HEALTH ISSUES OF FEMALE ATHLETE

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TOPICS TO BE DISCUSSED

- Sports injuries in female athletes
  - ACL tear
  - Patellofemoral joint pain
  - Stress fracture

- Menstrual cycle and exercise
  - Effects on sports performance
  - Exercise related menstrual dysfunction
  - Female Athlete Triad
ANTERIOR CRUCIATE LIGAMENT

- Prevents femur from moving forward during weight bearing
- Prevents rotation of the joint
- Hamstrings and quadriceps co-activation
ACL TEAR

- 4-6 folds increase in female athletes
- Common in soccer, basketball, netball

MECHANISM OF INJURY:
- Contact (tackled by another player) vs non-contact (pivoting/cutting, sudden deceleration, landing from jump)

TREATMENT
- Reconstructive surgery

RISK OF OSTEOARTHRITIS
ACL TEAR – RISK FACTORS

- **Intrinsic factors:**
  - Hormones
  - Ligament size
  - Intercondylar notch size

- **Extrinsic factors:**
  - Strength
  - Muscle recruitment patterns
  - Landing, cutting/pivoting techniques
ACL TEAR – RISK FACTORS

- Hamstring activation reduces strain in ACL
  - Female athletes rely less on their hamstrings and more on quads and gastrocnemius

- Landing/cutting techniques in women are different
  - Increased hip adduction/internal rotation, knee abduction
  - Muscular strength, neuromuscular activation
  - Increases strain in ACL
PATELLOFEMORAL JOINT PAIN

- Dull, aching pain under or around the knee cap, pain with stair ascent/decent, squatting, running, jumping, prolonged sitting
- Excessive patellofemoral joint stress associated with abnormal patellar tracking/kinematics
  - **Proximal factors**
    - Altered trunk/pelvis motion, hip abductor and ER weakness
  - **Local factors**
    - Quadriceps strength/recruitment, soft tissue tightness, patellar alignment
  - **Distal factors**
    - Subtalar pronation
KNEE INJURY PREVENTION

- ACL injury prevention programs
  - E.g. FIFA 11+ , PEP program
  - 52% and 85% risk reduction in F and M respectively

- Key components
  - Coach and athlete education
  - Improve trunk/hip/knee neuromuscular control
    - Learn how to fall/jump/cut
  - Strength and plyometric training
    - Reduce landing forces and improve strength ratios
    - Improve knee stiffness, agility, balance
Stress Fractures

- Most common in weight bearing bones
  - Feet, tibia, femoral neck

- Risk factors
  - Overloading, low bone mass, biomechanical issues

- Diagnosis by x-ray, bone scan or MRI

- Treatment- rest, address biomechanical issues, surgical (e.g. femoral neck)
MENSTRUAL CYCLE
- **Follicular phase:**
  - ↑ FSH, low E & P
  - E level peaks toward the end
  - LH surge -> OVULATION

- **Luteal phase**
  - Corpus luteum (CL) secretes E & P -> uterine lining thickens
  - No fertilisation, CL degenerates
  - ↓ P & E -> lining sloughs off -> menstrual bleeding

- **Average length of cycle:** 28-40 days
DOES MENSTRUAL CYCLE AFFECT SPORTS PERFORMANCE?

- Most studies show that sports performance is not affected by the menstrual cycle
  - muscle strength and fatigability
  - Substrate utilisation (glycogen and fat)
  - Body weight, fluid regulation
  - VO2max, anaerobic capacity

- Decrease in ex time to exhaustion during mid-luteal phase in hot/humid conditions
  - Prob. Due to increase in BBT
MENSTRUAL DISORDERS THAT MAY AFFECT SPORTS PERFORMANCE

Heavy menstrual flow (Menorrhagia)
Painful menstruation (Dysmenorrhoea)
Pre-menstrual syndrome (PMS)
MENORRHAGIA

- Blood loss during menstruation
  - 80% ~ 10-90ml (mean 43ml), quickly replaced by body

- Heavy flow interferes with daily activities, iron loss and low blood count (iron deficiency anaemia)

- Possible causes
  - hormonal imbalance, polyps, fibroids, Endometrosis

- Medical evaluation is needed
DYSMENORRHOEA

- Common in young women
- Pain in first few days before period or during period
  - “Cramps”, muscles in the uterus contracting or tightening
- Nausea, vomiting, headache, diarrhoea
- Improved with pain medication
- Severe pain – need medical evaluation to rule out other causes
PREMENSTRUAL SYNDROME

