738

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EFFECT OF POSTURE ON THE REFLEX AND VOLUNTARY PELVIC FLOOR MUSCLE CONTRACTION DURING DISTRACTION TASK

Hypothesis / aims of study

In continent women, we observed that a mental distraction task (DT) altered reaction time (RT) between an order to contract pelvic floor muscle (PFM) and the onset of PFM contraction activation in sitting position (1). In the same way, during a mental DT, the RT between the initiation of cough effort (activation of the external intercostal (EIC) muscles) and the onset of the PFM contraction is delayed in sitting position (2). The aim of the current study was to evaluate whether changing body position (sitting vs standing position) had an effect on voluntary and reflex PFM contraction during a mental DT.

Study design, materials and methods

The study group consisted in 19 healthy volunteer women. As the volunteers were expected to not suffer from uro-gynecological diseases, inclusion criteria were as follows: nulliparous, no diabetes, no heart rhythm disorder, no neurological disease, no pregnancy, no urinary symptoms (UDI-6 questionnaire score equal 0), no bowel symptom (Wexner questionnaire score equal 0), no problems in understanding the language used during the trials, no cognitive depletion or dementia (Mini Mental Status questionnaire (MMS) score equal 30). Volunteers were initially evaluated with the same protocol process as we previously published (1-2). EMG recordings evaluation consisted on recording external anal sphincter (EAS) electromyographic (EMG) activity during voluntary and involuntary PFM contraction with and without a distraction task (Paced Auditory Serial Addition Task (PASAT) in a sitting and a standing position. Voluntary PFM contraction were recorded in eleven volonteers women. During voluntary PFM contraction, we mainly recorded latency between the order of PFM contraction and the onset of the EAS EMG activation (RT1). Reflex PFM contraction were recorded in nineteen volonteers women. During involuntary PFM contraction, latency between the onset of the involuntary EAS EMG activation and the onset of the EIC EMG activation (RT3) was also measured.

Results

Concerning voluntary PFM contraction, data are summarized in the table 1. There was no statistically significant difference between both position with and without DT except for RT1 without DT. Without DT, in a standing position RT1 was shorter than in a sitting position (353.99 ms vs. 409.86 ms, R=0.86, p=0.014). As we previously reported in a sitting position, in a standing position, there was also a significant difference between RT1 without and with DT: 353.99 (263.89-425.03) vs. 411.27 (330.36-501.78), respectively (R=1.16, p=0.05). Concerning reflex PFM contraction, data are summarized in the table 2. There was no significant difference between standing position RT3 and sitting position RT3. Without and with DT, RT1' seemed to be shorter in a standing position than in a sitting position (without DT, standing RT1': 585 ms vs. sitting RT1: 715 ms, R=0.82, p=0.007) With DT, standing RT1': 572 ms vs. sitting RT1: 664 ms, R=0.86, p=0.032). Without DT, RT2 seems to be shorter in a standing position than in a sitting position (621 ms vs. 742 ms, R=0.84, p=0.009). As we previously showed in a sitting position, in a standing position, there was also a significant difference between RT3 without and with DT: -96 ms (-114 ;-62) vs. -36 ms (-76 ;-3), respectively (R=0.38, p<0.001).

Table 1: Effect of body position on voluntary PFM with and without DT

No DT (n=11)				
	Sitting position	Standing position	R	p
RT 1 (ms) (median) (IQR)	409.86 (361.86-461.90)	353.99 (263.89-425.03)	0.86	0.014 ¥
Duration of the contraction (ms) (median) (IQR)	1212.73 (905.95-1396.25)	1223,84 (943.45-1488.69)	1.01	0.206 ¥
Area under the curve of EAS EMG activity (mv sec)	0.0271 (0.018-0.031)	0.024 (0.016-0.033)	0.89	0.966 ¥
DT (n=11)				
	Sitting position	Standing position	R	p
RT 1 (ms) (median) (IQR)	452.53 (358.33-517.86)	411.27 (330.36-501.78)	0.91	0.123 ¥
Duration of the contraction (ms) (median) (IQR)	1068.37 (859.52-1199.87)	1192.90 (934.52-1425.59)	1.12	0.365 ¥
Area under the curve of EAS EMG activity (mv sec)	0.021 (0.015-0.027)	0.023 (0.015-0.032)	1.07	0.831 ¥

