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A comparative study of prevalence of serum vitamin-d and serum calcium deficiency in burka clad pregnant women and non burka clad pregnant women in tertiary health care centre, Jaipur, Rajasthan

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Abstract

Introduction: In pregnant women, lower level of both serum calcium and vitamin D cause serious impact on fetomaternal outcome. Purpose of the study is to use the opportunity of antenatal checkups to screen the screening of pregnant women for Vit D-3 and serum calcium levels and find out effect of clothes worn by them routinely as proper exposure to sunlight remain a key factor in Vit-D 3 level in burka and non burka clad.

Methods and Material: This is an observational, randomized comparative study conducted in Department of obstetrics and Gynaecology at SMS Hospital, Jaipur, India from april, 2016 to july 2017. Total 200 of pregnant women who attended antenatal clinic were taken in the study, divided in burka clad and non burka clad and their blood samples sent for serum vitamin D3 and serum calcium level along with routine antenatal investigations.

Results: In our study in both groups around 92-94% of the pregnant patients were found to be deficient as their serum vitamin -D levels were below 20 ng/ml. The calcium level in both groups were also below normal in around 70-72% patients.

Conclusion: Serum vitamin D3 and serum calcium levels were very low in majority of pregnant women in both groups due to inadequate sun exposure, poor diet and supplement intake in their pre conceptional and antenatal period.

Keywords: Burka clad, Hypovitaminosis D, Serum ca level deficiency, Sun exposure

Introduction

Vitamin D deficiency is unexpected in a tropical country like India, where there is abundant overhead Sun throughout the year. Nevertheless, hypovitaminosis D, resulting in severe osteomalacia, has been observed in adolescents in India [1]. This paradox may be partly explained by prevalent social and cultural practices in India that preclude adequate exposure of adolescent girls and young women to sunshine. Revealing clothing is frowned on in traditional Indian households, both rural and urban. Newly married females are expected to cover themselves even more and are discouraged from outdoor activity. Increasing urbanization that results in poor outdoor activity and greater pollution, coupled with skin pigment, may further compound this problem [2].

Furthermore, milk, the primary source of calcium, is an expensive food in India. Deficient calcium intake has been shown to be the cause in a large proportion of childhood rickets in India [3] and other tropical countries [4, 5] and to contribute to adolescent osteomalacia [1, 3]. Dietary calcium replenishment produced healing of rickets independent of vitamin D in those rickets patients with normal serum 25-hydroxyvitamin D [25(OH) D] concentrations [3, 4]. Experimental studies in a rat model showed that dietary calcium deficiency caused secondary vitamin D deficiency and that calcium replenishment improved serum 25(OH)D concentrations [6]. It is possible that the same mechanism may be active in human calcium-deficiency rickets or osteomalacia. In a population that already has a high prevalence of vitamin D deficiency and poor dietary calcium intake, the problem is likely to worsen during pregnancy because of the active transplacental transport of calcium to the developing fetus. Hypovitaminosis D during pregnancy has important consequences for the newborn, including fetal hypovitaminosis D, neonatal rickets and tetany, and infantile rickets [7, 8]. Rickets during infancy has been associated with higher prevalence of lower respiratory tract infections [9], the largest cause of infant mortality in India.

Calcium is essential for many diverse mechanism and reactions such as muscle contraction, bone formation and enzyme and hormone functioning.

In pregnant women, lower level of both serum calcium and vitamin D cause serious impact on feto-maternal outcome. Purpose of the study is to use the opportunity of antenatal checkups to screen the screening of pregnant women for Vit D-3 and serum calcium levels and find out effect of clothes worn by them routinely as proper exposure to sunlight remain a key factor in Vit-D 3 level. The study conducted during their antenatal period comparing the deficiency level in BURKA CLAD and non BURKA CLAD. BURKA per se completely covers the body, the exposure to sun is minimal in these women compared to saree and other Ethnic dresses. This study conducted for comparing the effect of exposure of sunlight and other factors on the vitamin-D3 and calcium level in their body and also for early recognition of deficiency of both factors and providing prophylactic and therapeutic supplementation.

