TRUNK POSTURAL DEMANDS OF OCCUPATIONAL ACTIVITIES OF MERCHANT PREGNANT WOMEN IN BENIN, WEST AFRICA

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SUMMARY
Strenuous physical work puts expectant mothers at risk of experiencing back pain during the gestational months. Pregnant women in Benin perform physically demanding occupational tasks that include the carriage of heavy loads on their heads for commercial activities. In this study of 26 pregnant and 25 non-pregnant merchants, a large percentage of pregnant participants (58%) suffered from back pain since the start of their pregnancy. Furthermore, trunk posture was monitored with an inclinometer for 17 pregnant participants during an average of 7.9 ± 2 hours. The evaluation of the postural demands of the occupational activities of these participants revealed that they performed on average 328 trunk flexions at angles exceeding 60° per day, with 66 of these flexions sustained for more than four seconds. These results show that pregnant women are at great risk for developing back disorders during pregnancy.

INTRODUCTION
Women in West Africa participate in laborious daily occupational activities. These daily duties include a variety of tasks ranging from farm work and carrying heavy loads on their heads for commercial purposes to chores around the house such as doing laundry, washing dishes, and sweeping the floor. Such strenuous physical work, including frequent lifting and sustained postures, has been shown to be associated with an increased risk of developing low back pain during pregnancy [1].

The objectives of this study were to 1) identify the principal daily occupational tasks of a sample group of pregnant merchant women in Porto-Novo, Benin; 2) measure their trunk postures during those activities; 3) gain descriptive knowledge on the specific task of head load carriage; 4) describe bodily pain associated with this specific task.

METHODS
Twenty-six pregnant women (age 26 ± 5 years, mass 63 ± 15 kg, height 159 ± 6 cm, 25 ± 9 weeks of pregnancy) and a control group of 25 non-pregnant women (age 26 ±7 years, mass 57 ±11 kg, height 159 ± 6 cm) completed three questionnaires. The first questionnaire was designed to obtain information about the demographics and daily occupational tasks of our subject population. The second questionnaire was a modified version of the Oswestry 2.0 questionnaire where the original questions were adapted to the lifestyles of women in West Africa in order to compute the Oswestry disability index (ODI) as suggested by Fairbank and Pynsent [2]. The third questionnaire was a pain drawing [3] to identify the body parts where pain was experienced during the specific task of head load carriage. All participants were merchants.

Trunk postural data during a typical day for women in Benin were collected on 17 pregnant subjects (age 26 ± 5 years) using a Virtual Corset (MicroStrain, Williston, VT, USA). This device is an inclinometer capable of monitoring trunk angles with respect to the vertical in two directions. Participants were instrumented with a Virtual Corset (VC) at the level of C7 at the start of the day to obtain the angles of the trunk in flexion-extension and lateral bending (Figure 1). The percentage of time spent in the trunk flexion angle ranges of 0° to 20°, 20° to 60°, and larger than 60° was calculated, as outlined by the rapid upper body assessment (RULA) [4]. The number of trunk flexion occurrences in excess of 60° throughout the day was also determined counting each bending motion.

RESULTS AND DISCUSSION
Six of the ten daily occupational activities reported as most frequent in the first questionnaire were tasks that required highly flexed stoop trunk postures and sustained trunk postures, namely cooking, doing dishes, cleaning in and around the house, making beds, and doing laundry. The four remaining activities involved carrying of heavy loads or

Figure 1: Pregnant woman instrumented with a Virtual Corset at the level of C7.
strenuous physical effort, and were: going to the market, grinding condiments, going to get water, and going to get wood. The same tasks were reported by the two groups with similar frequency and duration. The two groups reported carrying heavy loads on the head; 19% pregnant and 24% non-pregnant participants carried loads of more than 20 kg.

Fifty-eight percent (58%) of pregnant women reported experiencing back pain since the start of their pregnancy with a mean ODI of 0.20 ± 0.12. Only 36% of non-pregnant women reported back pain, with a similar ODI of 0.19 ± 0.11. The body areas most frequently reported as painful during head load carriage were the pelvis, neck and shoulders, and upper back. A larger percentage of expectant women reported pain in the pelvic region which is probably due to the increased joint laxity and strain on ligaments and muscles in this region as a result of the weight of the foetus.

The percentages of the data collection duration spent in the ranges chosen for this study are shown in Table 1. Sagittal trunk inclinations exceeding 20° are regarded as critical in the risk of developing musculoskeletal injuries by several postural assessment tools [4]. Six of the top ten daily occupational activities reported in this study required trunk postures well in excess of 20°, thus increasing the demand on the back muscles [5]. In fact, the lower back extensor muscles must work harder during trunk flexion to counteract the increased mechanical moment created by the weight of the upper body and foetus, thus resulting in high compressive forces on the spinal motion segments [5].

**CONCLUSIONS**

The results obtained in this study showed that pregnant women in Benin are at risk of experiencing back pain during gestational months due to the physical nature of their daily occupational activities. In fact, their daily occupational tasks require unsupported trunk postures outside the recommended range of 0°-20° for prolonged periods of time. Furthermore, repetitive movement is another risk factor for women in Benin as it was shown that their daily activities require a large number of trunk flexions. It is then recommended that these women avoid spending long periods of time in highly flexed postures during occupational tasks.

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**REFERENCES**