies according to the baby's needs throughout the day. The circadian rhythm (sleep-wake cycle/biological clock) in breast milk contributes to the development of the baby's circadian rhythm. While the levels of fat, cortisol and amino acids are higher in breast milk during the day, melatonin and tryptophan are higher at night (Kilci Erciyas, 2021).

Colostrum secreted in the first 5 days after birth; in small quantities, yellow in color, rich in protein and immunoglobulin A, contains immunological compounds such as lactoferrin, leukocytes, epidermal growth factor and minerals such as sodium, chlorine, magnesium. Its levels of fat, carbohydrate and lactose are low, and its pH is alkaline. Thanks to its laxative properties, it facilitates the passage of meconium, prevents bilirubin from the intestine and therefore prevents neonatal jaundice (Kilci Erciyas, 2021; Uraş, 2017). It is the transition milk that changes gradually from colostrum to mature milk, is secreted more than colostrum and is secreted for about 10 days. In transition milk, the protein and immunoglobulin content decreases, while the lactose, fat and calorie content increases (Kilci Erciyas, 2021; Phattraprayoon et al., 2018). Breast milk postnatal acquires the characteristics of fully mature milk in the 4-6th week. Mature milk is secreted after the 15th day and is more juicy than colostrum. In mature milk, the protein content is less, the fat and carbohydrate content is higher (Kilci Erciyas, 2021; Uraş, 2017; Paulaviciene et al., 2020). Pre-milk, rich in carbohydrates and more juicy at the beginning of breastfeeding, is rich in fat at the end of breastfeeding, contains more calories with vitamin A, E. (Uraş, 2017; Phattraprayoon et al. 2018)

It is very important to know the factors that change the composition of breast milk in order to feed the baby and get the most out of breast milk (Bzikowska et al., 2018; Quinn et al., 2012). In this study, the relationship between the characteristics of the newborn and the nutritional content of breast milk is examined.

2. Method

This descriptive study was conducted in the neonatal unit of Istanbul University hospital in Istanbul between November-December 2019. In this study the STROBE Statement was used in the design, planning, implementation and reporting of the study (Cuschieri, 2019).

2.1. Aim of the Research

This study aimed to examine the relationship between newborn characteristics and breast milk nutritional content.

2.2. Research Questions

Do newborn characteristics (anthropometric, gender, vital signs) affect macroelements in colostrum, transitional and mature milk?

2.3. Setting and Population

The study population consisted of mothers who gave birth in the hospital where the data were collected, and the sample consisted of 46 mothers who met the sample selection criteria. The minimum sample size required for the study was calculated by power analysis. In this context, the required minimum sample size was found to be 34 under the assumption of the 5% first-type error margin, one-to-one group distribution rate, 80% study power and therefore, 20% second-type error, and the effect size of 0.50 according to a double-sided hypothesis and Cohen's standard effect sizes (Goulet-Pelletier et al., 2018). To increase the study's strength, it was planned to include 50 mothers in the sample. When the data collection process was terminated, four mothers were excluded from the sample because there were missing data, and 46 mothers formed the study sample.

Sample selection criteria

•Having a singleton pregnancy

•The infants' gestational age being over 35 weeks

Exclusion criteria

•The presence of a congenital anomaly in the newborn that will prevent the infant's sucking (cleft palate, cleft lip, etc.)

•The presence of a disease in the mother that may affect breast milk content (diabetes, hypertension, hypothyroidism, etc.)

•The presence of an infectious disease in the mother, such as HIV, hepatitis B, hepatitis C, etc., known to be transmitted through breast milk

Expulsion criteria

•The mother's not coming to the 5th-day and 15th-day postpartum controls

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2.4. Data Collection and Data Collection Tools

The data were obtained with the "Data Collection Form" created by the researchers by reviewing the literature (Bzikowska et al., 2018; Phattraprayoon et al., 2018). The first part of the form consisted of five questions on sociodemographic characteristics, three questions on obstetric characteristics, and three questions on birth. In the second part, seven questions were asked about the postpartum characteristics of the newborn anthropometric measurements (head, chest circumference, weight and height), first and fifth minute APGAR score, gender, etc., and in the third part, cord blood gas values taken from the umbilical cord at the end of birth were included. Breast milk from mothers is the first, fifth and 15th for macronutrients. Day values were included in the fourth section. Breast milk analysis was performed with Miris HMATM milk analyzer.

