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## ORIGINAL

### ANALYSIS OF OCCUPATIONAL TASKS IN PREGNANT BRAZILIAN WOMEN WITH LOW BACK PAIN

### ANÁLISIS DE LAS ACTIVIDADES OCUPACIONALES EN GESTANTES CON DOLOR LUMBAR DE BRASIL

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#### ABSTRACT

Pregnancy associated with some factors related to work environment may result in discomfort. **Objective:** To evaluate the gestational low back pain, the respective disability level and the relationship to the workplace environment.

**Materials and Methods:** 32 pregnant women were evaluated using three questionnaires. **Results:** 56.3% of them performed work on foot walking short distances. The mean of diary working hours was 7.31 and of the level of disability 35.68 (moderate disability). There was a positive correlation between: gestational age and intensity of discomfort; age and intensity of discomfort; Oswestry functional disability score and the physical effort expended in labor tasks. **Conclusion:** Low back pain is common and relevant aspect that interferes in the work tasks' performance.

**KEY WORDS:** Low back pain. Task Performance and Analysis. Pregnancy.

## RESUMEN

La gestación, cuando es asociada a factores del ambiente de trabajo, puede convertirse en dolores. **Objetivo:** evaluar el dolor lumbar gestacional, el respectivo nivel de incapacidad funcional y su relación con el ambiente de trabajo. **Materiales y Métodos:** fueron evaluadas 32 gestantes con tres cuestionarios. **Resultados:** 56,3% realizaban trabajo de pie con deambulaciones de corta distancia. El promedio de horas trabajadas por día fue 7,31 y del nivel de incapacidad funcional, 35,68 (incapacidad moderada). Se verificó correlación positiva entre: edad gestacional e intensidad del dolor; edad e intensidad del dolor; puntuación de incapacidad funcional de Oswestry y el esfuerzo para realización de las tareas laborales. **Conclusión:** El dolor lumbar es un factor presente y relevante en el desempeño del trabajo.

**PALABRAS CLAVE:** Dolor lumbar. Análisis y Desempeño de Tareas. Embarazo.

## INTRODUCTION

Pregnancy is a physiological condition unique to women, which is accompanied by profound musculoskeletal, physical and emotional changes. Lumbar lordosis can be increased in pregnant women who adopt a pattern of atypical posture, which often results in pain in this region <sup>(1)</sup>.

Even though low back pain is costly, it is considered a health problem relatively common – estimates show that approximately 70-85% of the entire world population will have low back pain at some point in their life <sup>(2,3)</sup>. A high incidence of this pathology has been reported specifically during pregnancy, and according to several authors, about 50-80% of pregnant women experience pain in the spine at some point during pregnancy, having been reported as the most common and debilitating musculoskeletal problem of pregnancy <sup>(2,4-7)</sup>. Moreover, according to Moura et al. <sup>(7)</sup>, the risk of pregnant women experiencing back pains is almost 14 times higher than in non-pregnant women.

Several factors contribute to the problem, such as the biological, social, biomechanical and professional, which are the most cited ones <sup>(6)</sup>. Weight gain, postural changes, ligament laxity, adaptable changes in the center of gravity, and vascular and hormonal changes are amongst the physical changes that take place during pregnancy that could explain such discomfort <sup>(5,6,8-10)</sup>. There is no consensus about the etiology of gestational low back pain. However, literature describes it as of multifactorial character <sup>(8,9,11,12)</sup>. It is also said to generate functional limitations, which can interfere in the performance of various activities <sup>(11)</sup>.

Based on ergonomic studies, inadequacies of workplaces represent the major causes of low back pain onset<sup>(13-15)</sup>. Stressful work is said to be related to the appearance of low back pain<sup>(8)</sup>.

According to the research carried out and published by the Brazilian Institute of Geography and Statistics<sup>(16)</sup>, in 2009, approximately 35.5% of the women in the labor market were formal registered workers, and an average of 10.6 million performed professional activities. This demonstrates the need to create, by employers and employees, adaptive strategies for the control of potential environmental and occupational risks, considering that these women need to stay in good health, safe and well in their jobs<sup>(17-20)</sup>.

