

Evaluate the Mean Serum Calcium Levels in Pregnant Women with Pregnancy Induced Hypertension and Compare with Normotensive Pregnant Women

Ca Level in
Hypertensive VS
Normotensive
Pregnant Women

Saliha Farooq¹, Wajiha Mehwish², Sujaria Yaseen², Nosheen Ghafar³, Sadaf Altaf⁴ and Unaiza Taufiq⁵

ABSTRACT

Objective: To examine the mean serum Ca levels in pregnant women presented with pregnancy induced hypertension and compare with normotensive pregnant women.

Study Design: Case control study.

Place and Duration: Department of Obstetrics and Gynaecology, M. Islam Teaching Hospital Gujranwala from January 2019 to June 2019.

Materials and Methods: 200 pregnant women were enrolled. All women were equally divided into two groups. Group A comprised of 100 women with pregnancy induced hypertension and Group B with normal pregnancy was control group. Mean serum Ca level was examined and compare the findings between both groups.

Results: In group A mean age was 28.12±3.21 years and 26.43±4.12 years in Group B. The mean serum Calcium levels in pregnant women convoluted with pregnancy induced hypertension with normotensive pregnant women was 7.86±0.39 mg/dl in Group A and 8.93±1.14 mg/dl in Group B (P<0.001).

Conclusion: It is concluded that mean serum Ca level was significantly lower in women with pregnancy induced hypertension as compared to women with normal pregnancy.

Key Words: Pregnancy induced hypertension, Serum Ca level

Citation of article: Farooq S, Mehwish W, Yaseen S, Ghafar N, Altaf S, Taufiq U. Evaluate the Mean Serum Calcium Levels in Pregnant Women with Pregnancy Induced Hypertension and Compare with Normotensive Pregnant Women. Med Forum 2020;31(1):99-102.

INTRODUCTION

Worldwide hypertension is the common disorders found in pregnant women. Preeclampsia is the major cause of mortality and mortality among pregnant women.¹ In developing countries 0.4 lac women died in every year due to the preeclampsia or eclampsia. In Pakistan preeclampsia is the most frequent cause of maternal and fetal morbidity and mortality.² The etiology of PIH is unknown despite decades of intensive research worldwide.

This is a disorder of hypothesis and affliction to involve all organs in the body. Many of etiological factors involve for PIH in which abnormal placentation vasculopathy, inflammatory changes, immunological factors, genetic factors, and nutritional factors.^{3,4}

The disorder usually progresses in the third trimester of pregnancy and worsens over time.^{5,6} Patients with gestational hypertension and pre-eclampsia, both are characterised by similar risks like increased maternal age, obesity, low levels of serum Ca, Mg and increased concentration of uric acid [7]. A WHO Survey on maternal and perinatal health, in 2014 showed 2.18% pre-eclamptic deliveries out of 8265 deliveries. Among all pre-eclamptic outcome, 38.12% and 24.43% were reported with low birth weight and preterm deliveries respectively. In this survey the perinatal death were reported as 10.75% compared to 1.08% maternal mortality.⁷⁻⁹ Pregnancy may induce hypertension in women who are apparently normotensive before pregnancy.¹⁰ Risk stratification and prediction of severity at an early stage in pre-eclampsia helps in appropriate management and timing of foetal delivery in order to avoid serious sequelae like eclampsia.¹¹

There are early studies establishing a relationship between pregnancy induced hypertension and Ca

¹. Department of Obstet and Gynae, CMH Multan.

². Department of Obstet and Gynae, M. Islam Teaching Hospital, Gujranwala.

³. Department of Obstet and Gynae, Sabzazar Hospital, Lahore,

⁴. Department of Obstet and Gynae, DHQ Hospital, Gujranwala,

⁵. Department of Obstet and Gynae, DHQ Hospital Sargodha.

Correspondence: Dr. Saliha Farooq, Consultant Gynaecologist, CMH Multan.

Contact No: 0300-6115250

Email: khurram2179@gmail.com

Received: August, 2019

Accepted: November, 2019

Printed: January, 2020

deficiency.^{12,13} In case control hospital based study showed that the mean serum Ca level in patients with pregnancy induced hypertension was significantly lower than the patients with normal pregnancy.¹⁴ Pregnancy induced hypertension is a common condition in Pakistani women as observed by practicing doctors and eclampsia is a noteworthy cause of maternal mortality in our population. This study will help in recommending women to include diet rich in Ca during pregnancy especially second and third trimester.

MATERIALS AND METHODS

This study was conducted Department of Obstetrics and Gynaecology, M. Islam Teaching Hospital Gujranwala from 1st January 2019 to 30th June 2019. Two hundred cases included and they are divided in two equal groups, case and control groups. Women with primigravidas, onset of hypertension i.e. more than 140/90 mm of Hg during second or third trimester at two occasions at least six hours, age between 20-35 years and singleton pregnancy on ultrasound were included. Women with pre-existing hypertension, systolic B.P >130 mm of Hg, diastolic >80 mm of Hg on basis of medical record and history, pre-existing cardiovascular disease on history and examination and known case of Diabetes mellitus type 1 and 2 were excluded. Patients were divided into two groups; cases and controls. Group A comprised of 100 women with pregnancy induced hypertension and Group B with normal pregnancy was control group. 3ml blood sample was taken from the pregnant women to examine the serum Ca level. Serum Ca measurement was performed by Colorimetric assay with end point determination and sample blank from hospital laboratory. The colour intensity is measured photometrically. The data was entered and analyzed through SPSS-20.

