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Short Communication

Evaluation of the physical components in Algerian high-school pupils (16-19 years): Determination of the somatotype in relation to choice of sports activity

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This study aims to explore the somatotype of Algerian high-school pupils of 16-19 years old. Various works in the field of sport have shown that athletic performance is a result of multiple factors that could be classified under psychological, physiological and physical. This last factor relates to the physical aspects. It gathers anthropometric dimensions, the body indices and the somatotypes. The result reveals that the mesomorp, the ectomorph and the somatotype are physical components, but most important of them all is the somatotype among young boys of 16-19 years old. On the other hand, in the girls, the mesomorp seems to be more important; it is explained by the peak speed of the weight occurrence between the16-19 years old.

Key words: Evaluation, motricity, somatotype, anthropometry, APS.

INTRODUCTION

The study of the shape of the human body always arouses interest due to its clinical or esthetics purpose that is related to variations of human growth. Scientists, eager to quantify and compare the infinite variations of human morphology, developed many systems to classify these physical variations. Since the sixties, the calculation of the somatotype represents one of the methods most useful for quantification of the body form, independent of the size. The use of adequate anthropometric measurements made it possible to create a method needed to evaluate the total image of the shape of the human body and to study its plasticity: the calculation of the anthropometric somatotype (Carter and Heath, 1990; Carter, 2003).

The somatotype consists of the qualitative description of the form and the body composition in one determined moment, expressed by three components: a) The endomorphie (which informs us about the relative adiposity which characterizes the roundness of contours and the digestive visceral prevalence, b) the mésomorphie (which informs us about the ostéo-muscular development compared to the size or with the thin mass (Carter, 1975).

The human body is formed of thin mass, fatty mass and the mineral contents. It indicates to us the importance of the bones and the muscles and c) the ectomorphie (informs us about the elongation of the segments of the body. It stresses the importance of the surface of the body and the nervous system compared to the mass). The aim of this research is to determine the type of somatotype in Algerian high-school pupils, and to optimize the selection criteria and the orientation towards a sporting discipline.

MATERIALS AND METHODS

Sample

900 pupils of 9 colleges, representing the Western area of Algeria were evaluated. For each college, a group of 100 pupils comprising 75 boys and 25 girls of 16-19 years old were measured to know their anthropometric characteristics (weight, size, somatotype, fat folds under cutaneous). The data collected were analyzed accord-

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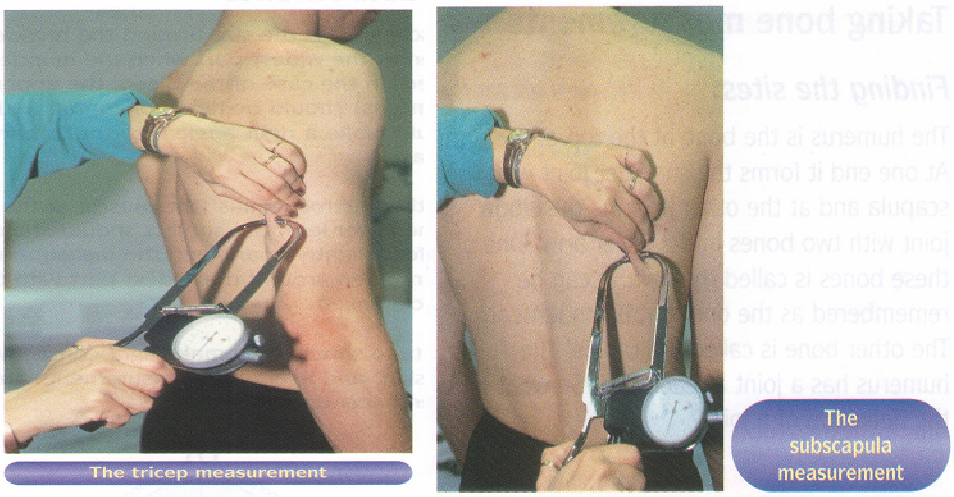

Figure 1. Various types of anthropometric measurements.

ing to the chronological age and somatic level of maturation.

Anthropometric measurements

In anthropometry, there exists longitudinal measurements (stature, length of the upper and lower limbs, among others); transversals (diameters biacromial and bicrète) and of the perimeters (thorax, arm, thigh). The measurement technique consists of carrying out anatomical reference marks on the skin (Figure 1). The material of measurement is composed of:

1) A dismountable anthropometric measuring apparatus intended for longitudinal measurements and transversals.
2) A slide caliper for the widths and thicknesses (hands, feet…).
3) An outside caliper for cephalometric measurements (head).
4) A flexible metric ribbon for the perimeters.
5) #a grip with cutaneous folds (standard Harpenden).
6) Dicipital; tricipital; subscapular; suprailiaque; calf.

Somatotype of Heath and Carter

An improvement of the somatotype of Sheldon was carried out in 1968 per Heath and casing. The somatotype used the following measurements of the human body: size, weight; thickness of the cutaneous folds, tricipital, subscapular, supra-iliaque, thickness of the medium of the calf, the width bicondiliaire of the humérus and the femur; the circumference of the arm (medium) and the leg at the level of the calf.

