A Comparative Study Between Talented Young Rajkot and Gujarat Handball Players in Some Physical and Anthropometric Characteristics

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INTRODUCTION

Contemporary handball requires a high level of general and specific fitness. The actual length of a match is about 40 minutes, with consecutive attacks and defenses, performed with high intensity. During a game, direct contact with opponents takes place, and players perform a lot of accelerations, turns and jumps. The diversity of efforts requires comprehensive preparation in terms of endurance, speed and strength. The energy required for handball competition derives from both aerobic and anaerobic processes. Good levels of general fitness, as well as a high aerobic and anaerobic capacity, form the foundation for success in handball.

Despite the importance of physical fitness features of young handball players, they are poorly evaluated. From the relevant literature it seems that there is little information available concerning the motor abilities and specific anthropometric characteristics of young handball players.

MATERIALS AND METHODS

The aim of this study was to compare the physical fitness characteristics of young Rajkot and Gujarat handball players. It was hypothesized that the differences between the groups would detect the strategies and training methods which could improve their physical fitness characteristics. The fitness profile is an important factor for coaches to monitor and plan training programmer. The Rajkot and Gujarat players underwent a training programmer of 2-3 sessions per week, session duration 90-120 minutes.

Subjects

One hundred and sixty-two players participated in this study: 88 Rajkot young male players and 74 Gujarat young male players. Rajkot players showed a mean (±SD) of 14.04 (0.36) years for age, 1.75 (0.06) m for height, 69.76 (12.13) kg for weight and 22.85 (3.35) kg/m2 for body mass index. Gujarat players showed a mean (±SD) of 14.11 (0.58) years for age, 1.68 (0.09) m for height, 62.44 (11.25) kg for weight and 22.32 (4.47) kg/m2 for body mass index (Table 1). Apart from body height and mass and body mass index, the players were measured for arm span, hand length and hand spread as anthropometric tests (Table 2). Physical fitness measurements were 30 m sprint, standing long jump, sit reach and 20 m shuttle run test (Table 3).

Testing protocols

After standard anthropometric tests, all players warmed up for 15 minutes, then the testing session began with the sit and reach test for flexibility followed by 30 m sprint, standing long jump and at the end 20 m shuttle run test.

Anthropometrics

Body height, body weight and body mass index (BMI) as standard anthropometric tests were measured for each subject. Arm span was measured from the right to the left middle finger tip with the arms extended and abducted. Hand spread was measured from the tip of the thumb to the tip of the fifth finger with all fingers abducted. Hand length was considered as the distance from mid-styli on to dactyl ion. BMI was computed as the ratio of body mass to the squared standing stature (kg/m2). The length characteristics were measured to the nearest 0.1 cm.

30 m sprint

Electronic photocells were placed at the start and 30 m. The sprint test from a standing position required subjects to run as fast as possible for a total distance of 30 m and they stood with one foot at the starting line.

Standing long jump

The standing long jump assessed the explosive power of the lower limbs. The subjects stood on the jumping line and jumped as far as they could. Subjects were allowed the use of countermovement with the arms and legs. Measurements were recorded in meters from the line of takeoff to the back of the heel of the foot landing nearest the jumping line.

Sit and reach test

Lower back and hamstrings flexibility was measured with the sit and reach test to the nearest cm. Players were instructed to sit with their knees extended and to perform a maximal trunk flexion, aiming to reach as far forward as possible. A 90° angle was kept for ankles, while a value of "0" was set at the position of just reaching the toes.

20 m shuttle run test

The players ran continuously between 2 lines set 20 m apart at running speeds increased by a pre-recorded beep at appropriate intervals. Velocity was started at 8.5 km.h-1 for the first minute, increasing by 0.5 km.h-1 every minute thereafter. Players were instructed to complete as many stages as possible and the test was stopped when a subject was unable 3 consecutive times to reach a 3 m zone situated ahead of each 20 m line at the moment of the audio signal.

Statistical analysis

Descriptive statistics were derived for all test variables using SPSS (15.1). Differences in physical fitness characteristics between the groups were assessed by an independent samples t-test. Statistical significance was accepted at an alpha level of p-value ≤ 0.05.

TABLE 1
DESCRIPTIVE PERSONAL DATA FOR THE SUBJECTS

Variables	Rajkot (n = 88)	Gujarat (n = 74)	p-value
Age (year)	14.04 ± 0.36	14.11 ± 0.58	0.37
Height (m)	1.75 ± 0.06	1.68 ± 0.09	0.00**
Weight (kg)	69.76 ± 12.13	62.44 ± 11.25	0.00**
BMI (kg/m²)	22.85 ± 3.35	22.32 ± 4.47	0.39

Note: Values are mean ± SD, BMI - Body Mass Index

** Significant at 0.01 level (2-tailed)

RESULTS

The results of this study are presented in the following three tables.

The results from tables one and two revealed no significant difference between the two teams in terms of age and body mass index, but a significant difference between Rajkot and Gujarat players was found for height, body weight, arm span, hand length at p ≤ 0.01 and hand spread at p ≤ 0.05.

Physical fitness characteristics results from table 3 were significantly in favor of Rajkot players in the 30 m sprint, standing long jump, and 20 m shuttle run test at $p \leq 0.01$. No significant differences were detected between the two groups in the sit and reach test. And 6.5 km per game. Handball players require high levels of aerobic capacity to aid recovery after high-intensity bouts of activity and maintain the ability of optimal output in shooting, which is significantly affected by time.

It is interesting that Gujarat athletes, although they are shorter and have a shorter arm span than the Rajkot, outperform the Gujarat in hand spread (22.94 vs. 23.45 cm) (Table 2). Hand spread is a significant anthropometric feature in handball, as it is correlated with ball throwing velocity (a basic factor in handball), more than the other body sizes. Flexibility of the abducted fingers and the ability to grab the ball firmly is an important factor for a fast shot.

A possible explanation is the size of the ball used. Rajkot at these ages use ball no. 2 (54-56 cm perimeter, 325-375 g), and Rajkot use no. 3 (58-60 cm, 425-475 g). Additionally, it is possible that the kind of training and sporting background (more ball training) leads to greater finger flexibility.

TABLE 2

ANTHROPOMETRIC CHARACTERISTICS FOR THE SUBJECTS

Variables	Rajkot (n = 88)	Gujarat (n = 74)	p-value
Arm Span (cm)	179.61 ± 7.31	168.86 ± 9.81	p<0.01
Hand Length (cm)	19.27 ± 0.84	18.07 ± 1.37	p<0.01
Hand Spread (cm)	22.94 ± 1.27	23.45 ± 1.65	p=0.03

Values are mean ± SD

TABLE 3

PHYSICAL FITNESS CHARACTERISTICS FOR THE SUBJECTS

Variables	Rajkot (n = 88)	Gujarat (n = 74)	p-value
Sprint 30m (sec)	4.79 ± 0.25	5.05 ± 0.44	p<0.01
Sit and reach (cm)	32.86 ± 7.72	30.69 ± 7.23	p=0.07
Stand Long Jump (cm)	203.38 ± 21.54	178.80 ± 28.75	p<0.01
VO2max Shuttle Run Test	50.93 ± 3.99	44.55 ± 6.43	p<0.01

Note: Values are mean ± SD

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