Sports And Performance Nutrition

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Week-03

Lecture-12: Mineral- Iron

There are several minerals that can impact exercise. In this topic we are going to be diving deep in understanding of iron. What can iron mean for an athlete? What is its role in exercise? How can athletes choose rich food sources? When should you consume the iron rich food? This education can help an athlete keep in good shape. Let us start. The blood that carries the oxygen for the entire body and the brain itself is made up of iron. It is stored in red blood cells.

Similarly, it is also stored in the muscles called as myoglobin. Iron which carries oxygen is needed for every function of the body. So you can imagine what that could mean for an athlete who could train 3 to 4 hours at a stretch. Therefore iron can have a direct impact on the immunity to other than the hemoglobin which is present in the blood.

Iron itself can be very harmful and that is why they are stored in the body bound to proteins. So from the transport protein called the transferrin there is another important protein that stores the iron in the body called ferritin. This ferritin can be a very important blood marker to assess the athlete's iron status. So going by only hemoglobin or the iron studies independently without considering ferritin in athletes may not be useful. The iron digestion and absorption is a very complicated and a very intricate process.

It depends on several other nutrients for the optimal formation of the red blood cells found in the hemoglobin. You also require vitamin B12 and we will be going through this vitamin in detail under vitamins. And if you wonder why traditionally Indians drank water from a copper pot which the water was rested overnight you will know that iron absorption cannot occur without copper. For the absorption of the iron in the stomach you need the acids and most importantly intrinsic factor. So if you have poor eating habits or you take a lot of antacids for acidity that may not work in the favor for iron absorption.

Several athletes practice vegetarianism. For those athletes iron can come mainly from the plant source and that is a non-heme iron which the body cannot readily absorb. Hence adding foods which are rich in vitamin C we will discuss that in just a few more minutes. Also adding foods rich in vitamin C along with iron sources can help convert the ferric to ferrous iron in which way the body absorbs it. Similarly folate is found in dark green leafy vegetables and that also can support iron metabolism.

So if you heard your elders tell you to eat the dark green leafy vegetables then you know why it is important. Exercise leads to several hormonal changes and in context to iron we need to understand this hormone produced in the liver called hepcidin. Physical activity increases or elevates hepcidin hormone. So some iron is lost through sweat loss. Post exercise hepcidin can remain very high for a few hours.

Elevated hepcidin hormone prevents the absorption of iron unless an athlete is already deficient in iron and the body has low iron stores. The body maintains a homeostasis and hence there is a priority to absorb more iron the body can suppress hepcidin hormone post exercise. But for the others with adequate iron stores there is some good news. If you are in regular training over few hours consuming carbohydrate during the exercise ensuring good amount of carbohydrate intake for a training day can lower hepcidin. If you remember we discussed at length of how it is important to consume an isotonic so when athletes have very long training sessions ensuring carbohydrate intake during exercise can be of support not only for the prolonged workout but also to make sure that the hormone hepcidin can be lowered.

By now you would have already got an idea of how challenging it can be for an athlete especially if he is vegetarian when the demand is very high to meet his requirement and that can sometimes lead to low levels and lead to iron deficiency anemia. One is the internal change of the hormones some type of sports also lead to the breakdown of the red blood cells which forms the hemoglobin this is called hemolysis or the rupture of the red blood cells. So there is a loss of iron when there is destruction of RBCs. The sports with impact lead to foot strike hemolysis meaning due to the high impact there is a rupture of the red blood cells and this is seen in racquets sports such as tennis, badminton, squash, high intensity interval training or also in endurance sports such as marathon running or triathlon. So how does an athlete look for foods that can give him more iron? A vegetarian athlete can opt for dark green leafy vegetables particularly this variety which is shown in the photo called the amaranth that has slightly more iron.

