

Kinematic gait differences between females with and without chronic Non-Specific Back Pain, and the effect of breast support garments on gait and pain

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Summary

Female specific factors are poorly incorporated in clinical guidance for chronic musculoskeletal pain. This study explored the effect of different breast support garments on pain and gait kinematics of females with and without chronic non-specific back pain (NSBP). Significant differences were observed between groups, and different breast support conditions contributed to normalising gait and reducing pain. Future management approaches for chronic NSBP should be patient-focused, considering female specific factors including bra fit and breast support.

Introduction

The prevalence of neck and back pain is greater in females compared to males [1,2]. Female specific considerations in healthcare and research are essential to improving care and reducing inequalities. Such underpinning factors may include breast and bra related differences [3].

This study explored gait differences between females with and without chronic Non-Specific Back Pain (NSBP), and the effect of different breast support garments on pain and gait kinematics amongst participants with chronic NSBP.

Methods

Healthy control females [CTRL] (n=24) were examined wearing their usual bra [UB] as a measure of normative data. Females with chronic NSBP [NSBP] (n=24) were examined first wearing their UB as a baseline measure, and then in two intervention bras; (a brand new professionally fitted standard bra [SB], and a bespoke fit alternative bra [AB]). The SB and ABs were worn for 4-weeks in randomised order before post-intervention effects were examined. Inter-segmental spinal and pelvis kinematics were collected using Qualisys motion capture. NSBP symptoms were measured via Numerical Rating Scales and the Short-Form-McGill Pain Questionnaire-2. Statistical tests explored between group [CTRL-NSBP] differences and intervention effects [UB-SB-AB].

Results and Discussion

Participants with NSBP demonstrated significantly greater sagittal plane Range of Motion (RoM) between the lower lumbar and pelvis and between the upper and lower lumbar segments. Similarly, they had greater frontal plane RoM between the lower lumbar and pelvis, and greater transverse plane RoM between the upper and lower thoracic segments was also seen (Table 1). Within the NSBP group, the SB reduced sagittal plane RoM between the lower lumbar and

pelvis compared to the UB, and the AB reduced frontal plane RoM between the upper and lower lumbar segments compared to the UB. Clinically important and statistically significant differences in pain measures were noted between intervention bras, with the SB and AB consistently reducing pain compared to the AB.

Table 1: Between group differences. Median (Q1 / Q3) with Mann-Whitney-U tests. Statistical significance set at p<0.05. * Indicates statistical significance

Segment	RoM	CTRL	NSBP	sig.
LL: pelvis	Sagittal	6.1 (4.0/7.1)	8.9 (5.6/14.7)	0.003*
	Frontal	4.6 (3.2/5.3)	6.2 (4.1/10.0)	0.007*
UL:LL	Sagittal	7.1 (4.3/9.7)	10.0 (7.8/15.8)	0.004*
	Transverse	5.4 (3.3/8.1)	7.1 (5.2/10.4)	0.048*
UT:LT	Transverse	3.0 (2.1/4.1)	4.2 (2.7/5.4)	0.040*

CTRL – Healthy control group in the UB, **BP** – Back pain group in the UB
LL – Lower Lumbar, **UL** – Upper Lumbar, **LT** – Lower Thoracic, **UT** – Upper Thoracic

Table 2: Intervention effects. Median (Q1 / Q3) with Friedman tests. ^A indicates significant difference between conditions.

Segment	RoM	UB	SB	AB	sig.
LL: pelvis	Sagittal	8.9 ^A (5.6/14.7)	7.1 ^A (4.1/7.9)	7.1 (5.0/9.7)	0.018*
	Frontal	6.1 ^A (4.5 / 8.2)	5.2 (4.3/8.1)	5.0 ^A (3.3/7.3)	0.048*

UB – Back pain group in the Usual Bra **SB** – Back pain group in the Standard Bra **AB** – Back pain group in the Alternative Bra **LL** – Lower Lumbar **UL** – Upper Lumbar

Conclusions

Individuals with chronic NSBP exhibit greater intersegmental spinal RoM during gait compared to healthy individuals. The intervention bras elicited intersegmental spinal and pelvis kinematic changes during gait, both which were reflective of normalising gait, comparable with the healthy individuals in the CTRL group. Assessment and management of chronic NSBP should be patient-focused, considering female specific factors like bra fit and breast support.

References

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- [3] Haworth L et al (2023) *Prosthet Orthot Int.* **48**(2),213-22