Prevalence of vitamin D deficiency in patients of pregnancy induced hypertension

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INTRODUCTION

Having a healthy pregnancy is one of the best ways to promote a healthy birth. Pregnancy nutrition is essential as nutrition of the fetus begins at conception. Micronutrients are only needed in very small quantities but are essential for normal physiological function, growth and development. Some of micronutrients deserve more attention as causes of poor pregnancy outcome, including other B vitamin deficiencies that result in homocysteinemia, antioxidants, vitamin D, and iodine.

Pregnancy induced hypertension (PIH) is defined as the hypertension that develops as a direct result of the gravid state. Every tenth pregnancy is affected by hypertension, one of the most common complications and leading causes of maternal death worldwide.

Apart from known risk factors such as stress, obesity, diabetes, and advanced age, low anti-oxidants, variations in trace metals and electrolyte disturbances have been linked with the pathogenesis of pre-eclampsia.1,2

Recent epidemiological studies have emphasized the role of vitamin D deficiency in the development of pre-eclampsia.3

Vitamin D (Sunshine Vitamin) is a pro-hormone which plays significant role in bone metabolism via regulation of calcium and phosphate homeostasis. The prevalence of

ABSTRACT

Background: The objectives of this study were to compare the serum Vitamin D levels in pregnant patients of pregnancy induced hypertension (PIH) and healthy normotensive patients and to study the prevalence of vitamin D deficiency in patients of PIH.

Methods: This study was conducted in Shri Guru Ram Das Institute of Medical Sciences and Research, Vallah, Amritsar in year 2015-2017. In total 100 cases were taken for the study and divided into two groups.

Results: Serum Vitamin D levels were quite low in women with pregnancy induced hypertension with a mean vitamin D levels of 13.006±6.24 ng/ml as compared to 23.239±10.601 ng/ml in healthy pregnant women. The prevalence of vitamin D deficiency in PIH group was very high i.e. 94% compared to 46% in normotensive group (Mean Vitamin D levels <20 ng/ml).

Conclusions: Vitamin D levels are deficient in patients of PIH and there is increased prevalence of vitamin D deficiency with PIH suggesting that vitamin D deficiency can be a risk factor for the development of PIH.

Keywords: PIH, Prevalence, Vitamin D
Assay procedure: The measurement of 25-OH Vitamin D concentration in the serum or plasma was done by competitive chemiluminescence immunoassay (CIA).

Statistical analysis

Numerical variables were reported in terms of mean and standard deviation. An independent (unpaired) sample t-test was used to compare the difference of means for independent quantitative variables following normal distribution.

RESULTS

Mean age: In present study, the mean age of the study group was 27.74±4.539 years as compared to 27.26±3.93 years in case of controls. On statistical analysis, the p-value was not significant. This indicates that the patients of both groups were age matched.

Mean Gestational age: The mean maternal gestational in present study was 34.063±3.58 weeks in the study group as compared to 34.078±2.93 weeks in the control group. On statistical analysis, the p-value was 0.3944 (not significant). This shows that the two groups of present study were similar in terms of gestational age at which serum vitamin D levels were measured.

Systolic and diastolic blood pressure in both groups: The mean SBP and DBP of patients of study group on admission was 159.24±23.50 mmHg and 101.92±12.38 mmHg and that of control group was 115.48±8.21 mmHg and 76.70 mmHg. P-value was<0.001 proving that the mean values of SBP and DBP were significantly higher in the PIH subjects compared to the control ones.

Mean serum Vitamin D levels: In present study it was observed that serum Vitamin D levels were quite low in women with pregnancy induced hypertension with a mean vitamin D levels of 13.006±6.24 ng/ml as compared to 23.239±10.601 ng/ml in healthy pregnant women. So, on comparing the vitamin D levels between the both groups, it was observed that the difference between two groups was highly significant with the p-value of < 0.001.

