FORCE AND PRESSURE CHARACTERISTICS OF THE DELIVERY STRIDE IN FAST-PACED CRICKET BOWLING

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INTRODUCTION

The cricket fast bowling technique, which consists of a run-up, jump and upper body movement all performed at high speed, can lead to the generation of forces, up to nine times body weight being exerted onto the body[1]. Although the forces recorded and injury rates are both very high[2] little recent research has taken place into the consecutive footfall placements of the bowling action and almost none within a relevant cricket environment. The cricket bowling action itself is divided into three stages, the run-up, the pre-delivery and the delivery. The delivery itself is split into three separate steps (the back foot delivery step, the front foot delivery step and the follow through recovery step) and it is these that are the focus of this study. The aims of this study were twofold; 1) to evaluate the kinetic profile of the delivery phase in cricket fast bowling; 2) to examine the validity of in-sole measurement systems for such research.

METHOD

Seven cricket bowlers of University Academy standard with (mean age19.43±0.98years, height 81.99±14.84kg and weight 184±11.90cm) participated in the study. The subjects completed twelve deliveries of their normal fast bowling action at a set of stumps 22yds away. Force and pressure readings were recorded using the Pedar Mobile System (Novel GmbH, Munich). This in-sole measuring system was preferred to a force platform in order for consecutive steps of the final stage of the delivery to be recorded in an appropriate cricket environment. The data recorded for each subject was normalised to body weight and the following biomechanical parameters elicited for each step of the delivery phase; peak impact force, mean force, loading rate and peak pressure. A group average for each parameter was calculated and exposed to a univariate between groups ANOVA and the relevant post-hoc tests.

RESULTS AND DISCUSSION

The three steps are significantly different from each other with respect to peak impact forces with the front foot delivery step 147% and 32% larger than the back foot delivery step and follow through recovery step respectively. The mean values (table 1) for both peak impact force and loading rates at peak impact are also similar to previous research [2], although at the lower end of the reported data range. Mean peak pressure (figure 1) in the front foot landing step is greater than that experienced in the other two back foot landing steps.

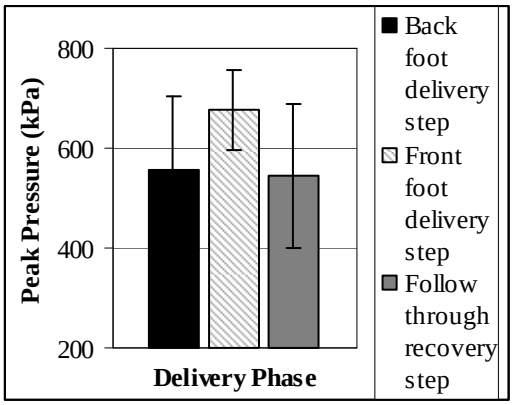

Figure 1: Group mean peak pressure experienced during the delivery phase

Data regarding the cricket fast bowling action is difficult to quantify as the technique is unlike any other sporting movement, although both pressure and force recordings are considerably higher than in running. For example, with respect to pressure, recorded values are at least 45% greater than those in running [3]. The statistical analysis revealed that crucially the bowling action is unique to each subject and therefore the coaching of existing specific techniques may be inappropriate. The action itself is also subject to within-subject variation which should be further investigated in order to assess the possible affect on performance. Finally the validity of using an in-sole measuring system for analysis of the fast bowling technique is supported by the results which are similar to those previously recorded using force platforms [2]. In addition this system permits data collection to take place in the field which can only improve the ecological validity of the data collected.

CONCLUSION

Although mean force values were found to be similar to existing footfall data in cricket, the recorded peak impact force and loading rate at peak impact in the landing phase were found to be lower than those previously reported.
The in-shoe measuring device has great potential for further exploration of the kinetics involved in cricket bowling.

REFERENCES

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3. Weist, R et al. Conference Precedings ESM, Kananaskis, Canada, 2002.

Table 1: The group mean peak force and loading rates during the stages of the delivery phase.

Back Foot Delivery Step		**Front Foot Delivery Step**		**Follow Through Recovery Step**	
Peak Force (BW)	**Loading Rate ($BW \cdot s^{-1}$)**	**Peak Force (BW)**	**Loading Rate ($BW \cdot s^{-1}$)**	**Peak Force (BW)**	**Loading Rate ($BW \cdot s^{-1}$)**
2.01±0.58	68.97±27.65	4.88±1.16	157.85±71.92	3.96±0.56	173.8±72.87