RESULTS

Majority of the patients were found between 26-30 years of age in both A & B groups, in Group A 48% (n=48) and in Group-B 53% (n=53), the subjects with 20-25 years of age in Group A were 35% (n=35) and in Group B 29% (n=29) while 17% (n=17) of Group A and 18% (n=18) in Group B were found between 31-35 years of age with mean age was 28.12±3.21 in Group A and 26.43±4.12 in Group B (Table 1).

The comparison of mean serum calcium levels in pregnant women complicated with pregnancy induced hypertension with normotensive pregnant women was done (Table 2), where in Group A (7.86±0.39 mg/dl) and in Group B (8.93±1.14 mg/dl) mean calcium score was measured, t test was applied and p value was calculated as 0.00, which is highly significant.

Table No. 1: Frequency of age in the both groups (n=200)

Age (years)	Group A		Group B	
	No.	%	No.	%
20-25	35	35.0	29	29.0
26-30	48	48.0	53	53.0
31-35	17	17.0	18	18.0

Table No. 2: Comparison of mean serum calcium levels in pregnant women complicated with pregnancy induced hypertension with normotensive pregnant women

Variable	Group A	Group B
Mean serum calcium (mg/dl)	7.86±0.39	8.93±1.14
P value	0.00	

DISCUSSION

Hypertension in one of the most frequent disorder in pregnant women and accounted about 10% in all over the world.¹⁵ It is directly associated with maternal and neonatal morbidity and mortality.¹⁶ These disorders are also associated with adverse perinatal outcomes such as stillbirth, preterm and small for gestational age babies.^{17,18}

Ca is an important element in pregnant women. It is very important for the growth of bones and teeth and plays an important role for the development of fetus skeletal during pregnancy. It has been evident that there is high frequency of low serum Ca level in hypertensive pregnant women and this disorder contributes highly in maternal and neonatal mortality and morbidity.¹⁹

The results of our study demonstrates that majority of the patients were found between 26-30 years of age in both A and B groups, mean and sd was 28.12±3.21 in Group A and 26.43±4.12 in Group B while on comparing the mean serum Ca levels in pregnant women complicated with pregnancy induced hypertension with normotensive pregnant women reveals 7.86±0.39mg/dl in Group A and 8.93±1.14 mg/dl in Group B, which is statistically highly significant.

These findings are consistent with the findings of Yao and workers²⁰ who recorded the mean serum Ca of the study group 8.38±1.04 mg/dl, while that of the control group was 9.04±1.13mg/dl (P=0.001). Another study by Priyanka et al²¹ reported significant difference regarding serum Ca level between hypertensive and normotensive pregnant women (8.47±0.208 mg/dl) compared to normal pregnancy (9.423±0.157 mg/dl). Many of previous studies showed similarity to our study findings in which serum Ca level was significant lower in hypertensive pregnant women as compared to hypertensive pregnant women and these factors contributed high rate of maternal and neonatal morbidity and mortality.²²⁻²⁴

A study conducted by Hofmyer et al²⁵ in which they demonstrated that calcium plays an important role for decreasing the risk of hypertension and preeclampsia in pregnant women. Studies reported that patients with low Ca level were on high risk for PIH and preeclampsia and these factors reported major causes of maternal and fetal mortality.²⁶

CONCLUSION

Low serum calcium level is directly associated with pregnancy induced hypertension and contributed high rate of morbidity and mortality among pregnant women. We concluded that mean serum Ca level was significantly lower in women with pregnancy induced hypertension as compared to women with normal pregnancy.

Author's Contribution:

Concept & Design of Study:	Saliha Farooq
Drafting:	Wajiha Mehwish, Sujaria Yaseen
Data Analysis:	Nosheen Ghafar, Sadaf Altaf, Unaiza Taufiq
Revisiting Critically:	Saliha Farooq, Wajiha Mehwish
Final Approval of version:	Saliha Farooq

Conflict of Interest: The study has no conflict of interest to declare by any author.

