



## Risks and Complications Due to Malnutrition

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### Abstract

According to the World Health Organization (WHO), nutrition is the intake of food in relation to the dietary needs of the body. Good nutrition, understood as a sufficient and balanced diet combined with regular physical exercise, is a fundamental element to maintain a healthy life. A bibliographic review was carried out on the main complications and risks from a dental point of view, in patients with nutritional disorders.

**Keywords:** Malnutrition; Mouth Ulcers; Anemia; Obesity; Oral Cavity

### Introduction

The professional must be very observant from the moment the patient enters the consultation and must see how the patient moves, the physical shape, the characteristics of the skin, among other aspects that can guide you to the nutritional characteristics of the condition. One of the most common risks to which we can be subjected from a young age are nutritional disorders, these have accompanied us since our beginnings, being present even from the beginning of intrauterine life. And this biological process through which organisms absorb the nutrients necessary for life from food and which we call nutrition plays a predominant role in the development of our entire vital process [1,2].

According to the World Health Organization (WHO), nutrition is the intake of food in relation to the dietary needs of the body. Good nutrition, understood as a sufficient and balanced diet combined with regular physical exercise, is a fundamental element to maintain a healthy life [1,2].

Nutrition: Nutrition is the set of processes that are carried out in your body to use the nutrients that are in the foods you eat, it includes ingestion, digestion, absorption, transport, distribution, metabolism, storage and excretion, incorporating and transforming the matter and energy of organisms so that they can carry out three fundamental processes: maintenance of internal conditions, development and movement, thus maintaining the homeostatic balance of the organism at a molecular and microscopic level. Nutrition's main function is to transform and extract the necessary nutrients from the foods we consume and it is through this process that the body generates the energy necessary to maintain the

body and develop its functions. There are two types of nutrition and these are classified as autotrophic and heterotrophic.

### Objective

Describe the main oral manifestations due to nutritional alterations.

### Analysis Strategy

The search is based solely on nutritional alterations and their negative impact on the oromaxillofacial complex.

### Developing

The classification is defined according to the source from which the nutrients we consume are extracted. Autotrophic nutrition refers to feeding on oneself, synthesizing organic substances. 2. Heterotrophic nutrition is the type of nutrition used by living beings that need an already prepared source of food. It is necessary to point out that nutrition is not the same as food: Nutrition refers to the nutrients that make up food, it involves the processes that happen in your body after eating, that is, the obtaining, assimilation and digestion of nutrients by the body. While food is the choice, preparation and consumption of food, which has a lot to do with the environment, traditions, economy and the place where you live [1,2].

Healthy eating meets the nutritional needs that the body needs to maintain good health. In addition, eating healthy protects you from suffering from diseases such as obesity, diabetes and high blood pressure. On the contrary, an "unhealthy" food provides little nutritional value and has many calories since they are usually rich

in fats and sugars. Eating healthy means eating in balanced portions, taking from the 3 food groups, which are: carbohydrates (sugars), fats and proteins (legumes, meat and dairy). Good nutrition depends on a balanced diet that meets the following

- **Complete:** Includes the 3 food groups, when combined they will provide you with the necessary nutrients.
- **Balanced:** Eat appropriate amounts of food, but without excesses.
- **Sufficient:** It attempts to cover the body's needs to ensure its vital functions and allow it to maintain an adequate body weight.
- **Varied:** The combination of different foods will provide you with the vitamins and minerals that your body needs.
- **Suitable for each individual:** Adapt your diet to your needs (age, sex, activity, medical history, body constitution, eating habits, time of year and taste).

Adequate and appropriate nutrition can only be achieved by consuming a balanced diet, made up of a diversity of nutrients, which are the substances contained in foods that nourish the body. A healthy diet allows you to maintain an appropriate and balanced body weight in its composition (the percentage of fat and muscle in the body) and guarantees the ability to carry out daily physical and mental activities. If food consumption is excessive, you are more prone to obesity. Likewise, if large amounts of certain nutrients, usually vitamins or minerals, are ingested, the effects can be harmful (toxicity). If the affected person does not consume enough nutrients, malnutrition may appear, leading to nutritional deficiency disorder [3].

And so it is that the individual who does not have controlled his eating habits can be affected by these factors that cause dissimilar damage to health, which also become eminent risks in the face of other pathologies and in many cases disfavor our procedures and treatments as healthcare professionals. Health in our daily work, because disorders such as malnutrition or malnutrition are protagonists in countless failures in therapies that, if not for them, would be resounding successes. When we talk about malnutrition we refer to deficiencies, excesses and imbalances in a person's caloric and nutrient intake. That is, malnutrition is nothing more than the lack of nutrients in the body, which occurs when the body does not obtain them sufficiently, due to poor diets, digestive disorders and other diseases [4].

It is important to emphasize that, by not eating healthy, malnutrition or malnutrition can occur in people, but it is worth clarifying that the terms malnutrition and malnutrition are not synonymous. Malnutrition is defined as an abnormal physiological condition caused by insufficient, unbalanced or excessive consumption of macronutrients that provide dietary energy (carbohydrates, proteins and fats) and micronutrients (vitamins and minerals) that are essential for growth and development. physical and cognitive de-

velopment. Therefore, it is easy to define that this is nothing more than an unbalanced diet, either due to excess or lack of various components or nutrients that the body needs or whose intake is in the wrong proportions.

It is more common for this disorder to appear in developed regions due to the high rates of obesity and overweight that these countries suffer. Which increases the risk of suffering from an infection or infectious diseases, and also leads to the appearance of chronic diseases. On the other hand, we see that malnutrition occurs when a person has a deficit or lack of nutrients in their body and is caused by little or no food intake, inadequate nutrition, alterations in the metabolic or digestion process, in addition to other factors. as increased excretion of nutrients Malnutrition is a serious disease, mainly caused by an inappropriate diet. That is, the body does not receive enough calories and proteins. Although there are also other elements that cause it, such as poor absorption of nutrients. A malnourished person has a food deficit, that is, they do not eat as much as they should. On the other hand, a malnourished individual can eat even excess food, but it is not healthy [1-3].

#### Causes of malnutrition

- Undernourishment and malnutrition: food intake that is insufficient to meet dietary energy needs.
- Micronutrient deficiencies: are deficient in one or more essential vitamins and minerals.
- Overnutrition and obesity: an abnormal or excessive accumulation of fat that can harm health.
- Lack of food: this is common among the low-wage group, as well as those who are homeless.
- Those who have difficulty eating due to painful teeth or other painful mouth injuries. Those with dysphagia or difficulty swallowing are also at risk of malnutrition. This could be due to a blockage in the passage or joint or due to pain in the mouth.

