

Hip joint moment change after botulinum injection in cerebral palsy

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Introduction

Cerebral palsy (CP) is a non-progressive neurological disorder. Botulinum toxin is used as an effective adjunct to other treatment options to reduce spasticity in CP. 3-D gait analysis, an accepted method for outcome evaluation in CP treatment, was used to assess the efficacy of botulinum toxin.

Aims

Retrospective evaluation of change in ranges of movement and joint moments in lower limb joints following botulinum injection.

Methods and Materials

Average age of the patients was 9 years. Group I- Ranges of movement of hip, knee and ankle were assessed in 3 dimensions, before and after injection in 15 patients. Group II- Joint moment changes in sagittal plane in three segments of stance phase were compared before and after botulinum injection in 13 patients. Segments 1 & 3 are double support. Vicon® motion system was used for gait analysis (Figure 1). Post injection assessment was done at a mean of 7 weeks after intervention. Paired t test was used for comparison of pre- and post-injection values.



Figure 1 Clinical gait analysis lab

Results

Joint angles and moments were obtained and reported as in Figure 2-3 and Table 1.

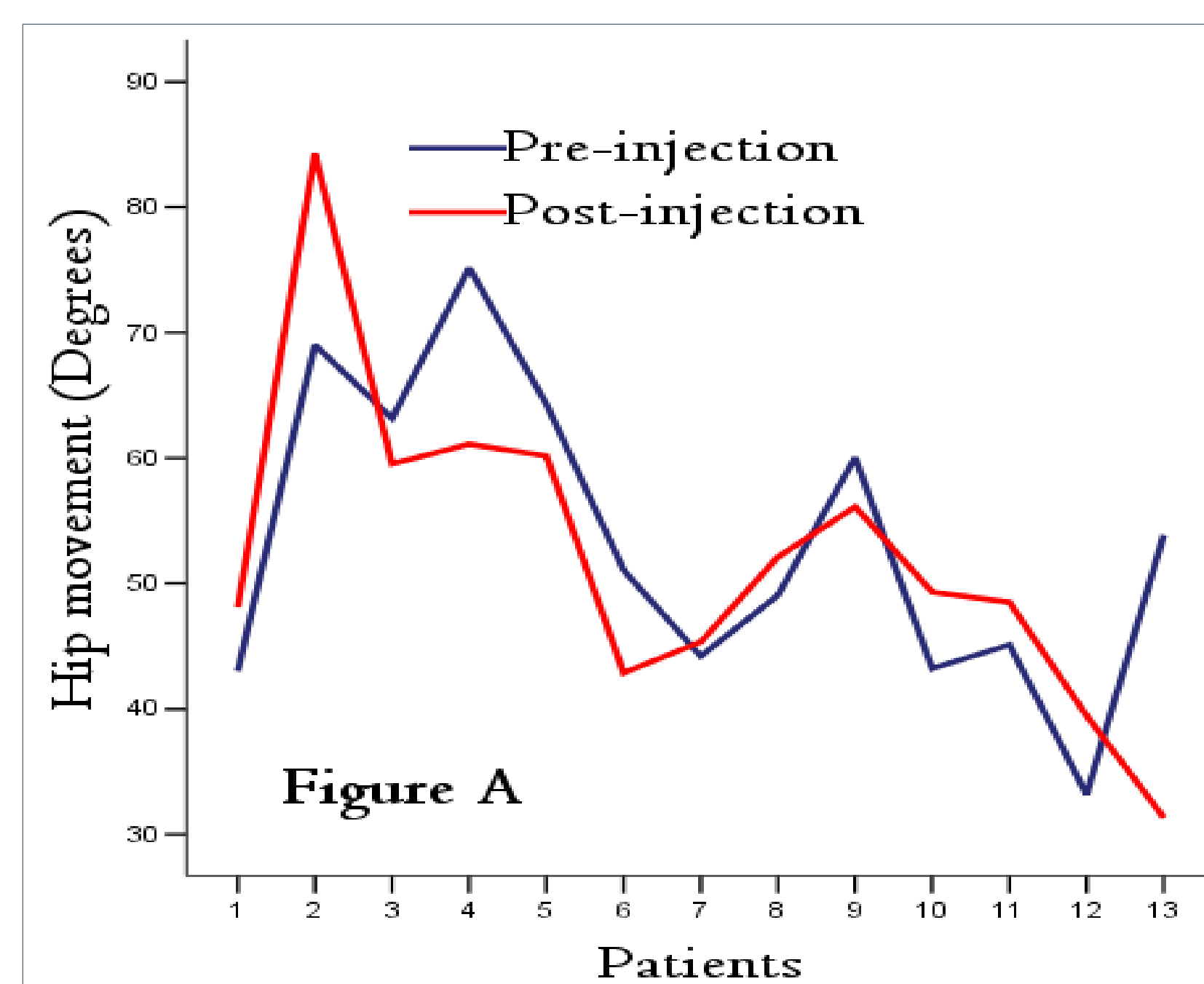


Figure 2.A Joint angles from all patients

