

**Case Report****Micronutrients: Trace Yet Grave***Satam Kasturi M¹, Mala Dixit Baburaj²*¹*Postgraduate student, Department of Periodontics, Nair Hospital Dental College, Mumbai*²*Professor & Head, Department of Periodontics, Nair Hospital Dental College, Mumbai***How to cite:** *Satam K¹ et al, Micronutrients: Trace Yet Grave, Int J Perio Rehab. Volume 2023, Article ID 23154004, 7 pages**Received: 05.05.2023**Accepted: 30.05.2023**Web published: 21.06.2023***ABSTRACT:**

Periodontal disease is a multifactorial phenomenon resulting from various interactions between the host and its surroundings. Tissue destruction is caused mainly by the body's exaggerated immune response to microbes. Various factors have the power to modulate this response and hence modify the disease progression. One of these factors is the presence of trace elements in the body. Apart from the macronutrients which are the main source of energy, there are various micronutrients present in the body which are mainly classified as vitamins and minerals. Although present in small quantities, their deficiency can have a huge impact on one's body. The following case report describes a case in which oral supplements of micronutrients along with traditional non-surgical periodontal therapy paved the way for improvement in the periodontal status.

Keywords: Non-surgical periodontal management, Micronutrients, Iron, Ascorbic acid, Folic Acid

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Nair Hospital Dental College, Mumbai Central, Mumbai.**Email: kasturisatam18@gmail.com***INTRODUCTION**

Periodontitis is a complex immunoinflammatory disease [1]. It is the result of interaction between variety of factors and in which the exact causal mechanism of the disease still remains an enigma. Non-surgical periodontal therapy remains the gold standard of treatment [2]. A variety of adjuncts are used along with non-surgical periodontal therapy to improve

the prognosis of the diseased dentition, micronutrient supplements being one of them. These micronutrients are a part of structural moieties of the cell and help in transport of substances at the molecular level [3]. They also act as cofactors to various enzymes present in the body.

Micronutrient deficiencies can be precipitated due to various factors like [4]

- Malabsorption
- Loss of large amounts of fluids from the body like in case of major surgeries or burns
- Drugs
- Increased requirements during growth and pregnancy
- Systemic disorders
- Lifestyle factors like smoking and drinking

In order to overcome these micro nutritional deficiencies diet modification is a must. Diet change will provide a slower and gradual change in the nutrient reserve of the body. Therefore, in severe cases of disease, micronutrient supplements along with diet counselling is advised for a quicker recovery. The following case report describes one such case in which oral supplements of ascorbic acid, folic acid and iron lead to a drastic change in the periodontal condition.

CASE REPORT:

A 37 years old female patient reported to the Department of Periodontics, NHDC, Mumbai with the chief complaint of swollen gums and generalized mobility in teeth. The patient gave no contributing medical and habit history. The patient was advised a complete blood count and blood glucose investigations. The blood investigations revealed a reduced hemoglobin value of 7.5 g/dl and reduced erythrocytes. However, the various other cell counts and blood glucose investigation revealed a normal value.

Intraoral examination - Intraoral examination revealed extensive soft deposits on all teeth. Generalized spontaneous bleeding and pus discharge from gums was noted with respect to several teeth. Several posterior teeth and lower central incisors were missing which were extracted in the past year due to increased mobility. Gingiva showed erythema with loss of stippling. Generalized periodontal pockets with average clinical attachment loss of 7-8mm was noted. OPG dated one week back revealed severe horizontal bone loss.

Treatment - Patient was educated regarding her oral condition and after consenting for treatment, a thorough supra and subgingival scaling was performed. Oral hygiene instructions were reinforced. 0.2 % Chlorhexidine mouthwash was prescribed twice a day for 2 weeks and a suitable brushing technique was demonstrated. Oral supplements of folic acid, ferrous ascorbate and chewable vitamin c tablets were prescribed for a period of one month. Diet counselling was done. Grade III mobile hopeless prognosis teeth were extracted once the hemoglobin level was within the normal limits. Quadrant wise curettage was performed in the subsequent appointments.

Follow-up - At the end of two months significant improvement was noted in the periodontal status.

Removable prosthesis was fabricated for the missing teeth. Patient was motivated with the results and is currently under maintenance therapy.