Miris HMATM (Uppsala, Sweden): The energy and macronutrients (protein, fat, and carbohydrate) of breast milk were analyzed with the Miris HMATM device. The Miris HMATM device is certified by the International Organization for Standardization (ISO 9622: 1999). The Miris HMATM device analyzes 2 ml of breast milk in approximately 2 minutes. The milk was taken from the mother's breast into a syringe and analyzed in the Miris HMATM device.

Mothers giving vaginal birth and their infants are discharged after 24 hours if there are no health problems, and those born by cesarean section are discharged after 48 hours. The first control of newborns after discharge is performed within 72 hours according to the requirements. One of the researchers filled out the data collection form by conducting face-to-face interviews with the mothers.

Mothers who met the sample selection criteria were included in the study. 2 ml milk samples were taken from the right breast at least two hours after breastfeeding in the first 24 hours after delivery, on the fifth and 15th days after delivery, analyzed with Miris HMATM. Macronutrient content values were obtained approximately three minutes after the breast milk sample was introduced into the analyzer. On the other hand, Apgar score of newborns was evaluated by a researcher at the 1st and 5th minutes after birth. The same researcher took anthropometric measurements of the newborn. In the first minute after birth, 1 ml of blood was taken from the umbilical cord vein and blood gas was studied.

2.5. Ethical Approval

Voluntary consent was obtained from all participants. The study was approved by the ethics committee (Date:15/08/2019; No:88/1). All participants signed the informed consent before answering the questionnaire.

2.6. Limitations

The results obtained from the study are limited to women of similar socio-economic characteristics who gave birth in a university hospital.

2.7. Data Analysis

The data obtained from the study were evaluated in the SPSS 24.0 package program using parametric and non-parametric descriptive statistical analyses. The Mann-Whitney U test was used for comparisons of quantitative variables between the two groups, and the Kruskal-Wallis test was used

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for comparisons between more than two groups. The relationship between the continuous variables was tested by Spearman Correlation. Statistical significance was accepted as $p<0.05$.

3. Results

It was determined that the mothers in the study group were 28.6±5.5 years old, 95.7% were not working, and 60.8% gave birth by cesarean section. It was determined that 65.3% of the babies in the study group were male, the mean gestational age was 38.9.1±1.1 months, the mean birth weight was 3389.13±406.4 g and according to the Lubcenko curve, 82.6% of the babies were in the Appropriate for Gestational Age-AGA. It was found that 89.13% of the babies were fed with breast milk, 54.35% of the mothers took their babies in their arms within 30-60-minutes after birth and 76.10% breastfed. It was determined that 50.50% of the baby had blood type A Rh pose (+), cord blood gas pH value was 7.35±.08, and PCO_2 44.92 ±6.59. (Table 1).

Table 1. Distribution of maternal and infant characteristics (n=46)

Characteristics	n (%)
Mother's Education	
Literate	16 (34.7)
Primary education	17 (36.9)
Secondary education	13 (28.4)
Employment status	
Employed	2 (4.3)
Unemployed	44 (95.7)
Family type	
Nuclear	19 (41.3)
Extended	27 (58.7)
Mode of delivery	
Vaginal	18 (39.2)
Cesarean section	28 (60.8)
Sex	
Female	16 (34.7)
Male	30 (65.3)
Birth weight according to gestational age	
Suitable for gestational age	38 (82.6)
More than gestational age	8 (17.4)
Baby's diet	
Human Milk	41 (89.13)
Mixed	5 (10.87)
Baby's blood group	
0 RH+	14 (30.43)
ARH+	23 (50.50)
B RH+	9 (19.07)
Time to hold the baby in the first arms after childbirth	
Right away	16 (34.78)
30-60 Minute	25 (54.35)
61dk-2 Hours	5 (10.87)
First breastfeeding time	
30-60 Minute	35(76.10)
61min-2 Hours	11 (23.90)
The situation of using a pacifier bottle	
Yes	23 (50.00)
No	23 (50.00)

