

## THE EFFECT OF DIFFERENT POSTURES ON THE RESTING ACTIVITY OF THE PELVIC FLOOR MUSCLES

### Hypothesis / aims of study

Previous research has documented that the local stabilizing muscles of the lumbo-pelvic region (transverse fibres of internal oblique and superficial lumbar multifidus) are activated in upright lumbo-pelvic postures (sitting and standing) and relax in passive postures (slumped sitting and sway standing) [1]. There is some evidence that the PFM are similarly activated in 'very tall' upright sitting and relaxes with slump sitting [2] suggesting a postural bias to its function. To date there is no evidence that the pelvic floor relaxes in sway standing when compared to upright standing or slump compared to lumbo-pelvic sitting postures. The aims of this study were (1) to determine whether there is a difference in the electromyography (EMG) of the pelvic floor in upright postures (erect lumbo-pelvic sitting and standing) compared with passive postures (slump sitting and sway standing) and (2) to compare the resting activity of the PFM in recumbent compared with upright postures.

### Study design, materials and methods

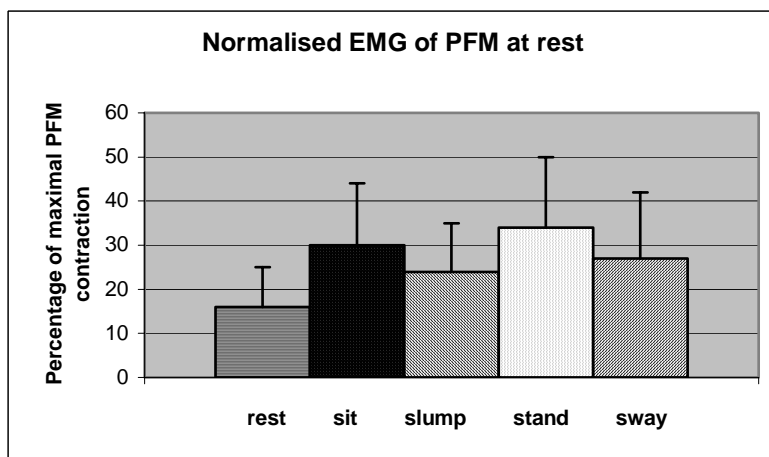
A repeated measures study design was used to compare the resting activity of the PFM in different postures. Twelve healthy continent, female volunteers were recruited from the community. Exclusion criteria were: pregnancy and symptoms of low back pain. Ethical approval and written informed consent were obtained before testing. All women were assessed using a Periform vaginal electrode to record the surface EMG activity from the PFM. The subjects were tested in five positions: (1) supine lying knees flexed to 60°, (2) lumbo-pelvic sitting with a neutral pelvic tilt and lumbar lordosis, (3) slump sitting, spine relaxed into flexion with posterior pelvic tilt, (4) upright standing, with the shoulder and hip (greater trochanter) directly in line with the lateral malleolus of the ankle and (5) sway standing, defined as a relaxed standing posture in which the pelvis translated anteriorly relative to the trunk. Three repeat, 3-second measures, of the resting PFM EMG were recorded in the five positions. The EMG data were normalised to the maximum voluntary PFM contractions in each subject. Paired *t* tests were used to detect a difference in PFM resting activity in the active compared with the passive postures and between supine and the upright positions.

### Results

Subjects had a mean (SD) age 35(9), BMI 22(2), and median (range) parity 0 (0-3). The mean (SD) of the PFM activity expressed as a percentage of maximal PFM contraction is displayed in Fig 1.

There was a significantly greater level of PFM activity in lumbo-pelvic sitting when compared with the slump sitting posture ( $p = 0.02$ ). Similarly there was greater PFM activity in upright standing when compared with the sway stand position ( $p = 0.005$ ).

The pelvic floor was more active in both the upright sitting ( $p = 0.03$ ) and standing ( $p = 0.001$ ) and sway stand ( $p = 0.043$ ) postures when compared to supine. There was no difference in the level of PFM activity in supine compared with slump sitting ( $p = 0.192$ ).



**Figure 1**

Normalised EMG of the pelvic floor at rest expressed as a percentage of maximal PFM contraction in five positions: supine (knees flexed), erect sitting, slump sitting, erect standing, sway stand

### Interpretation of results

The results demonstrate that upright postures result in tonic activation of the pelvic floor and the level of activity of the PFM is significantly influenced by the exact posture adopted. This data concurs with previous studies [2, 3]. Aligned

upright lumbo-pelvic postures facilitate PFM activity and passive lumbo-pelvic postures (slump sitting and sway standing) decrease PFM activity. These findings emphasize the importance of postural rehabilitation in women with incontinence undertaking PFM training. Furthermore women who habitually adopt passive postures may deactivate and potentially decondition the PFM. This gains significance given that many women at risk of bladder control disorders spend substantial amounts of time in passive postures (older persons in nursing homes, postnatal mothers sitting to feed their baby, or standing in sway postures with a baby on the hip).

#### Concluding message

Pelvic floor muscle resting activity increases as the body is upright and is influenced by lumbo-pelvic posture in these positions. The adoption of passive postures such as slump sitting and sway standing has an inhibitory effect on the level of PFM activity. Postural reeducation and training in upright functional positions is recommended as part of a PFM training program.

#### References

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3. *Etiology of the resting myoelectric activity of the levator ani muscle: physioanatomic study with a new theory.* World J Surg, 2003. **27**(3): p. 309-14.

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**HUMAN SUBJECTS: This study was approved by the Curtin University Human ethics committee and followed the Declaration of Helsinki Informed consent was obtained from the patients.**