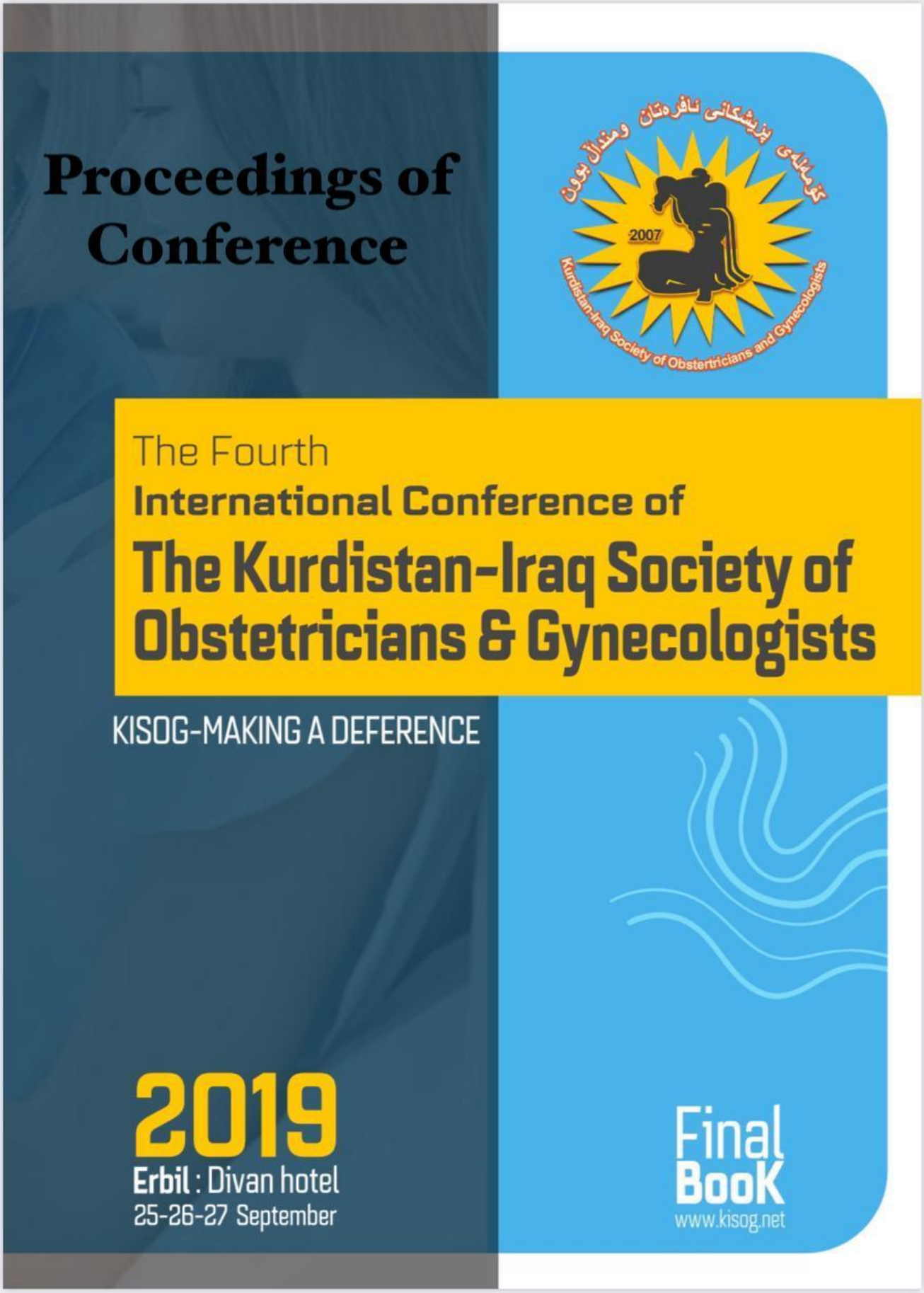
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Association between serum Magnesium level and Preterm Labour

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ABSTRACT:

Background: Preterm born baby at more complication risk for short term and long term such as disabilities and mental and physical growth problem. Magnesium play important physiological role in delivery and deficiency of serum magnesium level cause hyperactivity in uterine subsequent to cervical dilatation.

