

Sports And Performance Nutrition

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Lecture-22: Carbohydrate loading for sports performance

Hi everybody, by now you are already assured of how important carbohydrate is for physical activity. In this lecture on carbohydrate loading we are going to discuss how to beef up glycogen store. What is carbohydrate loading? What are the foods ideal for consumption during carbohydrate loading? In what quantities should the food be consumed? How many days should an athlete carbohydrate load? What are the best Indian food options for carbohydrate loading and relating it to a sport and discussing a scenario how an athlete can maximize glycogen store? With roughly about 5 grams of carbohydrate in the bloodstream to roughly 100 grams of the stored carbohydrate called glycogen in the liver to about 5 times its amount which is stored in the muscle glycogen. By now you have heard about how important glycogen is for higher intensity workout or a longer duration of physical activity. So carbohydrate loading is consuming extra carbohydrate rich foods to increase the glycogen store in the body. Carb loading is most useful for sports which last longer than one and a half hours.

So in endurance sports the stored glycogen is broken down back to glucose by supplying steady energy for the working muscle thereby prolonging the exercise time and preventing fatigue. So which sports come under endurance activity? Marathon, triathlon, cycling, race walking, even long distance swimming and rowing. Team sports like cricket and football and racquet sports be it tennis or badminton which can last beyond one and a half to two hours are those exercises or sporting events which require the use of stored glycogen. High carb meals are very important to support high intensity workout or high training load.

So you can imagine if there is a competition or an event how important it is to optimize the glycogen stores. I hope discussing the type of carbohydrate which we have dealt in detail in the fundamentals of carbohydrates right in the beginning is helpful for you to choose high glycemic index foods for carbohydrate loading by consuming simple carbs with low fiber content such as white rice, aloo, carrots, roti, even white bread from Sago, Dosa, Idli. In Indian meals there is no dearth of carbohydrates. So these kind of simple carbohydrate food choices keeping modest amounts of protein and low amount of fat is ideal for carb loading phase. When an athlete consumes high carbohydrate in the peak competition season or even for recovery carbohydrate may lead to a marginal increase in body weight.

The food is converted to the storage form as glycogen and glycogen holds water molecule and hence athletes may notice slight weight gain. I am often asked can athletes consume fruit juices while carb loading? Yes fruit juice can be an easy option to consume extra carbs sometimes even with sugar but do keep in mind of the race day strategies where you want to avoid sugary items too close to the event. While we understand that we want to choose carbohydrate foods with low fiber what about vegetables and fruits which also contribute to the fiber. Should an

athlete consume a lot of salads for carbohydrate loading that may be unnecessary. High fiber is the indigestible part of fruits, vegetables or the skin of pulses such as chole, lobia or the bran of whole grains such as wheat or brown rice.

These indigestible fibers will lead to gas or flavors in the intestine in the process of digestion and that can be inconvenient for an athlete especially when the focus is to be ready for a match. So what is the solution to making digestion easier during carbohydrate loading? Avoiding vegetables can soften the fiber and ease digestion. So during carbohydrate loading it is also best to consume cooked sabzi or vegetables thereby avoiding salads other than rice roti or bread. Carbohydrates are also found in fruits, vegetables and dairy. So even milk and milk products can be a source of carbohydrates during carbohydrate loading.

The he or milk both can be consumed even as a smoothie or a fruit milkshake that can be useful to add additional carbohydrates. While increasing carbohydrate intake athletes can touch about 70 to 80 percent of their intake by focusing on carb rich food options. At the same time athletes should also ensure they taper their training load and rest so that they are recovering from the training session and gearing for the big day. In the past there was a practice of not consuming carbohydrates for a few days coupled with high intensity workout and introducing the carbohydrates back in a higher quantity to make up for the lost glycogen and amplify the carbohydrate store as glycogen. So what does the current evidence suggest towards this protocol of glycogen formation? So this approach to carb loading was very helpful in untrained athletes.

The latest studies do conclude today that this form of glycogen super compensation may be unnecessary. Seasoned and elite athletes already have the enzyme glycogen synthase very high. So in these well-trained athletes consuming high amount of carbohydrate just for a couple of days will be adequate to ensure a high glycogen store. Even better there are guidelines to see consuming high carbohydrate a couple of days prior to the main event and followed by sticking to the regular intake of carbohydrate even 24 hours prior to the big day will be good enough or will suffice. Now there's an interesting bit to understand what can be the gender difference to the carbohydrate intake.

Can female athletes have the same ability to enhance the glycogen store as a male athlete? Yes, if a female athlete can consume larger portions of carbohydrate she can also equally enhance her glycogen store. However male athletes have a slightly larger requirement for carbohydrate consumption. Men can get about 7 to 10 grams of carbohydrate per kg body weight while females can consume slightly lesser about 5 to 8 grams of carbohydrate per kg body weight. Physiologically there is a difference how a male or a female athlete use energy substrates. Male athletes oxidize more carbohydrates and female athletes can burn more fat.

So what are some of the common high carbohydrate options in Indian meals? We have already been discussing of how carbohydrates are present in fruits, in dairy, in root vegetables such as Aloo or carrot, rice roti bread and the interesting addition in this slide is dals. A cutlery of dal roughly which is 100 grams can give 15 grams of carbohydrates. Now if you correlate consuming even 8 to 10 grams of carbohydrate per kg body weight you can put your heads together to do some basic maths. So you can imagine how you need to consume large portions of carbohydrate meal to even meet 600 grams of carbohydrate for a reference man of 60 kgs. So this is where you can focus on nutrient density.

