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ORIGINAL ARTICLE

# Effect of socioeconomic status on leg muscle power in Tunisian adolescent athletes

*Effet du statut socioéconomique sur la puissance des membres inférieurs chez les athlètes adolescents tunisiens*

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## KEYWORDS

Socioeconomic status;  
Jump height;  
Leg muscle power;  
Leg muscle volume;  
Athletes

## Summary

**Objective.** – The purpose of this study was to examine the effect of socioeconomic status on the anthropometric parameters and vertical jumping performances during growth in Tunisian adolescent athletes.

**Methods.** – Eight hundred and fifty athletic adolescents aged between 13 to 19 years (570 males and 280 females) were randomly selected to take part in the study. Measurements of anthropometric parameters and the socioeconomic status were realized. Jump heights and leg power were provided by an optojump device using countermovement jump (CMJ) and squat jump (SJ) techniques. Correlations and general linear model were used to show the interrelation between anthropometric variables and socioeconomic status with the jump height performances.

**Results.** – Trained adolescents from HSES have higher values of height, body mass, fat mass and leg muscle volume than those from LSES. These values were associated with higher jump performances (SJ height, SJ power, CMJ height and CMJ power) than those from LSES. The general linear model showed that the main factors affecting the development of vertical jumping performances are gender, age, standing height, sitting height, waist size, body mass index, leg muscle volume and socioeconomic status in athletic Tunisian adolescent.

**Conclusion.** – The socioeconomic parameter plays a major role in determining anthropometric variables and jumping performances in adolescent athletes.

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## MOTS CLÉS

Statut socioéconomique ;  
Athlètes ;  
Hauteur du saut ;  
Puissance musculaire des membres inférieurs ;  
Volume musculaire

## Résumé

**Objectif.** – L'objectif de notre étude est de déterminer l'effet du statut socioéconomique sur les variables anthropométriques et les paramètres du saut vertical chez les athlètes tunisiens pendant la croissance.

**Méthodes.** – L'échantillon étudié dans ce travail représente une population de 850 adolescents sportifs tunisiens (570 garçons et 280 filles) âgés de 13 à 19 ans. Le niveau socioéconomique des adolescents a été évalué à partir des données mentionnées dans le questionnaire. La hauteur du saut et la puissance musculaire des membres inférieurs ont été calculées à l'aide d'un optojump en utilisant les tests de *squat jump* (SJ) et contre *mouvement jump* (CMJ). Les corrélations et le model linéaire généralisé ont été utilisés afin de déterminer l'effet du statut socioéconomique sur les variables anthropométriques et les performances du saut vertical.

**Résultats.** – Le poids, la taille, la masse maigre et le volume musculaire des membres inférieurs sont plus élevés chez les athlètes tunisiens issus d'un niveau socioéconomique élevé par rapport à des athlètes issus d'un niveau socioéconomique faible. Ces paramètres anthropométriques sont en comparaison à celles des athlètes issus d'un bas niveau socioéconomique. Le model linéaire généralisé a démontré que les principaux facteurs affectant le développement des performances du saut vertical sont le sexe, l'âge, la taille assise, la taille debout, le tour de taille, l'indice de masse corporelle, le volume musculaire des membres inférieurs ainsi que le statut socioéconomique.

**Conclusion.** – Le statut socioéconomique a un effet significatif important sur les variables anthropométriques et par conséquent sur les performances du saut vertical chez les athlètes adolescents tunisiens.

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## 1. Introduction

The determination of factors influencing muscle power in adolescent athletes is important for coaches to detect potential weaknesses in order to practice specific muscle reinforcement with two objectives; ameliorate performance but also prevent injuries. Several studies regarding elite young athletes have focused on the assessment of factors influencing physical and physiological performances and how these factors are related to growth and maturation [1]. Several authors have showed marked increases in physical performances during and after puberty [2]. These increases concern both functional parameters, such as neuronal, hormonal, cardio respiratory, anthropometric and biomechanical ones [3,4]. Some studies have suggested the importance of anthropometric parameters in muscle anaerobic performances [2]. In this context, Armstrong and McManus [1] postulated that increases in muscle volume are associated with the increases in muscle power during adolescence. Despite the number of growth and maturation studies related, few studies assessed the relationships between socioeconomic status, anthropometric parameters and muscle anaerobic performance.

Many tests are proposed in the literature to assess muscle anaerobic power. The vertical jumping test is a simple and easy test, which is very often used by many authors to assess muscle explosiveness of athletes [5,6]. Performances during this test are related in particular to gender, age, growth and maturity and in consequence body composition [7,8]. For example, Abidin and Adam [6] noted that anthropometric profile of athletes plays a major role in vertical jump performance. Buchanan and Vardaxis [7] showed that height and weight are important predictors of muscle strength in young male basketball players.

However, some authors showed that changes in muscle power during childhood and adolescence couldn't be explained only by quantitative modifications; other factors such as altitude and the socioeconomic status, are important for the evaluation of short-term maximal anaerobic power among children [9,10].

Tanner suggested that the growth is a mirror of the conditions in society [11]. Indeed, the family status affects dietary intakes and the latter could play a role for health and muscle performances, particularly for young athletes [12]. In this context, some reports showed that differences in social class (parental profession, income, education) might influence physical performances [13]. Jiménez Pavón et al. [14] showed relationships between socioeconomic status and lower body muscular strength in European adolescents.

To the best of our knowledge, there are few studies about these relationships in adolescents living in developing countries, where nutritional conditions may be different [15].

Therefore, we undertook to identify the effect of socioeconomic status on anthropometric parameters and vertical jumping performances among Tunisian adolescent athletes male and female aged between 13 and 19 years.

## 2. Materials and methods

### 2.1. Participants

Eight hundred and fifty adolescent athletes (570 males and 280 females), aged from 13 to 19 years participated in this study. The subjects were selected from twenty multidisciplinary sport associations. Subjects practice various sports such as athletics, rugby, soccer, handball, volleyball, basketball, cycling and tennis. Participants were randomly chosen from the north and the centre of Tunisia. The altitudes

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