

Essentials of Sports Injury Prevention & Rehabilitation

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Lecture – 9

Conditioning

Good morning friends, myself Dr. Atul. I am your faculty for prevention and rehabilitation. So, it is the fourth lecture of the second week. Till now we have studied about the various kinds of medical examinations, then the lab investigations, the warming up, flexibility and conditioning. So what is conditioning? Conditioning is a preparation of our body for the sporting activity.

So let us start. So what are the components of conditioning or preparation of a conditioning program? Basically, conditioning is when some conditioning coach plans for the conditioning program, he keeps various activities like endurance, speed, agility, resistance and flexibility in his mind, and accordingly he prepares his training program. According to or as per your sports, the weightage depends on how much endurance training in that training cycle he has to put. Like for long distance runners, the endurance part will be more, speed will be little bit there, agility part might be very less, resistance training, little bit of resistance training in the form of strengthening, isotonic exercises and the flexibility exercises.

While we are preparing for team event like football, again the speed part and agility part might be more. The endurance part will be there and the resistance part will also there because he has to take small, small spurts of speed and agility; and for that he requires explosive power, so resistance training must be there. Flexibility: So his lengthening of muscles will be there, and the proper recovery should be there. So the conditioning, or conditioning program for each and every sport depends on the requirement of that particular sport. So what is endurance? Endurance is how long he can get his oxygen to work for that muscle.

That muscle can work for how long in the presence of oxygen. So it increases the oxygen with the endurance exercises, the oxygen delivery of that working muscles will be increased. It is not like that it keeps increasing. There is a limit for each and every thing in the human body. But with the help of exercises, with the help of training, we can increase a bit and these endurance exercises help to build all these things.

And there are various parts of, or the methods to develop the endurance training. The first is interval training, fartlek training, maximal aerobic speed training, cross training, skill training as

endurance. So, as we are talking about injury prevention, cross training is generally used when athlete gets injured and he is not able to do his regular sporting activity. Like a footballer, he is just operated or he is recovering, so he can be advised for swimming or underwater running. So his operated leg will not be much utilized or much disturbed, but his aerobic capacity will be maintained.

So, cross training means like he is not doing running, but he is doing his running. And simultaneously or vice versa, a swimmer who recently got operated on his shoulder, we are asking him to do cycling. So it is a kind of cross training. And with the help of cross training, we maintain his aerobic capacity. And the interval training, we have to do a particular running or a sprinting activity, for a particular interval and then we have to repeat a number of times.

By doing this, the endurance level of that athlete is increased, or his VO₂ max is increased. In fartlek training, we have to exercise with our own time on a particular level. In the skill training as an endurance, here comes the intelligent part. The coach can be or the conditioning coach can ask the team to play with the less number of athlete, or the size of that sporting field can be increased with the same number of players or the less number of players, or he has to do after a particular minute or after a particular interval, extra running or extra activity after a particular interval. So by this, the endurance level of that athlete can be enhanced. Like five-a-side football, or five-a-side hockey, or basketball with three players or after once an athlete reaches on the opposite court, he has to take an extra round off the hockey ground; or after every five minutes, everyone has to take an extra round. So these are skill training with endurance.

And speed, it is self-explanatory. Athlete has to do speed training, how fast he can do those movements is speed training. In speed training, there are the techniques of training, technique training, speed interval training and skill training. Now, how fast he can box on a punching box, or how fast he can run. These are all speed training.

Agility is the ability to alter direction to achieve a specific goal. Like hockey, football or these games, badminton or boxing requires a lot of agility. So agility is a major part of their conditioning program. So, agility and speed are their major part because in boxing, you never know from which side a punch will come or you have to throw a punch to the opponent. If you are not very agile, you cannot progress to the opposite side with your hockey stick, or you can carry the football to the opponent's side or you cannot score a goal. For this, there are various agility drills, techniques, and skill training as agility. That will be covered under the strength and conditioning part of your sessions.

Resistance training: Resistance training means any kind of weight training or muscular activity comes under resistance training. There are three types mainly: isometric, isotonic and isokinetic. Isometric means the length of that muscle is not going to change. It is an isometric muscle

strengthening. Example, when we try to lift a very heavy object, your biceps get contracted, but the length remains the same. You try to lift, but that very heavy object does not move, but your muscles get completely tightened up. It is a kind of isometric exercise.

