Vitamin A is available in dietary sources as either preformed vitamin A or as provitamin A carotenoids. It is well recognised that lack of vitamin A is the cause of xerophthalmia, keratomalacia and blindness. Vitamin A deficiency is common in preschool children and pregnant ladies, but is rare in adult population. In renal disease and on patient on hemodialysis, there is increase in plasma retinol concentration. We report a case of vitamin A deficiency, who is an adult on maintenance hemodialysis for diabetic nephropathy. He was treated with oral vitamin A supplementation.

Case report

63 year old gentleman who is a known case of Type 2 Diabetes mellitus since 33 years, diabetic nephropathy, diabetic cystopathy, diabetic neuropathy, benign prostatic hyperplasia, chronic obstructive pulmonary disease and hypothyroidism now in end stage renal failure and on thrice a week maintenance hemodialysis since 1 year, presented with the complaint of defective night vision for 3 weeks duration. He was not on any oral vitamin supplementation and complained for anorexia. He was malnourished with BMI of 17 kg/m2 and sr albumin 2.6 gm/dl.

His best corrected visual acuity was 6/9, near vision was N6 in both eyes. On Slit lamp examination there was conjunctival and corneal xerosis, Bitots spots were seen on both temporal and nasal side of interpalpabral conjunctiva. Punctate staining of cornea was seen in fluorescein staining. pupil were normal, PCIOL in place. fundus was normal. Since he had night blindness, Bitots spots, conjunctival and corneal xerosis he was diagnosed to have vitamin A deficiency. Serum levels of Vitamin A(retinol) and retinol binding protein was done in this patient which were 64 mcg/dl(normal 38-98 mcg/dl) and 5.3 mg/dl(normal 1.5-6.7 mg/dl) respectively. He was started on oral vitamin A supplementation 25,000 IU OD x 3 days in addition to dietary supplementation of vitamin A rich food.

He reported gradual improvement in his vision, he was re-evaluated after one month. There was significant improvement in night vision. Ocular surface also showed significant improvement.

Discussion

Vitamin A deficiency and its manifestations is known in children in developing countries. Vitamin A deficiency in adults is very rare. Vitamin A deficiency in patients on maintenance hemodialysis patients is not known and has not been reported so far. Vitamin A supplementation recommended for patients with xerophthalmia is a dose of 200,000 IU on day 1, day 2 and after 2 weeks.

In patients with end stage renal disease, Vitamin A deficiency is rare, as the serum retinol binding protein(RBP) levels are high. Hypervitaminosis is common in patients on maintenance hemodialysis, so we expect a higher value in patients on dialysis but in this case we had normal values for Serum RBP and serum retinol levels.

Chronic renal failure patients exhibits high Vitamin A levels due to diminished metabolism of retinol to retinoic acid, which is a function of the kidney and increased concentrations of retinol-binding protein.1,2

There was a significant elevation of plasma retinol and dialysis failed to normalise this level.4,5,6

The vitamin A concentration is known to be higher in these patients compared to the general population where elevated vitamin A concentrations are associated with adverse outcome. A strong association of low retinol and RBP4 concentrations to all-cause mortality in diabetic haemodialysis patients is seen.7

Wide discrepancies exist in the use of vitamins in kidney disease, and evidence-based recommendations are sparse. Water-soluble vitamin levels may be inadequate in patients not receiving supplements and this may be associated with increased mortality, which deserves further attention to increase strength of evidence. Supplements should be administered cautiously as renal mechanisms to prevent hypervitaminosis are no longer functional. The most reliable assays for vitamin status examine tissue mechanisms that rely on vitamins as cofactors.8, Chronic hemodialysis patients require nutritional evaluation and regular dietary counseling to improve the protein and energy intake. Regular supplementation of vitamin B complex is required, whereas, vitamin A supplementation must be prohibited in chronic hemodialysis patients.9

In patients undergoing dialysis, inadequate removal of urea may contribute to anorexia and poor oral intake; these conditions may sometimes go unrecognized because we accept a low serum urea concentration as evidence of adequate dialysis even though it can be a sign of malnutrition. Measurement of urea kinetics is helpful in identifying patients...
in whom malnutrition is a problem.

Vitamin A deficiency results in the replacement of mucus-secreting cells by keratin producing cells in tissues throughout the body. Xerophthalmia (dry eyes) occurs after the dropout of conjunctival mucus-secreting goblet cells, and secondary irritation and infection often supervene. A description of night blindness might have been an earlier clue to the cause. Infection may well have been present as a complication of the xerophthalmia. In addition to the loss of the normal epithelial barriers, patients with vitamin A deficiency also have several alterations in their humoral and cellular defense mechanisms. Vitamin A was long ago labeled the “anti-infective” vitamin, on the basis of the increased number of infections noted in patients and animals with vitamin A deficiency. Even Bitot’s spots, the textbook eye lesion in vitamin A deficiency, have infection as part of their source. They represent a massive accumulation of bacterial organisms and keratin debris on the cornea. Topical antibiotic treatment eliminates this clue to the diagnosis.10

Uremia could be associated with functional vitamin deficiency, maintaining high plasma vitamin levels by adequate nutrition and tolerable supplementation would be beneficial in end stage renal disease (ESRD) patients.11

Chronic hemodialysis patients require nutritional evaluation and regular dietary counseling to improve the protein and energy intake and prevent vitamin deficiency.
References

1. ALBERT & JAKOBIEC chapter 335, page 4579-4584

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