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Importance of First Pregnancy Monitoring and Its Relationship with Newborn Measurements at Delivery

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ABSTRACT

Aim: The aim of this study was to determine the relationship between first pregnancy screen parameters and newborn measurements in healthy pregnant women who have healthy babies.

Methods: The study was planned two centered at Şişli Hamidiye Etfal Training and Research Hospital and University of Recep Tayyip Erdoğan. Women who had healthy pregnancy and healthy child and came to our clinic for any reason between June and December 2017's first pregnancy screen parameters (at the first 14 week of pregnancy) and newborn infants measurements were retrospectively collected and recorded. Data were entered into the SPSS program and statistical calculations were made with appropriate methods.

Results: There was a statistically significant positive correlation between newborn birth weight and maternal alanine transaminase, final gestational weight, first gestational weight, and body mass index at first pregnancy screen. There was a positive relation between the mother height and the newborn birth height, and a negative relation between newborn birth height and aspartate transaminase and creatinin levels of the mother.

Conclusions: The first monitoring parameters are useful in detecting risky pregnancies and early detection of abnormal conditions, as well as affecting births of healthy newborns born as a result of a healthy pregnancy.

Keywords: Biochemical measurements, newborn birth weight, monitoring, risky pregnancy

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Introduction

Maternal mortality is one of the most important parameters that indicate country development. According to data from the World Health Organization, 289,000 maternal deaths occurred in 2013, while maternal mortality decreased by 45% worldwide from 1990 (1). The importance of monitoring during pregnancy cannot be denied.

Pregnancy monitoring that is performed in primary care is one of the most significant components of family medicine practice. According to the Family Medicine Regulations of the Ministry of Health in Turkey, all pregnant women must be monitored at least 4 times. The first examination must be performed in the first 14 weeks of pregnancy (2). During the first examination, anamnesis, risk assessment and vital signs should be recorded, as well as recommended laboratory tests and physical examinations should be performed. Pregnancy monitoring is important not only for maternal health but also for the health of the newborn. The quality and the quantity of pregnancy monitoring reduces infant mortality (3). As a result of the arrangements made within the "Health Transformation Program" in the last 2 decades in Turkey, the infant mortality rate has decreased rapidly (4,5). According to statistical data, the infant mortality rate decreased from 27.156 to **7.595** per 1000 live deliveries (6).

In this study, it was aimed to determine the relationship between first monitoring parameters and neonatal measurements in individuals who had healthy pregnancies and babies and had their follow-ups in family medicine clinics.

Methods

The study was planned for two centers and was performed at the Şişli Hamidiye Etfal Training and Research Hospital and the University of Recep Tayyip Erdoğan. Data were recorded using a retrospective file scanning method. First examination parameters of individuals (during the first 14 weeks) who had healthy pregnancies and infants and newborn measurements of their babies who applied to family medicine clinics for any complaint were recorded between June 2017 and December 2017 in these centers. Age, weight, height, BMI (Body Mass Index), blood pressure measurement, laboratory findings (blood glucose level, Thyroid Stimulating Hormone (TSH), Complete Blood Count (CBC), Urea, Creatinine, Aspartate Transaminase (AST) and Alanine Transaminase (ALT) were recorded at the first examination, and the mother's gestational age, birth weight, height and head circumference of the newborn were compared.

Individuals that had a healthy pregnancy and a healthy baby, having had pregnancy above the age of 18 and having requested data completed in their files were included. Having had any disease before or during pregnancy, if their newborn had any disease or had gestational age ≤ 36 weeks were excluded. This study was performed with 192 individuals having the inclusion criteria. This study was approved by the ethical and research committee of the University of Recep Tayyip Erdoğan (number: 2017-240).

Statistical Analysis

Descriptive statistics: number and percentage for categorical variables, mean, standard deviation, median, and interquartile interval for numerical variables were recorded. Distribution was analyzed and Shapiro–Wilk Correlation Analysis was used to investigate relationships between numerical variables when the normality assumption was not met, and Spearman correlation coefficient was also computed. Mann-Whitney test was applied for comparison of weight at the beginning of the pregnancy, weight at the beginning of the pregnancy and weight gain during

the pregnancy in the birth weight group. All analyses were done using SPSS (SPSS Inc. Released 2007. SPSS Windows, Version 15.0. Chicago, SPSS Inc.). The statistical significance level was accepted as $p < 0.05$.

Results

The first examination data of 192 mothers and the newborn birth data are given in Table1. The mean age of the mothers was 31.4±5.9. The mean weight of the mothers was 66.4 ± 10.3 kilograms (kg) at the beginning and was 78.1±10.0 kg at the end of their pregnancy and the mean weight gain during pregnancy was 11.7 ± 4.7 kg. Their mean BMI at the first examination of their pregnancy was 26.13±4.18 kg/m^2.

Table1. First visit data of mothers and median and mean values of newborn measurements.

