American Journal of Biomedical and Life Sciences
2017; 5(6): 119-122
http://www.sciencepublishinggroup.com/j/ajbls
doi: 10.11648/j.ajbls.20170506.12
ISSN: 2330-8818 (Print); ISSN: 2330-880X (Online)

Implication of Back Extensor Muscles in the Appearance of Back Pain in 30 Beninese Pregnant Women

Tigri Tertulie Lamatou Nawal[1], Lawani Mohamed Mansourou[1], Yessoufou Lafiou[1], Dumas Geneviève[2]

[1]Department of Sciences and Technology of the Physical Activities and Sporting, Abomey-Calavi University, Porto-Novo, Benin
[2]Department of Mechanical and Materials Engineering, Queen's University Kingston, Ontario, Canada

Email address:
nawly2008@yahoo.fr Tigri (T. T. L. Nawal), bissiriou03@yahoo.fr (L. M. Mansourou), yessoufoulafiou@yahoo.fr (Y. Lafiou), dumas@queensu.ca (D. Geneviève)

To cite this article:
Tigri Tertulie Lamatou Nawal, Lawani Mohamed Mansourou, Yessoufou Lafiou, Dumas Geneviève. Implication of Back Extensor Muscles in the Appearance of Back Pain in 30 Beninese Pregnant Women. *American Journal of Biomedical and Life Sciences.* Vol. 5, No. 6, 2017, pp. 119-122. doi: 10.11648/j.ajbls.20170506.12

Received: September 15, 2017; **Accepted**: October 8, 2017; **Published**: November 10, 2017

Abstract: The pregnancy involves important modifications in the pregnant woman. These include, we have the rachidian pains which are painful demonstrations sitting on the level of the rachis. They go from a simple embarrassment to an impossibility of carrying out daily and or professional tasks. The woman is thus confronted with serious health problems. Objective. Showing the role of the extensors of the back (thoracic Spinalis and longissimus lumbar) in the appearance of the rachidian pains in the pregnant woman. Methods. It is about an experimental and analytical study. Thirteen women are included according to criteria. Parameters ENR and RMS were measured using an electromyography of surface (EMGS). For the study, women written assent, a card of data collection was used to record the measured data. The statistical analysis was processed by means of the software Graph Pad PRISM5. Results. At the end of this work, it arises that values ENR and RMS of the various muscles vary according to the state of the woman and according to the trimester of pregnancy. It also comes out from our study that the percentage of fibers recruited of these two muscles varies with the evolution of the pregnancy. Conclusion. The extensors of the back (thoracic Spinalis and longissimus lumbar) are implied, in the appearance of the rachidian pains in the pregnant woman, by an increase in the electric activity of the latter, thus involving muscular tiredness.

Keywords: Pregnant Women, Rachidian Pains, Extensors of the Back

1. Introduction

Pregnancy is a serious and important period in a women life. It confers to girls the status of mother. However, woman comes under many muscular – skeletal modifications which cause her to feel unwell all the time. The most frequent discomforts are undoubtedly backaches [2]. They are primarily caused by a displacement of the center of gravity forwards [3]. The weight of the centers, the uterus and the fetus which increases more the pregnancy advance [4]. A former displacement accentuates the lumber curve [5] in order to compensate for a static imbalance which becomes increasingly problematic [6]. In addition, one notices in the pregnant woman a generalized hypotonic of the abdominal sheath [7]. To crown the whole, the basin in anteversion increasing the muscular constraint. It is on the latter that muscular work must concentrate [8]. Indeed, the Beninese pregnant women develop great risk of lumbago [9]. There exists a compensation force on the muscular level in the case as of rachidian pains. This force developed by the extensors of the trunk increase with the evolution of the pregnancy involving the tiredness of the requested muscles [10].

2. Methods

2.1. Nature, Type and Setting of Study

It is about an experimental and analytical study which takes place at the Laboratory of Biomechanics and

Performance (LABIOP) of National Institute of Youth Physical Education and the Sport (INJEPS), the maternity of the health centers of the Departmental University Hospital Ouémé Plateau (CHDU-OP) and Zèbou at Porto-Novo in Benin Republic.

2.2. Sample of Study

30 women are reasonably selected according to the exhaustive technique. This includes the maternities.

2.3. Criteria

Are included in the study:

Inclusion criteria:

1. Being Beninese sedentary living in Porto-Novo
2. Having freely given its written enlightened assent
3. Being at least 18 years old
4. Having normal, low risk pregnancy (being able to exercise pre-natal gym, according to the doctor or midwife advice)

Exclusion criteria:

Are excluded from the study, women missing one data collection session

Data were collected during the first trimester (pregnancy, range 8-12 weeks), second trimester (19-25 weeks pregnant) and third trimester (pregnancy, range 30-38 weeks). Which resigned during the experiments

2.4. Variables Studied

Dependent variables:

1. Electric activity of the extensors of the trunk (ET) measured with the assistance of EMGS;
2. Existence or no of the pain (BP) from the woman;

Independent variables:

1. Index from body mass;
2. Age of the woman;
3. Age of the pregnancy;
4. Gestity;
5. Body circumferences

2.5. Equipment

Equipment used is composed of:

