Female Athlete Triad

by Sherri L. Kwasnicki and Alan D. Martin

Dans un contexte sportif, cet article examine les désordres alimentaires, l'aménorrhée et l'ostéoporose. L'auteure explique plus précisément comment les athlètes féminins qui tentent d'exceller dans leurs sports courrent de grands risques de développer ces trois désordres physiques potentiellement fatal.

In gymnastics, dance, figure skating, and synchronized swimming, performances can be won based on aesthetic qualities. A gold medal becomes the "proper" balance of athletic performance and ideal body image.

Exercise has been aggressively promoted as a means of improving the physical, social, and psychological health of our population. It has been recognized as being linked with a reduced risk of cardiovascular disease, obesity, certain cancers, and other health-related disorders (Pate). Regular exercise has been shown to improve self-esteem, increase energy levels, and contribute to social development (Calfas and Taylor). Recent research suggests that exercise is also a critical factor in developing peak bone mass during adolescence with important implications for the prevention of osteoporosis later in life. Bailey and Martin in their review of growth, physical activity and skeletal health noted 19 studies which reported that physical activity had a beneficial effect on bone density. It is clear that as a society we should be encouraging children and young adults to make a lifelong commitment to physical activity.

Yet, a hazardous triad of disorders, the "Female Athlete Triad," disordered eating, amenorrhea, and osteoporosis, has recently been observed in young female athletes. The young female athlete driven to excel in her sport is at a particularly high risk for developing this disorder. She often desires a certain athletic physique in order to attain a competitive edge. Furthermore, the tremendous pressure that society places on females to be thin compounds the athletic pressures. This pressure, the intense training, and her need to attain a certain weight or body fat often lead to disordered eating patterns. Also, the combination of intense training and reduced caloric or fat intake can lead to menstrual irregularities including amenorrhea, in which menses are absent or very infrequent. Athletic amenorrhea is a manifestation of reduced blood estrogen levels which increases bone loss and puts the athlete at risk for developing osteoporosis. Some of the damage may not be reversible and therefore, this disorder is a growing concern in the field of sports-medicine. Prevention, early identification, and management of this triad of disorders is critical to avoiding the potentially serious psychological and physical problems that may develop.

The athletic experience

Leanness has been deemed advantageous to performance in many sports and, as a result, many young female athletes assume that continued weight loss ensures continued improvement in athletic performance, and many coaches and trainers establish weight and body fat goals for their athletes (Rosen and Hough). Furthermore, in sports where aesthetic marks are awarded, judges appear to prefer leaner physiques. This is demonstrated by the fact that first, second and third place athletes at a national gymnastics meet possessed significantly lower body fat than those who placed lower (Rosen and Hough). As a result of the pursuit of performance, many athletes strive for leanness through an increase in training intensity and a restricted caloric or fat intake. In many however, this drive becomes a vicious cycle leading to ill-health and even death.

More women are participating in sport than ever before and, as a result, women's athletic performances are rapidly improving. Competition is tremendous and the pressures to excel in sport have never been greater for women. The 'win at all cost' attitude, the money, and the fame drive athletes to begin training at an earlier age, train longer, more intensely, and with greater vigor. As a result, there has been a recent trend for young female athletes to pursue their athletic dreams with little or no regard for health and well-being. Many athletes decide that they will do whatever it takes to be the best in their sport. It is not surprising that steroids, nutritional supplements, and other ergogenic aids have become commonplace in female athletics, since running faster, jumping higher, and increasing endurance, stamina, and strength are of critical importance.

To further complicate matters, many sports require a certain body type or body image in order to excel. A lean physique in running appears to promote a better performance but speed is the undeniable factor. However, in many sports such as gymnastics, dance, figure skating, and synchronized swimming, performances can be won based on aesthetic qualities. Thus a gold medal becomes the "proper" balance of athletic performance and ideal body image.

Athletic amenorrhea

The effects of intense training with the associated poor nutritional habits seen in many female athletes appear to have a negative effect on their reproductive capacity. It is a common observation that athletes experience later menarche than non-athletes (Loucks), in fact, some gymnasts and ballet dancers may reach 20 years old before menarche (Wolman). The exact cause of this form of amenorrhea remains unknown but it may be related to feedback mechanisms from increased secretion of endorphins or cortisol, or both, in response to physical and emotional stress levels. It appears that the hypothalmic-pituitary-gonadal axis is affected thus leading to a reduction in estrogen and progesterone release from the ovaries (Wolman). Yeager *et al.* have suggested that seemingly minor deficits between caloric expenditure and caloric intake may play a role in the development of the menstrual irregularities. Approximately 50 per cent of elite ballerinas, cyclists, runners, and rowers are amenorrheic, compared to two to five per cent in the general population (Wolman). Estrogen levels in most amenorrheic women drop to post-menopausal levels (Otis and Lynch).

