THE RELATIONSHIP BETWEEN STRESS URINARY INCONTINENCE AND EXERCISES IN NULIPAROUS WOMEN

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ABSTRACT

The etiology of the Stress Urinary Incontinence (SUI) is multifactorial. An etiologic factor may be the kind of physical activity, when a chronically increased intra-abdominal pressure is created and the pelvic floor is damaged. It is known that the athletes' abdominal musculature strength tends to be high. However, there is doubt about the athletes' pelvic floor strength: is it stronger due to the increased overall muscle fitness or "weaker" because of the high intra-abdominal pressure that they are submitted to for a long period of time? If there is "weakness" of this musculature, the result may be loss of urine when submitted to physical effort and predispose young and nulliparous women, even in the absence of other risk factors for SUI. The objective of this study is to compare the pelvic floor strength and abdominal muscles between a group of athletes and groups of sedentary women, both nulliparous, and evaluate the influence of the abdominal force on the pelvic floor. A

descriptive and comparative study was realized among 8 nulliparous women, being 7 them 4 volleyball players and 4 sedentary students average age 20,29 Í 3,66. They were submitted to a questionnaire and a physical examination, where it was evaluated the abdominal strength subjectively and pelvic floor strength objectively. The athletes had better results in the tests of abdominal and muscular pick of contraction of the pelvic floor than the sedentary ones, however there were no significant statistical differences. This suggests there is a larger propensity to develop SUI, in case there is significant increase in intra abdominal pressure. For this, however, more comparative studies with objective values and normality parameters are necessary.

KEY WORDS: Stress Urinary Incontinence; intra-abdominal pressure; pelvic floor; athletes

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INTRODUCTION

According to the International Continence Society (ICS) urinary incontinence is due to the involuntary loss of urine that is both a social and an sanitary problem. The Stress Urinary Incontinence (SUI) is defined by the ICS as a involuntary leakage of urine when the vesical pression exceeds the maximum urethral pressure in the absence of activity of the detrusor muscle. The intra-abdominal pressure increases during daily life activities such as exercising, or because of coughing or sneezing.

SUI is not only a geriatric problem and its prevalence in middle aged women is 30% (WEINBERGER, 1995) and this percentage reaches 47% in women that regularly practice exercises and only 30-35% of these women seek medical attention (NYGAARD et al., 1990). The issue of SUI in physically active women has been reported in recent years by many authors. Nygaard et al. (1994) in the exam of 144 nuliparous elite athletes reported 28% (40) experiencing episode of UI during exercise. The activities most related to the urinary loss were jump with open legs (30%), jump with closed legs (28%), running (30%), sports involving ground impact (14%). In a group of 290 patients, the rate of UI in physically active females is 30%, and UI amounts to 20% in women who quit working out due to incontinence (NYGAARD et al., 1990).

Among young, nuliparous, physically active women, that do not show other potential risk factor for UI, an important etiological factor can be the type of physical activity they practice and that can

cause chronically elevated intra-abdominal pressure on the pelvic floor. According to Kulpa (1996) almost half the women that practice exercises regularly have symptoms of UI and, although the cause is most of the time multifactorial, the physical activity tends to aggravate the problem. In this regard, health professionals should question active women on stress urinary incontinence, which is the sort of incontinence that may be associated to physical activity. Many times, those athletes with symptoms of UI use absorbent pads, modify their technique, change sport type or discontinue exercise unnecessarily due to lack of information about possible treatments.

It is known that among athletes the abdominal musculature strength tends to be high and this can be due both to the sport modality that requires this musculature and to the overall physical training to which they are submitted to. However, there is uncertainly about the strength of the pelvic floor of these athletes, whether it is strong due to the increase in the overall muscle force or whether it is "weak" due to the high intra-abdominal pressure to which they are submitted for long periods. If there is "weakness" of this musculature facing a high intra-abdominal pressure episodes of urine leakage may occur when submitted to physical distress and predispose young and nuliparous women, even in the absence of other classic risk factors, to stress urinary incontinence and genital prolapse.

The objective of the present study is to compare the strength of the musculature that of the pelvic floor musculature and of the abdomen between a group of athletes and a group of nuliparous sedentary women, and evaluate the influence of the abdominal strength on the pelvic floor.

MATERIALS AND METHODS

The study involved two groups of women. The first one included four sedentary trainees of the University Hospital of the North of Paraná. The second involved four volleyball athletes. Athletes' average age was 22 (±5,35), and sedentary women is 22,75 (±1,5). All of them were nuliparous and non virgin. A comparative study was made the groups with descriptive analysis at the mentioned hospital.

