SHOULDER ISOKINETIC PROFILE OF MALE HANDBALL PLAYERS

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Introduction – isokinetic evaluation

Sport activities – repetitive high – velocity upper limb movement (throwing)

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Shoulder injuries and pain

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Challenge – development of effective shoulder injury prevention programs

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Define individual biomechanical parameters

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Isokinetic evaluation – information about strength, power, endurance and balance ratio

Introduction – isokinetic evaluation

Peak Torque	**Muscle strength**	a measure of how much force muscle can exert
Total Work	**Muscle endurance**	a measure of how many times muscle can repeat a specific exertion of force
Ratio	**Agonist / Antagonist**	ratio of muscular strength / muscle balance comparison the strength of opposing muscle groups important in prevention of injuries

Introduction – isokinetic evaluation

Elements of functional specifity of a joint

Subject to numerous factors of variation i.e.:

- Dominance
- Gender
- Age
- Physical activity
- Velocity of movement

Clinical elements in the functional analysis of the joint:

- The risk of developing injuries
- Guide control in the modalities of rehabilitation

Aim

The aim of the study was to evaluate the external (ER) and internal rotator (IR) muscles isokinetic peak torque (PT), total work (TW) and strength ratios in handball players

Statistical analyzis – paired t-test with a significance set at **0.05**

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Biodex System 3 PRO

- Isokinetic mode (con/con)
- Internal / External Rotation
- Modified seated in scapular plane
- Test speed (in order)
  - 180°/sec – 3 reps
  - 90°/sec – 3 reps
  - 360°/sec – 3 reps
  - 270°/sec – 15 reps

