

GENDER RESPONSES TO SITTING IN AUTOMOBILE AND OFFICE SEATS – INFLUENCE OF HIP AND HAMSTRING FLEXIBILITY ON SEATED POSTURES

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INTRODUCTION

Sustained lumbar spine flexion, characteristic of both office (Beach et al., 2005) and automobile (Harrison et al., 2000) sitting, is considered an important factor in hypothesized LBP-generating mechanisms. Consequently, understanding factors that influence lumbar flexion in these seated exposures may be used to help those who experience LBP while seated. The purpose of this study was to examine the influence of gender and hip/hamstring flexibility on lumbo-pelvic postures adopted when performing laboratory-simulated computer work and automobile driving.

METHODS AND PROCEDURES

Ten female and 9 male university student volunteers were exposed to 10 minutes each of the abovementioned sitting conditions. Accelerometers, taped to the skin over the sacrum and L1 spinous process, were used as inclinometers (c.f., Hansson et al., 2001) to characterize sagittal lumbo-pelvic postures while sitting. ANOVAs (general linear model) with one within-subject factor (sitting condition) and one between-subject factor (gender) were used to compare lumbo-pelvic postures. Correlation analyses were performed between lumbo-pelvic postures and various measures of hip and hamstring flexibility. $P < 0.05$ was considered to be statistically significant.

RESULTS

When driving, females displayed 9.8 degrees more posterior pelvic tilt ($P = 0.0329$) and 10.5 degrees more lumbar flexion ($P = 0.0116$) than males with respect to their lumbo-pelvic alignments in upright standing. When performing seated computer work, it was males who experienced greater posterior pelvic tilt ($P = 0.0048$) (Figs. 1 and 2).

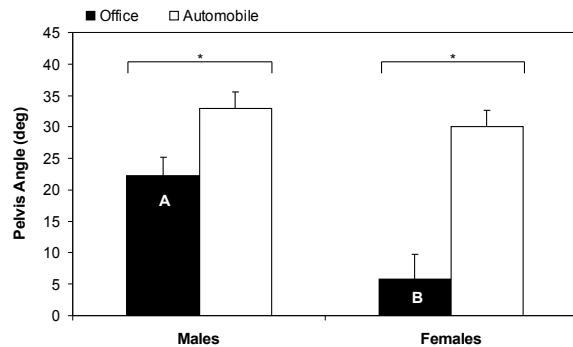


Fig. 1. Mean (SEM) posterior pelvic tilt angles during sitting. “A” and “B” indicate that posterior pelvic tilt angles were significantly different between genders during office chair sitting.

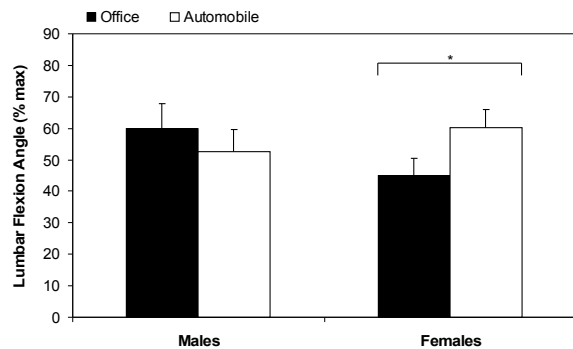


Fig. 2. Mean (SEM) lumbar flexion angles during sitting.

Results of flexibility tests are summarized in Table 1.

Table 1. Summary of flexibility test results. Mean (SEM) values are provided. Larger magnitudes represent greater flexibility.

	Hip Flexibility, deg	Hamstring Flexibility, deg	Sit-and-Reach, cm
Females	107 (3.9)	251.9 (6.6)	34.5 (2.4)
Males	97.2 (3.4)	239.8 (1.4)	24.9 (2.6)
<i>p</i> -value	0.0725	0.1020	0.0132*

* indicates that female flexibility was significantly greater than that of males.

Individuals who exhibited greater posterior pelvic tilt in office chair sitting, typically males, were those with less hip ($r = -0.5484$; $P = 0.0150$) and less hamstring ($r = -0.4690$; $P = 0.0496$) flexibility (Fig. 3). Individuals with greater hip flexibility, typically females, adopted lumbar flexion postures closer to their voluntary end-range while driving ($r = 0.5709$; $P = 0.0107$) (Fig. 4).

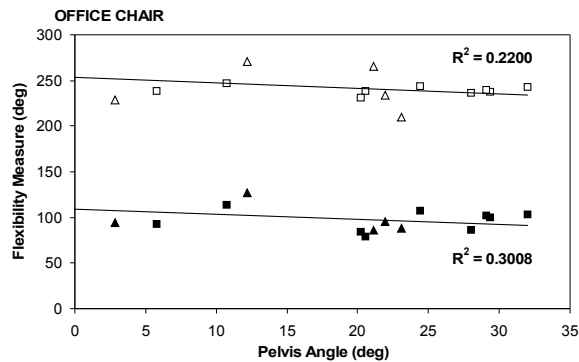


Fig. 3. Relationship between pelvic tilt angles in office chair sitting and hip (■ males; ▲ females) and hamstring (□ males; △ females) flexibility. Positive (negative) pelvic tilt angles represent posterior (anterior) rotation with respect to vertical.

DISCUSSION

The results of this study suggest that individuals with lower hip and hamstring flexibility experience greater posterior pelvic tilt in office chair sitting, but more lumbar spine flexion in automobile driving. Given

that differences existed between males and females with respect to various indices of hip and hamstring flexibility, it is possible that gender-based differences observed in seated lumbo-pelvic postures were related to these inherent differences in flexibility between the sexes.

CONCLUSIONS

The findings of this study suggest that strategies to prevent LBP associated with sitting depend on both individual characteristics and the type of seated exposure. With apparent increases in sedentary occupational and recreational activities, more studies are warranted to determine if gender-based postural differences in sitting are related to other anthropometric differences, or if improving hip and specifically hamstring flexibility would be associated with different seated lumbo-pelvic postures.

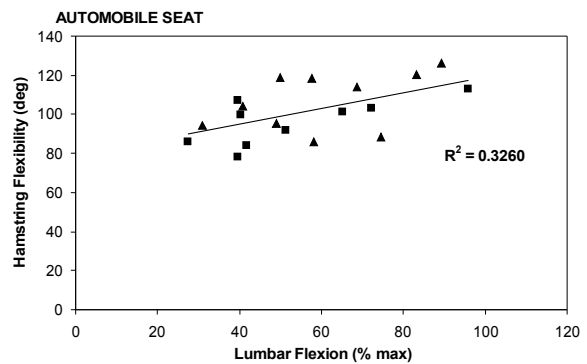


Fig. 4. Relationship between hamstring flexibility and lumbar flexion postures in automobile driving (■ males; ▲ females).

REFERENCES

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