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### Pilot Study Using Sideline Hand-Grip Dynamometry To Assess Strength Changes In A High School Baseball Season: A Feasibility Study

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# A PILOT STUDY USING SIDELINE HAND-GRIP DYNAMOMETRY TO ASSESS STRENGTH CHANGES IN A HIGH SCHOOL BASEBALL SEASON

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## Background

- Using hand-grip dynamometry (HGD) to measure strength changes may help identify early signs in the injury process.
- Hypothesis:** It is feasible to perform HGD on-site at the high school level and HGD measurements will change throughout the season in varsity baseball athletes.
- Secondary aim: Assess HGD measurement in the context of injury/pain/fatigue/pitching.

## Study Design

- Prospective Cohort study.
- Varsity Baseball players.
- HGD testing performed 5 times.
  - 1 preseason and 4 in-season.
- Fatigue/Injury questionnaire filled out each testing session.
- Bi-weekly testing done by ATs, PTs, SATs, Physicians.
- HGD Testing done in 2 positions and repeated 3 times in each position.

## Demographics

Subjects (N=15)	
<b>School</b>	
A	9 (60.0%)
B	6 (40.0%)
<b>Dominant hand</b>	
Left	2 (13.3%)
Right	13 (86.7%)
<b>Throwing arm</b>	
Left	2 (13.3%)
Right	13 (86.7%)
<b>Grade</b>	
Freshman	1 (6.7%)
Soph	3 (20.0%)
Junior	4 (26.7%)
Senior	7 (46.7%)
<b>Sex</b>	
Male	15 (100.0%)
Female	0 (0.00%)
<b>Pitcher (baseline)</b>	
No	8 (53.3%)
Yes	7 (46.7%)

## Results

- Good consistency in test-retest HGD measurements.
  - (ICC=0.89 [CI: 0.87, 0.91])
- Good consistency within each school was observed.
  - School A: ICC=0.90 [CI: 0.86, 0.92]
  - School B: ICC=0.85 [CI: 0.81, 0.88]
- Changes in strength were less variable for fatigued athletes.
  - (0.45; [95% CI: -1.73, 2.63]; p=0.69)
- Players reporting pain had more strength change throughout the season.
  - (95% CI: -3.70, 0.62; p=0.16)
- Pitchers were the most likely to report pain (8/35 vs 1/25; p =0.044) and fatigue (7/35 vs 2/25; p=0.38).

## In-season Fatigue, Pain, and Loss of Time

In-season sessions		1	2	3	4
<b>Fatigue</b>	Yes	1 (6.7%)	4 (26.7%)	2 (12.3%)	2 (12.3%)
	No	14 (93.3%)	11 (73.3%)	13 (86.7%)	13 (86.7%)
<b>Missed Time</b>	No	15 (100%)	15 (100%)	15 (100%)	15 (100%)
<b>Pain Location</b>	No pain	12 (80%)	14 (93.3%)	13 (86.7%)	12 (80%)
	Elbow	1 (6.7%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
	Shoulder	2 (13.3%)	1 (6.7%)	2 (13.3%)	3 (20.0%)
<b>Pain Scale</b>	0	12 (80.0%)	14 (93.3%)	13 (86.7%)	12 (80.0%)
	1	2 (13.3%)	0 (0.0%)	1 (6.7%)	2 (13.3%)
	2	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
	3	0 (0.0%)	1 (6.7%)	0 (0.0%)	0 (0.0%)
	4	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
	5	1 (6.7%)	0 (0.0%)	1 (6.7%)	1 (6.7%)

## Conclusion, Limitations, and Further Studies

- Performing HGD testing on-site at the high school level is feasible.
- Teaching appropriate usage of a HGD is straightforward and performing the testing is rapid.
- Limitations: low number of participants and only one short high school baseball season.
- Future studies: larger cohort numbers, longer total duration of study, and shorter testing intervals.