International Journal of Gynecology and Obstetrics 113 (2011) 187–191

Contents lists available at ScienceDirect

International Journal of Gynecology and Obstetrics

journal homepage: www.elsevier.com/locate/ijgo

CLINICAL ARTICLE

Specific exercises to treat pregnancy-related low back pain in a South African population

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ARTICLE INFO

Article history:
Received 8 June 2010
Received in revised form 27 October 2010
Accepted 22 February 2011

Keywords:
Back pain
Exercise
Pregnancy

ABSTRACT

Objective: To investigate the effect of an exercise program, including specific stabilizing exercises, on pain intensity and functional ability in women with pregnancy-related low back pain. *Methods:* Fifty women between 16 and 24 weeks of pregnancy were recruited at Tygerberg and Paarl Hospitals, Western Cape, South Africa. Twenty-six women were randomized to a 10-week exercise program and 24 were randomized as controls. *Results:* Overall, the most frequent type of back pain experienced was lumbar pain (36 [72.0%]). Pain intensity ($P=0.76$) and functional ability ($P=0.29$) were comparable between the groups on study entry. In the study group, there was a significant improvement in pain intensity ($P<0.01$) and an improvement in functional ability ($P=0.06$) at the end of the study. In the control group, there were no significant changes in pain intensity ($P=0.89$) or functional ability ($P=0.70$) at the end of the study. *Conclusion:* A specific exercise program decreased back pain intensity and increased functional ability during pregnancy in South African women with lumbar and pelvic girdle pain.

1. Introduction

Low back pain is common during pregnancy, with incidence and point prevalence ranging from 4% to 76% [1]. Reasons for this include varying definitions and study methodologies [1]. Van Dongen et al. [2] observed that 38% of pregnant South African women had subjective complaints of low back pain [2]. Pregnancy-related low back pain often begins before the end of the first trimester and tends to increase as the pregnancy advances [3]. Although it usually resolves 1–3 months after delivery [4], it may persist in 10%–16% of women [5,6]. In approximately one-third of pregnant women, back pain can be severe enough to compromise everyday life, and it is the most common cause of sick leave in Scandinavia [3,7].

Pregnancy-related low back pain occurs between the twelfth rib and the gluteal fold [1]; it can be classified as lumbar pain (LP), pelvic girdle pain (PGP), or combined LP and PGP [4,8]. Pelvic girdle pain is "experienced between the posterior iliac crest and the gluteal fold" [1], especially in the area of the sacroiliac joints, and may radiate to the posterior thigh—usually becoming more prominent as pregnancy progresses [3,9]. Pain may be due to changes in ligament laxity and posture; the former is assumed to be caused by the hormone relaxin, and Kristiansson et al. [10] reported a correlation between relaxin levels and pregnancy-related back pain. Lax ligaments within the sacroiliac joints lead to decreased stability of the pelvic girdle, and during pregnancy the center of gravity changes because of the growing uterus. This causes a postural change involving an increase in pelvic tilt, shortening of the paraspinal muscles, and overstretching of the abdominal muscles—resulting in lumbar lordosis [11]. Such changes, together with low muscle endurance, compromise the strength and stability of the low back and pelvis [8].

Treatment programs comprising stabilizing exercises significantly decrease pain intensity and increase the quality of life of women with pregnancy-related low back pain, both during pregnancy [12] and postpartum [13]. These exercises strengthen the paraspinal and abdominal muscles controlling lumbopelvic stability. Contraction of the transversus abdominis muscle leads to stabilization of the lumbar spine and significantly reduces laxity of the sacroiliac joints, thereby facilitating the rehabilitation of non-pregnant patients experiencing low back pain [13,14]. A Cochrane systematic review [15] on interventions for treating pelvic and back pain during pregnancy showed a positive effect of exercise, although the authors advised caution because of poor methodologic quality resulting in the potential for bias; furthermore, they could not perform a meta-analysis owing to the heterogeneity of interventions and study methods.

Thus far, no intervention studies have been published from South Africa. The aim of the present study was to determine whether a specific exercise program could improve pregnancy-related LP and PGP.

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0020-7292/$ – see front matter
doi:10.1016/j.ijgo.2010.10.030

2. Materials and methods

The present study was an unblinded randomized controlled trial conducted at Tygerberg Hospital (secondary and tertiary referral institution) and Paarl Hospital (primary and secondary referral institution), Western Cape, South Africa, between June 22, 2007, and December 18, 2008. The study population was drawn from women attending prenatal clinics at the study hospitals who experienced low back pain that had started in the index pregnancy. The inclusion criteria were maternal age between 20 and 40 years, any parity, gestational age between 16 and 24 weeks, low back pain experienced anywhere from T12 to the gluteal fold—with or without radiation to the knee—that started during the current pregnancy, and any degree of pain. Exclusion criteria were known chronic orthopedic or rheumatologic disorders, intervertebral disc pathology or radiculopathy, chronic back pain for more than 3 months, referred pain below the knee, and any uncontrolled medical or obstetric condition for which aerobic exercise would be contraindicated according to the Royal College of Obstetricians and Gynaecologists (RCOG) guidelines for exercise during pregnancy [16]. Informed consent was obtained from all participants. The study protocol was approved by the Committee for Human Research at the University of Stellenbosch, Cape Town, South Africa.

