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Analysis of postural changes on lumbar spine of pregnant women

Análise da alteração postural na coluna lombar das gestantes

Análisis de la alteración postural en la columna lumbar de las gestantes

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Max dos Santos Afonso[1]
Caroline Henriques Graciano[2]
Karine Fernandes Ávila[3]
Marla dos Santos Afonso[4]
Abelardo Soares de Oliveira Júnior[5]
Fernanda Burlani Neves[6]

This study aimed to analyze the postural change in lumbar spine of pregnant women through photogrammetry in the three trimesters of pregnancy and check the frequency of low back pain. This is a quantitative study, consisting of 21 pregnant women, carried out from September to November 2012, using questionnaires on the profile of the population, the Nordic Musculoskeletal Questionnaire and the International Physical Activity Questionnaire. Palpation and location of anatomical points were made for placing markers. After that, pregnant women were subjected to the photographic record and the angles analyzed using the Postural Assessment Software. A high index of pain in the lumbar region of pregnant women was found for a total of 72%, with all showing an increase in lumbar lordosis. Significant postural changes among the three trimesters of pregnancy were verified and the presence of low back pain was reported by the majority of pregnant women.
Descriptors: Pregnant Women; Low back pain; Exercise; Photogrammetry.

O presente trabalho teve como objetivo analisar a alteração postural na coluna lombar de gestantes por meio da biofotogrametria nos três trimestres gestacionais e verificar a frequência de lombalgia. Trata-se de um estudo quantitativo composto por 21 gestantes, realizado entre setembro a novembro de 2012, através dos questionários sobre o perfil da população, nórdico de sintomas osteomusculares e o internacional de atividade física. Foi feita palpação e localização dos pontos anatômicos para colocação de marcadores, após as gestantes foram submetidas ao registro fotográfico e os ângulos analisados através do Software de Avaliação Postural. Foi encontrado alto índice de dor na região lombar das gestantes, em um total de 72%, sendo que todas apresentaram aumento na lordose lombar. Foram verificadas alterações posturais significativas entre os três trimestres gestacionais e a presença de algia lombar foi referida pela maioria das gestantes.
Descritores: Gestantes; Dor lombar; Exercício; Fotogrametria.

El presente trabajo lleva como objetivo analizar la alteración postural en la columna lumbar de gestantes a través de la biofotogrametría en los tres bimestres gestacionales y verificar la frecuencia de lumbalgia. Se trata de un estudio cuantitativo compuesto por 21 gestantes, realizado entre septiembre hasta noviembre de 2012, a través de encuesta acerca del perfil de la población, nórdico de síntomas osteomusculares y el internacional de actividad física. Fue hecha palpación y ubicación de los puntos anatómicos para ponerse marcadores, tras eso, las embarazadas fueron sometidas al registro fotográfico y los ángulos analizados a través del Software de Evaluación Postural. Fue encontrado alto índice de dolor en la región lumbar de las gestantes, en un total del 72%, siendo que todas presentaron aumento de lordosis lumbar. Fueron verificadas alteraciones posturales significativas entre los tres trimestres gestacionales y la presencia de algia lumbar fue referida por la mayoría de las embarazadas.
Descriptores: Mujeres embarazadas; Dolor de la región lumbar; Ejercicio; Fotogrametría.

1. Physical therapist. Specialist in Sports Physiotherapy. Master's degree in Nursing from the Federal University of Rio Grande (FURG). Physiotherapy Course at Anhanguera School of Pelotas, RS, Brazil. ORCID: 0000-0001-9989-9535 E-mail: max.afonso@hotmail.com
2. Physiotherapist. ORCID: 0000-0002-5558-0968 E-mail: carolhgraciano@yahoo.com.br
3. Physiotherapist. Specialist in Hospital Physiotherapy. ORCID: 0000-0002-7772-1434 E-mail: kaka.fa@hotmail.com
4. Psychologist. Master's Degree in Nursing from FURG, Porto Alegre, RS, Brazil. ORCID: 0000-0002-7014-5999 E-mail: marla_afonso@hotmail.com
5. Physiotherapist. Public Health. Specialist in Children's Cancer Care. Master student in Respiratory Sciences, Federal University of Rio Grande do Sul, Porto Alegre, RS, Brazil. ORCID: 0000-0003-4682-688X Email: junior_osoares@hotmail.com
6. Physiotherapist. Master in Health Sciences. PhD in Health and Behavior. Professor Physiotherapy Course at Anhanguera School of Pelotas, RS, Brazil. ORCID: 0000-0003-0468-4676 E-mail: fernanda.burlani@aedu.com

INTRODUCTION

Pregnancy is a period in which the woman undergoes several changes involving the various systems and devices. This woman is going through a period of biological and psychological transformation and these effects vary from one pregnant woman to another, besides the gestational age[1].

