

Iron Deficiency in Female Athletes

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In partial fulfillment for the requirements of
NUTR243 Food and Nutrition Education

April 29, 2009

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Summary of Iron Deficiency Anemia in Female Athletes

Anemia has become a growing issue in the world; almost 30% of the population has been diagnosed with anemia of some sort. One of the largest types of anemia includes iron deficiency. This is a lack of iron in one's diet, inability of the body to use iron, or the loss of a lot of blood in the body. It is a growing issue because of the change in diets and lifestyles of people.

If there is a lack of iron in a person's body, the body will lack oxygen. This is because iron works with the red blood cells in the body and its hemoglobin. Hemoglobin is a protein found in the blood cells that transports oxygen from the lungs to the different parts of the body. If the body is lacking iron, then there are no bonding sites on the red blood cells for the oxygen. Iron also works with myoglobin, which stores oxygen in the cells, and uses the oxygen when the body is vigorously working, or just working out.

There are many different symptoms that someone may have if they become iron deficient. Some include, but the list is not limited to fatigue, shortness of breath, cramps, pale skin, headaches, and pain in the chest. A doctor can diagnose iron deficiency by doing blood work. By looking at the blood, the doctor will be able to know if the patient has an iron deficiency if the blood cells are a pale red; the number of red blood cells is less than normal, and if the red blood cells are smaller than the standard size. The way one can treat iron deficiency anemia is by eating more iron rich foods and taking supplements.

Female athletes is one population group that has to monitor their iron deficiency. This is because of menstrual periods, which causes the loss of blood, and the strenuous exercise the athlete is put through. With the loss of blood, there is less hemoglobin in the

body, resulting in less oxygen being transported throughout the body. With this, the female athlete needs to increase the amount of iron they are taking to increase the amount the remaining blood cells have and to increase the iron stores in the myoglobin.

Review of Literature

I) Hemoglobin and Myoglobin and the importance of both in the body

In the circulatory system in the body the red blood cells, or erythrocytes, contains hemoglobin. The hemoglobin is responsible for the red color of the blood and for the transportation of oxygen from the lungs to the different parts of the body. It takes up oxygen as blood passes through the lungs and releases it as blood passes through the tissues, where the oxygen pressure is low. Oxyhemoglobin is scarlet in color; reduced hemoglobin is of a purplish color. Without it, our bodies would be deprived of oxygen and eventually all vital systems would shut down (1).

Myoglobin is found, however, in the muscle cells, which supplies the muscles during exercise with oxygen. During exercise when oxygen is being used in the muscles, the oxy-myoglobin releases the oxygen it has for the metabolic processes (1).

The use of iron in both of these helps the oxygen to bind to the molecules. When there is a deficiency of iron, then hemoglobin and myoglobin are unable to have iron bind to them, causing a depletion of iron in the body.

II) Iron in General

Iron is one of the trace minerals that are found in the body. Trace minerals are inorganic compounds that are needed in small amounts in the body. They help with oxygen transport, energy metabolism, growth, and cell and nerve protection. Iron,

despite how important it is for the body is one of the most abundant metals on earth (2). The amount of the iron that is absorbed in the body depends on the iron stores. If there is a high storage of iron in the body, then there is less iron absorption. The opposite is true if there is a small amount of iron stores in the body. If this occurs then the absorption of iron is higher (1) Absorption of iron also depends on the promoters and enhancers in the diet.

There are two types of iron that the body uses, heme and non-heme. Heme iron is more efficiently absorbed in the body at a rate of 5-35% for each meal. Heme iron is mainly found the animal products or products that obtained oxygen when alive or living and is derived from hemoglobin (2, 3). Vitamin C can increase the amount of iron absorbed in the body. Some examples of products that contain heme iron include, but are not limited to, oysters, beef, clams, turkey, chicken and tuna.

Non-heme iron is absorbed only at a 2-20% rate during a single meal. This type of iron is found in plant foods, fortified, and iron-enriched foods. Some of these types of foods include ready to eat cereal, oatmeal, soybeans, lentils, beans, tofu, and whole wheat breads. “Tannins (found in tea), calcium, polyphenols, and phytates (found in legumes and whole grains) can decrease absorption of non-heme iron” (2).

Iron, as mentioned before, helps oxygen bind to hemoglobin and myoglobin. The hemoglobin, as it passes through the lungs, uses iron to collect and “hold onto” the oxygen, and then transports the oxygen to the different parts of the body. Once the hemoglobin reaches these parts, the iron releases the oxygen for the systems needing it. Without this process, the vital systems of the body would be deprived of oxygen causing them to fail.

