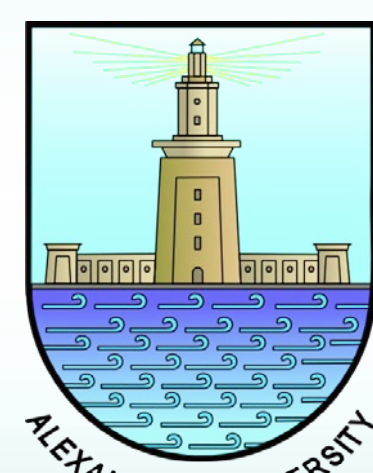


IONIZED CALCIUM AND 25-HYDROXYVITAMIN D₃ IN CHILDREN WITH STEROID-SENSITIVE NEPHROTIC SYNDROME



Yasmine Ashraf Abdelmeguid¹, Omneya Magdy Omar¹, Ola Atef Sharaki²,
Mahmoud Mohi El-Din El Kersh¹

¹Department of Pediatrics, Faculty of Medicine, University of Alexandria, Egypt

²Department 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.⁽¹⁾
- Hypocalcemia is a common feature in NS patients. It was initially attributed to hypoalbuminemia leading to reduction of protein-bound calcium.⁽²⁾ It may also relate to low ionized calcium levels due to loss of vitamin D-binding protein and 25-hydroxyvitamin D₃ (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.⁽³⁾
- 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.⁽⁴⁾

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 ± 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 ≤ 20 ng/ml, severe VDD ≤ 5 ng/ml, vitamin D insufficiency 21-29 ng/ml, and vitamin D sufficiency ≥ 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).

