ORIGINAL ARTICLE

Frequency of Hypocalcemia in Women with Preeclampsia at a Tertiary Care Hospital

SADAF SAEED[1], AMNA JAMAL[2], FAREEHA RAFIQ[3], *FASEEHA RAFIQ[4], AHMAD JAMAL[5]*

ABSTRACT

Background;Preeclampsia is an important risk factor for increased morbidities and mortalities among pregnant ladies and their fetus and this systemic disease hits approximately 5 – 7% of all pregnancies.
Aim: To determine frequency of hypocalcemia in women with preeclampsia at a tertiary care hospital.
M**ethods:**One hundred and ten preeclamptic women who met inclusion our study were recruited from Department of Gynecology and Obstetrics, Nishtar Hospital Multan from December 2015 to December 2016. Detailed history and physical examination was conducted. Five ml venous blood sample was drawn for serum calcium levels estimation and Calcium level less than 8 mg/dl was considered as hypocalcemia.
Results: Mean age of our study cases was noted to be 30.82±4.20 years (range; 21-42 years). Our study results have indicated that majority of our study cases i.e., 65(59.1%) were aged more than 30 years of age. Mean gestational age of our study cases was 31.24±4.23 weeks. Our study results have indicated that majority of our patients i.e., 65 (59.1%) had gestational age more than 30 weeks. Majority of these patients i.e., 60 (54.5 %) belonged to urban areas, 70(63.6%) were from poor families, 80(72.7%) were illiterate and 65(59.1%) had parity more than 3. Mean body mass index (BMI) of our study cases was 23.18±2.74 kg/m^2 and obesity was noted in 15(13.6%) of our study cases. Family history of preeclampsia was noted in 20(18.2%) of our study cases while previous history of preeclampsia was present in 55(50%) of our study cases. Mean serum calcium level was noted to be 7.91±0.57 mg/dl (ranging from 7.0mg/dl to 9.2mg/dl). Hypocalcemia was noted in 66(60%) of our study cases.
Conclusion: Our study results have indicated low levels of serum calcium in women presenting with preeclampsia and frequency of hypocalcemia was also very high. Low serum calcium level was associated with increasing age, poor socioeconomic status, increasing parity, family history of preeclampsia and previous history of preeclampsia. All the preeclamptic women should be screened for serum calcium levels and be managed accordingly to avoid future fetomaternal adverse outcomes.
Keywords: Preeclampsia, Serum calcium level, Hypocalcemia.

INTRODUCTION

Preeclampsia is an important risk factor for increased morbidities and mortalities among pregnant ladies[1,2] and their fetus and this systemic disease hits approximately 2–7% of all pregnancies[3,4].Preeclamsia can be associated with 6% primigravida ladies. It is one the most common disorder of the pregnancy and yet needs to be explored completely which is characterized by “high blood pressure, platelet aggregation, swelling of the lower extremities and protein in urine. Sudden weight gain, headaches and changes in vision are important symptoms”. Usually increase in blood pressure and preeclampsia is observed among pregnant ladies in their late 2nd or last trimester of pregnancy[5,6]and this phenomenon can be characterized by a failure of trophoblastic invasion of the arteries. Preeclampsia can be clinically diagnosed by “persistently elevated blood pressure of greater than 140/90 mmHg, proteinuria and oedema” and it can be related with different complications like “visual disturbances, oliguria, eclampsia, hemolysis, elevated liver enzymes, thrombocytopenia, pulmonary oedema and fetal growth restriction[7-10]. Hence early diagnosis and proper management plays a vital role in reducing these related complications of this disorder while pathophysiologicaly mechanism is not properly understood and etiology is still not clear[11,12]. However nutritional and environmental determinants are thought to be involved in the etiology of this condition while importance of the nutritional factors during pregnancy has been implicated with the good health of the mothers and their babies[13,14].

