

Editorials

The Female Athlete Triad: Recommendations for Management

Rachel Chamberlain, MD, CAQSM

University of Texas Southwestern Medical Center, Dallas, Texas

The female athlete triad was recognized in 1992 and is defined as a spectrum disorder of three interrelated components: (1) low energy availability due to disordered eating, eating disorder, or lack of nutrition relative to caloric expenditure; (2) menstrual dysfunction; and (3) low bone mineral density (BMD).^{1,2} Its advent has been linked to the increase in female athletic participation since Title IX passed in 1972.¹⁻³ An international consensus group published updated recommendations on the female athlete triad in 2014.¹ Family physicians should be familiar with these recommendations because prevention and early intervention can significantly reduce morbidity from this disorder.

The incidence of the female athlete triad is ill-defined because of patient reluctance in providing an appropriate history. Athletes at greatest risk are those who participate in sports that emphasize leanness (e.g., “aesthetic” sports such as cheerleading, gymnastics, and dance) and endurance (e.g., long-distance running, swimming).² Data show that 36% of female high school athletes have low energy availability, 19% to 54% have menstrual irregularity, and 13% to 19% have low BMD. In aesthetic and endurance athletes, 10% to 15% have at least two components of the female athlete triad.⁴ The presence of even one component is concerning and should warrant further investigation.¹

Immediate and long-term health consequences of the female athlete triad are listed in *Table 1*.^{1,2} The short-term consequences can be emotionally devastating to athletes.¹ The largest accrual of BMD in females occurs during adolescence, and BMD peaks in late adolescence or early adulthood.¹ Because the female athlete triad most commonly affects this age group, much of the loss of BMD accrual likely cannot be recovered.⁵ The long-term consequences of loss of BMD accrual in peak years are not fully known.⁵ Diagnosis of the female athlete triad can be difficult because features can be subclinical.¹ Cultural attitudes about

the female athlete’s body image⁶ and low awareness of the disorder may prevent those affected from seeking help.^{7,8} There is a belief in certain sports that amenorrhea is a sign that the athlete has achieved a training ideal.^{6,7} Knowledge about the female athlete triad is low among school nurses, and only 47% of primary care physicians are aware of the disorder.^{3,9}

Screening female athletes for the disorder during the preparticipation examination is recommended. However, because data are limited on the effect of screening, family physicians should use their judgment on how to best spend time during preventive visits. A questionnaire is available to help identify at-risk patients such as those with a low body mass index, disordered eating, delayed or irregular menses, or history of stress fracture¹; answers suggesting any component of the disorder warrant further investigation. Standard workup for amenorrhea is needed before functional hypothalamic amenorrhea can be diagnosed. BMD testing with dual-energy x-ray absorptiometry should be considered in patients with at least one high-risk criterion or at least two moderate-risk criteria.¹

Nonpharmacologic management is first-line therapy for the female athlete triad, and a multidisciplinary team is recommended. Therapeutic goals are increased energy availability, weight gain, and resumption of normal menses. Athletes may need to restrict physical activity to increase energy availability. If a patient has poor knowledge of her energy expenditure and is not consuming enough calories, referral to a nutritionist/sports dietitian and/or exercise physiologist is recommended. Patients with disordered eating should be referred to a dietitian for nutritional counseling; these patients may also need psychological evaluation. Psychological treatment should focus on modifying unhealthy beliefs and behaviors related to food and body image. If a patient has a clinical eating disorder, reversal of low energy availability will likely require psychological therapy and nutrition counseling.¹

Pharmacologic treatment should be considered only if a patient has not achieved eumenorrhea after one year of recommended therapy. Although oral contraceptives can falsely induce withdrawal bleeding, data have not ►

TABLE 1

Health Consequences of the Female Athlete Triad

Immediate

Increased musculoskeletal injuries (e.g., sprains, strains, tendonitis)

Infertility (reversible if energy availability and menses normalize)

Poor athletic performance due to low energy availability

Stress fractures

Long term

Infertility (if energy availability and menses do not normalize)

Lifelong eating disorder or disordered eating

Low bone mineral density/
osteoporosis

Psychiatric disease

Information from references 1 and 2.

shown that they improve BMD. If pharmacologic estrogen replacement is necessary because of worsening BMD with nonpharmacologic treatment, transdermal estrogen with cyclic progesterone may be considered in patients 16 to 21 years of age to prevent further bone loss. Bisphosphonates should be a last resort, and referral to an endocrinologist or expert in metabolic bone disease is needed in such cases.¹

Family physicians are well positioned to educate patients, families, and coaches about the female athlete triad during preparticipation examinations and well-woman visits. Family physicians are often the first point of contact for women with amenorrhea and musculoskeletal injuries, both of which are associated with the female athlete triad. Although the benefits of regular exercise far outweigh the risks,⁵ the female athlete triad may negatively affect a significant number of female athletes. Family physicians can help change the culture in sports through improved detection of this disorder and educating patients and communities.

