

Strength of pelvic floor muscles and sexual function during pregnancy

Força dos músculos do assoalho pélvico e função sexual em gestantes

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Abstract

Background: Sexual well-being depends on pelvic floor muscles (PFMs) that are strong enough to maintain their function. During pregnancy, both the sexual function and the strength of the PFMs may be altered. **Objectives:** to compare the degree of PFM strength and the sexual function of pregnant women in the second and the third trimesters. **Methods:** a descriptive, causal-comparative study was carried out with 37 pregnant women in Florianópolis (18 in the second trimester and 19 in the third trimester) with a mean age of 25.22 years (± 5.7 years). The instruments used were the Female Sexual Function Index (FSFI) Questionnaire and the Manual Test of Pelvic Floor Muscle Strength, using the modified Oxford scale to grade strength. The data were analyzed using descriptive and inferential statistics (independent *t* test, the Mann-Whitney U test, Spearman's correlation) with a significance level of 0.05. **Results:** There was no significant difference between the mean rank values of PFM strength of pregnant women in the second and third trimester ($U=150.5$; $p=0.512$). However, the sexual function of the pregnant women in the second trimester of pregnancy was better than that of the women in the third trimester ($U=104$; $p=0.042$). In addition, PFM strength had statistically significant correlations with age ($\rho=0.320$, $p=0.041$) and with FSFI score ($\rho=0.540$, $p<0.001$). **Conclusions:** Sexual function decreased significantly from the second to the third trimester while PFM strength did not differ between trimesters.

Key words: sexual function; pelvic floor; pregnancy.

Resumo

Contextualização: O bem-estar sexual depende de músculos do assoalho pélvico (MAP) fortes o suficiente para manter a sua função. Durante a gestação, tanto a função sexual como a força dos MAP podem modificar-se. **Objetivos:** Comparar o grau de força dos MAP e a função sexual em gestantes do segundo e terceiro trimestres. **Métodos:** Pesquisa descritiva causal comparativa realizada com 37 gestantes de Florianópolis (18 do segundo e 19 do terceiro trimestre), com média de idade de 25,22 anos ($\pm 5,7$ anos). Os instrumentos utilizados foram o Questionário *Female Sexual Function Index* (FSFI) e o Teste Manual da Musculatura do Assoalho Pélvico, utilizando a escala de Oxford modificada para graduação da força. Os dados foram analisados por meio de estatística descritiva e inferencial (teste *t* independente, teste U de Mann Whitney, correlação de Spearman), nível de significância de 0,05. **Resultados:** Não houve diferença significativa entre a média dos valores dos postos do grau de contração dos MAP de gestantes do segundo e do terceiro trimestre ($U=150,5$; $p=0,512$). Todavia, a função sexual das gestantes do segundo trimestre de gestação foi melhor que as do terceiro trimestre ($U=104$; $p=0,042$), e o grau de contração dos MAP apresentou correlações estatisticamente significativas com a idade ($\rho=0,320$, $p=0,041$) e com o escore do FSFI ($\rho=0,540$, $p<0,001$). **Conclusões:** A função sexual diminuiu significativamente do segundo para o terceiro trimestre, enquanto que a força dos MAP não apresentou diferença entre os trimestres.

Palavras-Chave: função sexual; assoalho pélvico; gestação.

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Introduction

The pelvic floor constitutes the inferior portion of the abdomino-pelvic cavity¹, and its strength refers to the degree of maximum voluntary contraction, with the recruitment of the greatest possible number of fibers^{2,3}. The events which occur during a woman's lifetime, such as pregnancy, childbirth, weight gain, menopause and aging, affect the strength of the pelvic floor muscles (PFMs) and other structures which provide support to the pelvic organs⁴. The pelvic floor is the only transverse muscle group of the human body that supports load, and it is responsible for several functions such as: support of the abdominal and pelvic organs⁵⁻⁷, maintenance of urinary and fecal continence^{1,3,8}, aid in increasing intra-abdominal pressure, in breathing and in stabilizing the body^{1,6}. These muscles also allow sexual intercourse and childbirth; their involuntary contractions are the main characteristics of orgasm^{6,7,9} and, when these muscles are weak, they can cause vaginal hypoesthesia and anorgasmia⁷. Therefore, PFMs can interfere negatively in female sexual function^{10,11}.

The importance of sexual health in quality of life has been increasingly recognized in recent years^{12,13}. Thus, sexual dysfunction can have harmful effects on women's self-esteem and relationships. Studies have shown a significant correlation between sexual dysfunction and feelings of physical and emotional dissatisfaction, as well as a reduction in the general well-being of these women¹³⁻¹⁵. Pregnancy is a time of physical and psychological changes which, combined with cultural, social, religious and emotional influences, can have an impact on sexual activity and behavior^{13,15,16}. As pregnancy progresses, women usually have a decrease in sexual desire, frequency and satisfaction¹⁷. However, the relationship between pregnancy, pelvic floor muscles strength and female sexual function is still unclear. Thus, the present study aims to compare the strength

of PFMs and the sexual function of pregnant women in the second and third trimester.

