

Correlation of Abortus Imminence Cases in the First Trimester with Biochemical Markers

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Abstract

Objective: In this study, we compared the biochemical markers of imminent abortion, missed abortion, and healthy pregnant women in the first trimester to see if there were any differences. **Materials and Methods:** The study method is prospective. Pregnant women who applied to the obstetrics clinic of Istanbul Training and Research Hospital between 01.04.22 and 31.10.22 were diagnosed with abortion imminens or missed abortion between 6 weeks and 12 weeks or had normal pregnancy follow-up, had no chronic diseases, and did not take magnesium and calcium supplements were included in the study. 20 pregnant women with missed abortion, 20 pregnant women with abortion imminens diagnosis and 20 normal pregnant women who met the criteria were included in the study. Magnesium (Mg), calcium (Ca), copper (Cu), zinc (Zn) and hemogram (CBC) levels were checked in pregnant women included in the study. **Results:** The Mg, Cu, Zn, and CBC values of the study participants' women did not differ in a statistically significant way. When compared to pregnant women who had a normal pregnancy process, the difference in Ca value was found to be statistically substantially smaller in pregnant women who were diagnosed with abortion imminens and missed abortion. The findings of our study suggest that serum Ca levels be measured prior to conception or at the initial visit. **Conclusion:** Serum Ca levels were found to be significantly lower in the missed abortion group than in the abortus imminens and normal pregnant groups in our study ($p < 0.05$).

Keywords

Abortion, Biochemical Markers, Calcium, Copper, Magnesium, Missed Abortion, Spontaneous Abortion, Zinc

1. Introduction

Abortion (miscarriage) is the spontaneous or induced termination of pregnancy

before viability is achieved. Miscarriages up to 12 weeks are called early abortions. Abortion imminens—vaginal bleeding, cramping, or pelvic pain is accompanied by a fetal heartbeat in the intrauterine cavity in the first half of pregnancy. There is no falling fetal tissue or rupture of membranes. Missed abortion occurs when the pregnancy does not end with bleeding or miscarriage despite the absence of a fetal heartbeat [1] [2]. The incidence of spontaneous abortion is around 15% - 40%. 62% of spontaneous abortions occur before the 12th gestational week [3].

Elements (Zn, Mg, Ca, and Cu) in the human body are involved in various physiological processes, and their deficiencies result in various pathologies [4]. These elements are vital for both mother and fetus during pregnancy [5] [6] [7]. Studies have shown that maternal Zn deficiency is associated with premature rupture of membranes, premature and unexpected abortions, prematurity, intrauterine growth retardation, and fetal neurological defects. Ca deficiency is found to be related to fetal and bone development, tissue growth, and dysfunction.

Mg deficiency is associated with increased risk of chronic hypertension, preeclampsia, placental dysfunction, and premature birth, and Cu deficiency is associated with intrauterine growth deficiency, teratogenesis, embryonic or fetal death, and postnatal complications [8] [9] [10] [11]. In this study, it was aimed to evaluate the serum Zn, Mg, Ca, Cu, and CBC levels of women with missed abortions, abortion imminens and healthy pregnancies and to determine the relationship between these groups.

2. Material and Method

Our study was carried out with blood samples taken from volunteer pregnant women and inpatients who applied to the Obstetrics and Gynecology Department of the Istanbul Training and Research Hospital (IEAH Ethics Committee Approval Decision No: 100). A total of 60 patients, including 20 diagnosed with missed abortion, 20 diagnosed with abortion imminens, and 20 healthy pregnancies considered the control group, were included in the study. The study excluded pregnant women with systemic disease, uterine anatomical disorders, multiple pregnancies, IVF patients, taking vitamin supplements from the above elements, or receiving iron deficiency treatment.

The serum Zn, Mg, Ca, and Cu levels and CBC values of each patient participating in the study were checked. Patients' ages, gravida and parity numbers, height and weight information, BMI values, and CRL lengths measured during the ultrasonographic examination were noted. The laboratory study was carried out in the Medical Biochemistry Laboratory of the Istanbul Training and Research Hospital. After 10 - 12 hours of fasting, the serum sample taken into an anticoagulant-free S-Monovette tube was centrifuged at 4000 rpm for 10 minutes at room temperature. Mg and Ca titers in serum samples from the centrifuge were studied by the photometric method in the Roche COBAS 501 device. Zn and Cu levels were studied in the biochemistry laboratory of Cemil Taşcıoğlu

City Hospital. Zn and Cu levels were measured using the Shimadzu AA-7000 series atomic absorption spectrometer [12].

