

A Study of Serum Magnesium and Calcium Levels in Missed Abortion

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Abstract

- Background** Pregnancy is considered as a physiological stress, normal static metabolism of a woman is changed into dynamic anabolism, calcium (Ca) is the first most abundant cation in the human body, whereas magnesium (Mg) is the fourth most abundant one, role of calcium and magnesium in enzymatic activity of cell to release energy is well established.
- Objective** To assess the relation of serum magnesium and calcium levels in cases of missed abortion.
- Methods** Eighty two pregnant women at their 1st and 2nd trimester of pregnancy (before 24 completed weeks of pregnancy), 42 of them with missed abortion compared with 40 normal pregnancies served as a control group. Calcium analysis done using manual colorimetric method while magnesium analysis was done by magnesium calmogite method at the hospital laboratories.
- Results** Serum calcium was found to be insignificantly altered while serum magnesium was found to be significantly reduced in cases of missed abortion compared with normal pregnancy. Serum Ca/Mg ratio was found to be significantly elevated in cases of missed abortion compared with normal controls.
- Conclusion** Estimation of serum magnesium and Ca/Mg ratio in selected pregnancies can be valuable parameters for predicting missed abortion.
- Keywords** Missed abortion, Serum Calcium, Serum Magnesium.

Introduction

Miscarriage is the spontaneous end of a pregnancy at a stage where the embryo or foetus is incapable of surviving generally defined at or prior to 20 weeks of gestation, it is the most common complication of early pregnancy⁽¹⁾. A missed miscarriage is a type of abortion in which the foetus dies but the fetal tissue is not expelled by the woman's body and remains there until it is removed by a doctor⁽²⁾. The exact cause of a missed miscarriage is unknown. However, about half of all early miscarriages occur due to a genetic problem within the ova or sperm. In addition, other

factors such as immune system problems and serious infections can increase the risk of miscarriage. The chance of having a miscarriage also increases with age. About one percent of all pregnancies end in a missed miscarriage^(3,4). Excellent nutrition is one of the primary cornerstones of maintaining a healthy pregnancy, and there is no better time to start than in the first trimester. A highly varied diet is the most important aspect of maintaining excellent health during pregnancy, but the three most important nutrients during the first trimester are folic acid, vitamin B-6 and calcium⁽⁵⁾. Calcium (Ca) is required for muscle

contraction, blood vessel expansion and contraction, secretion of hormones and enzymes, and transmitting impulses throughout the nervous system ⁽⁶⁾. Magnesium (Mg) is needed for more than 300 biochemical reactions in the body. It helps to maintain normal muscle and nerve function, supports a healthy immune system, regulates blood sugar levels, promotes normal blood pressure, and is known to be involved in energy metabolism and protein synthesis ^(7,8).

The aim of the study is to assess the relation of serum magnesium and calcium levels in cases of missed abortion.

Methods

This case control study was conducted at Al-Elwiya maternity teaching hospital in Baghdad from Jan. 2010 to Jul. 2010. The study protocol was approved by the Obstetrics and Gynecology Committee of the Arab Board for Medical Specialization and the authority of Al-Elwiya Teaching Hospital.

Eighty two women in their 1st and 2nd trimester of pregnancy (before 24 completed weeks of gestation) were included in the study, forty two of them with proved missed abortion and 40 with normal pregnancy served as control group. The patients were selected during their visit to the outpatient clinic during the study period after submission to inclusion and exclusion criteria.

The inclusion criteria included all singleton pregnancies before 24 completed weeks of gestation, age between 18-35 years, parity not more than 3 and abortions not more than 2.

The exclusion criteria included all pregnancies with lethal congenital abnormalities; any

associated maternal medical diseases that may lead to fetal compromise and pregnant women receiving medications for chronic illnesses like diabetes mellitus, thyroid disease and parathyroid disease, also cases of multiple pregnancies, patient receiving calcium and/or magnesium during current pregnancy and currently lactating women.

A detailed history was taken from each woman included her gestational age (which was established according to the last regular menstrual period (LMP) and early pregnancy ultrasonography), fetal viability was established by 2 consecutive ultrasound examinations, detailed history of a current pregnancy and previous pregnancy outcomes with any obstetrical or medical complications or early pregnancy disorders. The information recorded on special form designed for the study.

Blood samples were taken from each patient in both study and control groups, serum isolated and sent for calcium analysis by manual colorimetric method, and magnesium analysis by magnesium calomel method.

Statistical analysis

Data were collected and arranged in tables and then subjected to analysis using descriptive statistics (No. and %) and inferential statistics (unpaired t-test). *P* value less than 0.05 was considered statistically significant and CI not containing zero also was considered significant.

