



EFFECT OF GOLF SWING STYLES ON RESULTANT JOINT MOMENTS OF LOW BODY JOINTS AND L4/L5

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Introduction

- ❖ Recently, technical differences between one-plane and multiple-plane swing style are the most popular issues in golf swing coaching.
- ❖ One plane golf swing introduced by Jim Hardy [2] explains, the arms will be on the same plane as the shoulders at the top of the swing, whereas in a two plane swing the arms and shoulders are said to be on different planes, thus, creating two distinct movement patterns from the top of the swing through impact and follow through.
- ❖ However, there have been no investigations about the effect of two golf swing styles on low body joints and L4/L5 which may imply golf injuries
- ❖ The purpose of this study was to determine if swing style influences on the resultant joint moments of ankle, knee, hip, and L4/L5

Methods

- ❖ Six right-handed professional golfers (Handicap 1 or lower) : 3 subjects for single-plane group (height: 180.3 ± 6.4 cm; mass: 84.5 ± 16.0 ; age: 29 ± 8.5 years) and 3 subjects for multiple-plane group (height: 180.7 ± 3.2 cm; mass: 81.8 ± 9.0 ; age: 37.3 ± 16.1 years).
- ❖ RMS deviation of the club head trajectory from the swing plane was used to verify the group difference. From attached reflective markers, nineteen markers (Left ASIS, Mid-PSIS, Left lateral thigh, left lateral epicondyle, Left medial epicondyle, Left lateral shank, Left lateral malleolus, Left medial malleolus, Left heel, Left toe, Right ASIS, Right lateral thigh, Right lateral epicondyle, Right medial epicondyle, Right lateral shank, Right lateral malleolus, Right medial malleolus, Right heel, Right toe) were used (Figure1).
- ❖ The resultant joint moments of left ankle, left knee, left hip and L4/L5 were computed by inverse dynamics and assessed in a phase; from the address at ball to vertical club shaft position after impact.
- ❖ Modified Lariviere et al (1998)'s model was used for calculation of resultant joint moment of L4/L5 spine.
- ❖ Eight digital cameras were used in 60Hz..
- ❖ AMTI OR6-5 force plate was used to collect force and moment data sampled at 100 Hz.
- ❖ Kwon3D XP version was used to analyze the data
- ❖ Paired t-test was used to find if there was significant difference between two groups with SPSS v15.

