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Original Article

Short- and Long-term Effects of a Physical Exercise Intervention on Work Ability and Work Strain in Symptomatic Menopausal Women

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ABSTRACT

Background: Physical exercise during leisure time is known to increase physical capacity; however, the long-term effects on work ability and work strain are inconclusive. The aim of this study was to investigate the effects of a 6-month physical exercise program on work ability and work strain after 6 months and 30 months, among women with menopausal symptoms at baseline.

Methods: A questionnaire including questions on work ability and work strain was mailed in the beginning, at 6 months and after 30 months after the intervention to occupationally active women participating in a randomized controlled study on physical exercise and quality of life. The intervention included aerobic exercise training 4 times per week, 50 minutes per session. Work ability was measured with the Work Ability Index (WAI) and with questions about physical and mental work strain.

Results: Women aged 47–62 years ($N = 89$) who were occupationally active at baseline were included in the analyses. The increase in WAI from baseline to the end of the exercise intervention (6 months) was statistically significantly greater among the intervention group than among the control group (regression coefficient 2.08; 95% confidence interval 0.71–3.46). The difference between the groups persisted for 30 months. No significant short- or long-term effects on physical and mental work strain were found.

Conclusion: A 6-month physical exercise intervention among symptomatic menopausal women had positive short-term as well as long-term effects on work ability.

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1. Introduction

Physical capacity and work ability decline with age because of biological and environmental factors [1,2]. Decline in aerobic (physical) capacity is on average 5–15% per decade between the ages of 30 years and 60 years [3]. Lifestyle factors (e.g., age, sex, and physical activity level) may affect the decline of physical capacity, but the effects of age can mainly been seen after the age of 45 years [4,5]. Physical capacity could be improved through increased physical activity at all ages. All workers, especially middle-aged workers, benefit from physical training, and beneficial effects on work-related outcomes have also been reported [6,7]. Chronic disease, poor musculoskeletal fitness, and cardiorespiratory fitness are associated with low physical capacities, whereas well-being, physical demands of the work [8], and poor work ability [9] [measured with the Work Ability Index (WAI)] decline with age. WAI in women is slightly lower than in men. Especially during the transitional ages of menopause, the differences between men and women are greater but are smaller in older age groups, which may be a sign of the effect of the menopause [10,11]. Decreased work ability in most women may be caused by sex-specific age-related diseases, and lack of mental resources, partly because of commitments outside work and more sickness absence [1].

It is known that good physical fitness is associated with well-being and health at many levels [12]. Better physical capacity may increase work ability and help people to cope with physical strain at

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work. It could also improve mental resources; help to recover faster from mental strain, and positively affect work ability. Information about the effects of physical exercise on work-related factors is, however, limited and inconsistent [12].There are only a few well-designed studies of the effectiveness of leisure-time physical exercise programs on work-related outcomes [12,13]. Most of the interventions are worksite related and have focused on the effect of exercise in either physical or mental occupations [9]. The effect has been very limited, e.g., regarding sickness absence, inconclusive for job satisfaction, job stress, and employee turnover, and nil for productivity. The viewpoint of work ability and strain at work has received little attention. A physical exercise intervention that included mental health workers, police officers, homecare workers, and cleaners, showed only a slight improvement in work ability despite a significant change in physical capacity [7,14–17].

It is not known whether or not menopause symptoms have an effect on work ability. The menopausal transition may affect quality of life and also the ability to cope with increasing work demands, because up to 80% of women report menopause-related symptoms [18,19], such as hot flushes, sleep disturbances, and mood swings [20,21]. The most effective treatment for menopausal symptoms is hormone therapy, but the risks may outweigh the benefits [17]; thus, alternative treatments are warranted. An increase in physical exercise is known to have beneficial effects on overall health [22,23] and could therefore also alleviate menopause-related symptoms, and also result in improved work ability. There is a lack of information on the effect of the menopausal transition on work ability and work-related factors [24]. We found only one cross-sectional study suggesting that menopausal symptoms are negatively associated with work ability and may increase the risk of sickness absence [11]. However, it is known that menopausal symptoms (transition) have an effect on those health- and well-being–related factors, which are associated with work ability and work-related factors [25].

