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Examination of the relationships between different birthweights and various gestational parameters

Farklı doğum kiloları ile bazı gebelik parametreleri arasındaki ilişkinin değerlendirilmesi

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Abstract

Aim: The aim of the study is to assess the relationship between different birth weights and some pregnancy parameters. If there is a relationship, which is the relationship between birth parameters and birth weight. What are the importance levels of these relationships?

Methods: The significant levels of the relationships for these data were statistically examined. 18-39 years old, total 276 patients were investigated, the birth weights were grouped into 7 groups were included. Multiple comparison tests were performed between the groups by weight levels for the examined parameters, and different groups were determined by testing significance levels at 95% confidence interval using Multivariate Analysis of Variance (MANOVA). For the 7 different weight groups formed, correlation analysis was performed in order to determine the correlation coefficients among the gestational parameters, i.e., age range, gravida, mode of delivery, gestational age, zinc range and live/stillbirth status and the correlation levels among these parameters were determined

Results: Birth weights decreased with increasing maternal age and gravida during pregnancy. Significant correlations were found between birth weight and examined birth parameters.

Conclusion: Based on the results of this study, it is suggested that birth weight of the patient should be taken into account and the risky birth weight patient group should be followed according to gravida, zinc range, gestational age and live/stillbirth status.

Keywords: Pregnancy, Birth weight, Age, Zinc, Gravida

Öz

Amaç: Farklı doğum ağırlıkları ile bazı gebelik parametreleri arasındaki ilişkiyi değerlendirmek ve eğer bir ilişki varsa bunun önem düzeyinin ne olduğunu belirtmek amaçlanmıştır.

Yöntemler: Bu veriler için ilişkilerin anlamlılık düzeyleri istatistiksel olarak incelendi. 18-39 yaş aralığında toplam 276 hasta araştırılmış, doğum ağırlıkları 7 gruba ayrılmıştır. Gruplar arasında incelenen parametreler için ağırlık düzeylerine göre çoklu karşılaştırma testleri yapılmış ve farklı gruplar çok değişkenli Varyans Analizi (MANOVA) kullanılarak anlamlılık düzeylerini% 95 güven aralıklarında test ederek belirlenmiştir. Oluşan 7 farklı ağırlık grubu için, gebelik parametreleri, yaş aralıkları, gravida, doğum şekli, gestasyonel yaş, çinko aralığı ve canlı / ölü doğum durumu arasındaki korelasyon katsayılarını ve korelasyon katsayılarını belirlemek için korelasyon analizi yapılıp bu parametreler belirlenmiştir.

Bulgular: Doğum ağırlığının maternal yaşla ve gravida ile doğru orantılı olarak azaldığı görülmüştür. Doğum ağırlıkları ile incelenen doğum parametreleri arasında anlamlı korelasyonlar bulunmuştur.

Sonuç: Hastanın doğum ağırlığının dikkate alınması ve riskli doğum ağırlıklı hasta grubunun gravida, çinko aralığı, gebelik haftası ve canlı / ölü doğum durumuna göre izlenmesi önerilmektedir.