Material

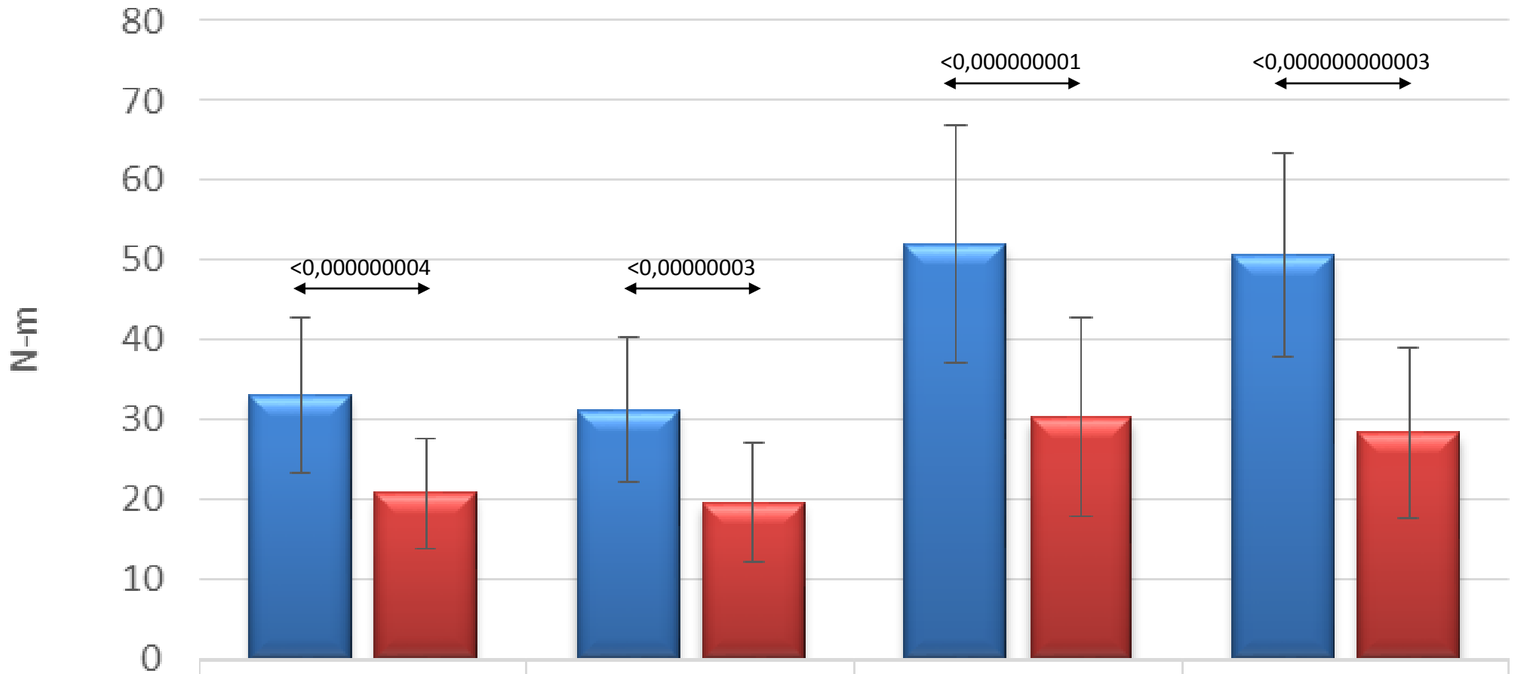
Examined Group

- **48 handball players**
  - Age: 24,0 (±4,5)
  - Height: 187,1 (±5,9)
  - Weight: 91,0 (±11,6)
  - Throwing arm: R – 37; L – 11

Control Group

- **25 healthy volunteers**
  - Age: 22 (±1,0)
  - Height: 174,0 (±9,7)
  - Weight: 71,2 (±14,9)
  - Dominant arm: R – 25; L – 0