Dates, figs, raisins the dry fruits which can also be an advantage when you have long training sessions also offer some iron. Of course you also have to remember to eat them away from your training pulses such as chana can also give you iron. But as I already explained these sources of vegetarian foods are non-heme iron and hence a simple trick can increase the bioavailability or the absorption of iron rich foods by adding a dash of lemon juice or eating a raw salad with a bit of tomato in it can improve the iron absorption from these foods converting it to for those who enjoy foods from the animal sources such as the red meat liver. The good news is the body does not have to work harder or worry about the conversion. The iron got from red meat is called heme iron and the body absorbs it readily and better and in your household if you are using iron utensils cast iron which is typically a good choice to make your dosas, your dumplings is the best way to incorporate iron.

If you do not have an iron utensil in your kitchen it will be good idea to invest in at least one or two of these tawaas or the iron kadai where the seasoning can be done to incorporate iron in your food. Now the tricky part there are ways we can improve iron absorption and one of it is also keeping in mind of those foods that can lower this iron absorption and they are the iron inhibitors which lower the absorption because they compete or fight with the iron for absorption. Phytates are found in dark green leafy vegetables, phytates are found in whole grains and pulses so high fiber foods typically do have phytic acid. The rival of iron is calcium, dairy foods which are rich in calcium can compete with iron for absorption. If you remember in the protein chapter I also talked about drinking tea coffee with your food so the tea contains tannin and coffee contains caffeine and they lower the absorption of very important minerals including iron.

Any processing of the food from cooking, soaking, sprouting, molting, fermenting all of these typical traditional Indian cooking methods can lower phytates and for some other foods it is just better to be conscious and plan your meals so that you can integrate iron rich foods 3 to 4 hours apart the training devoid of the other nutrients that can lower iron rich absorption and for seeds like flax seed or any seeds that can contain cyanide you can mildly roast these seeds and that can lower cyanide content. So that was about focusing on how to improve iron from food. What about those with very low levels where food alone may not be enough particularly if they are in a peak competition cycle. The iron parameters are very gradual to change and may take months to improve the levels. In that situation an athlete can benefit by taking an iron supplement of course with the right guidance and advice from a qualified sports dietician or a sports physician.

The best way to ensure iron is to consume it on a non-training day that is the best option. Now what if an athlete trains all 6 to 7 days and we do see that many times. In that case you have to find window periods where there is a gap of at least 3 to 4 hours after the training and that way we can target the low hepcidin window. Just like the way I reinforced of how the iron rich food needs to be consumed with vitamin C rich foods even when we supplement you have to ensure the iron supplement is consumed with vitamin C. Iron can also be very important for female athletes.

With the onset of menarche which is the first menstrual cycle around puberty in young girls menstruating leads to a loss of blood. In some girls there can be excessive bleeding or heavy flow and that can further lower the iron store in the body. Also if you are a poor eater or trying to make weight and consume less food if you remember the first chapter of energy availability where we talked of relative energy deficiency in sport. Automatically consuming lesser amount of food can give you little amount of the nutrient when your demand can be extremely large. So that can compromise your need to your supply and further exacerbate or make the iron deficiency worse.

There are athletes who deliberately train at high altitude to increase their bodies iron store. There are also training chambers to simulate this environment for erythropoiesis. The thin air or the sparse oxygen available can initiate the process of the synthesis of new red blood cells and that can be very advantageous for an athlete. So when we have athletes who had to lay or anywhere else at a very high altitude to practice this kind of training we advise them to do their blood parameters. Evaluate what are the iron stores are they deficient is there a need for a supplement intervention and of course side by side they also look at their food practices are they vegetarian non vegetarian what is their cultural food habit and that can help us understand the need for supplement based on his food intake.