Both groups answered a questionnaire and underwent clinical exam. The questionnaire (ANNEX 1) includes identification, personal, gynecologic and obstetric record, habits, family record and questions of incontinence and physical activity. The questionnaire was objective with closed questions suggesting

possible factors that may contribute to a future predisposition to urinary incontinence.

During the clinical exam (ANNEX 2) some information was ellicitedand vital signs such as blood pressure, respiratory and cardiac frequency, weight, height and body mass index were checked. Two tests were made, one for abdominal strength an other of pelvic floor strength.

The force of the upper and lower abdominal muscles was tested and graded according to Kendall. In the test for the upper abdominal muscles the women were positioned in dorsal decubit position with stretched legs. When a posterior pelvic inclination was prevented by shortening of the hip flexors, a polling device was put under the knee. Afterwards, they were asked to perform a slow rolling, completing the vertebral spine flexion, followed by hip flexion, which faces strong resistance against the abdominal muscles. This test was rated 10, 8, 6 and 5. *Grade 10* = normal: when the individual was able to flex the vertebral spine and keep it flexed while in phase of hip contraction with the hands crossed behind the head. *Grade 8* = good: when she could flex the spine and keep it flexed during all the movement with the arms crossed over the thorax. *Grade 6* = regular +: when able to perform the same movement with arms stretched ahead. *Grade 5* = regular: when she could flex the spine with the arms stretched ahead, but unable to keep it flexed during the phase of hip flexion.

In the test for lower abdominal muscles the women were positioned in dorsal decubit with stretched legs in vertical position together with arms crossed over the thorax. They were told to rectify the lumbar spine and keep it in this position while moving the legs down slowly. The examiner focused on the lumbar and pelvic regions during the movement. The force was graded according to the capacity of keeping the lombar spine rectified during the test. The angle between the legs and the table indicated the degree of muscular strength. The graduation varied from 10 to 5, being 10 normal (0º) and 5 regular (75º).

To test the muscular strength of the pelvic floor it was used a perineometer (Peritron 9300+). It has an anatomical pneumatic device with 11 cm length and 2.7 cm diameter that was introduced in the vaginal channel of the tested women. After inflation to 100cmH_2O with a syringe, the women were asked to contract the perineum that was kept according to the command of the examiner during the expiration. At the end, the perineometer registered the peak and the average contraction in cmH_2O, beside the time of contraction in seconds. The evaluation of the muscular strength of the pelvic floor was performed three times in each women without analyzing the use of the accessory musculature.

Among the three attempts of contraction the best peak was focused and the mean and standard deviation was calculated based on the data of the selected attempt in both groups. Through the *test–t* the statistically significant difference among the athletes and the sedentary ones was calculated.

RESULTS

The questionnaires revealed that no women presented relevant personal record. The menstrual cycles were regular among women of the sedentary group with mean duration of 4.75 ± 2.06. In the athletes' group the cycle was irregular in 50% of cases with mean duration of 4.66 ± 0.47. The average age for first sexual intercourse in the sedentary group was 15.56 ± 1.82 and 17.03 ± 4.19 among athletes.

The athletes had been training volleyball for 7.55 ± 4.78 years. In the analysis of the urinary continence all women reported being continent during their daily-life activities, including during efforts that increase the intra-abdominal pressure. Only one athlete reported an episode of mictional urgency.

At the clinical exam, vital signs were normal. The body mass index among sedentary was 19.9 ± 7.05 and 18.66 ± 1.72 among the athletes. In 100% of the cases it was detected muscular strength of the upper abdominals with grade 10 (normal). In the sedentary the grade was 10 in 25%, 8 in 50% (good) and 6 (regular+) in 25% (FIGURE 1). In the analysis of the lower abdominals 50% had grade 7 (good-), 25% grade 8 (good) and 25% grade 6 (regular+). In the group of sedentary the lower abdominal had grade 6 (regular+) in 50%, grade 5 (regular) in 25% and 7 in 25% (FIGURE 2).

