

Problems of High Performance Female Athletes

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Although male and female athletes from the same sporting discipline are prone to develop many similar types of problems, this article explores the problems that are associated with female athletes. Many common injuries from sport are just as likely to occur in men as in women. For example, all athletes are just as susceptible to dehydration (the loss of body fluids) which increases the risk of hyperthermia (very high body temperature) and hypothermia (very low body temperature). Broad participation by females in athletics is not a new phenomenon; however, detailed research into the medical difficulties faced by women athletes is not widely available. Typically, coaching education programs ignore the medical aspects of coaching and, in particular, aspects related to coaching women.

Many injuries are the result of anatomical abnormalities. These abnormalities should be identified by coaches during the early phases of the athletes' athletic careers. However, in many instances, early identification does not occur and the risk of later, more serious injury is heightened. Coaches should be aware of the anatomical requirements of their sports and use common sense.

It is important, even at the elite level, to emphasise the correct stretching technique and the correct exercises. Injuries to the ligaments of the ankle and knee joints are the most common training related injuries in female athletes. Pain due to a problem in the pelvis may present as pain in the knee or the back as they have the same nerve supply; the breast is rarely injured (White, 1980; Garrick and Shiveley, 1981).

The most frequent injury today in high performance athletics is an overuse injury, i.e., doing too much too quickly. Musculoskeletal (muscles, bones and joints) injuries are more common in female athletes who are amenorrhoeic (no menstrual periods for at least six months). Female athletes who develop recurrent shin splints (pain along the shin bone) or stress fractures should have a biomechanical assessment performed and should consider a full hormone profile, a dietary analysis, and a bone mineral density assessment (calcium content in bone). Athletes whose training is physiologically monitored, and who are regularly seen by a physician, are less likely to become overtrained.

Societal Problems

Family commitments frequently put a great strain on women because, in many societies, cultural norms or religious teachings continue reinforcing the belief that a woman's place is in the home. This obviously makes it more difficult for those women who wish to participate in high level sport. This attitude adds to their stress and may be reflected in changes in their menstrual cycle.

There are still many myths circulating about the effects of exercise on women (e.g., that it makes woman less feminine, and that they will tend to bulk up (develop marked hypertrophy, increase in size, of their muscles). This is due to the action of testosterone (a male hormone) and only occurs in the low percentage of women who have naturally high levels of testosterone or those who are taking steroids.

Dietary Problems

Dietary problems occur very frequently in female athletics, particularly in women's sports requiring low body fat (e.g., women's gymnastics or synchronised swimming). Eating disorders occur in 6% of non-athletes, 20% in sports where low fat content is emphasised, and a further 10% in athletes who are exceptionally preoccupied or have tendencies toward eating problems. In a recent British survey, 40% of synchronised swimmers were found to be below the recommended levels in 10 out of 12 nutrients and one athlete was low in all.

A correct diet plays a chemical role in the health and performance of all athletes. Research shows that inadequate caloric intake is more likely to occur in female athletes, and this will affect the hormones associated with the menstrual cycle. Fasting or reduced calorie intake increases the serum hormone binding globulin (SHBG) or the substance that combines with the male and female hormones and transports them in the blood. This then reduces the level of the biologically active oestrogen and testosterone. In young athletes, this may delay menarche (their first period) and in older athletes may result in long periods without menstruation. An increase in SHBG also occurs in athletes on a high fibre diet and a low meat protein diet (i.e., vegetarians) with the same result.

Female athletes are more likely to be iron deficient. Iron deficiency also affects vegetarians who, if they are on the contraceptive pill, may develop problems with the metabolism of their folate and vitamin B12 which are essential for the maturation of the red cells that transport oxygen in the blood. Vitamin C helps to absorb non-haeme iron (iron found in cereals but not in meats) while tea prevents 60% of the absorption of non-haeme iron.

Menstrual Problems

There is a great variation in the effects of the menstrual cycle on performance, and this may vary from one cycle to the next in the same individual. In a recent survey, about one third of female athletes believed that menstruation affects performance. Nevertheless, medals have been won by female athletes during all phases of the menstrual cycle (Delaney, Upton et al., 1976).

