Center for Sports Medicine
Performance Diagnostics
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Preventive and Rehab Medicine

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The
Physical Condition Profile
for Beach Handball

A Study Commissioned by DHB
for the years
2000 - 2008
Strength

- Strength component is major determinant for performance
- High level of dynamic activity in the lower limbs (maximum strength, endurance)
- Speed strength for lower spurt muscles (e.g. in the case of explosive-vertical jumps)
- Suspension of stretch-shortening cycle especially in the shoulder-arm area
- Stabilization function of all coordinating muscle sections in the torso and limbs
Endurance

- Basic capacity

- Interaction between anaerobic – alactacid and anaerobic – lactacid exertion
Coordination and agility

- Requirements regarding orientation, differentiation and equilibrium
- Proprioception
- Ensuring freedom of movement in the joints
Speed

- Speed strength

- Acyclic speed
  dynamic strength/speed of movement (e.g. changing direction)

- Cyclical speed
  Short steps by playing goalkeeper
Performance diagnostics in beach handball

- Period investigated 2000 – 2008
- Places and events
  - German Championships in Cuxhaven
  - European Championships
  - World Games
  - Master series throughout Germany

- Beach handball players, female: n = 190
  - National
    - Beach handball players, male: n = 730
- Beach handball players, female: n = 48
  - International
    - Beach handball players, male: n = 76
Performance diagnostics in beach handball

- Measurement procedures for specific sport types during competitions
  - Blood – biochemical laboratory values
  - Performance parameters for aerobic – anaerobic metabolism
  - Specific muscle enzymes - identification
Performance diagnostics in beach handball

- Measurement of lactic acid (lactate)
  - Normal value: 0.6 – 0.8 mmol/l (at rest)

- Measurement of creatine kinase (muscle enzyme)
  - Normal value: 10 – 80 U/l (at rest)
Performance diagnostics in beach handball

- Lactate values before exertion (m/f)
  - Mean value: 1.12 mmol/l

- Lactate values during + after exertion
  - Mean value: 2.7 – 4.5 mmol/l

- Peak values of up to 7 mmol/l for playing goalkeepers were measured
Performance diagnostics in beach handball

- Creatine kinase - values before exertion (m/f)
  - Mean values: 20 U/l

- Creatine kinase – values after exertion (around 1h after competition)
  - Mean values: 60 – 410 U/l

- Exertion of unexercised, unspecific muscle groups may lead to enormous increases in creatine kinase.
  Mechanical changes (e.g. bruises) also result in higher levels.
Performance diagnostics in beach handball

- **Heart rate before exertion**
  - Mean value: 100 – 115/min

- **Heart rate during exertion**
  - Mean value: 140 – 200/min

- **Blood pressure before exertion**
  - Mean value: 135/85 mmHg

- **Blood pressure after exertion**
  - Mean value: 180/95 mmHg
Injuries in beach handball

Injuries specific to this sport (compared to indoor handball)

1. Contusions to muscles and joints (4%)
2. Distortion injuries to small and large joints (12%)
3. Ruptures of tendons and ligaments (< 1%)
4. Fractures (< 0.5%)
5. Cuts and lacerations (2%)
Performance-limiting factors in beach handball

- Short high-intensity stress in attacks lasting around 15 seconds
- Medium-term intense stress in attacks lasting around 40 seconds

- During playing times lasting around 20 min + 5 min break, heart rates of around 140 – 200/min and lactate values of 2 to 7 mmol/l were measured

- Beach handball may be referred to as an alactacid to partially lactacid short-time interval sport type.
Conclusions

- Compared with indoor handball, movements in sand are much higher
- Changing strength requirements (comparable to beach volleyball)
- This leads to adaptations of the muscles of the lower limbs that may result in tissue stabilisation and muscle increase
- The endurance needed for this sport guarantees performance in the preparatory phase for the indoor playing season
- Increase in strength endurance and speed strength
- Improvement of muscle coordination
- Lower injury profile compared to indoor handball