

Original article

Hypopressive Gymnastics as a Resource for Perineal Proprioception in Women with Urinary Incontinence

Ginástica hipopressiva como recurso proprioceptivo para os músculos do assoalho pélvico de mulheres incontinentes

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Abstract

Introduction: It is widely reported in the literature that women with and without pelvic floor dysfunction have great difficulty in performing adequate contraction of the perineal muscles. Hypopressive Gymnastics could facilitate the correct understanding of contraction since that supposedly promotes reflex contraction of the pelvic floor muscles (PFM) during its implementation. **Objective:** To evaluate the function of PFM before and after hypopressive exercise protocol to improve perineal proprioception in women with stress urinary incontinence (SUI). **Methods:** Were included 14 women with SUI who underwent a protocol of 3 individual sessions with standardized content, which included learning of the hypopressive exercises in stages. After this learning period, patients underwent 12 weeks of home exercise, with monthly sessions with the physiotherapist. At each session, the patients presented diary of exercises to measure adherence. The role of PFM was measured before and after treatment by bidigital palpation, using the Oxford scale, muscular endurance and the number of rapid contractions. **Results:** Was observed improvement in all evaluated parameters of muscle function: Oxford ($p = 0.0005$), endurance ($p = 0.0001$) and number of rapid contractions ($p < 0.0001$). **Conclusion:** An increased pelvic floor muscle function was observed after performing hypopressive exercises aimed at improving perineal proprioception.

Key-words: perineal proprioception, stress urinary incontinence

Resumo

Introdução: Está amplamente descrito na literatura que as mulheres com e sem disfunção do assoalho pélvico apresentam grande dificuldade em realizar a contração adequada dos músculos perineais. A Ginástica Hipopressiva poderia facilitar o entendimento da correta contração uma vez que supostamente promove contração reflexa dos músculos do assoalho pélvico (MAP) durante sua realização. **Objetivo:** Avaliar a função dos MAP antes e após protocolo de exercícios hipopressivos para melhora da propriocepção perineal em mulheres com incontinência urinária de esforço (IUE). **Métodos:** Foram incluídas 14 mulheres com IUE que se submeteram a protocolo de três sessões individuais, com conteúdo padronizado, que incluiu o aprendizado dos exercícios hipopressivos em etapas. Após este período de aprendizado, as pacientes se submeteram a 12 semanas de exercícios domiciliares, com sessões mensais com o fisioterapeuta. A cada sessão, as pacientes apresentavam diário de exercícios preenchido para mensuração da aderência ao tratamento. A função dos MAP foi mensurada antes e após o tratamento por meio de palpação bidigital, utilizando-se a escala de Oxford, o *endurance* muscular e o número de contrações rápidas. **Resultados:** Houve melhora em todos os parâmetros de função muscular avaliados: Oxford ($p = 0,0005$); endurance ($p = 0,0001$) e número de contrações rápidas ($p < 0,0001$). **Conclusão:** Houve aumento da função muscular do assoalho pélvico após prática de exercícios hipopressivos para melhora da propriocepção perineal.

Palavras-chave: incontinência urinária de esforço, propriocepção perineal

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Introduction

According to the International Continence Society (ICS), the appropriate function of Pelvic Floor Muscles (PFM) is defined as the capability of voluntary strong contractions and involuntary contractions, which lead to circular closure of the vagina, urethra and anus, cranio-ventral movement of the perineum and the lifting of pelvic organs [1]. This contraction is important to prevent involuntary loss of urine or feces [1].

Several authors described the difficulties that women face in order to adequately contract PFM [2-4]. Among women with pelvic floor dysfunction, 37.2% was reported not to have the ability to appropriately contract PFM even after a session where orientations were provided. Moreover, 25% of these women performed the opposite contraction, the Valsalva maneuver. In a more recent study, 44.9% of women with no dysfunction was reported to be unable to contract the PFM [3]. Among incontinent women, the difficulty is even greater, affecting 65.5% [4].

Hypopressive gymnastics was proposed as an alternative for treating pelvic floor dysfunctions; the improvement of PFM proprioception was mentioned as one of the indications of this gymnastics [5,6].

These exercises are performed in three steps: 1) slow and deep inhalation, 2) complete exhalation and, 3) diaphragmatic breathing when progressive contraction of the deep abdominal muscles, intercostal muscles and lifting of diaphragmatic domes occur [5,7].

Diaphragmatic breathing presumably fosters negative pressure in the abdominal cavity and, as a reflex, it activates PFM through the contraction of abdominal fascia [5,7]. Thus, this reflex activation of PFM helps women to learn how to correctly contract them [5].

Although these indications exist, there is a lack of evidence about the effectiveness of hypopressive exercises in helping women to learn how to correctly contract their PFM. The aim of this study is to evaluate the effects of a hypopressive gymnastic protocol that helps women with urinary stress incontinence (USI) to learn how to contract PFM.