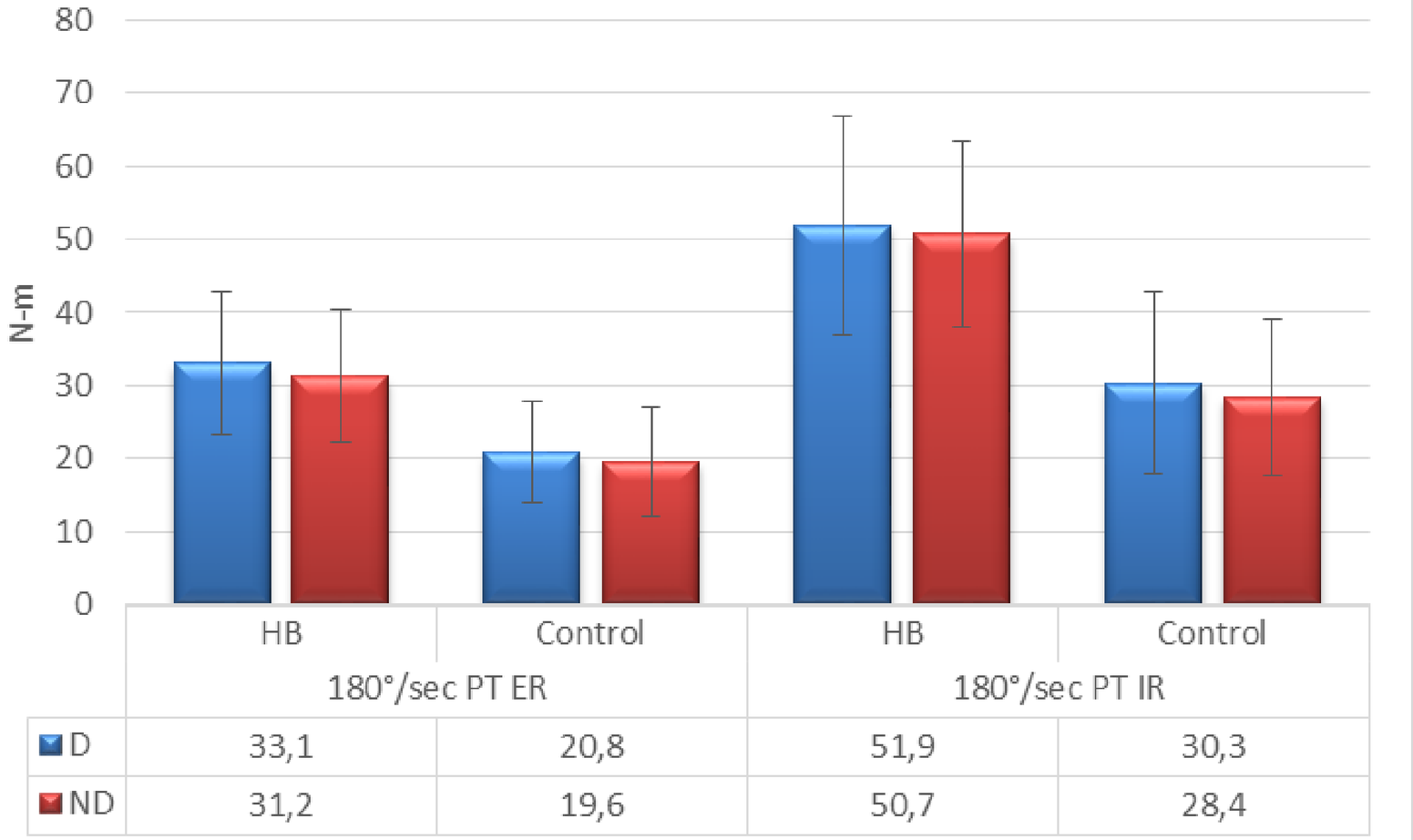
Results – Peak Torque



	180°/sec PT ER		180°/sec PT IR	
HB	33,1	31,2	51,9	50,7
Control	20,8	19,6	30,3	28,4

Between groups – statistically significant difference in ER and IR PT of dominant and non-dominant shoulder between handball players and volunteers

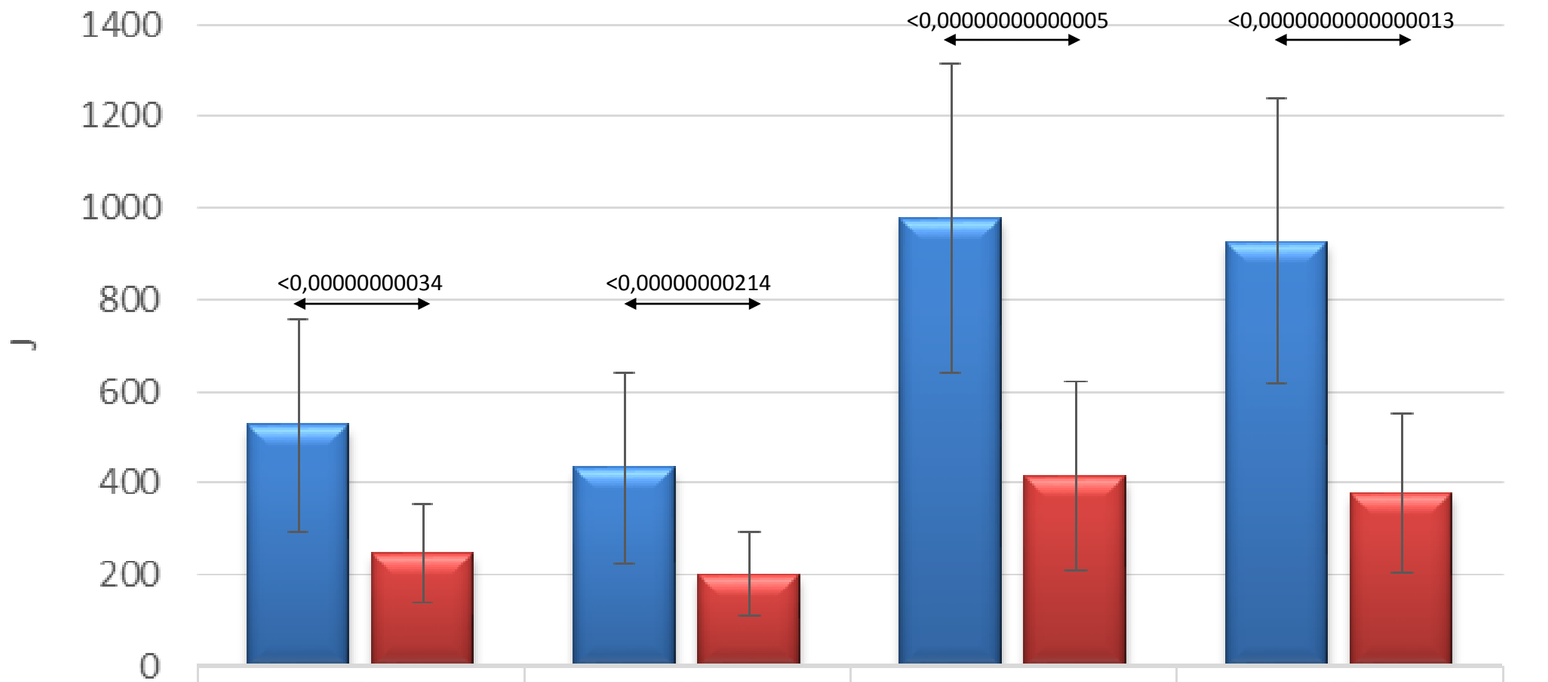
Results – Peak Torque



	180°/sec PT ER		180°/sec PT IR	
D	33,1	20,8	51,9	30,3
ND	31,2	19,6	50,7	28,4

In groups – no statistical differences between dominant and non-dominant shoulder in both group for peak torque of the ER and IR muscles