Women were discouraged from physical exercise during pregnancy and should be in sedentary rest, since the physical efforts were seen as harmful to the fetus[2].

Physiological changes are necessary to adapt the woman to this new condition. These transformations involve hemodynamic, hormonal and biomechanical adaptations, for example, lift objects, coughing, rapid movements of the trunk, produce forces that challenge the postural control and that may cause musculoskeletal disorders such as low back pain[3,4].

There are three classifications for gestational low back pain: pelvic pain, lumbar pain, and the combination of both. Pelvic pain is unstable and may radiate to the buttocks and lower limbs, causing blocking and interfering with the gait, affecting the static posture. Low back pain or lumbar pain states musculoskeletal disorders localized below the margin of the last ribs (costal margin) and above the inferior gluteal lines. It is presented by pain on palpation, joint stiffness, muscle tension, decreased spinal range of motion, interfering with the posture and gait[5].

Biomechanically, one of the main causes of changes in static and dynamic skeleton of the pregnant woman is the constant growth in size of the uterus. It occurs a displacement of the center of gravity upwards and forwards, due to the increase of the abdomen, weight gain, hormonal changes and breast enlargement, which leads to posture changes. These adjustments produce an accentuation of the lumbar lordosis and the resulting in tension of the paravertebral muscles[6].

From the second gestational trimester, overload on spinal muscles and ligaments is more pronounced because the hormone relaxin is secreted more intensely in early pregnancy and ends up reaching a balance in the second trimester, remaining until the end of the pregnancy[2-7].

Under the action of hormones, especially relaxin, there is an increasing relaxation of ligaments, as well as a cartilage softening and increase in the volume of synovial fluid and articular space, acting on the collagen fibers, reducing their density and causing greater extensibility of the joint structures. The result is an increased joint mobility and unstable joints, predisposing pregnant women to injuries, with high levels of relaxin being associated with lower back and pelvic pain[2-7].

Although this painful condition is not fully understood, its etiology is related to physiological, biomechanical, vascular and psychological factors. One estimates that gestational low back pain affects one in every two pregnant women, usually from the third trimester of pregnancy, causing worry and discomfort both for its high prevalence and the intensity caused by pain. According to researches conducted in Brazil, the prevalence found about the onset of low back pain during pregnancy ranges from 48% to 83%[8].

In view of the repercussions that such symptomatology can generate in pregnant women, it is justified the search for methods and tools for assessment and identification of postural changes resulting from the pregnancy.

Due to the importance of better understanding the relationship between postural changes and symptoms of back pain in pregnancy, this study aimed to analyze the postural change in lumbar spine of pregnant women through photogrammetry in the three trimesters of pregnancy and check the frequency of low back pain.

METHOD

This is a cross-sectional, quantitative and descriptive study, carried out with pregnant women in prenatal care, in the period from September to November 2012, at the Basic Health Units (BHUs) of São Miguel, Castelo Branco II and Santa Rosa districts, located in the municipality of Rio Grande, RS, Brazil.

The identification of patients for sample composition was carried out by

consulting the evaluation record sheets of the unit. The identified patients were approached after attendance at BHU.

Inclusion criteria were: aged 18 years or over, be linked to the health service, with no pregnancy complications. For greater reliability, medical developments on the progress of pregnancy were checked in the records of the subjects.

The following instruments were used for the research: Questionnaire on Population Profile, addressing socioeconomic, demographic, behavioral and health issues of the pregnant woman; Nordic Musculoskeletal Questionnaire (NMQ). It consists in multiple or binary choices regarding the incidence of symptoms in the body anatomical regions in the last twelve months, as well as the removal of normal activities[12,13].

It was also used the International Physical Activity Questionnaire (IPAQ); to estimate the usual level of physical activity, measured in minutes per week, considering that the pregnant woman who does activity for 150 minutes or more during a week is seen as physically active[14,15].

Computerized photogrammetry was used for functional physical diagnosis, as it is based on the application of photogrammetric principle to photographic images obtained from body movements, in which photointerpretation bases are applied. It is used in postural and biomechanics assessment of the body, as it provides accurate values that are fundamental in targeting a particular treatment.