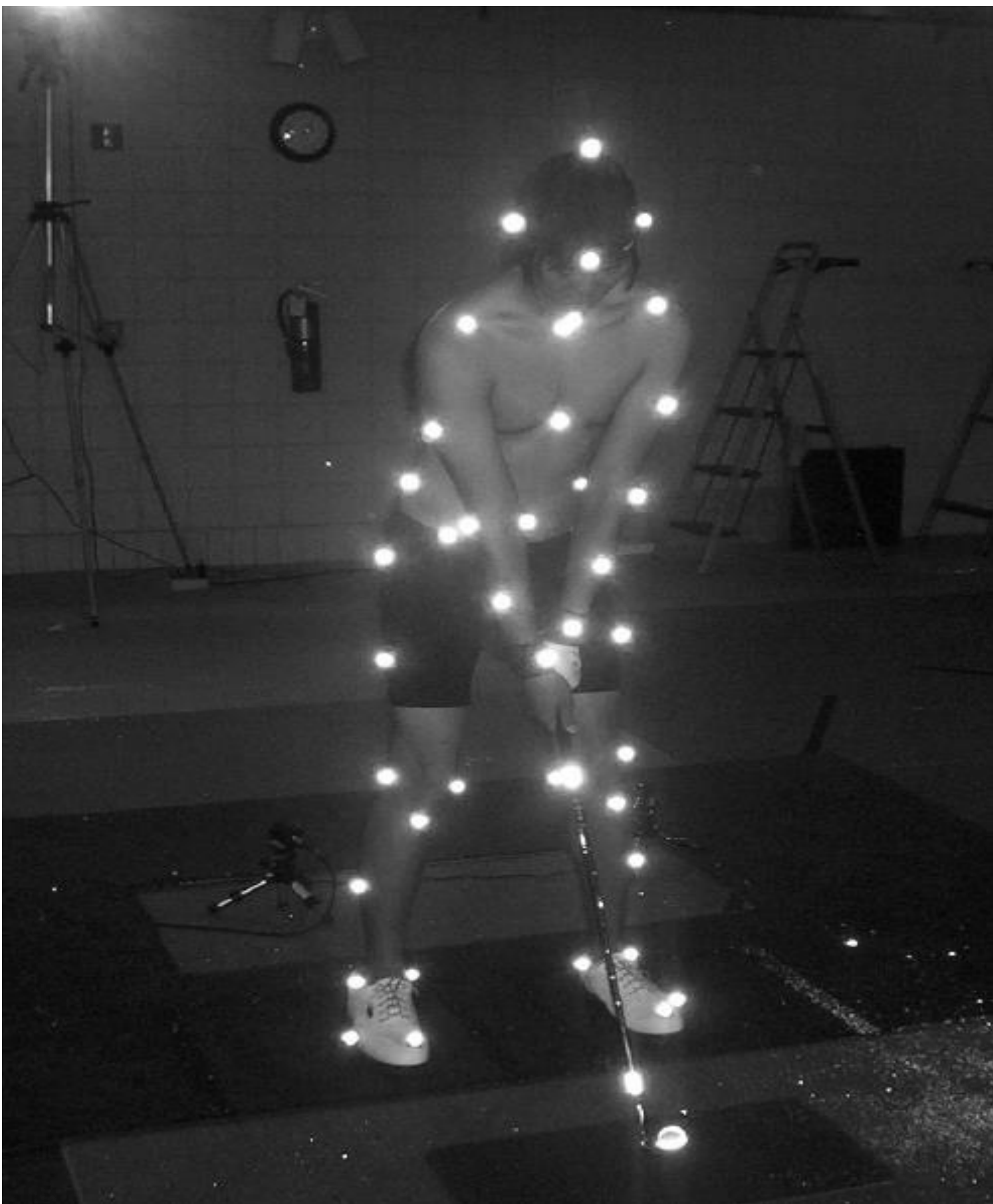


Figure 1. Marker positions

Results and discussion

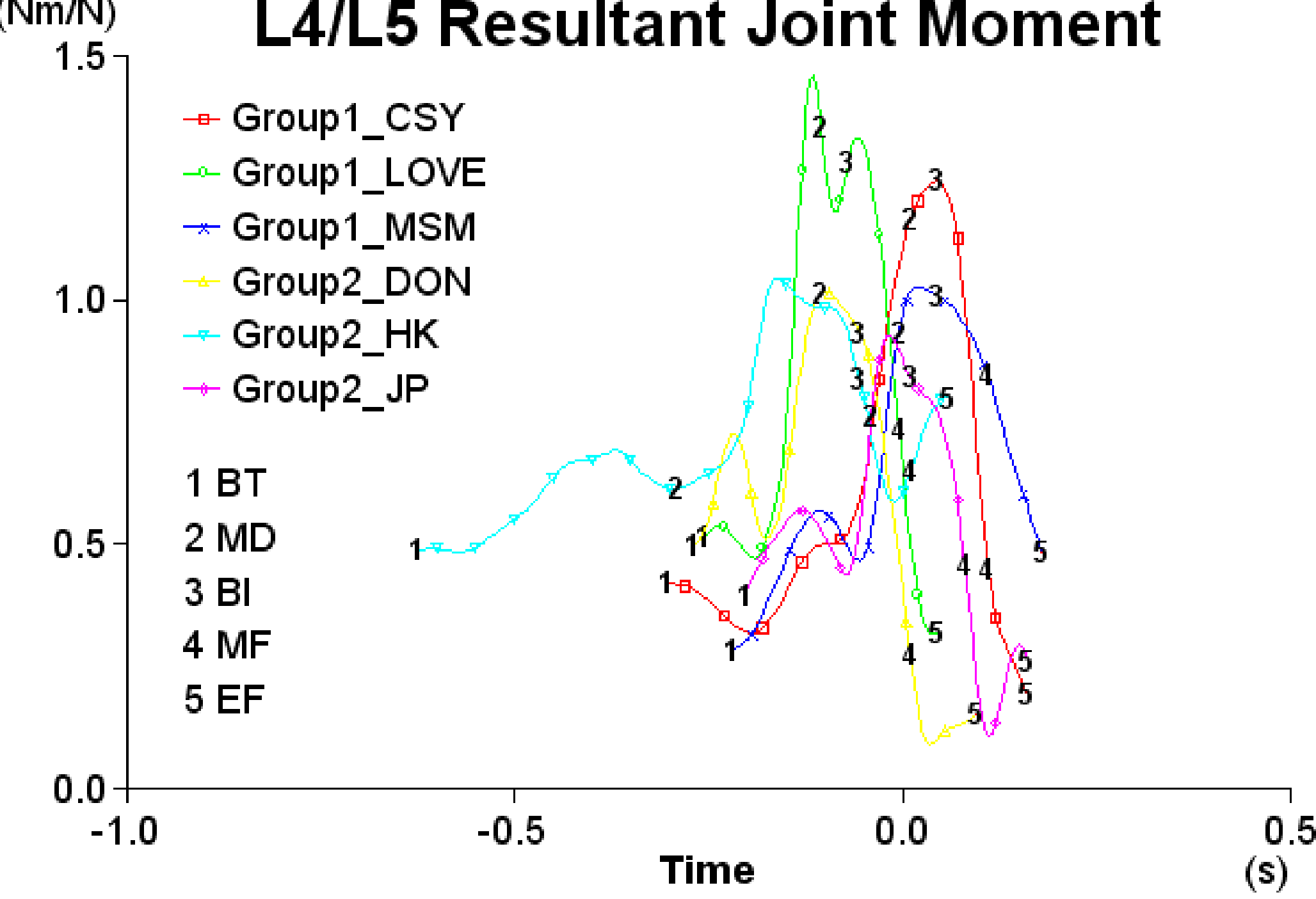
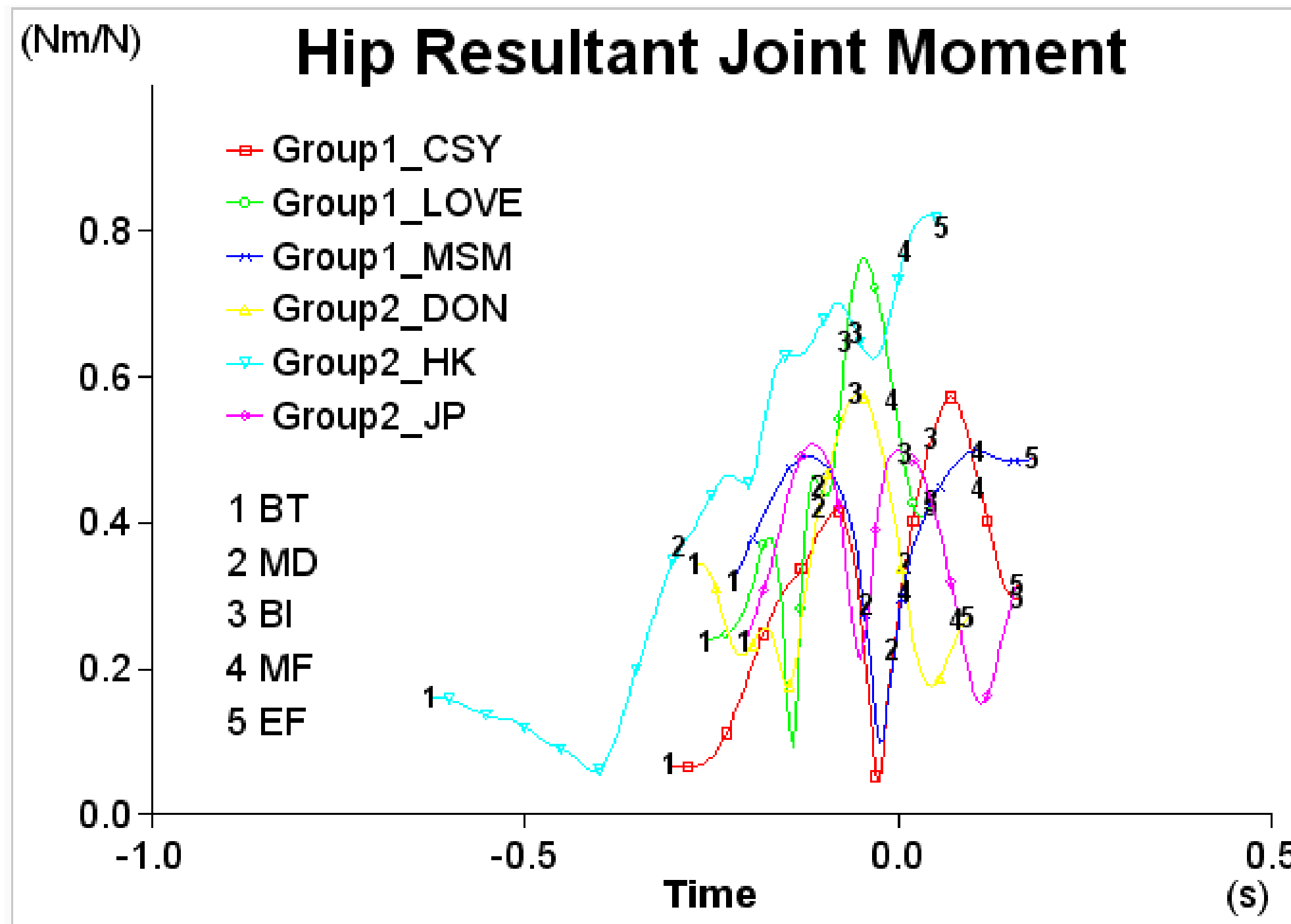
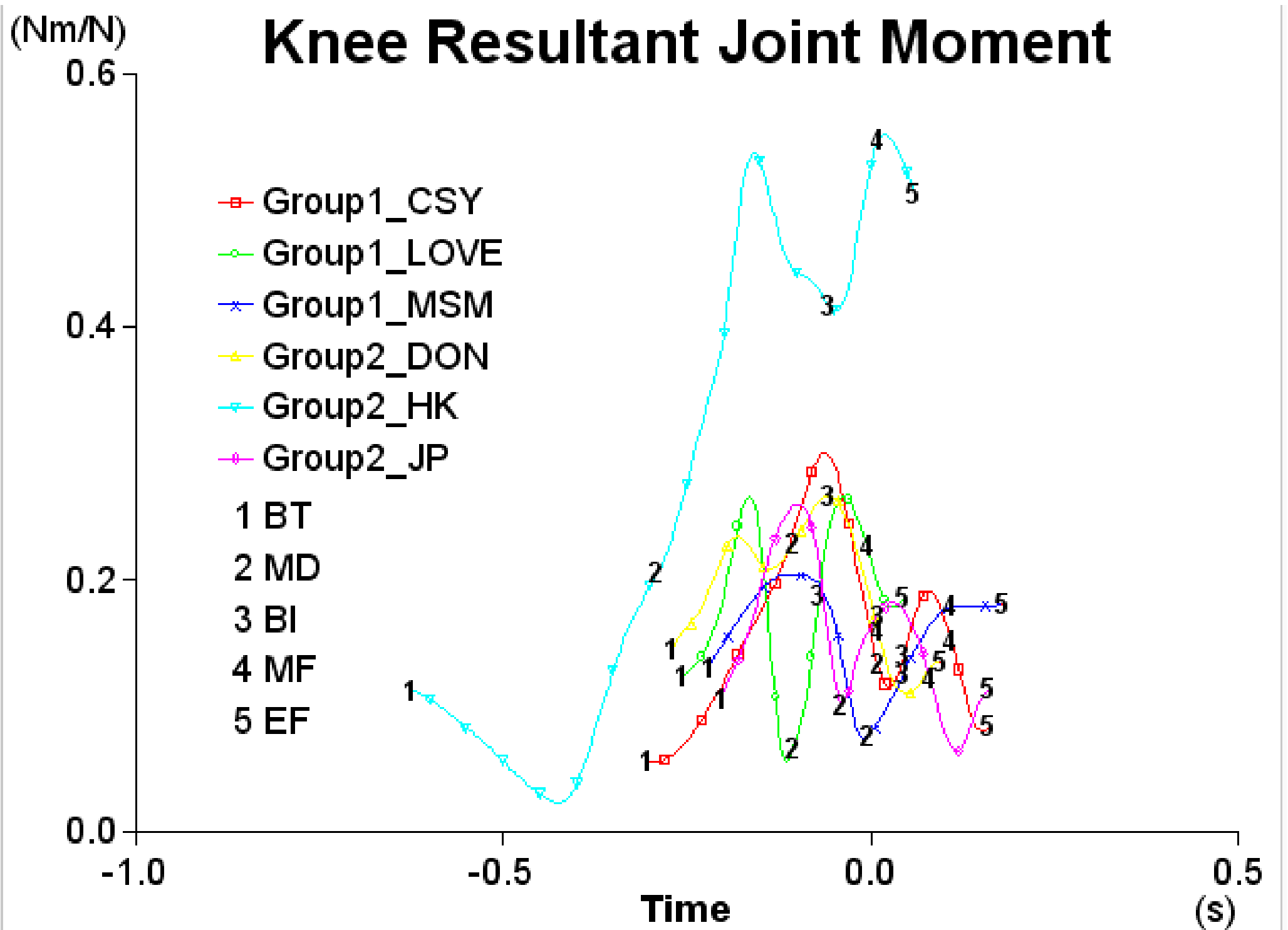
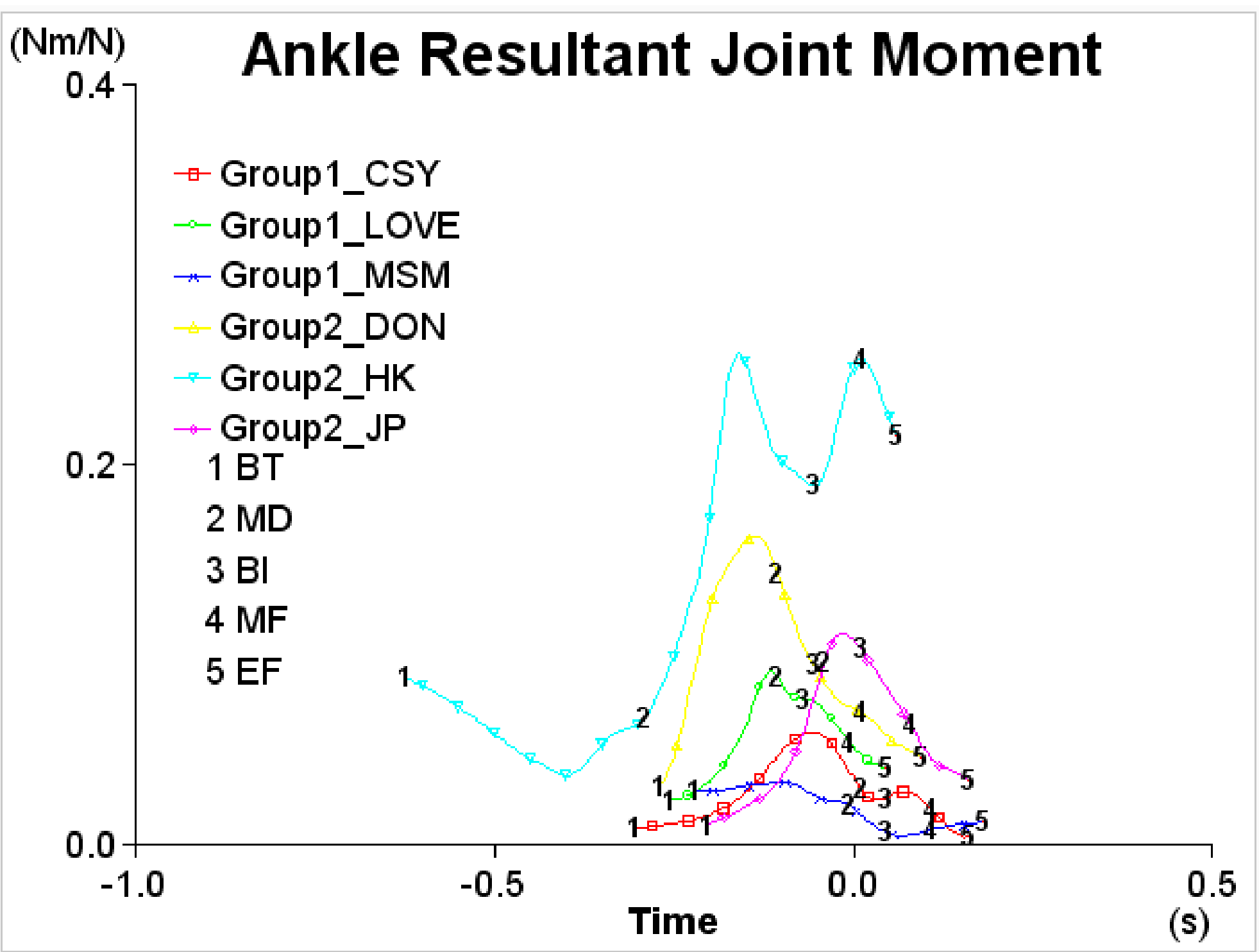


Table1. Peak resultant joint moment normalized by body weight (N·m / N)				
	Left ankle	Left knee	Left hip	L4/L5
Single-Plane Group(n=3)	0.0753±0.016	0.249±0.061	0.631±0.113	1.359±0.109
Multi-Plane Group (n=3)	0.177±0.075*	0.359±0.167	0.635±0.165	0.999±0.062*

* Significantly different from matching joint (p < .05)

- ❖ This study identified the fact that two golf swing styles have different mechanisms. Single-plane group used much greater joint moment in L4/L5, whereas multiple-plane group used much greater joint moment in left ankle. This may suggest that single-plane group is at much high risk of L4/L5 injury, whereas multiple-plane group is at much high risk of left ankle and knee injury during golf swing of driver.

REFERENCES:

1. Lariviere, C. and D. Gagnon. *Clinical Biomechanics*. 13:36-47, 1998.
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