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WHICH FACTORS COULD INFLUENCE THE ELECTROMYOGRAPHIC ACTIVITY OF THE FEMALE PELVIC FLOOR MUSCLES?

Hypothesis / aims of study

The female pelvic floor is a complex but vulnerable structure. Functional alterations or lesions may arise throughout the woman's life, being those during pregnancy or delivery and due to hormonal factors or aging. Such factors seem to lead to uroginecological dysfunction complaints. So, it is important to study the pelvic floor muscles (PFM) behavior and the factors related to the pelvic floor activity in order to prevent and treat dysfunctions. Considering the predisposing factors to the pelvic floor dysfunctions, we studied which factors could influence the electromyography activity of the pelvic floor muscles comparing diferent phases of the female vital cycle.

Study design, materials and methods

A clinical, controlled, prospective study was conducted with 423 women from a public health service center, recruited from March 2011 to June 2013, being 49 nulliparous women, 103 primiparous pregnant women, 92 primiparous postpartum women (45 to 60 days of postpartum) divided into vaginal delivery (n=43) and cesarean section delivery (n=49); 22 climacteric women and 65 postmenopausal women.

All patients were evaluated with digital palpation (Modified Oxford Scale) and surface electromyography (sEMG - *EMG System do Brasil™*, 400C model). PFM evaluation was performed by putting the subjects in supine position, lower limbs flexed with the feet on the stretcher. Firstly, the contraction of the PFM has been previously taught to the volunteer, requesting her to press the probe in cranial direction and observe its contraction on the computer screen. Only patients who were able to contract the PFM were included in the study. Exclusion criteria were women who had other prior abdominal or pelvic surgery (excepted cesarean section), pelvic organ prolapse, diabetes, hypertension, neurological abnormalities, myopathy, chronic lung diseases and presence of urinary tract infection.

Pelvic floor sEMG was recorded using a vaginal probe (Physio-Med Services™), which has two opposing metal sensors. The probe was inserted and manually positioned, by the researcher, with the metallic sensors placed laterally in the vagina. The reference surface electrode was positioned on the right wrist. The sensors were connected to the sEMG equipment, which transmitted the electrical signals in microvolt (µv) to a notebook. The protocol consisted of three maximal, voluntary PFM contractions, recorded by the vaginal probe for five seconds, analyzed by the arithmetic mean of three root-mean-square (RMS)**.** Each requested contraction, was performed with a rest period of twice the time of the performed contraction, in order to avoid muscle fatigue. (1)

The pelvic floor sEMG was correlated to the following clinical factors: age, Body Mass Index (BMI), number of pregnancies and presence and severity of urinary incontinence evaluated through *International Consultation on Incontinence Questionnaire Urinary Incontinence short Form (ICIQ UI-SF)*.

The groups were compared to the pelvic floor SEMG results through *ANOVA* with response variable transformed in posts. The correlation between the sEMG results and the numerical variables was verified through *Spearman's rank correlation coefficient*. The significance level adopted was 5%.

Results

Pelvic floor sEMG activity was higher in nulliparous women than all other groups (46.59±16.83µv). Primiparous pregnant women (35.31±18:22 µv), primiparous postpartum cesarean section (33.28±13µv) and primiparous postpartum vaginal delivery women (31.23±12.16 µv) showed higher pelvic floor sEMG values than postmenopausal women (21.23±15.11µV - $p < 0.0001$), as shown in Figure 1.

Interpretation of results

Our study corroborate with other electromyographic findings. Resende et al (2) compared pregnant and non-pregnant women and showed that the maximum voluntary contraction was significantly greater in the nonpregnant nulliparous than in the primiparous women.

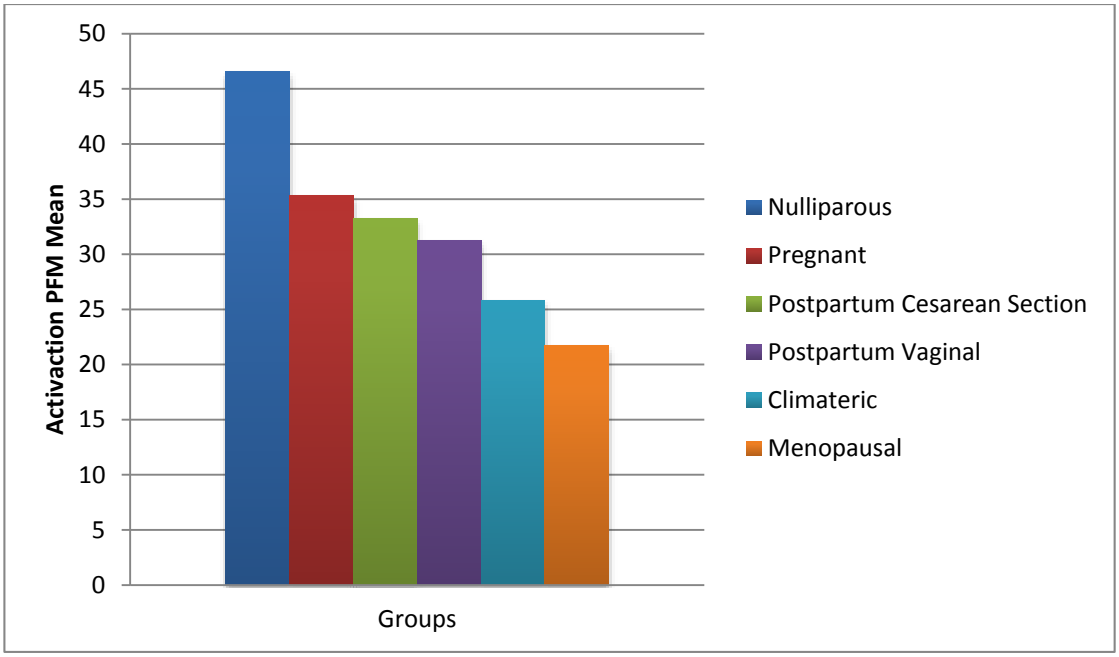
In the postpartum women, we obtained the same result as Botelho et al (1) whose showed that the vaginal delivery was associated to PFM contractility reduction 45 days after delivery when compared to cesarean section.

Zhang et al (3) studied PFM contractility in menopause and postulated that those values are not actually correlated to the electromyography values. However, we agreed with Zhang et al (3) which showed inverse correlation between sEMG findings and stress urinary incontinence. The same authors (3) showed that the sEMG values are dependent of age and parity, but did not correlate to BMI, as well as in our study.

Concluding message

Nulliparous women presented greater pelvic floor electromyography activity, followed by primiparous pregnant women, primiparous postpartum women with cesarean section delivery, primiparous postpartum women with vaginal delivery, climacteric and postmenopausal women. Electromyography activity correlated inversely to the age, pregnancie number and presence/severity of the urinary incontinence evaluated by ICIQ UI-SF. No correlations were found between pelvic floor electromyography activity and body mass index.

Figure1. Average maximum sEMG values according to the groups.



Arithmetic mean of three root-mean-square of the three maximal, voluntary PFM contractions, recorded by the vaginal probe for five seconds.

There was a significant inverse correlation between pelvic floor sEMG activity and age (ρ=-0.30; p<0.0001), however, there was no correlation between pelvic sEMG and BMI (ρ=0.08; p=0.13). Number of pregnancies (ρ=-0.40; p<0.0001) and pelvic floor sEMG activity shown inverse correlation, as well as ICIQ UI-SF (ρ=-0.21; p=0.0001),showing proportionally lower values for the PFM electromyography activity to greater age, number of gestations and presence of urinary incontinence symptoms.

References

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Disclosures

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