Methods

Participants

This is a descriptive, causal-comparative and non-probabilistic study. The participants of this study were pregnant women in the second and third trimester who received care at health centers in Florianópolis between April 23rd and May 09th, 2008. The exclusion criteria were: clinical complications (preeclampsia, risk of premature labor and urinary infection) which could interfere in the evaluation; obesity (pre-pregnancy BMI>30) and previous PFM contraction exercise. The study was approved by Human Research Ethics Committee of Universidade do Estado de Santa Catarina, protocol 149/2007. Table 1 shows the characteristics of pregnant women in the second and third trimesters.

Procedures

The procedure for data collection consisted of: a) information to the participants about the study and request for informed consent; b) anamnesis of prior knowledge and performance of PFM contraction exercises; c) verification of PFM strength through digital assessment; d) application of the Female Sexual Function Index (FSFI) questionnaire and, finally, e) sociodemographic data collection based on a semi-structured questionnaire. The entire data collection procedure was conducted in a private room of the health center and a single individual carried out the PFM evaluation for greater reliability.

Table 1. Participant's characteristics.

Variables	Second trimester (n=18)	Third trimester (n=19)
Age	X=24.67 years, SD=±6.9 years	X=25.74 years, SD=±4.6 years
Mass before pregnancy	X=63.29 kg, SD=±11.73 kg	X=56 kg, SD=±10.28 kg
Current mass	X=69.5 kg, SD=±13.65 kg	X=67.36 kg, SD=±11.83 kg
BMI before pregnancy	X=24.70, SD=±3.22	X=21.87, SD=±3.76
Marital status	Single: 2 (13.3%) Cohabiting: 4 (26.7%) Married: 9 (60%)	Single: 3 (21.4%) Cohabiting: 6 (42.9%) Married: 5 (35.7%)
Educational level	Complete/incomplete primary education: 3 (20%) Complete/incomplete secondary education: 10 (6.7%) Complete/incomplete tertiary education: 2 (13.3%)	Complete/incomplete primary education: 3 (21.5%) Complete/incomplete secondary education: 10 (73.4%) Complete/incomplete tertiary education: 1 (7.1%)
Race	White: 11 (73.3%) Mixed: 2 (13.3%) Black: 2 (13.3%)	White: 9 (64.3%) Mixed: 3 (21.4%) Black: 2 (14.3%)
Number of pregnancies	Primigravid: 8 (50%) Multigravid: 8 (50%)	Primigravid: 8 (50%) Multigravid: 8 (50%)

BMI=body mass index; SD=standard deviation.

Evaluation instruments

To measure PFM strength, the participant was in the supine position, with knees bent and covered with a sheet; the digital assessment was performed with lubricating gel and sterile gloves, and the patient was first instructed on how to perform the contraction appropriately and, then, requested to carry out a maximum PFM contraction. The test was carried out by a single physical therapist in order to minimize possible measurement errors, and the Modified Oxford Grading Scale by Laycock¹⁸ (Appendix 1) was used to grade muscle strength. The participants' sexual function was evaluated through the FSFI questionnaire, developed and validated in the United States of America¹⁴, translated into Portuguese language¹⁹ and later also applied to Brazilian pregnant women¹³. The questionnaire contains 19 multiple choice questions grouped into six domains: desire, arousal, lubrication, orgasm, satisfaction and pain. A value of 0 to 5 is attributed to each answer. A mathematical calculation is then performed to obtain a final index, the FSFI score. The scores range from 2 to 36, and the lower the score, the worse the sexual function.

Statistical analysis

The data were analyzed using the statistical program SPSS, version 13.0, through descriptive statistics (frequency, mean and standard deviation) and inferential statistics (independent *t* test, Mann-Whitney U test and Spearman's correlation). The confidence interval used was of 95% and *p* values lower than 0.05 were considered significant. The independent variable was the gestational trimester (second or third) and the dependent variables were: FSFI score and PFM contraction strength. According to the Shapiro-Wilk normality test, none of the dependent variables followed normal distribution (*p*=0.001 and *p*=0.013, respectively). For the control variable (age), the data were normal (*p*=0.119).