This study was developed with the purpose of assessing and characterizing the level of functional disability and the low back pain in working pregnant women and its relationship with the working environment. These findings may provide clues to raise understanding about the different aspects involved in musculoskeletal injuries during pregnancy, which are often consequences of poor working conditions.

## **MATERIALS AND METHODS**

This research is characterized as a descriptive, cross-sectional research with a quali-quantitative approach. It was carried out between February and April 2010, and the sample was composed of 32 pregnant women who were undergoing pre-natal care at Health Centers in Florianópolis, Santa Catarina, Brazil, and whose main complaint was low back pain. The sampling method was non-probabilistic accidental, i.e. the sampling type in which samples are selected perchance. The criteria for selection were: age above 18 years old, low back pain, gestational age from the second trimester and to perform paid work. The criteria for elimination were: to perform night shift work, double working shift, twin pregnancy and high risk pregnancy.

Two instruments were used. The first one is called the Oswestry Disability Questionnaire, created by Fairbank and Pynsent<sup>(21)</sup> and validated for Portuguese language<sup>(22)</sup>. It aims at quantifying the degree of functional disability perceived by the patient in terms of low back pain. The disability can be defined as the functional limitation of a patient's performance<sup>(23)</sup>.

The Questionnaire is made of ten sections of questions about different daily life activities, such as pain, personal care, weight lifting, pace, sitting down, standing up, sleeping, sex life, social life and travelling. Each section presents six disability severity items which vary between zero (minimum disability) and five (maximum disability). The values of the items chosen in the questionnaire are added and multiplied by two when it is complete, so that the maximum score is one hundred, which allows the results to be presented in percentage. The scores were interpreted according to a scale: from 0 to 20%, minimum disability; from 21 to 40%, moderate disability; and from 41 to 60%, severe disability<sup>(21)</sup>.

The second questionnaire used is called Task Description Questionnaire (TDQ), created by Cheng et al. <sup>(20)</sup> and validated for Portuguese language <sup>(24)</sup>. This instrument identifies the risk factors present in the working environment and the physical changes of working pregnant women. The questionnaire has six questions (Q): Q1 and Q2 require that the subject describes their professional activities and the materials, machinery and equipment used to perform occupational tasks. Q3 is subdivided into a nominal scale (yes/no) with 22 sub-items in which subjects identify components related to posture (objects handling, movements of the torso); manual weight lifting (lifting, carrying, pulling and pushing); the posture required by the job (standing up, sitting down); the working pace; and other factors (environment and stress) related to the job. The subjects may also add items to the list, as long as they are involved in the job. Q4 is related to the difficulties found in tackling the tasks due to pregnancy, where subjects choose yes/no for each of the eight factors presented, afterwards rating them according to the level of difficulty. Q5 and Q6 investigate the effort intensity required to perform the tasks and the discomfort felt during pregnancy (presenting a picture of a pregnant woman in the anteroposterior position), respectively. The latter questions are followed by a 10-point likert scale, varying from 0 (null intensity) to 10 (maximum intensity).

Firstly, the participants were informed about how the study was going to be carried out and about its objectives, then signing the Statement of Acknowledgement and Consent of the Santa Catarina State Ethics Committee (n.30/2009), in accordance with the National Health Council resolution under number 169/1996. Afterwards, a registration form was completed with the purpose of gathering personal and professional information and gynecologic and obstetric conditions. Thus, the proposed instruments were applied: the Oswestry Disability Index and the Task Description Questionnaire (TDQ) to assess low back pain in working pregnant women and examine its relation to the occupational tasks.

The data gathered was processed on a microcomputer by means of the Statistical Package for the Social Sciences (SPSS) application software, version 17.0, and then presented in tables and graphs for a clearer understanding. The Shapiro-Wilk test was carried out to assess the data normality and the variables: age, number of risk factors for low back pain, low back pain intensity scale, perceived effort in tasks and the final score of the Oswestry questionnaire, where the normality criteria were followed. Thereby, descriptive statistics resources were used (average, standard deviation and simple and percentage frequencies) and the Pearson correlation and independent t test.

## RESULTS

A total of 32 pregnant women participated in the study, in which the age average was 30.06 years old (+5.62), varying between 21 and 42 years /old. The results obtained in terms of marital status, education, parity, job activity classified according to working posture and level of disability can be seen in table 1.