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Table 1. Distribution of maternal and infant characteristics (n=46) (continued)

Characteristics	Mean±SD	Median
Mother's Age	28.6 ±5.5	27.00
Gestational age (weeks)	38.9±1.1	39.00
Baby's birth weight (g)	3389±406	3335.00
Baby's birth height	51.57 ±1.98	51.00
Baby's birth weight	3389.13±406.49	3335.00
Baby's birth head circumference	34.79±1.26	34.50
Baby's birth chest circumference	32.78 ±1.29	32.50
Baby's cord blood gas pH	7.35 ±.08	7.37
Baby's cord blood gas PCO2	44.92 ±6.59	46.60
Baby's cord blood gas base minus	-.94 ±2.11	-1.10
Apgar score 1st minute	8.85 ±.42	9.00
Apgar skoru 5th minute	9.91±.35	10.00

Colostrum, transitional milk and mature milk macronutrient values in breast milk are protein, respectively; 4.1 g/100 mL is 1.97 g/100 mL, 1 g/100 mL, carbohydrate; 4,7 g/100mL, 5,6 g/100 mL, 6.5 g/100 mL, amount of fat; 2.2 g/100 mL, 3.3 g/100 mL, 3.5 g/100 mL and calorie content; 68.50 kcal/100 mL, 67.4 kcal/100mL, 68.4 kcal/100 mL. In comparison of newborn characteristics and breast milk nutrient content; breast milk according to the gestational age of the baby 15th day protein value, 1st.,5th and 15th It was found that there was a difference between the energy value of the day ($p<0.05$; Table 2).

Table 2. Comparing breast milk content according to newborn characteristics (n=46)

	First Day			
Characteristics	**Carbohydrate (g)**	**Fat (g)**	**Protein (g)**	**Energy (kcal)**
Breast milk nutrients (in 100 mL) Mean±SD, Median				
	4.70±1.22, 4.60	2.27±.98, 2.10	4.10±1.63, 4.40	68.50±16.30,62.50
Mode of delivery				
Vaginal	4.76±.84	2.01±.88	4.32±1.51	65.61±11.79
Cesarean section	4.65±1.42	2.43±1.02	3.95±1.71	70.35±18.60
U*/p	240.50;.795	192.50; .180	220.50; .478	231.00; .636
Sex				
Female	4.94±1.09	2.42±1.17	3.68±1.62	64.06±15.35
Male	4.56±1.27	2.18±.87	4.31±1.61	70.86±16.53
U*/p	204.00; .406	223.00; .695	201.00; .368	171.00; .111
Birth weight according to gestational age				
Suitable for gestational age	4.77±1.30	2.16±.98	3.92±1.60	65.07±13.29
More than gestational age	4.33±.65	2.78±.86	4.93±1.56	84.75±20.20
U*/p	106.00;.182	85.00;.052	88.50;.066	51.50;***.004***
Baby's diet				
Human Milk	4.62±1.23	2.25±.97	4.20±1.64	69.21±16.87
Mixed	5.28±1.01	2.36±1.12	3.24±1.30	62.60±9.50
U*/p	68.00;.223	97.00;.846	61.00;.143	76.00;.349

U=Mann Whitney U, p<0.05*

Table 2. Comparing breast milk content according to newborn characteristics (n=46) (continued)