A mural measuring apparatus graduated at the millimeter about of brand SECA, one centimeter of brand BUTTERFLY graduated at the millimeter about and an electronic person scales, of brand SECA with a margin of 100g, were used respectively to measure the size, the circumferences body and the body mass among women. An electromyography of surface (EMGS) of type NTS 2000 SEMG – 4 – 14003 manufactured by NCC-Medical Co and of power cd. 6V was used to evaluate the electric activity of the extensors of the trunk (ET). Electrodes of 3M brand manufactured in Canada by 3M Health care

2.6. Experimental Protocol

The woman was placed in flexed seated position, ≈ 20 of trunk flexion from vertical, EMG electrodes were placed bilaterally, 2 cm from the spine at the T8 level for the Spinalis Thoracis and 4 cm lateral to L1 for the Longissimus Lumbarum muscles (Figure 1). The test consisted of holding the trunk flexion position with the arms crossed over the shoulders for 60s (Figure 1). Total energy spectrum and RMS were recorded to determine the percentage of fibers recruited.

Figure 1. *Electrodes positions to record.*

2.7. Ethical Consideration

The study was approved by the University scientific committee and all participants signed an informed consent form.

2.8. Statistical Analysis

The normality of the data was verified with Kolmogorov Smirnov test. For data with a normal distribution, ANOVAs were performed on the percentage of fibers recruited. For data with non-normal distribution, the Wilcoxon signed-rank test and the Mann Whitney U test were used. The differences are significant at $p < 0.05$.

3. Results

The percentage of fibers recruited for the dominant muscles: increased significantly from the first to the third trimester was significantly lower in the group with back pain ($p < 0.001$, table 1 and 2)

Table 1. *Percentage of fibers recruited for pregnant women according to the trimester.*

Electrode Position	GPW 1 (n = 10)	GPW 2 (n = 10)	GPW 3 (n = 10)
	Mean ± SD	Mean ± SD	Mean ± SD
% ST (Right)	17% ± 9	16% ± 14	16% ± 7
% ST (Left)	12% ± 8	11% ± 4	9% ± 5
% LL (Right)	18% ± 11	17% ± 5	15% ± 7
% LL (Left)	10% ± 5	11% ± 4	10% ± 6

Legend: GPW 1 = group of pregnant woman first trimester; GPW 2 = group of pregnant woman second trimester; GPW 3 = group of pregnant woman third trimester.

Table 1 show that the percentage of fibers recruited decreases with the evolution of the pregnancy. The muscular activity decreases with the evolution of the pregnancy from where an increase in muscular tiredness.

Table 2. *Percentage of fibers recruited for pregnant women without (NLBP) and with back pain (LBP).*

Electrodes Positions	GLBP (n = 13)	GNLBP (n = 17)
	Mean ± SD	Mean ± SD
% ST (Right)	15% ± 9	10% ± 4
% ST (Left)	12% ± 4	11% ± 7
% LL (Right)	21% ± 9	18% ± 5
% LL (Left)	17% ± 4	13% ± 5

Legend: GNLBP = No Low Back Pain group; GLBP = Low Back Pain group

Table 2 shows that the percentage of fibers recruited is higher among non-suffering women of rachidian pain compared to those suffering. The pain increases muscular tiredness during the pregnancy by a reduction in the muscular activity of the suffering women.

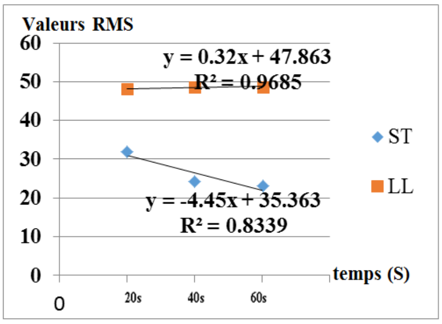

Figure 2. *RMS value according to the time of the muscle ST (Right) and muscle LL (Right) during the test of tiredness among low back pain women.*

Figure 2 translated values RMS of spinalis and the longissimus in time. Values RMS of the spinalis decrease in time whereas those of the longissimus increases, this shows that there exists a relation between the two muscles.

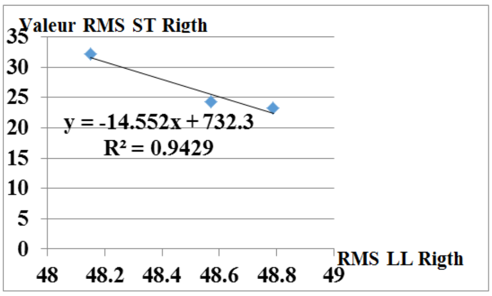

Figure 3. *Correlation between values RMS of the thoracic muscle dominating and of the longissimus lumbar dominating of the pregnant women with back pain.*

Figure 3 translated the correlation enters values RMS of spinalis and the longissimus of the suffering women. Values RMS of the longissimus increases while those the spinalis decrease, this supposes a relay of activity between the spinalis and the longissimus.

