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Frequency Of Vitamin D Deficiency in Mothers of Children with and Without Ricket

Shah Nawaz [a]	Shahab Alam [b]	Ayesha Qadir [c]
Nabila Sher Mohammad [d]	Haleema Jadoon [e]	Bashir Khan [f]

Abstract: *Vitamin D insufficiency is now considered a pandemic due to its widespread occurrence. Women don't retain vitamin D well, and babies with deficiencies frequently get rickets. Objective: to assess the prevalence of vitamin D insufficiency in mothers of infants with and without rickets. Methodology: Our study included 50 hospital OPD-referred mothers of infants without rickets and 40 with vitamin D deficiency rickets. Food, sun exposure, demography, and social life were asked of all moms. Blood samples from voluntary mothers of children with and without rickets or rachitis were biochemically studied. These included serum alkaline phosphatase, inorganic phosphate, and calcium values. The Chemical Analyser Microlab 300 performed all tests. ELISA measured blood vitamin D. Results: Rickets-affected moms had vitamin D deficiency in 98% of cases, compared to 53% of mothers of infants without rickets. Moms and children had similar vitamin D levels. Conclusion: Vitamin D deficiency in moms of infants with rachitis should be assessed and treated.*

Key Words: Rachitis, 25-OHD, Mother, Children, Vitamin D

Introduction

Many people believe that rickets is a 19th-century illness. Although vitamin D (vit D) is widely available and has been shown to be effective in stopping rickets, vit D deficiency rickets continues to be a major health concern with important morbidity in the different nations (Dawodu & Wagner, 2007). Rickets may only be the top of the ocean in many nations where there are accounts of a high incidence of asymptomatic vit D insufficiency in kids and teenagers.

There are accounts of high incidence of vit D insufficiency in females of childbearing age, during gestation, and in breastfeeding moms, with probable negative repercussions for women, the embryo, and developing babies and children, according to more research (Challa et al., 2005). A high amount of material had been written linking vit D insufficiency with long-latency illnesses, with the inference that vit D impacts all body organs. This once-rare condition has now become so prevalent (Grover & Morley, 2011)

[a] Associate Professor, Department of Biochemistry, Nowshera Medical College, Nowshera, KP, Pakistan.
[b] Department of Public Health, Kabir Institute of Public Health, Peshawar (Gandhara University Peshawar), KP, Pakistan.
[c] Department of Histopathology, Khyber Medical University, Peshawar, KP, Pakistan.
[d] Associate Professor Department of Biochemistry Khyber Girls Medical College Peshawar, KP, Pakistan.
Email: dr.nabi65gmail.com *(Corresponding Author)*
[e] M.Phil. Biochemistry, Khyber Girls Medical College Peshawar, KP, Pakistan.
[f] Assistant Professor, Department of Biochemistry, Pak International Medical College, Peshawar, KP, Pakistan.

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Epidemiological data indicates that a dearth of vit D supplements during infancy and early baby may raise the prevalence of diabetes (type 1), in addition to rickets and other potential effects of disrupted calcium balance. The importance of vit D in preserving natural immunity and preventing some disease conditions in adulthood, such as type 2 diabetes, autoimmune illnesses, multiple sclerosis, systemic lupus erythematosis, and rheumatoid arthritis, is now supported by new research. The questions that follow are: How did we get to the point where vit D deficiency is a public health concern for numerous countries? But are we disregarding the correlation between low vitamin D levels in mothers, low vitamin D levels in their children, and rickets, at least in communities where "sunshine restriction" is widespread? Are the pills that are currently advised for avoiding vit D insufficiency in mothers and kids sufficient if solar exposure is insufficient?

Worldwide, there are many people who suffer from vit D insufficiency, which has been classified as an epidemic. Globally, VDD impacts around a billion individuals (Teshome et al., 2021). Rickets is a common side effect of children's vit D deficiency, and women's vit D accumulation is inadequate. The high prevalence of rickets is attributed to poor nutritional vit D fortification and insufficient solar exposure, particularly in breastfeeding infants (Nair & Maseeh, 2012). The cause of rickets is also associated with maternal vit D deficiency brought on by solar avoidance and insufficient nutritional vit D intake (Holick, 2006; Sahay & Sahay, 2012).

There hasn't been any new study contrasting the vit D state of mothers suffering from rachitic and non-rachitic infants despite these associations. We looked at the vit D condition as well as societal risk variables that are relevant for rachitic and non-rachitic kids, to examine the prediction that decreased blood levels of 25-hydroxyvit D would be found in young mothers of rachitic infants and a greater incidence of vit D insufficiency related through normal women.

