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ORIGINAL ARTICLE

Water-gymnastics reduced the intensity of back/low back pain in pregnant women

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Objectives. To investigate if water-gymnastics during pregnancy may reduce the intensity of back/low back pain and the number of days on sick-leave.
Methods. A prospective, randomized study. One hundred and twenty-nine women were randomized to participate in water-gymnastics once a week during the second half of pregnancy and 129 were randomized to a control group. The women in both groups filled in questionnaires in gestational weeks 18, 34 and within the first postpartum week. Every day from week 18 to labor they assessed the intensity of back/low back pain.
Results. Back pain intensity increased during pregnancy. No excess risk for the pregnancy associated with water-gymnastics was observed. The women participating in water-gymnastics recorded a lower intensity of back/low back pain. The total number of days on sick-leave because of back/low back pain was 982 in the water-gymnastics group (124 women) compared with 1484 in the control group (120 women). After weeks 32–33, seven women in the water-gymnastics group compared with 17 in the control group were on sickleave because of back/low back pain ($p=0.031$).
Conclusions. Intensity of back/low back pain increased with advancing pregnancy. There was no excess risk for urinary or vaginal infections associated with water-gymnastics. Water-gymnastics during the second half of pregnancy significantly reduced the intensity of back/low back pain. Water-gymnastics decreased the number of women on sick-leave because of back/low back pain. Water-gymnastics during pregnancy can be recommended as a method to relieve back pain and may reduce the need for sick-leave.

Key words: back pain; pregnancy; sick-leave; water gymnastics

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Several studies have shown that at least 50% of women experience some kind of back pain during some period in their pregnancy (1–7). From studies of nonpregnant women of the same age in the general population in Scandinavia, the expected prevalence of back pain is 20–25% (8). Between 10–21% of all pregnant Swedish women are on sick-leave because of back pain during some period in their pregnancy (5, 6). Östgaard and Andersson (6) reported in 1991 that 67% of all Swedish pregnant women experienced periods of back pain during pregnancy. Back pain was also the most common reason for being on sick-leave during pregnancy. Of all pregnant women, 21% were on sick-leave on average for 7.5 weeks because of back pain. Sick-leave did not eliminate their pain (6, 9).

In a report to the Swedish government in 1995, the National Social Insurance Board showed that of Swedish women who gave birth in 1992, 72% were on sick-leave during some period in their pregnancy. Ten percent of these women were said to be on sick-leave due to back problems.

Water-gymnastics has been pointed out as a conceivable method to relieve back pain and to decrease the need of sick-leave because of back pain during pregnancy (9). Although no study has shown significant effects on back pain of water-

gymnastics during pregnancy, this activity has gained widespread popularity among pregnant women in Sweden. Midwives with experience of leading water-gymnastics have a strong impression that water-gymnastics reduce the intensity of back/low back pain, and enable the women to continue to work even late in pregnancy (11–14). Studies on the subject have been performed, but the number of women enrolled have been small (11–14). Granath investigated 94 pregnant women in a randomized prospective study (11). Of the 94 women, 44 had been on sick-leave, 70% of them because of back pain. There was a 17% reduction in the number of women being on sick-leave for back/low back pain and for other reasons among participants in the water-gymnastics. The reduction was, however, not significant.

The aim of the present study was to investigate if water-gymnastics during pregnancy can reduce the intensity of back/low back pain and reduce the number of days on sick-leave.

Materials and methods

Study population and design

A prospective randomized study was carried out between January 1995 and May 1996 at the Department of Obstetrics and Gynecology, Falu Hospital, Falun, Sweden. It was approved by the Ethics Committee of the Medical Faculty at Uppsala University. In Sweden, more than 95% of pregnant women attend the free maternity health care service and the great majority register before 19 gestational weeks. The local antenatal clinics are run by the County Health Care Boards. In the County of Falun (population 52,000) there are six antenatal care clinics; four in the city and two in the countryside. Women who registered at these six clinics before the 19th week of gestation were given the opportunity to participate in the present study. Women with epilepsy, a previous preterm birth before week 32, an age under 18, and women already participating in water-gymnastics, were excluded. Only women familiar with the Swedish language and an expected normal pregnancy were included.

