Lecture 49:

Nutrition in Female Athletes

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Three Concerns in Female Athletes:

- **Female Athlete Triad.**
- **Exercise – Induced Amenorrhea.**
- **Exercise – Induced Anemia.**

Female Athlete Triad (FAT):

- **Female athlete triad (FAT) is an athletic syndrome characterized by the triad of:**
- **Disordered eating**
- **Amenorrhea**
- **Osteoporosis**

- **These three medical conditions are interrelated, and the syndrome is not often recognized by health care professionals.**

- **Disordered eating comes from:**

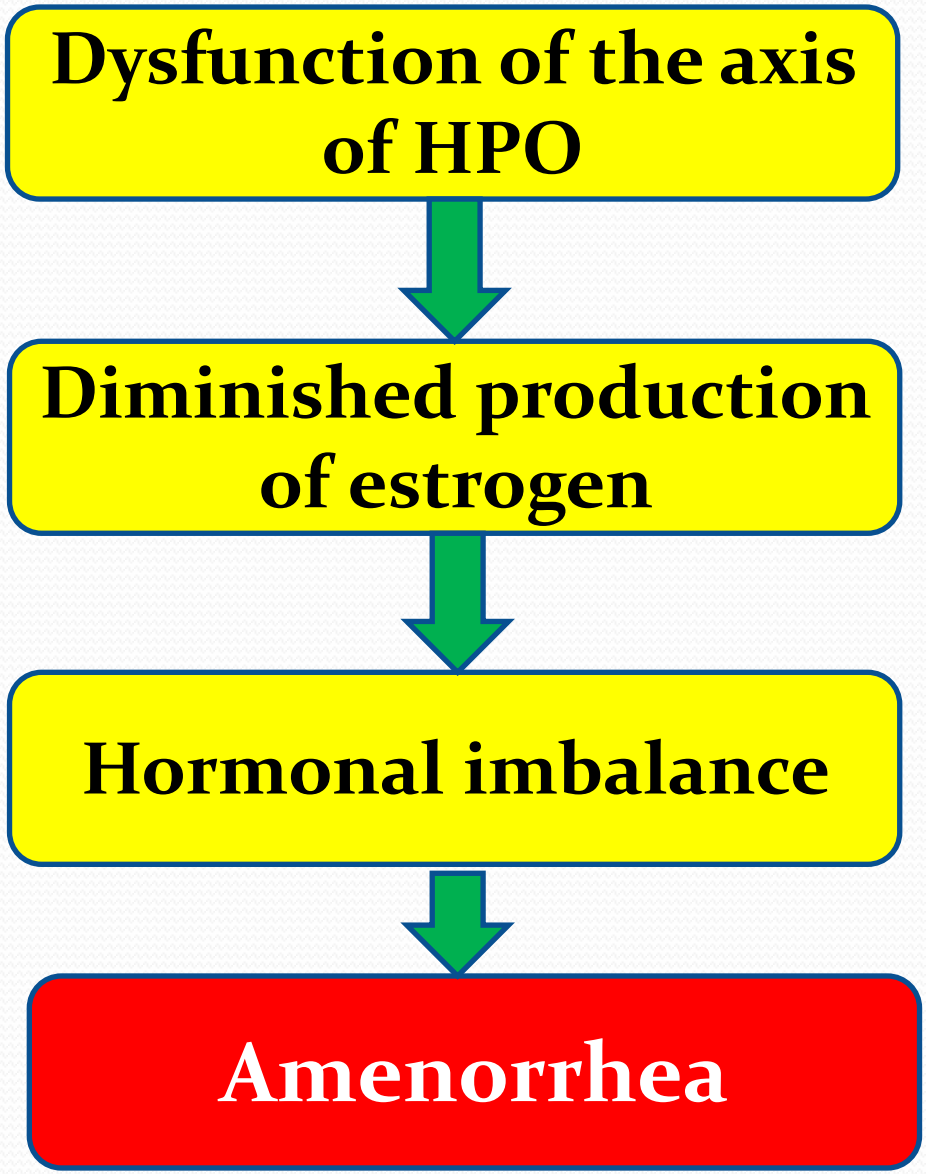
1) **Low intake of calories or**
2) **Excessive expenditure of calories due to intense exercise.**

In fact, it is because of imbalance between calorie intake and calorie expenditure. Disordered eating leads to a decrease in energy level, which is called "energy drain" among athletes.