Address correspondence to Rachel Chamberlain, MD, at Rachel.Chamberlain@UTSouthwestern.edu. Reprints are not available from the author.

Author disclosure: No relevant financial affiliations.

References

1. De Souza MJ, Nattiv A, Joy E, et al.; Female Athlete Triad Coalition; American College of Sports Medicine; American Medical Society for Sports Medicine; American Bone Health Alliance. 2014 Female Athlete Triad Coalition consensus statement on treatment and return to play of the female athlete triad: 1st International Conference held in San Francisco, CA, May 2012, and 2nd International Conference held in Indianapolis, IN, May 2013. *Clin J Sport Med*. 2014;24(2):96-119.
2. Matzkin E, Curry EJ, Whitlock K. Female athlete triad: past, present, and future. *J Am Acad Orthop Surg*. 2015;23(7):424-432.
3. Curry EJ, Logan C, Ackerman K, McInnis KC, Matzkin EG. Female athlete triad awareness among multispecialty physicians. *Sports Med Open*. 2015;1(1):38.
4. Thein-Nissenbaum JM, Carr KE. Female athlete triad syndrome in the high school athlete. *Phys Ther Sport*. 2011;12(3):108-116.
5. Thein-Nissenbaum J. Long term consequences of the female athlete triad. *Maturitas*. 2013;75(2):107-112.
6. Tan JO, Calitri R, Bloodworth A, McNamee MJ. Understanding eating disorders in elite gymnastics: ethical and conceptual challenges. *Clin Sports Med*. 2016;35(2):275-292.
7. Brown KN, Wengreen HJ, Beals KA. Knowledge of the female athlete triad, and prevalence of triad risk factors among female high school athletes and their coaches. *J Pediatr Adolesc Gynecol*. 2014;27(5):278-282.
8. Feldmann JM, Belsha JP, Eissa MA, Middleman AB. Female adolescent athletes' awareness of the connection between menstrual status and bone health. *J Pediatr Adolesc Gynecol*. 2011;24(5):311-314.
9. Kroshus E, Fischer AN, Nichols JF. Assessing the awareness and behaviors of U.S. high school nurses with respect to the female athlete triad. *J Sch Nurs*. 2015;31(4):272-279. ■

Acknowledging and Thanking AFP's Peer Reviewers for 2017

Sumi M. Sexton, MD

Georgetown University Medical Center, Washington, District of Columbia

This year it is my pleasure to acknowledge the hard work of our peer reviewers in improving *American Family Physician's* (AFP's) review articles. We recognize that these reviewers have volunteered their time and shared important expertise. Peer review continues to be an essential and valuable process for the journal.¹

If you are interested in reviewing for AFP, please visit <http://www.aafp.org/journals/afp/reviewers/guide.html> and complete a reviewer profile, or e-mail us at afpjournal@aafp.org. To assist reviewers, we have created an online Reviewers' Guide and developed a set of resources. The

American Academy of Family Physicians (AAFP) has authorized Continuing Medical Education (CME) credit for members who serve as peer reviewers for AFP. More information is available on the AAFP Report CME Activities website (<https://www.aafp.org/cme/reporting/claim-credit.aspx>) by clicking on the Scholarly Activity link under the Report Self-Directed Learning Activities heading.

The list of 2017 peer reviewers is available at <https://www.aafp.org/journals/afp/reviewers/lists/2017.html>. An archive of reviewers for previous years is available at <https://www.aafp.org/journals/afp/reviewers/lists.html>.

Editor's note: Dr. Sexton is Editor-in-Chief of AFP.

Reference

1. Siwek J. Acknowledging and thanking our peer reviewers. *Am Fam Physician*. 2016;93(7):544-545. ■