#### Loss of appetite

Common causes of loss of appetite include cancers, tumors, depressive illness and other mental illnesses, liver or kidney disease, chronic infections etc.

- Those with limited knowledge about nutrition tend to follow an unhealthy diet with not enough foods, vitamins and minerals and are at risk of malnutrition.
- The elderly, disabled people, students or young people who live alone have difficulty cooking healthy balanced meals for themselves and may often be at risk of malnutrition.
- The elderly (over 65 years of age), especially those living in assisted living facilities are at higher risk of malnutrition.

These individuals have long-term illnesses that affect their appetite and ability to absorb food and may also have difficulty eating nutrients. Additionally, there may be concomitant mental illnesses such as depression that affect appetite and food intake.

- Those who abuse drugs or are chronic alcoholics.
- Those with eating disorders like anorexia nervosa have difficulty maintaining adequate nutrition.
- Those with digestive diseases such as ulcerative colitis or Crohn's disease or malabsorption syndrome have difficulty in assimilating dietary nutrients and may suffer from malnutrition.
- Those with diarrhea or persistent nausea or vomiting.
- Some medications tend to alter the body's ability to absorb and break down foods and taking these can lead to malnutrition.
- The demand for energy from food exceeds the amount of food taken. This includes those who have suffered serious injury, burns, or after major surgical procedures. This also includes pregnant women and children whose growth and needs for the unborn baby cause increased demand for foods and calories that may be deficient in a normal diet [1-3].
- Among children the lack of knowledge of proper feeding among parents is the leading cause of malnutrition worldwide.
- Premature babies are at higher risk of malnutrition as are children at the time of weaning.
- The different variants of childhood cancer, congenital heart disease, cystic fibrosis and other important long-term diseases in children are causes of malnutrition.
- Neglected children, orphans and those living in care homes are at risk of malnutrition. Nutrition levels are not only a result of overall social and economic development, but are also an essential aspect affecting health, productivity and general well-being. People who are malnourished have fewer defenses against disease, get sick more easily and more frequently, and are less able to recover quickly and completely from illness. Malnutrition and micronutrient deficiencies can be particularly harmful to children, leaving them vulnerable to infectious diseases and ultimately causing physical and cognitive disorders [1-3].

Chronic malnutrition can cause stunting (low height for age) and wasting (low weight for height). Diets that do not provide enough micronutrients can lead to serious diseases, including anemia, mental retardation and permanent blindness. Both malnutrition and micronutrient deficiencies can affect children's cognitive functioning, preventing them from achieving their full potential in school, thereby affecting their future employment and income opportunities and thus perpetuating the cycle of economic, social and productive poverty of the individual.

Obesity and overweight Obesity is a chronic disease that is characterized by an excessive increase in the amount of adipose tissue (cells that have the capacity to store fat inside) in the body. This pathological increase in fat in our body manifests itself in an increase in weight and volume thereof. In other words, when we refer

to obesity we are referring to the increase in our body's energy reserves in the form of fat and that occurs for the simple reason that we incorporate more energy into the body than we expend, since we eat more calories than are burned during exercise and normal daily activities.

The main symptom, as we said, is excessive body fat, which increases the risk of suffering serious health problems and which becomes a warning button for some treatments and procedures, since due to these associations the obese patient is classified in the group high risk and this increases if the person undergoes surgery, starting with the anesthetic risk, those dependent on the disease and the risk of the surgical act itself, adding to this the risk of suffering postoperative complications, whether immediate or mediate [1-3].

Obesity represents a high surgical risk since the abundance of adipose tissue increases the anesthetic risk and creates technical difficulties due to being subject to associated diseases. Thrombotic, cardiac and respiratory complications are common, as well as the rate of surgical wound infections. is high, which makes the hospital stays of these patients prolonged. The main treatment involves making lifestyle changes, such as eating a healthier diet and exercising.

Low weight, thinness and cachexia Although being thin is often a sign of health, being underweight can be worrying. This happens when it is due to poor nutrition, pregnancy or other health problems. A person is underweight when they are below a healthy value. Low weight can be a symptom of an underlying pathology. In the case of unexplained weight loss, a medical diagnosis is essential. On the other hand, underweight may be a primary causal condition. People with this condition may have a weak immune system, as well as poor physical condition, making them prone to infections.

Other risks that low weight can cause are

- Fertility problems, especially in women. Also problems during pregnancy.
- Anemia
- Hair loss
- Increased risk of osteoporosis

The most common cause of low weight is malnutrition, due to the absence of adequate food. This cause of low weight can be due to multiple factors, such as an eating disorder, diabetes, or an overactive thyroid gland.

Low weight can be a consequence of a loss of appetite, caused by

- Depression, stress or anxiety
- Cancer

- Chronic illnesses or infections
- Drugs
- Illicit drugs

The most effective way to prevent underweight is to follow a healthy diet and exercise frequently. It is also important to rest adequately. Also, go to the medical specialist if you notice an unexplained change in weight. On the other hand, we are talking about Extreme Thinness when the BMI (Body Mass Index) in turn reaches extreme values, being below 18, that is, a person who measures 1.65 m. You should never lose less than 49 kilos to keep your health and immune system in optimal condition. Main consequences of extreme thinness [1-3].

- Low potassium: It can begin with cramps and muscle pain but if not corrected, brain inflammation can even cause death.
- Protein insufficiency: This further increases the lack of appetite and the feeling of fatigue and apathy, therefore aggravating the situation.
- The shortage of macro and micronutrients threatens the health of our immune system and, therefore, directly threatens our health.
- Anemias: They tend to be quite common, but that does not mean we should see them as something harmless since they can significantly alter the functioning of our body. How to detect symptoms of malnutrition?
- Brittle hair, very fine but with a tendency to become frizzy and dull.
- Paleness of the skin and mucous membranes.
- Peeling of the skin in certain areas (around the mouth and nose and behind the ears).
- Eye problems: When the eyes are very vascularized or have many veins or even a whitish layer on the cornea.
- Appearance of wounds and swelling on the lips or an abnormal color on the tongue and gums (deep red or purple color)
- White stains on your teeth.
- Flat or concave nails, spoon-shaped.

Pigmentation of the skin in the upper area of the cheeks, under the eyes. Cachexia Cachexia is a state of extreme malnutrition, muscle atrophy, fatigue and weakness that results in a deteriorated state of general health, characterized by weight loss and muscle loss. Wasting syndrome is usually a symptom of an illness, such as cancer, AIDS, heart failure, or chronic obstructive pulmonary disease (COPD), but it can also have causes that are not due to an underlying illness, such as lack of access to food, deliberate evasion of food or hunger strike. Symptoms include muscle loss, extreme and sudden loss of weight and appetite, fatigue, and decreased strength. Treatment is based on nutritional counseling, medications to stimulate appetite and weight gain, and treatment of the underlying disease or disorder [1-3].