A physical examination was performed to confirm that there was no significant comorbid disease, disc pathology, or radiculopathy. The examination included inspection of the spine for kyphosis, lordosis, scoliosis, and deformities. The spine, hip, and knees were evaluated through a range of active and passive movements. Power, sensation, and reflexes of the lower limbs were assessed, and a passive straight-leg raise test was performed. The sacroiliac joints and erector spinae muscles were examined, and pain elicited by palpation and the posterior pelvic pain provocation (P4) test was documented [4,7]. The entrance questionnaire completed by each participant contained items regarding details of demographics, daily activity, and pain [11]. Pain was categorized as LP, PGP, or a combination of both—according to participants' markings on a body diagram. Pain intensity was measured using a 6-item questionnaire, with each item scored using a 0–10 numerical rating scale (maximum possible score of 60) [17]. Functional ability was measured using the Likert-modified Roland–Morris Disability Questionnaire [18,19]. These data were recorded prior to randomization to the study and control groups, which was carried out using computer-generated random numbers in balanced blocks of 20; the allocations were provided in sealed, numbered, opaque envelopes. A power calculation was performed before commencement. Assuming a 30% decrease in back pain in the study group, with an α value of 95% and a β value of 80%, it was calculated that 38 participants in each group would be needed to achieve significance.

In addition to verbal information on basic back care and posture during pregnancy, all participants were given an information pamphlet covering the topic [20,21], which included advice on correct posture while sitting and standing, lifting and carrying heavy objects, use of support pillows (especially while sleeping), and methods to turn around in bed or to get up from bed without exerting excessive strain on the lower back. Women in the study group were also given a handout illustrating and explaining the exercise program [13,21]. After the first formal exercise class, a training diary was provided in the study group for recording the goal of daily exercise at home. Formal follow-up classes were held every second week for 10 weeks. The exercise classes were led by a biokineticist (with experience in instruction of exercises among pregnant women) and the principal investigator, with classes lasting from 30 to 45 minutes. The number of participants in each class ranged from 1 to 3. The principal investigator telephoned the women in the study group in advance to remind them about their next exercise class, in addition to phoning to reschedule missed classes and to encourage daily exercise at home. The active program comprised exercises that have been shown to improve low back and pelvic pain in both pregnant and non-pregnant women [13,15,22]. The 10-week intervention was divided into 3 stages to enable the difficulty of the exercises to increase progressively. Stages 1 and 2 were 4 weeks each, and stage 3 lasted 2 weeks. Exercise sessions began with stretches, followed by exercises focused on the transverse abdominal and pelvic floor muscles. The goal of stage 1 was to train the correct isolation and isometric contraction of the transversus abdominis and the pelvic floor. Stages 2 and 3 involved co-contraction of various other muscle groups (e.g. the gluteus, hip abductors, and quadriceps), in addition to contraction of the transversus abdominis and the pelvic floor. Sessions ended with stretching, relaxation, and breathing techniques. Women in the control group were not given specific instructions regarding whether they should perform any exercise. A self-administered exit questionnaire was completed by both groups after 10 weeks.

The primary outcomes were pain intensity and functional ability. Secondary analysis included maternal (labor and delivery) and fetal (birth weight, Apgar score, and perinatal loss) outcome. Data were analyzed, on an intention-to-treat basis, using SPSS version 16 (SPSS, Chicago, IL, USA). Categoric data were analyzed using the χ^2 test. For expected cell values less than 5, the Fischer exact test was used. For continuous data, *t* tests were used for parametric data, and the Mann–Whitney U test was used for non-parametric data. $P<0.05$ was considered to be statistically significant.

3. Results

Fifty women were recruited to the study and randomized to 1 of the 2 groups: 26 in the study group and 24 in the control group (Fig. 1). The baseline characteristics of the participants and their pregnancy-related back pain are shown in Table 1. There were significant differences in median age and parity between the study group and the control group: 27 versus 29 years ($P=0.04$) and 1 versus 2 ($P=0.01$), respectively. There were no significant differences between the groups in terms of the other baseline characteristics.

The mean body mass index (BMI, calculated as weight in kilograms divided by the square of height in meters) of participants was increased in both groups: 26.3 in the study group and 30.4 in the control group ($P=0.34$).

Although all participants had pregnancy-related low back pain, only 12 women in the study group and 11 in the control group could recall the gestational age at which it began in the index pregnancy: 3.2 and 3.3 months, respectively ($P=0.81$).

All of the women who exercised before entering the study were walkers (except for 1 woman in the study group who performed aerobics), with participants in both groups doing so for a median of 30 minutes per session, 7 days per week.

Fifteen (57.7%) women in the study group and 14 (58.3%) in the control group experienced pain intermittently every day, mostly in the standing and sitting positions—with bed rest providing relief for 18 (69.2%) women in the study group and 16 (66.7%) in the control group. The subtype of low back pain indicated on the body diagram (Fig. 2) in relation to positive objective tests at study entry is shown in Table 2. Except for pain elicited on palpation of the erector spinae muscles, the positive yielding of pain on sacroiliac joint palpation and the P4 test was low for all subtypes of low back pain.

In the study group, 1 woman withdrew from the study and another had a spontaneous abortion before starting the exercise program. Therefore, 2 exit questionnaires were not obtained from this group. One woman ceased exercising after 8 weeks because of a preterm delivery, and 1 woman stopped after 9 weeks owing to a diagnosis of placenta previa, although both completed exit questionnaires. In the control group, 1 woman was lost to follow-up 9 weeks into the study, whereas another had a preterm delivery after 5 weeks and was transferred quickly after delivery. In both cases, exit questionnaires were not completed. Of the 46 women who completed the exit questionnaire, 38 (82.6%) indicated the site of their pain on the body diagram. Seven