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THE EFFECT OF ANKLE INCLINATION IN SUPINE POSITION ON THE ELECTROMYIGRAPHIC ACTIVITY OF PELVIC FLOOR MUSCLES IN WOMEN WITH AND WITHOUT STRESS URINARY INCONTINENCE: PRELIMINARY RESULTS FROM A PILOT STUDY

Hypothesis / aims of study

Pelvic floor muscle (PFM) training is the first line treatment for female stress urinary incontinence (FSUI). Actually it is not well known which is the best position to facilitate PFM activity. Significant differences have been found in resting PFM activity (PFMa) in women with FSUI changing ankle position during a standing posture (1), whilst no data are available on the effect of ankle inclination on PFMain the supine position. We carried out this study to assess this aspect in women with and without FSUI.

Study design, materials and methods

A total of 40 women were selected: 20 (mean age 40 years, range 28-49) complained of FSUI, and 20 (mean age 26, range 18-35) were healthy volunteers. Exclusion criteria were: musculoskeletal problems; previous major abdominal or pelvic surgery; severe diseases; diabetes mellitus, a body mass index >30 kg/m2; intraureterine device implantation; pelvic organ prolapse, menopause. An electromyographic (EMG) biofeedback instrument using surface electrodes was employed to measure changes in PFMa. During EMG recordings, each subject was asked to perform PFM 5s-contractions while assuming the following different supine positions: ankles relaxed in a neutral position (NP), hips and knees at right angle (RA), ankles dorsiflexed at 0°(0DS), 5° (5DS), 10° (10DS), and 15° (15DS), and ankles plantar flexed at 5°(5PS), 10°(10PS) and 15° (15PS). None of the patients had never been instructed to perform PFM exercises before the enrolment. Resting and maximal PFMa (μV) was recorded as median values and interquartile range (IQR). The Wilcoxon signed-ranks test and the Mann-Whitney test were used to perform comparisons of the different procedures conducted on each subject and between continent and incontinent groups, respectively (P value ≤0.05) .

Results

Incontinent women were older than continent (P<0.001). Table I shows median values and IQR of resting and maximal PFMa in the different analysed positions in all the selected subjects. Table II shows the P values of differences in PFMa among the various postures of resting and maximal contractions in both the analysed groups. Resting PFMa in 10PS and 15 PS was greater in the incontinent group (P<0.020 and P<0.030, respectively).

Table I. Median values and IQR of resting and maximal PFMa in the different position

Position	Resting PFMa (IQR)	Maximal PFMa (IQR)	P value
Incontinent women			
NP	20.0 (18.8-28.3) μV	234.0 (180.0-541.3) μV	<0.001
RA	27.0 (24.8-42.0) μV	187.8 (138.5-320.3) μV	<0.001
0DS	28.0 (20.8-30.3) μV	192.3 (140.5-347.3) μV	<0.001
5DS	27.0 (22.0-31.8) μV	209.8 (125.0-327.0) μV	<0.001
10DS	26.5 (20.5-27.3) μV	212.0 (136.9-269.5) μV	<0.001
15DS	27.5 (20.5-32.3) μV	184.5 (152.5-266.3) μV	<0.001
5PS	25.5 (17.8-29.0) μV	226.3 (159.0-262.5) μV	<0.001
10PS	21.5 (19.0-27.5) μV	208.0 (170.1-261.5) μV	<0.001
15PS	20.0 (17.0-27.0) μV	197.0 (176.8-256.3) μV	<0.001
Continent women			
NP	15.5 (14.0-25.0) μV	367 (145.5-525.4) μV	<0.001
RA	28.0 (18.3-33.0) μV	194.0 (113.9-248.8) μV	<0.001
0DS	27.0 (14.0-39.3) μV	296.0 (156.6-457.1) μV	<0.001
5DS	22.5 (15.0-30.0) μV	265.8 (116.8-491.8) μV	<0.001
10DS	18.5 (13.0-25.3) μV	261.5 (120.3-483.4) μV	<0.001
15DS	23.5 (15.75-34.0) μV	230.5 (130.1-449.3) μV	<0.001
5PS	18.0 (13.0-25.3) μV	296.0 (118.9-428.8) μV	<0.001
10PS	16.0 (13.8-24.3) μV	312.8 (158.5-498.8)μV	<0.001
15PS	16.0 (13.0-22.3) μV	337 (182.3-447.0) μV	<0.001

