ORIGINAL ARTICLE

Vitamin-D Deficiency among Pregnant Women Undergoing Preterm Labor

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ABSTRACT

Background: Every year, 15 million neonates worldwide are born preterm. Of these, 1.1 million die as a result of complications of being born too soon and even more suffer from serious prematurity-related complications including learning disabilities.Several studies point to the fact that vitamin-D is involved in the regulation of acquired and innate immune responses at the fetal-maternal interface across gestation. Vitamin-D reduces the risk of spontaneous preterm birth also by maintaining myometrial quiescence.

Aim: To determine the frequency of vitamin-D deficiency in preterm labour.

Methods: This present study was carried out in the Department of Obstetrics and Gynaecology, Nishtar Hospital, Multan.A total of 167 pregnant women were registered mean age of our study cases was 28.48±3.58 years. Mean parity was 3.95±1.15. Mean gestational age of our study cases was 30.29±3.02 weeks.

Results:- Majority of our study cases i.e., 105(62.9%) had poor socioeconomic status, while 62 (37.1%) were from middle class while none of them were from rich class. Mean vitamin-D level was 40.86 ± 8.51 ng/dl (with minimum vitamin-D level was 22 ng/dl and maximum vitamin-D level was 56 ng/dl). Vitamin-D deficiency was seen in 27 (16.2%) of our study cases.

Conclusion:-Vitamin-D deficiency was significantly associated with poor socio-economic status, increasing age and gestational age less than 30 weeks.

Keywords: Vitamin D deficiency, preterm labor, gestational age.

INTRODUCTION

Preterm term labour is the leading cause of morbidity and mortality worldwide. Of all early neonatal deaths (deaths within the first 7days of life) that are not related to congenital malformations, 28% are due to preterm birth[1].Preterm birth rates have been reported to range from 5% to 7% of live births in some developed countries, but are estimated to be substantially higher in developing countries[2].The global prevalence of preterm birth is 9.6% [3]. The rate of preterm birth in Pakistan is 15·7% whereas it is 6·6% in Australia[4].

Preterm labour is the spontaneous occurrence of regular uterine contractions leading to cervical changes and initiating the labour after 24^{+0} weeks and prior to 36^{+6} weeks calculated by LMP. Labour is the process by which regular painful uterine contractions bring about effacemant and dilatation of the cervix and descent of the presenting part ultimately leading to expulsion of the fetus and the placenta from mother.

Vitamin-D has immunomodulatory and anti-inflammatory effects by regulating theproduction and function of cytokines and neutrophil degranulation products, that prevents microbial invasion, hence has a protective effect on SPB risk[5,6,7]. Vitamin-Dis involved in cell-mediated immunity by reducing the production of inflammatory cytokines such as IL-1, 6 and TNF α that are involved in spontaneous preterm birth[8,9,10]. Several studies point to the fact that vitamin D is involved in the regulation of acquired and innate immune responses at the fetal-maternal interface across gestation[11]. Vitamin D might reduce the risk of spontaneous preterm birth also by maintaining myometrial quiescence[12,13,14,15].

Baker et al conducted a nested case-control study which showed prevalence of first-trimester maternal vitamin D deficiency [25(OH)D <50nmol/L] was comparable among women who subsequently delivered preterm compared with controls (7.5% versus 6.7%, p=0.90)[16].

Asano S et al at Fujita Health University, Toyoake, Aichi, Japan carried out a study which shows, Mothers with threatened premature delivery had significantly lower 25-OHD levels (11.2 ± 3.2 ng/ml) than those in mothers with normal delivery (15.6 ± 5.1 ng/ml)[17].

Nishtar Hospital Multan is a tertiary care centre and patients with preterm labour are routinely managed here. Inspite of several randomized controlled trials and meta analysis, there is lack of

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evidence that how frequently vitamin-D deficiency is associated with preterm labour. The purpose of my study is to evaluate the frequency of vitamin-D deficiency in preterm labour in our general population.

MATERIALS & METHODS

Patients coming to the Outpatient and Emergency Department of Obstetrics and Gynaecology, Nishtar Hospital Multan fulfilling the inclusion were enrolled in the study.All pregnant women with singleton pregnancy with gestational age more than 23^{+6}weeks and less than 36^{+6} weeks calculated from the first day of last menstrual period were included in our study while patients having cervical incompetence in patients having history of 2nd trimester miscarriages or cervical cerclage, multiple pregnancy, placental abruption, fetal distress, women with medical disorders like diabetes, hypertension, bleeding disorders and anemia were excluded.Data were entered and analysis was done by using SPSS software. Descriptive statistics was used to calculate mean and standard deviation of age and gestational age of the patients. Frequencies and percentages were calculated for vitamin-D deficiency. Effect modifier like age, gestational age and parity were controlled by stratification and effect of these was seen on outcome through Chi-square test. p- value ≤ 0.05 was taken as significant.