This reduction in estrogen levels has very serious consequences for skeletal health (Bailey and Martin). In general, reduced levels of estrogen cause a net bone loss, thus placing the athlete at risk for stress fractures and other more serious fractures of the hip and spine. Although amenorrhea is usually completely reversible and regular menses can return once the original stressors are reduced or eliminated, the effects of low estrogen concentration on bone density if prolonged may not be reversible.

Osteoporosis

It is popular opinion that osteoporosis is associated with elderly women and that there is no need for alarm until the post-menopausal period. However, concern for osteoporosis should begin at an early age when bone mass is developing. It is critical that an optimal level of peak bone mass is obtained during adolescence and the early adult years. This will ensure that as bone mass declines through the process of aging, there will be enough stored so that it will not become a health concern. At least 90 per cent and probably more of the total adult bone investment has been deposited by the end of adolescence (Bailey and Martin).

Many studies have shown that mechanical loading of bone, through physical activity, can lead to an increase in bone mineral density (Bailey and Martin). Complete bed rest will result in a detectable reduction in bone density within a few weeks (Wolman). Lack of mechanical loading of the skeleton is thought to be responsible for the bone losses seen in the gravity-free environment of astronauts (Rosen *et al.*). However, as we have seen, low levels of estrogen associated with athletic amenorrhea may lead to a decrease in bone density or prevent attainment of optimal peak bone mass (Bailey and Martin). Thus, the positive effect of mechanical loading is offset by the hormonal and nutritional status of these young female athletes.

As far as the bones are concerned, these young girls are experiencing menopause. Approximately four per cent of the trabecular bone is lost in the first year of hypoestrogenic amenorrhea and this rate continues for the following two years (Otis). Bailey and Martin reviewed a number of studies suggesting that lumbar spine density was inversely associated with the number of menses missed since menarche. They reported that the 15-21-year-old amenorrheic females studied had lumbar bone mineral density 13 per cent below that of their normally menstruating peers, demonstrating the effect of amenorrhea on bone density. Additionally, they reported that lumbar and whole body bone mineral density in anorectic girls aged 12-20 years was significantly lower (18-26 per cent) than that in healthy girls, demonstrating the effects of nutritional imbalance on skeletal health. In fact, researchers have recorded bone densities of 20 year old women that appear to be equivalent to those of 70-80-year-old women (Nattiv and Lynch; Yeager et al.). Several studies have reported a higher rate of stress fractures and more serious fractures of the hip, pelvis and spine in athletes with amenorrhea (Carbon; Wolman; Yeager *et al.*).

Athletic amenorrhea is usually reversible and fertility restored when the stresses responsible for its development are eliminated. However, longitudinal research has shown the shortfall in bone density from prolonged amenorrhea may not be restored after the resumption of menses (Carbon; Otis; Wolman; Yeager *et al.*). This poses a serious long term health problem to any female athlete suffering from athletic amenorrhea.

Pressures on female athletes to improve their performances and physiques, and the general demand on all women to be thin, often results in attempts to achieve unrealistic body size and body weight goals.

Eating disorders

Growing evidence suggests that the prevalence of eating disorders and excessive concerns regarding body weight is increasing. Dieting has become a way of life for millions of women. It is estimated that 40 per cent of women living in the USA are trying to lose weight (Beals and

Manore). This search for the perfect, thin physique is fueled by the media. The ideal woman, as portrayed in magazine and TV, is, undoubtedly, unrealistic for the majority of women. With such an unattainable goal motivating women, many are forced to resort to unhealthy dieting practices (Beals and Manore).

The pressures on female athletes to improve their performances and physiques, coupled with the general sociocultural demand placed on all women to be thin, often results in attempts to achieve unrealistic body size and body weight goals. Rosen *et al.* found that 100 per cent of 42 gymnasts studied aged 17-22 years were dieting. Recent reports indicate that many female athletes are taking extraordinary measures to reduce body fat in hopes of enhancing performance. These same researchers found that 32 per cent of 182 female collegiate athletes practiced at least one weight control behavior defined as pathogenic (self-induced vomiting, bingeing, laxatives, diuretics, diet pills, starvation). Warren et al. found that 13 per cent of elite female runners had a history of anorexia nervosa. Furthermore, Yeager *et al.* reported that the prevalence of disordered eating in female athletes, based on a series of small studies, is estimated to be as high as 62 per cent.