**Table 1.** Characterization of the variables marital status, education, parity, job activity and level of disability of the pregnant women

| <b>Variables</b>                    | <b>n</b>  | <b>%</b>   |
|-------------------------------------|-----------|------------|
| <b>Marital Status</b>               |           |            |
| Married                             | 20        | 62,5       |
| Single                              | 9         | 28,1       |
| Divorced                            | 3         | 9,4        |
| <b>Educational Level</b>            |           |            |
| Primary School                      | 4         | 12,6       |
| Incomplete High School              | 5         | 15,6       |
| High School                         | 21        | 65,6       |
| College Degree                      | 2         | 6,2        |
| <b>Parity</b>                       |           |            |
| Primiparous                         | 13        | 40,6       |
| Multiparous                         | 19        | 59,4       |
| <b>Occupational Task</b>            |           |            |
| Standing up and moving              | 18        | 56,3       |
| Sitting down                        | 12        | 37,4       |
| Standing up still                   | 2         | 6,3        |
| <b>Disability Levels – Oswestry</b> |           |            |
| Minimum Disability                  | 3         | 9,4        |
| Moderate Disability                 | 18        | 56,2       |
| Severe Disability                   | 11        | 34,4       |
| <b>TOTAL</b>                        | <b>32</b> | <b>100</b> |

In terms of gynecological and obstetric conditions, it was observed that most of the women were multiparous varying between 2 and 4 pregnancies. In terms of gestational age, in weeks completed, the average was 21.84 weeks (SD +- 5.58), where 24 (75%) were in the second trimester and 8 (25%), in the third and last trimester.

Aiming at classifying the participants' occupational tasks, their professions were divided into 3 categories as criteria in terms of the type of task performed: sitting down (administrative assistant, telemarketing operator, secretary, bus fare collector, manicure, accounting assistant, social worker), standing up still (clerk) and standing up and moving (cleaner, nursing technician, merchant, teacher, cleaning assistant, janitor and sales representative).

The pregnant women's average hours worked daily was 7.31 (SD +- 5.58), where the minimum value was 5 hours, and the maximum, 10 hours. In terms of the time period they have been on the job, the minimum value found was 7 months and the maximum, 14 years working on the same professional activity.

Their mean disability indexes in terms of low back pain, assessed by means of the Oswestry Disability Questionnaire, were 35.68, which corresponds to the moderate disability index.

The occupational tasks most cited by the pregnant women in the TDQ, among the 22 sub-items described in question 3, are included in table 2.

**Table 2.** Elements present in the pregnant women's activities

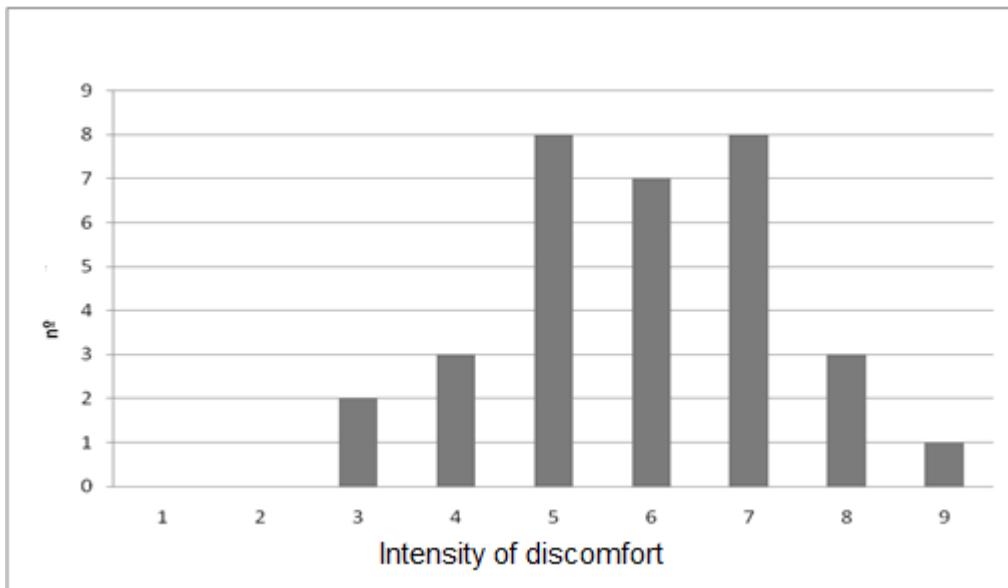
| <b>Occupational Task</b>                | <b>n*</b> | <b>%*</b> |
|---|-----------|-----------|
| Handling objects at stomach height      | 32        | 100       |
| Leaning and twisting the torso          | 28        | 87.5      |
| Lifting objects lighter than 5 kg       | 28        | 87.5      |
| Performing the same task repeatedly     | 26        | 81.25     |
| Carrying objects lighter than 5 kg      | 22        | 68.75     |
| Going up stairs                         | 21        | 65.62     |
| Standing up during long periods of time | 20        | 62.5      |