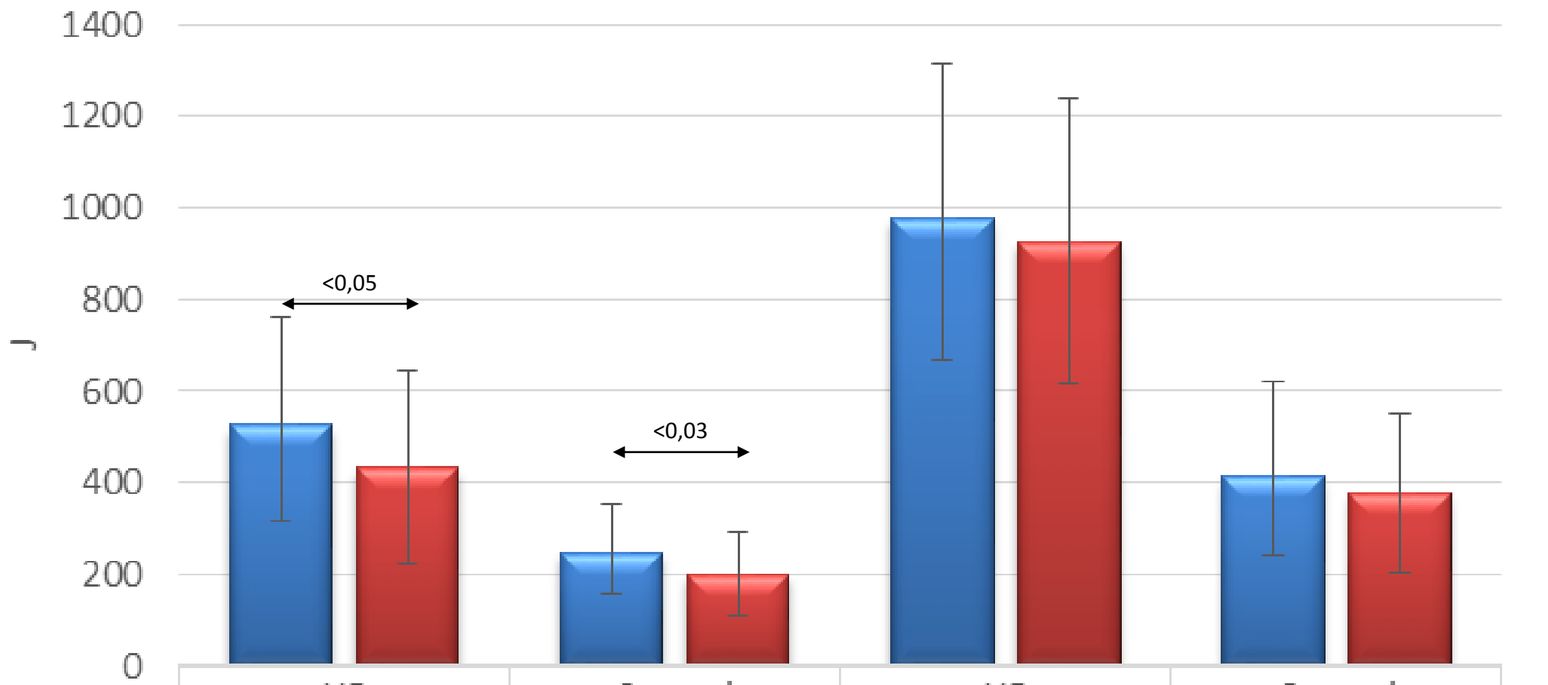
Results – Total Work



	270°/sec TW ER		270°/sec TW IR	
	D	ND	D	ND
HB	526,2	433,6	978,1	926,7
Control	247,1	202,0	414,5	377,9