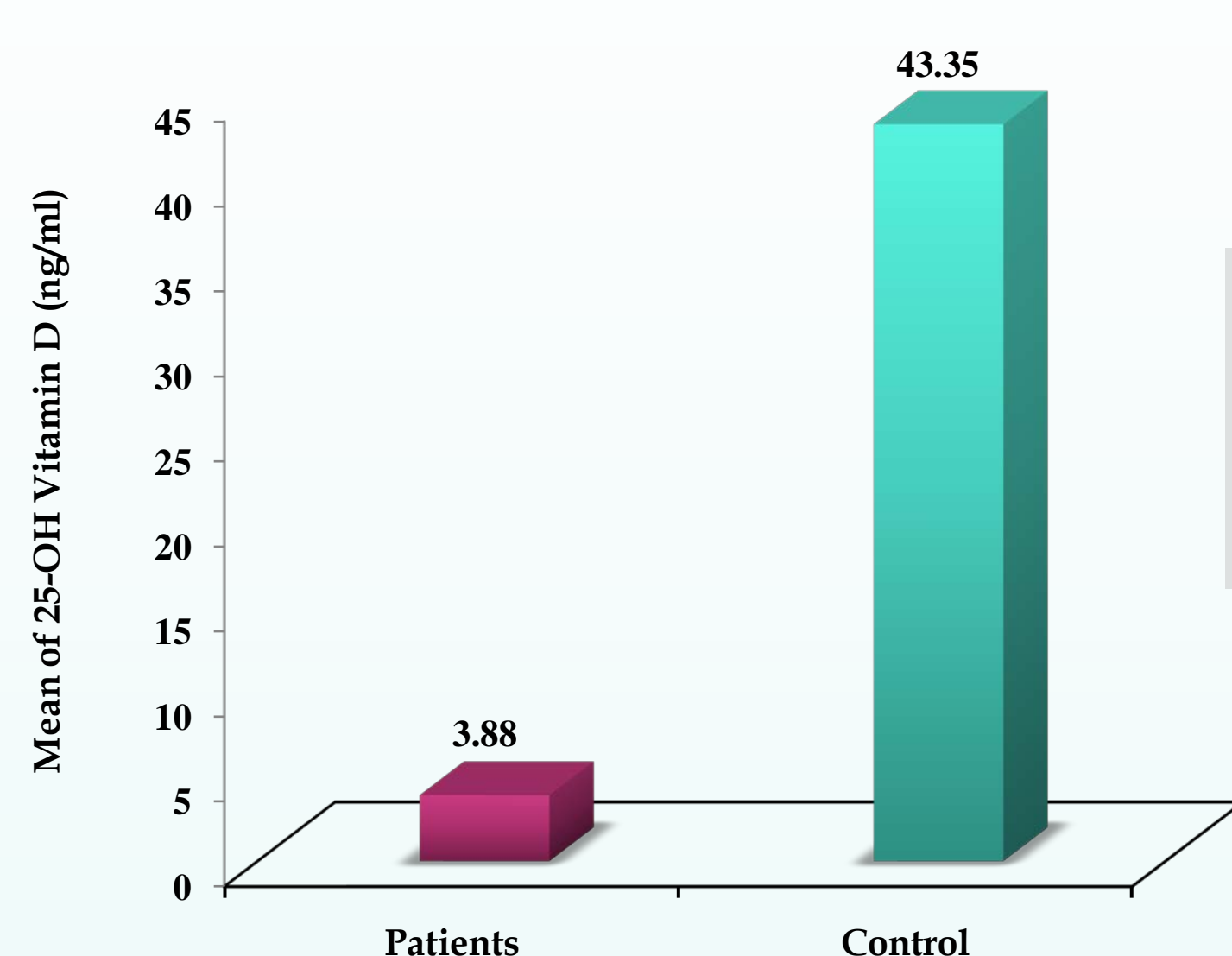


Figure 1: Comparison between the patients' group in the active stage of disease and the control group according to the level of 25-OHD

- 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).

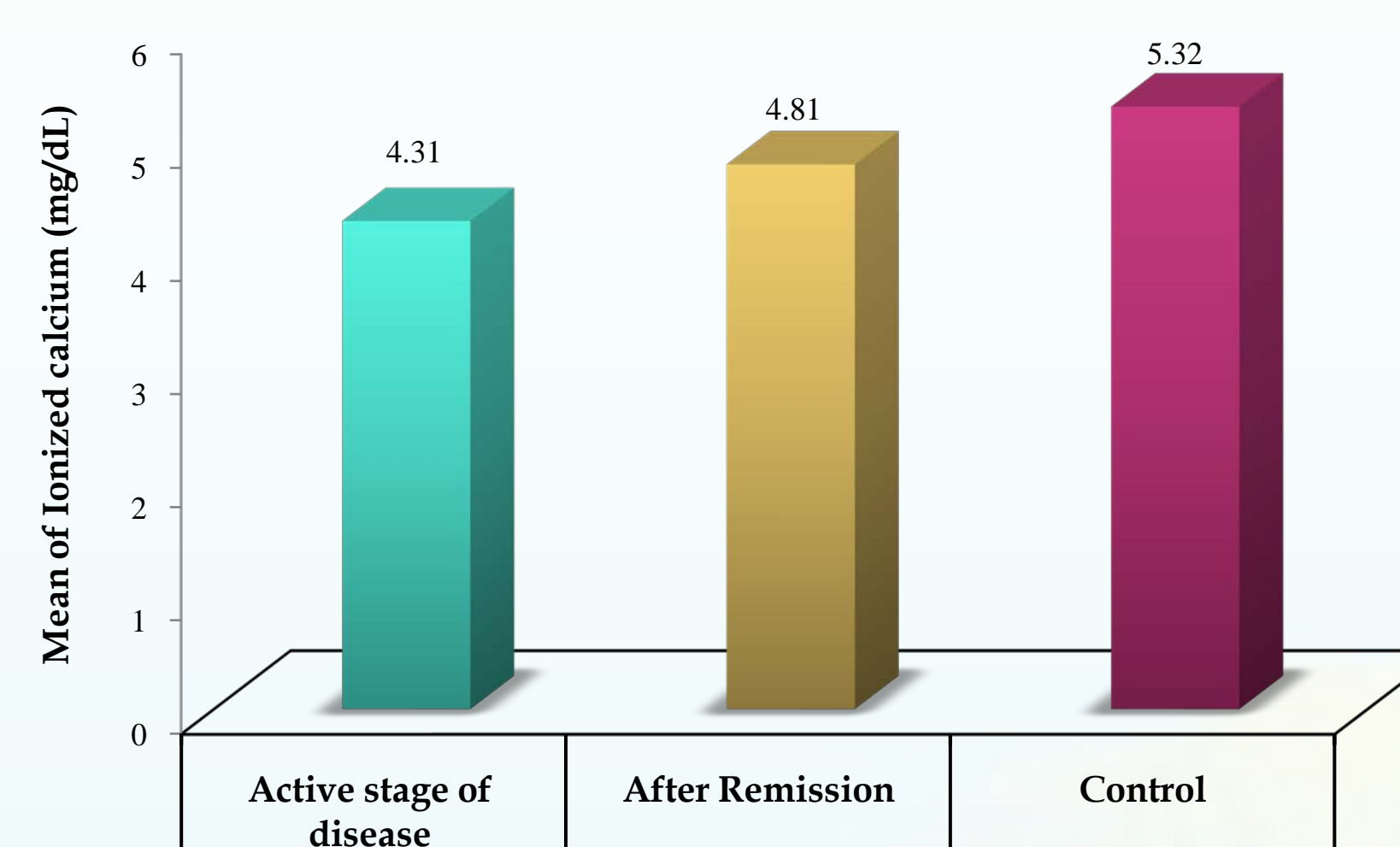


Figure 2: Comparison of serum ionized calcium levels between the patients' group (during active disease and remission) and the control group