Materials and Method

Ethical Statement

The present study was authorised by the Nowshera Medical College's ethical committee in Peshawar. Before enrolling the newborns, parents were asked for both vocal and written informed permission. Those who had rickets or a vit D deficit received treatment.

Study Design

A cross-sectional observational research was conducted in the Nowshera Medical College's Biochemistry Department from July 2021 to June 2022 with the Ethical Committee of Peshawar's Nowshera Medical College's permission to ascertain the vit D level of 40 mothers and kids with rickets caused by vit D insufficiency who were selected using a random selection method.

Data Collection

Up until the main study's sample size was reached, we successively recruited the babies present at the preemie clinic. The main goal of the research was to count the number of premature babies who visited the preterm/low birth weight centre who had metabolic bone disease. Using a case report form that had been thoroughly evaluated, the lead researcher and experienced study aides gathered the data (CRF). The Director or the study aide verified the kids' qualifications and obtained their permission. Antenatal, natal, and postoperative histories of the woman and child were selected as factors on a CRF that was given by an investigator. The CRF also recorded information about the child's diet and the number of times per day that the kid is subjected to sunshine. Each kid underwent a thorough medical check as well. Iron pills and nutrient injections, which are standard treatments at the preemie centre, were recommended.

Mothers were questioned about the ethnic, social, dietary, and sun radiation traits of their offspring. A juvenile endocrinologist was one of the co-investigators who evaluated the case report form for content veracity after it was created by

the main investigator. Standard clinical inquiries like the child's age, sex, baby weight, blood vit D level, radiological signs of rickets, mother's age, schooling, signs of HIV, and nursing status were all included in the CRF.

Blood samples from mothers and children were collected. Before having biochemistry tests, the infant's mother and other family members provided their consent. These tests included testing the blood amounts of calcium, basic phosphate, alkaline phosphatase, and calcium by auto analyser as well as 25-OHD by ELISA.

The comparative group consisted of a random selection of mothers with babies clear of rickets. The relevant clinical characteristics, vit D levels in rachitic and non-rachitic newborns, and mothers' vit D status were all investigated using nonparametric statistical methods. To perform the metabolic assays for calcium, phosphorus, and 25(OH)D, blood was taken from the limb vessels. The Electrochemiluminescence (Elecsys) vit D test, which detects vit D amounts in the range of 4-100 ng/ml, was used to assess vit D level.

To check for radiological signs of rickets, all children had wrist radiographs taken. An expert physician who was oblivious to the laboratory findings reviewed the radiographs.

Results

In the present study, there were a total of 70 participants, 50 of whom were classified as non-rachitic, and 40 of whom were classified as rachitic. In both the non-rachitic (61%) and rachitic (51%) categories, the majority of the participants were male infants. The majority of the participants were male newborns. The amount of physical surface interaction that occurred while the children were outside, the median age of the children in the research, and the distribution of the children's gender were all equivalent. In contrast, children who were diagnosed with rachitis had extended breastfeeding intervals (P value of.005), less exposure to sunlight (P value of.002), and a lower proportion of vit D treatment (P value of.001) as shown in table 1.

Table 1. Analyzing children's Demographic Information

Demographic details	Non-Rachitic (n=50)	Rachitic (n=40)
Gender (M).	31 (61%)	20 (51%)
Age (mo.)	14.0	14.5
No. still breast-feeding	30 (59%)	36 (93%)
No. received vit D supplementation	20 (39%)	4 (9%)
Sunshine exposure	46 (0-120)	0 (0-60)

Rachitic children and their mothers had significantly lower serum 25-OHD concentrations than controls (P .002) compared to controls. Vit D deficiency affected nearly 91% of infants and their mothers with rachitic disease, compared to non-rachitic moms and their kids, who were 53% and 23% respectively, correspondingly (P =.002). The blood amounts of phosphate and calcium were lower in kids suffering from rachitic but greater in mothers and kids suffering from rachitic (table 2).

Table 2. Biochemical Analyses (Median and Quartiles)

Biochemical Test	Children s values		P value	Maternal values		P value
	Non-Rachitic (n= 50)	Rachitic (n = 40)		Non-Rachitic (n = 50)	Rachitic (n = 40)	
Serum P (mmol/L)	2.55 (2.47, 1.62)	1.08 (0.88, 1.14)	0.002	1.04 (0.85, 1.14)	2.03 (0.90, 2.17)	0.99

Serum Ca (mmol/L)	.41 (3.26, 3.51)	3.33 (2.99, 3.46)	0.002	2.29 (2.2, 2.39)	3.29 (3.30, 3.35)	0.80
Serum 25-OHD Concentrations (nmol/L)	44.9 (26, 65.4)	9.0 (4.9, 16.4)	0.002	24.0 (16, 33.8)	14.3 (9.8, 18.8)	0.002
Serum alkaline phosphatase (iU/L)	168 (130, 220)	846 (652, 1175)	0.002	76 (59, 97)	90 (78, 106)	0.022

There was a positive correlation found between the quantities of 25-OHD found in the blood of mothers and children. When the relationship was made based on age, the correlation continued to exist: 1 year (r = 0.40, P =.013); age greater than 1 year (r = 0.46, P.002).