Surgical risks of underweight and cachexic patients the assessment of nutritional status as an indicator of health status is an important aspect in identifying risk groups with dietary deficiencies and excesses, which are risk factors in many of the chronic diseases prevalent today. Malnutrition is a strong predisposing factor to the appearance of both medical and surgical complications, the evolution can be hindered by the appearance of infections and decompensation of underlying chronic diseases, all of which has an impact on the delay and recovery and increase of the costs for both the patient and the institution. It has been shown that malnourished patients have higher rates of morbidity and mortality, greater complications such as pneumonia, sepsis and pressure ulcers, post-surgical complications, delayed wound healing, increased hospital stay and greater dependence on care. They also have a higher incidence of suture dehiscence, surgical wound infection and increased mortality, as well as increased healthcare costs [1-3].

The metabolic response to surgery includes, among other changes, important alterations in protein metabolism. High stress causes an increase in the hepatic synthesis of acute phase proteins and a state of protein hypercatabolism that is reflected in a decrease in plasma proteins, so, in the absence of adequate protein reserve and intake, the patient will be unable to meet these metabolic demands. Surgery is a process that entails a high percentage of complications (10-40%) such as infectious events, postoperative ileus or death.

There are non-modifiable factors that influence post-surgical complications and that cannot be acted upon, such as age, smoking, previous medical history or undergoing surgery for a malignant disease. There are also related factors that are modifiable and on which it is possible to influence, such as anemia and the early initiation of oral administration after surgery or the nutritional status of the patient prior to surgery. Methods to gain weight in a healthy way

- **Eat more frequently:** the patient may feel full faster if he or she is underweight. It is recommended to eat 5 or 6 times a day with smaller quantities, instead of 2 or 3 large meals.
- **Smoothies and shakes:** healthy drinks with milk and fruit are highly advisable. By contrast, coffee, diet soda, or other beverages with few calories or nutritional value are not recommended.
- **Nutrient-rich foods:** bread, pasta, whole grains, vegetables and fruits, as well as dairy, lean protein sources, and nuts and seeds.
- **Control fluids:** sometimes fluids before meals can reduce appetite. In this case, it is recommended to drink high-calorie drinks with a meal. You can also drink it half an hour after eating [1-3].
- **Add extras:** adding ingredients such as cheese to stews and scrambled eggs or skim powdered milk to soups will add a higher number of calories.

- **Practice exercise:** especially muscle strengthening, it is useful to gain weight by strengthening muscles. Likewise, it will also stimulate the appetite.
- Allow ourselves a treat: even underweight people should watch out for excess fat and sugar.
- Are there links between oral health and nutrition?
- There are several links between oral health and nutrition. Just as oral diseases can affect diet and nutrition, diet and nutrition can affect the development and progression of diseases of the oral cavity.
- Eating patterns and food choices can be important factors in cavity formation. Everything you eat passes through the mouth, where carbohydrates can be used by bacteria in dental plaque to produce acids capable of damaging tooth enamel. Avitaminosis We can define vitamins as organic substances of varied structure that the human body is unable to synthesize or does so in insufficient quantities, so they must be provided from the outside, usually through the diet, since their absence determines failure. in the fundamental basic processes of cellular metabolism. [2]

Avitaminosis is the lack of one or more of the essential vitamins at recommended levels in the blood. The disorder is generally caused by poor absorption by the body or by the lack of ingestion of these in the form of food or supplement, something that has serious and harsh consequences on health. We need vitamins to live and enjoy splendid well-being. Vitamin deficiency can promote the development of diseases, such as heart disease and cancer. There are various causes that lead to vitamin deficiency, one of them is the one we mentioned above, that is, not eating correctly and having a diet that is somewhat poor in nutrients, and, therefore, in vitamins [2].

Going on a diet without having consulted with a nutritionist, practicing a fast, restrictive diet due to illnesses, inappropriate dietary habits that last for a long time, etc. are other causes of vitamin deficiency. But there is more, because smoking, following bad habits such as drinking alcohol, food intolerances, and certain stages of our life (pregnancy, menopause...) can cause us to increase our vitamin deficiency. Vitamins are involved in the growth and protection of epithelia and tissues, they are cofactors or coenzymes in the metabolic processes of nervous tissue, they are catalysts of hematopoiesis, they have a reparative, oxygenating and non-specific defense function, they intervene in anti-oxidative processes, preventing Cellular degeneration and aging also intervene in the phospho-calcium balance, bone metabolism, and are also participants in the hemostasis processes in their plasma phase, all of which is affected when there are vitamin deficiencies [2-4].

### Classification of vitamins water-soluble

#### Vitamins generalities

They are characterized because they dissolve in water, so they can be transferred to the water from washing or cooking food. Many

foods rich in this type of vitamins do not provide us with the same amount at the end of preparation that they initially contained. To recover part of these vitamins (some are destroyed by heat) you can use the cooking water of the vegetables to prepare broths or soups. Unlike fat-soluble vitamins, they are not stored in the body. This means that they must be provided regularly and can only be dispensed with for a few days [2-4].

Excess water-soluble vitamins are excreted through urine, so they do not have a toxic effect no matter how high their intake. Some of these contain: Nitrogen, sulfur or cobalt. Most B vitamins are also absorbed by passive diffusion, but some can be absorbed by an active process especially when the diet contains low levels of this vitamin. Water-soluble: (Folic acid or Folacin, Vitamin C or ascorbic acid -antiscorbutic-). Additionally in this group we have the B complexes (B1,B2, B3, B5, B6, B8, B9, B10, B11, B12, B15, B17).

#### Fat-soluble vitamins generalities

They are characterized because they are not soluble in water, they are stored in the body and excessive intake can cause imbalances. Chemically, these are unsaponifiable lipids, characterized by their inability to form soaps, since their molecules lack fatty acids linked by ester bonds. Vitamins A, D, E and K belong to this group. These are excreted mainly in the feces via bile, these vitamins are mainly composed of: Carbon, hydrogen and oxygen.

They are absorbed by passive diffusion through the lipid phase of the mucous cell membrane. Treatment Normally, the vitamin or vitamins in which we are deficient are usually identified in order to replace them through vitamin supplements. Then a correct diet is determined that we must follow. Possible consequences Having avitaminosis causes health consequences [2-4].

