Female Athletes and Eating Disorders

A research synopsis

Presented to the Intercollegiate Center for Nursing Education

Whitworth College, Spokane, Washington

In Partial Fulfillment of the
Requirements for the Degree
Master of Nursing

By

Jamie Pilcher RN, BSN

Spring 1999

We, the undersigned members of the committee,
Have read and approved this project

Female Athletes and Eating Disorders

By

Jamie Pilcher

CHAIR	DATE
Margaret A Bauer	April 99
COMMITTIEE MEMBERS	
Jacquelyn Banasik	April 5 1999
Barbara Morrison	April 5, 1999

Intercollegiate Center for Nursing Education

Whitworth College, Spokane, Washington

Acknowledgments

I would like to thank those individuals who helped me in achieving not only the completion of my research synopsis but also my degree as a nurse practitioner. First and foremost I would like to give thanks to John Mark, my wonderful husband to be. His incredible support, love and understanding have helped me to get through the hard times and focus on the end goal. Margaret Bruya deserves many thanks for initiating my career as a nurse practitioner, for believing in me and for supporting my decision to enter the program as a new graduate. Margaret without you I truly would have struggled. I would also like to thank my family for their always-present encouragement and love. They provided me with the fundamental base I needed to be successful. Lastly, I would like to thank the instructors who have inspired, guided and expanded my knowledge and understanding in the field of nursing. Lorna, Jackie, Donna and Gail thank you!

Abstract

In the United States, 95% of eating disorders exist in females. One-third of females in athletics suffer from disordered eating. Research is examining the physical and psychological consequences associated with this behavior. The physical consequences of eating disorders among female athletes are becoming so common they've even named a phenomenon after them called the Female Athlete Triad. The three components of the triad include disordered eating, amenorrhea and osteoporosis. Tools used to detect eating disorders in female athletes include body mass index, screening questionnaires and twenty-four hour nutritional screens. Treatment for a female athlete may include hormone replacement therapy, vitamin and mineral supplements and antidepressants. Nurse Practitioners are vital in providing necessary preventative strategies and education to females who are at risk or currently have an eating disorder.

INTRODUCTION

> Jane Williams is a 21-year-old female who runs track for the local University. She presents to her family nurse practitioner with complaints of pain in her left leg. Jane has lost 10 pounds since her last visit (a pre-participation physical) 8 months prior. She is bradycardic and slightly hypotensive, with her skin having a yellow cast and covered with fine, lanugo hair. Jane's left leg has point tenderness over the median point of the tibia. Results from x-ray are inconclusive, however; a bone scan reveals a stress fracture in the proximal aspect of her left tibia.

As her provider, what is your course of treatment for Jane? Is your focus primarily on her stress fracture or are there other, more pressing, issues that need to be addressed? This case presentation is used to illustrate findings consistent with a female athlete who has an eating disorder.

Since the passage of the Title IX act in 1972 mandating equal athletic opportunities for men and women in college athletics, the number of females participating in athletics has increased 600% (Huston & Wojtys, 1996). Practitioners will be caring for more women athletes, and need to understand and address the health-related issues they face.

Eating disorders associated with women in athletics is becoming a well-studied topic. One-third of female athletes struggle with pathogenic weight control behavior (Clark, 1994). How women compete, train and maintain their level of performance has been the focus of an expanding body of research. Areas gaining more attention are the physical and psychological ramifications associated with athletes who have eating disorders.

This article presents material regarding which female athletes are at high risk for developing an eating disorder, why athletics may be a risk factor for causing/contributing to an eating disorder, clinical tools to detect an eating disorder in athletes, health outcomes, and the implications eating disorders in athletic women have on clinical practice.

EATING DISORDERS

In the United States, ninety to 95% of eating disorder patients are female. The onset of disordered eating habits usually occurs between the ages of 11-19 years of age (Shisslak, Crago & Neal, 1990). It is imperative to be attentive to the possibility of eating disorders in the differential diagnosis of girls as young as junior high, or high school athletes. Of the females who have an eating disorder, many of them also participate in competitive athletics. Data suggests that the prevalence of eating disorders among athletes is between 15%-62% (Joy, Clark, Ireland, Matire, Nattiv & Varechok, 1997).

