Exercise and smoking habits among Swedish postmenopausal women

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Abstract

Objective—To assess exercise habits and their relation to smoking habits and social and medical factors in postmenopausal women.

Methods—A cross-sectional study with a questionnaire to all 1324 55–56 year old women in Linköping, Sweden.

Results—Response rate was 85%. About a third of the women took part in some kind of quite strenuous exercise for at least one hour a week. About a quarter worked out once a week; fewer did swimming and jogging. One in four women smoked. Women who used hormone replacement therapy, who were not smoking and who had a physically light occupation more often took part in strenuous sports. Women who had been treated for malignancies or with back problems exercised to the same extent as women in the general population.

Conclusion—About a third of the postmenopausal women exercised on a regular basis, if exercise involved in getting to and from work was not counted. Since regular physical exercise has many health benefits, more women should be encouraged to take part in regular physical exercise. Factors probably associated with level of education and general awareness of the importance of a healthy lifestyle positively influenced the likelihood of these women to be physically active on a regular basis. A previous malignant disease or current back problems did not prevent women from taking part in exercise on a regular basis.

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Menopause is the last menstrual bleed, when ovarian oestradiol production no longer stimulates the endometrium to proliferate. Menopausal age is about 51 years in Western countries.^{1–4} Around menopause most women experience vasomotor symptoms such as hot flushes and sweating, and some years later many women report urogenital symptoms such as dyspareunia, dysuria, and urgency incontinence.^{1–4} The incidence of cardiovascular disease increases from this age,⁵ partly because of loss of the effect of oestrogen on lipoprotein metabolism and vessel wall relaxation.⁶ Bone loss is accelerated, with increased risk of fractures.⁷

Many peri- and post-menopausal women also report depression and other psychological problems, which may be attributed to exogenous factors, but also to hormonal changes.⁸

Most of these symptoms and changes around menopause may be ameliorated or completely cured by oestrogen replacement therapy (ERT), which should be combined with progestagen therapy to avoid hyperstimulation of the endometrium and risk of endometrial carcinoma.⁹ Combined treatment, usually called hormone replacement therapy (HRT), leads to vaginal bleeding, which makes some women abandon the treatment. Other women are prevented from undergoing ERT for medical reasons. Therefore there is a need for alternative treatments. There are relatively few pharmacological alternatives to ERT/HRT. Lifestyle factors such as regular physical activity affect many metabolic changes and symptoms of the climacteric,¹⁰ including mental status as well as vasomotor symptoms.¹¹ In fact, most metabolic changes correlated to the decrease in sex steroids around menopause are affected by exercise in the same direction as by oestrogens, but exercise also has some unique effects. Studies have shown that physically active women have a higher maximal oxygen uptake^{12–16} and a decreased risk of cardiovascular disease and death.^{17–20} Exercise has beneficial effects on weight,^{21–24} lipoprotein metabolism,^{25–26} blood pressure,^{27–29} and glucose tolerance.^{30–33} Furthermore, exercise increases bone mass and prevents bone loss^{34–36} and also benefits balance,³⁷ which should decrease the risk of falls and fractures. Fewer physically active women were found to have moderate to severe hot flushes after menopause than age matched women from a control group.³⁸ Physical activity also exerts mental effects reducing both anxiety and physiological arousal,³⁹ has definite relaxing effects,⁴⁰ and appears to be an efficient treatment for mild to moderate depression.^{41–42}

During the past few decades the number of competitive sports available to women has increased as has women's general leisure time for physical activity.⁴³ Women may even have increased their activity levels more than men, and this also includes older women.⁴³ The mean age of joggers has been found to increase, perhaps the result of a cohort phenomenon.⁴⁴ Although interest in physical activity is growing, only 7–8% of women and men in the US aged 18–65 years were found to take part in regular physical exercise that involved large muscle groups for at least 60% of the

cardiorespiratory capacity for more than 20 minutes, three times a week.⁴⁵

Although we now know that regular exercise has a number of beneficial effects on the peri- and post-menopausal woman, we do not know to what extent women of these ages actually take part in different kinds of exercise and which women are active. Smokers have an earlier menopause and also seem to metabolise endogenous as well as orally administered oestrogens more rapidly. Therefore, apart from the negative effects of smoking in itself, smokers may have more pronounced symptoms and metabolic changes after menopause than non-smokers. Smoking is influenced by social factors, and women are less likely to smoke if married than if divorced, widowed, or single.⁴⁶⁻⁴⁹ Smoking seems to be common even among postmenopausal women, and 25–38% of Swedish women of postmenopausal age were smokers in the early 1980s.⁵⁰⁻⁵¹ Therefore, it is important to include smoking habits in a survey on lifestyle factors in postmenopausal women.