Characteristics (First Day)	Carbohydrate (g)	Fat (g)	Protein (g)	Energy (kcal)
Baby's blood group				
0 RH+	4.67±1.70	1.91±.64	4.30±1.82	62.71±11.19
ARH+	4.69±.96	2.36±.90	4.27±1.53	71.60±19.44
B RH+	4.73±1.02	2.58±1.45	3.32±1.48	69.55±12.76
Z/p**	.285;.593	2.265;.132	.236;.627	1.861;.172
5th Day				
Breast milk nutrients (in 100 mL) Mean±SD. Median				
	5.66±1.20, 5.90	3.13±.67, 3.10	1.97±1.02,1.70	67.35±10.45,68.0
Mode of delivery				
Vaginal	5.72±.95	3.06±.75	1.92±1.09	67.22±9.44
Cesarean section	5.62±1.34	3.16±.61	2.00±.98	67.42±11.22
U*/p	251.500; .991	10.45; .490	77.26; .660	78.00; .795
Sex				
Female	5.86±1.13	3.27±.74	1.81±.76	65.31±11.56
Male	5.55±1.23	3.05±.62	2.05±1.12	68.43±9.84
U*/p	216.500; .587	191.500;.261	233.500; .881	208.000/.459
Birth weight according to gestational age				
Suitable for gestational age	5.72±1.24	3.04±.58	1.78±.76	65.65±10.15
More than gestational age	5.33±.91	3.51±.90	2.86±1.56	75.37±8.27
U*/p	111.500; .239	93.500/.088	94.000/.092	65.500/***.012***
Baby's diet				
Human Milk	4.62±1.23	3.13±.69	2.03±1.05	67.85±10.84
Mixed	5.28±1.01	3.04±.37	1.46±.37	63.20±5.35
U*/p	78.500; .395	98.500; .887	73.500; .305	71.500; .273
Baby's blood group				
0 RH+	5.80±1.53	2.91±.39	1.95±.87	63.78±10.17
ARH+	5.73±.95	3.25±.74	2.15±1.22	70.17±10.23
B RH+	5.25±1.21	3.14±.77	1.52±.30	65.66±10.50
Z/p**	.619; .432	1.926; .165	.099; .754	4.419; ***.036***
15th Day				
	Carbohydrate (g)	**Fat (g)**	**Protein (g)**	**Energy (kcal)**
Breast milk nutrients (in 100 mL) Mean±SD. Median				
	6.48±.88 6.60	3.50±.81 3.45	1.05±.31 1.00	68.41±9.57 68.50
Mode of delivery				
Vaginal	6.62±.58	3.28±.83	.98±.28	66.61±8.73
Cesarean section	6.39±1.03	3.64±.76	1.49±2.25	69.57±10.05
U*/p	249.500; .955	175.500; .084	206.500; .302	187.500; .146
Sex				
Female	6.23±1.10	3.37±1.01	1.08±.37	66.31±12.00
Male	6.62±.72	3.57±.68	1.41±2.18	69.53±7.99
U*/p	212.500;.524	205.500;.425	230.500;.825	220.500;.652

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Table 2. Comparing breast milk content according to newborn characteristics (n=46) (continued)

Characteristics (15th Day)	Carbohydrate (g)	Fat (g)	Protein (g)	Energy (kcal)
Birth weight according to gestational age				
Suitable for gestational age	6.41±.95	3.35±.74	1.04±.32	67.47±9.70
More than gestational age	6.80±.32	4.20±.76	2.48±1.21	72.87±8.02
U*/p	110.000; .222	58.000; ***.006***	138.500; .693	92.000; .082
Baby's diet				
Human Milk	6.49±.88	3.48±.84	1.32±1.88	68.39±10.10
Mixed	6.44±.95	3.68±.41	1.06±.20	68.60±3.04
U*/p	95.000; .791	74.500; .322	91.000; .683	98.500; .888
Baby's blood group				
0 RH+	6.23±.88	3.30±.65	1.11±.35	66.42±8.59
ARH+	6.74±.74	3.59±.78	1.58±2.48	71.13±7.68
B RH+	6.20±1.09	3.58±1.07	.85±.19	64.55±13.73
Z/p**	3.322; .068	2.880; .090	.002; .962	5.989; ***.014***

U=Mann Whitney U, Z**=Kruskal Wills, p<0.05*

A negative relationship was determined between the gestational age of the baby and the protein value on the 15th day. A positive relationship was found between the baby's birth length and breast milk CHO on the first day, head and chest circumference and breast milk fat value on the first day (p<0.05; Table 3).