The two most common eating disorders among athletes and non-athletes are anorexia nervosa and bulimia nervosa. The primary characteristics of these disorders are further described in the following table adapted from the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV).

TABLE 1. CRITERIA FOR ANOREXIA NERVOSA AND BULEMIA

Anorexia Nervosa	Bulemia Nervosa
1) Refusal to maintain normal body weight	1) Recurrent food binges at least two per week for three months
2) Abnormal fear of gaining weight	2) Feeling out of control during eating
3) Distorted physical and self image	3) Recurrent method to prevent weight gain such as self-induced vomiting, misuse of diuretics or laxatives, fasting, or vigorous exercise to prevent weight gain
4) Amenorrhea for 3 or more consecutive months	4) Negative body image

Adapted from the American Psychiatric Association Diagnostic Criteria on Eating Disorders, 1994.

Additional psychological traits of anorexics include being more introverted, obsessive, and sexually inexperienced. Bulimics, on the other hand, tend to be extroverted, impulsive, and sexually active (Shisslak, Crago & Neal, 1990). Similarities between the two disorders are that they both produce or sustain a low self-esteem, increased self-doubt, a negative body image, feelings of inadequacy, and often signs of depression.

It is also important to know and understand the physical components associated with an eating disorder so that as a nurse practitioner you can know what you should be looking for and in turn properly diagnose the female. A partial list of major physical signs and symptoms are presented in Table 2.

TABLE 2. SIGNS/SYMPTOMS ASSOCIATED WITH EATING DISORDERS

ANOREXIA NERVOSA	BULEMIA NERVOSA
1) Headache, dizziness or weakness	1) Facial edema and bloating –
2) Decreased ability to concentrate	"chipmunk cheeks"
3) Bradycardia, arrhythmias	2) Swollen parotid or salivary glands
4) Dry hair and skin	3) Blood shot eyes
5) Lanugo, especially on the trunk	4) Erosion of tooth enamel
6) Yellowish appearance of skin	5) Pharyngitis
7) Decreased body temperature	6) Scarred or callused knuckles
8) Fat and muscle loss	7) Chest pain
9) Muscle cramping	8) Abdominal pain
10) Amenorrhea	9) Diarrhea or constipation
11) Increased risk of stress fractures	10) Menstrual irregularities
	11) Fatigue

Perfection, compulsiveness and high achievement expectations are personality traits often possessed by female athletes. These characteristics, although seemingly positive, are commonly associated with eating disorders. The paradox for female athletes is that they are encouraged to eat healthy foods and fuel their bodies with energy for a heightened performance; however, weight restrictions are self-imposed by the athletes and often supported or encouraged by their parents and coaches leading to further pressure to be thin.

Wilkens-Runkle and Wendland (1994) found eating disorders to be a problem that effects not only "world class" and collegiate athletes, but also interscholastic and young female athletes. Pre-teen and teenage female athletes are facing the challenge of being

competitive while at the same time struggling with self-esteem issues common to the period of adolescence. The combination of these challenges may cause a teenager to make an attempt at maintaining a reduced weight. Health problems including headache, nausea, and menstrual dysfunction have been linked with adolescent attempts at weight control (Koff & Rierdan, 1993).

The identification and treatment of eating disorders among adolescent and collegiate female athletes is significant to nurse practitioners because of the high percentage and serious, life-threatening consequences associated with eating disorders. Knowing who is at risk for eating disorders and the clinical signs and symptoms that may present in these cases, allows health care practitioners to identify and treat these females earlier and more adequately.

LITERATURE REVIEW

Although substantial literature exists regarding the topic of females and eating disorders, it is just recently that more has been published about the correlation between females who participate in athletics and eating disorders. Eating disorders are seen in athletes of all sports, however; certain sports have a higher association of placing athletes at a higher risk. Sports, in which the female appearance is as highly judged as the athletic ability, pose greater demands on girls/women to remain/become thin. Long distance running, swimming and ballet emphasize body leanness for enhanced performance (Johnson, 1994). Swimmers are especially vulnerable to disordered eating secondary to display of their bodies in tight revealing uniforms (Benson & Taub, 1993). Gymnastics, diving, figure skating and synchronized swimming are also included in the category of sports that judge physique.