The objective of this study was to assess exercise and smoking habits in peri- and postmenopausal Swedish women in relation to other health factors.

Methods

In early 1995 a questionnaire was sent to all 1324 women residing in Linköping, who would be 55 or 56 years old during that year. Their names and addresses were obtained from the Swedish population register. A postal reminder was sent after two months. Some of the unclear answers and unanswered questions were sent back to be returned after correction or completion.

The questionnaire covered occupation, parity, time of last menstruation, gynaecological operations, climacteric complaints, use of HRT, body length, and weight. All women were asked about smoking and exercise habits. They were asked if they exercised on a regular basis, including cycling or walking to and from work. They were also asked to give the number of hours per week spent on a number of different kinds of sport. We had chosen working out, jogging, swimming, walking, and cycling. They were also asked to give the number of hours spent on other kinds of exercise and what they were.

In this way we received separate data for a number of different sporting activities from each woman. In order to obtain the total number of hours per week dedicated to the more strenuous sports, we added up the number of hours each woman spent on jogging, swimming, and working out. The women were also asked to specify other sports and types of exercise undertaken. Many listed activities such as gardening and golf under "other" exercise, but these were not included in the total sum as they were not considered to be energetic enough to affect pulse rate or oxygen consumption significantly. If the subject regularly spent time cycling, that time was divided by two before it was included in "total" time, because we considered that cycling is usually

less energetic than the other sports, especially as most women used cycling as a means of transport to and from work. Walking was not included in the "total" sum.

The questionnaire was validated by letting five randomly selected healthy women of peri- and post-menopausal age answer it in writing. These women were then interviewed in order to find possible misinterpretations, so that the questions could be made easier and clearer.

DATA HANDLING AND STATISTICS

The questionnaires were coded and remained so when data were analysed using Macintosh Statview 4.1 (Abacus Concepts Inc). χ^2 Test or Wilcoxon rank sum test was used for analysis of differences between groups, and contingency analyses were performed when categorised data with more than two categories were compared.

ETHICS

The study was approved by the local ethical committee of the University of Linköping.

Results

Of the 1324 questionnaires sent, 1122 (84.7%) were answered after one postal reminder, albeit all not completely. All questions about exercise were answered by 1107 women.

The women had on average 2.03 children (range 0–10). Body mass index (BMI) was 24.7 (4.0) (mean (SD)); median and 25th and 75th percentiles were 24.15 and 21.9–26.5. Median time since menopause was four years (25th to 75th percentiles were 1.9–6.5 years); about 90% were postmenopausal—that is, at least one year since the last menstrual bleed. Almost 9% of the women had experienced a surgical menopause—that is, undergone hysterectomy with or without bilateral oophorectomy. About 35% of the women currently used HRT, half of them for at least two years; only 5% had tried HRT and abandoned it. About 5% used herbal and alternative remedies to relieve climacteric symptoms, and another 15% had tried such therapies and abandoned them mainly because of insufficient effects.

Two thirds of the women never used any medication (other than HRT), but 8% used analgesics, 6% antihypertensive medication, and 4% had treatment for bronchial asthma. About 2% used sedatives now and then, and another 0.5% used sedatives because of disturbed sleep caused by climacteric symptoms. Some 4% used thyroxine, and 1% had diabetes.

