Sports And Performance Nutrition

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Lecture-07: Importance of proteins in performance

Hello, today we are going to be discussing proteins. What does protein mean for an athlete? What is its function? What can be good sources of protein for an athlete? Proteins are needed just to make up the cell, for children to grow, for any wound that needs to heal and those cells and muscle tissues need to repair. Proteins have a major role in maintaining and repairing the muscle tissue. And if you are wondering what happens to that egg or the glass of milk that you consume, the digestion itself takes place because all the digestive enzymes are nothing but proteins. Proteins are also a part of the macronutrient meaning that we consume them in larger quantities and we have already learnt that each gram of protein gives 4 kilocalories. Proteins are also part of blood components be it the haemoglobin, the albumin, the globulin.

If you have an infection and the WBCs or the white blood cells are going to fight an antibody, all those immune functions itself are taken care by the proteins. Those antibodies are also made up of proteins and if you are concerned about a lot of hair fall or nails that chip easily ensure that you take good amount of proteins in your diet because a tertiary structure called the keratin itself is also made up of protein. If you need good skin, the cementing material of the skin that holds the cells together that is the collagen and that also is made up of protein. If you want to feel good, the happy hormone serotonin itself is also derived from high protein intake.

Good quality proteins have a important amino acid called tryptophan which is also the raw material from which serotonin increases and the body itself can make some amino acids by converting one to another. So a lot of these internal manufacturing of these proteins can also occur with adequate amino acid pool in the body. What is the protein requirement for athletes? And that itself can vary based on several parameters. Growing children of course have a higher demand for protein intake due to the requirement of the extra muscles that they need to build. An athlete who is looking for training adaptations and whose objective is to increase the muscle mass and whose strength training also has a higher need for protein intake in order to increase his muscle protein synthesis.

Interestingly, the training status of an athlete can really influence the turnover of protein and a highly trained athlete is quite efficient to even sustain with slightly lesser amount of protein intake. And for those athletes who are also looking at weight cutting, meaning to lower the body weight and their fat mass, keeping their calorie intake and carbohydrate intake lower and keeping the proteins higher can ensure they reach this goal. Adequate protein intake post training can really ensure that there is not only recovery from the exercise where the muscle protein synthesis is being supported, adequate amount of carbohydrate and protein when combined and consumed together can ensure there is no further breakdown of the muscles as with the macronutrient of eating enough rice roti. If an athlete is in a peak training season, be

it the pre-competition or a competition cycle, the protein requirement will be higher to sustain the training load and also to ensure optimal recovery. Similarly, if an athlete has had an injury, be it a muscle tissue injury or sometimes even if an athlete is unwell and his immunity is lowered even after an infection, good amount of high quality proteins can improve this healing process.

The highlight of protein metabolism is that the stimulus itself is exercise and particularly the weight bearing exercise. Strength training coupled with optimal and ideal recommendations of protein increases muscle protein synthesis. Interestingly, please note that when an athlete is looking to increase muscle mass, higher amount of calories, carbohydrates and protein supports the muscle protein synthesis. If after the intense training session, the athlete does not ensure to consume adequate nutrition from the right food choices in the ideal portions, unfortunately that can lead to breakdown of the muscle tissues and this catabolism can lower his muscle mass. So the body maintains a fine homeostasis and a balance of the muscle synthesis versus the breakdown of muscle.

It is an absolute must for an athlete who trains several hours in the day to ensure optimal amounts of protein intake through the day and now we know from research that as we age and the metabolic rate dips by 1 or 2 percent for every decade, a master athlete has definitely higher requirement for protein intake. An athlete of a middle age or older must plan and ensure adequate amounts of protein intake to complement the training load and goes without saying India is a country where vegetarianism is followed and practiced by several. For a vegetarian athlete and for those who are also looking to go vegan who mainly consume only plant based food, it is extremely important to understand how to combine certain foods to optimize the protein intake. Post training for an athlete to support the muscle remodeling, the consumption of high quality protein is very very crucial. The ideal recommendations are to consume about 25 grams of protein in every meal.

