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Physiological Perspective of Handball Players on Physical Development

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Abstract – India being one of the oldest civilizations boasts of one of the richest and the most diverse cultures in the world. It is an apt example of unity in diversity for the entire world to imitate. It has remarkably produced some of the most eminent and great personalities in various spheres of life that have left a profound impact and have contributed immensely in almost every field including sports. Sports and games play an important role in our life. Physical education and sports have been considered as part of education. Sports are dynamic social forces in a culture. The current article highlights the physiological profiles of university level Handball players.

Keywords: Player, Sports, Handball, Dynamic, Social

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INTRODUCTION

Sports have become an important part of cultures across the globe. They have significant influence on International Affairs and have social, political, legal and educational overtones. Sports have become cultural phenomena of great magnitude and complexity during the present century. Sport is fast becoming a social institution. It has become a potent educational, social and economic force.

There is a profound cultural change with regard to the role of sports and physical recreation during present time. Sports are primarily cultural products. Sports and games propagate the feelings of nationalism and help in creating a new generation of individuals with the feelings that the differences based on caste, community and religion have no meaning. The faith, love, peace, and the feeling of goodwill and brotherhood serve to a greater extent towards humanity.

Sports and games provide a common platform where sportspersons from different regions, professing different religion and faiths, speaking different Languages, having different customs and traditions interact with each other in a harmonious congenial atmosphere. Players forget all their differences and emerge as a homogenous group. Such type of thinking, insight and mental approach can play positive role in nation building. Sports and games help in creating such understanding and can play a very decisive and pivotal role in bringing about national integration.

Sports and games have been an integral part of Indian culture. The country has always admired and regarded its outstanding sportspersons as national heroes/heroines. These sportspersons have been the role models for younger generation who continued to inspire them towards the attainment of greater heights in chosen sporting endeavors.

Such sportspersons aptly set their realistic long term as well as short term goals and made sincere all out efforts for their realization. Their regular process of goal setting and dedicated efforts put through rigorous training and workouts take them to the highest level of their performance.

Sports include absolute freedom of activity. The major aim of sports is recreation. Sports are in fact, the attitudes of mind. For some people sports are recreation, for others, the means to excel and achieve high standards in performance during competition. Sports are largely individual events such as athletics, archery, swimming, shooting; wrestling etc wherein the participant tries to compete against his/her owns previous standards as well as those of others.

Organized sports nowadays are refined with activities bound by rules and regulations so that there are constant efforts for betterment of standard and perfection in performance of skills. Sport is a highly ambiguous term having different meanings. Some persons refer to sports when they are speaking of athletics competition whereas others refer to sports when they are discussing the organizational and financial status of a team. Sport is a play, a competition, an acquisition of physical skill, strategy and physical process. The major attribute that distinguishes sports from game is physical process.

METHOD

All players (n = 44) volunteered for this study. Informed consent was received from all participants or their guardians, in case of underaged players (age < 18 yr, n = 5), after verbal explanation of the experimental design and potential risks of study. Exclusion criteria included history of any chronic medical conditions and use of any medication. All participants visited the laboratory once and underwent a series of anthropometric and physiological measures.

Physical measurements included stature, body mass and skinfolds. BMI was calculated as the quotient of body mass (kg) to height squared (m^2). Body fat (BF) was estimated from the sum of 10 skinfolds (cheek, wattle, chest I, triceps, subscapular, abdominal, chest II, suprailiac, thigh and calf; BF = −41.32 + 12.59 · $\log_e x$, where × is the sum of 10 skinfolds). An electronic weight scale was employed for body mass measurement (to the nearest 0.1 kg), a portable stadiometer for stature (0.1 cm), a caliper for skinfolds (0.5 mm), a small anthropometer for breadths (0.1 cm) and a tape for circumferences (0.1 cm).

Statistical analyses were performed using IBM SPSS v.20.0. Data were expressed as mean and standard deviations of the mean (*SD*). One-way analysis of variance (ANOVA), with a sub-sequent Tukey post-hoc test (if difference between the groups was revealed) were used to examine differences in physical and physiological characteristics among the three handball teams. The level of significance was set at α=0.05, and mean difference ± SD together with 95% confidence intervals (CI) was calculated when the post-hoc was necessary. In addition, stepwise discriminate analysis was used for physical and physiological characteristics with team ranking as the dependent variable.

RESULTS

The ANOVA analysis revealed significant differences between the players of the three teams in stature and FFM. Players from team C had lower stature compared to players from team A (−6.2±2.2 cm (−11.7; −0.7), mean difference ±SD (95% CI)) and team B (−9.2±2.2 cm (−14.5; −4.0), respectively). Also, players from team C had lower amounts of FFM compared to the other two teams, with −6.4±2.2 kg (−11.8;−1.1) and −5.4±2.1 (−10.5; −0.2) relative to A and B, respectively.

