

# MOTION ANALYSIS OF BACK PEDAL IN AMERICAN FOOTBALL: THE CHARACTERISTICS OF SPINE TILT ANGLE

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## Introduction

Defensive backs (DB) of American football need the high speed back pedal running backward with keeping the head bent forward, to cover pass play. Ability to keep the spine tilt angle was regarded as the index of level of skill of DB. The purpose of this study was to examine whether the posture was kept with comparing the spine tilt angle of back pedal in high speed and low speed.

## Methods

Subjects are five American football players of Kanazawa University, participated in this study (age:  $20.4 \pm 1.14$  yrs). Reflective markers were put at the left side of their head, shoulder, elbow, ASIS, great trochanter, knee and ankle. Two low speed back pedals and two high speed back pedals were taken movies by a 200Hz high speed camera (HAS-220, DITECT). The video based 2-D motion analysis system (Flame DIAS II Ver. 3, DKH) was used to measure the angle on the sagittal plane. Spine tilt angles when left foot grounded (Figure 1) were compared between low speed and high speed. Independent t-test was used to test for differences between speeds. Significant level was set at 5%.

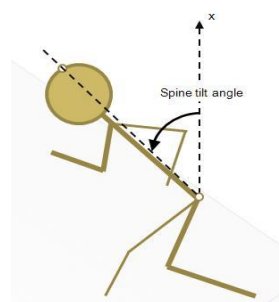


Figure 1. spine tilt angle

## Results & Discussion

There were significant differences of spine tilt angle between high speed and low speed on subject 1 (high:  $50.44^\circ$  low:  $46.65^\circ$  ), 2 (high:  $49.32^\circ$  low:  $44.76^\circ$  ), and 3 (high:  $52.90^\circ$  low:  $53.33^\circ$  ), between the average of high speed ( $49.01^\circ$  ) and the average of low speed ( $52.12^\circ$  ), no significant difference. This differed from an anticipated result that all subjects ran back pedal with same spine tilt angle. Especially, subject 2 was the player with the shortest experience and subject 1 was the next shorter. Therefore this renders that the player who had shorter experience couldn't make upper body ahead.

## Conclusion

On three subjects, comparing of spine tilt angle between low speed back pedal and high speed back pedal indicated significant difference. This means the level of subject's skill of DB was developing.

## References

1. Mayhew, Jerry L, et al. (2010). *Journal of Str & Cond Res*, 24(2): 447-451.