Materials and Methods

Study Design

This is an observational, randomized comparative study conducted in Department of obstetrics and Gynaecology at SMS Hospital, Jaipur, India from April, 2016 to July 2017. Total 200 of pregnant women who attended antenatal clinic were taken in the study.

Study Participants

Pregnant women recruited in the study when they were attending the antenatal clinic. Women were counseled about the importance of screening the level of their serum calcium and vitamin D and future maternal and fetal outcome in deficient state and impact of the early diagnosis and prevention of deficiency.

Study Method

All pregnant women who were attending the ANC clinic and consenting to be a part of study were enrolled in study and divided in two groups. In one group the pregnant women who were Burka Clad and in second group the pregnant women who were non Burka Clad and their detailed history was undertaken regarding their age, socio economic status, residence, gestational period, obstetric history, period of lactation, dietary history, indoor and outdoor work hours, medical history, mode of delivery, vitamin D intake as supplementation. After detailed history blood samples were sent for serum calcium and vitamin D level along with their routine antenatal investigations. All the data were collected and analysis were done statistically.

Results

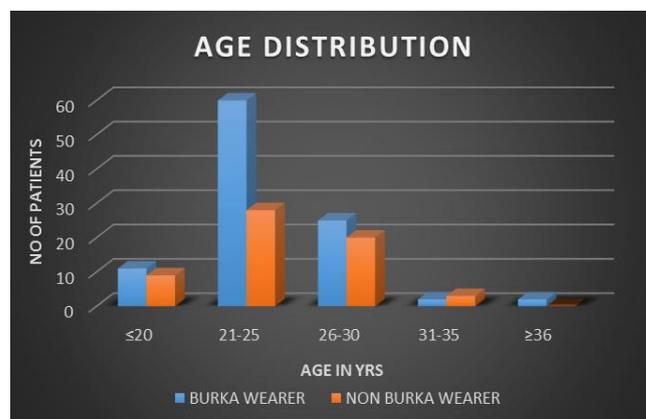
A total of 200 pregnant patients were recruited in the study and their blood samples were sent for serum calcium level and vitamin-D level and the data collected and compared. All the women under the study were divided in two groups-first is BURKA CLAD, in this group all the pregnant women who wore BURKA during their outdoor activity all the time and in second group Non Burka Clad, all pregnant women who did not cover

themselves during outdoor activity with burka.

Age distribution in both groups were comparable and no significant difference was observed. In both groups most of the women (60-68%) belonged to the 21-25 years age group category, which is the reproductive age group.

Chart and table showing age distribution in both groups

| Age (Yrs.) | Burka Clad (100) | Non Burka Clad(100) |
|------------|------------------|---------------------|
| ≤20 | 11 | 9 |
| 21-25 | 60 | 68 |
| 26-30 | 25 | 20 |
| 31-35 | 2 | 3 |
| ≥36 | 2 | 0 |



Most of the study subjects were from urban area in both groups. Firstly because the study was conducted in tertiary centre situated in urban area (Jaipur city) and more awareness about antenatal check-up in people living in urban area than in rural areas.

Chart and table showing residential area of both groups

| Residence | Burka clad | Non burka clad |
|-----------|------------|----------------|
| Rural | 12 | 32 |
| Urban | 78 | 68 |