R, ratio (distraction task/without distraction task); DT, distraction task; EAS, external anal sphincter; EIC, external intercostal muscle; EMG, electromyographic; RT, reaction time; RT1, latency between stimulus and onset of EAS EMG activation. ¥ Wilcoxon test.

Table 2: Effect of body position on reflex PFM with and without DT

No DT (n=19)				
	Sitting position	Standing position	R	p
RT 1' (ms) (median) (IQR)	715 (585-861)	585 (407-683)	0.82	0.007 ∨
RT3 (ms)(median) (IQR)	-34 (-67;8)	-36 (-76;-3)	1.06	0.860 ∨
Duration of the contraction (ms) (median) (IQR)	911 (580-1182)	974 (677-1239)	1.07	0.515 ∨
Area under the curve of EAS EMG activity (mv sec)	0.0141 (0.006-0.021)	0.014 (0.008-0.017)	0.96	0.595 ∨
DT (n=19)				
	Sitting position	Standing position	R	p
RT 1' (ms) (median) (IQR)	664 (501-830)	572 (452-716)	0.86	0.032 ∨
RT3 (ms)(median) (IQR)	-80 (-100;-51)	-96 (-114;-62)	1.2	0.225 ∨
Duration of the contraction (ms) (median) (IQR)	1029 (607-1380)	933 (639-1130)	0.91	0.568 ∨
Area under the curve of EAS EMG activity (mv sec)	0.017 (0.008-0.023)	0.015 (0.011-0.018)	0.87	0.352 ∨

R, ratio (distraction task/without distraction task); DT, distraction task; EAS, external anal sphincter; EIC, external intercostal muscle; EMG, electromyographic; RT, reaction time; RT1', latency between stimulus and onset of EAS EMG activation; RT3, latency between onset of EIC EMG activation and onset of EAS EMG activation. ∨ Wilcoxon test.

Interpretation of results

Independently of the DT condition, EMG activation (ie. area under the curve) of the voluntary or of the reflex PFM were equal in the standing and sitting position. These finding were different than those previously reported by Capson et al. (3). They observed that in a normal standing position EMG activation of the PFM was higher than in a lying or standing position with hypo or hyperlordosis. However, Capson et al. (3) used an intravaginal probe (Periform™) whereas we used surface electrode. As previously reported by Capson et al. (3), during cough, we didn't find any influence of body position on the timing of PFM contraction. However, RT to voluntary contract PFM was shorter in a standing position, meaning that continent women were more able to contract faster their PFM in a standing than in a sitting position, in order to avoid urinary leakage. DT had the same impact on voluntary and reflex PFM contraction in a standing or in a sitting position.

Concluding message

Body position only influence RT of voluntary PFM contraction. Influence of DT on the voluntary and reflex PFM, was the same wathever the body position.

References

1. Thubert T, Deffieux X, Jousse M, Guinet-Lacoste A, Ismael SS, Amarenco G. Influence of a distraction task on pelvic floor muscle contraction. Neurourol Urodyn. 2015 Feb;34(2):139-43.
2. Thubert T, Villot A, Billecocq S, Auclair L, Amarenco G, Deffieux X. Influence of a distraction task on the involuntary reflex contraction of the pelvic floor muscles following cough. Neurourol Urodyn. 2017 Jan;36(1):160-165.
3. Capson AC, Nashed J, Mclean L. The role of lumbopelvic posture in pelvic floor muscle activation in continent women. J Electromyogr Kinesiol Off J Int Soc Electrophysiol Kinesiol. févr 2011;21(1):166-77

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