Aim of the research: To determine the serum magnesium concentration in women with preterm labour and compare the result with those obtained from pregnant woman not in labour at the same period of gestation age.

Materials and Methods: A case-control study conducted in Sulaimani Maternity Teaching Hospital from September 2018 to February 2019. The study included 120 pregnant women in 28 – 36 gestational weeks were divided into 2 group's included 60 women with preterm labour (case group) and 60 pregnant women they have no labour (control group). Serum magnesium level was compared between these two groups. KENZA 240TX instrument used to analyze serum magnesium and chi-square and T-test used to compare case and control groups with considering a P-value equal or less than 0.05 a significant level.

RESULT: Range of magnesium level (mg/dl) in the case group (1.20- 1.77) was lower than in the control group and mean and standard deviation of serum magnesium level (mg/dl) of pregnant women in the case group (1.47 ± 0.17) were lower in comparison with serum magnesium level (mg/dl) of pregnant women in the control group (2.23 ± 0.38) with significant relationship.

Conclusion: Serum magnesium were lower among case group in comparison to control group with a highly significant relationship.

Key Words: Preterm labour, Magnesium, Hypomagnesaemia

Introduction

Born baby before complete the pregnancy duration (37 weeks) and after 22 weeks of gestational age called preterm labour. Main cause of perinatal morbidity and mortality is preterm birth and it is one of the main causes of infant mortality (1). Also, preterm born baby at more complication risk for short term and long term such as disabilities and mental and physical growth problem (2).

The frequency of magnesium deficiency among pregnant women reported in range from 4.6% to 48% (3) and approximately in United State in every 8 born babies 1 is born before 37 weeks of gestational weeks (4). Many studies reported that lack of sufficient magnesium during pregnancy linked with development of preeclampsia and restrict fetal growth (5). Also, constipation and increase incidence of leg cramp (6).

There are many factors that cause preterm such as; idiopathic, preterm rupture of membranes and infection of urinary tract infection. Also, deficiency of micro or macro biochemical materials at cellular level such as magnesium and potassium however this elements not play any direct etiology role to preterm labour but may play indirect role like etiopathogenesis (7). Magnesium is essential for muscle contraction and nerve condition (8) also magnesium play important physiological role in delivery (9). Deficiency of magnesium level in myometrium could be result of decrease of serum magnesium level cause hyperactivity in uterine subsequent to cervical dilatation (10).

The normal range of magnesium among pregnant women range from 1.8 mg/dl to 4 mg/dl and lower than this this range categories as hypomagnesaemia (11). Present of high concentration magnesium in the myometrium, block the uptake of calcium in myometrium cells by blocking calcium channels that lead to activate potassium channels all this actions cause myometrium relaxation (12). Finally, hypomagnesaemia cause neuromuscular tissues excitability which is lead to uterine hyperactivity and muscle cramps. Increase of cervical dilatation caused by this hyperexcitability that induced by hypomagnesaemia lead to accelerating pathological colonization of micro-organisms in vagina into cervix change vaginal discharge (11).

Aim of the current study to determine the serum magnesium concentration in women with preterm labour between 28-36 weeks of gestation age and compare the result with those obtained from pregnant woman not in labour at the same period of gestation age.