Between groups – statistically significant difference in ER and IR TW of dominant and non-dominant shoulder between handball players and volunteers

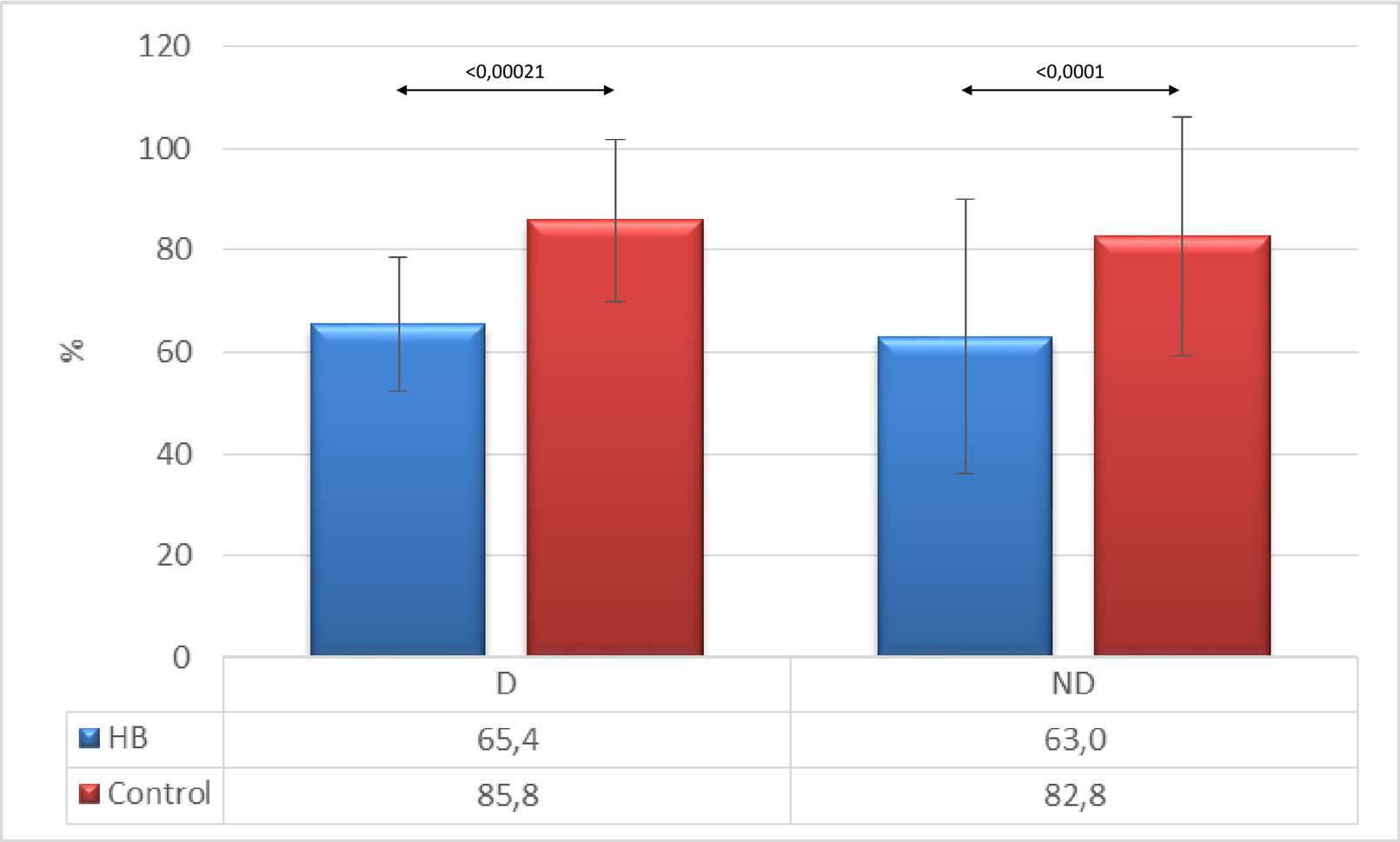
Results – Total Work



	HB	Control	HB	Control
	270°/sec TW ER		270°/sec TW IR	
D	526,2	247,1	978,1	414,5
ND	433,6	202,0	926,7	377,9