Anahtar kelimeler: Gebelik, Doğum Kilosu, Yaş, Çinko, Gravida

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Introduction

With the rapid pace of development of the society and economy, macrosomia, defined as the birth weight of ≥4000 g, has become more common in affluent societies [1]. The mechanisms underlying this relationship have not been clearly identified yet. It is important to understand which maternal characteristics are causally related to birth weight because understanding these relationships will facilitate targeted development of interventions to be tested in randomized controlled trials, leading to clear and evidence-based recommendations in pregnancy [2]. Previous studies have demonstrated a relationship between fetal macrosomia and cesarean section [3]. Birth weight less than 2500 g was defined by the World Health Organization (WHO) as low birth weight (LBW) [4]. The United Nations International Children's Emergency Fund (UNICEF) and WHO reported that more than 20 million infants (15.5% of all births) were born LBW worldwide in 2000 [5]. In the studies conducted, it was reported that an association was present between maternal age and LBW. Reduced LBW rate was observed in cases with a maternal age of more than 20 [6]. A study on 1041 pregnant women demonstrated that the incidence of macrosomia was associated with the weight gain compared to the related gestational week, maternal age; the incidence of macrosomia was higher in male infants. However, it was not associated with parity and pre-pregnancy BMI (body mass index) .The rate of LBW increased in cases with low maternal age, female gender, low gestational age, and primipara [7]. In a study on 450 cases consisting of 15 newborns from each of 30 villages, young maternal age, grand multiparity, maternal anemia and the presence of a short interval between pregnancies were found to be associated with LBW [8]. In 2016, 123 normal weight and 123 LBW newborns were evaluated, and LBW incidence was found to be high in cases who had 1-3 visits during pregnancy, with young maternal age, with intervals between pregnancies shorter than two years and multi-gravidity. In those who were encountering their second or third pregnancies, the rate of delivery of infants with birth weights of less than 2500 grams was 46.42%; this difference was considered statistically significant [9]. In a study that retrospectively examined 237 pregnant women with a maternal age of ≥35 in Turkey, it was reported that, in advanced age group, the rates of preeclampsia, gestational diabetes, low Apgar score and intrauterine fetal death were higher, whereas the rate of prematurity, LBW and fetal anomalies were similar, compared to the young maternal age group [10]. It was stated that zinc levels were found to be low in preterm infants and zinc supplementation was required during the first trimester [11]. It was reported that zinc deficiency might cause inflammation in the placenta, leading to SGA and LBW [12]. However, in a study that investigated whether deficiencies of vitamin A and zinc during antenatal second and third trimesters were associated with LBW by measuring the weights of 575 infants during the first 72 hours after delivery, the rate of LBW was 16.5%; however, no association with zinc and vitamin A could be demonstrated [13].

In the present study that investigated the relationships between different birth weights and various gestational parameters, the newborns were divided into 7 groups, based on their weights. It was demonstrated in detail whether significant changes in the gestational parameters were present or not, and if present, in which gestational parameters.

Materials and methods

The present study included 326 patients who were at the 12th week of pregnancy or earlier. In order to reduce the factors that may influence the study results, patients with the systemic disease or multiple gestations were excluded from the study. From the subjects who agreed to participate in the study by reading and signing the informed consent form, 3 cc blood samples were collected in biochemistry tubes and centrifuged within 30 minutes at 3000 rpm for 15 minutes. The blood samples were stored at –80°C until the analysis. During the gestational follow-up until the delivery, the data of 276 patients were accessed. Zinc levels were determined using the "Thermo-atomic absorption spectrophotometry" method, which was in the range of 49 to129 µg/dl. Serums were diluted to 1/5 and worked. The normal range of zinc was 70-115 µg/dl. The test range was 15-250 µg/dl. The lower limit of detectable zinc level was 10 µg/dl. Among the parameters examined, zinc levels were evaluated in 8 groups as 49-59, 60-69 and so on, with increments of 10 units until reaching 120-129 µg/dl. Mode of delivery was defined as abortion, normal delivery, cesarean section, and presence of history of cesarean section, ectopic and voluntary abortion. Gestational age was defined as abortion, 24-37 weeks, 37-41 weeks, more than 41 weeks and ectopic pregnancy. Birth weight was defined in 7 groups as abortion, less than 1500 g, 1500-2000 g, and with increments of 500 g until reaching more than 4000 g. Birth status was defined as live birth, stillbirth, and no birth. Gravida was defined in 3 groups as 1, 2-3 and ≥ 4. The no birth group involved those with abortion, voluntary abortion and ectopic pregnancy.

The data from the patients examined within the scope of the study were assessed based on the weight levels in 7 groups. For this purpose, the data obtained from the patients were tabulated by weight levels. The data obtained were analyzed using the SPSS 16 package; their descriptive statistics were determined, multiple comparison tests were performed between the groups by weight levels for the examined parameters, and different groups were determined by testing significance levels at 95% confidence interval using Multivariate Analysis of Variance (MANOVA). For the 7 different weight groups formed, correlation analysis was performed in order to determine the correlation coefficients among the gestational parameters, i.e., age range, gravida, mode of delivery, gestational age, zinc range and live/stillbirth status and the correlation levels among these parameters were determined. It was determined whether these correlations were positive or negative, which parameters were important in the groups formed according to weights, and whether these parameters significantly changed according to the groups.

