

# Is the Pill the Answer for Patients with the Female Athlete Triad?

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As a family and sports physician, I care for many young women affected by the female athlete triad. Typically, they present with low body mass index (BMI), oligomenorrhea or amenorrhea, and, oftentimes, low bone mineral density or stress fractures. Sometimes, the low BMI stems from intentional restriction of dietary intake; other times, it is a consequence of an unintentional mismatch of caloric intake relative to high calorie expenditure related to training and/or sport participation. Menstrual dysfunction may take the form of delayed menarche, short infrequent menses (oligomenorrhea), or complete absence of menstruation (amenorrhea). In this setting, bone health alterations are thought to be related to changes in one's hormonal milieu, in addition to nutritional deficiencies.

The mainstay of clinical management for patients affected by the female athlete triad is to correct the negative energy balance or low energy availability that leads to menstrual dysfunction and alterations in bone health. However, as many clinicians know, this can be challenging. Competitive female athletes often are resistant to recommendations to increase dietary intake and body weight and/or reduce their exercise or training. A common practice has been to place amenorrheic women, especially athletes, on oral contraceptives (OCP) in an effort to provide estrogen replacement, in hopes of protecting against bone loss and/or stress fracture. However, there is emerging evidence that this practice is not beneficial and may even lead to harm.

The amenorrhea that occurs within the spectrum of the female athlete triad is referred to as functional hypothalamic amenorrhea. It is an adaptive mechanism that reduces a woman's fertility when the body perceives that there is inadequate energy to support the substrate, let alone a fetus (2). While this may seem beneficial to many athletes, as they may not be seeking pregnancy, the adverse effects

of this hormonal disruption is manifest in negative impacts on bone health, 1) in the form of inadequate bone mineral acquisition, 2) in the loss of existing bone mineral density, or 3) in increased risk of stress fracture, even in the setting of normal BMD.

Combined OCP, consisting of estrogen and progesterone, have been recommended for use in treating women affected by the female athlete triad (1). However, the evidence supporting a role for OCP in treatment is inconclusive at best (5). This likely is related to the fact that combined OCP containing only estrogen and progesterone cannot overcome the alterations in hormone levels associated with low energy availability, including decreased total triiodothyronine, leptin, insulin, insulin-like growth factors, glucose, luteinizing hormone pulsatility, and follicle-stimulating hormone, as well as an increase in growth hormone and cortisol (5).

Not only are OCP unable to counter the impact these hormone alterations have on bone health; they may contribute, in fact, to worsening bone health. Exogenous estrogen replacement in young athletes may lead to premature closure of physes (growth plate) (4), and early OCP use has been associated with lower BMD in the spine and femoral neck among female distance runners (6).

So what is a clinician to do when faced with the challenge of treating an athlete with the female athlete triad? The first step is to perform a comprehensive history and physical examination to confirm the diagnoses. Second, engage a multidisciplinary team, which often includes a physician, sports dietitian, and mental health professional, to guide and support the athlete's recovery. The cornerstone of treatment is to reverse the situation of low energy availability, which is typically a consequence of both inadequate stored energy (low BMI) and low energy intake relative to expenditure.

The goal is to increase caloric intake above  $30\text{-kcal}\cdot\text{kg}^{-1}$  fat-free mass (FFM); some would recommend upward of  $45\text{-kcal}\cdot\text{kg}^{-1}$  FFM to produce changes in bone mineral density (3,7). What this translates into practically is approximately 1,912 cal for a 110-lb female distance runner with 15% body fat ( $110\text{ lb} \times 0.85 = 93.5\text{-lb FFM} \rightarrow 42.5\text{-kg FFM} \times 45\text{-kcal}\cdot\text{kg}^{-1}\text{ FFM} = 1,912\text{ kcal}$ ). Assuming she was continuing to train throughout this recovery period, adding additional calories to cover exercise-related expenditures would be required to replace the deficit ( $\sim 100\text{ kcal}\cdot\text{mile}^{-1}$ ).

The role of the sports dietitian is to help the athlete consume the required amount of calories while minimizing

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the discomfort associated with the increase in volume of food. This is best accomplished by splitting intake into smaller, more frequent meals and snacks and by utilizing foods with higher caloric density to avoid excessive fullness from the obligatory increased volume. The role of the dietician is less about telling the athlete “what to eat” and more about teaching the athlete how to meet her energy needs while maintaining health and performance.

For athletes experiencing true eating disorders such as anorexia nervosa, bulimia nervosa, or an eating disorder not otherwise specified, engaging a mental health professional is critical. Their role is to help the athlete overcome underlying thought disturbances regarding food, body weight, body composition, and appearance, as well as to identify underlying issues that may be driving eating-disordered behaviors.

The role of the physician is to evaluate and manage health consequences of the female athlete triad. This includes making referrals to other members of the treatment team and supporting their recommendations, determining readiness for return to play, prescribing medications if needed, and, along with other members of the treatment team, determining whether a patient requires higher levels of care or intervention, which brings us full circle to the topic of OCP.

Is there a role for OCP in managing the female athlete triad? The answer is yes. While the use of OCP is not the first step or even the second step, they may be beneficial in some patients and should not be discarded as a management tool. Despite the fact that randomized control trials and epidemiologic studies examining the impact of OCP on bone health have been inconclusive, there is a limited role for OCP in treatment of women affected by the female athlete triad. There is evidence for a positive impact of OCP on bone mineral density and stress fracture incidence (3). Treatment with OCP should be considered in athletes who are unwilling to follow dietary recommendations or reduce their exercise or in athletes who, despite their compliance with nutrition and exercise counseling, fail to achieve restoration of menstrual function after a period of 6 months. In all cases, the decision to implement the use of OCP should

be individualized, based on age, bone density, and bone loss (8).

Caring for females affected by the triad can be challenging. Many unanswered questions remain regarding susceptibility, long-term implications, evaluation, and management. Research on the use of OCP in this disorder is ongoing. While the cornerstone of treatment is to optimize nutrition and training to restore energy balance, it behooves all of us as sports medicine professionals to actively work with athletes, coaches, administrators, and parents to prevent the female athlete triad. There also is room for improvement among our own ranks as several studies have revealed knowledge and practice deficits regarding care of the patient affected by the female athlete triad (5). Expanding educational efforts for health care professionals is critical to improving the quality of care and the health outcomes for individuals affected by the female athlete triad.

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