\*n = number of pregnant women who chose the item

% = percentage of the sample

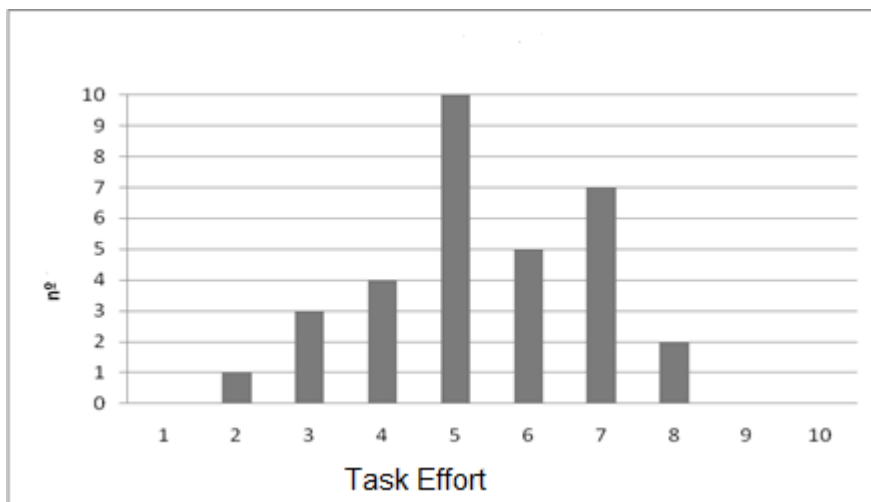
The intensity of discomfort assessed in question 6 of the TDQ is measured through a visual scale in which the pregnant woman was supposed to fill in the degree of pain presented at that moment, where 0 is a complete absence of pain and 10, the maximum level of pain tolerated. The average of discomfort presented was 5.91 (SD+- 1.46), i.e. a moderate intensity pain. The minimum degree of pain cited by them was 3, and the maximum, 9. The distribution of the discomfort intensity can be seen in graph 1, where it is related to the number of pregnant women who claimed it.

**Figure 1.** Distribution of the Intensity of Discomfort



In question 5 of the TDQ, the study participant was asked to classify the effort currently required to perform their occupational task, comparing it to the effort required before pregnancy. For such, they were asked to choose a number between 0 and 10, where 0 is no effort at all and 10, the maximum effort required. Results showed that the average of efforts was 5.38 (SD +- 1.51), i.e. the effort perceived by the pregnant women in carrying out the tasks was moderate. The minimum effort chosen was 2, and the maximum, 8, as can be seen in graph 2.