It is also interesting to note not only 0.3 to 0.4 grams of protein per kg body weight in every meal is recommended but most importantly one needs to plan the similar amount of protein every 3 to 4 meals in a day consuming the proteins along with the carbohydrate foods is also equally important. Carbohydrate foods increase a hormone called insulin from the pancreas. This hormone insulin enhances the absorption of these amino acids from the protein.

When the protein is broken down the small bits of that protein is called amino acids. Several amino acids make up a protein food thereby the co-ingestion of your rice, roti, aloo, dahi or even any dairy product even fruits which contain carbohydrates. Diets when consumed with the protein foods optimize muscle protein synthesis for an athlete. Is there an ideal time to consume protein foods after training? Yes, ideally as soon as you can. Post workout the best option and the benefit that you gain from consuming protein is within the first 15 minutes and all the way up to 2 hours.

In the carbohydrate chapter I had emphasized of how the extra carbohydrates that an athlete eats get stored in the liver and the muscle as glycogen. After a long workout where athletes train for several hours typically anyway from 1 hour and that can be 2 to 3 hours at a stretch and we know that the liver glycogen can last about 1 and a half to 2 hours of exercise based on the intensity. So after an exhaustive session of physical training when the liver glycogen is very low there is an enzyme called glycogen synthase that is elevated. What is the role of glycogen synthase? It converts the food that we consume from the glucose and stores it back

as glycogen so that the athlete can be ready for the next training session. So when an athlete is consuming the protein foods consuming the carbohydrate foods along with the protein foods also stimulates and releases the hormone insulin and this hormone insulin also stimulates glycogen synthase.

This way the athlete is optimizing muscle protein synthesis and also ensuring the recovery of glycogen. So there is an ideal carbohydrate to protein recommendation. The carbohydrates can be 2 to 3 times that of a protein serving. So for a given athlete of 60 kgs of a reference body weight 1 gram per kg body weight can be roughly 60 grams of carbohydrate. 60 grams of carbohydrate is about 4 rotis that is ideal to be combined with at least 20 grams of protein.

Roughly about 100 grams of a chicken breast can give you 20 odd grams of protein. If you consume eggs 3 whole eggs is approximately 18 grams of protein. So this way an athlete can plan carbohydrate and protein together. Like I mentioned a few minutes earlier when proteins are dissected and broken down the small little building components of this is called amino acids. Like in the picture given for an analogy and an example this puzzle is made up of several little parts of the puzzle that we put together.

So the amino acids are fragments and bits of proteins. There are about 8 essential amino acids which means that these cannot be made inside our body and hence we need to eat them from the food and what type of food? High quality proteins. Dals are a very integral part of Indian diet. Seldom is our Indian meal complete without a sambar or a dal or a chana chole gravy on the side. However, dals lack a very important amino acid called methionine.

Hence dals are called a low biological value protein and besides dals also have a lot of carbohydrates in them. Roughly a 30 gram raw weight of a dal has at least 15 grams of carbohydrate. If I could just get about 20 grams of protein eating a blob of chicken breast of approximately 100 grams I would have to eat 3 kachoris which is roughly a very large bowl of 300 grams of dals to get the similar 20 grams of protein in a vegetarian meal and that is obviously 3 times more calories. And what can one do about this missing or a low amino acid methionine which is one of the essential amino acid? There is good news that you can improve the protein quality by just combining 2 different food groups. You consume the dals along with grains.

The grains are low in a amino acid called lysine and the dals lack methionine. So when we eat these 2 food groups together which is called as complementation they make up for the lost amino acids by complementing one another thereby improving the amino acid quality. But just to keep in mind but just as I mentioned a few minutes earlier you need to consume this mixed meal in larger portion and hence the calorific value goes up. So we discussed what is low biological value protein and how we can improve that by consuming the rice and the dal together, the bread with the beans or we eat the khichdi, pongal, idli, dosa where all these foods can be combined together to improve the protein profile. With high biological value proteins you do not have to worry about that.