Materials and Methods

A case control study carried out in The Maternity Teaching hospital in Sulaimani city and data collected from September 2018 to February 2019 after a study was approved by Sulaimani director of Health and the administration of Sulaimani Maternity Teaching Hospital. A study sample size were 120 pregnant women selected at Maternity Teaching Hospital in Sulaimani city with convenience sampling method with age range between 16-45 years old that divided into two groups; **Group one (case)** consist of 60 pregnant lady with active labour (in labour ward) between of 28-36 week of gestation and **Group two (control)** consist of 60 pregnant lady not in labour at comparable gestational age 28-36 weeks, attended the Shahid hadi consulting center for routine antenatal visit. A study included pregnant women with (28 – 36 week) of gestational age and patient with established preterm labour include primigravida and multigravida while pregnant women with maternal complications (Pregnancy-Induced Hypertension, gestational Diabetes Mellitus, Preterm Premature Rupture of the Membranes, twin pregnancy women, previous preterm labour and presence of infection where excluded.

For serum magnesium, 5 ml of blood was collected (by the researcher and the nurse) from anticubital vein by disposable syringe put it into plain tube. The blood immediately transferred to the laboratory where serum was separated by centrifugation 2000 rpm in 5_10 minutes. These separated serum were analyzed in department of biochemistry by KENZA 240TX instrument (normal value of this instrument 1.6mg/dl) used to analyze serum magnesium and were compered between 2 groups.

The data analyzed by SPSS (statistical package for social since) version 23, for descriptive statistics mean, standard deviation, frequency and percentage were calculated and for the comparison between the variables in case and control groups was determined by using the Chi-square test with a P-value equal or less than 0.05 was considered a significant relationship.

Results

The current study included 120 pregnant women that divided into two equal groups; case and control group. Age of case group ranged from (16 to 45) years old with (28.72 ± 7.54) mean and standard deviation in comparison with control group were age ranged from (17-45) years old with (26.83 ± 6.98) mean and standard deviation. Furthermore, most of women 24 (40%) in cases group there's age were between 24-34 years and follow by equal or lower than 23 years old and 35-45 years old both group contains 18(30%) women. For control group, majority of women 29 (48%) their age were between 24-34 years old and followed by 21 (35%) of women in equal or lower than 23 years old while10 (16.7%) of women their age were between 35-45 years old. In addition, there was a non-significant relationship between age in case and control groups (P-value<0.05). (Table 1)

Table 1 Distribution of age groups in case and control groups

Age	Case		Control		P-value
	No	**Percentage**	**No**	**Percentage**	
≤ 23	18	30	21	35	0.224
24-34	24	40	29	48.7	
35-45	18	30	10	16.7	
Mean± standard deviation	28.72 ± 7.54		26.83 ± 6.98		

Majority of participated women 21 (35%) in the current study had duration 28-30 weeks and 31-33 weeks of gestational age for both groups and 34-36 weeks of gestational age group were include 18 (30%) women for case group while for control group most of participated women 26 (43.3%) were in 28-30 weeks and followed by 34-36 weeks were 18 (30%) and 31-33 weeks were 16 (26.7%) weeks respectively. In addition, mean and standard deviation of gestational age of control group (31.82 ± 2.57) was higher in comparison with case group (31.77 ± 2.51) and there was a non-significant relationship between women gestational age groups among case and control with (P-value <0.05). (Table 2)

Table 2 Distribution of gestational age among case and control groups

Gestational age (week)	**Case**	**Control**	P-value

	No	Percentage	No	Percentage	
28-30	21	35	26	43.3	
31-33	21	35	16	26.7	0.547
34-36	18	30	18	30	
Mean± standard deviation	31.77 ± 2.51		31.82 ± 2.57		

Table 3 shows that 16 (26.7%) pregnant women in the case group had 1 and 2 parity for each parity and followed by 3 parity were 11 (18.3%), women with non-previous parity were 10 (16.7%) and 4 and 6 parity were 3 (5%) respectively, while 5 parity had lowest frequency 1 (1.7%). For the control group, pregnant women with 1 parity had highest frequency 18 (30%) and followed by 12 (20%) for both women with no previous parity and 2 parity women, 9 (15%) for 3 parity women and 7 (11.7%) for 4 parity women respectively, while women with 5 and 6 parity had lowest frequency 1 (1.7%) for each parity group. In addition, mean and standard deviation of pregnancy women's parity in the case group (1.93 ± 1.52) was higher in comparison with pregnant women's parity in the control group (1.8 ± 1.46) and there was a non-significant relationship between number of parity among case and control (P-value <0.05)

