An Approach to Musculoskeletal Injury in Postmenopausal Women

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Recently our society has been confronted with several epidemiological factors that are likely to have a significant impact on the future practice of sports medicine. Older adults make up the fastest growing segment of the population, with estimates of one in six people in the general population being over the age of 65. The incidence of obesity and diabetes are rising. Cardiovascular disease continues to be a major burden on the health of the population, and the level of physical inactivity in our population is high. The health benefits of physical activity have been demonstrated in the prevention or management of obesity, hypertension, coronary artery disease, diabetes mellitus, and osteoporosis, as well as in the management of common symptoms and changes that occur in menopause (Garry & Whetstone, in press).

Menopausal women are uniquely prone to weight gain, diabetes, cardiovascular disease, and osteoporosis as a result of the changes in their hormonal status. In this article I review concepts of aging as they relate to exercise and sports, the effects of menopause, physical activity and exercise issues, sports participation, and rehabilitation issues as they affect postmenopausal women.

Effects of Aging

The aging process results in changes in cardiorespiratory fitness, muscle mass, strength, flexibility, tendon-capillary blood flow, bone-mineral density, and neurophysiological function (Kallinen & Markku, 1995). Cardiorespiratory fitness declines with age, from 1.5 ml · kg · min⁻¹ in highly active individuals, on average approximately 10% per decade for the general population. An average of approximately 20% of muscle mass present at age 20 is lost by age 65. Strength also declines with age secondary to a decrease in muscle mass. As a consequence of the need to use higher proportions of available muscle mass for exercise, overuse injuries become common. Because of the changes that occur in connective tissue and tendons, elasticity decreases and flexibility declines. Both of these changes are associated with higher injury rates and must be considered during rehabilitation of muscle-tendon injuries. Bone-mineral density also decreases with age, and this is particularly prominent in postmenopausal women secondary to changes in estrogen status. For women age 35 and older, bone mass is lost at a rate of about 1% per year and increases to approximately 3% per year at menopause (Burghardt, 1999). Despite these physiologic changes associated with aging, however, older athletes...
who maintain lifelong athletic training are able to preserve functional capacity, aerobic capacity, muscle mass, strength, bone mass, and neurophysiological function (Kallinen & Markku).

Arthritis is also a common condition associated with aging and the most prevalent chronic condition reported by women in the United States (Center for Disease Control, 1995). Osteoarthritis is the most common form of arthritis and is significantly more prevalent in women than in men (Praemer, Furner, & Rice, 1992). It has been suggested that women demonstrate a more severe form of osteoarthritis than men do (Arendt, 2000). Because obesity also affects osteoarthritis, weight gains that occur in menopausal and postmenopausal women might affect the risk of developing, and natural history of, this form of arthritis.

### Effects of Menopause

Menopause occurs at an average age of 51. The term climacteric refers to the years surrounding menopause, during which the transition from a reproductive to a postreproductive state occurs. Menopause is associated with a host of biological and psychological changes. Women in their climacteric phase can experience hot flashes, weight gain, irritability, mood changes, loss of bone mass, and a reduction in high-density lipoprotein cholesterol (Greendale, Lee, & Arriola, 1999). Secondary to many of these changes, postmenopausal women are at increased risk for obesity, osteoporosis, diabetes mellitus, hypertension, hypercholesterolemia, and cardiovascular disease. Participating in regular exercise mitigates both the primary and the secondary changes associated with menopause in many women (Garry & Whetstone, in press).

Osteoporosis is largely a disease of postmenopausal women. Although it is rare among Black women, it affects approximately 15% of postmenopausal White women in the United States. Low bone mass, the defining feature of osteoporosis, is the most accurate predictor of an increased risk for fracture. Most fractures in postmenopausal women occur from falls, and loss of balance is one of the leading causes of falls in this population. Fall prevention can be achieved through a regular exercise program designed to improve strength, balance, and neuromuscular coordination (Arendt, 2000).

## Participation in Physical Activity and Sports

Over the past several years there has been a call for increasing the physical activity levels in the overall population. Organizations such as the Office of the Surgeon General, the National Institutes of Health, the Centers for Disease Control and Prevention, and the American College of Sports Medicine have all recognized the burden of inactivity and are working to promote an increase in physical activity levels. This national agenda could lead to higher levels of involvement in recreational activities or sports participation, which ultimately will lead to an increase in the overall number of injuries secondary to these activities. Because injury has been identified as the second most common barrier to sport participation in older age groups, preventing and managing such injuries becomes increasingly important (Matheson, Macintyre, Taunton, Clement, & Lloyd-Smith, 1989).

The epidemiological data demonstrate that women have lower overall levels of physical activity than men do, and older adults have lower levels than do younger adults (Pratt, Macera, & Blanton, 1999). This suggests that postmenopausal women are at risk for decreasing levels of physical activity. Data regarding physical activity levels among U.S. adult women demonstrate that 43% are sedentary, 40% perform some activity at levels that are insufficient to gain health benefits, and 15% report regular, sustained physical activity on 5 or more days per week for 30 min or more per day (Garry & Whetstone, in press). In addition, among postmenopausal women, increasing levels of physical activity are associated with a graded, inverse relationship to overall mortality and cardiovascular mortality (Kushi et al., 1997).

Because of the evidence of the health benefits of exercise, the number of older adults and postmenopausal women who participate in sports is increasing (Kallinen & Markku, 1995). This is evidenced by the explosion in the number of participants in the National Senior Olympic Games. In the first Senior Games in 1987 there were 2,500 competitors, and at the 1999 Games there were over 11,900 competitors.