



Original article

Anthropometric and fitness profile of high-level basketball, handball and volleyball players[☆]

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ABSTRACT

Objective: The aim of this study was to compare several anthropometric and physiological variables between high-level basketball, handball and volleyball players.

Method: Forty-six Spanish first division professional players took part in our study. Height, standing reach, body weight, body fat percentages (by using Jackson & Pollock equation), vertical jumps (assessed by Bosco tests), 4 m × 5 m agility test and maximal power output in a bench press exercise were assessed.

Results: A one-way ANOVA, showed that basketball players had significant higher average height and standing reach values ($p < 0.01$) while volleyball players displayed the lowest body mass and handball players presented the highest body mass values. Body fat percentage was significantly lower ($p < 0.05$) in basketball and volleyball. Jump levels were significantly better in volleyball for the countermovement ($p < 0.05$) and the countermovement jump with arm swing ($p < 0.001$). Results of the agility test were significantly better in basketball ($p \leq 0.01$). In the concentric actions of maximal power tests basketball players obtained a higher mean power output for all loads ($p < 0.05$). In the eccentric phase volleyball players presented the lower outcome ($p < 0.001$).

Conclusions: There is evidence of anthropometric and physiological differences among the high-level team sports analyzed. Its assessment seems capital for the improvement of training strategies and accurate talent identification processes.

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Perfil antropométrico y de aptitud física de jugadores de alto nivel de baloncesto, balonmano y voleibol

RESUMEN

Objetivo: El objetivo del presente estudio fue comparar variables antropométricas y fisiológicas entre jugadores de baloncesto, balonmano y voleibol de alto nivel.

Método: Cuarenta y seis deportistas profesionales de primera división de España fueron evaluados. Valores de altura, alcance, masa corporal, porcentaje grasa (mediante ecuación de Jackson y Pollock), salto vertical (mediante test de Bosco), test de agilidad de 4 × 5 m y potencia máxima de press banca fueron registrados.

Resultados: El análisis mediante ANOVA mostró que los jugadores de baloncesto presentaban mayores alturas y alcances ($p < 0.01$). Los jugadores de voleibol mostraban los valores más bajos de masa corporal

Palabras clave:

Rendimiento deportivo

Perfil fisiológico

Deportes de equipo

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y los de balonmano los más altos de la muestra. El porcentaje de grasa en baloncesto y voleibol fue el más bajo ($p < 0.05$). Los valores de salto fueron mejores en voleibol para el salto con contra movimiento ($p < 0.05$) y salto con contra movimiento y uso de brazos ($p < 0.001$). Los resultados del test de agilidad fueron mejores en baloncesto ($p \leq 0.01$). En las acciones concéntricas del *press banca*, los baloncestistas obtuvieron mayor potencia media en todas las cargas ($p < 0.05$). En la fase excéntrica los jugadores de voleibol presentaron los valores menores ($p < 0.001$).

Conclusiones: Se muestran diferencias antropométricas y fisiológicas entre deportes de equipo. Su evaluación parece clave para la mejora del entrenamiento y para conducir mejores procesos de selección de talentos.

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Perfil antropométrico e de aptidão física de jogadores de alto rendimento de basquetebol, andebol e voleibol

R E S U M O

Objetivo: O objetivo do presente estudo foi comparar variáveis antropométricas e fisiológicas entre jogadores de basquetebol, andebol e voleibol de alto rendimento.

Método: Quarenta e seis jogadores profissionais da primeira divisão profissional da Espanha fizeram parte desse estudo. Valores de altura, alcance, massa corporal, percentual de gordura (utilizando equação de Jackson & Pollock), salto vertical (medido com o teste de Bosco), teste de agilidade 4 × 5 e potência máxima no exercício supino reto foram registrados.

Resultados: Uma ANOVA one-way mostrou que os jogadores de basquetebol apresentavam uma média significativamente maior na altura e alcance ($p < 0.01$), enquanto que os jogadores de voleibol apresentaram os valores mais baixos de massa corporal e os jogadores de andebol os valores mais altos da amostra. O percentual de gordura foi significativamente menor ($p < 0.05$) nos jogadores de basquetebol e voleibol. Os valores de salto foram significativamente melhores no jogadores de voleibol para o salto com contramovimento ($p < 0.05$) e no salto com contramovimento com utilização do balanço dos braços ($p < 0.001$). Os resultados do teste de agilidade foram significativamente melhores no basquete ($p \leq 0.01$). Nas ações concêntricas dos testes de potência máxima os jogadores de basquetebol obtiveram uma média maior de potência para todas as cargas ($p < 0.05$). Na fase excêntrica os jogadores de voleibol apresentaram o resultado mais baixo ($p < 0.001$).

Conclusões: Há diferenças antropométricas e fisiológicas entre as equipas de desportos de alto nível analisadas. A sua avaliação parece primordial para a melhoria das estratégias de treino e processos de identificação de talentos precisos.

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Palavras-chave:
Performance atlética
Perfil antropométrico
Equipas desportivas

Introduction

One of the most recent and relevant research topics in the field of team sports training has been the establishment of a reference fitness profile for every single sport. Although it is commonly accepted that team sports training needs a multifaceted approach to understand all of the performance factors affecting competition, it is also well known that the enhancement of fitness levels is relevant to obtain a better result. Each one of these team disciplines seems to present a particular anthropometric and physiological profile due to specific functions and requirements for each position of the game. However, some common characteristics can be defined when comparing different sports. The correct definition of reference profiles in sport is not only important for proper coaching of elite populations; it is also essential to conduct proficient talent selection processes.

Sprinting performance, strength, and muscular power are thought to be important for successful participation in basketball.¹ Anthropometrically, basketball players have shown a notable average height in several studies^{2,3} even when conducted with players from different nationalities.⁴ Most notably, several authors have found that anaerobic performance is crucial in basketball, with critical elements in the game such as quick change of direction, acceleration, deceleration and jumping ability.^{1,3,5} However, physical characteristics are not homogeneous for all the positions of the

game. Centers and forwards are taller, heavier, and show a higher percentage of body fat than guards.³ Previous studies suggest that the characteristics of junior basketball players differ slightly, in the above-mentioned parameters, from those playing in high-performance situations.¹

Differing definitions of the sport of handball have been discussed within the literature. Gorostiaga et al.⁶ define team handball as an intermittent, high-intensity sport that stresses running, jumping, and throwing abilities with high demands of physical capacity. The authors support the idea that handball requires great strength levels to hit, block, push, turn, change speeds and grab opponents during games. Hermassi et al.⁷ stated that handball is a strenuous contact sport that places emphasis on running, jumping, sprinting, throwing, hitting, blocking, and pushing. From the authors' point of view, muscular strength and power, technical and tactical skills are the factors that give a clear advantage in high-level competitions. Marques⁸ defined handball as an explosive sport with continuous sprints, jumps, changes of direction and explosive ball throwing, including body contact. Several studies describe the anthropometric characteristics of handball players,^{9,10} and similar to basketball, particular characteristics for the different positions of the game exist. Pivots and backs tend to be the tallest players, while goalkeepers present the higher percentage of body fat.⁹ Also, significant differences can be found in the body mass and hand-length of the backs.¹¹

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