Using sealed envelopes the women who accepted the offer were randomized into two groups; one group was offered water-gymnastics once a week during the second half of pregnancy, the other group was not. The randomization was done by a midwife in connection with the ultrasound examination which all women are offered in gestational weeks 15–18. All women invited to the study came to the ultrasound examination. The invitations to the study and the randomization were not consecutive during the study period, because no more than 60 women could participate in the water-gymnastics during the same period. The swimming-pool could be used only four hours a week for 15 women at a time. The recruitment had to be stopped when four classes were full until the first class was almost finished. At the beginning of the study, 12 women were randomized to each class. The three last classes were enlarged to include 15 women because it was evident that the swimming-pool had enough space for 15 women.

All women gave their informed consent. The women in the water-gymnastics and the control group were asked to fill in three questionnaires and an every-day classification of intensity of back/low back pain.

The questionnaires

The women in both groups filled in questionnaires in gestational weeks 18, 34 and within the first post partum week in the maternity ward. The questionnaires focused on previous and present back/low back pain, parity, education, comfort with their work, working hours, physical characteristics of their work, exercise habits, smoking habits, gynecological and urinary tract infections and history of sick-leave due to back/low back pain or other reasons. The postpartum questionnaire also included questions about sick-leave during this pregnancy, weight gain during pregnancy, gestational week at delivery, whether the delivery was spontaneous or induced (and if so, the reason for induction), mode of delivery, analgesic methods used during labor, number of days in the Neonatal Care Unit, weight and height of the neonate, experience of labor pain and opinions about water-gymnastics. Back/low back pain intensity was re-

Table I. Background factors recorded in gestational week 18

	Water-gymnastics group	Control group	*p*-value
Number of pregnancies	*n*=127	*n*=128	
1 pregnancy	35.4%	26.6%	
2 pregnancies	34.6%	35.9%	
3 pregnancies	17.3%	21.1%	
>3 pregnancies	12.6%	16.4%	0.434
Smoking	*n*=124	*n*=128	
>10 cig. per day	2.4%	1.6%	
<10 cig. per day	4.8%	6.3%	
No smoking	92.7%	92.2%	0.802
Back pain	*n*=124	*n*=128	
Previous back pain	49.2%	47.7%	
No previous back pain	50.8%	52.4%	0.998
Back pain during pregnancy	*n*=123	*n*=127	
Previous back pain	29.3%	33.9%	
No previous back pain	35.8%	40.2%	
No previous pregnancy	35.0%	26.0%	0.303

corded in the questionnaires on a visual analog scale. The scale is a ten centimeters long horizontal unstratified line spanning the entire experience of pain, starting with zero which denotes 'no pain' and ending with ten which denotes 'unbearable pain'. The women indicated how they experienced the pain 'at its worst', 'at its mildest' and 'just now' by making a mark on the line. The distance from the start of the line to the mark was measured in millimeters as a measurement of pain experience. The first two questionnaires were completed at home and checked for completeness by the midwife at the antenatal care clinic at the next visit.

Every day classification of back/low back pain

Every day from gestational week 18 to labor the women assessed the intensity of back/low back pain by writing down a figure from '0' to '10' on a record. where '0' denoted 'no pain at all' and '10' 'unbearable pain'. Back problems classified as 'tiredness' or 'stiffness' were not recorded.

The water-gymnastics

The water-gymnastics group included ten classes of 12–15 women and took place in a swimming-pool with a water temperature of 32–34 degrees Celsius. The exercises were recommended by the Swedish Swimming Society (15–17) and tested for pregnant women by physiotherapists. The women were offered water-gymnastics 17–20 times (once a week during the second half of pregnancy). Each training session lasted one hour and included relaxing exercises. All the classes were led by one specially trained midwife. Another specially trained midwife replaced her during holidays or sickness. Two different exercise programs were used for all women; one with exercises suitable for earlier pregnancy to be used for the first ten training sessions, and one with exercises suitable for later pregnancy for the last ten sessions. The physical training lasted for 30 minutes followed by 30 minutes of relaxation, all in water and to music adjusted to the different exercises and to relaxation.