Fig 1: Pre-operative status



Fig 2: 2 months post-operative status



Fig 3: Complete rehabilitation of the patient

DISCUSSION:

Vitamin C and periodontitis - Vitamin C also known as ascorbic acid is a water-soluble vitamin supplied through the

diet [5]. It is one of the main antioxidants present in the body and the redox reaction that takes place is responsible for all the functions of this vitamin. Its daily requirement is about 60-70 milligrams. Various functions of vitamin C include:

1. Collagen synthesis: by increasing the transcription of procollagen genes Hydroxylation on proline and lysine residues
2. Functions as an electron donor for various enzymes: (Antioxidant property)
3. Osteoblast and lymphocyte differentiation
4. Tyrosine and Tryptophan metabolism
5. Norepinephrine (noradrenaline) synthesis.
6. Increases absorption of Fe and maturation of RBCs

The relationship between vitamin C and periodontal pathology has been described historically since the 18th century, when during maritime trading and exploratory seafaring, sailors suffered from scurvy. It was associated with gingival bleeding and tooth mobility. Clinically, scurvy is diagnosed when serum ascorbate levels fall below 11 μM , with the normal range being 23-50 μM . The etiologic relationship between Vitamin C and periodontal disease was described in the early 1980s by Woofle et al [6].



Evidence showed that plasma levels of vitamin C were correlated with serum antibodies against *Aggregatibacter actinomycetemcomitans* and *Porphyromonas gingivalis* [7]. According to Jacob et al vitamin C depletion resulted in gingival bleeding irrespective of oral hygiene performance. Similarly, a sufficient vitamin C level may contribute to a healthy gingival homeostasis, despite bacterial challenge [8]. Vitamin C slows and prevents periodontal disease by causing differentiation of the periodontal ligament progenitor cells [9]. de Jong TM et al (2014) and Stratakis CA et al (2000) stated that in patients with periodontitis a single variation (nucleotide polymorphism) in the gene *SLC23A1* that codes for a transmembrane vitamin C transporter was associated with aggressive periodontitis in German and Dutch population. Also depleted serum vitamin C level amplifies the rapid tissue destruction seen in patients with aggressive periodontitis [10][11]. Various studies described the role of vitamin C in the etiopathogenesis of periodontitis. A few studies also illustrated the role of increase in dietary vitamin C leading to an improved periodontal condition like a longitudinal study by H. Staudte (2005) linked the consumption of vitamin C rich grapefruit to improved plasma concentrations of vitamin C and decreased sulcus bleeding score [12]. According to another study intradermal and sub-epithelial vitamin C injections was used as an adjunct with surgical and non-surgical treatment of periodontal diseases (U. Raghavendra, et al.2018) [13].

Folic Acid and periodontitis - Folic acid (B9) belongs to a family of 8 water soluble vitamins necessary for metabolism,

muscle development, erythrocyte production, and collagen synthesis. It is obtained from diet as well as is synthesized by gut microflora and is required in the range of 6–20 ng/ml. The majority of FA in the diet are destroyed during processing, canning, and cooking [14]. Its daily requirement is 200µg and its deficiency is related to

1. absence of keratinization of the gingival surface
2. decreased cell turnover rate
3. diminished resistance to infections
4. destruction of gingival and periodontal tissues without inflammation.

In Smokers deficiency of FA can occur even with regular dietary intake due to additional utilization of folic acid to convert the compounds in cigarette smoke into biologically inactive compounds [15]. A R Pack evaluated the effect of a folate-containing mouthwash in patients with gingivitis and periodontitis. His results showed that case group patients exhibited reduced bleeding on probing as well as less gingival inflammation than control group.

Anemia and periodontitis - Periodontitis, a chronic inflammatory disease results in a reduction in a number of erythrocytes [16], subsequently leading to reduction in the hemoglobin level. Infection is associated with profound disturbances in iron metabolism. Pro-inflammatory cytokines inhibit proliferation and differentiation of erythrocyte progenitors, modulate iron metabolism and suppress erythropoietin production. Anemia is a common and serious health disorder in our country among both sexes and all age groups. Iron deficiency anemia causes aberrant bone morphology and microarchitecture which cause decrease in alveolar bone density [17]. According to a study by Yamamoto et al, progression of periodontal disease is associated with a decrease in erythrocyte counts. Furthermore, improvement in hematological parameters up to 6 months following nonsurgical periodontal therapy of patients with chronic periodontitis was reported [18].

CONCLUSION:

An immune response to bacteria and their products in periodontitis induces a major vascular response, causing interactions between periodontal infection and a variety of systemic disorders. Nutrition has significant effects on the inflammatory processes as well as on the cellular and humoral immune mechanism [19]. Hence, we can conclude that not only the deficiency micronutrients accelerate the disease process but also that the replenishment of these micronutrients can revert disease state back to health.

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