Exercise in the menopause – an update

A. Pines and E. M. Berry

Department of Medicine ‘T’, Ichilov Hospital, Tel-Aviv; *Department of Human Nutrition & Metabolism, The Braun School of Public Health and Community Medicine, Hebrew University-Hadassah Medical School, Jerusalem, Israel

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ABSTRACT

One of the most important components of lifestyle relates to physical activity. Sedentary people fare less well than those who exercise regularly. The benefits of exercise can be demonstrated in many organs of the body. The most frequently studied effect of exercise is reduction in cardiovascular morbidity and mortality, but positive effects on the musculoskeletal system, breast cancer, mood and cognition, and quality of life have been recorded as well. In many cases, a dose-response was evident, and even a mild to moderate degree of activity, performed only a few times weekly, may carry significant merits. The following article reviews this topic and brings updated information on the benefits of exercise on postmenopausal health.

INTRODUCTION

It has been known for a long time that physical activity is a powerful means for the promotion of all aspects of human health. Spending time in the ‘gym’ became fashionable in many places around the globe, in part because of the related social aspects. However, exercise as a medical intervention means being active rather than sedentary, and moving your body on a regular basis. In order to achieve medical goals by exercise, one needs several weekly sessions, not too long, not too hard. Energy expenditure during recreational activity may be calculated by simple grading (mild, moderate, vigorous exercise) or by a more scientific measurement using metabolic equivalent tasks (METs) per hour. One MET is the amount of energy spent at rest. Two METs mean that the energy expended is twice that at rest. A useful table at http://healthfullife.umdnj.edu/archives/METsTbl.htm shows how many METs are expended during various types of physical activities and sports. The following manuscript summarizes the main issues pertinent to the beneficial effects of physical activity in menopausal women.

EXERCISE AND CARDIOVASCULAR DISEASE

The most studied area in this respect is, of course, the association between exercise, physical fitness and cardiovascular morbidity and mortality. The pathophysiological basis for the reduction in cardiovascular risk lies in the diversity of metabolic effects attributable to exercise. Exercise lowers body mass index (BMI), decreases total body fat as well as subcutaneous and visceral fat, diminishes the waist circumference, improves the maximal oxygen consumption, carbohydrate handling and the lipid profile, lowers blood pressure, and is associated with better endothelial function and thinner intima-media dimension. These changes may account also for the neuropsychological benefits of physical activity, expressed in lessening of the symptoms of anxiety and depression.

The two major observational studies on postmenopausal women, the Nurses’ Health Study (NHS) and the Women’s Health Initiative (WHI), presented quantitative data on exercise and primary prevention of coronary artery disease.
A recent publication from the NHS\textsuperscript{4}, summarizing 20 years of follow-up, revealed that women who exercised less than 1 h/week had 58% increased risk for coronary heart disease as compared to women exercising more than 3.5 h/week. Exercise was defined as moderate to vigorous activity, requiring three or more METs per hour. Although the relative risks were attenuated after adjustments for other risk factors for coronary heart disease (body mass index, smoking, lipids, etc.), they still remained highly significant. An earlier publication from the NHS examined the influence of exercise on mortality during 16 years of follow-up\textsuperscript{5}. The reference group consisted of women being active for less than 1 h/week. Devoted exercisers (>7 h/week) had 31%, 77%, 13% and 44% lower risk for cardiovascular death, respiratory death, cancer death, and all other causes of death, respectively. Reduction in risk was also seen with more moderate grades of physical activity. While the NHS recruited women in the age range 34–59 years, the WHI trial (observational study) included women aged 50–79 years\textsuperscript{6}. During a mean follow-up period of 2.2 years, the same pattern of a graded, inverse relation between increasing physical activity score and risk of cardiovascular events was evident. Compared to sedentary women, those who were either walking (energy expenditure of more than 10 METs per h/week) or engaged in vigorous exercise (more than 150 min of exercise/week), had a 40% decrease in age-adjusted relative risk for cardiovascular events.

Fitness may be measured by a simple 400-m corridor walking test. The ability and speed of such a task correlate with mortality. In a study by Newman and colleagues on healthy women, aged > 70 years, those who could walk 400 m in the shortest time were also those with the best 5-year survival\textsuperscript{7}. The hazard ratio for death in those with the poorest performance, needing at least 360 s to walk the 400 m, was more than three times higher than that in those walking this distance in less than 290 s.

**EXERCISE AND THE MUSCULO-SKELETAL SYSTEM**

A systematic review of 28 randomized controlled trials on the effects of exercise in healthy, early postmenopausal women demonstrated that exercise is also beneficial to balance and coordination, muscle strength and flexibility\textsuperscript{8}. There were many studies which investigated the possible positive effect of exercise on bone density. However, the results are conflicting, perhaps because of employment of different exercise protocols. As recent examples of studies in early menopause, 4 years of progressive strength training showed a positive correlation with changes in bone mineral density (BMD)\textsuperscript{9}; 3 years of low-volume, high-resistance strength training and high-impact aerobics maintained BMD at the spine, hip and calcaneus, but not at the forearm\textsuperscript{10}; and a meta-analysis of ten trials concluded that "The exercise protocols that were used in this individual patient data meta-analysis do not improve femoral neck BMD"\textsuperscript{11}. The association of exercise with fracture risk has more importance, of course. Albrand and colleagues found, in a cohort of 672 women (mean age 59 years, mean follow-up 5.3 years) that the odds ratio for fracture was doubled in women with low physical activity\textsuperscript{12}. Data from the NHS were also favorable, since they showed that walking at an average pace for just 1 h/week (equivalent to 3 METs) decreased hip fracture risk by 6%. Every increment of an additional 1-h walk per week decreased the risk by a further 6%. Active women with at least 24 METs/hour/week, had 40–50% lower risk for hip fracture\textsuperscript{13}.