Each vitamin deficiency represents a different problem. For example, vitamin B1 or thiamine deficiency causes neurological disorders; Not having vitamin B2 causes alterations in the mucous membranes, or a deficiency of vitamin B3 can represent gastrointestinal and dermatological alterations. Vitamin A deficiency causes eye disorders, vitamin D deficiency causes rickets; the lack of vitamin K, bleeding and lack of vitamin E can cause weakness and anemia [2-4].

Avitaminosis A (Retinol) Vitamin A deficiency can be secondary to inadequate intake, fat malabsorption, or intestinal, liver, and biliary disorders. Deficiency of this vitamin alters immunity and hematopoiesis and causes rashes and eye disorders. Vitamin A is necessary for the formation of rhodopsin, a photoreceptor pigment present in the retina, which is why its deficiency causes serious eye disorders. Primary vitamin A deficiency is usually caused by Prolonged dietary deprivation Secondary vitamin A deficiency may be due to Decreased bioavailability of provitamin A carotenoids.

Interference with the absorption, storage or transport of vitamin A. Interference with absorption or storage is likely in celiac disease, cystic fibrosis, pancreatic insufficiency, duodenal bypass, chronic diarrhea, biliary obstruction, giardiasis, and cirrhosis.

Vitamin A deficiency is common in prolonged protein-calorie malnutrition, not only because the diet is deficient but also because there are alterations in the storage and deposition of vitamin A. Keratinization of the skin and mucous membranes may occur in the respiratory system, digestive tract, and urinary tract. There may be dryness, peeling and follicular thickening of the skin and respiratory infections. The younger the patient, the more serious the effects of vitamin A deficiency. Growth retardation and infections are common among children since immunity is usually affected in these types of patients; manifestations such as blindness are also common. Nighttime, xerophthalmia, fatigue and weight loss and irritability, hyperkeratosis, respiratory conditions due to metaplasia of the respiratory epithelium, there are also oral signs and symptoms such as xerostomia, intraoral keratotic lesions such as diffuse whitish spots on the back of the tongue, and also keratinizing metaplasia of salivary glands [1,2].

Avitaminosis B B 1 (thiamine) Thiamine, also known as vitamin B1, is present in many foods. It is essential for assimilating (metabolizing) carbohydrates (to produce energy), proteins and fats and for the normal functioning of the nerves and heart. Thiamine is not toxic, so consuming excessive amounts of thiamine is not a cause for concern.

Foods that contain good amounts of thiamine include: dried yeast, whole grains, meat (especially liver and pork), fortified cereals, nuts, legumes and potatoes. Thiamin deficiency is caused by insufficient dietary intake, excessive consumption of coffee or tea, alcoholism, chronic diseases such as cirrhosis and diabetes mellitus, this deficiency is often accompanied by other B vitamin deficiencies. The first symptoms of thiamine deficiency are vague; they include fatigue, irritability, poor memory, loss of appetite, sleep disorders, abdominal discomfort and weight loss. Over time, a significant deficiency of thiamine (beriberi) occurs, characterized by nervous, brain and heart disorders. Different forms of beriberi have different symptoms. Dried beriberi. It manifests itself with nervous and muscular abnormalities. Symptoms include a tingling sensation in the toes, a burning sensation in the feet that worsens at night, and cramps and pain in the legs. The muscles weaken and waste away (muscle atrophy). If the deficiency worsens, the arms are also affected. Wet beriberi. This type of beriberi leads to heart abnormalities [2-4].

The heart pumps more blood and beats faster, and the blood vessels widen (dilate), causing the skin to become warm and moist. Since the heart can no longer work at this rate, heart failure eventually occurs. As a result, fluid accumulates in the legs (edema) and

lungs (congestion), and blood pressure drops markedly, sometimes leading to shock and death. Brain disorders. Thiamin deficiency causes, especially in alcoholics, brain alterations that may be present without any symptoms, until something happens that further aggravates this deficiency, such as drunkenness. Symptoms may also appear after giving carbohydrates intravenously to an alcoholic. This is because extra carbohydrates increase the need for thiamine. These brain alterations are called Wernicke-Korsakoff syndrome, which has two phases

- Wernicke encephalopathy causes confusion, apathy, difficulty walking, and eye problems, including involuntary eye movements (nystagmus) and partial eye paralysis. If not treated quickly enough, symptoms worsen, leading to coma and even death [5-7].
- Korsakoff psychosis causes memory loss of recent events, confusion, and a tendency to invent facts to fill gaps in memory (fabulation). Children's Beriberi. This form of beriberi occurs in infants (usually between 3 and 4 weeks of age) fed by a mother who has thiamine deficiency. Sudden heart failure, partial loss of voice (aphonia), and absence of some reflexes may occur. In general, we can see that in vitamin B1 deficiency states, clinically, there is a global involvement of the cardiovascular, nervous, muscular and gastrointestinal systems, which in turn causes emotional alteration, lack of concentration, memory defects, states of irritability, anorexia, depression and insomnia, polyneuritis and dermatitis, as well as encephalopathies and psychosis, dentally this type of patient presents oral-facial neuritis. B 2 (Riboflavin) Riboflavin is involved in carbohydrate metabolism as an essential coenzyme in many redox reactions involved in protein and carbohydrate metabolism. Riboflavin is essentially non-toxic [5-7].

Dietary sources include milk, cheese, liver, meat, eggs, and fortified grain products. This deficiency is present in people with serious nutritional deficiencies, in diabetic, thyroid, and liver patients; it is also common in chronic alcoholics, patients with abuse of drugs such as penicillins, tetracyclines, streptomycins, and oral contraceptives. Clinically we can find manifestations such as seborrheic dermatitis in the scrotum or vulva, neurological alterations, hematological alterations such as microcytic or normochronic anemias, ocular alterations such as photophobia, corneal opacity, ulcerations, presenile cataracts, conjunctivitis, orally they may present glossitis, angular stomatitis and seborrheic dermatitis. facial [5-7].

B 3 (Niacin) Niacin, a type of B vitamin, is essential for metabolizing carbohydrates (carbohydrates), fats and many other substances in the body, and for the normal functioning of cells. Foods that provide a good supply of niacin are yeast, liver, red meat, poultry, fish, legumes, and whole-grain or grain-enriched products or bread. Foods rich in tryptophan (an amino acid), such as dairy products, can compensate for insufficient dietary niacin intake, since the body can convert tryptophan to niacin.

The term niacin is used in two senses: as a synonym for nicotinic acid and as a broader term that includes nicotinic acid and nicotinamide, two forms of this B vitamin. One form of niacin deficiency results from a deficiency of niacin and tryptophan (an amino acid). This type of deficiency causes a disorder called Pellagra, which affects the skin, digestive system and brain. Pellagra only appears if there is a lack of niacin and tryptophan in the diet, since the body can convert tryptophan into niacin.