Table 1 summarises the exercise habits. It appeared that the most popular specific sports were working out and swimming, but a large number of women spent at least one hour a week walking (84.3%) or cycling (46.9%), often as a method of transport between home and work. In all therefore most women undertook some physical activity every week, and 57 women (5%) spent at least four hours every week on exercise. When we calculated the "total" number of hours per week spent on exercise, we omitted walking and divided hours cycling by 2, which explains the apparent

discrepancy between the figures for separate sports and the "total" sum in table 1. Only about every third woman did not exercise at all (see the "total" column in table 1), and two thirds exercised at least one hour per week. About 16% of women took part in other kinds of exercise, such as riding, tennis, golf, and bowling.

When looking at more specific sports, we only included jogging, swimming, and working out. Forty women (3.6%) jogged at least one hour a week, 103 women (9.3%) spent at least one hour per week on swimming and 245 women (22.1%) at least one hour per week working out (table 1). Some women exercised regularly participating in more than one of these different sports, but 343 (31.0%) practised one of the more intense sports on a regular basis at least once a week and 101 (9.1%) for two hours or more a week (table 1).

SMOKING HABITS AND EFFECT OF SMOKING ON EXERCISE

About a quarter of the women were smokers, a quarter had previously smoked but stopped, and the rest had never smoked (table 2).

BMI was slightly lower for smokers than non-smokers (mean 23.9 *v* 24.9; *P* = 0.013; Student's *t* test). There was a weak, but significant, negative correlation between time/week spent on exercise and BMI (*r* = -0.15; *P* < 0.01).

Regular exercise, counting all kinds of exercise for at least one hour/week ("Total"; table 1), was significantly more common

among non-smokers (69.1%) than among smokers (55.6%; $\chi^2 = 14.8$ with Yates's correction; *P* < 0.001). Non-smokers tended to be more active in all different sports, and the difference reached statistical significance for working out, whereas twice as many non-smokers than smokers (25% *v* 12.5%) were active for at least one hour/week ($\chi^2 = 17.3$; *P* < 0.001). The longer the time since the women had quit smoking, the higher the prevalence of active women working out (table 2). The more cigarettes per day women smoked, the less likely they were to work out (contingency analysis $\chi^2 = 38.45$; *P* = 0.0034). For other sporting activities this tendency was less evident. Most women (81–92%) spent at least one hour/week walking, no matter whether they were smokers or not (table 2).

SOCIAL AND OTHER FACTORS AND THEIR ASSOCIATION WITH EXERCISE

There was no correlation between parity and number of hours/week spent on exercise (*r* = -0.013, simple regression analysis).

Women were asked to classify their occupation as physically light (44%), moderately heavy (35%), or heavy (9%). About 10% had retired prematurely because of a somatic or psychiatric chronic disease and 2.4% were housewives (table 3). The women were not asked about satisfaction with work or total working time per week.

Participation in jogging and working out was associated with the type of work. About 5% of women with light or moderately heavy occupations spent one hour/week or more jogging, whereas neither women with a heavy occupation nor retired women jogged. A quarter of women with a light occupation worked out, but only half as many (13%) of those with a heavy occupation ($\chi^2 = 5.98$ with Yates's correction; *P* < 0.05). No housewives worked out whereas prematurely retired women worked out to the same extent as other women (table 3).

Besides jogging and working out, there were no general differences with regard to how many women took part in physical exercise between those with light and heavy occupations (table 3). Even women who were prematurely retired because of illness were as active as the others—that is, two thirds took part in some kind of regular exercise including walking and cycling. The housewives differed, only one third being physically active for at least one hour per week, compared with two thirds of women who worked outside their homes ($\chi^2 = 14.1$; *P* < 0.001).

MEDICAL FACTORS AND THEIR RELATION TO EXERCISE

About a third of the women used HRT and these took part in some kind of regular exercise significantly more often (72%) than non-users (64%; $\chi^2 = 8.34$; *P* < 0.01). Working out seemed to be particularly attractive to women using HRT; 29.6% of the 382 HRT users took part in workout sessions at least once a week, compared with 18.0% of women who did not use medication for climacteric symptoms ($\chi^2 =$

Table 1 Exercise habits among 55 and 56 year old women from Linköping, Sweden. The column "total" includes the sum for each woman of the hours spent jogging (J), swimming (S), and working out (W), and more intense "other" sports and also hours spent cycling divided by 2. Time spent on less intense "other" sports and walking are not included in the "total"