RESULTS

In this study, a total of 167 pregnant women fulfilling inclusion and exclusion criteria of this study were registered from the department of Obstetrics and Gynecology of Nishtar Hospital, Multan. Mean age of our study cases was 28.48±3.58 years (with minimum age was 22 years and maximum age was 35 years). Our study results have indicated that majority of our study cases i.e., 64.7% were less than 30 years of age. Mean parity was 3.95±1.15 (with minimum parity was 2 and maximum parity was 6) while our study results have indicated that majority of our study cases i.e., 65.3% were having parity equal or less than 4. Mean gestational age of our study cases was 30.29±3.02 weeks (with minimum gestational age was 26 weeks while maximum gestational age was 35 weeks). Our study results have indicated that 54.5% had their gestational age between 23-30 weeks. Majority of our study cases i.e. 105(62.9%) had poor socioeconomic status, while 62(37.1%) were from middle class while none of them were from rich class. Mean vitamin-D level was 40.86 ± 8.51 ng/dl (with minimum vitamin-D level was 22 ng/dl and maximum vitamin-D level was 56ng/dl). Vitamin-D deficiency was seen in 27(16.2%) of our study cases.

Table-1: Stratification of Vitamin-D deficiency with regards to age (n=167)

Age (years)	Vitamin-D deficiency		P-value
	Yes (n-27)	No (n-140)	
20-30	10	98	0.002
>30	17	42	

Table-2: Stratification of Vitamin-D deficiency with regards to parity (n=167)

Parity	Vitamin-D deficiency		P-value
	Yes (n-27)	No (n-140)	
Equal to or >4	18	91	1.00
>4	09	49	

Table-3: Stratification of Vitamin-D deficiency with regards to gestational age (n=167)

Gestational age (weeks)	Vitamin-D deficiency		P-value
	Yes (n-27)	No (n-140)	
23-30	26	65	0.000
>30	01	75	

Table-4: Stratification of Vitamin-D deficiency with regards to socioeconomic status (n=167)

Socioeconomic status	Vitamin-D deficiency		P-value
	Yes (n-27)	No (n-140)	
Poor	22	83	0.031
Middle	05	57	

Table-5: Stratification of Vitamin-D deficiency with regards to age (n=167)

Age (years)	Vitamin-D level		P-value
	Mean	Standard deviation	
20-30	41.79	7.69	0.057
>30	39.17	9.68	

DISCUSSION

In this study, a total of 167 pregnant women fulfilling inclusion and exclusion criteria of this study were registered from the department of Obstetrics and Gynecology of Nishtar Hospital, Multan. Mean age of our study cases was 28.48±3.58 years (with minimum age was 22 years and maximum age was 35 years). Our study results have indicated that majority of our study cases i.e. 64.7 % were less than 30 years of age. Thorp et al[18] reported mean age 26.8±5.5 years which is close to our study results. Pratumvinit et al[19] reported 28.9±6.4 mean age, which is similar to that of our study results. Similar results have been reported by Bodnar et al[20].

Mean gestational age of our study cases was 30.29 ± 3.02 weeks (with minimum gestational age was 26 weeks while maximum gestational age was 35 weeks). Our study results have indicated that 54.5% had their gestational age between 23-30

weeks. Similar results have been reported by Thorp et al[18] and Bodnar et al[20].

Poor dietary intake is an important risk factor for vitamin-D deficiency and which is associated with socioeconomic status of the family and majority of our study cases i.e. 105(62.9%) had poor socioeconomic status, while 62(37.1%) were from middle class while none of them were from rich class. Vitamin-D deficiency was significantly more seen in patients with poor socioeconomic status (p=0.031).

Mean vitamin-D level was 40.86 ± 8.51 ng/dl (with minimum vitamin-D level was 22 ng/dl and maximum vitamin-D level was 56 ng/dl). Thorp et al[18] reported relatively higher mean values of vitamin-D levels to be 67ng/dl. Vitamin-D deficiency was seen in 27 (16.2%) of our study cases. Pratumvinit et al[19] reported 34 % vitamin D deficiency with preterm labor from Thailand. Thorp et al[18] reported 22% vitamin D deficiency associated with preterm labor. Bodnar et al[20] reported 11.3% vitamin-D deficiency in pregnant women undergoing preterm labor, which is close to our study results.

CONCLUSION

Vitamin-D deficiency was significantly associated with poor socio-economic status, increasing age and gestational age less than 30 weeks.

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