- A collection of symptoms that some women experience before each period

- Symptoms vary in severity, may interfere with normal functioning

- Physical symptoms:
  - Breast tenderness, bloating, lethargy, joint/muscle pain. Headache, food cravings etc

- Emotional symptoms:
  - Irritable, anger, sad, depressed, difficulty concentrating, decreased interest etc
EXERCISE RELATED MENSTRUAL DISORDERS

- **Prevalence**
  - 6-79% in female athletes vs 2-5% in general population, common in female runners, gymnasts, dancers

- **Types**
  - Luteal phase defect, anovulation
  - Oligomenorrhea (< 8 cycles per yr, cycle > 35 days)
  - Secondary amenorrhea (cessation of menses > 3 months)

- **Mechanism**
  - “Low energy availability”: Inadequate dietary energy intake to support exercise energy expenditure and menstrual functions -> hypothalamus-pituitary axis suppression -> low estrogen
  - Exercise does not have suppressive effect on reproductive functions apart from its energy cost
INTENSE TRAINING AND DELAYED PUBERTY

- Delayed pubertal growth, menarche and skeletal maturation reported in female athletes involved in sports that emphasize on low body fat

- Earlier the age of initiating intensive/competitive training before puberty -> more delayed the menarche age, greater the % of athletes who are delayed

- Nature, Nuture or both?
  - Many athletes may inherit a tendency for late maturation but delay further or exaggerated by early ex training
HEALTH CONSEQUENCES

- **Delayed Menarche**
  - lower rate of bone mineral accretion during adolescence, decreased peak bone mass
  - Higher incidence of scoliosis
  - ? Greater risk for stress fracture/osteoporosis in later life

- **Estrogen Deficiency**
  - Rapid bone loss in first 2-3 yrs following menstrual disturbance – 4% per yr, slower rate after that
  - Higher risk of stress fracture, low bone mass, premature osteoporosis
  - Infertility, elevated LDL ? Risk of cardiovascular disease

- **Low dietary intake/eating disorders -> nutritional deficiency**
FEMALE ATHLETE TRIAD

- 3 distinct but interrelated disorders found in female athletic population: amenorrhea, disordered eating, osteoporosis

- Original **ACSM position statement** in 1997; Revised definition and recommendations in 2007

- Low energy availability (with or without eating disorders), menstrual dysfunction and altered bone mineral density
2007 ACSM Position Stand on Female Athlete Triad

- Low Energy Availability with or without an Eating Disorder
- Reduced Energy Availability with or without Disordered Eating
- Functional Hypothalamic Amenorrhea
- Subclinical Menstrual Disorders
- Low BMD
- Eumenorrhea
- Osteoporosis
- Optimal Energy Availability
- Optimal Bone Health
MANAGEMENT

- **MEDICAL EVALUATION**
  - No menarche/breast development by age 14
  - No menarche at age 16
  - Absence of menses for 3 months or longer

- **DIAGNOSIS OF EXCLUSION**
  - Need to rule out other causes
    - Thyroid disease, polycystic ovary syndrome, prolactinoma, premature ovarian failure etc
Aims: Restore menstrual cycle, improve BMD, correct abnormal eating behaviours

Multi-disciplinary team
- Sports physician, gynaecologist, psychiatrist, dietician

Nonpharmacological therapy
- ↑ energy availability thru increase energy intake and/or reduce energy expenditure (> 30kcal/kg FFM /day)
- Weight gain may be necessary to improve BMD
- Calcium and VIT D supplements (↑ Higher requirement)
- Higher protein needs (1.2-1.6g /kg/day)
- Psychotherapy, counseling
TREATMENT FOR EXERCISE RELATED AMENORRHEA

- Consider pharmacological therapy if low bone mass density present

- Estrogen replacement therapy
  - No pharmaceutical agent has been shown to fully revert low BMD in amenorrheic athletes
PREVENTION

• Early detection
  • Monitor Ht, Wt, sexual maturation/menstrual cycle, dietary intake, training volume, emotional stress
  • Evaluate delayed menarche/menstrual disorders, screen for eating disorders in high risk sports

• Educating athletes, parents and coaches
  • Delayed menarche/amenorrhea not a normal response to exercise/indication of training effectiveness
  • Understanding increased adipose deposit is part of natural development during puberty
  • Recognizing unhealthy weight control practices