Table 3. The relationship between the characteristics of the baby at birth and the macronutrient content of breast milk (n=46)

Characteristics	**r p**	**Gestational Age**	**Birth Length**	**Birth Weight**	**Head Circumference on Birth**	**Birth Chest Circumference**	**Cord Blood Gas pH**	**Cord Blood Gas pCO2**	**Apgar Score 1st Minute**	**Apgar Score 5th Minute**
1st Day CHO *	**r**	0.287	.348*	-0.190	-0.107	-0.209	0.220	0.031	-0.046	0.103
	p	0.053	***0.018***	0.205	0.479	0.163	0.141	0.840	0.759	0.496
5th Day CHO*	**r**	0.255	0.198	-0.205	-0.062	-0.145	0.232	0.070	0.174	0.082
	p	0.087	0.186	0.172	0.681	0.336	0.121	0.642	0.247	0.590
15th Day CHO*	**r**	0.056	-0.142	-0.053	0.052	0.044	-0.052	0.104	0.064	-0.096
	p	0.712	0.345	0.725	0.732	0.772	0.731	0.492	0.673	0.524
1st Day Fat	**r**	-0.004	0.010	0.170	.326*	.421**	-0.145	-0.035	-0.176	0.028
	p	0.981	0.945	0.258	***0.027***	***0.004***	0.337	0.817	0.243	0.855
5th Day Fat	**r**	-0.264	-0.124	0.041	0.114	0.146	-0.014	-0.183	-0.157	0.122
	p	0.076	0.412	0.788	0.449	0.331	0.928	0.224	0.296	0.418

CHO Spearman Correlation Test p<0.05*

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Table 3. The relationship between the characteristics of the baby at birth and the macronutrient content of breast milk (n=46) (continued)

Characteristics	r p	Gestational Age	Birth Length	Birth Weight	Head Circumference on Birth	Birth Chest Circumference	Cord Blood Gas pH	Cord Blood Gas pCO2	Apgar Score 1st Minute	Apgar Score 5th Minute
15th Day Fat	r	-0.191	-0.262	0.015	-0.015	0.041	-0.124	0.073	0.114	0.050
	p	0.082	0.420	0.788	0.430	0.340	0.938	0.223	0.296	0.425
1st Day Protein	r	-0.041	0.039	.315*	0.180	0.209	-0.138	-0.056	-0.239	-0.153
	p	0.612	0.039	***0.011***	0.310	0.146	0.420	0.263	0.411	0.156
5th Day Protein	r	-0.050	0.105	0.150	-0.029	0.044	0.087	-0.178	***0.017***	-0.061
	p	0.741	0.488	0.319	0.847	0.770	0.567	0.236	0.909	0.686
15th Day Protein	r	-.339*	-0.061	-0.131	-0.182	-0.037	0.251	-.418**	0.245	-0.053
	p	***0.021***	0.688	0.387	0.227	0.809	0.093	***0.004***	0.101	0.725
1st Day Energy	r	0.208	0.260	0.289	0.185	0.179	-0.217	.415**	-0.133	0.060
	p	0.087	0.112	0.107	0.446	0.492	0.552	***0.002***	0.512	0.388
5th Day Energy	r	0.059	-0.048	0.086	0.104	0.135	-0.138	0.101	-0.069	-0.047
	p	0.698	0.752	0.569	0.490	0.370	0.359	0.505	0.649	0.756
15th Day Energy	r	0.184	-0.059	0.235	0.263	.322*	-0.144	0.133	-0.042	-0.048
	p	0.222	0.697	0.116	0.078	***0.029***	0.338	0.378	0.779	0.749

CHO Spearman Correlation Test p<0.05*

4. Discussion

Macro and micronutrient content in breast milk; It is known that the baby's gender, age, birth weight, health status of the baby, breastfeeding duration, mother's nutrition and breastfeeding time vary. (Bravi et al., 2016; Galante et al., 2018; Hinde et al., 2012; Kilci Erciyas, 2021; Paulaviciene et al., 2020; Uraş, 2017). In this study, the relationship between newborn characteristics and breast milk nutrient content was examined.