We have reported earlier on the primary outcomes of the randomized controlled 6-month exercise trial used in this study. These were improved quality of life and decreased menopausal symptoms [26,27]. We have also reported the secondary results related to perceived work strain, and work ability among all employed, responding women [28]. The aim of this study was to include women in employment and to study both the short- and long-term effects (30 months) of the 6-month physical exercise on perceived work ability and work strain.

2. Materials and methods

2.1. Study design

The study was a secondary analysis of a randomized controlled study [26] with 2-year follow-up. The main outcome measures were perceived work ability and work strain. In this study, only those who were occupationally active (working $>$ 1 h/wk), continued their participation until the end of the intervention, and completed all questionnaires were included in the analyses ($n = 89$). The study participants were mostly working in mentally demanding jobs ($n = 65$; e.g., office work), but also in positions requiring physical activity ($n = 5$; e.g., cleaning) and mixed (physical and mental) jobs ($n = 19$; e.g., nursing).

Women were recruited via local newspapers. Details of the recruitment and participant selection were reported earlier [26]. One hundred and seventy-six menopausal women participated in the study. Inclusion criteria were: symptomatic (daily hot flushes), age 40–62 years, no current postmenopausal hormone therapy, or hormonal therapy withdrawal (washout period 3 months), low physical activity (physical exercise $<$ 3 times/week) and 6–36 months since their last menstruation.

The duration of the intervention was 6 months. The women were randomized into intervention and control groups. The intervention included aerobic exercise training four times per week, 50 minutes per session, with a progressive increase in intensity. At least two sessions were to involve walking or Nordic walking and the other two could be jogging, cycling, swimming, skiing, aerobics, or other gymnastic exercise. Walking was emphasized because of the experiences from earlier trials as having favorable effects on health among menopausal and postmenopausal women [29]. Adherence to the trial was supported by an option to participate in supervised aerobics or step aerobics sessions at the research institute twice per week. The ratings of perceived exertion were used to check the intensity of the exercise. The target for the rated value during the exercise was 13–16 on a 6–20 point scale. This corresponds to about 64–80% of the maximum heart rate [30]. The control group was asked to maintain their normal physical activity habits. Both the intervention and control groups attended lectures once or twice per month (6–12 times/6 months). The lectures took 60–75 minutes and mostly addressed topics of physical activity and general health [26].

Twenty-four months after the physical exercise intervention we mailed a follow-up questionnaire to all study participants ($n = 176$), of whom 102 (57%) answered the questionnaire. All the study participants provided written consent and the study was approved by the Pirkanmaa Hospital District Ethics committee (Tampere, Finland).

2.2. Assessments

Questionnaires were completed on paper at baseline, after 6 months and 30 months from baseline. The WAI was used to estimate perceived work ability [2]. The final WAI score comprises the sum of seven items: (1) work ability in relation to lifetime best (scale 0–10); (2) work ability in relation to physical and mental work demands (scale 1–5); (3) number of diagnosed diseases; (4) estimation of work impairment caused by diseases (scale 1–6); (5) self-reported sick leaves during the past 12 months (scale 1–5); (6) personal prognosis of work ability after 2 years (scale 1, 4, and 7); and (7) mental resources (scale 1–4). The WAI score could range from 7 to 49 (poor to excellent).

Physical and mental strain at work was elicited using a modified Borg scale (How much physical/mental strain do you feel on a normal work day? (from 0 = very little to 10 = very much) [30]. Cardiorespiratory fitness was assessed by the 2-km Urho Kaleva Kekkonen (UKK) Walking Test. The UKK Walking Test is a reliable method for measuring aerobic fitness for 20–65-year-old adults with no illness or disability limiting brisk walking or who are not taking medication that affects heart rate [31]. Heart rate was monitored during the walk and registered immediately at the end (Polar Electro, Oulu, Finland). Maximal oxygen consumption was estimated through a formula based on a sex-specific model including walking time, heart rate at the end of the walk, age, and body mass index [31].

2.3. Statistical analysis

Characteristics of the study participants are described using means and standard deviations or proportions. Cross-sectional differences between groups at baseline and at 6 month and 30 month follow-up were evaluated using the Mann-Whitney *U* test. Normality of the continuous variables was evaluated with the Kolmogorov-Smirnov test.

To account for the within-participant correlation between three time points, we constructed multilevel ordinal logistic regression models (called the proportional odds model) and analyzed the

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