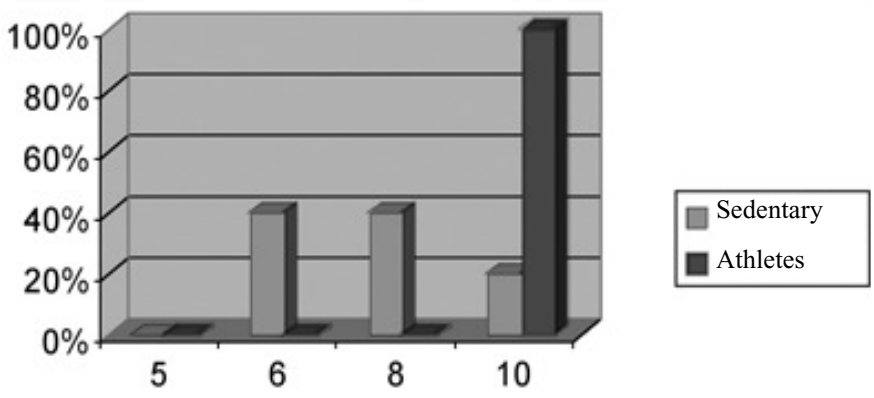

FIGURE 1 – Result of test for the upper abdominals between the groups of sedentary and athletes.

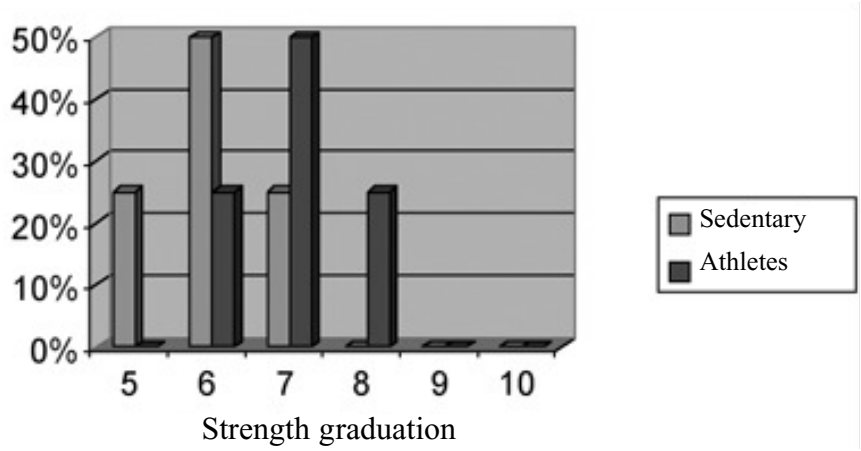

FIGURE 2 – Result of test for the lower abdominals between the groups of sedentary and athletes.

In the evaluation of the muscular strength of the pelvic floor the perinemometer revealed a mean peak of 175.75 ± 7.82 in athletes and 167.75 ± 7.08 in the sedentary women. The mean contraction force was 114.75 ± 1020 in the athletes and 131.5 ± 8.2 in the sedentary group. The mean contraction duration for the athletes was 16.5 ± 1.65 and 12.5 ± 0.8 for sedentary (TABLE 1).

TABLE 1 – Distribution of results for perinemometer test between the two groups.

Groups	Peak (cmH_2O)	Mean (cmH_2O)	Duration (seconds)
Sedentary	167.75 ± 7.08	131.5 ± 8.2	12.5 ± 0.8
Athletes	175.75 ± 7.82	114.75± 10.2	16.5 ± 1.65
Test t	0.23	0.068	0.007*

* Indicates difference with statistical significance in the duration of the contraction between sedentary and athletes ($p<0.05$).

The lombar-pelvic synergism was present in all women and the pelvic movements of anteroversion, retroversion and inclination considered satisfactory.

DISCUSSION

According to the objective of the study, that is, to verify whether the musculature of the pelvic floor in athletes is strong due

to general physical training or whether it is weak due the high intra-abdominal pressure that it is submitted to for a long period, it was verified through an objective value that the strength of this musculature in athletes shows a contraction peak superior to that of sedentary women. However, there is no significant statistical difference ($p>0.05$). From these data it is supposed that athletes show greater number of rapid contraction fibers (type II), used in great effort activities, such as those demanded in the studied sport modality, which explain the result.

In what regards the mean contraction, the sedentary group showed greater value if compared to the athletes'. This leads to the presumption that there is a greater oscillation in the strength of athletes since the contraction peak is superior. However, in none of these values did the difference statistical significance ($p>0.05$). In relation to the duration of the contraction the athletes had a better result with difference with statistical significance ($p>0.0.05$), making them keep the contraction for a longer time than the sedentary women.

In general terms, the abdominal musculature in athletes shows greater strength, both superior and lower abdominals, which can be a factor for increased intra-abdominal pressure. With these results it is possible to affirm that the intra-abdominal pressure in these volleyball athletes has a great impact in the pelvic floor.

Since volleyball is a high impact sport on the ground, viscera suffer the same acceleration and desacceleration than the rest of the body, and the pelvic floor has desacceleration function for these viscera and the abdominals the function of supporting of posture and contention of viscera during the shock on the ground. In this way, both shock of viscera and the pressure created by the abdominal musculature on the pelvic floor demand from the later a stronger contraction. However, are no studies showing objective data on the ideal muscular strength to support this sudden increase in pressure.