Table II. Urinary tract and gynecological infections during pregnancy

	In gestational weeks 19–34			From gestational week 35 to delivery		
Occurrence of infections	Water-gymnastics group	Control group	*p*-value	Water-gymnastics group	Control group	*p*-value
Urinary tract infection treated by antibiotics	*n*=124	*n*=122		*n*=123	*n*=118	
No	96.8%	96.7%		99.2%	96.6%	
Once	3.2%	3.3%	0.981	0.8%	3.4%	0.205
Vaginal Candida infection treated by medicine	*n*=124	*n*=122		*n*=124	*n*=117	
No	75.0%	80.3%		85.5%	90.6%	
Once	15.3%	12.3%		0.0%	0.0%	
≥2	9.7%	7.4%	0.700	14.5%	9.4%	0.601
Vaginal or cervical infection treated by antibiotics	*n*=124	*n*=121		*n*=123	*n*=119	
No	97.6%	100.0%		99.2%	99.2%	
Once	2.3%	0.0%	0.247	0.8%	0.8%	1.000

Table III. Maternal weight gain and pregnancy outcome

	Group	*N*	Mean	s.d.	*p*-value
Weight gain during pregnancy, (kg)	Water-gymnastics	123	13.9	4.9	
	Control	118	14.3	5.5	0.525
Pregnancy length, (days)	Water-gymnastics	121	277.3	11.0	
	Control	119	277.5	11.7	0.888
Weight of the neonate, (g)	Water-gymnastics	122	3618	457	
	Control	119	3635	601	0.806
Height of the neonate, (cm)	Water-gymnastics	122	51.1	2.1	
	Control	120	51.1	2.7	0.914

Table IV. The delivery

	Water-gymnastics group	Control group	*p*-value
Vaginal spontaneous	*n*=121	*n*=117	
	89.3%	84.6%	0.338
Cesarean section	*n*=124	*n*=120	
Elective	4.0%	3.3%	
Emergency	3.2%	4.2%	0.890
Vacuum extraction	*n*=122	*n*=115	
	4.9%	6.1%	0.780
Epidural analgesia	*n*=122	*n*=117	
	37.7%	29.9%	0.221
No analgesia used during labor	*n*=117	*n*=116	
	17.9	25.0	0.205

Statistical analyses

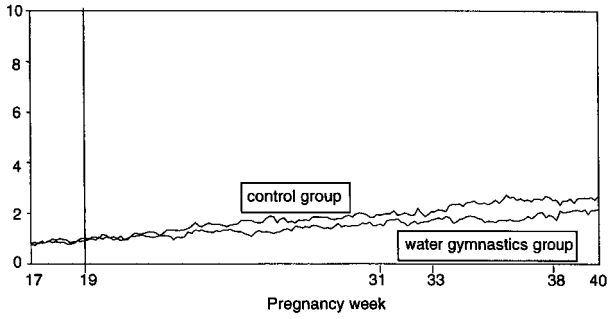
Assuming that we could find a reduction of 30% in intensity of pain (from 5 to 3.5 on the visual analog scare), a standard deviation of 3.5, and that 70% of women experience back/low back pain during pregnancy, 123 women were needed in each group (α=0.05, ß=0.80). Results were analyzed using the SPSS for Windows 7.5.1. Comparisons between the water-gymnastics group and the control group were carried out using *t*-test, Fisher's Exact Test and Chi-Square-test. To analyze the every day classifications of back/low back pain ANOVA with repeated measures was used. The results from every day and every individual were used but analyzed for one week at the time.

