Introduction

Background: One concern for wheelchair sprinters is the head’s alignment racing. This misalignment may increase significantly the resistance acting upon the athlete albeit, evidence on this is scarce in wheelchair racing.

A feasible way to gather insight on the effects of misalignments in the aerodynamics is the cost-down technique.

Aim: To compare the resistive forces acting upon an elite wheelchair sprinter keeping different body positions.

Methods

Subject:
- T52
- European medallist
- National record holder (100 & 400m events)
- Ranked 2nd in the world

Procedures: 3x(8x400m) @ several speeds, randomly assigned.

Each set was performed adopting one of three body position (Fig 1).

Results

Resistive forces: The speed decay ($f=33\text{Hz}$) was measured by Doppler-effect (Stalker-Pro, Stalker Radar, TX, USA) coasting-down in the final straight before the finish line (Fig 2).

Surface area of the sprinter plus chair was measured by a photogrammetric technique using a digital camera (DSC-T7, Sony, Tokyo, Japan) and an image measurement software (Udruler, AVPSoft, USA) [1].

Resistive forces were estimated by a simplified deceleration method [2].

Mechanical energy & power: Energy and power were then estimated [2] for the race he broke the 400m national record.

Conclusions

The resistance acting upon the sprinter is different according to his position on the chair.

Slight changes in the head position over the race can affect the power by almost 2%.

References