The effects of a sacroiliac belt on postural control: A pilot study

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Aims

- Investigate a method of measuring the effects of a pelvic belt on postural control;
- so that the use of the belt may be included in the management of patients with hypermobile SIJs.

Many patients experience pain relief when using a pelvic belt

Belt 1

Belt 2

Studies have indicated that:

- the mobility of the sacroiliac joints (SIJs) is restricted by application of a belt, and
- the force required for relief is small [1].

In our clinical practice, observation of postural sway is noted for patients considered to have hypermobile SIJs, as indicated by:

- a positive arm fossa test (SOT Category II) [2], or
- positive Hochman's Standing Stress Test [3].

Experimental

Number of subjects = 19

Types of belts:
Belt 1: a pelvic belt manufactured for the Anglo-European College of Chiropractic
Belt 2: a commercial Serola belt

Test conditions: feet apart and eyes opened for 60 seconds
C1: without a belt
C2: with Belt 1
C3: with Belt2

Equipment: Force Plate Model OR6-7 AMTI

Measurement: CoP X and CoP Y as a function of time
Measurements were repeated 3 times

Others: Arm fossa and standing stress tests were performed on each subject to check for sacroiliac hypermobility.

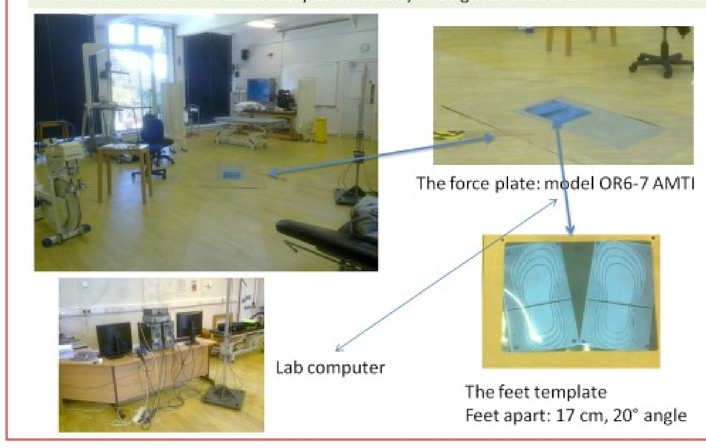
Other variables:

Postural Study Subject Details

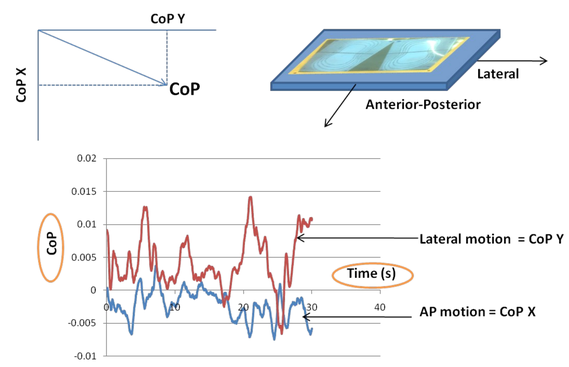
SUBJECT	Unit	10	11	12	13	14
DAY	counter	4	4	4	4	4
DATE	Jun 2011	15/6	15/6	15/6	15/6	15/6
TRIAL RANGE	data log	1-9	10-18	19-27	28-36	37-45
AGE RANGE	years	60-65	60-65	35-40	60-65	60-65
HEIGHT	cm	171	169	172	155	162
WEIGHT	kg	96	85	69	70	73
FOOT SIZE	cm	26	28	26	24	24
RECENT PAIN	Y/N	Y	N	N	N	Y
STANDING TEST	L/-/R	Cat III	R	R	_	_
ARM FOSSA	L/R UMS/LLL	Cat III	R LLL	R LLL	_	_
BELT ORDER	O/1/2	102	102	201	120	021
BELT SIZE	S/M/L	L,4	L,4	M,3	M,3	M,3
TRIALS/BELT	number	3	3	3	3	3
RUN SEQUENCE	number	4	4	3	2	6

Methodology

The Human Movement Laboratory at University of Brighton School of Health Science



When standing upright, the whole body center of mass is continuously moving. In response, it adjust the centre of pressure , **CoP**, underneath the feet in a way that keeps the center of mass within the feet. For every CoP, there is a corresponding pair, (CoP Y, CoP X) or (lateral, AP) component.



Analysis

Sample calculation results
For a given belt: 3 trials

#6 Condition: No Belt 60 s

	Trial 1		Trial 2		Trial 3	
	COP Y	COP X	COP Y	COP X	COP Y	COP X
Mean	0.002917	0.013176	0.006398	0.008766	0.004407	0.016109
SD	0.004535	0.004847	0.003867	0.004453	0.003638	0.004011
Max	0.015099	0.022809	0.020448	0.020257	0.015062	0.025339
Min	-0.00985	0.000188	-0.00182	-0.00189	-0.0065	0.003443
Range	0.024951	0.022622	0.022271	0.022146	0.021557	0.021896

#6 Condition: With Belt1 60 s

	Trial 1		Trial 2		Trial 3	
	COP Y	COP X	COP Y	COP X	COP Y	COP X
Mean	0.003103	0.013125	0.004312	0.019505	0.003959	0.012831
SD	0.003318	0.003539	0.00446	0.003845	0.003023	0.003666
Max	0.011317	0.021378	0.017301	0.030213	0.010478	0.021553
Min	-0.00432	0.003002	-0.00585	0.010879	-0.00393	0.003374
Range	0.015637	0.018376	0.02315	0.019335	0.014412	0.018179

Measurement Results

Mean CoP

SD for Standard Deviation of CoP (sway)

Range of CoP = Max- Min

A plot of the CoP motion, termed a stabilogram, can be used to assess one's standing balance.