4. Discussion

The results in table 1 and 2, show that in the pregnant women, the percentage decreases as the pregnancy evolves. Also when comparing pregnant women without (NLBP) and with (LBP) back pain, one notes a percentage of fibers recruited raised among pregnant women without back pain compared with those suffering from back pain. These results corroborate work of [11] and [12] which showed that in pregnant women with back pain, the muscle ST jointly present initial values RMS lower compared to the controls groups. This is accentuated with the weeks of amenorrhea. The figures 2 and 3 show that values RMS of the spinalis fall while those of the longissimus increase (figure 2) and that there exists a correlation between the two muscles (figure 3). Our results are in line with work of [12] which reports that in the woman, pregnancy simulates the catch of body mass that is observed in pregnant woman and leads to the activation of trunk extensor muscles. Study showed the weight of abdomen leads to an increase on lumbar lordosis and a subsequent increase in the activity of back extensor [13]. These results was explained by work of [14] which stipulates that the micro-traumas in soft tissues, is consequence of the forces developed by the back extensor muscles to resist the anterior flexion moment of the trunk, may result from postural changes due to pregnancy, or from micro-motions in joints due to increased ligament laxity. The changes of muscular recruitments corresponded then adaptation of subjacent spinal instability resulting from a relaxation or osteon-ligamentous deteriorations, from a muscular dysfunction or a reduction in the quality of neuromuscular control [15]. However, as we saw previously, the pregnancy is characterized by instability of the pelvic articulations. This one was unfortunately not quantified in our study.

5. Conclusion

This work relates to the influence of the pregnancy on the biomechanical capacities of the extensors of the back. The results show that pregnancy related morphological changes have an impact on the locomotors system. The whole of the results shows that the modifications (morphological and physiological) related to the pregnancy are reflected on the rachis in particular on the muscles which surround it. Adaptation mechanisms are then set up in order to compensate for these modifications and to maintain balance.

Acknowledgements

Our thanks to all those who made this study, in particular pregnant women, technicians and doctors who allowed its realization.

References

[1] BODIAGINA V. *Précis d'obstétrique, 1ère éd.* Moscou: Edition MIR; 1975.

[2] MOORE K., DUMAS G. A., REID J. D. Postural changes associated with pregnancy and their relationship. *J. Clinical. Biomechanics*, 1990, 5, p. 169-174.

[3] PERKINS, Jan. Identification and management of pregnancy-related low back pain. *Journal of Nurse-midwifery*, 1998, 43 (5)

[4] MANTLE M. J., GREEWOOD R. M., Currey H. L. F. Backache in pregnancy. *Rheumatol. and Rehab.*, 1977, 16, p. 95-99.

[5] TIMSIT M. A. Grossesse et douleurs rhumatologiques lombaires basses et de la ceinture pelvienne. *Gynécologie Obstétrique et Fertilité*, 2004, 32, p. 420-426.

[6] TEIXEIRA AND G. A. CARVALHO, "Reliability and validity of thoracic kyphosis measurements using flexicurve method," *Brazilian Journal of Physical Therapy*, vol. 11, no. 3, pp. 199–204, 2007.*

[7] FAUNDEZ A, ROUSSOULY P, LE HUEC JC. Analyse de l'équilibre sagittal du rachis. Une révolution dans les approches thérapeutiques des pathologies dégénératives lombaires. *Rev Med Suisse*. 2011; 322(46): 2470-4.

[8] RAIMONDI P, PROSPERINI V, SANTOS S, LO MONACO C, MARTINELLI E. Douleurs vertébrales et biomécanique pathologique chez les femmes enceintes. Résonances Européennes du Rachis. 2007; 15(45-46): 1886-92.

[9] BEAUCAGE GAUVREAU E, DUMAS A. G, LAWANI M. Head Load Carriage and Pregnancy in West Africa. Clinical Biomechanics. 26 (2011): 889–894.

[10] KAPANDJI I. A. Physiologie articulaire: schémas commentés de mécanique humaine. Fascicule III, tronc et rachis. 5ème ed. Paris: Maloine, 2000, 255p.

[11] SIHVONEN T., HUTTUNEN M., MAKKONEN M., AIRAKSINEN O. Functional changes in back muscle activity correlate with pain intensity and prediction of low back pain during pregnancy. *Arch. Phys. Med. Rehabil.*, October 1998, vol. 79, n°10, p. 1210-1212.

[12] DANTAS R. Protocole d'évaluation de la fatigue musculaire au cours de la grossesse. Th.: Génie Biomédical: Compiègne: 2004, 150 p.

[13] YESSOUFOU L. Etude des paramètres inertiels segmentaires par la méthode de Jensen chez 230 sujets béninois: cas des étudiants de l'INJEPS et de femmes enceintes dans la ville de Porto/Novo [Thèse]: Sciences et techniques des Activités Physiques et Sportives; option Biomécanique du geste: *INJEPS / Porto - Novo*: 2015, 140 p.

[14] MCGILL SM. A biomechanical perspective of sacro-iliac pain. Clinical Biomechanics. 1987; (2): 145–51.

[15] PANJABI M. M. The stabilizing system of the spine. Part II. Neutral zone and instability hypothesis. *J. Spinal Discord.* 1992, 5, p. 390-397.