Residents who live in regions where corn is the main food are at risk of pellagra, since corn is a food that contains little niacin and tryptophan. Furthermore, the intestine cannot absorb niacin from corn unless it has been treated with alkali (as is done when making corn tortillas). Pellagra is a seasonal disorder, which occurs every spring and lasts throughout the summer, a time when the diet consists almost exclusively of corn products. Pellagra also occurs in people who have any of the following characteristics: Hartnup disease, a rare inherited disorder in which tryptophan absorption is decreased [5-7].

Carcinoid syndrome, a rare disorder in which tryptophan is not converted to niacin. Niacin deficiency can also be due to chronic diseases such as cirrhosis, chronic diarrhea and alcoholism, as well as prolonged treatment with isoniazid. Pellagra is expressed in the skin, mucous membranes and the central nervous system. The clinical picture is characterized because it is a bilateral and symmetrical dermatosis, in photo-exposed areas (face, neck, hands, back of the feet) and in areas of rubbing and friction (elbows, knees, wrists, scrotum and vulva). The basic lesions present are erythema, scaling and pigmentation. They are considered pathognomonic when they are located in zone V of the neckline (dermatomas), "Casal's collar", and on the hands, "pellagrous gauntlet". Dermatitis can mimic sunburn when characterized by vesicles and blisters. In advanced stages, the dermatosis becomes rough and pigmented. In a third of patients there is a condition in the oral cavity where signs of malnutrition are observed, such as angular cheilitis and glossitis [5-7].

The initial neurological symptoms are quite nonspecific and include: headache, lack of concentration, irritability, confusion, behavioral disorders, anxiety, hallucinations, depression, ataxia, insomnia and amnesia that can progress to encephalitis, neuritis and myelitis in advanced stages. Cases have been reported with peripheral neuropathy of the upper and lower limbs (alterations in strength and sensitivity), which may persist even with appropriate supplemental treatment. The gastrointestinal condition initially manifests as anorexia, this is the classic sign of the disease, occasionally associated with abdominal pain, nausea, vomiting and then evolves to atrophic and inflammatory changes in the mucosa that result in diarrhea. Distinctive location of pellagra

- On the arms and hands (as if they were gloves)
- On the feet and calves (as if they were boots)
- Around the neck (like a necklace)
- On the face forming a butterfly shape

The skin abnormalities are persistent and the affected areas take on a scaly, brown appearance. In this condition the digestive tract is affected. The tongue and mouth become swollen and dark red. The tongue swells, there is a burning sensation in the mouth and ulcerations form in both. Burning is also felt in the throat and esophagus. Saliva production may increase. Other symptoms are nausea, vomiting, abdominal discomfort, constipation, and diarrhea (sometimes bloody) [5-7].

Over time, fatigue, insomnia and apathy appear. It usually progresses to brain dysfunction (encephalopathy), which is characterized by confusion, disorientation, hallucinations, and memory loss. Affected people may appear overexcited, depressed, extremely euphoric (mania), and have delusions or paranoid thoughts (thinking that other people intend to harm them). It is necessary to make a differential diagnosis of pellagra in patients with chronic alcoholism who present delirium tremens or psychosis, because these patients usually present with niacin deficiency [5-7].

As well as with other dermatoses, such as photodermatitis, atopic dermatitis, pemphigus vulgaris and porphyria cutanea Tarda, among others. Patients with severe psychiatric and neurological forms, such as encephalopathy and pelagrous psychosis, may present without cutaneous signs; this is probably secondary to the lack of time to manifest due to accelerated clinical deterioration. In patients with anorexia nervosa, the signs may be atypical and may overlap with other nutritional deficiencies. We must keep in mind that the classic triad (dermatitis, diarrhea and dementia) is not always present. In geriatric patients it is associated with a deficit in intake and neglect on the part of caregivers.

#### Treatment of niacin deficiency

- Niacin supplements
- Other vitamin B supplements

There are two types of niacin supplements: nicotinamide and nicotinic acid. Pellagra is treated with daily doses of oral nicotinamide. Nicotinamide, unlike nicotinic acid, does not cause redness, itching, burning, or tingling sensations.

Because people with niacin deficiency often have other nutritional deficiencies, it is important to eat a balanced diet. In addition to also administering supplements of other B vitamins. Vitamin B5, Vitamin W or Pantothenic Acid It helps convert fats and sugars into energy, form cells for growth, heal wounds and prevent fatigue. Its lack causes: Skin and blood problems and ulcers in the intestine. Obtained in: All meats and vegetables, fresh fruits and nuts. B 6 (pyridoxine) As vitamin B6 is present in most foods, dietary deficiency is rare. Secondary deficiency is usually the result of several disorders [8-10].

Symptoms may include peripheral neuropathy, a pellagra-like syndrome, anemia, and seizures that, especially in infants, may not

resolve with antiepileptic drugs. It is very rare to find this deficiency in isolation, it actually appears associated with deficiencies of several water-soluble vitamins, it can occur due to excessive food processing, it can occur during pregnancies, unbalanced diets with a high presence of proteins, use of drugs with antivitamin activity such as isoniazids, cyclosporines, penicillamine, hydrocortisone, also in chronic alcoholics, liver diseases and consumption of oral contraceptives. Some rare inborn errors of metabolism can affect pyridoxine metabolism. Signs and symptoms. Vitamin B6 deficiency causes peripheral neuropathy and a pellagra-like syndrome, with seborrheic dermatitis, glossitis and cheilosis and, in adults, it can cause depression, confusion, normocytic, microcytic or sideroblastic anemia may also develop.

Vitamin B8 or Biotin, also called Vitamin H Biotin is a B vitamin necessary for the metabolism of fats and carbohydrates. Biotin is found in many foods. Good sources are liver, kidney, pancreas, eggs, milk, fish and nuts. A deficiency is very unlikely in people who have a balanced diet. However, eating raw egg whites for weeks can cause this deficiency because they contain a substance that binds to biotin in the body and prevents its absorption. Symptoms include drowsiness, weight loss, dermatitis, anxiety attacks, muscle pain, and certain nervous symptoms, such as mental fatigue, insomnia, and hallucinations. This deficiency can also develop in people who receive long-term intravenous (parenteral) nutrition without biotin supplements [8-10].

Laboratory analyzes detect a reduction in biotin values in blood and urine. It serves to transform fats and proteins, prevents alopecia and gray hair, controls muscle pain and dermatological lesions, helps you sleep well and be in a good mood. Its lack causes: decay, bad mood; depressions; nausea and loss of appetite. Obtained in: liver, walnuts, peanut butter, green beans, egg yolk, cauliflower. Vitamin B9 or folic acid It serves for the formation of DNA; It is very necessary for growth, increases breast milk, protects against intestinal parasites and poisoning. It is highly recommended during pregnancy. Its lack causes anemia and malformations in fetuses during pregnancy. It is obtained in: green vegetables, oranges, nuts, enriched cereals, liver, mushrooms, fruit and fruit juices. B 12 (cyanocobalamin) Cobalamin is a general term used to designate compounds with biological activity of vitamin B12.