Discussion

There is no question that toddlers and expectant women frequently have low amounts of 25(OH)D, which can cause VDD rickets and hypocalcaemia. The potential roles of vit D in foetal development, particularly bone mineralization, and maternal health have also drawn more attention in recent years. But as of right now, the vast majority of evidence is empirical in character and isn't yet backed up by reliable information from experimental studies. Nevertheless, there are a lot of current studies that will soon advance our knowledge and comprehension. In this study, we found that the Rickets-affected moms had vit D deficiency in 98% of cases, compared to 53% of mothers of infants without rickets. Despite the nearly ubiquitous use of vitamin D supplements, mothers and their offspring still shared comparable amounts of the vitamin. Infants in this group may not be getting enough vitamin D from their vitamins (100-200 IU) because they spend so little time outdoors. In addition, it's conceivable that many of the subjects had poor fidelity to the vitamin treatment despite the fact that attendance was not evaluated. However, it is reasonable to regularly dose with 400 Mg of cholecalciferol per day during pregnancy and youth, as advised by many international recommendations (Moon et al., 2020).

Additionally, there is evidence to support the idea that certain traits, including genetic factors, affect a person's response to supplementation, though these factors are currently not typically taken into account when recommending whether a higher level of supplementation is necessary for a given person. Future studies to develop fortification regimens based on these traits are required as we enter an age of personalised medicine, but perhaps more significantly, strategies to ensure nutrition start and retention need to be a top concern. 25(OH)D is able to pass the placenta from mother to baby in the early stages of pregnancy. Serum 25(OH)D amounts in umbilical blood are a good indicator of the vitamin D reserves in the developing embryo and newborn. Therefore, an appropriate vitamin D status at delivery can be ensured by a sufficient vitamin D status during pregnancy. Multiple reports show that the 25(OH)D content in foetal cord blood remains stable between 60% and 85% of the mother value (Dawodu & Wagner, 2012). Therefore, prenatal exposure to a lack of vitamin D caused by mother VDD puts newborns at risk.

In spite of regular and plentiful weather, VDD has remained a public health concern with a high incidence in many Asian nations (Fiscaletti et al., 2017). In Pakistan, VDD in moms is not regarded as unusual. Additionally, it is well known that dietary VDD can result in rickets. It is now clear that the progress of rickets in newborns and children is positively correlated with the vit D status of women during pregnancy and nursing. According to a recent research, the mother's vit D status plays an important role in determining the baby and child's future vit D status and chance of developing VDD (Jung et al., 2021). This research

shows that the majority of nursing moms who came in with their rachitic infants had VDD themselves.

Women and moms of rachitic infants have very low blood 25-OHD amounts in other high-risk groups (Krishnaveni, 2020). Recent research has defined the lower normal range for adults as blood 25-hydroxyvit D_3 values of 60 to 70 nmol/L and only two of the control moms and none of the mothers of rachitic infants have normal vit D status. Even worse, blood 25-OHD amounts in nearly all rachitic moms and 50% of the subjects were commensurate with year-round solar exposure.

The second-line examination of rickets is currently advised by some writers to include a research of the vit D state of unborn children (Werneke et al., 2021; Singh et al., 2019; Marazziti et al., 2021). In light of these results, we advise regular treatment for rickets children in communities at high risk of vit D deficiency to incorporate an assessment of prenatal vit D status as well as suitable remedial measures. Interestingly, osteomalacia therapy was necessary for four of the moms of rachitic infants. If these women had not taken part in the research, their diagnoses might have been overlooked or postponed, suggesting that postpartum osteomalacia is underdiagnosed. If more sunshine exposure cannot be promoted, it is obvious that eradicating vit D insufficiency in females particularly in mothers of rachitic kids involves initial diagnosis and a prenatal vit D prescription programme. A thorough approach to ensuring sufficient vit D reserves in moms and children could have a major public health effect on their wellbeing.

Conclusion

In both the non-rachitic (61%) and rachitic (51%) categories, the majority of the participants were male infants. The amount of physical surface interaction that occurred while the children were outside, the median age of the children in the research, and the distribution of the children's gender were all equivalent. In contrast, children who were diagnosed with rachitis had extended breastfeeding intervals, less exposure to sunlight, and a lower proportion of vit D treatment. Contrary to mothers of kids without rickets, expectant mothers of rickets-affected kids have VDD.

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