Table 3 Distribution of parity frequency among case and control group

Parity	**Case**		**Control**		P-value
	No	**Percentage**	**No**	**Percentage**	
0	10	16.7	12	20	
1	16	26.7	18	30	
2	16	26.7	12	20	0.721
3	11	18.3	9	15	
4	3	5	7	11.7	
5	1	1.7	1	1.7	

6	3	5	1	1.7	
Mean ± standard deviation	1.93 ± 1.52		1.8 ± 1.46		

Serum magnesium level (mg/dl) among pregnant women in the case and control groups, results show that range of magnesium level (mg/dl) in the pregnant women in the case group (1.20-1.77) was lower than pregnant women in the control group and mean and standard deviation of serum magnesium level (mg/dl) of pregnant women in the case group (1.47 ± 0.17) were lower in comparison with serum magnesium level (mg/dl) of pregnant women in the control group (2.23 ± 0.38). Furthermore, there was a highly significant relationship between serum magnesium level among case and control groups (P-value 0.0001). Table 4 and Figure 1

Table 4 Comparison of serum magnesium level between case and control groups

Group	**Serum magnesium level (mg/dl)**		P-value
	Range	Mean ± standard deviation	
Group one (case)	1.20 - 1.77	1.47 ± 0.17	0.0001
Group two (control)	1.67 - 3.45	2.23 ± 0.38	

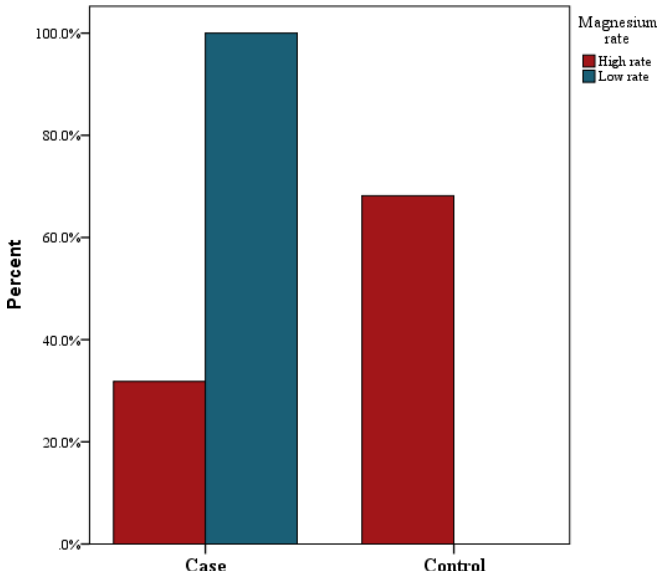

Figure 1 Comparison of serum magnesium levels between case and control groups

In comparison of serum magnesuim level with gesational age, results demonstarte that highest low serum magnesuim level were among pregnant women between 30-33 weeks of gestational age and followed by women between 26-29 weeks of gestational age, while highest rate of high serum magnesuim level were also among women between 30-33 weeks of gestational age and followed by 34-36 weeks of gestational age in comparision with other gesational age groups. Fruthermore, there was a significant relationship between women serum magnesuim level with gestational age. (Figure 2)