High implication of preeclampsia can be seen in developing countries as it is associated with 20–80% increased maternal deaths and expecting mothers of

[1,2,4]Nishtar Hospital, Multan, [3]City Hospital, Multan

Correspondence to Dr. Ahmad Jamal, Email: Ahmed_jamal@hotmail.com, Cell: 03211198999

such underdeveloped countries are reported to have nutritional deficiencies and poor mineral intake[15]. This poor intake of minerals and vitamins is not only harmful for the pregnant ladies but also for their fetus. There is growing evidence that describe the potential benefits of micronutrient supplementation to prevent such disorders of the pregnancies and it is hypothesized that increased Calcium intake can help to reduce pregnancy induced hypertension. Parathyroid hormone is stimulated under conditions of low serum calcium levels which ultimately cause high blood pressure also by rennin release. Calcium may have indirect influence on the smooth muscle functions by increasing magnesium levels. A study from India reported that mean serum calcium levels in pre-eclamptic women were significantly lower than normotensive ladies ($p<0.001$)[12].

Worldwide, preeclampsia is one of the leading causes of maternal mortality particularly in developing countries as compared to developed nations[16,17]. This study was done to document frequency of hypocalcemia in our general population of Southern Punjab.

MATERIAL AND METHODS

One hundred and tenpreeclamptic women who met inclusion our study were recruited from Department of Gynecology and Obstetrics, Nishtar Hospital Multan. Preeclampsia was defined as "systolic blood pressure above 140 mmHg and/or diastolic pressure >90mmHg measured at least two times with 4 hours interval and proteinuria ≥300mg/day was deemed as preeclampsia, after 20 weeks of gestation (on ultrasound) till delivery" while patients having twin pregnancy, already taking calcium supplements were excluded from our study. Detailed history and physical examination was conducted. Five ml venous blood sample was drawn and sent to central pathology laboratory of Nishtar Hospital, Multan for serum calcium levels estimation and Calcium level less than 8 mg/dl was considered as hypocalcemia.Data was analyzed by using SPSS Version 20 to calculate percentages of qualitative variables like family history of residential status, socioeconomic status, family history of pre-eclampsia, obesity, educational level, previous history of preeclampsia, hypocalcemia and age groups. Effect modifiers like age, educational status, socioeconomic status, residential status, hypocalcemia, family history, previous history of preeclampsia, Obesity, gestational age, and parity were controlled by making stratified tables at level of significance of 0.05 by applying chi-square test.

RESULTS

A total of 110 patients with preeclampsia who met inclusion criteria of our study were included this study. Mean age of our study cases was noted to be 30.82±4.20 years (range; 21-42 years). Our study results have indicated that majority of our study cases i.e.,65(59.1%) were aged more than 30 years of age. Mean gestational age of our study cases was 31.24±4.23 weeks. Our study results have indicated that majority of our patients i.e.,65(59.1%) had gestational age more than 30 weeks. Majority of these patients i.e.,60(54.5%) belonged to urban areas, 70(63.6%) were from poor families, 80(72.7%) were illiterate and 65(59.1%) had parity more than 3. Mean body mass index (BMI) of our study cases was 23.18±2.74kg/m^2 and obesity was noted in 15(13.6%) of our study cases. Family history of preeclampsia was noted in 20(18.2%) of our study cases while previous history of preeclampsia was present in 55(50%) of our study cases. Mean serum calcium level was noted to be 7.91±0.57mg/dl (ranging from 7.0mg/dl to 9.2mg/dl). Hypocalcemia was noted in 66(60%) of our study cases.

Table 1: Cross-tabluation of hypocalcemia in preeclampsia with different study parameters (n=110)

Characteristics	Hypocalcemia		P value
	Yes	No	
Age (years)			
Up to 30	25	20	0.437
More than 30	41	24	
Gestational age (weeks)			
Up to 30	30	15	0.322
More than 30	36	29	
Residential status			
Rural	36	14	0.021
Urban	30	30	
Socioeconomic status			
Poor	36	34	0.017
Middle Income	30	10	
Education			
Literate	15	15	0.199
Illiterate	51	29	
Obesity			
Yes	10	05	0.778
No	56	39	
Family History			
Yes	05	15	0.001
No	61	29	
Previous history			
Yes	05	15	0.001
No	61	29	
Parity			
Up to 3	20	25	0.010
More than 3	46	19	

DISCUSSION

Preeclampsia is an important risk factor for increased morbidities and mortalities among pregnant ladies and their fetus and this systemic disease hits approximately 2–7% of all pregnancies. This study was done to determine frequency of hypocalcemia in women with preeclampsia at a tertiary care hospital.A total of 110 patients with preeclampsia who met inclusion criteria of our study were included this study. Mean age of our study cases was noted to be 30.82±4.20 years (range; 21-42 years). Our study results have indicated that majority of our study cases i.e., 65(59.1%) were aged more than 30 years of age. A study conducted in India by Kanagal et al[8]reported 27.45±4.33 years mean age of pre-eclamptic women which is close our study results. Vafaei et al[18]reported similar results. A study conducted by Ugwuja et al[19]from Nigeria reported 29.5±3.70 years which is similar to that of our study results. Ephraim et al[20]reported 32.28±8.58 years mean age in women with preeclampsia which is similar to that of our study results. Sirajwala et al [21]reported 26.03±2.73 years mean age which is close to our study results.