In this slide here is also the added photo of Sabudana or Sago. This is a very calorie dense Indian food choice where you can get a very large amount of carbohydrate by consuming relatively lesser portion. That brings us to the other question of the stomach comfort. Can athletes get used to eating large amount of carbohydrates overnight? This is of course a gradual process where athletes have to train their gut. High carbohydrate intake comes with its own challenge.

So by consuming higher amount of carbohydrate throughout the training period athletes can get used to oxidizing more carbohydrates. So they are not jinxed just prior to a big event. If you could already relate to the quantities which I am just giving you an example as various food options and the quantities carb digestion also has some inconvenience of bloating gas or flatus. Restricting to one food group in such large intake sometimes can be cumbersome for an athlete and yes when you do consume high amount of high glycemic index of carbohydrates of course there is going to be a release of the hormone insulin because that is what its function is for the carbohydrate to be digested and pushed into the cells. Carb digestion has a fundamental role to play and yes in a social setting high carbohydrate intake may just be sometimes embarrassing.

So let me walk you through what carbohydrate loading can look like in meal options. So if you are targeting roughly about 10 grams per kg body weight and aiming for 600 gram of carbohydrate for an entire day what can a sample meal plan look like and we break it up into different meals. A porridge that is made from milk and consuming a sago upma on the side the athlete will still have to consume a glass of milk and a fruit and mind you in breakfast this was just the carbohydrate we are accounting for. The athlete may sometimes also consume a high amount of protein be it eggs or any other option. Similar to breakfast an athlete can plan to consume rice, roti, plain dal tarka, dahi along with the consumption of a starchy vegetable such as corn or peas.

For dessert choosing carb rich options be it fruit yogurt or even a toast and honey or jam can be an additional source of carbohydrate and of course that fruit juice we discussed. For an evening snack or bedtime an athlete can again plan for an additional carb rich snack from the sweet potato to a milkshake or smoothie. A permutation combination of dishes or a meal plan can be creatively used to avoid monotony and if you see the sample dinner plan typically what a Indian thali or a mixed meal will offer you rice, roti, dal, dahi, sabzi and of course consuming some beetroot can also be an additional source of nitrates and we will discuss that in detail very soon. So let us discuss in which sports carbohydrate loading can be useful. I am sharing the journey of one of my athletes where he participated in an iron man 70.3 in Finland. Iron man 70.3 involves swimming for 1.9 kilometers, cycling for 90 kilometers and running for 21 kilometers. This athlete participated in Goa 70.3 last year and you can imagine how enduring iron man can be which lasts beyond 7 hours.

I hope sharing the video of an athlete gave you some perspective to what an ultra endurance event can be. This is where we put into context the hydration strategies with electrolytes. The consumption of carbohydrate foods for carb loading for more than two days before an endurance or an ultra endurance event and the strategic consumption of sports foods such as sports drink and gel every hour. So consuming carbohydrate rich food to enhance the liver and muscle glycogen can really help an athlete sustain long hours of physical activity or exercise

and of course that will not suffice and in addition to carb loading in these kind of long events consuming enough carbohydrate during each hour of exercise can help you keep on track.

Iron man 70.3 is happening in Goa in a couple of days while I record this lecture. Athletes from across India and perhaps even outside of India will congregate in Goa. If you remember we are putting together a course content with various aspects that can help you bridge several important aspects from food to lifestyle to other support for travel and recovery. We are discussing the travel guidelines in detail in another course lecture and you may relate to the challenges of an athlete. From travelling within India which can either involve long hours of drive or taking a train or alternatively flying into the destination and the challenges of air travel.

Here in the case of the athletes journey which I shared from a 70.3 happening in Finland you can imagine what it is to travel across time zone to settle down to acclimatize and the uncertain weather conditions where this triathlete was faced with the challenge of very very cold conditions coupled with rains. So many times you plan and practice and the events don't go as in theory with practicing. So with the athlete training to digest high carbohydrate intake and also working with sports supplements there is comfort in knowing that your stomach or gut can be at ease and comfortable with the strategy that you have followed and practiced. With marathon running there is a lot of gastrointestinal distress.

Some athletes can feel comfortable to consume certain foods such as banana or even bread and jam or rice cakes which is nothing but the puffed rice laddoo. However in some athletes because running can be an impact sport or even using a caffeine gel or caffeine gum. There is a gastrointestinal disturbance and that can stimulate the gut and the athlete can have an urge to use the washroom but by following the carbohydrate loading guidelines having to eat more carbohydrate over weeks and months and strategically combining sports foods gels and confectionary such as even sugar candies endurance athletes can push their limits and sustain hours of exercise and I am happy to share. Both the gentlemen in these videos shared completed their iron man most importantly without any injuries. So carbohydrate loading is a protocol that definitely needs practice.

To summarize by now you already know how carbohydrate is king and even just additional intake of carb foods before and during exercise can support high intensity workout and definitely carbohydrate loading can increase endurance workouts while carbohydrate loading choose simple easy to digest food options which are low in fiber to avoid any gastrointestinal discomfort. You can practice carbohydrate loading for a couple of days before a very important match day or for an endurance event you are planning to prevent fatigue and help you sustain your exercise capacity. Thank you for listening and I hope this lecture was helpful for you.