In 1996, Bale, Doust and Dawson compared a group of female athletes versus individuals with anorexia nervosa. No significant differences were found between the groups when examining fat mass, lean body mass, age of menarche and incidence of amenorrhea. The study was composed of ten top class female distance runners, ten female anorexics, and twenty female gymnasts all of similar age (12-16 years old). They did find that anorexics had a slightly higher percentage body fat and a slightly lower lean body mass than the runners or gymnasts. When comparing the results to reference values for girls aged 13 to 14, study participants were shorter, weighed less and had a lower percentage of body fat (Bale et. al, 1996).

One out of ten female swimmers reported their coaches dictated their performance weight (Benson & Taub, 1993). Fifteen-percent of these same swimmers reported using laxatives, diuretics, fasting and self-induced vomiting to control weight gain. Thirty-percent of Division I college gymnasts used self-induced vomiting and/or binging to lose or maintain their weight (O'Connor, Lewis & Kirchner, 1995). In fact, gymnasts who compete today weigh close to 20 pounds less than those who competed 20 years ago (Joy, Clark, Ireland, Matire, Nattiv & Varechok, 1997).

Risk factors that lead female athletes to develop eating disorders are primarily linked with their heightened body awareness. One of the biggest risk factors is produced by families who encourage leanness and often pressure female athletes to be thin. In general, the families of anorexics tend to be enmeshed, over controlling, constricted, and deny the presence of conflict, while families of bulimics are disengaged, chaotic and under controlled (Shisslak et al., 1990). Johnson (1994) found those females with disordered eating patterns tend to come from families where coping skills are

underdeveloped and not taught as a life skill growing up. Frauenknecht and Brylinsky (1996) found that athletes who scored low on a problem-solving tool were more likely to engage in health-compromising behaviors, such as disordered eating. Without the ability to cope and make wise decisions individuals are more likely to succumb to the pressure of being thin and losing weight.

Additional risk factors stem from coaches who display the "win at all cost" mentality and often place undue pressure on their athletes (Johnson, 1994). Coaches may use punitive measures or negative reinforcement for weight gain or poor performance, which are common predisposing factors to the development of pathogenic forms of food restriction (Nattiv, Agostini, Drinkwater & Meager, 1994).

The physical and psychological ramifications associated with eating disorders are broad. The effects and consequences eating disorders have on the female athlete are being intensely researched. The medical conditions associated with female athletes with eating disorders are commonly referred to as the "female athlete triad." The triad, first coined in 1992, refers to the combination of disordered eating, amenorrhea, and osteoporosis. Because women tend to deny or underreport the occurrence of the triad, the exact incidence of the disorders is unknown and underestimated by health professionals (Thien & Thien, 1996).

The second component of the triad is secondary amenorrhea, or the absence of at least three to six consecutive menstrual cycles, after normal menarche has occurred. In contrast, primary amenorrhea is diagnosed if a girl reaches age 16 and has not yet had normal menses. Amenorrhea appears to occur more often in female athletes than in the general population (Castiglia, 1996). The occurrence of amenorrhea in female athletes of

all sports is as varying as 3.4-66%, whereas the general population is only 2-5% (Putukian, 1994).

Exercise-associated amenorrhea is believed to be a hypothalamic disorder (Putukian, 1994). The menstrual disturbance occurs as the secretion of luteinizing hormone (LH) is disturbed. With this disruption, the ovaries are unable to develop a follicle, ovulate, and support the corpus luteum until menses (Patterson, 1995). In addition, when LH levels are decreased, progesterone levels are decreased which also makes cycles irregular and often absent.

Folgelhom, Lichtenbelt, Ottenheija and Westerterp (1996) found that 31.4% of adolescent ballet dancers had amenorrhea. The start of menarche is later in the ballet dancers (13.7-15.4) years of age compared to (12.5-12.9) years of age in non-dancers. Fruth and Worrell (1995) reported 51% of endurance runners, 44% of ballet dancers and 12% of swimmers and cyclists reported menstrual disturbances during training. Thirty percent of gymnasts reported missing menstrual cycles (O'Connor, Lewis & Kirchner, 1995). The only known potential consequence of amenorrhea is sustained infertility, (Thien & Thien, 1996)

The lack of menstruation is hypothesized to be linked with premature osteoporosis, the last component of the triad (Nattiv et al., 1994). In an adolescent or college age female, osteoporosis refers to premature bone loss, or inadequate bone formation leading to an increased number of fractures.