They already have all these essential amino acids and they are complete. That is why an egg is the best athlete's food choice. Quite economical, easy to access and easy to prepare. Eggs can be a great source of protein for an athlete. What about those vegetarian athletes? Those who do not even consume eggs? They can look to consume certain soya based products from the tofu which is the soya milk paneer, the soya chow, the extruded soya powder called the

soya chunks or soya granules.They are all very good in high quality proteins. Soya also is slightly lower in methionine content but when consumed as a part of the mixed meal it can increase the amino acid profile. But do remember you may want to keep your soya intake to a maximum of about 25 grams of the entire protein consumption for a single day. Now you will ask me what about soya beans? Soya beans do have anti nutritional properties which can lower the absorption of certain other nutrients. So soaking them, cooking them, sprouting them is a better option.

And soya itself is also very high in fat content. The fermented soy product called tempeh is another option which is excellent and also lowers a lot of these anti nutritional properties. What are the recommended amounts of protein for an athlete? An athlete who practices strength training has a higher need for protein especially on that particular day. About 1.6 to 2 grams and even upwards based on the need per kg body weight is recommended.

So for a reference man of 60 kgs that could roughly be 120 grams of protein for an entire day and breaking that down for one single meal it is roughly 30 grams. So for an athlete who consumes non-veg approximately 100 grams of fish which is 20 grams of protein still needs additional 2 eggs to make up to 30 grams. What about a vegetarian athlete? If you consume the he or a glass of milk which is 3 grams or 7 grams and that together can even be just 10 grams then he needs to definitely make sure that he consumes at least 2 to 3 quatore of dals to make up to the remaining 20 grams. That explains what I was explaining to you of consuming larger portions to get the recommended amount of protein.

As I mentioned roughly about 0.3 to 0.4 grams of protein per kg body mass is ideal to plan in every meal. What happens to those athletes who are not strength training but are practicing a sport or they are into fitness and do a cardio workout? The recommendation of the protein intake is about 1 to 1.5 gram per kg body weight. For those athletes who are considering weight loss setting goals to consume less food, less calorie intake along with lesser amounts of carbohydrates they need to ensure a high amount of protein intake.

Protein foods offer a lot of satiety meaning a feeling of fullness. They lower the appetite stimulating hormone ghrelin and also use up a lot of extra energy for their own digestion thereby they have more thermic effect that can aid weight loss. Here I am discussing a very important topic which is highly overlooked. Most athletes focus on quantity of proteins without paying much attention to the way it is cooked. Cooking protein foods actually allows for its better absorption.

However if you overcook it as you can see in this picture of an egg when the fried egg is overdone and it is chewy and rubbery the proteins are destroyed which actually means that the absorption of the protein from that fried egg comes down. Similarly deep frying when you subject protein foods to very very high temperature or as in this photo of this grilled chicken when it is subjected to direct flame or fire certain cancerous compounds are formed which are not favorable. Consume less of these and pay attention to the right cooking methods. The safest option is steaming and boiling. Use modest heat and never overcook your protein foods.

Another practice I always notice with the athletes the consumption of tea and coffee with food. When you consume these beverages with a meal they have certain nutrients like tannins or caffeine and that is not favorable for protein absorption. Eating tea coffee along with a protein rich meal can lower the absorption of protein. If you do consume and enjoy these beverages

try and allow some gap after the consumption of a important meal which can allow the absorption of the nutrients ideally at least an hour. Just like the way we have discussed the glycemic index of carbohydrate do you know that even in protein we have protein choices that can get digested fast and certain protein foods that can digest very slowly.

Should you consume boiled eggs after workout or should you do chocolate milk or consume a protein shake? The answer lies in how fast are these protein foods absorbed. Finally you want to choose those that can optimize your protein absorption. A lot of research studies have been conducted on chocolate milk and how beneficial it is for muscle protein synthesis in athletes post their training. And of course for those who need a whey protein supplement can always be a value addition and we will discuss that also in detail in the next chapter on protein supplements. And of course if you have a longer gap post your training and you do not need to go back to an immediate session you can always choose to consume food options with eggs, chicken or be it dals or dahi.

And I hope that this discussion on eggs versus chocolate milk will guide you towards what you need to eat. The crux of the muscle protein synthesis is governed by a single amino acid the elixir of muscle protein synthesis and that is called leucine. Leucine is an essential amino acid and if you heard of the very popular branch in amino acid which are mainly 3 and leucine is one of them. Now today we know from a lot of studies which have highlighted the importance of leucine to enhance the muscle building. Leucine is highest in foods that come from non-vegetarian choices be it chicken or eggs and of course dairy.