Analyses were performed to find whether the patients examined in 7 groups constituted according to birth weight were different in terms of age range, gravida, mode of delivery, gestational age, zinc range and live/stillbirth status. Multiple comparison tests were performed to test whether there were significant differences between birth weights and examined

parameters, and different groups were determined by testing significance levels at 95% confidence interval using Multivariate Analysis of Variance (MANOVA). P value <0.05 was counted as statistically significant.

Results

The parameters that were different according to birth weight were shown in Table 1. The table shows that there were differences between the groups formed according to birth weight in terms of gravida, zinc range, gestational age and live/stillbirth status with significance levels of 0.016, 0.05, 0.003 and <0.001, respectively. During the data analysis, the birth weights were analyzed in 7 groups formed as abortion, less than 1500 g, 1500-2000 g, and with increments of 500 g, until reaching more than 4000 g. The descriptive statistics of the data were shown in Table 2.

Table 1: Multiple comparisons for the gestational parameters examined according to birth weight

Gestational parameters	Birth weight p
Age range	0.451
Gravid	0.016
Zinc range	0.050
Birth week	0.003
Birth types	0.676
A live birth - Still born	<0.001

Correlation analysis was performed to describe the relationships between the birth weights and the gestational parameters by their significance levels. The relationships between the birth weights and the gestational parameters were determined and presented as tables. The correlation coefficients found in the analysis were interpreted as described below. According to this, the correlation coefficients were classified as follows:

0.00-0.25 “Correlation is very poor”
0.26-0.49 “Correlation is poor”
0.50-0.69 “Correlation is moderate”
0.70-0.89 “Correlation is high”
0.90-1.00 “Correlation is very high”

The birth weights were defined as 7 groups, and the correlations of the examined parameters with birth weights were analyzed in detail for each birth weight group. The results were shown in Table 3.

Table 3: Correlation coefficients between birth weights and the pregnancy parameters

Pregnancy parameters	Birth weight (gr) <1500	1500-2000	2000-2500	2500-3000	3000-3500	3500-4000	>4000
Age	-0.096	-0.380	-0.265	-0.428	-0.383	-0.019	-0.479
Gravida	0.548	0.099	-0.879	-0.105	-0.178	0.161	-0.049
Zink level	0.059	-0.039	-0.067	-0.005	0.071	0.130	-0.038
Birth week	-0.728	-0.498	-0.724	0.113	0.041	0.368	0.710

Table 2: Descriptive statistics of pregnancy parameters analyzed according to birth weights

Analyzed pregnancy parameters		Birth weight (gr) <1500	1500-2000	2000-2500	2500-3000	3000-3500	3500-4000	>4000	Birth no	Total
Age range	18≥x	0	0	1	2	0	0	0	2	5
	19≥x>24	0	0	1	9	19	4	2	9	44
	24≥x>29	1	2	4	20	26	13	7	12	85
	29≥x>34	2	2	5	18	36	18	7	18	106
	34≥x>39	0	0	0	5	11	7	4	7	34
	39≤x	0	0	0	0	0	0	1	1	2
Total		3	4	11	54	92	42	21	49	276
Gravida	1	0	1	6	19	35	10	7	10	88
	2 or 3	2	3	4	31	55	28	11	29	163
	4 or more	1	0	1	4	2	4	3	10	25
Total		3	4	11	54	92	42	21	49	276
Birth way	Abortion	0	0	0	0	1	0	0	34	35
	Normal delivery	3	3	8	36	48	20	12	0	130
	Cesarean section	0	1	3	8	19	10	6	0	47
	Previous C/S	0	0	0	10	24	12	3	0	49
	Ectopic	0	0	0	0	0	0	0	3	3
	Terminated	0	0	0	0	0	0	0	12	12
Total		3	4	11	54	92	42	21	49	276
Birth week	Abortion	2	0	0	0	1	0	0	34	37
	24-37	1	2	7	16	27	6	0	0	59
	37-41	0	2	4	27	56	28	11	0	128
	>41	0	0	0	11	8	8	10	0	37
	Ectopic	0	0	0	0	0	0	0	3	3
	Terminated	0	0	0	0	0	0	0	12	12
Total		3	4	11	54	92	42	21	49	276
Zinc range	49≤x<59	0	0	2	1	3	0	1	6	13
	59≤x<69	0	0	2	7	10	5	2	6	32
	69≤x<79	1	1	2	7	18	5	5	12	51
	79≤x<89	0	3	1	13	21	8	7	10	63
	89≤x<99	0	0	1	15	15	9	3	10	53
	99≤x<109	1	0	1	8	13	13	2	4	42
	109≤x<119	1	0	2	3	8	2	0	1	17
	119≤x<129	0	0	0	0	4	0	0	0	4
	129≤x	0	0	0	0	0	0	1	0	1
Total		3	4	11	54	92	42	21	49	276
Live-Dead birth	Live birth	2	2	7	50	90	42	21	2	216
	Dead birth	1	2	4	4	1	0	0	0	12
	Birth no	0	0	0	0	1	0	0	47	48
Total		3	4	11	54	92	42	21	49	276