These compounds participate in the metabolism of nucleic acids, the transfer of methyl groups, and the synthesis and repair of myelin. They are necessary for the formation of normal erythrocytes and normal neuronal function. Dietary deficiency of vitamin B12 is usually the result of insufficient absorption, although deficiency can occur in vegetarians who do not take vitamin supplements. The deficiency causes megaloblastic anemia, damage to the white matter of the spinal cord and brain, and peripheral neuropathy and is attributed to various states of malabsorption such as Birmer's disease, caused by lack of secretion of intrinsic factor by

parietal cells of the brain. the gastric mucosa, total or partial gastrectomies, intestinal causes such as stagnant loop syndrome, also the interaction of some drugs such as amino salicylic acid, guanidines and enformins.

Dentally, there are manifestations such as intense red discoloration of the oral mucosa and inflammation, clinical symptoms and discomfort, a burning sensation and in some cases dysphagia; there may also be whitish and atrophic areas of the mucosa. Anemia usually has an insidious onset. It is usually more serious than its symptoms indicate, since its slow evolution allows for physiological adaptation. Sometimes splenomegaly and hepatomegaly are identified. Various gastrointestinal symptoms may occur, including weight loss and abdominal pain of undefined location. Glossitis, commonly described as a burning tongue, is rare. Neurological symptoms develop independently of, and often in the absence of, hematologic abnormalities. Subacute combined degeneration refers to degenerative changes in the central nervous system due to vitamin B12 deficiency; They mainly affect the white matter of the brain and spinal cord [8-10].

Demyelination or axonal neuropathies may occur. In the initial phases, a decrease in perception of position and vibration of the extremities is accompanied by mild to moderate weakness and hyporeflexia. In the more advanced stages, spasticity, plantar extensor responses, greater loss of position and vibration perception in the lower limbs, and ataxia occur. These alterations may appear with a glove and sock distribution. Sensations of touch, temperature, and pain are usually not affected, although in older adults they may be difficult to assess.

Some patients also present with irritability and mild depression. In advanced cases, paranoia (megaloblastic dementia), delusions, confusion, and sometimes postural hypotension may occur. Confusion can be difficult to distinguish from senile dementia, such as Alzheimer's disease. Vitamin B13 or orotic acid Prevents some liver conditions and premature aging. It is not well known what problems its deficit causes. It is obtained in carrots, turnips, radishes and onions. Vitamin B15 It facilitates the absorption of oxygen, helps form defenses, protects the liver, reduces blood cholesterol, relieves asthma, and protects against polluting agents. Its deficiency brings with it glandular and nervous disorder; heart diseases and lack of oxygen in the tissues. It is obtained in yeast, pumpkin seeds and whole grains.

Avitaminosis C (Ascorbic acid) Ascorbic acid is essential for the formation, growth and repair of bones, skin and connective tissue as well as the normal functioning of blood vessels. Vitamin C helps keep teeth and gums healthy, in addition to collaborating with the body in the absorption of iron, which is necessary to produce red blood cells (erythrocytes), and contributes to the healing of burns



and wounds. Ascorbic acid is the substance that allows the formation of collagen in the body [9].

Foods that provide a good supply of vitamin C include citrus fruits, tomatoes, potatoes, broccoli, strawberries, and peppers. Its deficiency or lack is called and known as scurvy and frequently occurs in smoking patients, hospitalized elderly people with poor oral hygiene, chronic alcoholism, neoplastic, gastrointestinal, cardiovascular, respiratory and joint diseases such as rheumatoid arthritis, it is fundamentally triggered by lack of consumption. of fresh foods, is common among sailors. When the diet does not contain enough vitamin C, adults feel tired, weak and irritable; They lose weight and have indefinite pain in their muscles and joints. The symptoms of scurvy appear after a few months of deficiency. Bleeding can occur under the skin (especially around hair follicles or in the form of hematomas or bruises), in the gums and inside the joints in the nails [11-13].

The gums take on a purple hue, become swollen and spongy; Over time, the teeth become loose. Hair becomes dry, brittle and coiled (like a corkscrew) and skin appears dry, rough and flaky. Fluid may accumulate in the legs. It can progress to anemia. Infections may appear and wounds may not heal well. Infants become irritable, feel pain when moving, lose their appetite, and do not gain weight at the rate they should. In both infants and young children, bone growth is inadequate and bleeding and anemia occur.

Clinically, patients may present follicular hyperkeratosis, ecchymosis, petechial spots, malleolar edema, joint pain, orally we can find gingival hemorrhages, tooth mobility, gingivitis, alveolar osteoporosis and a tendency to infection.

- Avitaminosis D (Calciferol) It is common in infants who are fed only by exclusive breastfeeding and do not receive supplements of this vitamin or sufficient exposure to sunlight, also in malabsorption syndromes and liver and kidney disease. Clinically we find rickets in children, with typical bone deformities ranging from craniomalacia to the costal rosary, anteroposterior crushing of the thorax, swellings in the epiphyses of the long bones and curvatures, muscular hypotonia and motor delay. In adults, osteomalacia, expressed by a defect in bone mineralization, and pain in the dorsolumbar area, pelvic girdle and thighs. Among the oral manifestations we have in the child with rickets dental and enamel hypoplasias, deficit in dentin and cement formation, periodontal involvement and large pulp cavities, in the adult with osteomalacia we find fractures and deformities in teeth and jaws, abnormal bone matrix and bone softening.
- Avitaminosis E or Tocopherol Helps relieve fatigue; prevents and dissolves blood clots, protects the lungs against pollution, helps heal burn wounds, prevents cramps. Its deficiency causes destruction of red blood cells; muscle problems

and anemia. It is obtained in oils from corn, safflower or sesame, avocado, broccoli, plum, spinach, asparagus, apple, blackberries, banana, tomato, carrot. [10]

- Avitaminosis K (Menadione) Vitamin K is necessary to synthesize proteins that help control bleeding (coagulation factors) and, therefore, for normal blood clotting. It is also essential for good bone and other tissue health. Vitamin K deficiency is more common in babies, especially those who are breastfed. This deficiency can cause bleeding; Therefore, all newborns should receive a vitamin K injection. Vitamin K deficiency is rare in healthy adults because many green vegetables contain vitamin K and bacteria in the intestine produce vitamin K. If you have a vitamin K deficiency, the administration of warfarin or similar anticoagulants interferes with the synthesis of clotting factors (which help blood clot) and may increase the likelihood of bleeding or worsen it.