Time spent (hours/week)	Percentage						
	Walking	Jogging	Swimming	Working out	Cycling	Other	J+S+W Total
No exercise	15.7	96.4	90.7	77.9	53.1	84.0	69.0
1–<2 h/w	28.0	2.5	8.4	17.6	16.7	8.2	21.9
2–<3 h/w	23.6	0.6	0.5	3.5	10.7	3.5	6.5
≥3 h/w	32.7	0.5	0.4	1.0	19.5	4.3	2.6

Table 2 Percentage of 55 and 56 year old women taking part in different kinds of exercise at least one hour/week in relation to smoking. The number of women who both answered about smoking and number of hours participation in a certain sport varied a little between different sports, which is shown as a range under "N". The column "total" includes the sum for each woman of the hours spent on jogging, swimming, and working out, and more intense "other" sports and also hours spent cycling divided by 2. Time spent on less intense "other" sports and walking are not included in the "total"

Smoking habits	N	Percentage						
		Working out	Jogging	Walking	Cycling	Swimming	Other	Total
Never	552–556	25.2	4.5	85.8	49.6	10.3	15.7	67.9
Finished > 5 years ago	202–203	25.6	3.0	82.8	48.0	9.9	18.2	69.5
Finished 1–5 years ago	57	22.8	0	80.7	49.1	12.3	17.5	77.2
Finished < 1 years ago	19	21.1	5.3	89.5	47.4	5.3	26.3	73.7
Smokes 1–5 per day	73–74	16.2	5.4	83.8	44.6	5.5	16.2	64.9
Smokes 6–19 per day	177–179	11.7	2.2	83.8	40.7	6.7	12.4	53.1
Smokes > 19 per day	12	8.3	0	91.7	16.7	16.7	16.7	41.7

Table 3 Percentage of women taking part in different kinds of exercise at least one hour/week in relation to occupation. The number of women who both answered about occupation and number of hours participation in a certain sport varied a little between different sports, which is shown as a range under "N". The column "total" includes the sum for each woman of the hours spent jogging, swimming, and working out, and more intense "other" sports and also hours spent cycling divided by 2. Time spent on less intense "other" sports and walking are not included in the "total"

Occupation	N	Percentage						Total
		Working out	Jogging	Walking	Cycling	Swimming	Other	
Light	480–483	25.6	5.4	86.5	43.4	8.5	18.8	66.5
Moderately heavy	378–380	22.1	3.2	79.2	55.3	10.8	15.1	71.6
Heavy	100–101	13.0	0	91.1	49.5	6.9	13.0	61.4
Prematurely retired	105–106	22.6	0.9	84.9	37.7	9.5	11.3	56.2
Housewife	26–27	0	0	92.3	33.3	7.4	11.1	33.3

18.3; $P < 0.001$). For the other different sports there were no significant differences.

Women who had previously used oral contraceptives (64%) took part in regular exercise slightly, but significantly, more often than women who had not used oral contraceptives (68.4% *v* 60.4%; $\chi^2 = 7.21$; $P < 0.01$).

Physical activity among women who used no medication such as analgesics, antihypertensives, thyroxine, and antidiabetic drugs was compared with that of women who did use such medications. Contingency analyses showed women not taking medication to be significantly more active with respect to jogging ($P = 0.029$), cycling ($P = 0.0002$) and overall ($P = 0.008$), whereas they did not differ with respect to walking, working out, and swimming.

Sixty eight women had been treated for a uterine or breast malignancy, but this fact did not prevent them from taking part in regular exercise. Thus women treated for malignancies took part in exercise to the same extent as women in general.

Neither did previous premenstrual symptoms during the fertile period affect to what extent women were physically active.

Almost half of the women had suffered from back problems during the recent period, but these problems did not influence their exercise habits. Even women with moderate to severe back problems exercised to the same extent as women without these symptoms.

There was no relation between exercise habits and the occurrence of hot flushes (table 4). In fact, quite a few (12%) women had moderate to severe hot flushes at the time of the survey, probably because every third woman used HRT.