Results

PFM strength

For the variable PFM strength, the median and the mode were 3. Figure 1 shows this distribution in the studied trimesters. Most of the women in the third trimester had medium strength, and most of those in the second trimester had medium to high strength. Additionally, the mean rank of PFM strength for second-trimester women was 20.14 (sum of

ranks=362.5) compared to 17.92 for third-trimester women (sum of ranks=340.5). However, the difference between the means was not statistically significant (Mann-Whitney U test=150.5; *p*=0.512).

Sexual function

The FSFI mean score was 21.73 (± 8.02). The Mann-Whitney U test was used to compare the FSFI mean score of the second-trimester women (*n*=18) to that of the third-trimester women (*n*=19). The mean ranks for the second-trimester women was 22.72 (sum of ranks=409.00) compared to 15.47 (sum of ranks=294.00) for the third-trimester women. The test also showed a statistically significant difference between second and third-trimester women (Mann-Whitney U test=104.00; *p*=0.042).

To determine whether this difference could be credited to the age difference between the participants, the mean age of the second and third-trimester women was compared. The mean age of the second-trimester women was 24.67 yrs (± 6.90 yrs) and the mean age of the third-trimester women was 25.85 yrs (± 4.50 yrs). Although the second-trimester women had a lower mean age compared to third-trimester women, that difference was not significant (*t*=-0.619; *df*=28.72; *p*=0.541).

PFM strength and sexual function

PFM strength had statistically significant correlations with some controlled variables of the present study: age, FSFI score and with 15 of the 19 variables of the FSFI (Table 2).

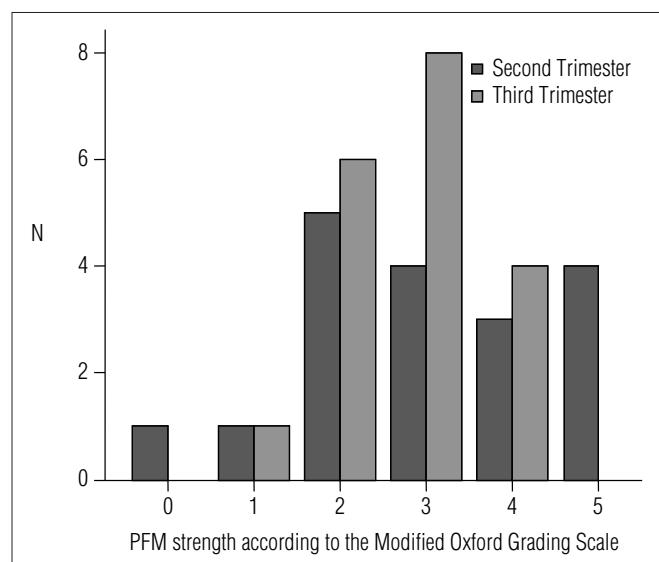


Figure 1. Pelvic Floor Muscle (PFM) strength according to gestational trimester.

Discussion

PFM strength

No studies were found comparing PFM strength between gestational periods. However, asymptomatic non-pregnant Austrian women with a mean age of 41.2±14.6 yrs old were evaluated in relation to PFM strength according to the Modified Oxford Grading Scale by Laycock¹⁸. The authors reported that: 2.6% showed grade 0 muscle contraction; 12.5% showed grade 1 muscle contraction; 29.7%, grade 2 muscle contraction; 31.2%, grade 3 muscle contraction; 18.4%, grade 4 muscle contraction and 5.5%, grade 5 muscle contraction²⁰. Although the non-pregnant women of this study had a higher mean age than the participants of the present study, the results were similar.

Digital assessment is one of the most widely used methods of evaluating pelvic floor strength because it is simple and does not require expensive equipment², despite the fact that evidence does not ensure its intra-rater reliability²¹. According to other authors, this is the most sensitive method of assessing PFM strength and tonus³. Although not the most reliable method, it is the most accessible and affordable and, in the present study, a single physical therapist carried out the assessment to minimize possible measurement errors.

Only one participant of the present study (2.7%) had heard about the PFM contraction exercise needed to measure the strength of these muscles through digital assessment. In

contrast, 55.3% of pregnant women in England received some instruction about pelvic floor exercise²²; in the United States, most of the asymptomatic and non-pregnant women had already heard about this exercise, but had not been instructed on how to perform it²³. Another study reported that only 10% of pregnant/postpartum women who received instructions on the correct contraction of these muscles were instructed during the pelvic exam²⁴.

When asymptomatic women were instructed on how to perform this exercise, 68% were capable of performing an appropriate PFM contraction for up to 3 seconds²³, and a high percentage (15.2%) of the women was not able to voluntarily contract the PFM²⁰. More than 30% of the women were not able to perform an appropriate PFM contraction during the first assessment². This could jeopardize the results in relation to PFM strength grading, even though the participants were instructed on how to perform the exercise. Thus, there is potential for improvement of the awareness of pelvic floor exercises and their benefits for pregnant women in Brazil.