Table 2: Mean vitamin D levels in both groups.

| Groups | Mean vitamin D levels |
|--------|-----------------------|
| PIH    | 12.857                |
| NT     | 23.239                |

Prevalence of vitamin D deficiency in Healthy Normotensive patients: In present study, only 28% of the candidates of healthy pregnant women had normal Vitamin D levels (i.e. mean Vitamin D >30ng/ml). So, the prevalence of Vitamin D deficiency was 46% and Vitamin D insufficiency was 26% pointing towards high prevalence of Vitamin D deficiency among pregnant women in India.
Prevalence of vitamin D deficiency in patients of PIH: In present study group, only 4% patients had normal Vitamin D levels (Mean Vitamin D levels >30 ng/ml). So, the prevalence of vitamin D deficiency in PIH group was very high i.e. 94% compared to 46% in normotensive group (Mean Vitamin D levels <20 ng/ml).

In present study, severe Vitamin D deficiency (Mean Vitamin D levels <10 ng/ml) was seen in 44% in study group as compared to 10% in control group. This shows that there is high prevalence of Vitamin D deficiency in patients of PIH as compared to normotensive patients.

Table 3: Prevalence of vitamin D deficiency in both groups.

| Serum vitamin D (ng/ml) | PIH Prevalence | NT Prevalence | Prevalence |
|-------------------------|----------------|---------------|------------|
| Deficient (<20)         | 46             | 94            | 23         |
| Insufficient (Between 20-30) | 2             | 4             | 13         |
| Sufficient (>30)        | 2              | 4             | 14         |

DISCUSSION

In present study, the mean Vitamin D levels were significantly less in the study groups compared to the control group. This finding is consistent with the recent study of Sadin et al who found that serum 25(OH)D concentration was significantly lower in preeclamptic cases compared to controls (10.09±6.66 and 15.73±5.85 ng /ml respectively, P=0.002). This association was also accordant with findings of recent three systematic reviews and meta-analysis of observational studies conducted by Tabesh M et al, Aghajafari F et al and Wei SQ et al who found that maternal risk of preeclampsia has been associated with low maternal circulating level of 25(OH)D.

In contrast to present study, in a study conducted by Umar N et al it was observed that serum 25(OH)D levels were quite low in both groups with a median vitamin D level of 14.04 (IQR 10.64 ng/ml) in preeclamptic women; and in normotensive pregnant women.

Median vitamin D level was found to be 13.8 (IQR 6.92 ng/ml). But on comparison of vitamin D levels between two groups, it was observed that the difference between groups was insignificant with p-value of 0.21.

So, it was concluded that there is no association between serum Vitamin D levels and development of preeclampsia.

In present study, the prevalence of vitamin D deficiency was 94% in the study group as compared to 46% in the control group and that of severe Vitamin D deficiency was 44% in the study group and 10% in the control group.

Table 4: Studies comparing severe vitamin D deficiency in PIH group (mean S. vitamin D levels<10 ng/ml).

| Studies   | Prevalence of severe vitamin D deficiency in PIH group | Prevalence of severe vitamin D deficiency in control group |
|-----------|------------------------------------------------------|----------------------------------------------------------|
| Present study | 44                                                   | 10                                                      |
| Gupta T et al18 | 90                                                   | 62                                                      |
| Mehmood S et al19 | 86.5                                                 | 65.4                                                    |
| Robinson CJ et al20 | 83.3                                                 | 68                                                      |

In contrast to present study, in the recent study conducted by Goel P et al it was seen that all women (100%) in group 1 had vitamin D deficiency as compared to 92% in group 2 but this was not statistically significant. 83.3% of women in hypertensive group had severe deficiency compared to 68% women in healthy pregnant women.

This finding of present study was also in contrast with study conducted by Umar N et al in which it was found that severe vitamin D deficiency is present in 95% of preeclamptic and 62% normotensive pregnant women but the difference of vitamin D level between the two groups was not found significant.

CONCLUSION

Hence from present study it was concluded that vitamin D levels are deficient in patients of PIH. However, association of vitamin D deficiency with the causation of PIH cannot be ascertained as the study was conducted after PIH has developed. Increased prevalence of vitamin D deficiency with PIH has been proved in present study. But there is a need for large scale studies and a bigger number needs to be evaluated for more detailed analysis.

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