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Polymyographic Study of the Pelvic Floor Innervation In Daily and Therapy Related Activities

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POLYMYOGRAPHIC STUDY OF THE PELVIC FLOOR INNERVATION IN DAILY AND THERAPY RELATED ACTIVITIES

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INTRODUCTION

The innervation characteristics of the pelvic floor muscles (PFM) in the processes of daily activities and therapy activities remains inconclusive. Current treatment and training strategies tend to concentrate on isometric activation of the target muscles and the efficiency of such activities is unknown. Knowledge about the coordinative involvement of the PFM is very important for planning preventive and therapeutic trainings strategies and concepts. The aim of this study is the evaluation of the involvement of the PFM in daily and therapy related activities. The results can promote training of the target muscle in a variety of ways.

METHODS

The 35 participants of this study were students of the German Sports University at Cologne and women of a midwife's practice. All participants were subjectively free of problems concerning incontinence and also had no specific experience with pelvic floor training. The neuromuscular activity was measured by a NORAXON EMG-System. The following muscles were detected: Mm. pelvic floor, M. obliquus internus, M. obliquus externus, M. rectus abdominis, M. longissimus, M. multifidus, M. gluteus maximus, Mm. adductors. The collection of the EMG data occurred according to the guidelines of ISEK and SENIAM. The pelvic floor muscle was recorded via a vaginal probe (Fa. Medicheck). The raw EMG was sampled with 1500 Hz in a band of 10-500 Hz. All data was analysed by the EMG software "MyoResearch XP". The raw EMG data were full wave rectified and smoothed (RMS 100 ms) and amplitude normalized to the highest activity level of a MCV test sequence. Afterwards all data were statistically analysed via a multifactorized analysis of variance by using the software EASYSTAT.

RESULTS

The results give evidence for the important duty of the PFM involvement in activities of daily living such as therapeutic investigations. In activities of daily living the PFM was seen as the most active muscle in relation the others. This would imply that they are important muscles for trunk stabilization. The study of the therapeutic investigations shows that the target muscle can be trained by many different kinds of exercises. An additionally willful activity of the PFM tends to result in more activation and can therefore be integrated in exercises of higher abdominal pressure.

n= 35		standing	lifting	p-value	standing	stabilization	p-value	standing	Crunch	p-value	standing	Leg-press	p-value	standing	spelling	p-value
Pelvic floor	x	12,92	34,06	0,001	12,92	34,58	0,001	12,92	30,7	0,001	12,92	38,23	0.001	12,92	14,88	n.s.
	s	6,6	17,35		6,6	18,22		6,6	15,04		6,6	19,86		6,6	16,88	
M. obliquus internus	x	7,33	12,31	0,001	7,33	26,1	0,001	7,33	44,17	0,001	7,33	5,17	n.s.	7,33	13,93	0.05
	s	6,23	8,36		6,23	25,03		6,23	15,7		6,23	3,54		6,23	14,59	
M. rectus abdominis	x	3,33	5,17	0.05	3,33	5,3	0,001	3,33	46,01	0,001	3,33	3,29	n.s.	3,33	3,69	n.s.
	s	3,01	5		3,01	3,19		3,01	18,18		3,01	2,55		3,01	2,3	
M. obliquus externus	x	5,38	7,72	0,001	5,38	13,07	0,001	5,38	38,1	0,001	5,38	4,96	n.s.	5,38	7,14	0.001
	s	3,31	4,52		3,31	4,55		3,31	16,52		3,31	2,94		3,31	4,61	
Mm. adductores	x	1,4	11,7	0,001	1,4	5,54	0,001	1,4	7,73	0,001	1,4	10,09	0.001	1,4	1,67	n.s.
	s	1,35	9,25		1,35	6,23		1,35	6,37		1,35	6,85		1,35	2,04	
M. erector spinae	x	3,78	25,85	0,001	3,78	11,69	0,001	3,78	8,16	0,001	3,78	12,68	0,01	3,78	5,6	n.s.
	s	2,58	11,91		2,58	8,11		2,58	4,61		2,58	9,26		2,58	5,6	
M. multifidus	x	4,08	29,99	0,001	4,08	11,76	0,001	4,08	6,98	0,001	4,08	13,78	0,001	4,08	6,64	0,05
	s	3,08	11,75		3,08	7,68		3,08	5,3		3,08	8,93		3,08	7,01	
M. glutaeus maximus	x	3,3	25,68	0,001	3,3	5,21	n.s.	3,3	4,82	0,05	3,3	17,17	0,001	3,3	4,3	n.s.
	s	3,82	15,94		3,82	4,51		3,82	3,57		3,82	8,45		3,82	5,78	

Tab. 1: Mean data (x) and standard deviations (s) and p-value of the activities standing compared to activities of daily living and therapeutic investigations.

Exercises that were combined with training machines such as the "leg-press" or the "hip adductor" yielded the greatest change. Some established exercises like voice-based or "Kegel-exercises" were unable to reach an adequate activation level (≤ 30% MVC) that is necessary for PFM training.

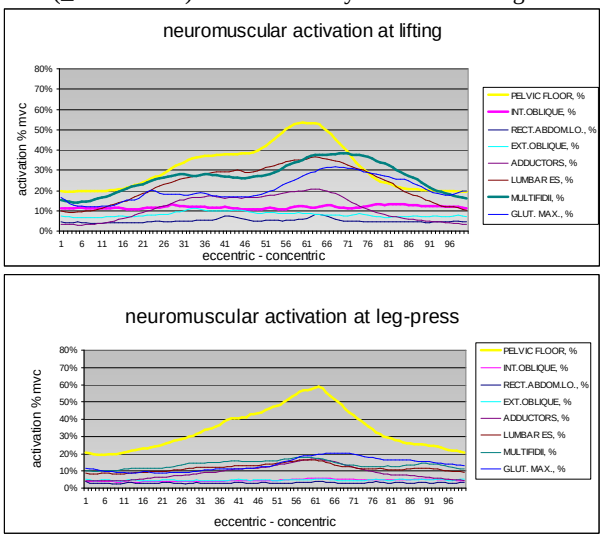

Fig. 1: The average activation profiles (N=35) of the analyzed muscles for the movements "lifting" and "leg-press".

DISCUSSION

The results show in an impressive way the importance of the integration of PFM in activities of daily living and therapeutic investigations. The data revealed that PFM can effectively be trained by dynamic exercises in preventive and therapeutic strategies. Training with both machines demonstrates high activation while the abdominal pressure is low. Furthermore, it seems reasonable to infer that with the use of complex exercises the non-voluntary activation of the PFM can be facilitated. This is important in therapeutic fields, where the effect of PFM training in the treatment of i.e. incontinence is still unclear.

CONCLUSION

The results of this study emphasizes the involvement of the pelvic floor muscle in the movements of daily activities such as therapeutic investigations. In activities of daily living PFM seem to stabilize and protect the trunk and the viscera in healthy women. The results of the therapeutic investigations seem to offer many new and more interesting possibilities of training the pelvic floor muscle. Especially for prevention, but also in therapeutic fields.

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