Bone is in a constant state of reabsorption and formation, bone density reaching its peak when a female is in her mid-twenties. After this age bone density decreases approximately 1% per year (Putukian, 1994). If bone is not being formed correctly or is

lost due to the menstrual disturbances and inadequate calcium intake related to eating disorder, the risk for osteoporosis increases. The result is a young female who has a bone density similar to that of a postmenopausal women (Castiglia, 1996).

Although exercise is known to strengthen bone density, amenorrhea can lower bone density despite exercise (Griffin, 1995). In addition, it was found that stress fractures occur more frequently in female athletes when compared to male athletes. This finding was found to be related to abnormal eating, menstrual dysfunction and low estrogen levels.

Devastating health problems can result from one or a combination of disorders associated with the female athlete triad. The consequences associated with eating disorders such as infertility or bone loss may seem inconsequential during adolescence. However, as the female athletes age, these factors may negatively impact their health and personal choices. The mortality rate in treated anorectic women (non-athletes) is 10% to 18% leading to the belief that the problem of eating disorders is one that needs to be taken very seriously (Nattiv et al., 1994).

TOOLS

In order to better assess and evaluate eating disorders, nurse practitioners need some tools. Two common methods used predominately to assess the occurrence of eating disorders are 1) The Eating Disorder Inventory and 2) Body Mass Index. The Eating Disorder Inventory (EDI) is a 64-item scale designed to assess psychological and behavioral traits associated with anorexia nervosa and bulimia. There are eight subscales to the inventory including Drive for Thinness, Body Dissatisfaction, Bulimia, Ineffectiveness, Perfectionism, Interpersonal Distrust, Interceptive Awareness and

Maturity Fears. The EDI has been used as a screening instrument in nonclinical populations to identify individuals who may be excessively weight preoccupied and/or at risk for developing an eating disorder (Koff & Rierdan, 1993).

Body mass index (BMI) determines the percent of body fat in relation to muscle. The BMI assesses the relation of muscle to adipose tissue throughout the body. Body Mass Index appears to be the most acceptable measure of relative body weight in the absence of body composition measures (Sciacca, Melby, Hyner, Brown & Femea, 1991). The recommended range for BMI is 19-25 for ideal health. To determine a person's BMI the following formula is used:

$$\frac{\text{Body weight (in kilograms)}}{\text{Height}^2 \text{ (in meters)}}$$

You may also use a published chart (as shown in Table 3.) to assess an individual's BMI.

TABLE 3. BODY MASS INDEX

	19	20	21	22	23	24	25	26	27	28	29	30	35	40
Height (inches)	**Body weight (pounds)**													
58	91	96	100	105	110	115	119	124	129	134	138	143	167	191
59	94	99	104	109	114	119	124	128	133	138	143	148	173	198
60	97	102	107	112	118	123	128	133	138	143	148	153	179	204
61	100	106	111	116	122	127	132	137	143	148	153	158	185	211
62	104	109	115	120	126	131	136	142	147	153	158	164	191	218
63	107	113	118	124	130	135	141	146	152	158	163	169	197	225
64	110	116	122	128	134	140	145	151	157	163	169	174	204	232
65	114	120	126	132	138	144	150	156	162	168	174	180	210	240
66	118	124	130	136	142	148	155	161	167	173	179	186	216	247
67	121	127	134	140	146	153	159	166	172	178	185	191	223	255
68	125	131	138	144	151	158	164	171	177	184	190	197	230	262
69	128	135	142	149	155	162	169	176	182	189	196	203	236	270
70	132	139	146	153	160	167	174	181	188	195	202	207	243	278
71	136	143	150	157	165	172	179	186	193	200	208	215	250	286
72	140	147	154	162	169	177	184	191	199	206	213	221	258	294
73	144	151	159	166	174	182	189	197	204	212	219	227	265	302
74	148	155	163	171	179	186	194	202	210	218	225	233	272	311
75	152	160	168	176	184	192	200	208	216	224	232	240	279	319
76	156	164	172	180	189	197	205	213	221	230	238	246	287	328

Perspectives in Nutrition, 1996.