III) What is Anemia?

Anemia means the reduction of red blood cells. It is one of the most common types of diseases found in the blood. .Anemia also causes a decrease in hemoglobin, the protein in red blood cells, which in turn causes less oxygen transport to the body and body systems (4). It is estimated of just about 30% of the people in the world are anemic. There are many types of anemia, including iron, B₁₂, and folate, because all are used to produce red blood cells in the marrow of bones.

There are many symptoms of anemia including headaches, fatigue, shortness of breath, muscular weakness, and the paleness of the skin. Some symptoms of severe anemia include shortness of breath at rest, confusion, and/or lethargy. If the doctor believes these symptoms are being caused because of anemia, they will take a blood sample to do a blood count, hemoglobin count, and the size of the blood by the flow of the blood. Depending on the severity of the anemia, various treatments will be prescribed for the patient. Supplements may be given, an increase in the types of food that contain the mineral that the patient is deficient in may be suggested, or, if it is chronic anemia, it may result in blood transfusions and supplements to increase the blood count.

IV) Iron Deficiency Anemia

“Iron deficiency is the most common single nutrient deficiency disease in the world and is a major concern for about 15% of the worlds population” (1). This disease can be caused from a decrease in the iron found in the red blood cells, not receiving

enough iron in the body; the iron is not being absorbed in the body (5), or heavy bleeding. The types of people who may have decreased iron in the blood, and low iron stores, and might not receive enough iron in their diets include vegetarians, because the vegetarian diet mainly consists of foods which include only non-heme iron. The bleeding can refer to internal bleeding, menstrual periods with females, and certain types of cancers (6).

Many symptoms are involved with iron deficiency anemia, including tiredness, headaches, sore mouth, and shortness of breath, pale skin, weakness, fatigue, and pain in the chest (5, 6, and 7). Symptoms of chronic iron deficiency anemia include, but are not limited to glossitis, spoon nails, angular stomatitis, blue sclera, and esophageal webbing (1, 8). Researchers are also beginning to look into the affects iron deficiency on neurobehavioral behaviors because of the lack of oxygen that is being transported to the brain because of the decreased amount of iron found in the blood (9). The researchers experimented with mice, and they found with the lack of iron in the system, there were significant differences in mRNA transcripts.

There are many ways to treat and prevent iron deficiency anemia. If one is diagnosed with iron deficiency anemia, positively identified with blood work, the doctor may prescribe an iron supplement which would increase the amount of red blood cells in the body, or may suggest an increase the amount of iron rich foods. Eating iron rich foods is also a way to prevent iron deficiency anemia. Some iron rich foods include (2):

- o Chicken Liver (3 ½ ounces) – 12.8mg
- o Oysters (6 Pieces) – 4.5 mg
- o Beef, chuck, lean only, braises, (3 ounces) – 3.2mg

- o Beef, tenderloin, roasted (3 ounces) – 3.0
- o Turkey, dark meat, roaster (3 ½ ounces) – 2.3mg
- o Chicken, breast, roasted (3 ounces) – 1.1mg

When eating iron rich foods, one is advised to consume Vitamin C foods as well, because it helps increase the rate that the iron is absorbed into the body.

V) Female Athletes and Iron Deficiency Anemia

Iron deficiency has become very prominent in female athletes; this is because of a greater turnover of red blood cells during exercising, menstrual periods, which causes the loss of blood, causing less hemoglobin in the body and less amounts of oxygen in the body and cells, and increased gastrointestinal blood loss. The average female athlete is to consume 15-18mg of iron a day (10). Once again, this can be achieved by eating iron rich foods along with foods rich in vitamin C. If the female is found to have an iron deficiency, they are also prescribed supplements, depending on how far advanced the iron deficiency is.

Conclusion of Iron Deficiency in Female Athletes

Iron deficiency anemia IS a growing issue in the world, and one of the groups of people greatly affecting is female athletes. This is mainly because of the menstrual period cycles and potentially diet. With the loss of blood, there is a loss of hemoglobin causing a decrease of oxygen that can be transported within the body. Increasing the amount of iron eaten would help cancel out the effects of the loss of blood. In addition, if prescribed by a doctor, an iron supplement can be taken to raise levels of iron in the blood.

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