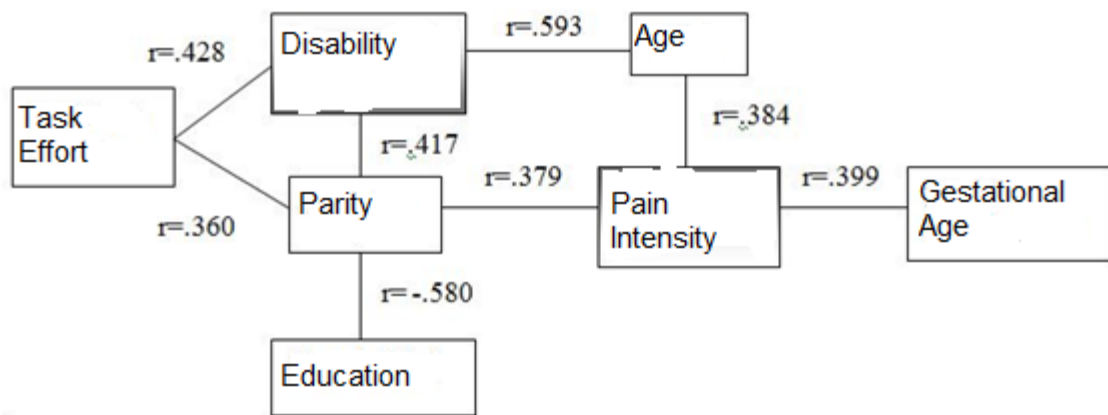
**Figure 2.** Distribution of the Task Effort



The Pearson correlation test determined the correlation between the Oswestry functional disability score and the variables (figure 3). Pregnant women with higher levels of functional disability also presented higher parity, were older and



reported greater effort to perform work activities. Similarly, pregnant women who claimed higher intensity of pain had higher parity, were older and were on a more advanced gestational age. It is also worth noting that there was a negative correlation between the educational level and parity.



**Figure 3.** Pearson correlation (r) between parity and the variables assessed in the study,  $p < .05$

The independent t test was carried out to compare primiparous and multiparous women in relation to their incapacity due to low back pain. A statistically significant difference was found between the two groups, where primiparous women presented a lower average score ( $\bar{X} = 30.62$  and  $DP \pm 10.14$ ) than the multiparous ( $\bar{X} = 39.16$ ,  $DP \pm 11.3$ ),  $t = -2.2$ ,  $p = .034$ .

## DISCUSSION

This study assessed and characterized the level of functional incapacity and low back pain in working pregnant women, as well as it identified the problems faced by them in their working environment, correlating these factors to the remaining gynecological and obstetric variables.

By applying the Oswestry Disability Questionnaire, it was possible to verify, from the results obtained, that pregnant women experience a moderate to severe index. According to the classification by Fairbank et al. <sup>(21)</sup>, the moderate disability index means that the subject experiences more pain in sitting down and standing up. Besides, travelling and even keeping a social life become difficult tasks. The subject may be unable to perform occupational tasks, while personal care, sexual activity and sleeping may not be affected. In the severe disability indexes, it is understood that the pain remains the main problem for this group, for whom daily life activities are affected <sup>(21)</sup>.

Several studies with pregnant women present contradictory results in terms of the level of disability proven. Dumas et al. <sup>(26)</sup> carried out a study with 32 pregnant women in different gestational weeks (14, 24, 29 and 34) and verified that a higher number of individuals presented minimum disability in the weeks above. When they were in the 19<sup>th</sup> and 34<sup>th</sup> weeks, the participants presented functional disability scores considered to be minimum and moderate, and few



pregnant women interviewed reported severe disability. However, the study carried out by Cheng et al. <sup>(20)</sup> with 73 pregnant women interviewed from their second trimester verified that the average scores obtained, as in this study, was of moderate intensity. This difference in results may be due to the cultural diversity, the characteristics and the nature of the work performed.

This study verified that the most evident elements in the professional activities of pregnant women were: "handling objects at stomach level", "leaning and twisting the torso", "lifting objects lighter than 5 kg", "performing the same task repeatedly", "carrying objects lighter than 5kg", "going up stairs" and "standing up during long periods of time". Cheng et al <sup>(20)</sup> assessed the difficulty in performing work in pregnant women working in education, health and services by means of the TDQ. The authors concluded that 60% of the 72 pregnant women interviewed had difficulty in carrying out at least one task within the working environment. "Reaching objects above the head level", "bending over", "twisting movements", "pushing" and "performing repetitive tasks" were amongst the most difficult tasks.