Screening questionnaires may be helpful to focus in on those at risk for eating disorders. An example questionnaire is listed in Table 4. This tool can be used to screen all athletes seen for pre-participation physicals. The scores can be recorded each year to identify changes in the way they are answered. From these questions, assessment of the female athlete's eating and exercise behaviors, menstrual status, and concern with body weight may be determined. This tool can be used in the clinical setting by asking patients to fill them out while waiting to see the nurse practitioner.

TABLE 4. PREPARTICIPATION EXAMINATION QUESTIONNAIRE

1) Do you skip two or more meals a day?
2) Do you eat large amounts of food or feel out of control with your eating?
3) Do you eat a lot when you aren't hungry
4) Do you use laxatives, diuretics, or stimulants to control weight?
5) Do you avoid social situations to maintain your eating or exercising schedule?
6) Do you hide the food you eat from others"
7) Do you exercise beyond required workouts or hide extra workouts from others?
8) Do you exercise at night when you should be sleeping:
9) Do you self-induce vomiting after eating?
10) How old were you when you became active in competitive athletics?
11) How often do you take a day off from training?
12) Have you ever had a stress fracture?
13) How old were you when you had your first period?
14) Do you currently have regular menstrual periods?
15) How many times did you get your period in the past 12 months?
16) Are you on any medication (including birth control pills)?
17) What is your present weight?
18) What is the most/least you've weighed in the last year?
19) What is your ideal weight for your sport?
20) How much of an issue is weight for you?

Clinics in Sports Medicine, 1997.

CLINICAL IMPLICATIONS

The first step in preventing an eating disorder is having an increased awareness of the existence of the problem, the signs and symptoms that present, and who falls in the "at risk" category (Nattiv et al., 1994). The first sign may be a distorted body image as reflected by the adolescent female's perception of being overweight. The distorted perception may serve as an initial marker for individuals at risk for an eating disorder

(Sciacca et al., 1991). Health care professionals must realize that the risk for developing an eating disorder may occur very early in a female's life. Increased body mass begins at age six requiring interventions to begin early (Koff & Rierdan, 1993).

All female athletes are required to obtain a pre-participation physical exam before the athletic season. The exam gives providers an ideal opportunity to screen athletes for disorders relating to the female athlete triad (disordered eating, amenorrhea, osteoporosis) among other health concerns (Nattiv et al., 1994).

When an eating disorder is suspected, the nurse practitioner should complete a more detailed history on the menstrual and nutritional status along with incidence of any other health problems including stress fractures. A 24-hour nutritional screen of what the athlete typically eats may be needed. However, it is important to realize that answers to questions on this tool can be fabricated. Eating Disorder Inventory (EDI) forms and screening questionnaires can be made available for athletes to fill out in nurse practitioners' offices. In addition it is imperative that staff be aware of normal body mass index and be able to calculate what the BMI is for patients suspected of an eating disorder.

Laboratory tests may be indicated if an eating disorder is suspected to further assess nutritional status or amenorrhea. A complete blood count, chemistry panel, and urinalysis are useful as screening tests. If the female also has the diagnosis of secondary amenorrhea, additional labs to consider are: a pregnancy screening test, follicle-stimulating hormone, thyroid-stimulating hormone, luteinizing hormone, prolactin and estradiol levels can help to determine the cause of the menstrual disturbance (Wiggins & Wiggins, 1997). If the patient has primary versus secondary amenorrhea additional

screening for thyroxine (T4) and triiodothyronine (T3) may be indicated (Hicks & D'Angelo, 1997). Typical results for lab tests of anorexics and bulimics are presented in Table 5.

When a female athlete complains of lower leg pain and a stress fracture is in the differential diagnosis, an x-ray or bone scan may be indicated. In 1997, a group of health professionals discussed how extensively bone scans should be ordered for the female athlete. The recommendation was for completing a triple-phase technique of both legs from hip to ankle. Furthermore, if osteoporosis is suspected, a dual-energy x-ray absorptiometry (DEXA) study should be ordered to assess the athlete's bone density (Joy, Clark, Ireland, Martire, Nattiv & Varechok, 1997).

If the provider has confirmed that there is a disordered eating pattern, the next step is to work with the patient and refer the female athlete to a nutritionist, psychiatrist, or psychologist. Research suggests treatment for a female athlete with an eating disorder to include nutritional counseling and cognitive behavioral psychotherapy (Shisslak et al., 1990). The athlete should meet weekly for individual appointments with the dietician and psychologist, and monthly with the team physician or nurse practitioner (Baer, Walker & Grossman, 1995). It is also important to include the team trainer and coach regarding the status of the athlete, so that daily monitoring at practice can take place.