Results

Nine hundred and sixty-seven women registered at the six antenatal care clinics during the study period. Three hundred and twenty-nine women were invited to participate in the study. Sixty of these declined participation since they could not consider taking part in water-gymnastics. Six women could not participate because of recurrent urinary tract infection, shift work, baby-sitting problems, a miscarriage and lack of time and five women were incorrectly invited after recruitment to the study had stopped. Of the remaining 258 women, 129 were randomized to water-gymnastics and 129 to the control group. In the water-gymnastics group, 124 women answered all questionnaires and 123 filled in the everyday classification of back/low back pain. Five women did not participate in the water-gymnastics and did not fill in the questionnaires nor the everyday classification. The reasons were baby-sitting problems, a miscarriage, sickness and that the time for the water-gymnastics was unsuitable. In the control group, 120 women filled in all questionnaires and 118 filled in the everyday classification of back/low back pain. Two women in the control group dropped out because of a miscarriage and an intra-uterine death. The remaining drop-outs gave no reason why.

The mean age was 28 years in the water-gymnastics group and 29 years in the control group. There were no differences between the two groups regarding parity, previous back pain, smoking (Table I), history of sick-leave due to back/low back pain or other reasons, educational level, comfort with work, physical characteristics of work or exercise habits. No excess risk for the pregnancy associated with water-gymnastics was observed. There were no differences concerning gynecological and urinary tract infections (Table II), nor concerning maternal weight gain, gestational week at delivery or weight and height of the neonate (Table III). No differences were found concerning spontaneous or induced delivery, mode of delivery, analgesic methods used during labor or number of days in the Neonatal Care Unit (Table IV). Eighty-six women (70.5%) in the water-gymnastics group compared with 89 (74%) in the control group experienced some kind of back/low back pain at some period during pregnancy (p=0.57). According to the everyday classification of pain intensity, there was no difference in pain intensity between the two groups in week 18, i.e. before the start of the water-gymnastics. During the rest of the pregnancy the women participating in water-gymnastics reported a lower intensity of back/low back pain. During the 31st and between the 33rd and the 38th weeks the difference between the two groups was significant. The pain increased during pregnancy in both groups (Fig. 1).

In addition, when recorded on the VA-scales in the questionnaires, the women participating in water-gymnastics experienced less back/low back



* Back/low back pain intensity assessed every day between pregnancy 18 to labor by writing down a figure from '0' to '10' on a record. '0' denoted 'no pain at all' and '10' 'unbearable pain'. The figure shows the average experience of pain. The water-gymnastics started at week 19.

Fig. 1. Everyday classification of back/low back pain*.

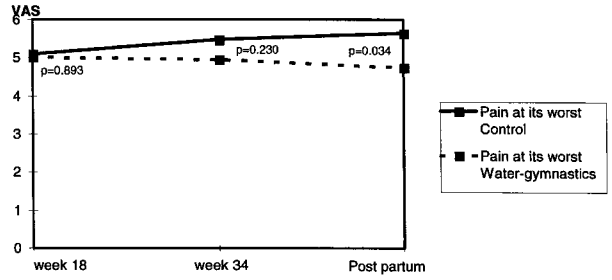


Fig. 2. Pain at its worst, recorded on a visual analog scale by questionnaires in gestational weeks 18, 34 and within the first postpartum week.

pain than the control group. When the pain was 'at its worst' there was no difference between the groups in week 18, but a significant difference was recorded within the first postpartum week ($p=0.034$) (Fig. 2).

In the water-gymnastics group, 16 women (12.9%) were on sick-leave because of back/low back pain at some period during pregnancy, compared with 26 (21.7%) in the control group ($p=0.09$). The total amount of days being on sick-leave because of back/low back pain was 982 in the water-gymnastics group (124 women) compared with 1484 days in the control group (120 women). Because of physically heavy work, 43 women (35.0%) in the water-gymnastics group and 46 (38.7%) in the control group were entitled to pregnancy leave from week 32 or 33. In the water-gymnastics group it was given to nine of the 16 women who earlier in pregnancy had been on sick-leave because of back/low back pain. In the control group, the corresponding figures were nine of 26 women. Thus, seven women in the water-gymnastics group and 17 in the control group were on sick-leave because of back/low back pain after week 32–33. This difference is significant ($p=0.031$).