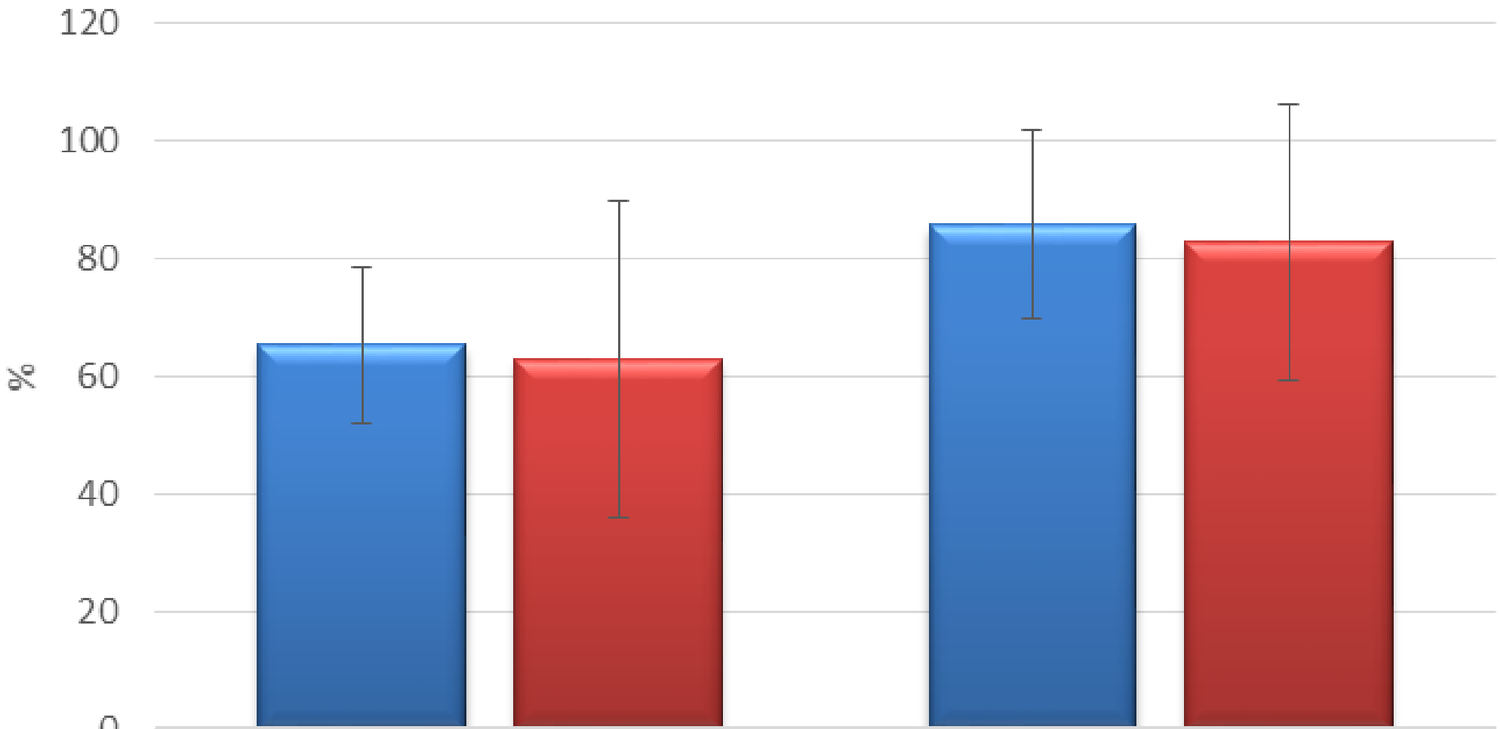
In groups – statistical differences between dominant and non-dominant shoulder in both groups for total work of the ER

Results – Agonist / Antagonist Ratio



Between groups – statistically significant difference in Ratio of dominant and non-dominant shoulder between handball players and volunteers

Results – Agonist / Antagonist Ratio



In groups –no statistical differences in Ratio between dominant and non-dominant shoulder in both groups

Conclusions

Handball players present higher isokinetic parameters comparing to normal population

The study establishes additional normative data on ER and IR muscle torque and total work on high – level male handball players

The results are important for the application and interpretation of isokinetic data of handball players for both basic knowledge and practical reasons

Thank You

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