Sports And Performance Nutrition

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Lecture-32: Diabetic athletes

Hello everybody. In the module Special Groups, this lecture will focus on athletes with high blood sugars. What is diabetes? What are the ideal food choices to manage high blood sugars? Should diabetic athletes practice carbohydrate loading before endurance workout? How to prevent low blood sugars while exercising? What is ketosis? What are the ways diabetic athletes can monitor blood sugars and can diabetes management be a challenge in master athletes and how does muscle mass impact blood sugars? Let us understand more. There is an organ called pancreas. Pancreas secrete two hormones insulin and glucagon. Insulin helps absorb glucose.

Glucagon helps breakdown of stored glycogen from the liver to form glucose. So the body maintains homeostasis or a balance of constant blood sugars for our daily needs. If you remember all the extra carbohydrate foods is stored in the liver as liver glycogen and insulin is responsible for that. Similarly when during exercise the blood sugars fall the enzyme glucagon from pancreas help breakdown the stored liver glycogen to give glucose for energy.

When there is an inadequacy of the hormone insulin or the absence there is a challenge to maintain blood sugars. This medical condition is called diabetes. In type 1 there is no insulin secreted from pancreas. In type 2 typically seen in obesity when the weight is very high there is insulin, but because of the higher adiposity there is a challenge of its function. GDM or gestational diabetes is seen in pregnancy due to hormonal changes.

Since athletes have high physical activity and the weight is always in check the type 2 diabetes typically seen in overweight and obese individuals is a rarity. Type 1 diabetes can occur out of nowhere suddenly which can be even due to an infection or sometimes an autoimmune incidence. The body mistakenly destroys the pancreatic cells and hence there is a lack of insulin. The only way to manage type 1 diabetes is by injecting insulin. Unfortunately type 1 diabetes occurs also in children and this management needs to be personalized based on the blood levels of sugars along with the amount of insulin that is needed to control high blood glucose.

This requires hand holding from a clinical dietitian who helps the athlete to understand how to plan the carb counting to the units of insulin taken again based on the various different types of insulin when athletes exercise they use up blood sugars and the stoned liver glycogen. Hence there is a need to replenish the low blood sugars. This is where insulin comes to play. So in a diabetic athlete this poses a challenge for steady maintenance of blood sugars. So with higher intensity workout or longer duration obviously the blood sugars fall and this condition is called hypoglycemia.

This requires tweaking and fine tuning the food where the diabetic athlete needs to learn how to manage carbohydrate intake to manage steady blood glucose. So by consuming calculated amounts of carbohydrate before the workout or planning for the duration of exercise based on the intensity and replenishing calculated carbohydrate amounts after workout athletes can take control of their blood sugars. So obviously this takes time and some learning. So that brings us to the question when the athlete already has high blood sugars because of the lack of insulin should a diabetic athlete practice carbohydrate loading. Consuming more carbohydrates than usual either for a competition or a prolonged activity requires the support of a qualified registered dietitian or a clinical dietitian even a sports nutritionist or a sports dietitian can educate athletes in understanding the carbohydrate amount consumed especially if they take insulin to match the units to the carbohydrate load.

While a normal athlete can consume simple carbohydrates like white rice for carbohydrate loading perhaps a diabetic athlete needs to tweak that and consume slow digesting or complex carbohydrates in mixed meals gradually across a few days prior to the big day. Again a word of caution here for athletes with high blood sugars is to closely monitor the blood sugar level to avoid hypoglycemia or further aggravate high blood sugars. If the workout is more than one hour of duration consuming one or two servings of carbohydrate about one hour before the exercise can maintain blood sugars that can be one katori of dahi and one fruit such as apple which is a slow digesting carbohydrate. During exercise energy is being used and the muscles also are consuming blood glucose for workouts hence the blood glucose is used up and if the athlete with high blood sugars does not take care to replenish about 30 grams of carbohydrate after 45 minutes to one hour that can lead to his blood sugars falling which can cause hypoglycemia or low blood sugar. So you can monitor the blood sugar by a simple blood test and if the value is less than 70 mg per deciliter that means that the athlete is having low blood sugars.

So athletes with high blood sugars should also ensure to consume about 30 grams of carbohydrate for about half an hour to one hour based on the intensity of workout just like any other athlete to ensure the prevention of hypoglycemia. Low blood sugars in diabetic athletes can lead to not only weakness profuse sweating and the inability to continue exercise. So how does an athlete with high blood sugar take care to prevent hypoglycemia? With a glucometer you can monitor the blood levels and if the value is less than 70 mg per deciliter you can follow the 15 thumb rule. A table spoon of simple sugar such as either a sugar candy which can be even a few dates. A diabetic athlete can consume 15 grams of table sugar, a couple of dates or even sugar candies and wait for 15 minutes and repeat the blood test using a glucose monitor to see if the blood level has increased.