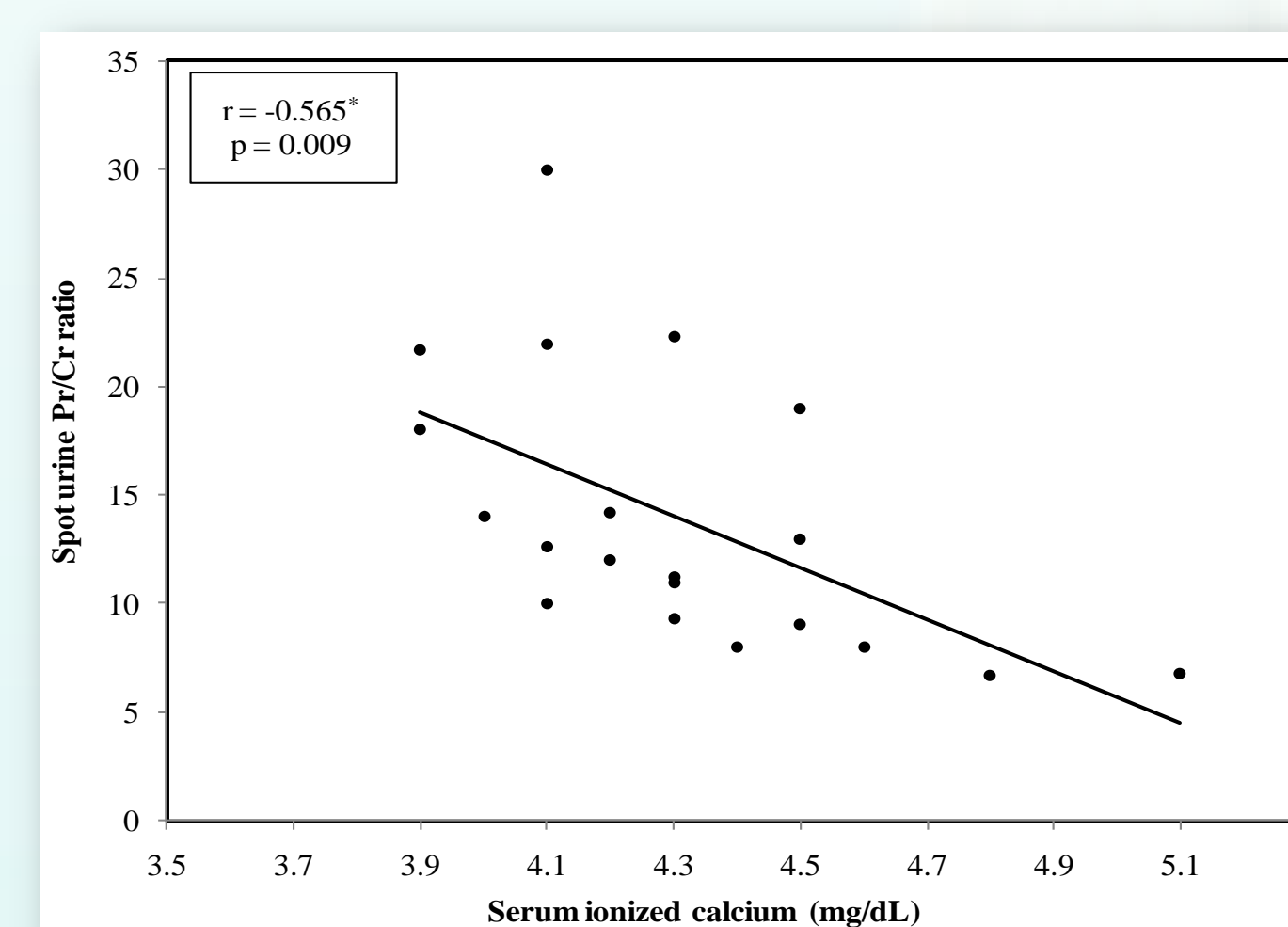


Figure 3: Correlation between serum ionized calcium (mg/dL) and spot urine Pr/Cr ratio in patients' group (n = 20)

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

1. Bhimma R. Steroid sensitive nephrotic syndrome in children. J Nephrol Therapeutic 2014; S11: 003.
2. Viola IW, Dida AG, Nanan S. Relationship between serum ionized calcium and serum albumin level in children with idiopathic nephrotic syndrome. Paediatr Indones 2010; 50: 361-4.
3. Alon US. Vitamin D metabolites in childhood nephrotic syndrome. Pediatr Nephrol 1995; 9: 791-2.
4. Eldar GJ. Nephrotic syndrome: Don't forget the bones! Nephrology 2008;13:43-4.