Athletes who have menstrual problems often had them prior to training. Excessive bleeding often is due to wearing an intrauterine device. The effects of menstruation on performance in sports may be sports-related as well. Dysmenorrhea (severe period pain) is rare in athletes and, if reported, should be investigated. It only occurs in ovulatory cycles (when an ovum or egg is released). It is the only menstrual symptom to which a specific biological cause has been attributed, namely the release of prostaglandins (pain producing substances) from the lining of the uterus or womb. Two out of 57 Irish athletes developed dysmenorrhea and, on investigation, one proved to have fibroids which had to be removed, the other an ovarian cyst. The treatment for dysmenorrhea is an anti-

prostaglandin (i.e., Ponstan or the oral contraceptive pill). Some athletes take medication for pain that contains codeine which is on the IOC list of banned substances. Athletes should read the contents of any medication carefully or consult with their National Olympic Committee's Banned Substances office.

Athletes with pre-menstrual tension (fluid retention and irritability) are at a disadvantage in sports where fine judgement is required and they are often more accident-prone. Diuretics should never be given as they are also banned by the IOC. If an athlete has pre-menstrual tension or dysmenorrhea, treatment should be started several cycles before a major competition. All athletes should keep detailed records of their menstrual cycle.

Hormones which control the menstrual cycle are also affected by exercise, circadian rhythms and seasonal variations.

Factors which predispose athletes to menstrual irregularities are:

1. late commencement of menstruation (menarche).
2. irregular menses prior to sports participation.
3. nulliparity (never had a pregnancy).
4. intensity of training prior to menarche.
5. immature reproductive axis (hormonal control).
6. psychological stress of training or competition.
7. low weight or loss of weight.
8. low body fat or loss of body fat.
9. poor nutritional status.
10. irregular menstruation prior to pregnancy.

The progression of changes in the menstrual cycle with increasing exercise are:

1. normal follicular (menstruation to ovulation, 14 days) and luteal phases (ovulation to menstruation, 14 days).
2. prolonged follicular and short luteal phases (less than 10 days).
3. euoestrogenic anovulatory oligomenorrhea (normal levels of oestrogen, not ovulating and reduced numbers of periods).
4. hypoestrogenic amenorrhoea (low levels of oestrogen and no periods) (Shangold, 1984).

Emotional Problems

Emotional stress may be another factor involved in exercise-induced menstrual cycle changes, possibly acting above the hypothalamic-pituitary system. Frisch et al., (1974) found that emotional stress was more frequent in women with secondary amenorrhoea (have menstruated, but now no periods) than in age-matched controls. Emotional stress is well-documented in nurses when they first attend hospitals. Anderson (1979) found that three-quarters of female West Point cadets were amenorrhoeic after two months of summer training camp, but after 18 months, only eight were still amenorrhoeic.

Menstrual disturbance is not consistent across the sports. Feicht (1978) found that 7% occurred in recreational runners, 10-12% in swimmers and 25% in competitive runners. The American College of Sports Medicine found that one third of competitive long-distance female runners experienced periods of amenorrhoea or oligomenorrhoea (Baker, 1981).

Many so-called normal cycles are abnormal when hormonal studies are carried out. Hormonal assessment increased the incidence of abnormal cycles from 60% to 89% in 32 women undergoing an intensive training program (Bullen et al., 1955). Amenorrhoea may cause problems if an x-ray or a bone scan is required because of the 10-day rule; they can only have x-rays done ten days from first day of menstruation.

Osteoporosis

Amenorrhoeic athletes who are hypoestrogenic (low levels of oestrogen) develop osteoporosis; that is, they have a reduced bone mass in trabecular bone [the body of the vertebrae and the neck of the femur as reported by Cann (1980), Drinkwater (1981) and others].

The mean bone density in amenorrhoeic runners age 25 was comparable to that of women age 50. If not treated, they are guaranteed stress fractures at the menopause. Osteoporosis is associated with the age of onset of training, intensity and volume of training, duration of participation in training, the sport involved, diet and stress (Riggs, 1981). Osteoporosis must be investigated and treated.

Moderate exercise protects against osteoporosis but excessive exercise may be causative. Many further investigations must be carried out to enable us to understand why some athletes are more at risk than others. Amenorrhoeic athletes may have increased levels of prolactin (hormone that increases in times of stress and plays a role in the control of the reproductive hormones), and this may be due to a prolactin tumour. It cannot be assumed that an amenorrhoeic athlete is infertile; she may be pregnant. Pregnancy or the inability to become pregnant can be problematic in female athletes.

Much more information is required to help the female athlete to reach and maintain her peak level of performance. This involves close teamwork with all concerned: the athlete, coach, physiotherapist, dietician and physician.