- **Female athletes with anorexia nervosa or bulimia nervosa also suffer from disordered eating, and it is highly important to distinguish them from FAT syndrome.**

- **Amenorrhea is the cessation of monthly menstruation for three consecutive months.**
- **Exercise – induced amenorrhea results from dysfunction of the axis of HPO (hypothalamic – pituitary – ovary).**
- **The five important elements contributing to dysfunction of the axis of HPO are:**

1) **Poor diet**
2) **Low body fat**
3) **Stress (physical or emotional)**
4) **Excessive weight loss**
5) **Exercise/training – induced hormonal alterations.**


Dysfunction of the axis of HPO
Diminished production of estrogen
Hormonal imbalance
Amenorrhea

- **Amenorrhea in women of reproductive age:**
- **General population : 2 – 5% .**
- **Female athletes: up to 40%.**

- **Amenorrhea is common among athletes especially endurance athletes and leanness – related sports they should not be labeled as FAT syndrome unless the other two components exist.**

- **There is usually a direct relationship between exercise and bone density. That means bone density increases with exercise.**

- **Decreased bone density or osteoporosis in physically active females is one of the paradoxes of exercise.**

- **It is believed that decreased bone density results primarily from blunted estrogen synthesis which in turn results from amenorrhea.**

- **Inadequate mineral intake is secondary factor.**

- A decease in bone density increases the risk of stress fractures.
- For every 1% decrease in bone density, the risk of stress fractures increases by about 10%.

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Risk Factors for FAT Syndrome:

- **The true incidence of FAT syndrome is unknown.**

- **However, it is estimated that it may affect 20 – 60% of female athletes.**

Non – Professional Athletes:

Among regular Gym – goers, the risk factors of developing FAT syndrome include:

- **a) Women who train intensely while being on low calorie diets.**
- **b) Vegetarians who exercise excessively.**
- **c) Female Gym – goers with the following medical conditions:**

  1)Anorexia nervosa.

  2) Premature – ovarian syndrome (POS).

  3) Hypothyroidism.

Professional Athletes:

Female athletes involved in endurance activities are more prone to FAT syndrome.

Athletes from the following sports are at higher risk to develop FAT syndrome:

- **a) Athletics:**

1) Jumps (high jump, long jump, triple jump, and pole vault).

2) Middle distance (800 m, 1500 m, and 3000 m).

3) Long distance (5000 m, 10000 m, 20 km walk, and marathon)

- b) Ballet.
- c) Bodybuilding.
- d) Cycling.
- e) Diving.
- f) Figure skating.
- g) Fitness modeling.
- h) Gymnastics.
- i) Swimming.

Approach to FAT Syndrome:

- **Approach to FAT syndrome should be managed by a multidisciplinary team of a physician, a sports nutritionist, and a psychologist.**

- **The optimal approach would be intervening in training sessions and dietary changes.**

- **To re-establish normal menstruations, the following interventions would be helpful:**

- **a) Decreasing exercise intensity by 20%.**
- **b) Increasing total calorie intake by 20%.**
- **c) Increasing body weight by 2%.**
- **d) Preventing body fat from dropping to below 17%.**

Exercise – Induced Anemia:

- **Anemia is defined as an abnormally decreased number of red blood cells, or hemoglobin level or both.**

- **Signs and symptoms of anemia depend on its severity and chronicity.**

- **They include fatigue, tiredness, weakness, brittle nails, atrophic tongue, exertional dyspnea, dizziness, cold extremities, looking pale, palpitation, chest pain, pale skin, inflammation of tongue, pica, jaundice, exercise intolerance, and tingling and numbness in hands and feet.**

- **Exercise – induced anemia is iron deficiency anemia.**
- **It is sometimes called "Sports Anemia".**

- **Total iron in an average person is 3 -4 grams:**
- **70% in hemoglobin**
- **10% in myoglobin**
- **20% in enzymes and iron stores (hemosiderin and ferritin).**

Females are at risk for the following reasons:

- 1) Insufficient iron intake is common among females.
- 2) Monthly menstruations:

- For every 30 ml blood loss, you lose 15 mg of Iron.

- 3) Pregnancy:

- It increases iron demand for both mother and baby.

- 4) Exercise.


Sports
Anemia

Sports Anemia:

- **Sports anemia is defined as a decrease in Hb level approaching to an apparent anemia linked with sports/exercise trainings.**

- **Exercise especially strenuous exercise put "strain" on iron reserves, increasing demand for iron.**

Strenuous exercise may increase iron demand for the following reasons:

- **1) loss of iron in sweat in small amount.**
- **2) increased destruction of red blood cells from increased temperature and mechanical trauma from feet pounding on the ground (footstrike hemolysis or march hemoglobinuria).**
- **3) micro-bleeding from GI in endurance running.**

How About Iron Supplementation in Female Athletes?

- **An increase in iron loss along with low dietary intake and mensuration will compromise iron stores in the body.**
- **Not every athletes necessarily need iron supplements.**
- **What to do then?**

- **1) Monitor iron reserves. Measuring ferritin level in blood is a good indication of how iron reserve is.**
  - **Female: below 20 mcg/L**
  - **Male: below 30 mcg/L**

- **2) Evaluate iron intake through diets.**

- **3) Recommend iron supplements.**

Homework:

- **1) Describe your approach to manage Female Athlete Triad.**

- **2) Describe why a professional runner might develop “sports anemia”.**