The Effect of Target Size on the Accuracy and Stability of Upper-arm Throwing

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Abstract

The purpose of this study was to investigate the effect of target size on the accuracy and stability of upper-arm throwing. Five male undergraduates were recruited as subjects. Their mean age was 20.80 ± 0.45 years, mean height was 175.60 ± 4.51 cm, mean weight was 71.60 ± 8.53 kg. In experiment, each subject threw a baseball four times to each target randomly. The target sizes were 0.30m², 0.60m² and 0.90m² respectively and the distance between subject and target was 9m. Silconcoach Video Analysis Software, Microsoft Excel and One-way ANOVA function in SPSS software were used to calculate and compare the accuracy and stability parameter. Results showed: 1. Accuracy parameters subjects threw baseballs to 0.3m², 0.6m² and 0.9m² targets were 0.10m, 0.09m and 0.07m separately. By the increasing of target size, subjects performed better in throwing accuracy, but these parameters weren’t different significantly. 2. Stability parameters were 0.03m, 0.05m and 0.02m when subjects threw baseballs to 0.3m², 0.6m² and 0.9m² targets. The stability parameter 0.05m was bigger significantly than 0.02m. Therefore, the target size would influence the throwing stability and subjects would perform better in throwing stability when throwing baseballs to the 0.9m² target than throwing baseballs to the 0.6m² target.

Keywords: target size, accuracy, stability, upper-arm throwing.

1. INTRODUCTION

Different with animals could fly, run or swimming fast, human body was skilled in throwing an object fast, far and precisely. As this characteristic, we were always fascinated with good throwing performance (Sakurai, 2002). Progressively probed into the factor effect throwing, task, organism itself and environment were the main constraints (Newell, 1986). In this study, the object was to investigate the effect of target size on the accuracy and stability of upper-arm throwing. According to these results, the influence of target size on throwing performance could be understood clearly.

2. METHODS

(1) Subject

Five male undergraduates were recruited as subjects. Their mean age was 20.80 ± 0.45 years, mean height was 175.60 ± 4.51 cm, mean weight was 71.60 ± 8.53 kg (Table 1).

Table 1: The average parameters of subjects

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Height (cm)</th>
<th>Weight (kg)</th>
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<tr>
<td>20.80 ± 0.45</td>
<td>175.60 ± 4.51</td>
<td>71.60 ± 8.53</td>
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(2) Procedure

Shown in figure 1, each subject threw a baseball four times to each target randomly. The target sizes were 0.30m², 0.60m² and 0.90m² respectively and the distance between subject and target was 9 meters.

(3) Measurement

A Sony video camera was used to film the instant picture of baseball hitting target. Silconcoach Video Analysis Software and Microsoft Excel were used to calculate the accuracy and stability parameters of upper-arm throwing.

To compute accuracy parameter, three steps were carried out. Step 1: the distance between hitting position and target center was calculated firstly. Step 2: the four times throwing average of each distance that each subject threw baseball to the same size target was calculated. Step 3: from Step 2, each subject’s average was gathered separately, and a new average of these five averages was been computed again. Finally, the accuracy parameter could be got. To compute stability parameter, the Step 3 to compute accuracy parameter was been continued. A standard deviation of these five averages was been computed. This standard deviation represented stability parameter.

(4) Statistics

One-way ANOVA function in SPSS software was used to compare the accuracy and stability parameter.

3. RESULTS & DISCUSSIONS

Table 2 was the statistic results of the accuracy parameter. These results showed accuracy parameters subjects threw baseballs to 0.3m², 0.6m² and 0.9m² targets were 0.10m, 0.09m and 0.07m separately. By the increasing of target size, subjects performed better in throwing accuracy, but these parameters weren’t different significantly. Hence, we could comprehend target size wouldn’t influence throwing accuracy.

Table 3 was the statistic results of the stability parameter. These results showed stability parameters were 0.03m, 0.05m and 0.02m when subjects threw baseballs to 0.3m², 0.6m² and 0.9m² target. Moreover, the stability parameter 0.05m was bigger significantly than 0.02m. Therefore, the target size would influence the throwing stability and subjects would perform better in throwing stability when throwing baseballs to the 0.9m² target than throwing baseballs to the 0.6m² target.

4. CONCLUSIONS & RECOMMENDATIONS

In this study, the effects of target size on the accuracy and stability of upper-arm throwing were investigated. Conclusions and recommendations were as below.

(1) Conclusions

By the increasing of target size, subjects performed better in throwing accuracy, but these parameters weren’t different significantly. Therefore, target size wouldn’t influence throwing accuracy.

Target size would influence the throwing stability and subjects would perform better in throwing stability when throwing baseballs to the 0.9m² target than throwing baseballs to the 0.6m² target.

(2) Recommendations

In this study, the distance between target and thrower was 9m. The distance could be changed in the future study.

Upper-arm throwing was one of the typical throwing styles. The other two styles were side-arm and lower-arm throwing. For this reason, executing this two style throwing using the same experimental procedure could be performed progressively.

5. REFERENCES


6. Acknowledgement

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