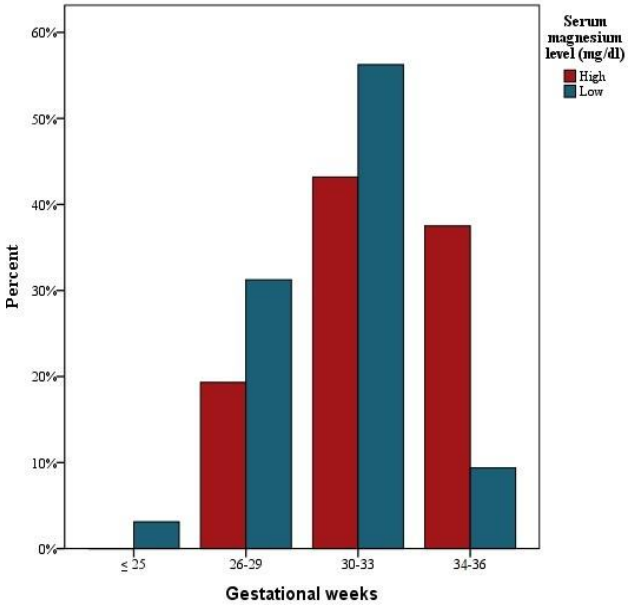

Figure 2 Comparison of serum magnesium levels with gestational age group

Discussion

The current study included 120 pregnant women in Sulaimani Maternal Teaching hospital. Were pregnant women divided into two groups; group one (case) included 60 women with preterm labour and group two (control) included 60 women with not labour pregnant women, serum magnesium level test were conducted for both groups to determine the effect of low magnesium level on preterm labour.

The mean and standard deviation of serum magnesium level for the current study was 1.85 ± 0.47 and there was a significant relation between magnesium level with women in case and control level. The current study agree with other studies example; Gorantla (10) at 2014 found a significant depression of serum magnesium level in preterm labour women with taking 1.8 mg/dl as critical rate, Kamal (13) concluded that serum magnesium level is important indicator for predicting preterm labour, Kehinde and Okunade (12) found a significant relation between serum magnesium level with preterm and Shahid (14) concluded that pregnant women with 1.9 mg/dl serum magnesium rate more risk to preterm compare with normal level serum magnesium rate pregnant women and pregnant women with low serum magnesium level relative risk 3.188 at more time to preterm compare to normal women. In addition, Uludağ stated that serum magnesium level significantly lower in preterm labour group (1.6) compare to not laboured pregnant group (1.9) women (15).

Reducing of magnesium rate during pregnancy related to increased metabolic demand of pregnancy, inadequate intake, especially as gestation advance, increasing parity and physiological hemodilution in pregnancy. (16, 17)

For use of magnesium as supplement for pregnant women to prevent preterm labour in pregnant women, some studies recommended to maintain magnesium rate between 2.0 - 3.5 mg/dl by taking magnesium as supplement (6, 18) and there are other studies show that magnesium as supplement is lack of effect on preventing preterm pregnant (19-21).

Low serum magnesium level was more in 28-30 weeks of gestational age compare to other gestational groups in the current study. Studies stated that serum magnesium level slightly decreased or unchanged during first and second trimester of pregnancy and change during third

trimester of pregnancy, specifically in last two month of pregnancy (22). Furthermore, Shatha (8) observed low serum magnesium more during 31-33 gestational age pregnancy with significant relation.

For relationship between women in the case group and control group for age, gestational age and parity, the results show non-significant relations for all these relations. In other studies different results observed for example; In Ropeta (11) study the relation between all mentioned variables were non-significant except of gestational age. Also, Shakura (2) found significant relation between gestational age with preterm labour, Uludag (15) and Okunade (12) concluded non-significant relation for all mentioned variables including gestational ages, Cunningham (23) study stated significant relation between preterm labour and age of pregnant women and this finding were not observed in Okunade (12) study. Furthermore, Enaruna (9) found significant relation between preterm and age of pregnant women and non-significant relation for parity. The different between outcomes of these studies on relation between control and case group's variables might be related to type sampling or different geographical area.

Conclusion

Hypomagnesaemia were more in preterm labour women in comparison with not labour pregnant women and high magnesium were more in not labour pregnant women than preterm labour women with a significant relationship between magnesium rates in preterm labour women (case group) with not labour pregnant women (control group). In addition, low serum magnesium level were highest in 28-30 weeks of gestational age compare with other gestational age groups.

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