



## Back pain of working pregnant women: Identification of associated occupational factors

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### ABSTRACT

The objective of this study was to identify major occupational factors that were significantly correlated with back pain in pregnant women working in higher education, health care and service areas. A total of 73 working pregnant women were surveyed using questionnaires specifically designed for evaluating correlations between occupational factors and severity of back pain; 37 women were interviewed at both 20 and 34 weeks of pregnancy, 17 at 20 weeks only, and 19 were interviewed at 34 weeks only. "Rest breaks allowed" and "job autonomy" were negatively correlated with severity of back pain at 20 weeks of pregnancy. "Staying in a confined area" and "having restricted space" were positively correlated with severity of back pain at 34 weeks of pregnancy. The study suggests that allowing pregnant women to take more rest breaks and to have more job autonomy may reduce the severity of back pain during early pregnancy, and that allowing movement outside the working area and providing less restricted space may reduce back pain during late pregnancy.

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### 1. Introduction

Back pain during pregnancy is a common problem affecting about 50% of pregnant women and is sometimes severe enough to limit their ability to work (Ostgaard et al., 1991; Berg et al., 1988; Rungee, 1993; Turcotte, 1992). Several biological, social, biomechanical, and occupational factors have been found to contribute to the problem, including social, physiological and body-shape changes that occur during pregnancy (Orvieto et al., 1994; Levangie, 1999; Paul et al., 1994; MacEvilly and Buggy, 1996). Strenuous physical work (such as frequent lifting and sustained posture) and previous back pain were reported to be associated with increased risk of developing low back pain (LBP) during pregnancy (Rungee, 1993; Cherry, 1987; Heliovaara, 1989; Fung et al., 1993). In an epidemiological study, Endresen (1995) reported that the occupational factor with the greatest risk for pelvic pain and/or lower back

pain is twisting or bending several times an hour. These studies focused mainly on pregnant women in industry. However, a large number of women are now working in apparently less physically demanding jobs, such as those in education, health care and service areas (for example, clerical, administrative and counseling work). Studies of back pain during pregnancy and related occupational factors in these areas are scarce. Other factors may increase the risk of back pain in these occupations. Back pain has been related to sedentary occupations (Hartvigsen et al., 2000) including prolonged sitting and standing. For pregnant women, body changes may require change in posture to perform their job tasks. For example, they may have difficulty with reaching due to the size of the abdomen. The possibility to adjust the physical work environment as well as the work pace and order of tasks, or not, may be important factors in the incidence of back pain during pregnancy. Physical activity outside of work may also play a role in the incidence of back pain, and a survey on homework and leisure activities was also performed. This study was designed to investigate back pain in pregnant women working in higher education, health care and service areas and to identify occupational factors associated with lower back pain by means of a survey of pregnant women.

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## 2. Methods

### 2.1. Subjects

Working women at 20 and 34 weeks of pregnancy were recruited for participation in this study from Queen's University, two Kingston hospitals and in the local area (Kingston, Ontario, Canada). These two stages of pregnancy were chosen for the following reasons. At 34 weeks, most of pregnancy physical changes have occurred, and it was expected that most women would still be pregnant and working. However, at this stage, some women may have stopped working because of lack of accommodation for their pregnancy. Therefore it was felt necessary to also survey at an earlier stage. At 20 weeks, pregnancy is already visible and may start needing accommodation in some cases.

Recruitment was by advertisements in the local media and by flyers and posters placed on bulletin boards in the area. The inclusion criteria were that the subject be pregnant and currently working in a full-time or part-time job. Participants in the study were scheduled for interviews at 20 weeks and at 34 weeks of pregnancy with a research assistant using specially designed questionnaires. Subjects recruited later than 20 weeks were surveyed at 34 weeks only. Participants in the study signed an informed consent form (approved by the Ethics Committee of Queen's University, Kingston, Ontario, Canada) before their first interview.

### 2.2. Survey

The survey used three questionnaires: an initial survey, a job analysis questionnaire, and a task description questionnaire. This paper reports results from the first two questionnaires. Results from the task description questionnaire have been reported elsewhere (Cheng et al., 2006).