Indices in anthropometry

All dimensions of the trunk and the members can be expressed in % of the stature. The formula then is: 100 X dimension considered for stature, are between them, thus bringing a total geometrical description. They are very useful relative values that one can classify and are of practical interest. The index of Quételet makes it possible to characterize the stoutness of the subjects:

IMC = Weight (kg)/stature2 (cm)

The index cormic informs us about the relative height of the bust:

Ic = 100 X size-sitted (rectified) / stature

•Brachycorme (short bust Ic < 51)
•Métriocorme (average bust 51.1 < Ic < 53.1)
•Macrocorme (buste long Ic > 53. 1)

Equations for the calculation of the somatotype

The regression equations used by the method of Heath and Carter are based on anthropometric measurements: cut (cm), weights (kg), four folds subcutaneous (triceps, subscapulaire, suprailiaque and the calf, in mm), osseous diameters (width humérale and femoral in cm) and two circumferences (calf and arm in maximum inflection, cm), osseous diameters (widths bicondylaires humérale and femoral, in cm) and circumferences (calf and arm in maximum inflection, cm). The equations used are those of Heath and Carter (1967) and of Casing and Al (1983), namely:

1. Endomorp: 0.7182 + [0.1451 (∑) – 0.0068 (∑2) + 0.00014 (∑3)]

∑= nap of the folds triceps, subscapulaire and suprailiaque is multiplied by (170,18/taille).

2. Mesomorph [(0.858H) + (0.601F) + (0.188CBC) + (0.161CPC)] - (0.131E) + 4.5

• H = width bicondylaire humérale; F = femoral width bicondylaire; E = size.
• CBC=circumference of arm (CB) corrected for the fold of the triceps=CB- (fold of the triceps/10).
• CPC= circumference calf (CP) corrected for the fold of the mollet=CP- (fold of the mollet /10).

3. Ectomorph: [(E (P) 1/3) 0.732] – 28.58; E = size; P = weight It should be held account that: if [E (P) 1/3] < 40.75

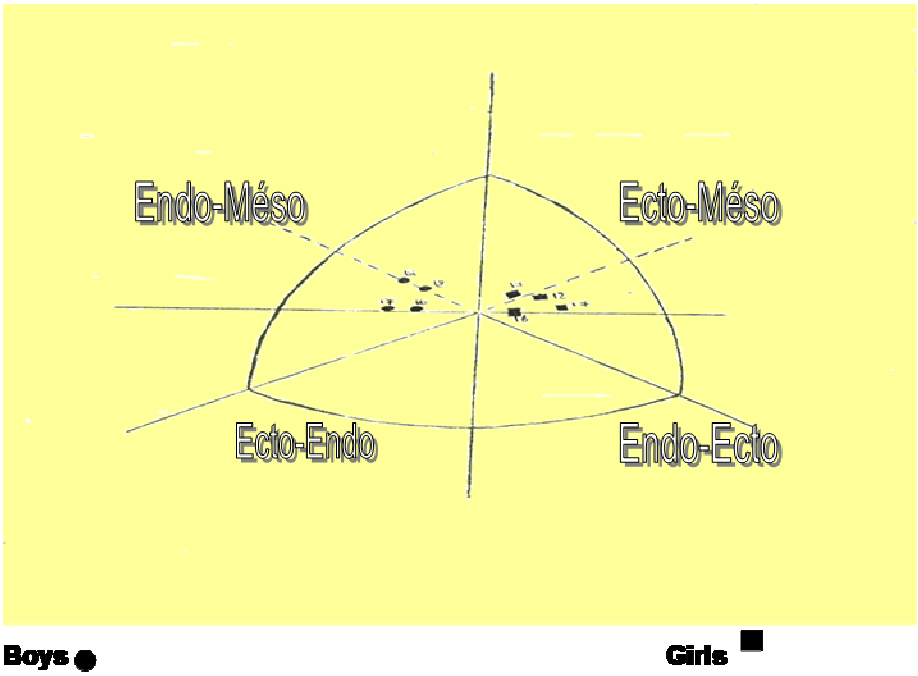

Figure 2. Somatotype of the boys and girls of Algeria (16-19 years).

40.75 and > 38.25, the ectomorphie = [E (P) 1/3] 0.463) – 17.63 if [E (P) 1/3] < 38.25, the ectomorphie = 0.1 (Figure 2).

DISCUSSION

The result reveals that the mesomorp, the ectomorph and the somatotype consist of the physical components. However, while the somatotype is the most important among young boys of 16-19 years old, the mesomorph seems to be more important in the girls. It is explained by the peak speed of the weight ocurrence between the16th and 19th years (Figure 2). These results suggest that the difference among the girls and boys appear very early. Consequently, an orientation and a sporting selection objective is essential during this age. Our next study will focus on establishing the profile of the somatotype for some sporting disciplines. This process will have to facilitate the orientation and the early selection of the young talents (Carter, 1970).

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