The present study concluded that there is no statistically significant difference between the contraction force of the pelvic floor of athletes and sedentary women, which explain a greater propension in stress urinary incontinency among nuliparous athletes.

With the result of the abdominal tests it was observed that the force of contraction of the upper abdominals was greater than that of the lower ones, both in athletes and in sedentary women. This bring about some discussion on the effectiveness of the test with regard to the equivalence of the graduation between the upper and lower abdominal or whether, in a generic way, the lower abdominals are really weaker than the upper abdominals. According the Guedes (1997), there is a tendency of weakening of the lower abdominal

wall due to obesity, sedentarism, age and loss of muscular tonicity. However, in athletes these factors do not exert influence, which suggests that others, such as a great training of the upper abdominals, the gravity, and the increase of the intra-abdominal pressure acting on the lower region, could have some influence.

The study could not draw objective data to evaluate the strength of the abdominal musculature and the intra-abdominal pressure, thus not allowing an effective comparison with the objective data on the strength of the pelvic floor musculature. However, it is not possible to affirm that the greater incidence of urinary incontinence in nuliparous athletes occur due to the high intra-abdominal pressure created by the abdominal musculature or whether the strength of the pelvic floor is enough to keep the continence during the efforts, since there are no normal parameters both in sedentary and athletes. Besides that, the sample size did not allow for reliable conclusions regarding the levels of significance adopted.

CONCLUSION

It was possible to verify that, despite the greater abdominal strength, the athletes are able to keep the continence, but this do not exclude the possibility of this being a possible risk factor to the development of Stress Urinary Incontinence. To arrive at this conclusion more comparative studies with objective values and the existence of parameters of normality would be necessary.

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ANNEX 1

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Questionnaire:

Identification:

Name:
Age: Civil status:
Occupation:
Origin:
Color: ( ) white ( ) black ( ) yellow

Personal antecedents:

Dou you have or had any of the following diseases:
( ) diabetes ( ) hypertension ( ) cardiac diseases
( ) lung diseases

Gynecologic and obstetric antecedents:

At which age you had the first menstruation?
Your menstrual cycle is: regular ( ) irregular ( )
If regular, how many days it takes?
Which is your period of menstruation?
How many absorbents do you use a day?
Dou you have or had any of the following gynecologic problems:
( ) mioma ( ) prolapse ( ) urinary infection ( ) urinary incontinency
Did you had any gynecologic surgery? ( ) yes Which?
( ) no
Do you have or had sexual intercourse? yes ( ) no ( )
At which age you had your first sexual intercourse?
Did you use anticonceptionals? ( ) yes since when?
( ) no
You are a mother? ( ) yes How many children?
( ) no
Your deliver was: ( ) normal ( ) cesarian
Did you had any problem during pregnancy? ( ) yes which?
( ) no
Do you have any history of abortion? yes ( ) how many ( )
no ( )

Habits:

Do you smoke? Yes ( ) since when? How many packs a day?
No ( )

Do you drink? Yes ( ) since when?
No ( )

Family story:

Any member of your family has any of the following diseases:
( ) diabetes ( ) hypertension ( ) cardiac diseases
( ) mioma ( ) prolapse ( ) urinary incontinency
( ) lung diseases

Incontinency:

How many glasses of water do you take a day?
How many times do you urinate a day?
Can you retain urination? yes ( ) no ( )
Do you miss urine while couching or laughing? yes ( ) no ( )

Do you miss urine during sports? yes ( ) no ( )

Physical activity:

Do you practice sports or any physical activity: yes ( ) which?
no ( )
Since when?

Did you practice any other sort of physical activity? yes ( )
Which?
no ( )
Since when?

ANNEX 2

Physical examination:

Name:
BP: RF: CF:
Weight: Heigth: IM:

Muscle force:

Upper abdominals: ( ) grade 10 (normal)
( ) grade 8 (good)
( ) grade 6 (regular+)
( ) grade 5 (regular)
Lower abdominals: ( ) grade 10 (normal) = 0º
( ) grade 9 (ggod+) = 15º
( ) grade 7 (good-) = 30º
( ) grade 6 (regular) = 60º
( ) grade 5 (regular) = 75º

Perineometer:

	Peak	Mean
Duration		
1º attempt:		
2º attempt:		
3º attempt:		

Lumbar-perlvic synergism

( ) absent ( ) present ( ) satisfactory