The initial survey collected information on demographics, history of back pain, and physical activities performed during both domestic work and leisure activities. Incidence of back pain was measured by three questions with yes/no responses: back pain before pregnancy, back pain during pregnancy, and back pain currently. The Oswestry disability questionnaire (Fairbank et al., 1980) was used in the initial survey to assess the severity of low back pain. It consists of 10 multiple choice questions that assess functional limitations in performing daily activities. It was modified to apply to the worst episode of back pain experienced up to this point in pregnancy. The question on physical activities for domestic work listed 12 tasks: cooking, shopping, washing dishes, cleaning, doing laundry, ironing, making beds, giving personal care to a child or handicapped adult, hobbies (sewing, knitting, crocheting, etc.), indoor household maintenance (painting, repairs, etc.), outdoor household maintenance (gardening, shoveling snow, etc.), and driving for errands. The subject was asked how many times she had performed each task per week, and how many minutes (on average) were spent on each task. Three ranges of average time (in minutes) were specified: 1–15, 16–30 and 31–60.

A similar question on physical activities for leisure listed 17 activities: walking for exercise, bicycling, swimming, jogging, exercising at home, ice skating, cross country skiing, tennis, golf, popular dance, baseball/softball, alpine skiing, ice hockey, bowling, exercise classes, racquetball, and curling. For each activity, the questionnaire asked the number of times it was performed per week, the average time for the activity per session, and the intensity of the activity. Four ranges for average time were given in this case: 1–15, 16–30, 31–60 and more than 60. Intensity was rated at three levels: light (slight change from normal state), medium (some perspiration, faster than normal breathing), and heavy (heavy perspiration, heavy breathing). For both domestic tasks and leisure

activities, the subjects were invited to add activities not mentioned in the questionnaire.

In the job analysis questionnaire, the subject was asked general questions about her job, such as job title, employer, hours of work per week, work shift, and any job changes. Two additional questions were analysed for this study. The first (Question 1.8) asked the subject to rate the degree of autonomy in her job on an ordinal scale of 1–7, where 1 meant “very little autonomy” and 7 meant “a great deal of autonomy”. Job autonomy was described as the extent to which the worker was allowed to decide how to perform the work. The second additional question (Question 1.10) contained nine statements describing various occupational factors (characteristics of the work) as either helpful or stressful as follows:

1. The job denies me any chance to use my personal initiative or judgment in carrying out the work.
2. The job restricts me to stay in a confined area.
3. Tasks must be completed in restricted space.
4. The job gives me considerable opportunity for independence and freedom in how to do the work.
5. The job allows me to take breaks to rest when I need to.
6. The job requires that I walk a lot to do my work.
7. The job requires that I spend a lot of time standing.
8. The job requires that I spend a lot of time sitting to do my work.
9. Help is available for physically demanding tasks.

The subject was asked to rate the accuracy of each statement on an ordinal scale from 1 to 7, where 1 meant “very inaccurate” and 7 meant “very accurate”. A follow-up question asked to rate the comfort of the chair which they sat on the most.

Readability and understanding of the questionnaires were pre-tested on 14 women in late pregnancy. Corrections and adjustments were then made to the questionnaires prior to data collection for the main study. Reproducibility and reliability of the corrected questionnaires were tested on 13 subjects interviewed twice, one week apart, at both 20 and 34 weeks of pregnancy. Pearson correlation coefficients and paired *t*-tests were used to test the repeatability of the questions yielding numerical responses. Kappa statistics were used for the questions with yes/no responses. More than 80% of the questions in the three questionnaires were found reliable for repeatability. Therefore, the questionnaires were not further modified.

### 2.3. Statistical methods

The data were entered into electronic templates of the questionnaires created using SPSS Form Builder. The Oswestry score was calculated as suggested by Fairbank et al. (1980) from the responses to the 10 questions in the Oswestry low back questionnaire. The calculated Oswestry score was represented by a continuous variable in the range 0.0–1.0 indicating degree of functional limitations due to the pain.

A computed variable “domestic activity” representing total time spent on physical activities for domestic work was calculated using all of the tasks listed in the question, according to the formula:

$$\text{Domestic activity} = \sum_i (\text{time per week})_i \times (\text{median minutes})_i,$$

where the index of summation *i* ranges over all 12 tasks (plus any others specified by the subject), (median minutes)<sub>*i*</sub> is the median of the interval chosen in response to the question on “average number of minutes at a time” for the *i*th task. For example, if the subject reported that she spent an average of 16–30 min on the fourth activity “laundry” (*i*=4), the median minutes for this activity would be 22.5. Similarly, a variable “leisure activity” was

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