In case the blood sugars are still low you can repeat the same procedure again. Monitoring steady blood glucose can be a challenging affair which requires constant monitoring. If the athlete needs insulin injections the insulin taken on rising and the fast acting insulin taken just before a meal has to be adjusted. So this also requires complementing insulin with the amount of carbohydrate eaten. If you have seen certain patches where individuals are using to monitor blood glucose you will be aware that continuous blood glucose monitoring is a way to track how you respond to food.

A important thing to note here is continuous blood sugar monitoring is most useful in diabetes and a normal healthy athlete does not need to use it. Consuming food especially with

carbohydrates will lead to insulin release and the insulin spike is a normal response. A healthy athlete does not have to worry about it whereas an athlete with high blood sugar or with the diabetes condition needs continuous blood glucose monitoring to see the pattern of how his body responds to either medication which are oral hypoglycemic agents or the insulin injections. So to emphasize continuous blood glucose monitoring is most useful to manage diabetes condition. What happens if an athlete does not take care to consume adequate carbohydrates during exercise? Because of the lack of the hormone insulin and the inability to push the glucose into the cell the body looks at an alternative to use fatty acids for energy.

The breakdown of fats leads to byproducts called ketones. Ketones are used as a substitute for carbohydrates. Also in conditions of extreme starvation or uncontrolled blood sugars when the body switches to using fats as an alternative for energy source these ketone bodies can lead to a very fruity odor from the sweat. This can also sometimes explain why an athlete loses weight. So consuming adequate carbohydrates before during and after the exercise is equally important in diabetes to prevent very high buildup of ketone bodies which can be dangerous in diabetic conditions.

So athletes can use continuous blood glucose monitoring which are patches used on the skin or can periodically use glucometers for self-monitoring of blood glucose. So maintaining charts of blood glucose status can help track the pattern. Even in athletes in middle age who participate in sports require management of food to take care of their blood sugars. Due to the aging process in master athletes there is a loss of muscle mass called sarcopenia. Aging muscle mass is extremely vital for the management of blood sugars.

Due to the aging process there is lowered testosterone which also has an impact and lowers the muscle mass. Also master athletes must focus on high protein intake and nutrients to keep higher muscle mass and high bone mineral density. High protein diets help elevate testosterone levels. Similarly among female athletes especially as they are nearing menopause there is lowered anabolic female hormone estrogen. So consumption of soya and soya based products can be useful.

Plant estrogen or phytoestrogen got from foods which are derived from soya like tofu, soy milk, tempeh, edamame or even flax seeds can help increase estrogen levels in female athletes. Just like testosterone in males that supports higher muscle mass in female athletes the phytoestrogen can be very helpful in keeping or maintaining a higher muscle mass and also bone mineral density. Severe muscle wasting can also be seen in certain autoimmune conditions. So loss of severe muscle mass can be also seen in age related degenerative conditions as muscle, muscle disuse, atrophy. So how can you preserve muscle mass which can be useful to manage steady blood glucose especially as you age through middle age and years thereafter.

In addition to consuming high protein from food by practicing weight bearing exercise or strength training diabetic athletes or master athletes can ensure higher muscle mass. To summarize for those individuals with high blood sugar or prediabetes consuming slow digesting carbohydrates such as whole grains be it dahlia, quinoa, millets along with the high protein diet salads and the use of vinegar helps maintain steady blood sugars. If athletes with high blood sugar will participate in endurance event their carbohydrate loading depends on their glycemic control. Individuals with uncontrolled high blood sugars must focus on

consuming complex carbohydrates gradually over one or two days. If the athlete is on insulin you need to closely monitor intake of carbohydrate with the extra insulin dosage.

More importantly for those individuals with irregular and erratic blood sugars consuming carbohydrate during the workout especially if they exercise beyond 45 minutes to 1 hour is more important to prevent hypoglycemia. Exercising weight bearing exercise helps to increase muscle mass and lowers insulin resistance that can be seen in slightly overweight diabetic or prediabetic athletes. Even exercising regularly even 30 minutes each day or a maximum of 150 minutes every week improves insulin insensitivity and helps manage blood sugar. I hope I could simplify this lecture on blood sugar management from food and by practicing strength training and this was useful for each of you.

Thank you for listening. I am Anurad Seymons. I am both a marathon runner and a prediabetic. As a marathon runner who is prediabetic carbohydrates are both your best friend and your worst enemy. Carbohydrates are your best friend when you have your running shoes on and your enemy at other times. We need massive amount of carbohydrates to match the miles we run.

We do this by carb loading prior to our long runs both during race day and during training. We consume energy drinks with electrolytes for hydration coupled with gels. This can severely disbalance your blood parameters if you are a prediabetic like me. However you can fix this predicament with a balanced healthy diet. Whole grains such as millet with high quality proteins, non-starchy vegetables, salads with vinegars, fruits which are not so sweet, consumed with good proteins and fats can be satiating yet maintain steady blood sugars.

Also the use of traditional foods such as methi, flax seeds can be useful in lowering blood sugars too. Thank you.