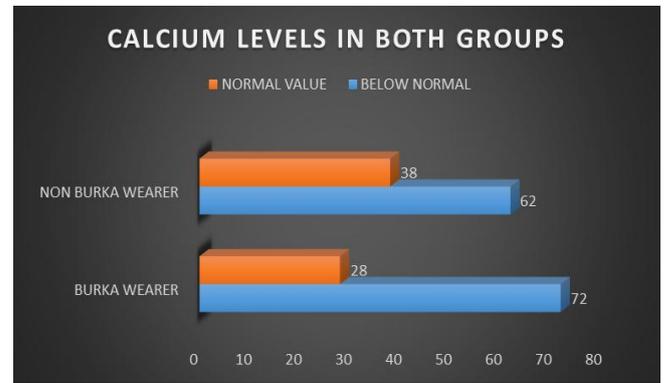
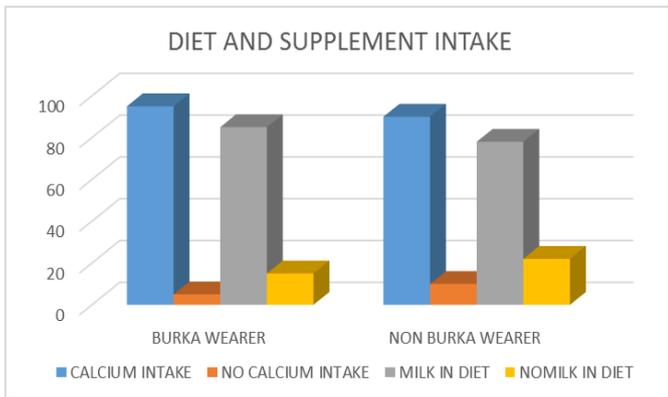
During study it was observed that 30% were primi gravida and 70% of were multigravida in burka CLAD community showing trends of having 2 and more than 2 children and small family norm in non burka CLAD group.

Chart and table showing pairity in study subjects

| Pairity | Burka clad | Non burka clad |
|--------------|------------|----------------|
| Primi | 30 | 43 |
| Multigravida | 70 | 57 |

In our study it is observed that both diet including milk and calcium supplement was taken by majority of patients in both groups. There was no significant difference was seen in both groups. Overall majority of study subject were not taking the proper diet rich in calcium.

| DIET | Calcium supplement intake | No calcium supplement | Diet including milk | Diet without milk |
|----------------|---------------------------|-----------------------|---------------------|-------------------|
| Burka clad | 95 | 5 | 85 | 15 |
| Non burka clad | 90 | 10 | 78 | 22 |



In our study the normal cut off value for serum calcium in pregnant women is 8.8 mg/ml -10.6 mg/ml and for serum vitamin-D level value less than 20 ng/ml is deficiency and majority of study subjects (92-94%) were found deficient in both groups.

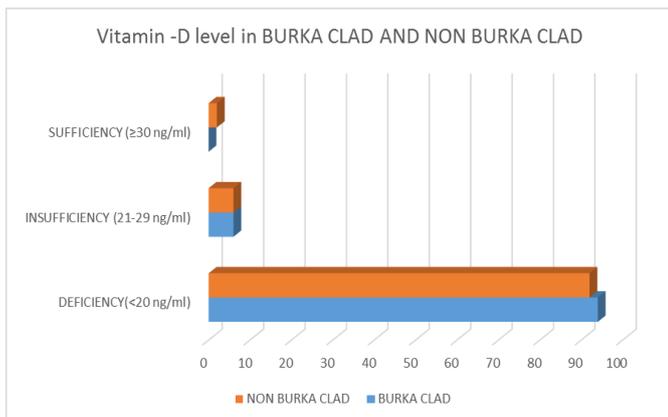
In burka CLAD group around 94% of the pregnant patients were found to be deficient as their serum vitamin -D levels were below 20 ng/ml. and in this group 80% of the patient were severely deficient as the serum vitamin-D levels were <10 ng/ml. Only 6% patients have insufficient level and no patient have serum vitamin -D level >30 ng/ml which is sufficient level. The severe deficiency of vitamin-D is due to less exposure of sunlight due to burka during outdoor activity.

In non burka CLAD, 92% of patient were found to be deficient and 6% patients have insufficient levels 2% patients have sufficient level. The low level of vitamin -D levels in non burka CLAD pregnant women are due to less outdoor activity in sunlight, darker skin in indian women, vegetarian diet deficient in dietary vitamin-D.

The calcium level in both groups were also below normal in 72% in burka CLAD group and 62% were in non burka CLAD and 28% and 38% patients have normal calcium level. This deficiency is most probably due to poor dietary intake, multiple births without much interval in two pregnancies, lack of vitamin -D due to less sun exposure,

Table 1: Vitamin-D level in burka clad and non burka clad

| Vitamin- d levels | Burka clad(100) | Non burka clad (100) |
|-----------------------------|-----------------|----------------------|
| Deficiency(<20 ng/ml) | 94 | 92 |
| Insufficiency (21-29 ng/ml) | 6 | 6 |
| Sufficiency (≥30 ng/ml) | 0 | 2 |



| Calcium Level | Below normal | Normal level (8.8-10.6 mg/ml) |
|----------------|--------------|-------------------------------|
| Burka clad | 72 | 28 |
| Non burka clad | 62 | 38 |

Discussion

Our study was conducted to compare the vitamin-D as well as serum calcium level deficiency in burka CLAD and non burka CLAD pregnant women and to see the effect of covering the body during outdoor activities due to less sun exposure.