The isotonic exercise, you do dumbbell curl, is a kind of isotonic exercise. And isokinetic exercises, the speed at that joint remains the same throughout the motion. And these exercises can be conducted in specialized machines.

As per the classifications of the exercises, they are again of two types, open chain and closed chain. They might be open chain isometric exercises, open chain isotonic exercises. They might be closed chain isometric, and closed chain isotonic exercises. It depends on which type of exercise you are using. The open chain exercises like any bar curl, dumbbell exercises, they are open chain; and closed chain like you are doing leg press. It is a kind of closed chain exercise. When both the ends are closed.

The qualities that we can develop with resistance exercises are: power of muscle, strength, then muscular endurance and the hypertrophy. Doing these exercises, we can change the muscles, power of those particular muscles and the strength, the endurance also and hypertrophy. So, there are various methods by which one can increase the power. There are various programs that we adopt for power programs. For strength gaining, there are different training programs, and to achieve muscular endurance and hypertrophy, there are different type of muscle resistance training exercises.

Flexibility, we have already discussed and warming up sessions also. So, till now we have discussed the periodic medical examinations, the warming up session, then the lab investigations, then the conditioning part. So, in the next session or next week, we will discuss about the next topic.

Now, I can revise the entire program. Pre-participation, the significance of physical examination, types of periodic: pre-participation, post-participation, off-season, no there is no common periodic medical examination, pre-participation medical examination, post-participation medical examination, why it is required and what is the common procedure, what is the significance of that medical examination and what generally and why these investigations and why there is a requirement of a human performance lab.

All these things we have discussed; and what is the significance of warm up sessions, why is the importance of warming up sessions, what are the components of warm up sessions, the most is aerobic session, then the stretching exercises or flexibility exercises and then the sports mimicking activities. Like, a bodybuilder wants to do, or a weightlifter wants to do warming up. So, how he has to start, he will do a little bit of jog for 3 to 5 minutes, he can do skipping, he can do a light walk or he can do a light jog. Once a light sweat or his pulse is about to touch 100 or cross the 90, then he can do his stretching exercises, and then he can do squat or snatching exercises or bar lift or so or squatting exercises which are mimicking his weightlifting main

activity. And if a badminton player wants to do a warm-up, he can do jogging for 3 to 5 minutes as that might take a longer duration because his heart rate will not increase as quickly as a weightlifter.

So, he has to do a little bit more aerobic activity, then stretching exercises for his shoulder, his hamstring, his calf muscles, his glute muscles, his adductors and then his pectoral muscles, chest muscles and then the sports mimicking activity with the help of a theraband or with the help of his racket; like smashing activities, backstroke, like all these activities he can do. So, flexibilities are two types: static and dynamic. Static is when it is a kind of a passive movement and dynamic it is a kind of a voluntary action of agonist and antagonist muscles. Agonist and muscles for range. At the elbow joint, when we do flexion, our biceps are agonist muscles and triceps are antagonist muscles. When we extend our elbow against some little bit of resistance, slowly one acts as an agonist and the opposite acts as an antagonist.

When we do a fast flexion extension of elbow, while in flexion biceps is agonist, and the antagonist is our triceps; and vice versa when we do it slowly, that rule changes. Factors affecting flexibility are age, your sex, joint structures, muscle mass, resistance training and your activity level. As soon as you are not doing any kind of exercise, your flexibility reduces and static exercise or static stretching should not last more than 30 seconds. The various parts of conditioning training are endurance, speed, agility, resistance and flexibility.

And by the endurance activity, you can increase your oxygen delivery to the working muscles. By the speed you can increase your speed activity. Agility is the portion where ability to alter direction to achieve a specific goal, like when you see Leonardo Messi or Ronaldo how fast they are, how good they are in their agility. So, they all come through proper training.

Resistance again are three types: isotonic, isometric, isokinetic. Isokinetic exercises can be performed only on specialized machines. While isotonic you can do with the help of various gym instruments, and isometric you can do on your own. For the isometric activity, you do not require any specialized instrument. And again, it can be divided into the open chain exercises and closed chain exercises. Open chain exercises examples: your barbell curl, your hamstring curl and closed chain exercises, your leg press and your push-ups are the closed chain exercises. Resistance exercises the quality for the resistance exercises is your power, your strength, muscular endurance and hypertrophy.

To develop all these there are different kinds of programs by which you can develop your power, your strength, your muscular endurance and your hypertrophy.

Thank you so much.