It is frightening to note that this prevalence of eating disorders is not limited to sports in which a lean physique is critical. One study indicated that 50 per cent of field hockey players, and 25 per cent of softball, volleyball, and tennis athletes demonstrated potentially dangerous behaviors relating to their efforts to control weight (Rosen *et al.*). While some athletes may be diagnosed with a clinical eating disorder (e.g., anorexia or bulimia nervosa), according to the strict DSM-III-R (the list of critera or symptoms used for diagnosing anorexia or bulimia nervosa) others will fall somewhere along a spectrum of eating disorders with each situation offering potentially serious health problems.

It is reasonable to state that female athletes are at a higher risk than the normal population for disordered eating. Some of the common psychological traits associated with the clinical eating disorders are high achievement orientation, obsessive-compulsive tendencies, and perfectionism (Beals and Manore). However, these traits are generally expected and usually essential for competing successfully and this may put the athlete at a higher risk for developing disordered eating. Many female athletes rely on their ability to excel at sport for their sense of self esteem (Beals and Manore). Additionally, many athletes are under tight control of a parent and/or coach which may force the athlete to use food as a source of control in her life. These traits may provide female athletes with a psychological predisposition for developing this disease. This predisposition, coupled with pressure from the media, increases the chances of a female athlete acquiring a clinical eating disorder. It appears that if an athlete perceives herself as overweight or has been told by others (coaches, parents, older athletes) that she could benefit from losing weight, she will tend to resort to hazardous weight control techniques.

Many athletes are under the control of a parent or coach which may force her to use food as a source of control. These traits may provide athletes with a psychological predisposition for developing this disease.

It is surprising that these athletes do not realize that the measures they are taking to enhance their performance, may in fact, cause their performance to deteriorate. Rapid weight loss causes muscle to atrophy which reduces strength. Poor nutrition can lead to fatigue, anemia, and electrolyte abnormalities which inhibits their training and performance. Malnutrition can lead to depression and other psychological abnormalities. They are at risk for developing serious endocrine problems that, at the extreme, can affect every organ system and even lead to premature death (Nattiv and Lynch).

What can be done?

Coaches, parents and peers play a vital role in the prevention and treatment of the female athlete triad. The female athlete triad can destroy a woman's chance to achieve a higher quality of life. In extreme cases, it may destroy her life. Action must be taken to address each of the three issues that threaten the health of our young female athletes. A multidisciplinary approach to treatment is essential. The treatment team should include the athlete, a physician, a registered dietitian, a psychologist or psychiatrist, the athletic trainer, the coach and the parents. The following guidelines were designed to manage this complex medical disorder:

•Make a lifelong commitment to physical activity and exercise.

•Girls and women should realize the full physiological, social, and psychological benefits of sports and exercise and should be encouraged to strive for excellence; however, pressures to excel that ignore the consequences for the athlete cannot be condoned.

•Teach and practice healthy eating patterns. Be aware of the signs and communicate the risks of disordered eating patterns. Decreasing body weight has never been directly linked to improved performance. Never tell an athlete she should lose weight. Do not praise an athlete for losing weight without first investigating the measures by which she has lost weight.

•If an abnormal delay of menarche or chronic irregular menstruation occurs, the intensity of training should be decreased (10-20 per cent) or stopped and the diet should be examined to confirm that an appropriate level of caloric intake and nutritional balance is being met. Athletes tend to

not want to decrease their training volume for risk of hampering performance. However, Wilmore and Costill showed that swimmers who decreased their training from 10000 to 3200 yards per day actually improved their performance 3.5-3.7 per cent. The goal should be to keep the reproductive system functioning. Communicate the risks of amenorrhea.

•Practice methods of improving self esteem of the young girl. Let her know that she will be loved and appreciated regardless of her performance. Communicate that she should never risk her health for the sake of performance.

•Practice methods of meditation and relaxation. These young athletes are often exposed to enormous pressures and stress. Stress can play a critical role in the development of amenorrhea. These techniques will allow the athletes to gain control over both external and internal pressures.

•Discuss the female body images that are portrayed by media in magazines and television. Destroy these images. Let young girls know that these women portrayed as 'ideal' are worked on for hours before their photo or TV shoots; they are painted, tucked, made-up. Encourage acceptance of their own body type. Beauty is developed through attitude.

Conclusion

It is sad and ironic that women, in pursuit of health and athletic excellence, are at an increased risk for developing this triad of potentially lethal disorders, disordered eating, amenorrhea, and osteoporosis. Why should a woman be forced to resort to these measures to ensure athletic acceptance and an optimal physique? It is disturbing that most women can relate to the desire to be thin, and that the weight-loss industry has cashed in on this weight-loss obsession resulting in a multi-billion dollar market. It is even more horrifying that athletes, whom most of society admire, respect and glorify, are developing serious health disorders as a result of the pressures to be thin. Something must be done to save our little girls.

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