A STUDY OF BALANCE CONTROL BY FREQUENCY ANALYSIS IN COM AND COP DURING SUSTAINED HAND STAND MOVEMENT

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INTRODUCTION: As one of the research on the balance control of hand stand, frequency analysis on center of mass (COM) during hand stand indicated the greatest power spectrum existed below 1Hz (Clement and Rezette, 1985). This study focused on the balance control by means of frequency analysis in COM as well as center of pressure (COP) fluctuations in the A-P direction during 10s sustained hand stand movement.

METHOD: Hand stand movement was perforrned on a force platform (9287B, Kistler Co., sampling rate: 1KHz) and was recorded with high speed camera (A602fc-2, BASLER, H6×8-1.0, SPACE inc., 100fps). X-Y coordinates of COP was recorded from force platform as long as saggital plane X-Y coordinates of COM from video analysis. COM was calculated by Winter method based on Dempster (1955) body segment data. Subjects were male Japanese junior high class gymnasts (n=44, age: 15.4±1.9 years old, height: 154.3±11.5cm, weight: 48.7±10.4kg). Each subjects performed twice sustained hand stand movements for 10 seconds, one of two trials was taken for the analysis. Frequency analysis in A-P fluctuations of COP and COM were examined by Fast Fourier Transform (FFT) methods.

RESULTS: Mean frequency in maximum power spectrum in COP and COM were shown at around 0.47±0.36Hz and 0.30±0.15 Hz, respectively. Whereas mean frequency in COP fluctuations have characterized as another high power spectrum at around 1.21±0.51 Hz.

DISCUSSION: The present study indicated that maximum power frequency at 0.30Hz in COM during hand stand. This result was similar to previous study by Clement and Rezette (1985). Higher frequency component in COP might contribute to minimize the fluctuation of COM.

CONCLUSION: It was estimated that the high power spectrum frequency band of COP might contribute to control the balance during sustained hand stand movement.

REFERENCES:

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