Material and methods

From February to December 2009, 14 participants were selected in the Urogynecology and Vaginal Surgery Clinic of the Universidade Federal de São Paulo (UNIFESP) in São Paulo, Brasil. Participants in this pilot study were selected through personal contact.

Inclusion criteria were the presence of USI, with no sphincter defects, confirmed by urodynamic study. Exclusion criteria were: presence of degenerative illnesses, decompensated diabetes and high blood pressure, and previous physiotherapy treatment for USI.

Those patients, who gave their consent to participate in the study, signed the free informed consent approved by the Ethic Committee of the UNIFESP by means of the protocol n. 1978/07.

In order to establish USI diagnosis, women underwent medical routine procedures (anamnesis, physical examination and gynecological examination).

Once the patient was included in the study, she was examined by a physiotherapist specialized in urogynecology who measured muscle function through bidigital palpation, using the Oxford scale, the muscle endurance test and the name of rapid contractions, also known as "fast". The abovementioned assessment was adapted to the "Perfect" method, described by Laycock *et al.* [8], widely used in literature.

Before the assessment, women were informed about the location and functions of PFM and the assessment procedure was explained in detail.

For the physiotherapy assessment, patients received orientation in order to empty their bladders and they were placed in lithotomy position. Rest time was three times longer than the length of contractions and women were asked to keep the contraction as long as possible immediately afterwards.

Proprioceptive protocol with hypopressive gymnastics consisted of 3 individual sessions for awareness and learning of exercises, once a week. These sessions were conducted by a second physiotherapist.

The first session consisted of delivering information about the location and function of PFM and abdominal muscles. Hereinafter, patients observed and located their own pelvic floor using a mirror. Immediately afterwards, they were asked to make isolated contractions of those muscles to help them in the learning process. Hypopressive gymnastics were taught in different stages. First, patients received training on diaphragmatic breathing. They were asked to breathe slowly and deeply through their noses and to exhale through their mouths the maximum amount of air possible. As they were performing this exhalation, their transverse abdominal muscles were activated. Subsequently, women received verbal commands as "put your ribs down" and "place your abdomen next to your back" in order to intensify the contraction of these muscles. Finally, they entered the third stage of hypopressive exercises which consisted of diaphragmatic breathing. According to Seleme *et al.*, during this maneuver, there is an association between the glottis closure and the abdominal vacuum movement, both backwards and upwards. This leads to negative pressure in the abdominal cavity and automatic activation of the transverse abdominal muscles of the pelvic floor [5]. It is believed that this maneuver could help women to learn how to correctly contract their PFM.

In the last session, patients were taught how to voluntarily contract their PFM in the stage of diaphragmatic breathing. Even though there was a reflex activation of these muscles, voluntary contractions were encouraged.

Exercises were performed both in standing and in lying down position. The duration of the diaphragmatic inhalation associated to the PFM contraction was boasted after the initial assessment of each woman's PFM.

After the training period, women received indications for doing exercises at home. The recommendations were: 4 to 6 repetitions of the exercise in a lying down position; 4 to 6 repetitions of the exercise while standing, twice a day, doing, in total, from 16 to 24 repetitions per day.

During the period established to make exercise at home, women filled in a diary of exercises and received phone calls every 15 days from the physiotherapist who offered clarifications and encourage them. In addition, patients received a card of exercises where each stage was explained in detail to make the learning process easier.

After one month, patients returned to the physiotherapist consultation. The Hypopressive gymnastics protocol was remade and the duration of the contraction was intensified according to the natural rhythm of the training process seeking an increased use of those muscles involved in the strengthening process and avoiding the adaptation of the muscle [8]. This protocol was followed for three months (12 weeks). At the end of this stage, patients were reassessed.

In relation to the statistical analysis, data were analyzed using the specialised software SPSS 13.0. Firstly, a descriptive statistics was conducted (frequency, mean and standard deviation), subsequently, analytical statistics was performed, using the T Student test to assess the differences among quantitative parametric variables, and Chi-square test to analyse ordinal variables. Confidence interval employed was 95% and values considered significant –those where $p < 0.05$ – were highlighted with an asterisk.

Results:

Among the 14 women selected for this study, 12 completed the treatment. Patients' mean age was 57.6 (± 8) years old. Average Body Mass Index (BMS) as 27.7 (± 6.5) kg/m². Number of pregnancies was 3.5 (± 1.6) and number of vaginal childbirth was 2.5 (± 1.8).

In relation to the assessment of PFM, results found are presented in Table I.

Table I. Assessment of Pelvic Floor Muscles, measured using bidimensional ultrasound and bidigital palpation at the beginning and at the end of treatment.

Variable	Initial	Final	p value
Oxford	1.6 (± 0.6)	2.8(± 0.5)	P=0,0005*
Endurance (sec.)	2.7 (± 1.8)	5.3(± 2.1)	P = 0.0001*
N. of fast contractions	3.4 (± 1.3)	7.3(± 1.9)	P < 0.0001*

*Values obtained with T Student Test

Regarding the variables measured using the diary of exercises, during the first month of treatment, patients reported to have performed the exercises 27.5 days on average. During the second month, women reported to have performed the exercises 27 days and, during the third month, 29, on average.