It is a method of postural evaluation of high complexity and reliability in their respective diagnoses and is grounded in a mathematical algorithm that transforms image pixels in Cartesian coordinate axes and quantifies angularly. Bone, joint references, planes, axes and body regions can be demarcated in individuals evaluated by computerized photogrammetry, prior to the collection of images or directly on the image, after collection. This demarcation is critical to the operation of the study and data analysis and depends on the knowledge of palpatory anatomy[9-11].

During collection, the images were digitally stored for later analysis using the Postural Assessment Software SAPo/PAS), a free and open source software, developed for image analysis. The software was designed exclusively for digital image analysis applied to health area and can be archived to monitor the postural evolution. In addition, it presents validation and good levels of reproducibility[16,17]. To study the current body mass and height, an anthropometric scale was used.

The participants were divided into three groups, according to the gestational trimester, called (TG). The group of the first trimester was (1TG - 1 to 12 weeks of pregnancy); the group of the second trimester (2TG - 13 to 28 weeks of pregnancy); and the group of the third trimester of pregnancy (3TG – from the 29th week up to delivery).

The labeling of the anatomical points was performed with polystyrene balls with 1 centimeter in diameter and demarcation points in the total spine (thoracic T7, T12), (lumbar L2, L3, L4 and L5), a green fluorescent label Pimaco brand was used.

The study was approved by the Health Department of the Municipality of Rio Grande, RS under Opinion No. 063-02/2012, by the Research Ethics Committee of the Anhanguera Educacional Faculty, under registration 108.745 and Platform Brazil under the CAAE 05854912.1.0000.5372.

RESULTS

The study included 21 pregnant women, with 6 in the first gestational trimester, 6 in the second and 9 in the third trimester. The average age was 25 years. The vast majority, 72% reported being married, 81% had complete elementary school and/or incomplete as education level. Only 24% were employed and 86% depended on the income of the child's father.

Regarding health perception, 81% of pregnant women reported having between excellent and good perception. With regard to lifestyle, 86% of pregnant women do not drink alcohol, 95% are non-smokers and 100% reported taking care of the food.

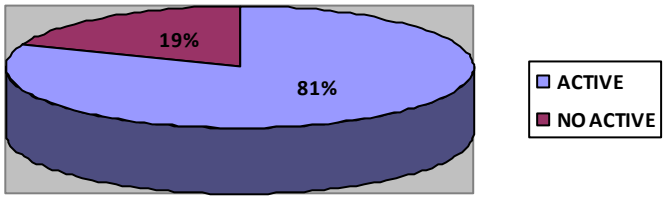
Table 1 presents the descriptive data on the age, pre-gestational body mass, gestational body mass, height and BMI variables related to the three groups of pregnant women evaluated in the study. The weight gain is verified during pregnancy.

Table 1. Age and anthropometric data of the pregnant women users of HBU, Rio Grande, RS, Brazil, in 2012.

Characteristics	1TG	2TG	3TG	Total
Age years)	23.83 ± 5.30	23.83 ± 6.51	26.44 ± 6.84	24.95
Body mass Pre-pregnancy (kg)	62.83 ± 6.51	74.67 ± 14.40	70.73 ± 15.15	69.43
Body mass Gestational (kg)	64 ± 7.97	79.67 ± 12.84	79.67 ± 13.68	75.47
Height (m)	1.58 ± 0.46	1.58 ± 0.73	1.61 ± 0.62	1.59
IBMI[3] (kg/m[2])	25.30 ± 2.47	30.52 ± 5.36	30.12 28.86 ± 4.92	28.86

In Figure 1 it is noted that, compared to the usual level of physical activity, 81% of pregnant women reported being physically active and the others, physically inactive.

Graphic 1. Pregnant women according to the average of the IPAQ results, Rio Grande, RS, Brazil, in 2012.



The percentage for the painful condition of pregnant women is shown in Graph 2. It was observed that 72% (15 out of 21 pregnant women) reported the presence of low back pain, and of all the pregnant women 19% (4) are in the 1st TG, 24% (5) on the 2nd TG, 29% (6) in the 3rd TG and 28% (6) reported no pain. Through the QNSO questionnaire, it was verified a high rate of back pain, totaling 72%.

Graphic 2. Pregnant women according to the results from the Nordic Musculoskeletal Questionnaire, Rio Grande, RS, Brazil, in 2012.

