Dynamical Analysis of Indoor Eight People Make Tug of War Attack Movements- "European Back-Step" and "Japanese Back-Step"

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INTRODUCTION

The "European Back-Step" Indoor Tug of War attack movement has been developed for more than one hundred years, and it is the most popular movement style in Europe. The "Japanese Back-Step" Indoor Tug of War attack movement is new technique from Japan. Both of the techniques have their own supporters. The purposes of this study were to investigate the kinetics parameters of Indoor Eight People Make Tug-of-War "European Back-Step" and "Japanese Back-Step" attack movements. We would like to find out which movement style is more powerful and more efficient.

METHODS

The subjects were 8 Taiwan Indoor Tug-of-War national team pullers (174.1±3.6cm, 72.7±2.4kg, 22.1±2.4 year). Two Redlake High-Speed video cameras (60Hz) and a Kistler (9287) Force Plateform (600Hz) were used to collect the 3D kinematical data and the ground reaction force of the subjects. The 3D data were analyzed by Kwon3D motion analysis system and the 6-second duration time of ground reaction force were analyzed by Bioware software. A Paired–samples t-test was used to compare the differences between "European" & "Japanese" back-step attack movements. The level of significance was $\alpha = .05$ in this study, and the statistical software was SPSS 12.0 version.

RESULTS AND DISCUSSION

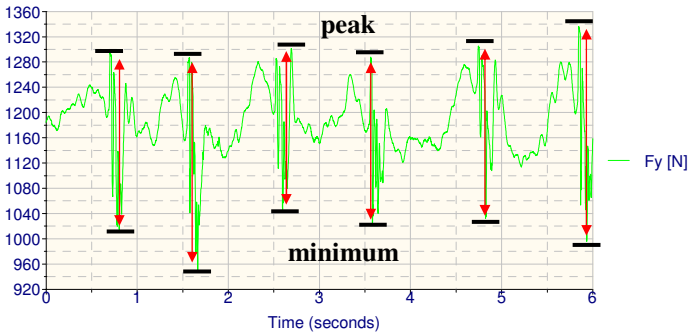

Figure 1: The curve of the peak and minimum backward ground reaction force (GRF)

We found that there were several cycles with peak and minimum backward ground reaction force (GRF) in the duration time in figure 1. The athletes should increase both the peak and minimum GRF in the competition. From the figure 2, we found there was a greater peak backward GRF in "Japanese Back-Step" (1.9bw) than "European Back-Step" (1.85bw). And there was a greater minimum backward GRF value in "Japanese Back-Step"(1.55bw) than the value of "European Back-Step"(1.47b w) (P< .05). That meant the "Japanese Back-Step" was more powerful than the European style both in the peak and the minimum GRF.

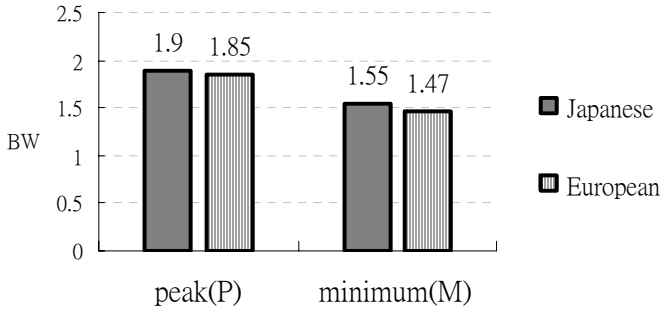

Figure 2: The peak and the minimum backward GRF of "European Back-Step" and "Japanese Back-Step"

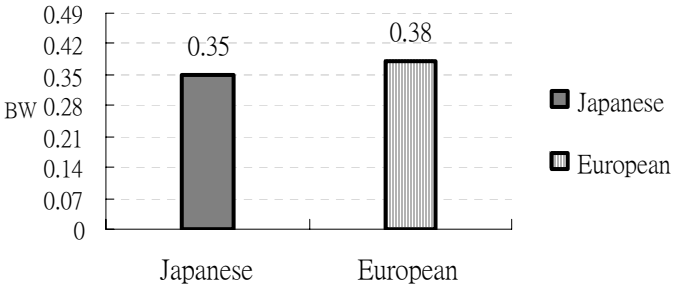

Figure 3: The value between the peak and minimum backward GRF

From the figure 3, the value between the peak and the minimum backward GRF of "Japanese Back-Step" (0.35bw) attack movement was less than that of "European Back-Step" (0.38bw) (p< .05). That meant the "Japanese Back-Step" was more constant than the European style. As the results, there was better performance in the "Japanese Back-Step" than that in the "European Back-Step" in the kinetics parameters.

CONCLUSIONS

As result showed, there were greater the peak, the minimum and the less value between peak and minimum backward ground reaction force of the "Japanese Back-Step" than those value of the "European Back-Step". That meant the "Japanese Back-Step" was more powerful and more efficient than the European Back-Step style. It is recommended that athletes should practice the Japanese Back-Step attack movement in the future.

REFERENCES

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