Mean gestational age of our study cases was 31.24±4.23 weeks. Our study results have indicated that majority of our patients i.e., 65(59.1%) had gestational age more than 30 weeks. A study conducted by Kanagal et a [12]in India reported 36.9±0.9 weeks mean gestational age in women with preeclampsia. These findings of Kanagal et al[12] are similar to that of our study results. A study conducted by Ugwuja et al [19]from Nigeria reported 21.4±3.22 weeks mean gestational age which is quite less than that being reported in our study. Ephraim et al[20]reported 30.72±2.84 weeks mean gestational age which is in compliance with our study results. Sirajwala et al [21]reported 34.48±3.52 weeks mean gestational age which is similar to that of our study results.

Majority of these patients i.e. 60(54.5%) belonged to urban areas, 70(63.6 %) were from poor families, 80(72.7%) were illiterate and 65(59.1%) had parity more than 3. Ephraim et al [93] reported similar results. Mean body mass index (BMI) of our study cases was 23.18 ± 2.74 kg/m^2 and obesity was noted in 15 (13.6%) of our study cases. A study conducted by Kanagal et al from India[12]reported 27.07±3.7 kg/m^2 which is slightly higher than our findings. A study conducted by Ugwuja et al [19]from Nigeria reported mean BMI 20.3±3.90 kg/m^2 which is close to our study findings. Ephraim et al [20]reported 29.04±7.61 kg/m^2 which is higher than that of our study results. Family history of preeclampsia was noted in 20(18.2%) of our study cases while previous history of preeclampsia was present in 55 (50%) of our study cases.

Mean serum calcium level was noted to be 7.91±0.57 mg/dl (ranging from 7.0 mg/dl to 9.2mg/dl). Hypocalcemia was noted in 66 (60%) of our study cases. A study from India by Kanagal et al[12] reported that mean serum calcium levels in pre-eclamptic women were significantly lower than normotensive ladies (7.84±0.87g/dl Vs 8.97±0.69mg/dl respectively, p<0.001). These results are in compliance with that of our study results. Vafaei et al[18]reported similar results showing decreased levels of serum calcium levels in women with preeclampsia. Ephraim et al[20]reported very high (100%) hypocalcemia in preeclampsia which is in compliance with our study results as mean value of our study cases was below normal value. Sirajwala et al[21]reported 7.09±0.37 mg/dl mean value of serum calcium level which is similar to that of our study results.

CONCLUSION

Our study results have indicated low levels of serum calcium in women presenting with preeclampsia and frequency of hypocalcemia was also very high. Low serum calcium level was associated with increasing age, poor socioeconomic status, increasing parity, family history of preeclampsia and previous history of preeclampsia. All the preeclamptic women should be screened for serum calcium levels and be managed accordingly to avoid future fetomaternal adverse outcomes.

REFERENCES

1. Wild R, Weedin EA, Wilson D. Dyslipidemia in pregnancy. CardiolClin. 2015 May;33(2):209-15.
2. Henderson JT, Whitlock EP, O'Connor E, Senger CA, Thompson JH, Rowland MG. Low-dose aspirin for prevention of morbidity and mortality from preeclampsia: a systematic evidence review for the U.S. Preventive Services Task Force. Ann Intern Med. 2014 May 20;160(10):695-703.
3. Bujold E[1], Roberge S, Lacasse Y, Bureau M, Audibert F, Marcoux S, et al. Prevention of preeclampsia and intrauterine growth restriction with aspirin started in early pregnancy: a meta-analysis. Obstet Gynecol. 2010 Aug;116(2 Pt 1):402-14.
4. Stepan H, Kuse-Föhl S, Klockenbusch W, Rath W, Schauf B, Walther T, et al. Diagnosis and Treatment of Hypertensive Pregnancy Disorders. Guideline of DGGG (S1-Level, AWMF Registry No. 015/018, December 2013). GeburtshilfeFrauenheilkd. 2015 Sep;75(9):900-914.
5. Phalak P, Tilak M. Study of lipid profile in pre - eclampsia. Indian J Basic Applied Med Res. 2012;5(2):405-9.

