Nutritional Assessment in Temporomandibular Disease: Creating an Awareness on Systemic Impact of Temporomandibular Disorder in Saudi Population

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Introduction

Temporomandibular disorder (TMD) is a multifactorial disorder often confused with other musculoskeletal disorders associated with different parts of the body. TMD has been defined as “functional disturbances of masticatory system.” It also includes masticatory muscle disorders, degenerative and inflammatory temporomandibular joint (TMJ) disorders, and TMJ disc displacements. Stiffness and pain in neck muscles, TMJ and masticatory muscles leads to poor mastication, irritation, and inflammation of the TMJ. Its a complex process associated with TMJ, muscular, hormonal, behavioral, psychogenic, genetic, and neurogenic factors. The management is usually medical and dental. There is enough literature on etiology, clinical features, pathophysiology, diagnosis and management of TMDs. However, not much has been investigated about nutrients and its relation with TMDs.

Materials and Methods

After obtaining ethical clearance from the Research Committee, Riyadh Colleges of Dentistry and Pharmacy (RCsDP), the study was conducted in the Department of Oral Diagnostics and Maxillofacial Surgery, RCsDP, Riyadh Saudi Arabia. This includes 67 male/female TMD patients with an average age of 45 years (age range 25-55 years). Routine clinical examination was done for nutritional deficiencies (depression, irritability, anorexia, loss of taste, smell, fatigue, abdominal cramps, generalized malaise, anaemia, aphthous ulcers, stomatitis, enamel hypoplasia, glossitis, pallor, cheilosis, hair loss, dry hair, brittle nails, and poor wound healing) following medical history. The patients were then subjected to standard blood assays for serum analysis of iron, ferritin, magnesium, vitamin A (beta carotene), vitamin D, vitamin B1, vitamin B6, B12, and vitamin C. Fasting was not advised before blood investigation. Laboratory results were compared against standard values and categorized as normal values and low values. Following nutritional and clinical assessment, a dietary counseling and appropriate treatment was followed up to improve patient well-being.

Statistical analysis

Data were analyzed using SPSS Pc+ 21.0 version statistical software. Descriptive statistics (frequencies and percentages) were used to describe the categorical study and outcome variables.
**Exclusion criteria**

- Trigeminal neuralgia,
- Odontogenic pain,
- Sinus pain,
- Developmental abnormalities, and
- Eagle’s syndrome.

**Results**

Among 67 TMD patients evaluated for clinical signs and symptoms of nutritional deficiencies, 87% showed pallor, 61.19% glossitis, 56.71% stomatitis, 44.77% hair loss, 43% cheilosis, and 16.41% brittle nails (Graph 1).

The results of serum micronutrient analysis are statistically significant with 55% of individuals showing low vitamin B complex values (37 of 67 patients), 53.73 (36 of 67 patients) low vitamin D values, 47.76% (33 of 67 patients) (vitamin C levels, 43.40% (29 of 67 patients) showed low iron values, 33.30% (19 of 67 patients) low on ferritin, 28.35% (15 of 67 patients) low zinc levels, 22% (10 of 67 patients) had low folate levels, 8.95% (6 of 67 patients), low magnesium levels, and 5.97% (4 of 67 patients) low vitamin A levels. To summarize, among 67 patients, 37 patients showed nutritional deficiencies (of various micronutrients), constituting 55.22% of nutritional deficiency in temporomandibular disease patients in RCsDP, Saudi Arabia (Graph 2).

**Discussion**

According to Joseph A. Molnar, low micronutrient values may lower the response to metabolic demands; he is of the opinion that even a single micronutrient, such as vitamin C, has the potential to slow down wound healing process in an individual.5

The role of nutrients and minerals in improving the treatment outcome in patients has been well documented. Vitamin A aids in collagen synthesis, bone, and epithelial tissue development. It is required for epithelial integrity and helps in lysosomal stability and glycoprotein synthesis. It is perioperatively supplemented in many patients. Vitamins C, D, B-complex are necessary for repair of damage tissue immune reactions and defend against infections. Vitamin B1 (thiamine) is involved in neurotransmitter synthesis and energy production, while vitamin B6 (pyridoxine) is essential for the synthesis of many proteins, including neurotransmitters. Vitamins B6 (cyanocobalamin) and folate are needed for DNA synthesis, which is essential for cell replication and repair. Vitamin D is required in calcium metabolism6 and its deficiency is associated with periododontal disease, with a considerably higher risk in women (74%) and may lead to autoimmune diseases such as sjogrens syndrome, rheumatoid arthritis, and crohns disease.7 Proteins aid in wound remodeling and iron supports collagen synthesis and improve leukocyte function. Zinc is responsible for DNA synthesis and is used by 300 enzymes for their functions in the body. However, vitamin E shows negative effect in wound healing and its effect on scar therapy is not proven.8 According to Tassman et al., post-operative use of oral bromelain (an extract from pineapple) reduced swelling and pain and improved wound healing. Perioperative supplementation of nutrients hastens healing in TMD patients.9

However, excess amounts of minerals and vitamins may have potential side effects.10 TMD patients not only suffer from chewing and swallowing but also systemic problems such as fatigue, headache, myalgia, loss of concentration, loss of appetite, back pain, and loss of sleep. Many dietary minerals, including iron, calcium, and magnesium, are also considered important factors in bodily functions, especially muscle function, and zinc is essential for cell mitosis and proliferation.

This might lead to nutritional deficiency and may have a negative impact on lifestyle. While examining a TMD patient, assessment of micronutrients is often inadvertently overlooked by clinicians. This could well be a causative factor for idiopathic TMD. Treatment of the same may lie in facilitating a balance of micronutrients in the body. Therefore, the patients need to be advised to visit dentist and physician regularly and follow the routine instructions of brushing in between meals, use of sialogogues to improve salivary flow, jaw exercises to improve mouth opening and take nutritional supplements. It is advisable for the patients to take soft and juicy diet rich in calorie and protein. Medical and dental management adjuvant
to appropriate diet counseling may therefore prove to be beneficial for TMD patients.

Limitation of the study
We assessed few micronutrients related to the general signs and symptoms of nutritional deficiency. In fact, there are many micro and macronutrients which do have influence on the nutritional status of the body. Further research in this area is thus needed.

Conclusion
Malnutrition acts as a cofactor in TMD patients. Proper diagnosis and management in consideration with the systemic health of the patient is quite challenging for both the doctor and the patient. It is therefore essential for the clinician to assess the dietary status of patients with TMD and guide them accordingly. Early recognition and management would hasten healing and improve treatment outcome in these patients.

References