Discussion

The use of an unselected population is important for most epidemiological studies, especially as the purpose in this study was to obtain a general impression of the population at this

Table 4 Participation in different sports on a regular basis for at least one hour/week among women with and without vasomotor symptoms. There were no significant differences between those with and without vasomotor symptoms

	Percentage		
	Jogging	Swimming	Working out
Vasomotor symptoms	3.0	10.0	21.6
No vasomotor symptoms	6.0	6.5	24.2

age. We consider our group large enough to be representative and that the low drop out rate (15%) did not affect the results markedly. Therefore we did not perform any drop out analysis. We assume that no women were missed since the Swedish population register is extremely accurate. Since the various questions had been tested beforehand and were easy to understand, we also consider the answers to be valid. There is a risk that the women overestimated the time spent on the different sports, and underestimated for example the number of cigarettes smoked per day, but that is a general problem in questionnaire studies. A personal interview would probably not overcome this problem, and there were no differences between the written and oral answers among the women who were interviewed after having filled in the questionnaire. A prospective study on exercise habits would avoid recall bias, but would probably in itself affect the exercise habits during the course of the study.

The time spent on separate sporting activities is probably fairly correct whereas our "total sum" (table 1) is arbitrary, since we have tried to estimate for each woman the number of hours spent on the more intensive sports and have omitted "walking", divided the number of hours spent cycling by 2, and omitted some of the "other" less energetic physical activities. These data should therefore be considered with caution. Other reasons to be careful with the interpretations is the fact that all data are self reported, intensity of physical activity is not defined, and systems to classify degree and type of exercise are lacking. An ideal study would include measurement of the intensity of exercise for each woman and sport, but this is of course impossible in a large cross sectional questionnaire study.

We found that about a third of the women dedicated at least one hour a week to fairly strenuous exercise—that is, jogging, swimming, and working out—and this rose to two thirds when we included other sports such as tennis and cycling. This is a rather high figure compared with the few data we have from other studies. White and coworkers⁵² found that 14% of 1472 English women aged 55–70 years exercised at an optimal level (at least three 20 minute sessions per week of moderate to vigorous activity), 23% at a suboptimal level, and 63% were sedentary—that is, no sporting activity.⁵² They found that 72% took part in physical activity for more than 30 minutes daily, when walking was included.

Kolanowski and coworkers⁵³ found that 7% of 51–85 year old members of a “ladies’ club” went swimming and jogging at least twice a week. Probably these women, being active members of a club, were more active than women from the general population, but the result is similar to ours for the general population, where we found 9% to be active in more strenuous sports for at least two hours per week. It should be emphasised, however, that our study looked at a narrower and younger population than that of Kolanowski and coworkers.⁵³ We found that exercise habits correlated with a number of factors. Women who smoked took part in workout sessions less often, which is in accordance with previous studies.^{52 54–56}

Physically active women had a slightly lower BMI than sedentary women, which confirms previous reports on exercise and body weight.⁵⁷ The correlation was, however, weak, probably because women who smoked, who were generally less physically active, also had a lower BMI than non-smokers. This is in accordance with previous studies on women of similar age, which also reported lower BMI among smokers,^{50 58–60} whereas heavy smokers have been reported to be generally heavier.^{50 61}

Women who were currently using HRT were more physically active, in particular working out. Today many women are aware of the health benefits from the use of HRT and the association between use of HRT and exercise habits suggests a general awareness of health benefits among these women.

Unfortunately we did not ask the women about their education, but only asked them to classify their kind of work as light or heavy. An occupation that is classified as light also often requires a longer education than a heavy occupation. If that is true, the association between light occupation and a high exercise level supports the hypothesis that educated women with greater awareness of healthy lifestyle factors are more likely to take part in physical exercise. Naturally, a woman doing heavy work may feel that she has had her “dose” of exercise at work and wants to use her leisure time for something else.

Premenstrual symptoms may be diminished by exercise^{62 63} and thus women with such symptoms, who may spontaneously have noticed this phenomenon, may take up exercise. Women who reported previous premenstrual symptoms, however, did not take part in exercise more often than other women.

