

繰り返されるバッティング動作が肘関節の機能と構造に与える影響

学籍番号 4124066

氏名 石川 駿

【目的】

繰り返されるバッティング動作が肘関節内側裂隙距離および上肢の関節可動域や筋力に及ぼす短期的な影響を明らかにすることを目的とした。

【方法】

対象は東都大学野球連盟2部に所属する男子大学野球競技者20名(20.7±1.0歳)とし、フロントティーバッティング(20球×5セット)を実施させた。打撃前後に、肘関節内側裂隙距離、肩・肘・前腕の関節可動域、握力、肩関節内外旋筋力、バットスピード、PlayerLoadを測定し、トップハンド(T)側・ボトムハンド(B)側の両側について評価した。統計解析は反復測定二元配置分散分析を用いた(p<0.05)。バットスピードについては、反復測定一元配置分散分析を実施した。また、肘関節にかかる局所的な負荷の参考指標として、Pulse Throwを両肘関節に装着し測定中に記録を行った。

【結果】

肘関節内側裂隙距離は、各セットの進行に伴って増加し(除重力位4.45±0.95 mm、抗重力位4.73±1.05 mm)、時間に対する主効果がみられた(p<0.05)。特にB側ではT側よりも顕著な増加傾向がみられた(p<0.05)。また、前腕回内可動域はT側でpre-set3(p<0.05)、B側でpre-set2・set3間に有意差がみられ、肩外旋可動域もT側でpre-set3間に有意差(p=0.006)がみられた。さらに、握力はpre-set4間で有意差がみられた(p=0.007)。一方、バットスピードは有意差がみられなかった(p>0.05)。

【結論】

繰り返される打撃動作が肘関節内側裂隙距離、上肢の関節可動域および筋力に対して短期的な変化を引き起こすことが明らかとなった。これらの結果は、打撃動作が肘関節に与える影響を把握するうえで重要な知見であり、今後の障害予防やモニタリング指標の検討に資する可能性がある。

Effects of repetitive batting motions on elbow joint morphology and structure

Student ID Number: 4124066

Name: ISHIKAWA, Shun

[Purpose]

This study was designed to clarify short-term effects of repetitive batting motion on the medial elbow joint space (MEJS), and to clarify the range of motion and muscle strength of upper limbs.

[Methods]

This study examined 20 male collegiate baseball players (mean age: 20.7 ± 1.0 years) belonging to the second division of the Tohto University Baseball League. Each participant performed five sets of front-toss batting, with 20 swings per set. Before and after the batting task, measurements were taken for medial elbow joint space (MEJS), ranges of motion of the shoulder, elbow, and forearm, and also grip strength, isometric strength of shoulder internal and external rotators, bat speed, and PlayerLoad. Evaluations were conducted of both the top hand (T) and bottom hand (B) sides. Repeated-measures two-way ANOVA was used for statistical analysis ($p < 0.05$). One-way ANOVA was used to analyze changes in bat speed. Additionally, to assess local mechanical load on the elbow joint, a Pulse Throw sensor attached to both elbows recorded data during the batting task.

[Results]

The medial elbow joint space (MEJS) increased significantly with progression of the sets (4.45 ± 0.95 mm gravity-eliminated position, 4.73 ± 1.05 mm gravity-dependent position), representing a significant main effect of time ($p < 0.05$). This increase was more pronounced on the bottom hand (B) side than on the top hand (T) side ($p < 0.05$). The forearm pronation range of motion decreased significantly on the T side between pre and set 3 ($p < 0.05$) and on the B side between pre and set 2 and set 3. The shoulder external rotation range of motion was also found to have a significant decrease on the T side between pre and set 3 ($p = 0.006$). In addition, grip strength decreased significantly between pre and set 4 ($p = 0.007$). In contrast, no significant change was found for bat speed ($p > 0.05$).

[Conclusion]

Repetitive batting motion was found to induce short-term changes in the medial elbow joint space (MEJS), upper limb range of motion, and muscle strength. These results, which provide important insights into batting effects on the elbow joint, might contribute to the future development of injury prevention strategies and monitoring indicators.