To reiterate what I have said earlier consuming high amount of protein containing leucine can be very beneficial for an athlete. So planning to consume adequate amount of protein with leucine ideally in 3 to 4 meals through the day is the best practice and the traditional old practice of how a glass of milk was consumed at bedtime an athlete can hold on to that practice. You don't have to necessarily consume a protein supplement but just consuming a high quality protein including even milk can support muscle protein synthesis through the sleep cycle when the human growth hormone releases midnight and all the repair work of the micro tears of your muscles are being taken care. Having a high amino acid pool of high quality proteins can support this building process. This can also prevent the breakdown or the catabolism of these muscle proteins.

So ensure that you do plan protein intake around bedtime to optimize muscle protein synthesis and for those who don't enjoy drinking milk the casein protein can be an ideal choice towards bedtime to support this muscle building process. In my practice in the interaction with several elite athletes I have noticed and observed some practical challenges of consuming protein foods around training. Protein foods do trigger the release of stomach acids such as HCL for its digestion. If an athlete has back to back to training sessions and consumes a meal with large portions particularly of animal foods such as chicken or any other non-veg food the athletes do complain of a slight burning sensation and the feeling of acidity and I also walked you through of how protein foods offers a satiety a feeling of fullness or they take longer for digestion. Sometimes it is good to moderate the amount of protein or the type of protein in a meal between two training sessions so the athlete is not in discomfort when he is not able to focus on his training due to a heavy meal.

In those situations sometimes it is best to have a lighter meal perhaps even a vegetarian meal of dal or dahi and perhaps you can consume the heavier meal with high quality proteins as

non-veg be it chicken or your eggs after the last training session for the day. Another concern that I hear from the athletes particularly those who are vegetarian the food options in the mixed veg meals be it your rajma or your choli or your certain vegetables which have higher fibre content through the process of digestion they do release a lot of flatus or what we typically call as gas. These fibres which we have discussed in the chapter carbohydrates are not digested and when they reach the intestine the gut bacteria will ferment and though they release some good short chain fatty acids which can improve the good microbiome or the good bacteria in your gut but sometimes yes for an athlete it can be a sense of embarrassment because the flatulence can be just a social concern. To summarize proteins are very important parts of the macronutrient intake for athletes you must plan anywhere between 20-25 grams of protein intake in a meal post training exercise stimulates muscle protein synthesis and the optimal protein synthesis not only occurs in the prime window within the first few hours after training but it can continue up to 24 to 48 hours. So do ensure to consume high quality protein in not just one meal but spread it across 3 to 4 meals of that entire day and perhaps even 2 days and if you are an athlete who is in off season or you are weight making meaning you are looking for weight loss in addition to consuming lower food and calorie intake, lowered carbohydrate intake ensure higher quantities of protein so that they can make up for the inadequate calories to sustain the maintenance of muscle mass.

I hope you enjoyed listening to this lecture if you have any questions please do reach us on the forum and we will be very happy to assist you. Thank you for listening. My name is Sarathi, my daughter is a equestrian. So over the last 3-4 years since she started competing we realized that the training along with training nutrition is very very important and more so the amount of protein the level of protein intake that an athlete needs is very very very different from an average person like me. So that took a lot of learning, a lot of tweaking from nutritional from a cooking point of view because we have to support her in her sport and the thing is we realized that she was not though her training was very intense and it took a lot out of her and we needed to help her with her nutritional levels because she was tiring faster and we realized that no matter how much you ate the amount of protein that she consumed was very important.

We are talking about quality here. So we had to tweak her diet so to speak not necessarily the amount of food but the kind of food that she ate. So we incorporated a lot of, she eats non-vegetarian food so it is easier when you are in non-vegetarian, your diet is non-vegetarian. So we incorporated a lot of chicken, fish and tofu. Tofu is a great addition here because you know it can get very monotonous to have the same kind of food. So yeah I mean that helped and so that has shown a lot of change in the way she has approached the sport after the change in her diet and protein helps.