

The Female Athlete Triad

A Growing Health Concern

Michelle L. Cameron Donaldson

The number of female athletes participating at the high school, collegiate, and elite levels has increased nearly 10-fold since the passage of Title IX. President Nixon signed title IX into law in 1972. It required that all schools receiving federal funding provide equal opportunities for men and women. With this large increase in high-level female athletes comes a special set of medical and orthopaedic issues. One of the most important is the female athlete triad. The triad consists of disordered eating, amenorrhea, and premature osteoporosis. Currently, this problem is largely unrecognized. The purpose of this article is to help to educate orthopaedic nurses about this important issue so that we can detect the triad early and help address this growing national health issue.

In the Victorian age, women were believed to be too frail to participate in sports. Something as ordinary as riding a bike was viewed as being too taxing for the Victorian woman. Attitudes gradually changed, and, by 1928, women were allowed to participate in limited capacity in the 1928 Olympics. The longest women's

race in the track-and-field events was the 800-meter race, but the cause of the female athlete was not helped by press coverage of this race. The press described the finals of the 800 meters as "eleven wretched women fainting or delirious." Because of this negative press coverage, the International Olympic Committee banned any further track-and-field events in future Olympics. Fortunately, the ban was partially reversed before the 1932 Olympics in the face of a multinational boycott. The effects of the negative coverage from 1928 were far-reaching. It wasn't until 1960 that a women's

race longer than 200 meters was again included in the Olympics.

The event that changed the face of women's athletics was the signing of Title IX in 1972. Title IX required that all schools receiving federal funding provide equal opportunities for men and women. During the 1971–1972 school year, there were 294,000 high school female athletes. In 1997, there were 2.6 million, nearly a 10-fold increase (Tietz, Hu, & Arendt, 1997). With the increased participation in women in sports, as well as participation at a more elite level, female athletes have developed a unique set of medical and orthopaedic problems, the most concerning of which is the female athlete triad. The female athlete triad comprises disordered eating, amenorrhea, and premature osteoporosis.

Disordered Eating

Common disordered eating patterns exhibited by female athletes include bulimia, anorexia, bingeing or purging, food restriction, prolonged fasting, diet pill abuse, diuretic abuse, and laxative abuse. These behaviors are much more common than we would like to believe. Those at highest risk for disordered eating are endurance athletes, gymnasts, ballet dancers, figure skaters, athletes who

Michelle L. Cameron Donaldson, MD,
Director, Department of Orthopaedics,
Sports Medicine, Park Clinic, Livingston,
MT.

started training at a young age, and highly competitive athletes.

Disordered eating occurs in 5% of the general population. Several studies have found the incidence to be much higher among female athletes. Rosen, McKeagh, Hough, and Curley (1986) found that 32% of 182 collegiate female athletes vomited or used diet pills, diuretics, or laxatives daily.

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A study of collegiate gymnasts found that 62% displayed some type of disordered eating. Twenty-six percent of these athletes vomited on a daily basis, 24% used diet pills, 12% fasted, and 75% had been told by their coach that they weighed too much (Calabrese, 1985). It is believed that disordered eating behavior somehow contributes to a disruption in the hypothalamic-gonadal axis, resulting in the second part of the triad: amenorrhea.

Amenorrhea

Amenorrhea is the absence of normal menses. There are two types of amenorrhea, primary and secondary. Absence of the onset of menses by age 16 is defined as primary amenorrhea. Secondary amenorrhea is defined as the absence of menstrual bleeding for 6 months or for a length of time equivalent to at least 3 of the woman's previous menstrual cycle lengths. The definition of secondary amenorrhea is controversial; however, the 6-month time frame is fairly well accepted (Marshall, 1994).

There are many causes for amenorrhea, the most common of which is pregnancy. Other causes that should be investigated in an athlete with amenorrhea are congenital discontinuities of the genital tract, premature ovarian failure, and pituitary dysfunction. It is believed that athletic amenorrhea is caused by a disruption in the hypothalamic-gonadal axis. The exact cause of the disruption is unknown and is commonly believed to be multifactorial (Marshall, 1994). Female athletes who are at risk for the development of athletic amenorrhea are endurance athletes, ballet dancers, gymnasts, and

figure skaters (DiPietro & Stachenfeld, 1997; Putukian, 1998; Shangold, Rebar, Colston Wentz, & Schiff, 1990). However, it is important to remember that any female athlete can develop this condition.