Anticoagulants are given when there are conditions that increase the risk of blood clots, such as being confined to bed (for example, due to an injury or illness), recovering from surgery, or having atrial fibrillation (altered, irregular heart rhythm). If you take warfarin, you need to have regular blood tests to determine how quickly clots form. Vitamin K deficiency can result from

#### Lack of vitamin K in the diet

- Very low-fat diet, because vitamin K is better absorbed when eaten with a little fat
- Disorders that alter the absorption of fats and, therefore, hinder the absorption of vitamin K (such as bile duct blockage or cystic fibrosis).
- Treatment with certain drugs, such as anticonvulsants and some antibiotics.
- Ingestion of large amounts of mineral oil, which decreases the absorption of vitamin K. Newborns are prone to vitamin K deficiency for the following reasons:
- Only small amounts of vitamin K pass from the mother to the fetus during pregnancy.
- During the first days of life, the newborn's intestine has not yet acquired the bacteria that produce vitamin K. The main symptom of vitamin K deficiency is endodermal (causing bruising), nasal, wound, stomach or intestinal bleeding (hemorrhage). Sometimes a stomach bleed causes vomiting of blood. Blood may also be seen in the urine or stool, or the stool may be dark in color and tarry. Hemorrhages in the brain, or around this organ, can be fatal in newborns. Having a liver disorder increases the risk of bleeding, because clotting factors are produced in the liver. Vitamin K deficiency also weakens bones. Intraorally we observed a tendency to gingival and post-extraction bleeding [11-13].

Avitaminosis F Nourishes the skin, works with vitamin D. It is a vital component in cell membranes, nerve fibers, brain cells, and for the normal functioning of reproductive organs. Its deficiency is characterized by eczema (redness and peeling of a part of the skin), pimples and acne, diarrhea, weight loss, dandruff, dry nails and hair. It comes in polysaturated oils (soybean, sunflower, peanut), nuts, grains.

Avitaminosis P or Bioflavonoids It helps the kidneys function well, prevents oxidation and bleeding. Its absence causes anemia. It is guaranteed in the egg yolk.

Avitaminosis T It serves for blood clotting. Its deficiency causes: Inflammation in the corners of the mouth and tongue, skin problems, sore throats, anemia or lack of red blood cells. It can be obtained in liver, milk, cheese, eggs, green vegetables, oats, legumes.

Avitaminosis U or meninic acid It helps heal ulcers, helps the stomach and intestine function, and prevents heart and skin diseases. Its lack causes gastrointestinal disorders. It is present in raw cabbage. Minerals Some minerals such as sodium, chloride, potassium, calcium, phosphorus and magnesium are considered macronutrients because they are needed by the body in relatively large quantities; They are called macrominerals [13,14].

Other minerals are micronutrients because the body needs them in small amounts; They are called microminerals or trace elements. They are iron, zinc, copper, manganese, molybdenum, selenium, iodine and fluorine. Mineral deficiencies, with the exception of iron and iodine, are rare. Excess of some minerals can cause poisoning. Lack of iron Iron is a component of many enzymes that are involved in chemical reactions throughout the body. It is also a component of hemoglobin, which allows red blood cells to transport oxygen and distribute it to the body's tissues. Foods contain two types of iron: heme iron, found primarily in animal products, and nonheme iron, which accounts for more than 85 percent of the iron in an average diet. Heme iron is absorbed much better than non-heme iron. However, non-heme iron absorption increases when consumed with animal protein and vitamin C.

Iron deficiency is the most common nutritional deficiency in the world, causing anemia in men, women and children. An inadequate diet, as well as bleeding, which causes a loss of iron, produces a deficiency that must be treated with mineral supplements. This deficiency is likely to occur during pregnancy because the mother must supply a large amount of iron to the developing fetus. Growing adolescent girls who begin menstruating are at risk of developing anemia caused by iron deficiency if they follow diets that exclude meat [14-16].

When the body's iron stores are depleted, anemia develops. Symptoms include paleness, spoon-shaped nails (a deformity in

which the nails are thin and concave), weakness with decreased muscle function, and disturbances in cognitive behavior. The diagnosis of iron deficiency is made based on symptoms and blood test results that indicate anemia and low levels of iron and ferritin, the protein that stores iron. Iron deficiency is treated with high doses of the mineral once a day for several weeks.

Treatment should be continued until the number of red blood cells and iron stores return to normal values. Excess iron Excess iron is toxic and causes vomiting, diarrhea and intestinal lesions. Iron can accumulate in the body when a person undergoes therapy with excessive amounts or for too long, when receiving multiple transfusions, or in chronic alcoholism. Iron excess disease (hemosiderosis) is an inherited disorder in which too much iron is absorbed, potentially fatal but easily treatable. Symptoms usually do not appear until middle age and their development is insidious [16].

The skin takes on a tan color, cirrhosis, liver cancer, diabetes and heart failure occur, and the patient dies prematurely. Symptoms may include arthritis, impotence, infertility, hypothyroidism, and chronic fatigue. Blood tests can determine if a person has excess iron. All relatives of an affected person should be tested. Repeated bleeding is the preferred treatment. Early diagnosis and treatment allow long survival with a very normal quality of life. zinc deficiency Zinc is widely distributed in the body because it is a component of more than 100 enzymes, including those responsible for the synthesis of DNA and RNA. The tissues that have the highest zinc content are the bones, liver, prostate and testicles.

The concentration of zinc in the blood depends on its content in the diet. Meat, liver, eggs and seafood are rich sources of zinc, but grains are not. Whole grains contain substances, such as fiber and phosphates, that inhibit zinc absorption. Eating clay, common for some people, inhibits the absorption of zinc and causes a deficiency of the mineral [17,18].

Acrodermatitis enteropathica, an inherited disorder in which zinc cannot be absorbed, causes zinc deficiency. Symptoms include loss of appetite, hair loss, dermatitis, night blindness and altered taste. The activity of the reproductive organs may be affected, which causes a delay in sexual development and, in men, reduced sperm production.

Growth may also be slowed. Disorders of the body's immune system and the ability to heal wounds may occur. In children, the first signs of this deficiency are delayed growth, loss of appetite, altered taste, and low zinc content in the hair. To establish the diagnosis, the concentration of zinc in the blood is measured.

The treatment consists of the administration of supplements of the mineral. Excess zinc Large amounts of zinc, usually acquired

from eating acidic foods or beverages packaged in zinc-lined (galvanized) cans, can cause a metallic taste, vomiting, and stomach problems. Ingestion of 1 gram or more can be fatal.