The athlete's family should always be kept informed of the current treatment plan and encouraged to participate when appropriate. They should also be educated regarding the physical and psychological signs and symptoms associated with an eating disorder. This will help them in knowing when to notify the health-care team when a relapse has occurred. Parents must be encouraged to support their daughter and avoid placing stress

or perfectionist ideals upon them. As stated previously these standards perpetuate the eating disorder for the athlete.

Medication therapy may also be warranted when a female athlete has an eating disorder. Hormone replacement therapy or oral contraceptives will assist in increasing estrogen along with helping to curb osteoporotic conditions. Antidepressant medications can relieve depression and obsessive conditions. Lastly, vitamin and mineral replacements can help to promote bone health and replace nutritional deficits.

When amenorrhea is present estrogen replacement therapy is necessary to prevent fractures and more importantly osteoporosis. Oral birth control pills are the treatment of choice for women in the reproductive ages that are not interested in conception. Although females with eating disorders may be very resistant to using oral contraceptives secondary to perceived potential for weight gain. Another alternative is to use conjugated estrogen with progesterone, which will resume menstrual function and restore estrogen. With hormone replacement therapy you must inform your patients that pregnancy could occur (Wiggins, et. al, 1997).

The combination of antidepressants along with psychotherapy may be very effective. There is no demonstrated difference in the efficacy of different antidepressants, so the selection should be based on minimizing side effects and enhancing compliance. Dr. Elizabeth Joy, who treats female athletes with eating disorders, reports using Selective Serotonin Reuptake Inhibitor's in almost all of her bulimic patients and in 50% of her anorexic patients. In addition, she will also use anxiolytic medications, such as benzodiazepams, in patients with extreme meal time anxiety (Joy, et. al, 1997).

Vitamin and mineral replacement therapy can also be helpful to prescribe to help replace deficits form inadequate nutritional intake. Nutritional supplements with 1500 mg of calcium, 400 mg of vitamin E, 400-800 IU of vitamin D and 100 Mg of vitamin C may be helpful for bone health and antioxidant benefits (Wiggins, et. al, 1997).

TABLE 5. LABORATORY TEST RESULTS FOR EATING DISORDERS

Anorexia	Result	Bulimia	Result
Transferrin	decreased	K+	decreased
Prealbumin	decreased	Na+	decreased
FSH	decreased	CL	decreased
LH	decreased	CO2	decreased
T4	decreased	BUN	increased
T3	decreased	Hgb	increased
BUN	decreased	Hct	increased
WBC	decreased	CPK	increased
Hgb	decreased	Aldolase	increased
Hct	decreased	Acidosis	increased
Glucose	decreased		

FSH = follicle stimulating hormone T4 = thyroxine

LH = Lutienizing Hormone T3 = triiodothronine

CPK = creatinine phosphokinase BUN = blood urea nitrogen

Laboratory Medicine, 1997

If severe weight loss (below 30% of normal), cardiac compromise, hypotension, dehydration, or electrolyte abnormalities occur, hospitalization may be necessary (Johnson, 1994). If more than 35% of ideal body weight has been lost, hospitalization is recommended (Putukian, 1994).

With proper education and teaching providers may be able to decrease the severity or even prevent the initiation of an eating disorder. One of the most important roles of a nurse practitioner is that of patient education. Through the practice of thorough assessments, nurses may be the first health care professional to recognize a female athlete with an eating disorder.

It is vital that health care providers understand the effects of an eating disorder can be physically and mentally destructive. With severe eating disorders, there are even risks for mortality and lifetime morbidity. Any female athlete at risk of possessing an eating disorder must be confronted with the issue. Such a safety net could be the difference between life and death for the young women.

REFERENCES

Journals:

Baer, J., Walker, W. & Grossman, J. (1995). A disordered eating response team's effect on nutrition practices in college athletes. Journal of Athletic Training, 30(4)315-317.

Bale, P., Doust, J. & Dawson, D. (1996). Gymnasts, distance runners, anorexics body composition and menstrual status. The Journal of Sports Medicine and Physical Fitness, 36(1), 36:49-53.