		Mean ± SD	Median (25th – 75th percentage)
Newborn measurements			
Birth weight		3320.6±429.7	3295 (3002.5-3600)
Birth weight n (%)	2500-3300	111 (57.8)	
	≥3300	81 (42.2)	
Birth height		50.0±2.1	50 (49-51)
Birth height n (%)	<50	130 (67.7)	
	≥50	62 (32.3)	
Head circumference		34.3±1.4	34 (33-35)
Head circumference n (%)	<35	149 (77.6)	
	≥35	43 (22.4)	
Gestational week		38.3±1.3	38 (37-39)
Gestational week n (%)	37-38	50 (26.0)	
	≥38	142 (74.0)	
First visit data			
Mother's age		31.4±5.9	32 (27-36)
Hemoglobin		12.0±1.1	12.1 (11.4-12.8)
Platelets		280.2±98.1	249.5 (211-333)
Fasting glucose levels		88.9±7.20	88 (84-94)
Urea		8.3±2.5	7.94 (7-9.2)
Creatinine		0.59±0.16	0.56 (0.5-0.67)
AST		20.4±7.8	18 (15-24)
ALT		17.0±9.1	14 (10-22)
TSH		1.69±0.6	2.0 (0.21-2.5)

Weight at the start of pregnancy		66.4±10.3	66 (58.2-73.7)
Weight at the end of pregnancy		78.1±10.0	78 (71-84)
Systolic blood pressure		107.4±12.3	105 (100-120)
Height of mother		159.5±5.2	159 (156-163)
Weight gain during pregnancy		11.7±4.7	11.8 (9-14)
BMI at the first visit of pregnancy		26.13±4.18	25.8(23.2-28.5)

As seen in Table2, there was a statistically significant positive correlation between newborn birth weight and newborn birth height, neonatal head circumference, maternal ALT, weight at the start of pregnancy, weight at the end of pregnancy, weight gain during pregnancy and BMI at the first pregnancy screen. There was also a negative correlation with mother's creatinine level and AST with the neonatal birth length, but a positive correlation with neonatal head circumference and gestational week. There was no statistically significant relationship between neonatal head circumference and the parameters evaluated. There was a negative correlation between gestational age and hemoglobin and AST levels during the first examination and first and last measured weight of mothers during pregnancy.

Table2. Comparison of data of mother and newborn measurements

	Newborn birth weight		Newborn birth height		Newborn head circumference		Gestational week	
	rho	p	rho	p	rho	p	rho	p
Newborn Birth height	0.392	<**0.001**						
Head circumference	0.259	<**0.001**	0.294	<**0.001**				
Gestational week	0.123	0.090	0.210	**0.003**	0.135	0.062		
Mother's age	0.053	0.469	-0.112	0.121	-0.023	0.752	-0.060	0.408
Hemoglobin	-0.046	0.530	-0.023	0.756	-0.033	0.653	-0.155	**0.032**
Platelets	0.053	0.467	-0.105	0.147	-0.032	0.659	-0.001	0.990
Fasting glucose level	0.089	0.221	-0.057	0.433	-0.067	0.359	-0.068	0.347
Urea	0.022	0.760	-0.022	0.766	0.033	0.651	0.024	0.741

Creatinine	0.067	0.357	-0.150	**0.038**	-0.083	0.252	-0.086	0.238
AST	0.111	0.124	-0.154	**0.033**	-0.057	0.431	-0.157	**0.030**
ALT	0.152	**0.035**	-0.115	0.114	-0.038	0.597	-0.107	0.141
TSH	0.031	0.688	-0.006	0.930	0.060	0.408	-0.086	0.233
Weight at the begining of pregnancy	0.137	**0.048**	0.039	0.587	0.057	0.432	-0.156	**0.031**
Weight at the end of pregnancy	0.280	<**0.001**	0.070	0.335	0.059	0.417	-0.173	**0.016**
Systolic blood pressure	0.092	0.204	0.048	0.508	-0.078	0.283	0.023	0.751
Height of mother	0.016	0.830	0.152	0.035	0.065	0.367	-0.040	0.580
Weight gain during pregnancy	0.221	**0.012**	0.006	0.932	-0.055	0.446	-0.069	0.338
BMI level at the beginning of pregnancy	0.150	**0.038**	0.013	0.855	0.078	0.283	-0.134	0.065

In the study, the median value of birth weight was calculated as 3300 grams, 42.2% of the babies were born over 3300 grams and 74% were born at or after 38 weeks of gestation. The weight gain during pregnancy and the last weight measured during pregnancy of mothers of the babies whose birth weight was 3300 grams and over were statistically higher than the mothers of the babies whose birth weight was below 3300 grams ($p<0.001$; $p=0.003$) (Table3).

