

# IONIZED CALCIUM AND 25-HYDROXYVITAMIN D<sub>3</sub> IN CHILDREN WITH STEROID-SENSITIVE NEPHROTIC SYNDROME



Yasmine Ashraf Abdelmeguid<sup>1</sup>, Omneya Magdy Omar<sup>1</sup>, Ola Atef Sharaki<sup>2</sup>,  
Mahmoud Mohi El-Din El Kersh<sup>1</sup>

<sup>1</sup>Department of Pediatrics, Faculty of Medicine, University of Alexandria, Egypt

<sup>2</sup>Department of Clinical and Chemical Pathology, Faculty of Medicine, University of Alexandria, Egypt

## INTRODUCTION

- Nephrotic syndrome (NS) is one of the most frequent glomerular pathological conditions seen in children.<sup>(1)</sup>
- Hypocalcemia is a common feature in NS patients. It was initially attributed to hypoalbuminemia leading to reduction of protein-bound calcium.<sup>(2)</sup> It may also relate to low ionized calcium levels due to loss of vitamin D-binding protein and 25-hydroxyvitamin D<sub>3</sub> (25-OHD).
- Steroid-sensitive nephrotic syndrome (SSNS) are only intermittently proteinuric. Consequently, concern regarding vitamin D nutritional status in NS has focused on treatment of steroid-resistant nephrotic syndrome (SRNS), with its persistent proteinuria, rather than SSNS.<sup>(3)</sup>
- Before children with NS can be considered candidates for routine 25-OHD screening, the prevalence of low 25-OHD levels in this population should be confirmed.<sup>(4)</sup>

## OBJECTIVE

- To study the level of 25-OHD during the active stage of the disease and serum ionized calcium during the active stage and after remission in SSNS.

## PATIENTS & METHODS

- A case-control study conducted on 20 children with first episode of SSNS attending Alexandria University Children's Hospital (AUCH) compared to 20 healthy children as a control group.
- Age of the patients included in the study ranged between 2.0 and 5.90 years (mean  $3.60 \pm 1.54$  years). There were 15 (75%) males and 5 (25%) females.
- Serum ionized calcium, total calcium, serum phosphorus, alkaline phosphatase (ALP), serum albumin, total protein, parathormone (PTH), 25-OHD, spot urine protein/creatinine (Pr/Cr) ratio were measured during the active stage of the disease and serum ionized calcium was repeated after remission.
- Vitamin D deficiency (VDD) was defined as 25-OHD level  $\leq 20$  ng/ml, severe VDD  $\leq 5$  ng/ml, vitamin D insufficiency 21-29 ng/ml, and vitamin D sufficiency  $\geq 30$  ng/ml.
- The study was approved by the Research Ethics committee in Alexandria University and informed consent was obtained from enrolled patients.

## RESULTS

- Children with active SSNS had low ionized calcium, low serum 25-OHD levels, high phosphorus and low ALP levels versus controls.
- All of NS patients in the present study had VDD, 80% of which had severe degree (Fig.1).

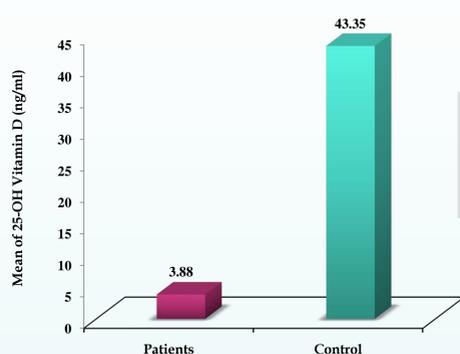


Figure 1: Comparison between the patients' group in the active stage of disease and the control group according to the level of 25-OHD

- Eighteen out of the 20 SSNS patients (90%) had low serum ionized calcium levels during the active stage of the disease. After remission, ionized calcium level increased and only 8 patients (40%) were still hypocalcemic with the lowest level being 4.3 mg/dL (Fig.2).
- However, both were significantly lower than the control group.
- Two patients had history of tetany during the active stage of the disease with serum ionized calcium levels 4.1 and 4.5 mg/dl (although their ionized calcium was not the least value among the patients).

- The mean level of serum PTH was higher in SSNS during the active stage of the disease compared to the controls but only 30% of the patients had secondary hyperparathyroidism with PTH levels  $> 65$  pg/ml.
- Serum ionized calcium was negatively correlated to spot Pr/Cr ratio in urine ( $r = -0.565$ ,  $p = 0.009$ ) (Fig.3).

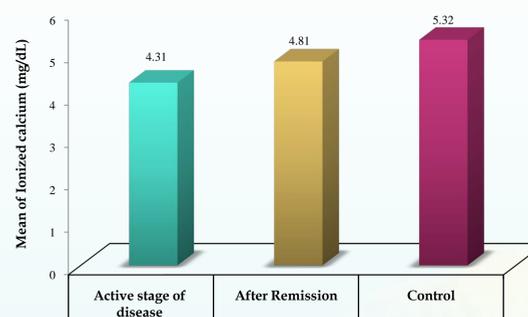


Figure 2: Comparison of serum ionized calcium levels between the patients' group (during active disease and remission) and the control group

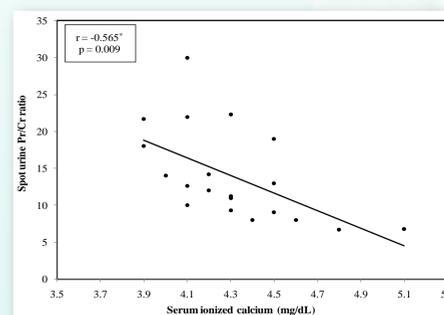


Figure 3: Correlation between serum ionized calcium (mg/dL) and spot urine Pr/Cr ratio in patients' group (n = 20)

## CONCLUSIONS

- Children with SSNS are at risk of VDD and hypocalcemia, therefore further research will be needed to prove the need of vitamin D supplementation to reach normal levels of 25-OHD and to prevent the occurrence of possible complications.

## REFERENCES

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