Table II. Comparison of median resting and maximal PFMa among the various postures in both the analysed groups. *Statistical significance

Incontinent group	Resting PFMa	Maximal PFMa	Continent group	Resting PFMa	Maximal PFMa

0DS-NP	0.20	**0.010***	0DS-NP	0.080	**0.010***
0DS-RA	0.70	0.10	0DS-RA	0.20	0.060
0DS-5PS	**0.010***	0.10	**0DS-5PS***	**0.010***	0.20
0DS-10PS	**0.020***	0.80	**0DS-10PS***	**0.020***	0.30
0DS-15PS	**0.008***	0.60	**0DS-15PS***	**0.020***	0.20
0DS-5DS	0.90	0.30	0DS-5DS	0.10	0.40
0DS-10DS	0.10	0.20	0DS-10DS	0.30	0.20
0DS-15DS	0.80	0.30	0DS-15DS	0.90	0.80
5PS-10PS	0.70	1.00	5PS-10PS	0.20	0.80
5PS-15PS	0.90	0.90	5PS-15PS	0.10	0.10
10PS-15PS	0.40	0.70	10PS-15PS	0.70	0.80
5DS-10DS	0.10	0.40	5DS-10DS	1.00	1.00
5DS-15DS	0.80	0.30	5DS-15DS	0.20	0.40
10DS-15DS	0.10	0.90	10DS-15DS	0.20	0.40
5PS-10DS	0.40	0.80	5PS-10DS	0.20	0.80
5PS-5DS	0.060	0.80	5PS-5DS	0.20	0.50
5PS-15DS	0.10	0.80	5PS-15DS	0.040	0.40
10PS-5DS	**0.040***	0.90	10PS-5DS	0.10	0.30
10PS-10DS	0.20	0.60	10PS-10DS	0.070	0.20
10PS-15DS	0.070	0.90	**10PS-15DS**	**0.006***	**0.020***
15PS-5DS	**0.020***	0.70	**15PS-5DS**	**0.030***	0.40
15PS-10DS	0.50	0.80	15PS-10DS	0.10	0.10
15PS-15DS	**0.040***	0.70	**15PS-15DS**	**0.003***	**0.010***
NP-5DS	0.10	**0.020***	**NP-5DS**	0.20	**0.010***
NP-10DS	0.50	**0.030***	**NP-10DS**	0.20	**0.002***
NP-15DS	0.080	**0.008***	**NP-15DS**	**0.050***	**0.001***
NP-5PS	0.60	0.060	**NP-5PS**	0.70	**0.010***
NP-10PS	0.60	**0.050***	**NP-10PS**	0.80	**0.020***
NP-15PS	0.40	**0.050***	**NP-15PS**	0.60	**0.040***
NP-RA	0.10	**0.030***	**NP-RA**	0.20	**0.003***
RA-5DS	0.70	0.20	RA-5DS	0.60	0.060
RA-10DS	0.20	0.20	RA-10DS	1.00	0.10
RA-15DS	0.80	0.30	RA-15DS	0.40	0.10
RA-5PS	0.090	0.50	**RA-5PS**	0.30	**0.050***
RA-10PS	0.10	0.50	**RA-10PS**	0.10	**0.010***
RA-15PS	0.20	0.30	**RA-15PS**	**0.050***	**0.005***

Interpretation of results

The maximal PFMa in any posture was greater than that during the rest periods ($P<0.001$). Concerning the resting PFMa, in both 0DS and RA it showed the greatest values, and in both 0DS and 5DS it was significantly greater than in PS ($P<0.010$). No EMG differences were found between DS, RA and NP. Concerning the maximal PFMa, no EMG differences were found between DS and PS. In contrast, a maximal PFMa was greater in NP than in RA, PS and DS, regardless angle inclination.

Concluding message

These preliminary results show that in supine position an ankle dorsiflexion at 0° may improve PFM tone, whilst ankles relaxed in a neutral position may facilitate a better maximal PFMa. References

1. Urology (2005) 66; 288-292.

FUNDING: no source of funding or grant

HUMAN SUBJECTS: This study did not need ethical approval because it is not invasive and it was carried out within an already approved rehabilitative protocol but followed the Declaration of Helsinki Informed consent was obtained from the patients.