Sexual function

A significant decrease in sexual function was observed from the second to the third trimester, and this difference could not be credited to the age difference between groups. Similarly, a study that evaluated sexual function at every gestational trimester (participants' age=25.5±4.5 yrs) found

Table 2. Correlations with pelvic floor muscle strength.

Variables	Spearman's ρ	P
Participant's age	0.320	0.041*
FSFI score	0.540	0.000*
Frequency of desire**	0.402	0.010*
Level of desire**	0.261	0.104
Frequency of arousal**	0.264	0.099
Level of arousal**	0.298	0.062
Confidence of arousal**	0.327	0.039*
Satisfaction with arousal**	0.410	0.009*
Frequency of lubrication **	0.491	0.001*
Difficulty of lubrication **	0.516	0.001*
Frequency of maintaining lubrication **	0.493	0.001*
Difficulty in maintaining lubrication **	0.413	0.008*
Frequency of orgasm **	0.465	0.003*
Difficulty to obtain orgasm **	0.446	0.004*
Satisfaction with orgasm **	0.285	0.075
Satisfaction with amount of closeness with partner **	0.393	0.012*
Satisfaction with sexual relationship**	0.433	0.005*
Satisfaction with overall sex life **	0.429	0.006*
Frequency of pain during vaginal penetration **	0.448	0.004*
Frequency of pain following vaginal penetration **	0.366	0.020*
Level of pain during or following vaginal penetration **	0.443	0.004*

* p values considered significant for a level of 0.05; ** FSFI variables. These variables are disposed in the scale in such a way that the higher the values the better the specific aspect of sexual function. For example, in the item "difficulty to obtain orgasm": the higher the value in the scale, the less difficult to obtain orgasm.

a significant decline in the scores in all the FSFI domains during gestation, with a significant decrease in the third trimester compared to the other periods²⁵. Another study found no significant difference between the FSFI total scores of the first and third gestational trimesters in the participants of both groups²⁶.

The analysis of each FSFI domain showed a decrease in sexual desire, arousal, vaginal lubrication, orgasm and sexual satisfaction from the second to the third trimester of gestation, as well as greater discomfort or pain related to the sexual activity. Several studies have reported similar results and attributed them to a series of factors such as: body changes that affect self-esteem, discomfort, fear of harming the baby and physical symptoms as nausea, sleepiness and fatigue^{16,26-33}. Some authors stipulated a total FSFI score of 26.5 as the cut-off score between women with and without sexual dysfunction³⁴. The mean value of the total FSFI score obtained in the present study was of 21.73; therefore, based on the reference score³⁴, the pregnant women of the present study had a low mean FSFI score, which may not represent a dysfunction, but an adaptation due to the pregnancy.

PFM strength and sexual function

There was a significant correlation between the grade of PFM strength and the sexual function score in pregnant women ($p=0.540$ and $p<0.001$). Meanwhile, Baytur et al.⁹ did not find a correlation between PFM strength (using the perinometer) and sexual function (through the FSFI questionnaire)

postpartum. However, a PFM training program with non-pregnant women found that those with weak PFMs and who received training had positive results in sexual function, also verified through the FSFI³⁵. This demonstrates that stronger muscles are linked to better sexual function.

Four of the 19 FSFI variables (“level of desire”, “frequency of arousal”, “level of arousal” and “satisfaction with orgasm”) did not correlate with the grade of PFM strength. This result is attributed to the fact that the abovementioned variables of sexual function are more psychological than physical.

Final considerations

The pregnant women in the second trimester demonstrated better sexual function than those in the third trimester. However, the grade of PFM strength was similar. Furthermore, higher grades of PFMs strength were correlated with better sexual function.

The present study compared only the second and the third gestational trimesters. It did not assess the first trimester and it did not include a control group, which would have been the ideal model. It is suggested that a new study be carried out comparing all the periods (before gestation, first, second and third trimesters) and controlling other factors, such as the physical symptoms resulting from gestation.

The relevance of this study goes beyond the research. During the data collection, it was possible to instruct the pregnant women about the importance of PFM exercises. Thus, the study also became an educational intervention.

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Appendix 1

The modified Oxford Grading Scale

- 0) No discernible contraction.
- 1) Flicker contraction.
- 2) Weak contraction, felt as slight pressure on the examining finger.
- 3) Moderate contraction, distinct pressure on the examining finger, and palpable upward and forward movement.
- 4) Good contraction, elevation possible against slight resistance, the fingers are pressed against each other in the direction of pubic symphysis.
- 5) Very strong muscle strength, with suction-type effect on the examining finger, these are pressed against each other in the direction of pubic symphysis.

Source: Bo and Sherburn², Laycock¹⁸.