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ORIGINAL ARTICLE

Reference values of vertical jumping performances and anthropometric characteristics in trained adolescents

Valeurs de référence des percentiles des performances de saut vertical et des paramètres anthropométriques chez des adolescents entraînés

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Received 17 July 2017; accepted 25 September 2017

KEYWORDS

Percentile values;
Jump height;
Leg muscle power;
Anthropometry

Summary

Objective. – The aim of this study was to provide percentile values for vertical jumping performances and anthropometric characteristics for athletic Tunisian children and adolescent.

Methods. – One thousand and fifty-five athletic Tunisian children and adolescents (643 boys and 412 girls) aged 7–18 years were randomly selected to participate in our study. They were asked to perform squat jumps and countermovement jumps. Jump heights and leg power were simultaneously provided by the Optojump device. The anthropometrics variables were measured by a single trained anthropometrist. Descriptive statistics for each-year age group within sex were calculated. Construction of the smoothed centile curves was performed using the polynomial regression models. For each measurement, a least square regression model with high order polynomials was fitted to predict mean and standard deviation of vertical jumping parameters and anthropometric variables.

Results. – Smoothed percentile curves and percentile values for the 5th, 10th, 25th, 50th, 75th, 90th, and 95th percentiles are presented for two sexes.

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<https://doi.org/10.1016/j.scispo.2017.09.002>

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Please cite this article in press as: Aouichaoui C, et al. Reference values of vertical jumping performances and anthropometric characteristics in trained adolescents. Sci sports (2017), <https://doi.org/10.1016/j.scispo.2017.09.002>

MOTS CLÉS

Percentiles ;
Hauteur du saut ;
Puissance
musculaire ;
Anthropométrie

Conclusion. – Percentiles values of vertical jumping performances and anthropometric characteristics are provided. the new Tunisian reference charts obtained can be used as a screening tool to determine growth disorders. This study may help in verifying the effectiveness of a specific training program and detecting highly talented athletes.

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Résumé

Objectif. – Construire des courbes et équations de percentile pour les performances de saut vertical et les paramètres anthropométriques à partir d'un échantillon représentatif d'adolescents sportifs tunisiens issus de plusieurs disciplines sportives.

Méthodes. – Mille cinquante-cinq enfants et adolescents sportifs tunisiens (643 garçons et 412 filles) âgés de 7 à 18 ans ont été choisis au hasard parmi une population sportive pour participer à notre étude. Ils ont effectué deux types de sauts verticaux, squat et contremouvement. Les hauteurs de saut et la puissance des jambes ont été simultanément mesurées par le dispositif Optojump. Les statistiques descriptives ont été calculées pour chaque tranche d'âge masculine et féminine. La construction des courbes de percentiles a été réalisée en utilisant les modèles de régression polynomiale. Pour chaque mesure, une régression par méthode des moindres carrés avec un polynôme d'ordre élevé a été utilisée afin de prédire la moyenne, la déviation standard pour les paramètres du saut vertical et les variables anthropométriques.

Résultats. – Les courbes des percentiles pour le 5^e, 10^e, 25^e, 50^e, 75^e, 90^e et 95^e percentiles ont été réalisées dans les deux sexes.

Conclusion. – Ces courbes permettront aux cliniciens de dépister les individus qui présentent des anomalies de croissance. Ces valeurs de référence peuvent être utilisées dans la majorité des sports pour identifier et orienter les jeunes sportifs doués ainsi que pour évaluer les effets des méthodes d'entraînement.

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1. Introduction

Muscular strength is an essential component of motor performance in that a certain level of muscular strength is necessary to carry out different tasks. Moreover, several motor performance tasks like jumping and throwing are commonly used as indicators of specific aspects of muscular strength [1,2]. Muscular strength improves with age during middle childhood and adolescence, but the pattern of improvement is influenced by many components like gender, individual body size, growth maturity and to a certain degree by motor competence and the level of physical activity [3,4]. In addition, muscle function and muscle force are two fundamentally different parameters of the motor system that are closely related and are used to determine whether pathological muscle weakness is present and to evaluate the effects of physiotherapy or training programs [5].

The whole-body level of body composition characterizes body size and configuration, which is often described by anthropometric measures such as body weight, skinfold thicknesses, circumferences, and body mass index among others assessment of body composition in athletes may help to optimize competitive performance and monitor the success of training regimens [6,7]. It has been demonstrated that improved body composition in athletes is associated with enhancements in cardiorespiratory fitness [8] and strength [9].

Anthropometric properties of athletes represent important prerequisite for successful presence at the same sport,

effecting athlete's performance and are necessary in order to gain excellent performance of sports skills [10].

Anthropometric measurements are population-dependent and may differ according to the dietary pattern and lifestyle habits. Anthropometric indices provide essential information regarding body composition in children. They may also be related to health complication such as the presence of cardiovascular risk factors and the extreme mass changes due to dehydration, or eating disorders [11,12].

Growth charts contain a set of percentiles ranging from 5 percent to 95 percent. The percentiles compare a child's development with other children. A growth chart is used by pediatricians, physician and other health personnel to follow a child's growth over time. For example, if a child's growth pattern suddenly changes and weight drops or increases significantly in the percentiles, a physician may look for reasons behind the shift. Growth charts can also be used to predict the expected adult height and weight of a child [13].

Some of anthropometric and muscle strength reference charts have been developed for specific populations like North Americans [14], Canadians [15], Australians [16], Spanish [17], Swedish elderly [18], Southern Brazilian children [19] and European children [20] which may not be suitable for Tunisian children and adolescents.

To the best of our knowledge, there are no percentile values of vertical jumping performances and anthropometric characteristics based on a large sample of athletic Tunisian children.

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