In relation to urinary incontinence, all women were reported to have unintentional losses of urine at the beginning of treatment (n=12). At the end of treatment, four patients reported not to have involuntary losses of urine any longer and seven patients reported to have experienced a significant improvement. At the beginning of treatment, six patients had uncontrollable leakage, wetting their clothes and suffering from embarrassment. When treatment ended, only one remained with these symptoms.

Discussion

Specific training for PFM is widely described in the literature as a key to treat stress incontinence [10] and, recently, it has also been recognized as a valuable tool for overactive bladder and genital prolapse [11].

Nevertheless, in order to implement specific training, it is necessary to ensure a correct contraction of the PFM. It would be worthless to make countless series of exercises, including rapid and slow contractions, if the movement performed during the training is not correct.

In 1952, Arnold Kegel described the correct contraction of PFM, which implies closure around pelvic floor orifices and upwards cranio-ventral movement of the organs. Recently, many authors have described studies that assessed the ability of correct contraction of PMF among women with no PFM dysfunction [2-4, 13]. Other authors affirm that studies in the field of perineal awareness and training for performing appropriate contractions should be a priority for researches working in the area of pelvic floor [14]. This pilot study was aimed at assessing the effect of a Hypopressive Gymnastics programme in the learning process for the correct contraction of PFM.

PFM function was measured before and after the training by means of bidigital palpation, using the Oxford scale or muscle endurance and the number of fast contractions. According to Bo and Morkved [14], bidigital palpation is one of the main methods for assessment employed by physiotherapists and, even nowadays, when many other technological methods exist for assessment (ultrasound, magnetic resonance imaging (MRI)), palpation remains as one of the most common methods for assessment.

Patients who correctly contract PFM should present values over 3 in the Oxford scale, not affecting other muscle groups such as adductor, abdominal or gluteus muscles [15]. In our study, the muscle function of the pelvic floor before treatment, measured with the Oxford scale was 1.6 (± 0.6)

considered a weak muscle function. On the other hand, after a training period using Hypopressive gymnastics to teach how to correctly contract these muscles, an improvement of the muscle function was observed, with a corresponding value of 2.8 (± 0.5), close to the considered ideal function.

The muscle endurance rose from 2.7(± 1.8) seconds to 5.3 (± 2.1) seconds ($p=0.0001$) and the number of fast contractions rose from 3.4 (± 1.3) to 7.3 (± 1.9) ($p < 0.0001$). Patients received indications to perform diaphragmatic breathing, that is to say, to hold the contraction for as long as possible. This can be the origin of the significant improvement in the duration of the contraction.

Regarding hypopressive technique, there is a lack of studies that provide real evidence of what happens with the diaphragm and the PFM. Those authors who advocate for this technique affirm that the lifting of diaphragmatic domes and PFM occurs as a consequence of the diminished pressure exerted on the abdominal cavity during the diaphragmatic breathing maneuver. Recently, Talasz *et al.* [16] reported an intimate correlation between the movement of the diaphragmatic domes and the pelvic floor through MRI. Their results proved that when the diaphragm is pushed down, during inhalation, the pelvic floor also goes down; and that during exhalation, the contrary happens, the diaphragmatic domes go up because the lungs empty and the pelvic floor goes up proportionally. These results come to terms with the statements of other authors that second hypopressive exercises regarding the synchronic movement of the respiratory diaphragm and the pelvic floor.

In this study, the adherence was measured through diaries of exercises. In the first months, patients practiced the exercises 27.5 days on average, on the second month, 27 days and in the last month, 29 days on average. These data show a high adherence to treatment.

Even if exercises for the pelvic floor are not invasive, have no side effects and are not expensive, some factors such as the low adherence to treatment, the low motivation of patients and the lack of appropriate understanding of the therapy can interfere in the results of this therapeutic approach [17]. This fact did not happen in the present study, where adherence to treatment was high.

Literature points out some determinant factors for the success of this therapy such as the understanding of the exercises and the awareness of one's own body. On the other hand, negative factors would be the lack of comprehension of the guidelines provided and the fact of not performing the exercises everyday. In case the training is inappropriate, it can lead to unsatisfactory results and frustration [17].

In this study, patients received indications to locate the PFM and to learn their function and this helped to raise

gymnastics was greatly accepted by patients in this study, maybe due to the fact that it considers the individual in a holistic way and in different postures, and it includes respiration and posture in practice.

Nonetheless, hypopressive exercises still need to be compared to other techniques of perineal awareness described in the literature.

Therefore, suggestions for new studies including other awareness techniques and other assessment techniques of the pelvic floor, such as the electric activity and the muscle volume must be taken into consideration by researchers in this field.

Conclusion

Hypopressive gymnastics presented positive results for the improvement of the perineal proprioception, which were observed through muscle function. Patients showed a high adherence to treatment.

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