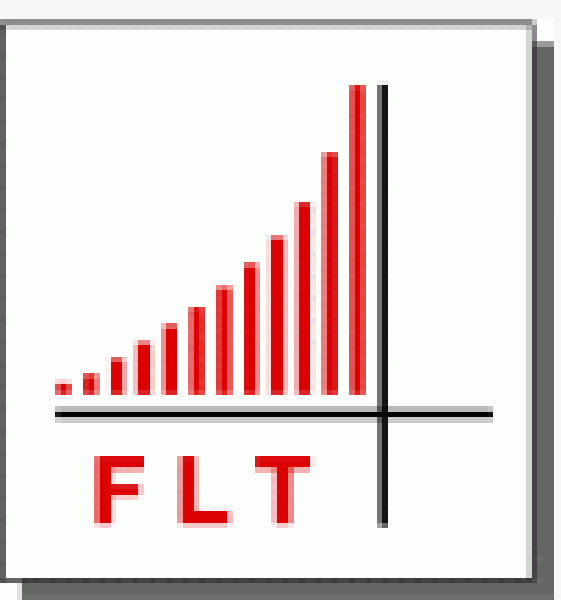


Effects of a pre-season preparation on anthropometric and physical capacities in a top-level male German handball team

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INTRODUCTION

To optimize the physical performance of a competitive handball team during the season, it is expected to accomplish a pre-season preparation to increase anthropometric and physical requirements (Wagner et al., 2014). However, this topic is not examined in players competing on an European top-level. Therefore, this study investigated the effects of a pre-season preparation on anthropometric characteristics and physical capacities in an European top-level male handball team.

METHODS

Twelve male team-handball players competing in the German Bundesliga participated. The sample included eight national players. All players were tested before and after a pre-season preparation, lasting six weeks, for anthropometric characteristics (body mass, fat and fat-free mass), speed (5, 10, 20 and 30 m), agility (22 m), vertical jump height (squat [SJ], counter movement [CMJ] and handball-specific jump), aerobic endurance (time to exhaustion [T_{lim}], maximum oxygen uptake [VO_{2max}] and time to reach a respiratory exchange ratio of 1 [RER=1]) and intermittent endurance (interval shuttle run test [ISRT] performance and submaximal heart rate at 14 km/h) (Figure 1). From a physical point of view, the preparation period focused on small-side games as well as resistance, sprint and plyometric based training. All training sessions were instructed by the professional coaches of the team. For statistical analyses, magnitude based inferences and effect sizes (ES) for practical significance were computed (Hopkins et al., 2008).

