

Anemia And Chronic Periodontal Disease

Abstract

Among the systemic disorders affecting periodontal disease, anemia plays a great role. Anemia is very commonly found among the population of developing countries. Various forms of anemia are discussed at length. Various factors causing anemia have also been described. Poor nutrition, regular loss of blood, chronic infection and malignancy are among those commonly found in Indian population. In the developing countries, higher rate of anemia is seen among young women which is twice as compared to young men due to regular menstrual bleeding. Anemia occurs in both young and old people, but anemia in older people is more likely to cause symptoms because they usually have additional geriatric medical problems.

Key Words

Anemia, ACD, Hemoglobin.

Introduction:

Anemia describes the condition in which the number of red blood cells (RBCs) in the blood is low. For this reason, physicians sometimes describe a patient with anemia as having a low RBC count in blood. Blood is comprised of plasma and a cellular component. The cellular part contains several different types of cells. One of the most important and most numerous cell types are RBCs. The other cell types are white blood cells and platelets. Only RBCs are discussed in this article. The purpose of RBCs is to deliver oxygen from lungs to other parts of the body.

Red blood cells are produced through a series of complex and specific steps in the bone marrow, where all the steps in their maturation are completed and then released into the blood stream. The hemoglobin molecule is the functional unit of the RBCs and is the protein structure inside the red blood cells. Even though the RBCs are made within the bone marrow, many other factors are involved in their production. For example, iron is a very important component of the hemoglobin molecule and the erythropoietin secreted by kidneys promotes the formation of RBCs in the bone marrow.

Some key points summarizing anemia are: RBCs play very important role in preventing anemia and having the correct number of RBCs requires cooperation

among the kidneys, the bone marrow, and the nutrients within the body. If the kidneys or bone marrow are not properly functioning or the body is poorly nourished, then the normal RBC count and their function may be difficult to maintain. Anemia is thus a risk factor for causing Chronic Periodontal diseases.

Anemia:

Anemia is actually a sign of a disease process rather than a disease itself. It is usually classified as either chronic or acute. Chronic anemia occurs over a long period of time and acute anemia occurs quickly. Determining whether anemia has been present for a long time or whether it is something new, assists the physician in finding its cause. This also helps predict how severe the symptoms of anemia may be. The red blood cells have an average life span of 100 days, so the body is constantly trying to replace them. In adults, production of RBCs occurs in bone marrow. Physicians try to determine if a low red blood cell count is caused by increased blood loss from body or from decreased production in the bone marrow. Knowing that the number of white blood cells has changed also helps determine the cause.

Types Of Anemia:

There are three major types of anemia according to the size of the red blood cells:

1. Microcytic anemia meaning that RBCs are of smaller size than normal

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such as in iron deficiency anemia and thalassemia an inherited disorders of hemoglobin.

2. Normocytic anemia meaning that RBCs are of normal in size, but low in numbers such as in anemia due to some chronic disease or anemia related to kidney disease.
3. Macrocytic anemia meaning that RBCs are larger in size than normal such as in pernicious anemia and anemia related to alcoholism.

Causes Of Anemia:

Many systemic conditions cause anemia. Common causes include:

Anemia from active bleeding : Loss of blood through active trauma or heavy menstrual bleeding in females, gastrointestinal ulcers or cancers. Cancer of the colon may slowly ooze blood and can also cause anemia.

Iron deficiency anemia : Iron plays an important role in the proper structure of the hemoglobin molecule. Therefore, bone marrow needs iron to produce red blood cells. If iron intake is limited or inadequate due to poor dietary intake, it may lead to iron deficiency anemia.

Anemia of chronic disease : Any long-term systemic condition can lead to anemia. The exact mechanism of this process is unknown, but any long-standing and ongoing systemic condition such as an infection or cancer may cause this type of anemia.

Anemia related to kidney disease : The kidneys release a hormone called the erythropoietin that helps bone marrow in the production of RBCs. In people with chronic kidney disease, the production of this hormone is diminished and this in turn diminishes the production of red blood cells causing anemia. This is called anemia related to chronic kidney disease.

Anemia related to pregnancy : Water weight gain during pregnancy dilutes the blood which may be reflected as anemia.

Anemia related to poor nutrition : Vitamins and minerals are required to produce RBCs. In addition to iron, vitamin B12 and folate are required for the proper production of hemoglobin. Deficiency of any of these may cause anemia because of inadequate production of RBCs. Poor dietary intake is an important cause of low folate and low vitamin B12 levels. Strict vegetarians who do not take sufficient vitamins are at risk to develop vitamin B12 deficiency and thereby anemia.

Pernicious Anemia : There may be problem in the stomach or intestines leading to poor absorption of vitamin B12. This may lead to anemia because of vitamin B12 deficiency known as pernicious anemia.