So during this high altitude training period athletes will be put on a supplement protocol so if the ferritin levels are alarmingly low then under the supervision of a sports physician the athlete can be administered iron via IV infusion. So in my consultations and practice I typically come across athletes when we sit at a very lengthy onboarding process and we are documenting the symptoms of these athletes those particularly with low iron can give you several clinical symptoms to name a few as which is already listed here very tired the athlete goes through fatigue low energy you definitely hear the parents complaining of children being always angry and quite irritated apathy which is sometimes parents mistake it for laziness but the children are sometimes genuinely tired which obviously leaves them sullen and they may not be very

enthusiastic and show lack of interest. As discussed educating the athletic and the parent community giving them a guidance on how to incorporate iron rich foods perhaps even give them a handout and adding nutritional supplements in sync to their training schedule meaning you plan the iron supplement away from the training period and on a highlight just because you have intervened with food or iron supplement the athlete just does not rejuvenate overnight it is a process that takes a few weeks but in due course of a couple of months the athlete has more energy as the blood levels of iron improve the oxygen carrying capacity of the blood is increased there is but a direct correlation to the athlete's stamina power and endurance exercise capacity. An athlete with adequate iron in the body can endure a good aerobic exercise an athlete with improved iron status obviously has better capacity for cardio types of training. So it is equally important to evaluate the blood parameters and supplement only when there is a need as a reflection of the blood parameter to a iron deficiency anemia.

Excessive iron intake can be toxic and lead to iron overload called haemocyderosis. Transcendental iron intake can unnecessarily also burden the balance of the oxidative stress and we will learn about that in the chapter antioxidants unnecessarily overtaking iron therefore can impair immune function. So for the athletic population with iron deficiency as per the IOC consensus statement and the Australian Institute of Sport the iron supplement protocol falls under the group A evidence-based approach to reinforce always work with credible professionals and qualified dieticians and sports medicine doctor. So also it is important and an ideal practice even on the supplement intervention it is advisable to periodically re-evaluate the iron status that way you can assure the safety of the athlete. Also as an education it is very important to send a clear message to the athletes they need to consume supplements periodized or only for that duration prescribed.

In my practice there are athletes who come to you for a certain period of time sometimes very small duration but then they assume that the supplement advice can be followed inadvertently meaning forever. So that can be quite dangerous and as support staff they cannot be held liable. So it is good to have it in clear writing in communication that the intervention of supplement is under the able advice only for the prescribed duration and beyond that the athlete is responsible for his own safety. So to summarize as practicing sports nutritionists and dieticians we definitely want to focus on food first and the message is always to eat right. So planning iron rich dishes keeping a gap of 3 to 4 hours after training is a good option to add iron in athlete meals.

A vegetarian athlete can consume vitamin C rich foods be it a fruit or a salad with some tomatoes or added vitamin C and that needs to be consumed fresh immediately. It cannot be stored in the fridge and eaten after one day when the vitamin C has got destroyed or perished. And if the blood levels depict a iron deficiency please consult a qualified sports nutritionist or a sports dietician or a sports physician and look at the necessary intervention in the pre or the competition season which is the peak training cycle for an athlete. I hope this lecture was useful for you and you have some important takeaways from here.

Thank you for listening. Hi I am Utra Bhatta Sarathi I am a national in Delhi questioning competing in research. As a female student athlete I would encourage all of you to take your blood tests and check your blood parameters to check your iron levels especially because as a female when you are menstruating you lose a lot of blood and in the blood you have a loss of iron and iron supplies the oxygen in the blood and in the body. So once you lose the iron and

the oxygen you get very sluggish and you don't have the stamina you can't endure. Basically it is very important to take care of your iron levels either through food or nutritional supplements because it will help you personally speaking it has helped me maintain my stamina during my training and I tried early in the morning so it has helped me maintain my stamina during training maintain and beyond the training it has helped me stay more alert and it has helped me in school to pay attention in my classes. So I encourage all of you to check your iron levels and make sure you all make sure they are fine.

Namaskar, Main Gauravana International student. I am an athlete and I am a vegetarian athlete. I have been doing this for 3 years now and I have been doing it for 3 years now. I have been doing it for 3 years now and I have been doing it for 3 years now. I have been doing it for 3 years now and I have been doing it for 3 years now.

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