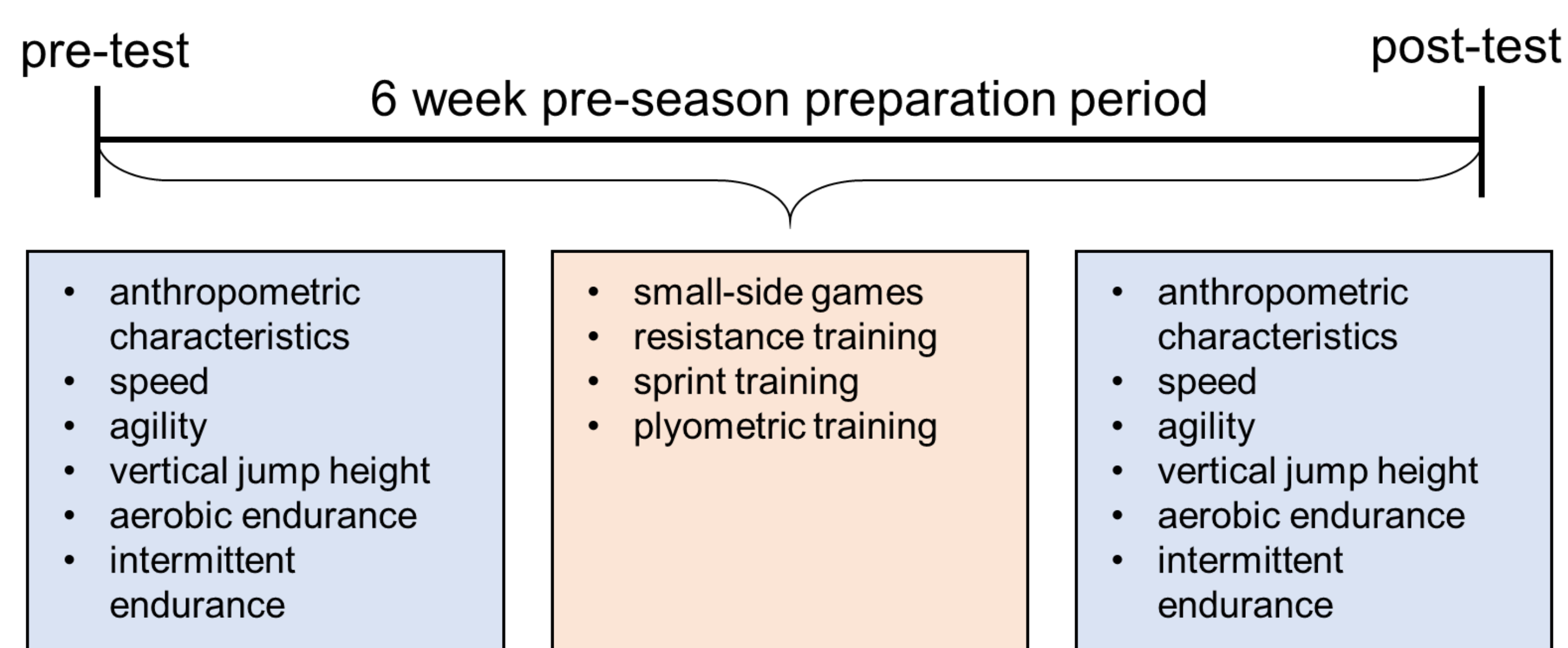


Figure 1. Experimental design.

RESULTS

The changes in anthropometric characteristics along with those in aerobic endurance were *unclear* to *likely trivial* (*trivial* to *small* ES). For speed, agility and vertical jump height, *unclear* changes were found (*trivial* to *small* ES). However, the changes in intermittent endurance were *most likely* (*large* to *very large* ES) (Table 1).

Table 1. Means and results of the magnitude based inference and effect size (ES) statistics.

Variable	Pre-test (mean)	Post-test (mean)	Likelihood (%) for pre-test being higher/similar/lower than post-test (descriptor)	ES (descriptor)
Mass (kg)	93.0	93.8	23/41/36 (<i>unclear</i>)	0.1 (<i>trivial</i>)
Fat (%)	14.2	14.4	4/86/10 (<i>likely trivial</i>)	0.1 (<i>trivial</i>)
Fat-free mass (%)	85.8	85.6	10/86/4 (<i>likely trivial</i>)	0.1 (<i>trivial</i>)
Speed 5 m (s)	1.12	1.11	50/33/17 (<i>unclear</i>)	0.1 (<i>trivial</i>)
Speed 10 m (s)	1.88	1.85	61/30/9 (<i>unclear</i>)	0.3 (<i>small</i>)
Speed 20 m (s)	3.18	3.12	62/31/8 (<i>unclear</i>)	0.4 (<i>small</i>)
Speed 30 m (s)	4.31	4.32	28/40/33 (<i>unclear</i>)	0.0 (<i>trivial</i>)
Agility 22 m (s)	5.68	5.58	65/28/7 (<i>unclear</i>)	0.4 (<i>small</i>)
SJ (cm)	35.1	34.6	42/38/20 (<i>unclear</i>)	0.1 (<i>trivial</i>)
CMJ (cm)	42.9	44.2	8/29/64 (<i>unclear</i>)	0.4 (<i>small</i>)
Handball-specific jump (cm)	57.8	59.4	7/29/63 (<i>unclear</i>)	0.4 (<i>small</i>)
T_{lim} (s)	845	875	8/27/66 (<i>unclear</i>)	0.4 (<i>small</i>)
VO_{2max} (ml/min/kg)	48.8	50.2	2/79/19 (<i>likely trivial</i>)	0.3 (<i>small</i>)
RER=1 (s)	492	530	1/75/24 (<i>likely trivial</i>)	0.4 (<i>small</i>)
ISRT (shuttles)	70	106	0/0/100 (<i>most likely</i>)	3.0 (<i>very large</i>)
ISRT 14 km/h (bpm)	188	175	100/0/0 (<i>most likely</i>)	1.8 (<i>large</i>)

DISCUSSION

For the first time, our findings show that a pre-season preparation did not meaningfully impact important anthropometric characteristics along with aerobic endurance, speed, agility and vertical jump height of a male top-level handball team. Contrary, there was a *large* to *very large* improvement in the intermittent endurance. The finding may be caused by the high initial level of our players, genetically different determined abilities to adapt and the particular contents of the preparation period (Bompa and Haff, 2009). Although our findings allow no generalization due to the applied case study design, they should be considered when planning a pre-season preparation of an European top-level handball team.

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