Amenorrhea affects 5% of the general population, 8.5% of unselected adolescents, 10–20% of vigorously exercising females, and 40–50% of elite

runners and ballet dancers (DeSouza & Metzger, 1991). Risk factors for the development of athletic amenorrhea include low caloric intake, low protein intake, low body weight, low body fat, and intense training. There is no exact threshold of body weight, body fat percentage, or amount of training that will universally make an athlete develop amenorrhea. Therefore, it is important to screen all female athletes for the triad.

Athletic amenorrhea is a problem because of the potential catastrophic skeletal effect. Patients with athletic amenorrhea can quickly develop osteopenia and, in some cases, osteoporosis. The bone mineral loss seen in athletes who have had amenorrhea for more than 6 months resembles that seen after menopause (Tietz et al., 1997).

Osteoporosis

From 60% to 70% of peak bone mass in women is acquired before the age of 20 years. Women build bone to a maximum age of 34, and then start losing bone at 0.3–0.5% a year after

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age 35. If a young female athlete is amenorrheic and does not lay down a normal amount of bone during adolescence, she may always have decreased bone mass. Restoration of normal menses may retard the rate of

further bone loss, but the bone that is already lost cannot be replaced (Weltman, Snead, & Weltman, 1992). Despite high-intensity exercise that increases bone mineral density, athletes with amenorrhea have significantly lower whole-body bone mineral density than control subjects (Myburgh, Bachrach, & Lewis, 1993).

The decreased bone mineral density often presents as multiple or recurring stress fractures. It is critical when evaluating a young female athlete with a stress fracture to consider the possibility of early osteoporosis related to amenorrhea and/or the female athlete triad.

Prevention and Treatment

The most effective intervention in treating athletic amenorrhea and the female athlete triad is prevention. In orthopaedics, nurses are in a perfect position to screen young female athletes regarding this issue. Orthopaedic nurses are often called on to provide preseason physicals, and this is the perfect opportunity to determine if the athlete is at risk of the female athlete triad. The history and physical form that is recommended by the American College of Sports Medicine includes questions about menstrual history, body image, and recent weight loss and a history of stress fractures. Unfortunately, many colleges and high schools do not use this form. It is up to the orthopaedic nurse to remember to ask the athlete questions about her menstrual and nutritional history. The menstrual history should include the age at menarche, the frequency and duration of periods, the date of the last menstrual period, and the use of hormonal therapy. The nu-

tritional history should include a 24-hour recall of food intake, the usual number of meals and snacks, and a list of forbidden foods. The body-weight history should include the highest and lowest weights since menarche

and the athlete's satisfaction with her present weight. Additionally, athletes should be asked if they have ever tried to control their weight by vomiting or using laxatives, diet pills, or diuretics.

Restoration of menses is essential in patients with athletic amenorrhea and/or the triad. Treatment requires a multidisciplinary approach involving

Conclusion

The female athlete triad and athletic amenorrhea are significant health concerns for female athletes. As more young women participate in sports at higher and higher levels, the at-risk population grows. As orthopaedic professionals, it is crucial that we are edu-

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physicians, nutritionists, psychologists, trainers, and gynecologists (Tietz et al., 1997; Marshall, 1994). Athletes must be convinced to eat a balanced diet, including 1500 mg of calcium per day. More serious eating disorders may require contracts between the physician and athlete that restrict athletic participation until the athlete reaches certain weight goals. Finally, oral contraceptives may be necessary to restore estrogen stimulation to the bone and prevent any further bone loss.

cated about this entity, regularly screen for it, and understand its treatment.

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WANTED: Organizational Research Participants

Purpose: To examine organizational stress, burnout, and personal well-being in nurses employed on specialty orthopaedic units, medical surgical units caring for orthopaedic patients, and home care departments.

Study Design: Descriptive, comparative, survey approach

Organizational Participants: Acute care hospital units caring for orthopaedic patients and home care departments that are either freestanding or hospital-based agencies.

Requirements: Hospital/agency must select a contact person to assist the investigator with sampling and distribution of surveys. Participating RNs, LPNs, and Assistive Personnel will be asked to complete a demographic profile and 3 short questionnaires.

Ethical Considerations: Data will be presented as aggregate data with no identification of hospital or subject. Each participating hospital will receive its hospital-based results as well as a copy of the final research report. This study has been approved by Kean University Institutional Review Board.

Contact: Dr. Susan Salmond, ssalmond@comcast.net