Standards were prepared for the Zn and Cu values to be measured in an atomic absorption spectrophotometer. These standards were read by the device, and a linear graph was obtained. The low and high controls were then read. After it was confirmed that the controls were within the reference values, the serums of the patients were diluted with distilled water at the rate of 1/10 for both Zn and Cu, and then read three times in the device. The average value was taken. CBC levels were determined in the Istanbul Training and Research Hospital Medical Microbiology Laboratory. 2.5 - 3 cc of blood samples were taken into the Etdali tube and turned upside down. It was then placed on the Mindray BC 6800 instrument. After working on the device by turning it upside down three times, 1.5 cc of blood was drawn and read.

3. Statistical Analysis

In the descriptive statistics of the data, mean, standard deviation, median, minimum, maximum, frequency, and ratio values were used. The distribution of variables was measured with the Kolmogorov-Smirnov test. ANOVA (Türkiye test), Kruskal-Wallis, and Mann-Whitney U Test were used in the analysis of quantitative independent data. In the analysis of qualitative independent data, the Fischer test was used when the chi-square test conditions were not met. The SPSS 28.0 program was used in the analysis.

4. Findings

Ca value in the missed abortion group was significantly lower than that in the abortus imminens and normal pregnant groups ($p < 0.05$). There was no significant difference in Ca value between the abortion imminens and normal pregnant groups ($p > 0.05$) (Table 1). There was no significant difference in Zn, Cu, Mg, PLT, HB, HCT, and WBC values between the missed abortion, abortus imminens, and normal pregnant groups ($p > 0.05$) (Table 2). It was observed that there was a statistically significant difference between the gestational week of women with a diagnosis of missed abortion and the gestational week of women with a diagnosis of abortus imminens or who had a normal pregnancy ($p < 0.05$).

5. Discussion

The serum Ca value was found to be lower in the group diagnosed with missed abortion compared to the abortion imminens and normal pregnant groups in our study. Ca values did not differ significantly between the abortus imminens and normal pregnant groups. In terms of Zn, Cu, and Mg values, there was no significant difference between the missed abortion, abortus imminens, and normal pregnant groups. According to our findings, measuring Ca in the serum at the preconceptional or first visit may be recommended.

Table 1. Comparison of anamnesis and examination findings.

		Missed Abortus (n: 20)	Abortus Imminens (n: 20)	Normal Pregnant (n: 20)	P	
Age	Avg. ± sd	32.0 ± 7.8	31.7 ± 30.5	29.7 ± 29.0	0.504	A
	Median	31.5	6.5	5.4		
BMI	Avg. ± sd	25.6 ± 4.4	24.8 ± 23.0	27.0 ± 28.0	0.264	K
	Median	24.5	3.6	4.4		
Gravidity	Avg. ± sd	3.1. ± 2.1	2.4 ± 2.0	3.1 ± 3.0	0.477	K
	Median	2.5	1.3	1.9		
Parity	Avg. ± sd	1.5 ± 1.4	1.1 ± 1.0	1.3 ± 1.0	0.601	K
	Median	1.5	1.1	1.4		
Gestational Age By LMP	Avg. ± sd	9.6 ± 1.7	8.3 ± 7.9	8.6 ± 7.8	0.033	K
	Median	9.7	2.0	2.0		
Gestational Age by USG	Avg. ± sd	8.0 ± 1.7	7.7 ± 7.4	8.4 ± 7.6	0.342	K
	Median	7.9	1.7	1.9		

A: ANOVA/K: Kruskal-wallis (Mann-Whitney u test)/X² Chi-square test.**Table 2.** Comparison of laboratory findings.