6. Richards DG[1], Lindow SW, Carrara H, Knight R, Haswell SJ, Van der Spuy ZM. A comparison of maternal calcium and magnesium levels in pre-eclamptic and normotensive pregnancies: an observational case-control study. BJOG. 2014 Feb;121(3):327-36.
7. Jeyabalan A. Epidemiology of preeclampsia: impact of obesity. Nutr Rev. 2013;71:18-25.
8. Tabesh M, Salehi-Abargouei A, Tabesh M, Esmaillzadeh A. Maternal vitamin D status and risk of pre-eclampsia: a systematic review and meta-analysis. J ClinEndocrinolMetab. 2013;98(8):3165-73
9. Abalos E, Cuesta C, Carroli G, Qureshi Z, Widmer M, Vogel JP, et al. Pre-eclampsia, eclampsia and adverse maternal and perinatal outcomes: a secondary analysis of the World Health Organization Multicountry Survey on Maternal and Newborn Health. BJOG. 2014;121:14-24.
10. Hutcheon JA, Lisonkova S, Joseph KS. Epidemiology of pre-eclampsia and the other hypertensive disorders of pregnancy. Best Pract Res ClinObstetGynaecol. 2011;25(4):391-403.
11. Cetin I, Berti C, Calabrese S. Role of micronutrients in the periconceptional period. Hum Reprod Update. 2010;16(1):80-95.
12. Kanagal DV, Rajesh A, Rao K, Devi UH, Shetty H,Kumari S, et al. LevelsofSerumCalciumandMagnesiuminPreeclamptica ndNormalPregnancy:AStudyfromCoastalIndia. J ClinDiagn Res.2014;8(7):OC01-4. doi: 10.7860/JCDR/2014/8872.4537.
13. Sibai B, Dekker G, Kupferminc M. Pre-eclampsia. Lancet. 2005 Feb 26-Mar 4;365(9461):785-99.
14. Chaiworapongsa T, Chaemsaithong P, Korzeniewski SJ, Yeo L, Romero R. Pre-eclampsia part 2: prediction, prevention and management. Nat Rev Nephrol. 2014 Sep;10(9):531-40.
15. Kane SC, Da Silva Costa F, Brennecke SP. New directions in the prediction of pre-eclampsia. Aust N Z J ObstetGynaecol. 2014 Apr;54(2):101-7.
16. Kane SC. First trimester screening for pre-eclampsia. Obstet Med. 2016 Sep;9(3):106-12.
17. Nicolaides KH[1], Bindra R, Turan OM, Chefetz I, Sammar M, Meiri H, et al. A novel approach to first-trimester screening for early pre-eclampsia combining serum PP-13 and Doppler ultrasound. Ultrasound Obstet Gynecol. 2006 Jan;27(1):13-7.
18. Vafaei H, Dalili M, Hashemi SA. Serumconcentration of calcium, magnesium and zinc in normotensiveversuspreeclampsiapregnantwomen: A descriptivestudy in women of Kermanprovince of Iran. Iran J Reprod Med. 2015 Jan;13(1):23-6.
19. Ugwuja EI, Famurewa AC, Ikaraoha CI. Comparison of SerumCalcium and Magnesium Between Preeclamptic and NormotensivePregnant Nigerian Women in Abakaliki, Nigeria. Ann Med Health Sci Res. 2016 Jan-Feb;6(1):33-7.
20. Ephraim RK, Osakunor DN, Denkyira SW, Eshun H, Amoah S, Anto EO. Serumcalcium and magnesium levels in women presenting with pre-eclampsia and pregnancy-induced hypertension: a case-control study in the Cape Coast metropolis, Ghana. BMC Pregnancy Childbirth. 2014 Nov 20;14:390. doi: 10.1186/s12884-014-0390-2.
21. Sirajwala HB, Sharma D, Agravatt AM. A study of serum total calcium and uric acid levels in preeclampsia. Indian J Basic App Med Res. 2013;1(3):50-56.