Benson, R. & Taub, D. (1993). Using the PRECEDE model for casual analysis of bulimic tendencies among elite women swimmers. Journal of Health Education, 24(6), 360-368.

Castiglia, P. (1996). Amenorrhea. Journal of Pediatric Health Care, 10(5), 226-227.

Clark, K. (1997). Disordered eating behaviors and bone-mineral density in women who misuse alcohol. Western Journal of Nursing Research, 19(1), 32-43.

Clark, N. (1994). Counseling the athlete with an eating disorder: A case study. Journal of the American Dietetic Association, 94(6), 656-658.

Folgelhom, M., Lichtenbelt, W., Ottenheija, K. & Westerterp, K. (1996). Amenorrhea in ballet dancers in the Netherlands. Medicine and Science in Sports and Exercise, 28(5), 545-550.

Frauenknecht, M. & Brylinsky, J. (1996). The relationship between social problem-solving and high-risk health behaviors among collegiate athletes. Journal of Health Education, 27(4), 217-223

Fruth, S. & Worrell, T. (1995). Factors associated with menstrual irregularities and decreased bone mineral density in female athletes. Journal of Orthopedic and Sports Physical Therapy, 22(1), 26-38.

Griffin, L. (1995). Stress fracture: With early diagnosis, rest is curative. Journal of Musculoskeletal Medicine, 12(12), 12-23.

Hicks, J. & D'Angelo, L. (1997). The laboratory's role in serving adolescent patients. Laboratory Medicine, 28(9), 581-587.

Huston, L. & Wojtys, E. (1996). Gender difference found in lower extremity muscle function. Orthopedics Today, 16, 20.

Johnson, M. (1994). Disordered eating in active and athletic women. Clinics in Sports Medicine, 13(2), 355-368.

Joy, E., Clark, N., Ireland, M., Martire, J, Nattiv, A. & Varechok, S. (1997). Team management of the female athlete triad – Part one: What to look for, what to ask. The Physician and Sportsmedicine, 25(3), 95-110.

Joy, E., Clark, N., Ireland, M., Matire, J, Nattive, A. & Varechok, S. (1997). Team management of the female athlete triad – Part two: Optimal treatment and prevention tactics. The Physician and Sportsmedicine, 25(4), 55-69.

Koff, E. & Reirdan, J. (1993). Advanced pubertal development and eating disturbances in early adolescent girls. Journal of Adolescent Health, 14(6), 433-439.

Nattiv, A., Agostini, R., Drinkwater, B. & Meager, K. (1994). The female athlete triad. Clinics in Sports Medicine, 13(2), 405-418.

O'Connor, P., Lewis, R. & Kirchner, E. (1995). Eating disorder symptoms in female college gymnasts. Medicine and Science in Sports and Exercise, 27(4), 550-555.

Patterson, D. (1995). Menstrual dysfunction in athletes: Assessment and treatment. Pediatric Nursing, 21(3), 227-229, 310.

Putukian, M. (1994). The female triad. Sports Medicine, 78(2), 345-356

Santomeir, J. (1989). Exercise: A neglected component in treatment. Addictions in Nursing Network, 1(4), 10-14.

Sciacca, J., Melby, C., Hyner, G., Brown, A. & Femea, P. (1991). Body Mass index and perceived weight states in young adults. Journal of Community Health, 16 (3), 159-168.

Shisslak, C. Crago, M. & Neal, M. (1990). Prevention of eating disorders among adolescents. American Journal of Health Promotion, 5(2), 100-105.

Thein, L. & Thein, J. (1996). The female athlete. Journal of Orthopedic and Sports Physical Therapy, 23(2), 134-138.

Wiggins, D., & Wiggins, M. (1997). The female athlete. Clinics in Sports Medicine, 16(4), 593-612.

Wilkens-Runkle, D., Wendland, K. & McKenzie, J. (1994). Pathogenic weight control behavior of National Collegiate Athletic Association Division II female athletes. Journal of Health Education, 25(3), 188-189.

Books:

American Psychiatric Association Diagnostic and Statistical Manual of Mental Disorders. 4th edition. Washington, D.C.: American Psychiatric Association, 1994.

Wardlaw, G. a& Insel, P. Perspectives in Nutrition. 3rd edition. Mosby: St. Louis, 1996.