Discussion

The retrospective study of maternal age in Turkey is 237 patients ≥35; preeclampsia, gestational diabetes, low Apgar scores and intrauterine fetal mortality rates were higher in older age group; Prematurity, the proportion of low birth weight infants and fetal anomalies are reported to be similar to the young maternal age group [11].

In our study, it was understood that there was a negative relationship between the age of the pregnant women and all the birth weight groups, and that as the age of the pregnant women increased, the whole birth weights decreased. However, this decrease was found to be at the highest level of 4000 gr with birth weight of -0.48, and at birth weight of -0.38 with 1500-2000 gr weight (Table 3).

The incidence of macrosomia is associated with weight gain and maternal age at the gestational week, with a higher incidence in male infants; However, 1041 pregnancies that were not associated with parity and pre-pregnancy BMI (body / mass index) were shown in the study conducted in 2015 [14]. However, the occurrence of LBW was highly possible in those with low maternal BMI (body mass index), inadequate food intake, a history of low birth weight or preterm delivery [15].

When we analyzed our data, it was observed that the gravida had a negative correlation between birth weight and birth weight. However, the increase in gravida was highly correlated with the level of -0.88 in the birth group weighing 2000-2500 gr. In this weight group it was understood that birth weight had a significant decrease in birth weight as the gravidity increased (table 3). It has been reported that zinc deficiency may cause SGA and LBW as a cause of inflammation in the placenta [16]. It was seen that there was a weak but positive relationship between the zinc level and the birth weight in the group between 3000-4000 gr. It was found that when the zinc level was increased for this group, the weights were increased if the weights were lower but the others were weaker for the negative ones (table 3).

In a study on 450 cases consisting of 15 newborns from each of 30 villages, young maternal age, grand multiparity, maternal anemia and the presence of a short interval between pregnancies were found to be associated with LBW [17].

When the data were analyzed, it was found that there was a negative correlation between the birth week and birth weight of less than 2500 gr, and the birth weight decreased as birth week increased. It was understood that the relationship between birth week and birth weight was between -0.72 and -0.72 between the group with 2000-2500 gr, which had a high level of relationship with the negative, especially in this group, as the birth week increased, the birth weight decreased with -0.72 relation level. On the other hand, in the groups with more than 2500 gr birth weight, there was a positive correlation between the birth week and the birth weight and it was determined that the birth weight increased as the birth week increased. As the week of birth increased, weight gain was found to be 0.37 for a group with a birth weight of 3500-4000 g and a relationship with a higher level was found at a level of 0.71 for groups over 4000 g. As the birth week increased, the birth weight increased by 0.71 (Table 3).

With the birth weight, "birth type" and "live-still birth, no birth" cases were also analyzed. According to this; there was a negative relationship between birth weight and birth patterns. There was a weak correlation between birth weight and abortion with -0.17, a weak correlation with -0.14 in the first cesarean group, a weak correlation with -0.22 in the pre-cesarean group whereas a negative correlation between birth weight and normal birth was -0.56 with moderate negative an increase in birth weight was found to reduce normal birth. Relationship levels between birth weight and live-stillbirth were examined and it was understood that there was a positive correlation between birth weight and live birth with 0.45 and that live birth increased as birth weight increased. There was a moderate negative correlation between birth weight and stillbirth (-0.57), indicating that the birth weight decreased as the birth weight increased (table 3).