In our study most of the study subjects were from 21-25 years of age group and remaining mostly from 24±4 years. Similar age distribution were found to be in another study done on pregnant women of Northern India by Alok Sachan et al.

Our study was done to compare the data on serum 25(OH) D and calcium in pregnancy from a population not wearing Burka and burka CLAD in a tropical country. The most important finding in our study is the unexpectedly high prevalence of hypovitaminosis D among pregnant women. Hypovitaminosis D and osteomalacia among pregnant South Asian women have been widely reported [10, 11, 12-19].

However, all studies but a few [ie, 10, 11, 16, 17] were from temperate regions such as the United Kingdom [12-15, 18] and Norway [19], where the already low availability of overhead sun is compounded for Asian women by poor outdoor activity, pigmented skin, and excessive clothing. Vitamin D deficiency has also been noted in pregnant women in tropical countries, but all studies were in Muslim populations, in whom the practice of purdah might have played an important role [16, 17, 20-23]. The only study to comment on serum 25(OH)D concentrations in pregnant non-Muslim women living in the tropics is from New Delhi [11], where the mean concentration in summer in 25 women was 21.9 ± 10.7 nmol 25(OH)D/L (8.6 ± 4.28 ng/mL).

We expected to find a higher serum 25(OH) D concentration in the rural women in our study than in their urban counterparts, who had distinctly poorer sun exposure. However, the results were contrary to expectation, with urban and rural women having equally low mean serum concentrations and equally high prevalence of the deficiency. The explanation could lie in the prolonged deficiency of dietary calcium intake among poorer parts of India (where most of the rural women in our study lived), because of the expensive nature of milk and milk products. Dietary calcium deficiency has been shown to lead to secondary vitamin D deficiency in rats [6]. The higher intake of dietary calcium in the women in our study is likely to have been short-lived and attributable to the social custom of providing extra milk to pregnant and lactating women. Further studies are needed to document direct evidence of improvement in serum 25(OH)D with calcium supplementation in large numbers of subjects in our region. Similar results were observed in the study done by Alok Sachan et al. [27].

Exactly how much sun exposure is needed for healthy people to maintain normal serum 25(OH)D is not clear. It would, of course, depend on latitude, season, skin pigment, and age. On the basis of his own studies, Holick [24] recommended that sub erythral exposure of face, arms, and hands (ie, 22% BSA) 3

times a week is probably sufficient for elderly people living in a temperate climate to maintain serum 25(OH)D at 20 ng/mL. It would be expected, then, that a similar amount of vitamin D should form in the skin of the women in our study, who were younger and lived in a more tropical latitude, and who exposed 11% of their BSA to sun for 1 h/d. In addition to the possible contribution of darker skin pigment and prolonged low intake of dietary calcium, the high amount of atmospheric pollution extant in Indian cities, including Lucknow, could be an important factor [2, 25].

At present, vitamin D supplementation is not a part of antenatal care programs in India. The US National Academy of Sciences mentions 400 IU as the dietary reference intake for vitamin D during pregnancy. However, several investigators worldwide are arguing for revised higher guidelines for vitamin D allowance during pregnancy and lactation [26]. So far, the concern expressed by those investigators is mainly for women in temperate climates, especially those with greater skin pigmentation, and for women living in tropical regions but observing purdah, such as those in the Middle East.

Conclusion

On the basis of our results, we conclude that such recommendations perhaps are also warranted for pregnant Indian women not practicing purdah, so that they may remain healthy and provide adequate vitamin D to their foetuses. The exact cause of or factors contributing to the occurrence of hypovitaminosis D in rural and urban women in a tropical country remain to be elucidated in future studies.

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