Other elements analyzed by the questionnaire, as "lifting objects heavier than 5 kg", "carrying objects heavier than 5 kg", "pushing objects", "pulling objects" and "intense workload" were hardly ever chosen, since a great portion of these women reported an adaptation and restriction of some professional activities that required a greater physical effort and caused discomfort. The importance of readaptation to occupational tasks is noted, since the biomechanical load can be reduced by ergonomic changes in the workplace and the possibility of the worker adapting to the physical environment. The workload and the speed demands for the accomplishment of tasks can be important factors for the incidence of back pain during pregnancy <sup>(6, 26)</sup>.

In dividing the professions according to the type of task performed, it was observed that a great portion of the pregnant women perform their work standing up and in movement (getting around) (56.3%), and 37.5% of them work exclusively sitting down. Both postures are related to low back pain and increase the risk of preterm delivery, besides possibly influencing uterine circulation and, consequently, the fetal development <sup>(28)</sup>. Frequent posture changes (standing up and then sitting down, or vice-versa) could reduce the effects of fatigue and the discomfort referred to by pregnant women, which are consequences of the relaxin action on soft tissues, as long as it is done for a working period of up to two hours <sup>(29)</sup>.

This study found that the average hours worked per day was 7.31 (SD  $\pm$  5.58). Mozurkewich et al. <sup>(30)</sup> have defined a long period of work as over 8 hours a day or 39 hours a week. However, other studies show that pregnant women who work sitting down for long periods of time or stand up for more than 4 to 6 hours a day present low back pain more often <sup>(14,31)</sup>, thus, the ones who work for more than 5 to 6 hours a day in the same position increase the possibility of giving birth to an underweight child <sup>(32,33)</sup>. Therefore, the health of pregnant women is closely related to their working conditions (posture, workload, hours worked) to which they are submitted, which indicates that these aspects must be monitored from the beginning of the gestational period <sup>(34)</sup>.

This study also found a correlation between gestational age and pain intensity. The pain tends to get worse as the pregnancy evolves, since the dislocation of the center of gravity is caused by the increase in abdominal volume and uterine growth during pregnancy, as the levels of pain and disability are proportionally increased by the gestational week<sup>(9,26)</sup>. This suggests that a little pain may follow hormonal changes rather than physical stress<sup>(35)</sup>.

A positive correlation was found between parity and the functional disability index and between parity and the intensity of discomfort. There was a statistically significant difference between the two groups (primiparous vs. multiparous), demonstrating that primiparous women present less disability caused by low back pain compared with multiparous women. According to Östgaard<sup>(3)</sup> the number of pregnancies would also be a risk factor for the appearance of gestational low back pain. Nevertheless, this does not mean that primiparous women are less susceptible to low back pain<sup>(12)</sup>. On the other hand, in a study by Bandpei et al.<sup>(2)</sup>, the correlation between multiparity and low back pain was not found high enough to be considered statistically significant. However, it is necessary to emphasize that the population studied was small, and that cultural aspects may have affected these results.

This study verified a positive correlation between age and the intensity of discomfort. The literature shows conflicting results in terms of the relation between age, parity and intensity of discomfort<sup>5</sup>. Some works show that, the younger the women are, the higher the chances of low back pain appearance, while others observe a higher incidence of low back pain as women age<sup>(6,12,36)</sup>.

It was verified that the level of functional disability had a positive correlation with the effort perceived in the performance of occupational tasks. Recent research point out that low back pain, as the effort required to perform tasks, has an enormous impact on women's functions and well-being<sup>(12)</sup>.

The negative correlation between the educational level and parity shows the reality of a developing country, where socioeconomic inequity still influences family planning and the health conditions of pregnant women. In the Brazilian context, women who want to get pregnant must find adequate working conditions in order to reconcile their good health with well-being at work. On the other hand, it is verifiable that regulatory standards (NR17) should foresee such risks, which would minimize and prevent functional disabilities within the population of pregnant women<sup>(37)</sup>.

## CONCLUSION

Low back pain was present and generated moderate to severe disability, which interferes in occupational activities and task performance.

It is recommended that other studies be carried out at the workplace of pregnant women in order to understand the adaptive strategies developed by them to maintain occupational health. Another limitation of this study was that it

did not control the postures and habits maintained in domestic activities, routine exercise activities nor the footwear worn by the women.

The data confirms the fragility of labor regulatory standards in Brazil, which does not provide adaptations or adjustments to the pregnant women's working environment.

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