Sickle cell anemia : In some individuals, the problem may be related to production of abnormal hemoglobin molecules. In this condition the hemoglobin problem is qualitative or functional. Abnormal hemoglobin molecules may cause problems in the integrity of the RBC's structure and they may become crescent-shaped (sickle cells). There are different types of sickle cell anemia with different severity levels. This is typically hereditary and is more common in those who have African, Middle Eastern, and Mediterranean ancestry.

Thalassemia : This is another group of hemoglobin-related cause of anemia. There are many types of thalassemia, which vary in severity. These are also

hereditary, but they cause quantitative hemoglobin abnormalities meaning an insufficient number of hemoglobin molecules are made.

Alcoholism : Poor nutrition and deficiencies of vitamins and minerals are associated with alcoholism. Alcohol itself may also be toxic to the bone marrow and may slow down the production of RBCs. The combination of these factors may lead to anemia in alcoholics.

Bone marrow-related anemia : Anemia may be related to the diseases involving the bone marrow. Some blood cancers such as leukemia or lymphomas can alter the production of RBCs and result in anemia. Other processes may be related to a cancer from another organ spreading to the bone marrow.

Aplastic anemia : Occasionally some viral infections may severely affect the bone marrow and diminish production of all blood cells. Chemotherapy and some other medications may cause such problems.

Hemolytic anemia : The normal shape of RBCs is important for their function. Hemolytic anemia is a type of anemia in which the RBCs rupture and become dysfunctional. This could happen due to a variety of reasons. Some forms of hemolytic anemia can be hereditary with constant destruction and rapid reproduction of RBCs. This destruction may also happen to normal RBCs in certain conditions such as with abnormal heart valves damaging the blood cells.

Other less common causes of anemia include side effects of some medicines, thyroid problems, cancers, liver disease, other genetic disorders, lead poisoning, AIDS, and bleeding disorders.

The anemia of chronic disorders is usually of moderate severity with the hemoglobin rarely falling below 8-0 g/dl unless additional factors are present. The RBCs tend to be microcytic with the mean corpuscular volume (MCV) in the range of 70-85 fl against the normal range of 80-92 fl. The MCV below 70 fl is suggestive of iron deficiency anemia. A value for MCV at the upper end of the normal range, or just above it, is extremely unusual in uncomplicated anemia of chronic disorders. The

morphology of the RBCs is unremarkable with varying degrees of anisocytosis and sometimes mild hypochromia. An elevated neutrophil count may accompany inflammation or malignancy and high platelet counts may also be seen in malignancy and in chronic inflammatory diseases such as rheumatoid arthritis (RA) and especially in juvenile chronic arthritis. The erythrocyte sedimentation rate (ESR) is generally elevated. There is an inverse relation between the ESR and the hemoglobin level.

Chronic Periodontal Disease:

Chronic periodontal disease is one of the most common diseases of humans. In the industrialized countries, moderate and severe forms of destructive periodontal disease affect 40% and 15% of the adult population respectively. Periodontitis is a chronic infectious condition of the supporting tissues of the teeth, and is most commonly caused by the sub gingival colonization of gram negative pathogens in susceptible subjects. The clinical symptoms of this infection include red swollen gingiva, gingival bleeding on probing, suppuration, periodontal pockets, gingival recession and loss of supporting alveolar bone. Ulcerated pocket epithelium around affected teeth forms a porte d'entrée for bacteria and their products. The percentage of periodontitis in the populations of developing countries ranged from 40-100 % in age group of 30 years and above.

Chronic Periodontitis is usually associated with the accumulation of plaque and calculus and generally has a slow to moderate rate of disease progression. But sometimes, periods of more rapid destruction may be observed. Increases in the rate of disease progression may be caused by the impact of local, systemic and environmental factors that may influence the normal host bacteria interaction. Local factors may influence plaque accumulation, where as systemic diseases such as diabetes mellitus, severe anemia and HIV infection may influence the host defense. The environmental factors such as cigarette smoking and stress may also influence the response of the host to plaque accumulation.

A direct correlation has been reported between periodontitis and certain

systemic conditions. Hence, there may be a potential effect of periodontal disease on a wide range of organ systems. The anemia of chronic disease (ACD) has been specially mentioned in the literature and seems to be one of the most common forms of anemia observed in clinical medicine. The ACD is defined as the anemia occurring in chronic infections, inflammatory conditions or neoplastic disorders that are not due to marrow deficiencies or other diseases, and occur despite the presence of adequate iron stores and vitamins.

Chronic diseases also cause anemia in a number of ways, such as poor nutrition, chronic blood loss and as a result of some drug therapies. Leaving aside these factors, there is a specific type of anemia associated with chronic infection, chronic inflammatory diseases and malignancy. This anemia is characterized by decreased plasma iron and iron binding capacity in the presence of normal or increased reticulo-endothelial iron stores. It has been termed as the anemia of chronic disorders. Although the anemia of chronic disorders is one of the most common anemia encountered in medical practice, its etiology still remains unclear and treatment unsatisfactory.

Recently, Hutter has also concluded that periodontitis has systemic effects and that periodontitis may tend towards anemia.

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