**Copper deficiency** Copper is a component of a variety of enzymes necessary for energy production, antioxidation, synthesis of the hormone adrenaline, and formation of connective tissue. Copper deficiency is rare in healthy subjects. It occurs most often in children who are premature or recovering from severe malnutrition. People who receive intravenous (parenteral) nutrition for a long time are also at risk of developing copper deficiency [18].

**Menkes syndrome** is an inherited disorder that causes copper deficiency. Symptoms include frizzy hair, mental retardation, low concentration of copper in the blood, and inability to synthesize enzymes that require copper. Copper deficiency causes fatigue and a low concentration of this element in the blood. A decrease in the number of red blood cells (anemia), white blood cells (leukopenia), and a type of white blood cell called neutrophils (neutropenia), as well as calcium in the bones (osteoporosis), is common. Likewise, small pinpoint hemorrhages occur in the skin and arterial aneurysms. Copper deficiency is treated with supplements of the mineral for several weeks. However, people with Menkes syndrome do not respond well to these supplements. Excess copper that is not bound to a protein is toxic.

Consuming relatively small amounts of free copper can cause nausea and vomiting. Acidic foods or beverages that are in prolonged contact with copper containers, tubes, or valves may be contaminated with small amounts of this metal. If large amounts of non-protein-bound copper salts are inadvertently ingested, or if compresses saturated with a copper salt solution are used to heal large areas of burned skin, sufficient amounts may be absorbed to damage the kidneys, inhibit the production of urine and cause anemia due to the destruction of red blood cells (hemolysis) [19,20].

**Wilson's disease** is an inherited disorder in which copper accumulates in the tissues and causes extensive lesions. It affects one person in 30,000. In this disorder, the liver does not secrete copper into the blood or does not excrete it into the bile. As a result, the concentration in the blood is low, but the mineral accumulates in the brain, eyes and liver, causing cirrhosis. The one that accumulates in the cornea of the eyes produces a ring of golden or greenish-golden pigmentation. The first symptoms are usually the result of brain injuries and consist of tremors, headaches, inability to speak, incoordination and even psychosis. Copper poisoning is treated with penicillamine, which adheres to the mineral and promotes its excretion, this being an example of chelation therapy.

Treatment must be continued for life to survive. **Manganese deficiency** Manganese is a component of several enzymes and is essential for normal bone structure. Abundant sources are unre-

fined grains and green leafy vegetables. When the diet is deficient in manganese for a few weeks, the body appears to conserve this mineral effectively. The only symptom is a temporary rash. Hydralazine, an antihypertensive, can cause manganese deficiency and related side effects such as pain that radiates along the path of the nerve (neuralgia), joint pain, fever, rash, enlarged lymph nodes, and enlarged lymph nodes. liver. The treatment consists of administration of manganese salts.

**Excess manganese** Manganese poisoning is common only in people who work in mines and refine manganese ores. Prolonged exposure causes nerve damage, with symptoms that resemble parkinsonism (tremors and difficulty in movement). **Molybdenum deficiency** Molybdenum is necessary for the oxidation of sulfur, a component of proteins. It is found in milk, beans, bread and cereals.

A molybdenum deficiency caused by insufficient consumption has not been observed in healthy subjects. However, this deficiency occurs under special conditions, for example, when a malnourished subject with Crohn's disease receives long-term total parenteral nutrition (all nutrients are supplied intravenously), without molybdenum supplements. Symptoms include a rapid heart rate, shortness of breath, nausea, vomiting, disorientation, and eventually coma. Molybdenum treatment can provide a complete recovery.

**Excess molybdenum** When large amounts of molybdenum are consumed, symptoms that resemble gout may develop, including a high concentration of uric acid in the blood and joint pain. Miners exposed to molybdenum dust may develop non-specific symptoms. **Selenium deficiency** Selenium is necessary for the synthesis of one of the antioxidant enzymes [18,20,21].

The symptoms of selenium deficiency, a rare condition, can be explained by a lack of antioxidants in the liver, heart and muscles, resulting in tissue death and organ dysfunction. Premature infants and adults receiving total parenteral nutrition without selenium supplementation are at risk of developing heart and muscle lesions caused by selenium deficiency.

Selenium treatment provides complete recovery. **Keshan disease** is a disorder caused by a virus that damages the heart muscle and can be prevented with selenium supplements. This disease affects about 1 percent of people living in a part of China, with low selenium content in the soil and the plants that grow in it.

**Excess selenium** can have harmful effects, which can be caused by ingesting supplements of around 5 to 50 milligrams daily without a prescription. Symptoms include nausea and vomiting, hair and nail loss, skin rash, and nerve damage. **Iodine deficiency** Iodine is necessary for the synthesis of thyroid hormones. About 80 percent of the body's iodine is found in the thyroid gland, primar-

ily in thyroid hormones. Seafood is an abundant source of iodine. The amount of iodide, a form of iodine, in drinking water generally depends on the iodide content of the local soil. About 10 percent of the world's population is at risk of developing iodine deficiency because they live at high altitudes where drinking water is poor in iodide. Iodide is added to some commercial table salts (iodized salt) [18,19,22].

In case of iodine deficiency, the thyroid gland tries to capture more iodide for the synthesis of thyroid hormones and therefore increases in size. The concentration of iodide in the blood and urine is very low. A pregnant woman with iodine deficiency may have a child whose brain is underdeveloped, known as cretinism. Treatment consists of providing iodine at doses approximately 10 times the recommended daily amount for several weeks. Excess iodine iodine poisoning is caused by consuming very large amounts of iodine per day (400 times the recommended daily dose), sometimes as a result of living near the sea. Excess iodine can cause goiter and sometimes hyperthyroidism.

Fluoride deficiency Fluoride, a form of fluorine, is an essential nutrient that strengthens bones and teeth. Sea fish and tea are rich in fluoride, but drinking water is the main source; Its content varies from too little to excessive, in various parts of the world. A fluoride deficiency can lead to cavities, which can be prevented by consuming enough fluoride in food and water. An addition of fluorides (fluoridation) to drinking water with low fluoride content significantly reduces the risk of dental decay [23].

Excess fluoride Absorption of too high a quantity of fluoride (fluorosis) can occur in inhabitants of areas where drinking water is very rich in this element. Fluoride accumulates in teeth, especially permanent ones, and in bones. This is a very broad topic, so the reader is recommended to search for bibliographies specifically dedicated to this content, so that they can deepen their knowledge [18,19,24].

## Conclusion

There are multiple manifestations that can be detected in the orofacial complex due to nutritional alterations, the main ones being oral ulcers and periodontopathies.

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