The content and amount of breast milk vary especially in the first two weeks after birth (Dritsakou et al., 2017). In this study, while the amount of protein was higher on day 1st, fat and CHO values were higher on day 5th and 15th In the literature, it is stated that while the protein content in colostrum is high and the amount of fat and energy is low, the protein content in transition milk decreases, while the lactose, fat and calorie content increases (Kilci Erciyas, 2021; Paulaviciene et al., 2020). Dritsakou et al. (2017) found that fat and energy were lower in colostrum, higher in transition milk, and reduced in mature milk by day 30 than in wet milk. It is reported that there are 53.6 kcal/100 ml calories in colostrum and 65.2 kcal/100 ml calories in transition milk and 57.7 kcal/100 ml in mature milk. (Bzikowska et al., 2018). The change in breast milk content is consistent with the literature.

The content of breast milk may vary according to the needs of the baby, such as gestational age, health, etc. (Kilci Erciyas, 2021). Although the amount of macro nutrient content changed according to the sex of the babies in the study group, no significant difference was found. Léké et al. (2019) did not find a significant relationship in their research investigating the relationship between the sex of

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term and preterm infants and the mother's nutritional status and milk content. It is recommended to conduct more studies on this situation.

In the literature, it is pointed out that each mother's milk is unique to her baby, and that the gestational age or individual characteristics of the baby affect the content of breast milk (Bravi et al., 2016; Hinde et al., 2012; Isaacs et al., 2010). On the 15th day of gestational age of the babies in the study groups, there was a negative relationship between breast milk and milk protein values. Hascoët et al. (2019) found that breast milk protein and the gestational age of the baby were negatively related to CHO. The research findings are consistent with the literature. However, the sex of the baby should be tested with more repetitive research to explain the relationship between gestational age and breast milk content.

The mean birth weight of the babies in the study group was 3883.2±3963.3 g, and as the birth weight of the baby increased, there was a relationship between the amount of protein in breast milk on the first day. In this study, weak correlations were found between anthropometric characteristics of infants at birth (weight, height, head circumference) and breast milk nutrients (fat, protein, CHO, and energy). Dritsakou et al. (2017) determined in a study they conducted that milk content of 305 mothers had a negative relationship with fat, protein and caloric value, and birth age and birth weight of the baby. Prentice et al. (2016) found no relationship between the anthropometric characteristics of the baby and the content of breast milk. Similarly, a study conducted in the Philippines by Quinn et al. (2016) found no relationship between the anthropometric characteristics of the baby and the nutrients of breast milk. Minato et al. (2019), in his study of 129 mothers in Japan, in which he examined the characteristics of the baby and the macronutrients of breast milk, determined that there was no relationship between the macronutrients of breast milk and the anthropometric characteristics of the baby in the first and third months after birth. In the literature, there are no research results showing the relationship between the anthropometric characteristics of the baby and the nutrients of breast milk. A weak correlation in the study group is not sufficient to explain the relationship. The research is in line with other research results in this aspect, and it may be recommended to repeat the research in a larger sample for certain judgments.

5. Conclusion

In repeated measurements (1st, 5th and 15th day), it was found that the amount of carbohydrates and fats in breast milk gradually increased and the protein decreased. It can be said that the nutritional content of breast milk varies depending on the characteristics of the baby.

Authors Contributions

Subject selection: FŞB, GB, EAÇ; Design: FŞB, GB, EAÇ; Planning: FŞB, GB, EAÇ; Data collection and analysis: FŞB; Manuscript writing: FŞB, GB, EAÇ; Critical review: GB, EAÇ.

Conflict of Interest

The authors declare no conflict of interest.

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