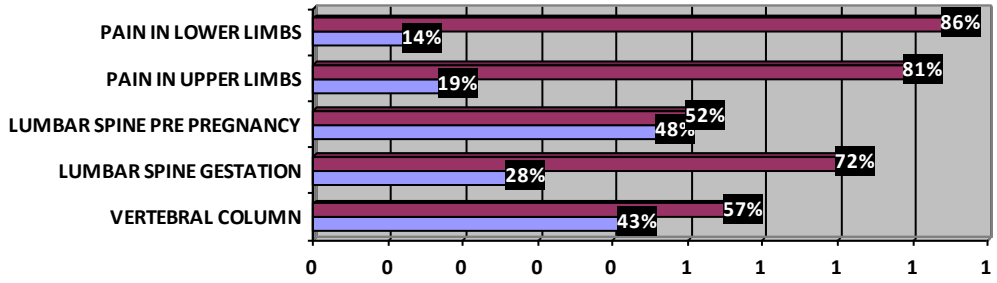


Table 2 shows the mean and standard deviation of the angles analyzed in pregnant women, referring lumbar lordosis according SAPo program. All pregnant women, regardless of the gestational trimester, showed an increase in lumbar lordosis and 72% reported the presence of gestational lower back pain.

Table 2. Pregnant according values (mean ± standard deviation) of the angles analyzed, Rio Grande, RS, Brazil, in 2012.

Angle	Mean ± standard deviation		
	1TG	2TG	3TG
LL	14.28 ± 3.39	18.67 ± 7.31	14.97 ± 4.79

DISCUSSION

Back pain is a common adversity in the population and this evidence often affects pregnant women, especially when the pregnancy period is at an advanced stage.

During this period, generally, some of the pregnant women often complain about discomfort, including lower back pain. This study found that 72% of the pregnant women reported having pain in the lumbar spine in accordance with some works mentioning the predominance of this pain between 33% and 77.6%[15-21]. Maternal conditions such as marital status, occupation, age, education, length of pregnancy, as well as the type of delivery, interfere with the health of pregnant women and the baby[18].

A review study[19] showed that, regardless of socioeconomic status and living habits, most of the pregnant women had symptoms and musculoskeletal discomfort.

In agreement with these data, a population-based survey[20] demonstrated that pelvic back pain affects about 50% of all pregnancies, especially from the 3rd trimester.

Another survey[19] that used purposive, non-probabilistic sampling with random distribution of cases, observed the occurrence of low back pain in active and sedentary pregnant women and sedentary women. It was noted the prevalence of low back pain (73%), being more frequent in the third trimester in 48% of them[19]. In the study mentioned, the prevalence of low back pain presented was only 1% less than the abovementioned study, and 29% in the third trimester of pregnancy.

Another study[21] found a higher prevalence of low back pain from the 5th month of pregnancy (2nd TG). The pain symptoms in the lumbar region can occur at any stage of pregnancy, but it is striking between the 4th (2nd TG) and the 7th (3rd TG) months.

In the state of Piauí a study22 was carried out, non-random type, in a philanthropic hospital, showing that the lumbar lordosis was not a predisposing factor to back pain, going against the present study, because according to Table 2, all trimesters of pregnancy - TG had a significant increase in lordosis angle, reflecting on the worsening of the gestational painful condition, corroborating the study.

CONCLUSION

In QNSO questionnaire, a high level of back pain was noticed in pregnant women, being possible to establish an association of the postural changes with lumbar pain in the period of pregnancy.

In this study, postural changes in the lumbar spine of the pregnant women were observed in the three trimesters using photogrammetry, which is a postural assessment method of high complexity, reliability, and importance to physiotherapeutic diagnosis.

The study shows some limitations with regard to the sample size, as being in a reduced number, allows to consider the findings consistent for the population in question; however, serving as a solid basis for further research.

This work aims to awaken in health professionals the desire to deepen further studies, idealizing a practice of physical exercises for pregnant women, regardless of the modalities chosen, contributing to a broader and more appropriate knowledge, in order to contribute to the quality of life of this group, further enhancing the performance of the professional as a key player in promoting women's health.

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CONTRIBUTIONS
Max dos Santos Afonso, **Caroline Henriques Graciano**, **Karine Fernandes Ávila**, **Marla dos Santos Afonso**, **Abelardo Soares de Oliveira Júnior** had equal contributions and **Fernanda Burlani Neves** acted in the critical review and was the supervisor of the research.

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