In conclusion, the relationship between birth weights and obstetric outcomes were different statistical results when we analyzed the data by dividing the birth weight by eight groups. It was concluded that new studies were needed by increasing the number of patients.

References

1. Koyanagi A, Zhang J, Dagvadorj A, Hirayama F, Shibuya K, Souza JP, Gülmezoglu AM.Macrosomia in 23 developing countries: an analysis of a multicountry, facility-based, cross-sectional survey. Lancet. 2013;381:476–83.
2. .Leffelaar ER, Vrijkotte TG, van Eijsden M. Maternal early pregnancy vitamin D status in relation to fetal and neonatal growth: results of the multi-ethnic Amsterdam Born Children and their Development cohort. Br J Nutr. 2010;104(1):108–17.
3. Nkwabong E. Maternal and neonatal complications of macrosomia. Trop Doct. 2014;44:201–204.
4. McCormick MC. The contribution of low birth weight to infant mortality and childhood morbidity. N Eng J Med. 1985;312:82–90.
5. 5th UNICEF. Low birth weight: country, regional and global estimates, New York. 2004. pp. 25–54.
6. Luhete PK, Mukuku O. Study of low birth weight associated with maternal age and parity in a population of mother and children monitored in Lubumbashi. Pan Afr Med J. 2015;20:246.
7. Demelash H, Motbainor A, Nigatu D, Gashaw K, Melese A. Risk factors for low birth weight in Bale zone hospitals, South-East Ethiopia: a case-control study. BMC Pregnancy Childbirth. 2015 Oct 13;15:264.
8. Feleke Y, Enquoselassie F. Maternal age, parity and gestational age on the size of the newborn in Addis Ababa. East Afr Med J. 1999 Aug;76(8):468-71.
9. Borah M, Agarwalla R. Maternal and socio-demographic determinants of low birth weight (LBW): A community-based study in a rural block of Assam. . J Postgrad Med. 2016 Jul-Sep;62(3):178-81.
10. Heredia-Olivera K, Munares-García O. Maternal factors associated with low birth weight Article in Spanish; Abstract available in Spanish from the publisher. Rev Med Inst Mex Seguro Soc. 2016 Sep-Oct;54(5):562-7.
11. Tamay AG, Güvenal T, Özgür N, Oruç Koltan S, Koyuncu FM. Retrospective Analysis of Advanced Maternal Age Pregnancies. Gynecol Obstet Reprod Med. 2011;17:83–7.
12. Wang H, Hu YF, Hao JH, Chen YH, Wang Y, Zhu P, et al. Maternal Serum Zinc Concentration during Pregnancy Is Inversely Associated with Risk of Preterm Birth in a Chinese Population. J Nutr. 2016 Mar;146(3):509-15.
13. Gebremedhin S, Enquselassie F, Umeta M. Independent and Joint Effects of Prenatal Zinc and Vitamin A Deficiencies on Birthweight in Rural Sidama, Southern Ethiopia: Prospective Cohort Study. PLoS One. 2012;7(12):e50213.

14. H Hu YF, Hao JH, Chen YH, Su PY, Wang Y, Yu Z, et al. Maternal zinc deficiency during pregnancy elevates the risks of fetal growth restriction: a population-based birth cohort study. Sci Rep. 2015 Jun 8;5:11262.
15. Shakya KL, Shrestha N, Kisiju P, Onta SR. Association of Maternal Factors with Low Birth Weight in Selected Hospitals of Nepal. J Nepal Health Res Counc. 2015 May-Aug;13(30):121-5.
16. Li Y, Liu QF, Zhang D, Shen Y, Ye K, Lai HL, et al. Weight gain in pregnancy, maternal age and gestational age in relation to fetal. Clin Nutr Res. 2015 Apr;4(2):104-9.
17. Borah M, Agarwalla R. Maternal and socio-demographic determinants of low birth weight (LBW): A community-based study in a rural block of Assam. J Postgrad Med. 2016 Jul-Sep;62(3):178-81.