Table 1

Physical characteristics of participants with ANOVA and post–hoc indicating mean differences between the players of the teams

	Team A (n = 14)	Team C (n = 13)	Team C (n = 13)	ANOVA
Age (yr)	24.0±5.7	27.2±6.7	25.0±5.8	$F_{2,41} = 1.16$, p = 0.323
Body mass (kg)	87.6±9.0 C	87.5±9.8 C	81.8±8.7 A,B	$F_{2,41} = 1.76$, p = 0.185
Stature (cm)	185.1±6.5 C	188.2±6.1 C	179.0±4.7 A,B	$F_{2,41} = 9.22$, p = 0.000
BMI (kg·m^{-2})	25.6±2.4	24.7±2.4	25.6±2.7	$F_{2,41} = 0.60$, p = 0.552
BF (%)	16.6±3.6 C	17.8±4.0 C	18.6±4.0 A,B	$F_{2,41} = 0.96$, p = 0.392
FFM (kg)	72.8±5.3	71.7±6.2	66.4±5.5 A,B	$F_{2,41} = 4.94$, p = 0.012
WHR	0.82±0.03	0.80±0.05	0.81±0.03	$F_{2,41} = 0.60$, p = 0.553
Endomorphy	3.3±1.0	3.6±1.0	4.1±1.4	$F_{2,41} = 1.98$, p = 0.151
Mesomorphy	5.2±1.2	4.9±1.1	5.7±1.2	$F_{2,41} = 1.54$, p = 0.226
Ectomorphy	2.1±1.0	2.5±1.1	1.7±1.0	$F_{2,41} = 2.22$, p = 0.121

As shown in Table 2 there were significant between group differences in Pmean, SJ, CMJ, CMJarm and the 30 s Bosco test. The Tukey post-hoc analysis revealed that players in team A scored higher on Pmean than both players in teams B (+0.48±0.18 W·kg^{-1} (0.05;0.92)) and C (+0.46±0.19 W·kg^{-1} (0.01;0.92)), respectively. Players from team A jumped higher than their team C counterparts in SJ (5.5±1.8 cm (1.11;9.9)), CMJ (5.5±2.0 cm (0.5;10.4)) and CMJarm (6.0±2.1 cm (0.8;11.2)), and performed better than players in team B (+7.8±1.8 W·kg^{-1} (3.5;12.1)) and C (+5.7±1.8 W·kg^{-1} (1.4;10.1)) on the 30 s Bosco test.

Table 2

Physiological characteristics of, and differences between, participants assessed by one-way ANOVA and a post-hoc

	Team A (n = 14)	Team B (n = 17)	Team C (n = 13)	ANOVA
PWC170 (W·kg^{-1})	3.3±0.5	2.9±0.6	2.9±0.8	F2,39 = 1.89, p = 0.164
Pmax (W·kg^{-1})	13.2±2.3 B,C	14.8±1.8 A	13.9±2.7 A	F2,38 = 2.02, p = 0.147
Pmean (W·kg^{-1})	8.8±0.4	8.3±0.5	8.3±0.6 A	F2,39 = 4.34, p = 0.020
SAR (cm)	21.8±8.7	21.2±10.5	24.4±9.2	F2,41 = 0.42, p = 0.658
HST (kg·kg^{-1})	1.3±0.2	1.3±0.2	1.4±0.2 A	F2,41 = 0.70, p = 0.504
SJ (cm)	36.5±4.5 C	33.5±4.7	31.0±4.8 A	F2,38 = 4.70, p = 0.015
CMJ (cm)	37.7±3.7 C	36.4±5.7	32.2±6.2 A	F2,38 = 3.89, p = 0.029
CMJarm (cm)	46.6±4.1 B,C	43.1±6.1 A	40.6±6.1 A	F2,38 = 4.05, p = 0.026
Bosco (W·kg^{-1})	38.8±3.7	31.0±4.6 A	33.0±5.5 A	F2,38 = 10.57, p = 0.000

CONCLUSION

For the first time, mean power output (W·kg^{-1}) in the 30 s Bosco test and WAnT, were shown to discriminate between players from higher ranked and lower ranked male elite handball teams. Also, vertical jump performances were better among the players on the best team. Furthermore, higher stature and amount of FFM were found in players from the higher ranked teams. This could indicate that both physiological and physical characteristics can be useful for discriminating between elite male handball players.

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