Fortunately women who suffered from back problems and women treated for malignancies were not prevented from taking part in physical exercise, but were as active as women in general. In fact, there are some epidemiological data suggesting that exercise can help to prevent some cancers, such as those of the colon,⁶⁴ endometrium,⁶⁵ and breast.^{66 67} Most postmenopausal women experience vasomotor symptoms with hot flushes and sweating.^{1–3} Many phenomena measured during the hot flush could be explained by an instability and a sudden resetting of the thermoregulatory centre, in order to decrease central body

temperature. If impairment of central opioid activity makes the thermoregulation labile^{68–70} and thereby provokes hot flushes, then mechanisms that increase central opioid activity, such as regular physical activity,⁷¹ might diminish the frequency of hot flushes. In a previous study we found that the prevalence of vasomotor symptoms was lower among physically active postmenopausal women than among women in general.³⁸ In the present study we could not confirm a lower prevalence of vasomotor symptoms among the physically active women. This may, at least in part, be explained by the fact that a third of all women had HRT, usually because of vasomotor symptoms. Thus quite a few women had hot flushes during the study, and women who avoided HRT despite hot flushes are probably a selected group.

The most common cause of morbidity and mortality among postmenopausal women is cardiovascular disease. Exercise seems to decrease the risk of cardiovascular disease through several different mechanisms,^{20 72 73} but in clinical practice the net effect in the individual patient is what is important. Most men and women, including most peri- and post-menopausal women, undertake little physical activity in their everyday life and work. Thus it is of great importance for women to take part in exercise and sport in their spare time, which would probably have beneficial effects with regard to cardiovascular disease.⁷ Thus many of the metabolic changes and risk factors for cardiovascular disease and fractures that appear around the menopause may be more or less counteracted by physical exercise, as are problems with anxiety and depression. Even vasomotor symptoms are less prevalent in exercising women. These effects of exercise are often of the same magnitude as those induced by ERT,¹¹ but exercise may also have additional beneficial effects.

The positive effects of exercise are affected by other factors such as general awareness of lifestyle, diet, and smoking habits. Many, but not all, studies compensate for such confounders, but there is still a great need for prospective randomised studies before definite conclusions can be drawn as to the benefits of exercise (and oestrogens) on well being and various health factors. Furthermore, it is not known whether beneficial effects of exercise are additive to those induced by ERT. To motivate women to exercise it is necessary to select exercise that is of interest and enjoyable. Also the exercise has to be adapted to the woman’s physical and socioeconomic circumstances. Compliance is the key to success.

Recommendations for regular physical exercise and an active lifestyle, especially in our sedentary modern westernised society are needed. Peri- and post-menopausal women not on ERT or HRT would probably benefit more from regular exercise than other women in general. The rather high prevalence of exercise in the present study is positive, but still much has to be done to encourage more women to take part in regular exercise with important preventive health effects.

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Figure 1 White water slalom course, Nottingham.

Bugs and boats: an athlete's view

As an athlete involved in a water sport many people ask if I am worried about Weil's disease (leptospirosis) or if it occurs often in canoeing.

Most of our elite athletes train twice a day on the white water slalom course in Nottingham (fig 1), but may also use water pools, canals, or rivers as flat water training sites. Weil's disease is more likely to be caught when canoeing on stagnant water, so there is some risk of exposure. For regular water users there is the possibility of subclinical infection not severe enough to be recognised. I know of only one suspected case of Weil's disease within the team, but this was never positively diagnosed.

Our biggest worry is the common cold! It disrupts training and everyone is concerned about banned drugs, so we usually take nothing, which makes you a social outcast as no one wants to catch it!

As highly trained athletes our immune system seems to be under stress, and we seem to be susceptible to any illness lurking around. It may be that canoeists catch these bugs in the aerosol produced from the water, develop cold symptoms and later a chest complaint. On the other hand, we do not seem to pick up any gastrointestinal illness from the river water, even as the water levels change through the year.

The biggest worry is developing a respiratory problem at a selection race or important international event. When 100ths of a second may separate you from a place in the team or a medal, feeling 100 per cent fit is essential. We all try the natural remedies, such as vitamin C, but is there any more we might do to keep these bugs at bay? Do other water sports have similar problems?

SHAUN PEARCE
British Canoe Slalom Champion