Results

All participants were comparable in regard to their age and gestational age of pregnancy (Table 1).

Table 1. Age and GA (in weeks) of both study and control groups respectively

	Study group	Control group	P value
Frequency	42	40	-
Age (years)	26.45 ± 5.62	26.4 ± 5.09	0.965
GA (weeks)	11.33	12.03	0.374

There was no statistical difference between study and control groups in the mean of serum calcium level. A significantly lower magnesium

level was noticed in women with missed abortion compared with normal controls (Table 2).

Table 2. Serum calcium and magnesium level of both study and control group respectively

Serum level (mg/dl)	Study group Mean ± SD	Control group Mean ± SD	P value
Calcium	8.074 ± 0.682	8.072 ± 0.598	0.99
Magnesium	1.597 ± 0.162	1.682 ± 0.140	0.012

The study also showed a statistically significant difference between study and control groups regarding mean of Ca/Mg ratio, there was

significantly higher Ca/Mg ratio noticed in women with missed abortion compared to normal controls (Table 3).

Table 3. The mean and SD for Ca/Mg ratio of both study and control groups respectively

Ca/mg ratio	Study group	Control group	P-value
Frequency	42	40	
Mean ± SD	5.116 ± 0.698	4.834 ± 0.521	0.041

Discussion

The loss of pregnancy is always distressing to the mother irrespective of its timing. Abortion has serious consequence with appreciable risk of maternal mortality and long term morbidity⁽⁹⁾. Pregnancy is considered as a physiological stress, normal static metabolism of women is changed into dynamic anabolism, calcium is the first most abundant cation in the human body, whereas magnesium is the fourth most abundant one, role of calcium and magnesium in enzymatic activity of cell to release energy is well established⁽⁹⁾.

We selected eighty two pregnant women at their 1st and 2nd trimester of pregnancy, the participants were singletons, not currently lactating, their parity not more than three (to exclude exhaustion of maternal stores of trace elements), also no more than two abortions to exclude the other common causes of recurrent abortions like congenital abnormalities of the foetus, incompetent cervix and congenital abnormalities of the uterus.

Nearly half of the sample served as a study group (pregnant with proved missed abortion) and another half served as a control group

(normal pregnancy) of approximately the same gestational age in weeks.

In order to focus on the difference in serum Ca and Mg levels and Ca/Mg ratio in the study cases and comparing the results with those of normal pregnancy, we excluded the statistical difference of gestational age in weeks, patient’s age, parity and number of abortions.

No statistical significance was found between the two groups in regard to serum Ca level (Table 2), indicating that there is no direct relation of Ca level with missed abortion. This result is comparable with the study of Han et al.⁽¹⁰⁾ who concluded that calcium level did not show statistical significance in most cases. While serum Mg level showed statistical significance between the study groups (Mg deficiency in cases of missed abortion compared with normal controls, as shown in table 2). These results are comparable with studies of Borella et al⁽¹¹⁾ who found that 25% of patients with abortion have hypomagnesemia.

The same thing is seen with Ca/Mg ratio which shows statistically significant difference between the study groups (Ca/Mg ratio increased in cases of missed abortion compared with normal controls). This goes with the results obtained by

Borella ⁽¹¹⁾ who reported an increased Ca/Mg ratio in patients with abortions, but not when patient had a successful continuation of pregnancy.

We find that our study does not go with the results of Cilensec *et al* ⁽¹²⁾ where whole blood and serum magnesium levels were determined in 66 healthy pregnant women and in 68 women with imminent, incipient, or incomplete abortions. Serum magnesium levels were equally depressed in abortion and in normal pregnancy, but magnesium concentrations per 100 ml erythrocytes were significantly higher in abortion patients. This finding is probably due to the increased release of immature erythrocytes with high magnesium concentrations to compensate for blood losses ⁽¹²⁾.

We think that trace elements and minerals are of value in continuation of normal pregnancy; this is confirmed by Barrington *et al* who suggested that low selenium levels were found in a significant number of women with single miscarriage ⁽¹³⁾.

Moreover, group comparison performed by analysis of variance [ANOVA] followed by dunnett test indicated substantially lower plasma concentration of copper in pathological conditions diagnosed during first trimester of pregnancy (spontaneous abortion, threatened abortion, missed abortion and blighted ovum) but not in the 2nd trimester ⁽¹⁴⁾.

Many studies show strongly positive balance of magnesium retention during pregnancy i.e. the formation of new tissues (maternal and fetal) during pregnancy requires higher magnesium intake than that of the normal non-pregnant women of comparable age ⁽¹⁵⁾.

In conclusion, there is a significant relation among magnesium deficiency, Ca/Mg ratio and missed abortion while there is no significant relation noticed between calcium deficiency and missed abortion.

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