REFERENCES

- Jain S, Sharma P, Kulshreshtha S, Mohan G, Singh S. The role of calcium, magnesium, and zinc in pre-eclampsia. *Biol Trace Elem Res* 2010;133: 162–70.
- Villar J, Betran AP, Gulmezoglu M. Epidemiological basis for the planning of maternal health services. London: WHO/RHR; 2001.
- Adewolu OF. Serum sodium, potassium, calcium and magnesium in women with pregnancy-induced hypertension and preeclampsia in Oredo local government, Benin metropolis: a pilot study. *Afr J Med Health Sci* 2013;12:1–5.
- Punthumapol C, Kittichotpanich B. Serum calcium, magnesium and uric acid in preeclampsia and normal pregnancy. *J Med Assoc Thai* 2008; 91:968–73.
- Cunningham FG. Hypertensive disorder in pregnancy. In: Cunningham FG, Leveno KJ, Bloom SL, Hauth JC, Gilstrap PL, Wenstrom KD, editors. *Textbook of Williams Obstetrics*. 22nd ed. New York: McGraw-Hill; 2005.p.761–808.
- Roberts JM, Cooper DW. Pathogenesis and genetics of pre-eclampsia. *Lancet* 2001;357:53–6.
- Chaurasia PP, Jadav PA, Jasani JH. Changes in serum calcium and serum magnesium level in preeclampsia vs normal pregnancy. *Int J Biomed Adv Res* 2012;3:511–3.
- Sibai BM. Prevention of preeclampsia: a big disappointment. *Am J Obstet Gynecol* 1998;179: 1275–8.
- Tavana Z, Hosseinmirzaei S. Comparison of maternal serum magnesium level in pre-eclampsia and normal pregnant women. *Iran Red Crescent Med J* 2013;15:e10394.
- Enaruna NO, Ande A, Okpere EE. Clinical significance of low serum magnesium in pregnant women attending the University of Benin Teaching Hospital. *Niger J Clin Pract* 2013;16:448–53.
- Guhan VN, Jeyakumar M, Prabhakara RK, Daniel M, Sivaa R, Priyadharshini S. Serum calcium and magnesium levels in preeclamptic patients: a case control study. *Int J Pharm Sci Rev Res* 2014; 26:149
- Whitworth JA. World Health Organization. International Society of Hypertension Writing Group. 2003 World Health Organization (WHO)/International Society of Hypertension (ISH) statement on management of hypertension. *J Hypertens* 2003;21:1983–92.
- Gupta S, Jain NP, Avasthi K and Wander GS. Plasma and erythrocyte zinc in pre-eclampsia and its correlation with foetal outcome. *J Assoc Physicians India* 2014; 62: 306-310.
- Ramos JG, Brietzke E, Matins-Cost SH. Reported calcium intake is reduced in women with preeclampsia. *Hypertnes Pregnancy* 2006; 25(3):229-39.
- Ballis A, Witter FR. Hypertensive disorders of pregnancy. In: Fortner KB, Szymanski LM, Fox HE, Wallach EE editors. *John Hopkins Manual of Gynaecology and Obstetrics*. 3rd ed. Lippincott Wilkins;2007.p.180-90.
- Hofmeyr GJ, Roodt A, Atallah AN. Calcium supplementation to prevent pre-eclampsia- a systemic review. *S Af Med J* 2003;93:224-8.
- Wang L, Manson JE, Song Y, Sesso HD. Systematic review: vitamin d and calcium supplementation in prevention of cardiovascular events. *Ann Int Med* 2009;152(5):315-25.
- Baolan W, Qiuxia P, Hua L, Juan Z, Yindi L, Ai Qin H. Correlation analysis between calcium content in pregnant women and gestational hypertension. *Progress Modern Biomed* 2013; 113: 5716-8.
- Emily W H, Margaret S, Margaret W. Calcium intake during pregnancy among White and African-American pregnant women in the United States. *J Am Coll Nutr* 2004;23(1):43-50.
- Yao Y, He L, Jin Y, Chen Y, Tang H, Song X, et al. The relationship between serum calcium level, blood lipids, and blood pressure in hypertensive and normotensive subjects who come from a

- normal university in east of China. *Biol Trace Elem Res* 2013; 153: 35-40.
21. Priyanka S, Rajini B. The study of serum calcium in pregnancy induced hypertension and normal pregnancy and its correlation with pregnancy induced hypertension. *Med Pulse Int J Physiol* 2017; 3(3): 37-41.
 22. Sabitha Bai T, Rudrappa G, Javarappa D. Study of serum and urinary calcium levels in pregnancy induced hypertension cases in and around Chitradurga. *Global J Med Res* 2014; 14(4): 15-9.
 23. Cormick G, Ciapponi A, Cafferata ML, Belizán JM. Calcium supplementation for prevention of primary hypertension. *Cochrane Database of Syst Rev* 2015;(30(6): CD010037.
 24. Easterling TR. Pharmacological management of hypertension in pregnancy. *Semin Perinatol* 2014; 38: 487-95.
 25. Hofmeyr GJ, Atallah AN, Duley L. Calcium supplementation during pregnancy for preventing hypertensive disorders and related problems. *Cochrane Database Syst Rev* 2006; 3:CD001059.
 26. Abiodun O, Oguntayo A, Sambo AI. Serum levels of calcium and magnesium in pre-eclamptic-eclamptic patients in a tertiary institution. *It J Gynaecol Obstet* 2015; 27(3).
 27. Trumbo PR, Ellwood KC. Supplemental calcium and risk reduction of hypertension, pregnancy-induced hypertension, and preeclampsia: an evidence-based review by the US Food and Drug Administration. *Nutr Rev* 2007;65(2):78-87.