**EXERCISE AND BREAST CANCER**

High energy intake and obesity are known risk factors for breast cancer. Since exercise leads to enhanced energy expenditure and loss of fat tissue, the question arises whether exercise protects from breast cancer. Indeed, in a recent study on a fairly large cohort and a 10-year follow-up, 4 hours/week of vigorous exercise resulted in 22% reduced risk for breast cancer compared to non-active women\textsuperscript{14}. Those who were characterized by the triad of the highest energy intake (that is, eating too many calories), the highest body mass index, and having the lowest energy expenditure (that is, physically inactive) had a two-fold risk for breast cancer as compared to those with the most favorable relevant data. Another aspect of the interaction between exercise and breast cancer risk could be the result of the influence of exercise on sex hormone levels. The WHI Dietary Modification Trial data reconfirmed that the higher the body mass index, the higher the level of intrinsic sex hormones, and the lower the level of sex hormone binding globulin\textsuperscript{15}. On the contrary, total physical activity (METs per week) was negatively associated with concentrations of estrone, estradiol and androstenedione, probably due to the effect of exercise on adiposity. The lowest hormonal levels were recorded in the
clinical setting of low body mass index/high physical activity, and this may well explain the decrease in breast cancer risk in women with such characteristics. A recent review of 19 cohort studies and 29 case-control studies concluded that there is a modest (15–20%) reduction in breast cancer risk in physically active postmenopausal women. Every additional hour of physical activity per week was associated with a 6% decrease in breast cancer risk.

EXERCISE AND THE MIND
Exercise is also good for the soul. While reviewing the psychological effects of exercise, Regalin stated that, for healthy individuals, the principal psychological benefit of exercise may be that of prevention, whereas, in those suffering from mild to moderate emotional illness, exercise may function as a means of treatment. The WHI observational trial (93 676 women, followed for 4.1 years) found that stroke, cardiovascular death and all-cause mortality were higher in depressed as compared to non-depressed women. Depression was diagnosed by a short form of the Center for Epidemiological Studies Depression Scale. An inverse dose-response relationship between depression and exercise level was also recorded. For example, women who exercised at least four times weekly had a 46% reduction in chance of being depressed. Even one session per week was beneficial, with 22% reduction in risk for depression. Cognitive function could benefit from regular exercise: a recent study showed in an elderly cohort that three or more sessions each week of 15 min of physical activity of any sort, during 6 years of follow-up, were associated with a reduction in the incidence of dementia from 20 cases per 1000 person-years (in the less active people engaged in exercise sessions up to twice-weekly) to 13 cases per 1000 person-years for the physically active. One cannot argue with the general saying that people who keep exercising regularly feel better than sedentary people.

EXERCISE AND QUALITY OF LIFE
Sleep quality is a major component of quality of life. Tworoger and colleagues recruited overweight, sedentary women, aged 50–75 years, and divided them into two groups: the first was instructed to do low-intensity stretching and the second group started moderate-intensity exercise sessions. After 1 year, sleep was three-fold better in morning exercisers (having more than 225 min of exercise per week) than in the stretchers in regard to the ability to fall asleep and to sleep duration. In contrast with the above, those who performed their exercise sessions in the evenings actually had more trouble falling asleep. Other parameters of quality of life that are relevant to the perimenopause and early menopause show improvement in women who are physically active. A small-scale study (60 women, mean age 54 years) evaluated various menopause-related symptoms in low-active, medium-active and high-active women. The results were very clear, demonstrating a graded positive effect of exercise on general somatic, vasomotoric and psychological symptoms. The total frequency-of-symptoms score was 103 for the low-actives, 90 for the medium-actives, and 76 for the high-actives. The total severity score of symptoms was also reduced as the degree of physical activity increased: low-actives had a total score of 105, the medium-actives, 85, and the high actives, 73.

Exercise is defined by its mode of training, as well as by its frequency, intensity, and duration. Most published trials examined the effects of a relatively short exercise program (usually up to 12 weeks). Such protocols are probably based on the guidelines of the American College of Sports Medicine, which stated that 12 weeks of aerobic exercise, or even less, are sufficient for attaining an improvement in many aspects of physical fitness. Since most studies used walking as the primary mode of exercise, the usual ‘prescription’ for optimal physical activity consists of at least 30 min of daily moderate walking in one to three bouts, in addition to resistance exercises twice a week.

FINAL REMARKS
Counseling patients on exercise and fitness should be an important task for care-givers. A recent study from the UK showed that primary physicians who counseled their patients on the health-related benefits of exercise achieved a good response rate, with more people becoming active and more people increasing the duration of their exercise sessions. The intervention group (mean age 57 years, 1-year follow-up) attained 33 more min per week of exercise and showed significantly higher scores in the SF-36 quality-of-life questionnaire.

One must remember that exercise may potentially carry a risk for injuries and adverse events. Not all middle-aged or elderly people are able to exercise because of various disease conditions and

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disabilities. Exercise may cause pain and damage in the musculoskeletal and articular systems. The mood-elevating effects of exercise may lead to addiction to strenuous or too long exercise sessions. As already mentioned, exercise lowers adiposity and the level of estrogen, while increasing the level of sex hormone binding globulin. Under such circumstances, hot flushes and other vasomotor symptoms might become more severe in overly physically active women. To conclude, exercise is one of the most powerful means to promote health. Individual prescription of exercise and proper monitoring may be the key factors to achieve maximal benefits while minimizing the potential for exercise-induced injuries or any other form of harm.

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References