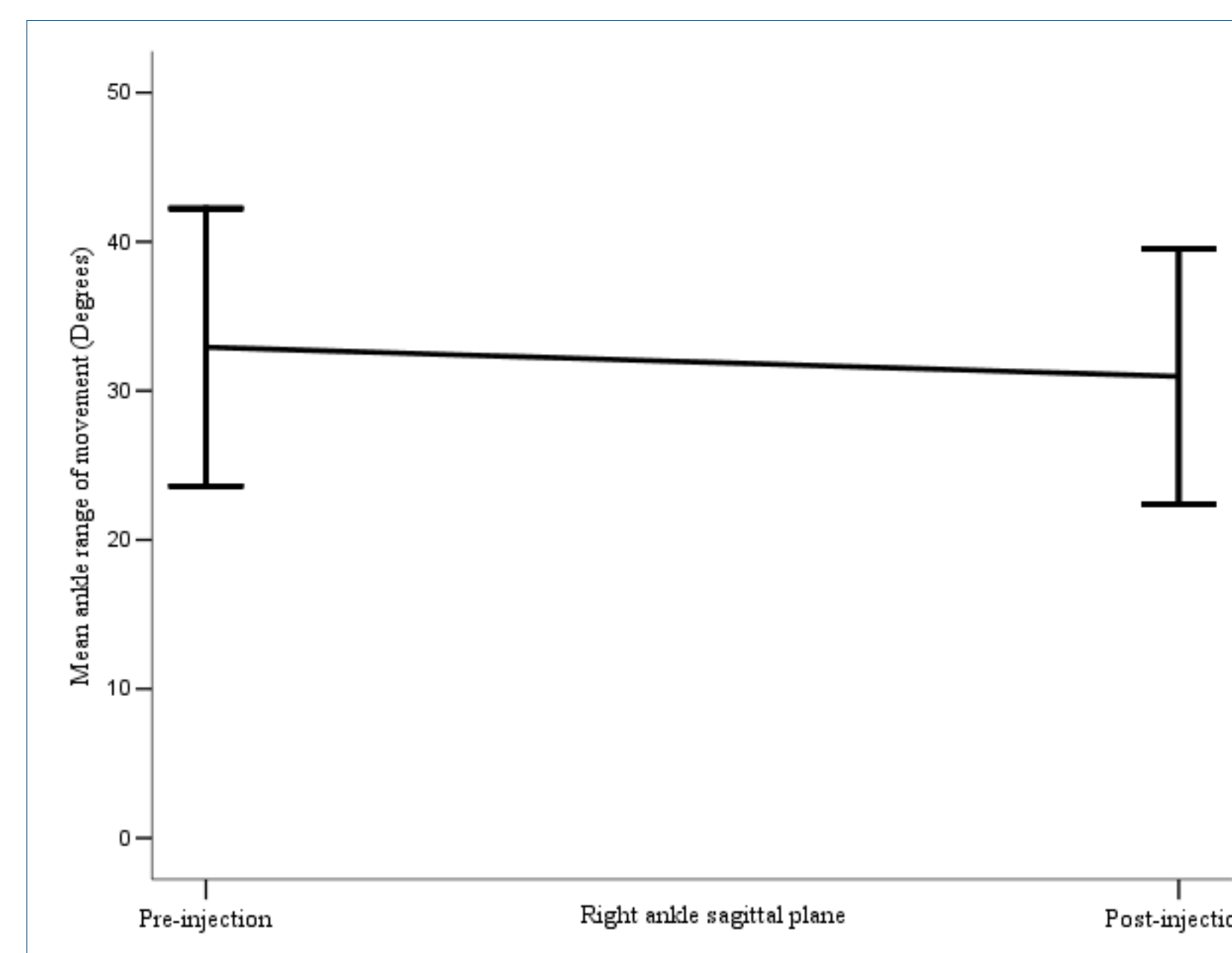


Figure 2.B Joint angle changes as group

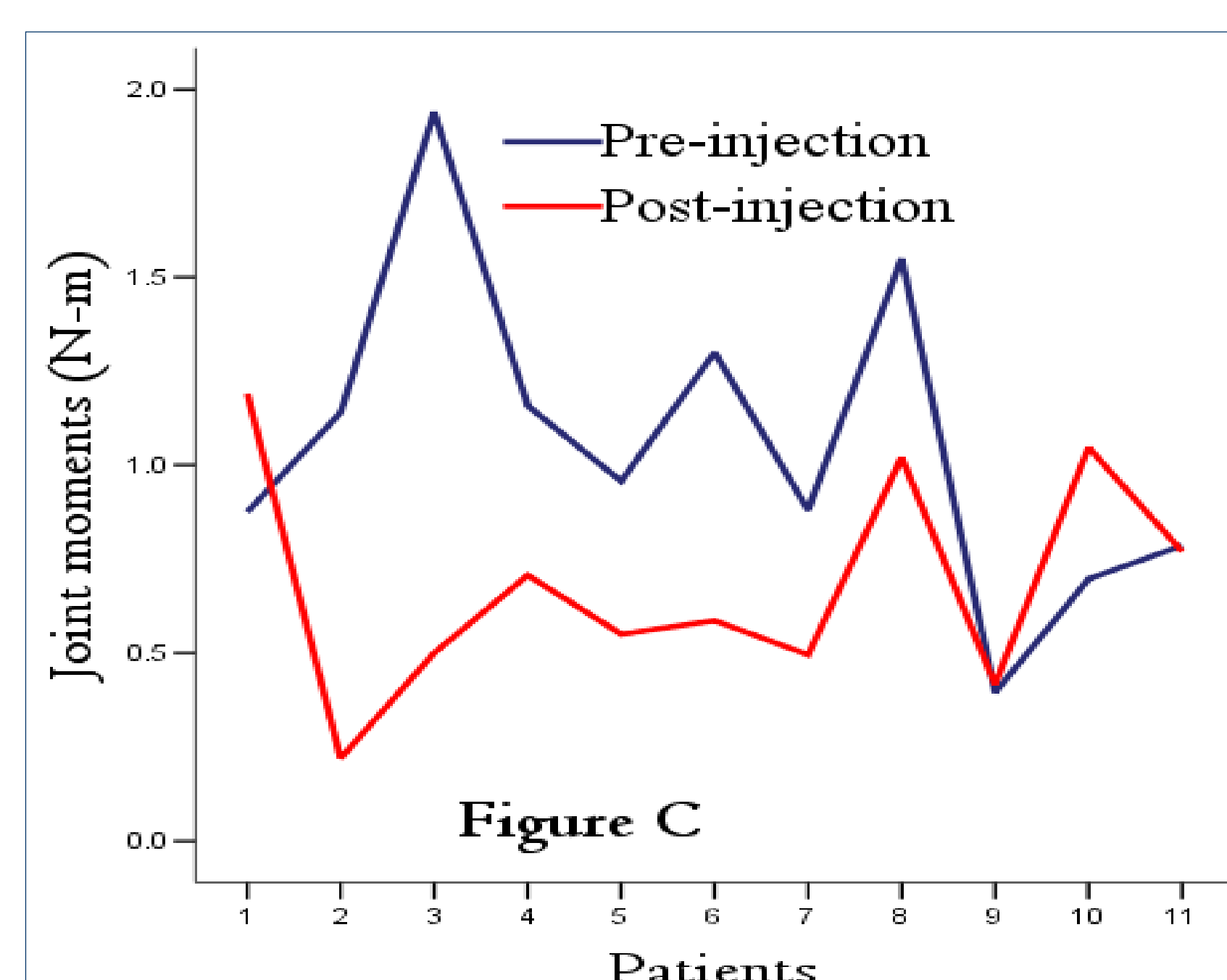


Figure 3.A Joint moments from all patients

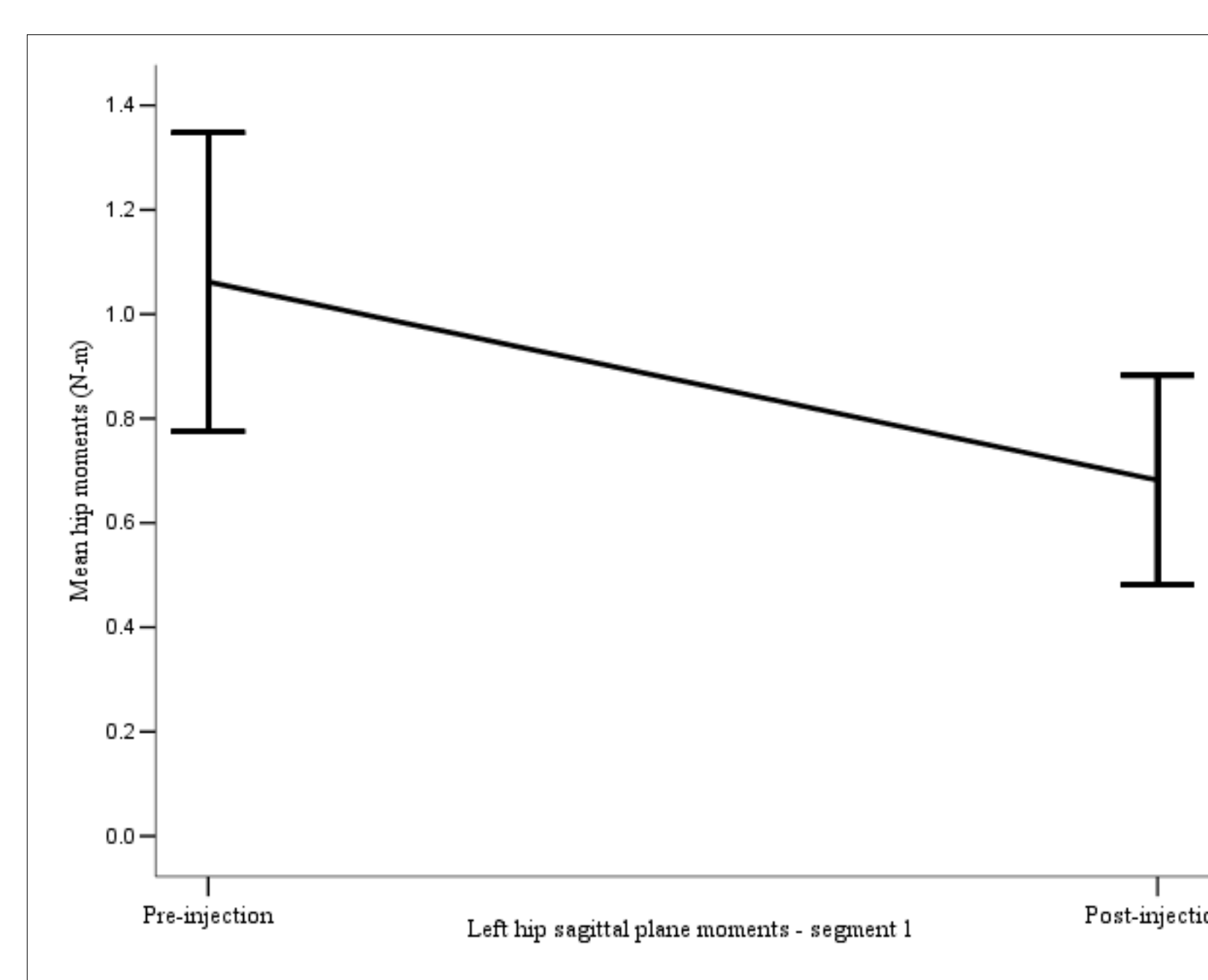


Figure 3.B Joint moment changes as group

Discussion

Movements had not changed significantly. Statistically significant difference ($p < 0.05$) was detected in the magnitude of left hip moment in segment 1 of stance phase following injection. There was significant change in the position of peak moments, changing the moment curve towards normal.

Table 1 Results for moments and related information

Parameter	Pre injection Mean	Post injection Mean	t	P, 2-tailed significance
Left Hip Segment 1 (Newton-metre)	1.06	0.68	2.353	0.04
Right Hip Segment 3 Gait position (%)	47.27	49.73	3.849	0.003
Right Knee Segment 1 Gait position (%)	7.55	11.18	3.39	0.007
Right Knee Segment 3 Gait position (%)	49.55	51.77	2.4	0.03
Left Ankle Segment 1 Gait position (%)	8.82	5.95	2.38	0.03

Conclusions

Significant reduction in magnitude of left hip moment in first segment was noted. Significant change in position of peak moments in hip, knee and ankle. No clinically or statistically significant change in range of movements. Prospective, randomised, controlled trials with larger number of patients will give stronger evidence.

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