		Missed Abortus (n: 20)	Abortus Imminens (n: 20)	Normal Pregnant (n: 20)	P	
Ca	Avg. ± sd	8.7 ± 0.7	9.3 ± 0.3	9.2 ± 0.3	0.001	K
	Median	9.0	9.4	9.2		
Zn	Avg. ± sd	69.8 ± 20.0	71.7 ± 9.5	74.0 ± 10.3	0.688	K
	Median	70.0	74.0	73.0		
Cu	Avg. ± sd	102	99.3 ± 17.6	99.1 ± 11.3	0.665	A
	Median	9 ± 14.6	96.5	101.0		
Mg	Avg. ± sd	1.8 ± 0.2	1.9 ± 0.1	1.9 ± 0.1	0.919	K
	Median	1.9	1.8	1.9		
PLT	Avg. ± sd	275.	262.1 ± 63.9	256.	0.723	A
	Median	0 ± 99.5	277.5	7 ± 47.6		
HB	Avg. ± sd	11.6 ± 1.2	12.1 ± 0.8	12.1 ± 1.4	0.354	K
	Median	12.0	12.2	12.0		
HCT	Avg. ± sd	35.2 ± 3.2	35.4 ± 2.0	36.3 ± 3.4	0.491	A
	Median	35.1	35.8	35.4		
WBC	Avg. ± sd	8.3 ± 1.7	7.4 ± 2.1	8.2 ± 1.7	0.172	K
	Median	8.0	7.5	8.7		

A: ANOVA/K: Kruskal-Wallis (Mann-Whitney u test).

When studies examining early pregnancy complications and serum electrolyte levels in the literature are examined; Sami *et al.* (2019), no significant difference in calcium levels between habitual abortion and healthy pregnant women is found [13]. According to Sahin *et al.* (2013), the Ca levels of pregnant women at risk of preterm birth were lower than those of healthy pregnant women [14]. Borella *et al.* (1990) discovered that women who had spontaneous abortions had higher Ca levels and lower Mg levels than healthy non-pregnant women [15]. Smolarczyk R *et al.* (1997) discovered no difference in Ca levels between women diagnosed with abortion imminens and those who had abortions, but they did discover a decrease in Mg levels [16]. Norman J. and others recurrent pregnancy loss was found to be more common in the late first trimester or early second trimester in pregnant women with hyperparathyroidism (HPT) and a high serum Ca value [17]. In D. Hirsch's research, pregnant women with primary hyperparathyroidism (PHPT) had a slight increase in serum Ca value, which was not associated with abortions [18]. According to Turan *et al.* (2019), Mg and Zn levels in pregnant women at risk of miscarriage were lower than those in healthy pregnant women, while Cu levels were higher [19]. Serum Mg and Cu levels were found to be within normal limits in our study. Serum Zn levels were found to be low in the groups of missed abortion, abortus imminens, and normal pregnancy. Unlike our study, Durmuşolu *et al.* (2018) found no significant difference in serum Zn levels in patients diagnosed with missed abortion, but they did find a statistically significant decrease in serum Cu level [4]. According to Omeljaniuk J. W *et al.* (2015), serum Cu levels were significantly lower in women who had missed abortions compared to pregnant women in the first trimester [20]. Thaker *et al.* (2019) discovered that serum Cu levels were significantly lower in women who had missed abortions than in non-pregnant women. Serum Zn levels, on the other hand, showed no difference [21]. In contrast to our findings, Skalnaya *et al.* (2019) discovered that the serum Cu level was high [22]. Alvarez *et al.* (2007) discovered that serum Zn levels decreased during pregnancy while serum Cu levels increased in a study of 159 healthy pregnant women [23]. Wang *et al.* (2020) discovered that serum Mg and Cu levels were higher in women who had spontaneous abortions than in healthy pregnant women [24]. Serum Zn levels were found to be low in missed abortions, abortus imminens, and normal pregnant women in our study, while serum Cu levels were found to be within normal limits.

The fact that the sample group of our study consisted of individuals living in the same geographical area, that the patients were exposed to the same environmental factors and were in similar socioeconomic conditions, and that diseases that could affect the levels of these electrolytes were eliminated are all strengths of our study. One of the limitations is the small sample size.

6. Conclusion and Recommendations

Serum Ca levels were found to be significantly lower in the missed abortion

group than in the abortus imminens and normal pregnant groups in our study. Ca in the serum may be measured during the preconceptional or first visit. However, there are only a few studies on serum Ca levels in pregnant women who have had a missed abortion or an abortus imminens. As a result, larger-scale studies are required.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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