Tablo3. Relationship between mother's weight measurements and newborn birth weight

Birth weight (grams)							
	<3300			≥3300			p-value
	Mean	SD	Median	Mean	SD	Median	
Weight at the start of pregnancy	65.25	9.90	65	67.93	10.76	66	0.122
Weight at the end of pregnancy	76.03	9.91	76	80.88	9.45	82	**p<0.001**
Weight gain during pregnancy	10.81	4.34	11	13.00	4.87	13	**0.003**

Discussion

Our study was performed with 192 people who had the required tests done and had their examination within the first 14 weeks of their pregnancies. The mean age of the participants was 31.4 ± 5.9 years. They were overweight according to their BMI at their first visit (26.13 ± 4.18 kg / m2). The reason for this may be that obesity is widespread in our country, as it is in the world.

Due to the current living conditions and the position of women in working life, women have begun to have their children at older ages than in the past and with the increase in conception age the complications for the baby as well as for the mother increases. Therefore, pregnancy above 35 years of age is considered as a risk factor (2). In a meta-analysis published in 2017: 1940 titles, 63 cohort studies and 12 case control studies were examined and it was reported that being over 35 years of age is still a risk factor for having a child (7).

In the literature, a study comparing mothers aged 35 and 20-29 showed that maternal age had no effect on neonatal health (8), while another study comparing under 40 years of age and older, it was found that especially being over 40 years of age had an effect on neonatal health and was even associated with low birth weight (9,10). In our study there was no association between age and neonatal weight and height. This could be because the mothers in our study had a mean age under 40.

Anemia, especially iron deficiency anemia, is common in pregnancy. In a UK study conducted in 2011, it was found that 24% of pregnant women had anemia (11). In a study conducted in the UK, when the relationship between anemia in pregnancy, hemoglobin values and newborns was examined, it was found that there was a relationship between hemoglobin level at the first examination and prenatal death (12). A meta-analysis published in 2019 revealed a relationship between low hemoglobin value and newborn health and indicated the importance of iron prophylaxis in pregnancy (13).The mean hemoglobin level of the mothers at the

first examination was 12.0 ± 1.1 and we did not find a significant relationship between hemoglobin levels and birth weight, height and head circumference of the newborn. Therefore we consider it usual as the hemoglobin levels were also normal. For the same reason, although the relationship between anemia and preterm birth has been shown in the literature (14), in our study, there was a statistically significant negative correlation between birth week and hemoglobin level in the first examination. This can be explained by the fact that the hemoglobin values we obtained belonged only to the first trimester, since the expected anemia in pregnant women actually occurs after the second trimester. Thus, monitoring only the initial hemoglobin can be misleading.

Complications caused by thyroid hormone disorders during pregnancy are known to adversely affect the health of the mother and the baby. According to data from the USA, the prevalence of subclinical hypothyroidism in pregnant women is 3.7% (15). In a study conducted in 2017, the relationship between TSH and FT4 levels and birth weight was examined and a relationship was found with FT4 but not with TSH (16). As we performed our study with healthy pregnant woman and newborn babies, TSH levels were normal at the first examination and similarly we did not find a significant relationship between TSH levels and newborn birth weight, height, head circumference and gestational age.

The relationship has been known between low weight gain during pregnancy and low birth weight and preterm birth (17, 18). The mother's weight gain in the second trimester was said to most affect the birth weight of the newborn (19). In our study, the relationship between newborn birth height, birth weight, head circumference and gestational age and the mother's first and last weight measured during examinations and weight gain during pregnancy were examined. There was a relationship between the birth weight of the newborn and the last weight of the mother during the pregnancy. In our study, similar to the systematic review published in 2015, a negative correlation was found between the gestational week and the mother's first and final weight during pregnancy (20).

Whitaker et al. found that obese mothers were two times more likely to have obese children than mothers who were not obese (21). In the present study, a relationship was found between the mother's first pregnancy examination BMI level and newborn weight. Birth weight of the newborn increased as BMI increased. The fact that BMI we obtained in the study were values at the beginning of pregnancy shows that maternal obesity causes an increase in baby weight regardless of the weight gain during pregnancy.

In this study, it was found that there was a relationship between birth height of newborns and maternal height, and similar to the publication in 2017 (22), no relationship was found between birth height of the newborn and weight gain of the mother during pregnancy. We think that the effect of maternal height on newborn birth height shows the role of genetic factors.

Conclusions

We found a relationship between first and last weight of the mother, weight gain during pregnancy, BMI of the mother, and newborn birth weight. Additionally, a statistically significant negative correlation was found between gestational weight and hemoglobin level of mothers at the first monitoring and mother’s weight at the beginning and at the end of pregnancy. Pregnancy monitoring is one of the parameters that decrease both mother and baby mortality rates. With first examination data, in addition to being useful for the detection of risky pregnancies and early detection of

abnormal conditions, some parameters also affect the birth measurements of a healthy newborn as a result of a healthy pregnancy. For this reason, it is important to catch pregnancies in the early weeks and make the necessary monitoring on time. It is necessary for family physicians to screen women in the 15-49 age group of their population at least twice a year and provide information about what to do in case of suspicion of pregnancy.

Conflict of Interest: The authors declare that there is no conflict of interest.

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