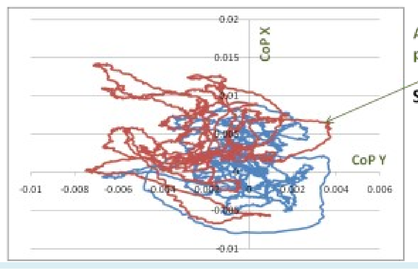
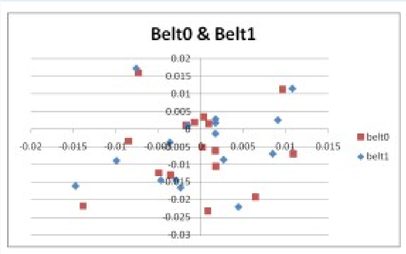
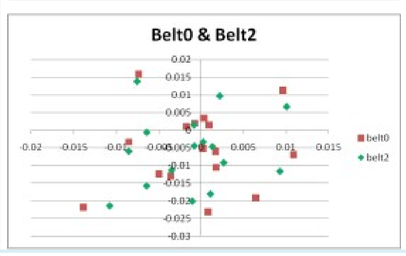


Illustration of CoP of Subjects



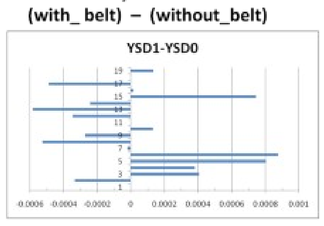


Each data point represents a subject

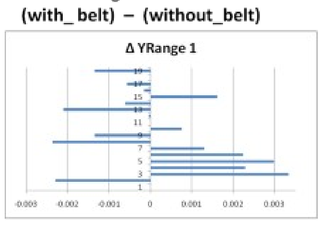
Plot of
(x-axis) Mean CoP Y (Lateral)
(y-axis) Mean CoP X (A-P)

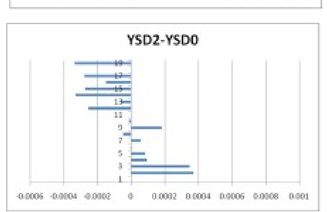
Illustration of Difference in Lateral Sway

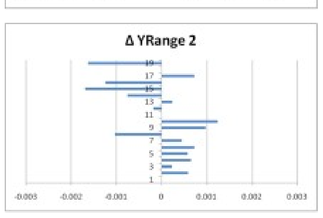
Lateral Sway Difference:
(with_ belt) – (without_belt)



Lateral Range Difference:
(with_ belt) – (without_belt)



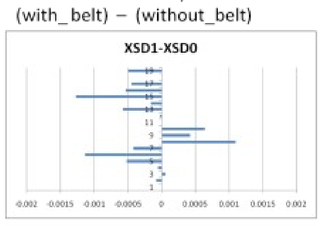




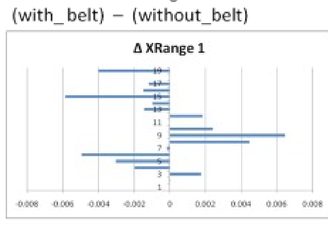
A negative value implies a reduction = less sway

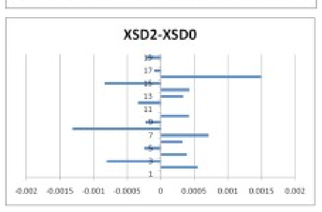
Illustration of Difference in Anterior-Posterior Sway

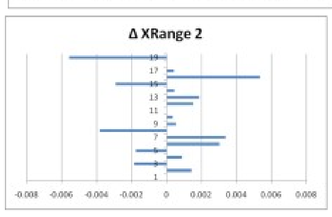
Difference in AP Sway:
(with_ belt) – (without_belt)



Difference in AP Range
(with_ belt) – (without_belt)







A negative value implies a reduction = less sway

Conclusions

- Initial SPSS analysis showed that no statistical significant difference in the measurements with and without either of the 2 belts for mean CoP, sway and range.
- There is a need to define and agree on the definition for sway area. Further calculations are yet to be performed.
- Further study is indicated with larger sample groups to include symptomatic and non-symptomatic subjects.

[1] Snijders CJ, A Vleeming A, Stoeckart R, Transfer of lumbosacral load to iliac bones and legs. Part 1: Biomechanics of self-bracing of the sacroiliac joints and its significance for treatment and exercise, Clinical Biomechanics 8 (1993) 285-294.
[2] Hestboek L, Leboeuf-Yde C, Are chiropractic tests for the lumbo-pelvic spine reliable and valid? A systematic critical literature review, Journal of Manipulative and Physiological Therapeutics 23 (2000) 258-275.
[3] Williams S, Pregnancy and Paediatrics: A Chiropractic Approach, self published, 2005, ISBN 0955132800, page 17.
[4] Karlsson A, Frykberg G, Correlations between force plate measures for assessment of balance. Clinical Biomechanics 15 (2000) 365-369.

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