

HYPOPRESSIVE ABDOMINAL TECHNIQUE OR TRANSVERSUS ABDOMINIS MUSCLE CONTRACTION?: DIFFERENCES IN ACTIVATION OF PELVIC FLOOR MUSCLES AND ABDOMINAL PRESSURE.

Hypothesis / aims of study

The hypothesis of this project is that Transversus Abdominis (TrA) muscle contraction increases pelvic floor muscle (PFM) electric activity more than Hypopressive Abdominal Exercises (HAE) and HAE decrease abdominal pressure (AP) both compared with a basal state.

The aim of this study is to assess TrA muscle contraction and HAE on pelvic floor muscle electric activity and AP compared with a basal state.

Study design, materials and methods

Twenty-two urinary-continent women participated in this study. Sample size and power have been calculated with GRANMO software (Version 7.12 April 2012). Alpha and Beta risks were set as 0.01 and 0.10 respectively. Standard deviations were taken from a pilot study and minimum expected differences were taken from different RCTs(1,2). Only patients who were able to perform correct HAE were included in the study. Participants were placed in the orthostatic position of HAE. They performed randomized repeated HAE and contractions of TrA. PFM and TrA electromyography (EMG) signals and associated AP data were recorded simultaneously. AP data were recorded from a rectal pressure balloon.

The ANOVAs repeated measures with LSD Post-Hoc test were used for statistical analysis.

Results

Results are shown in Table 1. TrA contraction increases the activity of PFM more than a HAE or basal state ($p < 0.001$). However, HAE increases the activity of PFM more than basal state ($p = 0.048$). A HAE decreases AP on both the basal state and TrA contraction ($p = 0.002$ and $p = 0.047$ respectively). With regard to TrA muscles, they have more EMG activity during a voluntary contraction of themselves ($p < 0.001$), although they increase EMG activity during a HAE but not significantly ($p = 0.057$ in right TrA and $p = 0.089$ in left TrA).

Table 1: Mean differences between exercises performed and their statistical significance, according to post-hoc tests after repeated ANOVAs measurement

	(I) EXERCISE	(J) EXERCISE	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
PFM EMG LSD Post-Hoc test	BASAL	TRA	-10.4991*	2.55703	0.000	-15.6089	-5.3893
		EAH	-5.1509*	2.55703	0.048	-10.2607	-0.0411
	TRA	BASAL	10.4991*	2.55703	0.000	5.3893	15.6089
		EAH	5.3482*	2.55703	0.041	0.2384	10.4580
	EAH	BASAL	5.1509*	2.55703	0.048	0.0411	10.2607
		TRA	-5.3482*	2.55703	0.041	-10.4580	-0.2384
AP LSD Post-Hoc test	BASAL	TRA	-9.6989	7.97645	0.229	-25.6488	6.2510
		EAH	16.1644	7.97645	0.047	0.2145	32.1143
	TRA	BASAL	9.6989	7.97645	0.229	-6.2510	25.6488
		EAH	25.8633	8.06867	0.002	9.7290	41.9976
	EAH	BASAL	-16.1644	7.97645	0.047	-32.1143	-0.2145
		TRA	-25.8633	8.06867	0.002	-41.9976	-9.7290
Right TrA LSD Post-Hoc test	BASAL	TRA	-15.7950*	3.43534	0.000	-24.2445	-7.3455
		EAH	-8.2795	3.43534	0.057	-16.7291	0.1700
	TRA	BASAL	15.7950*	3.43534	0.000	7.3455	24.2445
		EAH	7.5155	3.43534	0.097	-0.9341	15.9650
	EAH	BASAL	8.2795	3.43534	0.057	-0.1700	16.7291
		TRA	-7.5155	3.43534	0.097	-15.9650	0.9341
Left TrA LSD Post-Hoc test	BASAL	TRA	-19.2213*	4.59056	0.000	-30.6182	-7.8243
		EAH	-10.4852	4.67289	0.089	-22.0865	1.1162
	TRA	BASAL	19.2213*	4.59056	0.000	7.8243	30.6182
		EAH	8.7361	4.86232	0.236	-3.3355	20.8078
	EAH	BASAL	10.4852	4.67289	0.089	-1.1162	22.0865
		TRA	-8.7361	4.86232	0.236	-20.8078	3.3355

PFM: Pelvic Floor Muscles, EMG: Electromyography, AP: Abdominal Pressure TRA: Transversus Abdominis Muscle, HAE: Hypopressive Abdominal Exercise.

Significant differences are gray shaded.

Interpretation of results

In accordance with Sapsford and Hodges group, TrA contraction is the one which has increased more PFM EMG (2). PFM activation during an HAE was greater than the basal state; nevertheless, it was significantly less than during TrA contraction. Stüpp found similar results on PFM activation (3).

There is evidence that a HAE decreases the AP (1) during its realization. This result is in line with this study.

TrA increases electrical activity during a voluntary TrA contraction but not during a HAE performance in a significant way. This fact should be investigated in further studies.

According to these results, HAE would not be the first therapeutical option to be used for increase PFM activity. In this case, TrA contractions and PFM are more appropriate techniques. On the other side, if the problem is related to a bad management of AP, the technique of choice is HAE.

Concluding message

HAE decrease AP on both TrA contractions and basal state and increase PFM activity but to a lesser extent than TrA contraction. If treatment objective is to strengthen PFM the choice technique must be related to a TrA contraction, but if the objective is to improve pressure dynamics is better to choose HAE. The technique to be used should depend on the treatment objectives.

References

1. Caufriez M, Fernández JC, Guignel G, Heimann A. Comparación de las variaciones de presión abdominal en medio acuático y aéreo durante la realización de cuatro ejercicios abdominales hipopresivos. Revista Iberoamericana de fisioterapia y kinesiología 2007;10(1):12-23.
2. Sapsford RR, Hodges PW, Richardson CA, Cooper DH, Markwell SJ, Jull GA. Co-activation of the abdominal and pelvic floor muscles during voluntary exercises. Neurourol Urodyn 2001;20(1):31-42.
3. Stupp L, Resende AP, Petricelli CD, Nakamura MU, Alexandre SM, Zanetti MR. Pelvic floor muscle and transversus abdominis activation in abdominal hypopressive technique through surface electromyography. Neurourol Urodyn 2011 November;30(8):1518-1521.

Disclosures

Funding: This study has been funded by The Nursing and Physiotherapy School of Pontifical Comillas University. **Clinical Trial:** Yes **Public Registry:** No **RCT:** No **Subjects:** HUMAN **Ethics Committee:** San Carlos Clinical Hospital Clinical Research Ethics Committee **Helsinki:** Yes **Informed Consent:** Yes