

Essentials of Sports Injury Prevention & Rehabilitation

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Lecture - 32

Injury prevention in adolescent athletes & Women athletes - Part 03

Good morning friends. Today week 7, lecture 3, myself Dr. Atul Sharma. This week, in this lecture, we study about female athletes.

Female athletes: half of the sports persons are females. And there are some peculiarities by which male and female athletes are different. So first, we discuss about the differences between the male and female athletes. What are their differences? We will discuss the skeletal differences, body composition, physiological differences and training and performances. So first, we discuss the skeletal differences.

So male and female bodies are almost equal till the age of 9 to 10 years. At this age, the female gets her first growth spurt and she develops her thelarche (breast development) and she grows as compared to male counterpart in height. And sometimes menarche also occurs at this age. At the age of menarche, it depends on the nutritional and the socio economic data of that society. So, at the age of 9 to 10 years, the female athletes grow in height as compared to male counterparts.

And the second growth spurt is attained at the age of 15 to 17 years, and during this total growth period, if their parents or their genes are allowing genes like that, she get a height difference of 5 centimeters. During this entire process, she develops peculiar female body type like narrow shoulders and wide pelvic region. And these are specific to accommodate wide pelvis, to accommodate uterus and or her reproductive organs as females have to carry a kid in her womb during pregnancy. So that required widening of the pelvis. So there are skeletal differences, like their bones are shorter and the pelvis is wider and the upper limb is as compared to lower limb are shorter. And they also, as per the body composition of female athletes, their fat percentage is high, the normal body fat percentage for a female is around 20 to 26 percent while a male athlete requires at least 14 percent, or it depends on their game also.

And female athletes have a lower lean mass, their body has lower muscular mass and their height as compared to male counterparts is less. And in the fat distribution also the female body has more fat distributed towards the pelvic and thigh region, and in the male it is more on the upper torso. So there is a body composition difference also, and because of this difference, the

females are more protective towards cardiovascular health. There, these body fat distributions protect them from cardiovascular diseases. Physiological: there are physiological differences also, like the heart size of a female is less, their VO₂ max is also less.

But when we compare their weight and their lean mass, still the difference is up to 5 to 15 percent. Their metabolic rate is also slower than the male counterpart, and they have less hemoglobin. So all these; hemoglobin, less lean mass and low VO₂ max, basal metabolic rate and VO₂ max, so their performance also affects in a similar manner. But there is no difference in terms of strength gain. If the same size, same height female athlete who is practicing for the same weight, there is no difference in the strength gain.

There might be less hypertrophy of muscles, but the strength is almost equal. But the endurance because their heart size is small and their hemoglobin is also less and the endurance VO₂ max is also less, so their endurance capacity is less than the male. So apart from this, these major differences like skeletal differences, body composition, physiological and the training; females also have to go under menstrual cycles. And they are peculiar to the females only. And it is a natural phenomena and it is not a disease.

So one has to be clear in his mind that the menstrual cycle or menstruation is not a disease. It is a normal physiological phenomena which is gifted to a female only. And this menstruation protects females from a variety of diseases. And if menstruation is on time and it is regular, it boosts their bone health also, and their cardiovascular health. Beginning of menstruation is known as a menarche, and generally it occurs between 9 to 13 years of age.

But those games which require more physical effort or more intensive exercise, it may be delayed or because of nutritional deficiencies also it may be delayed. Like gymnasts, their menarche usually occurs at around 15 to 16 years of age, while those who are well healthy and in a good socio-economic area, their menarche occurs as early as 9 to 10 years of age. So, the end of menstruation is known as menopause. That means that after that menses or menstruation or ovulation does not occur in the female body. And the duration of the menstrual cycle, it depends from, or it ranges from 25, 23 days to 35 days.

And it is also divided into two phases, follicular phase and luteal phase. Follicular phase, the ovum grows in a size and luteal phase. If the ovulation in the luteal phase, if fertilization takes place, that luteum or that grows in size and the pregnancy occurs. The luteal phase is almost fixed in a normal menstrual cycle. It is of 14 days.

And while the follicular phase is generally not fixed. And the menstruation we count from the day of bleeding and the day one the bleeding starts and the last day when the next bleeding of the next cycle starts. So, generally we count between two menstrual cycles. The effects of

exercise on the menstrual cycles as we just discussed, delayed menarche, luteal phase defects, oligo or amenorrhea. Oligo or amenorrhea means less than 3 cycles in a year or if a cycle does not come more than 6 months, it will be considered reduced fertility.

The cycles got automatically extended, and there are some irregular cycles also, and reduced bone mass. And while this occurs, it is some, there is a hypothalamic-pituitary-ovarian axis. Because of this excessive exercise and low energy level, low energy consumption as compared to the body requirement, it occurs because of that. There are many other theories also, but the main appropriate theory which explain all these things are hypothalamic pituitary ovarian axis, and the energy balance theory. And female athlete triad, it is very rarely all three symptoms or all three things are available in particular patients like these are the three what you call classical athlete triads like low energy, amenorrhea and osteoporosis.

All these three symptoms are rarely available in an athlete. Sometimes only two and sometimes only one symptom appears in an athlete. Low energy means, the energy requirement or the body fat percentage goes below 20% and the putatory excess and hypothalamic excess, it is breakdown and so estrogen hormone level is quite less. So, it does not induce ovulation and because of that, the menses does not occur. And because of their performance, they have to perform in sports, so they do not eat properly or that leads to low energy availability, and which leads to amenorrhea and that amenorrhea leads to osteoporosis, or that leads to stress fracture or stress reactions and low bone mass.

It is not necessarily these sports women only. Those who all of a sudden like military cadets or military, women military cadets, those who just started their training in and all of a sudden they started excessive musculoskeletal training. They generally, as soon as they start doing excess strength training, they miss their periods by two months or by three months and with this excessive training, the bone resorption or bone remodeling got affected, and the stress reactions like MTSS or pelvic or pubic bone stress fractures are quite common in military recruits or cadets.