In the water-gymnastics group, 110 women (88.0%) exercised 10–20 times. Sixty-nine (55.2%) exercised 15–20 times and 41 (32.8%) 10–15 times. When women who had exercised at least 15 times were compared with women who had exercised 10–15 times, no significant difference was observed regarding days of sick-leave.

Ninety-eight percent of the women in the water-gymnastics group said they wanted to participate in water-gymnastics in their next pregnancy and recommended water-gymnastics to other pregnant women.

Discussion

This is the first study with an every day classification of back/low back pain during pregnancy. It showed no difference in pain intensity between the women in the two groups at the beginning of the study in week 18. During the rest of the pregnancy the women in the water-gymnastics group assessed a lower intensity of back/low back pain. The difference was significant during the 31st and between the 33rd and the 38th weeks of gestation (Fig. 1). The every-day classification also showed that the intensity of back/low back pain increased with advancing pregnancy (Fig. 1). This is in agreement with the results of Kristiansson et al. (7), based on three measurements during pregnancy.

The results of our study are similar to the results of other studies regarding frequency of back pain during pregnancy: 70–74% of Swedish women experience some kind of back pain at some period of their pregnancy (6, 7).

Among Swedish women who gave birth in 1992, approximately 7.2% were on sick-leave because of problems with their backs (10). Eighty percent were diagnosed as 'non-specified back pain', other diagnoses were ischiadic pains and lumbago (10). The reason for sick-leave is probably not always a strictly medical diagnosis, but back pain is also used when there is an unspecified need for sick-leave in pregnancy (6). Since 1992, employers in Sweden are obliged to pay for the first 14 days of sick-leave. This has been supposed to give an underrecording of the sick-leaves and, if so, more than 7.2% of the women who gave birth in 1992 had been on sick-leave because of back pain at some period during their pregnancy (10).

In this study, 12.9% in the water-gymnastics group were on sick-leave because of back/low back pain at some period during pregnancy compared with 21.7% in the control group. In the study of Östgaard and Andersson (6), 21% of all pregnant women were on sick-leave because of back pain. If all the sick-leaves because of back pain during pregnancy had been just one day shorter in 1992 it would have decreased the costs for society by between 2.6 to 3.7 million SEK (10). Regarding the fact that sick-leave also means losses in production, the costs are even greater for the nation. The costs for water-gymnastics used in this study can be estimated to 1000 SEK per pregnant woman.

A pregnant Swedish woman gets, on average, 290 SEK per day while on sick-leave. If the number of days on sick-leave were to decrease by 4.5 days (1484 days/120 women 982 days/124 women), 1300 SEK would be saved per women participating in water-gymnastics during pregnancy. If the difference concerning days of sick-leave between the women in the water-gymnastics group compared with the women in the control group is correct or close to correct there will be a positive cost benefit for the method.

The significant difference in number of women on sick-leave was found when women given maternity-allowance were excluded. Despite that, we prefer to count the hypothetical example on the results of the entire group.

There is no doubt that water-gymnastics was greatly appreciated by the women, as also reported by women in other studies (11–14). In Sweden, many pregnant women are offered traditional 'Maternity care gymnastics'. We have not found any study evaluating that activity, but it is offered to pregnant women by some antenatal care clinics. Exercise during immersion offers several physiologic advantages during pregnancy (18).

The results of this study did not show any excess risk for the pregnancy associated with water-gymnastics and the women in the two groups required analgesic methods during labor to the same extent. Their experiences of labor pain were the same. The women in the water-gymnastics group reported that the experience of relaxing exercises was useful during labor. In conclusion, we found that the intensity of back/low back pain increased with advancing pregnancy. There was no excess risk for urinary and vaginal infections associated with water-gymnastics. Water-gymnastics during the second half of pregnancy significantly reduced the intensity of back/back low pain. Water-gymnastics decreased the number of women on sickleave because of back/low back pain. Water-gymnastics during pregnancy can be recommended as a method to relieve back pain and may reduce the need for sick-leave.

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