

## МЕДИКО-БІОЛОГІЧНІ АСПЕКТИ ПІДГОТОВКИ СПОРТСМЕНІВ

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### SOMATOTYPE IN 6–12-YEAR-OLD WEST OF ALGERIA PRIMARY SCHOOLCHILDREN

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*The purpose of this study was to analyze the evolution of somatotype during growth.*

*Material and methods.* We examined 105 participants of the study: 42 boys and 63 girls aged from 6 to 12 years old, located in primary school (urban group) Tahar Jelloul city housing 348 Mostaganem to the west of Algeria. To fulfill the goal to find special sex difference in this relationship, males and females were studied separately. Having analyzed the results we found that the dominant model for both females and males of all ages was thin muscular which evidenced for the control of muscle mass at this age. We noted that the fine component confined between 02 and 04 between sexes, indicating that there was no difference in this component, where the differences sex did not affect until the age of 13.

*Results and discussion.* The theoretical and practical study showed that there was no difference between male and female in all morphology characteristics, such as thin muscular style which was dominant in this study. The movements of boys are characterized as arduous and violent, such as climbing and running. Girls' movements are less violent than boys' movements. It can explain the slight difference in the proportion of lipid mass and control of muscle mass and bone in both sexes. There was no difference between males and females in the proportion of fat or lipid mass and this was due to the lack of sexual differences between them. An important characteristic of this stage is the child's ability to endure weakness and feel tired for less effort, especially physical fatigue due

to the lack of growth of the heart and lungs in relation to the growth of body size. At this stage muscular compatibility begins to improve. There is nothing to prevent the child from giving some difficult movements, which require compatibility between muscles and nerves, and this helps us to improve the muscular compatibility. The child's physical growth remains relatively slow. Overexertion affects the growth processes in this age and usually growth at this stage is characterized as a slow process. Children at this stage like sport exercises practiced by adults very much. It is acceptable to take a father or a mother with them for some activities but with the condition that they match their level of maturity with no over-performance.

*Conclusions.* The tendency of the child at this stage to compete exercises together with adults should be used. That is why we recommend our children to practice sports activities in the form of competitions or games, chasing or wrestling.

**Keywords:** somatotype, schoolchildren, measurements, growth, anthropometry.

**Introduction.** The study of human body shape has always provoked much interest for a clinical purpose or aesthetic for its variations related to growth, gender and aging. Scientists who wish to quantify and compare the infinite variations of morphology, have developed many systems for classifying the physical variation [1]. Somatotype calculation represents one of the most useful methods for quantification of body

shape. The use of appropriate anthropometric measurements allowed the creation of a method to provide a comprehensive image of human body [2]. Many somatotype studies were carried out to investigate the relationships between physique and motor performance [3].

The somatotype has often been used to study morphometric variations in children [4]. The relationships between somatotype and age at menarche are significant. In general, endomorphy and mesomorphy exhibit a small negative association with age at menarche, whereas ectomorphy has a small positive association. Significant differences in somatotype were evident for only endomorphy, which exhibited a higher prevalence among urban girls relative to rural girls. Urban girls were heavier and more endomorphic than rural girls [5]. In particular, it would seem that those who have high mesomorphy values are predisposed to better strength performance. In the lower body, this may also be combined with a higher ectomorphy value. Overall, these findings may have important implications for both the identification of those predisposed to perform well in sports containing strength-based movements and prescription of training programmes in physically active males. [6]. Especially when landing after dismount from an apparatus in the final phase of routines. Furthermore, substantial power of the lower limbs represents a precondition for fast. Movement and take-off from the ground, especially during an approach sprint on a runway before a vault or during floor exercises. Optimal anthropometric measurements can ensure higher power for gymnasts. Nevertheless, few studies have analyzed these issues [7].

**The purpose of the study.** In this study we conducted various anthropometric measurements on the sample. We addressed to the sensitivity of this phase of any pattern to the dominant age group (06–12 years) and the difference between males and females in the components of the pattern which they have. We also defined the relationship between each of the blocks of muscle mass bone and fat.

#### **Material and methods.**

**Anthropometric measurements.** Heath and Carter anthropometric somatotype come to this method using measurements anthropometry and is a method commonly used for accuracy and objectivity. Furthermore it does not use photography, which can be expensive for some people [2]

We used Heath Carter to reach the following equations and to calculate the three components of the pattern of the body (fat, muscle, thin) using metric units. We accounted astvia using the following corrections:

1. Measure the height (cm).
2. Measurement of weight (kg).

3. Extract the average height weight (HWR) of the following equation:  $H.W.R = \text{Height} / \text{Weight}$  using the geometric shape of average height and weight "measurement systems".

4. Measurements of the thickness of skin folds of the following thickness of the skin fold behind the upper arm (mm) [8].

We divided the body into five regions:

1. The first area: the head and neck.
2. Region II: the chest or trunk above the diaphragm.
3. Region III: arms and hands arms and hands.
4. Region IV: abdominal or trunk below the diaphragm.
5. Fifth District: legs and feet.

Then the evolution of the order and using a new method called the method of measurement metric imaging Photogrammetric Technique.

1. Photography of the body from the front and side and rear in a manner known as Sheldon.

1. Use the form to the discretion of each sector in the light.

Regions and categories of card style body: Card style body diagram represents the five identifying places where the objects and patterns of spread of the sample under measurement, and is divided into thirteen segments of a watershed.

A card-style has three axes, each representing one of the three components of the body muscle and obesity (**Figure 1**) [9].

**Results and Discussion.** The study of each of the measured length and weight of the sample in this research is one of the key indicators of the growth process presented in **Table 1** and **2**. The process of increasing the length measurement was consistent and age where increasing length measurement gradually with age.

Both the height and weight continues to increase in phase difference between (1.33–1.67 cm) for height (1.22–3 kg) for weight. This is agreed with other study where at the end to find that there is equal growth through the ages from 08 to 12 years, but to varying degrees. **Table 1** shows that the length and weight of males more than females only in the category of 07 years it is observed contrary to the measured seen together as the length of the larger females than in males in the category of 09 years. Both height and weight are proportionate directly proportional to the age. As in previous studies, it was found that the most important correlates of the amount of error were the actual measurements of height and weight. An interesting finding was that misreporting of both height and weight in men was correlated with both aspects of body size, whereas for women, it was related mainly to the characteristic in question [10].



Figure 1. Card-style measurements

Table 2 – The results of the boys–girls comparison in each age group (10-12 years)

		10 Years			11 Years			12 Years			Unit
		N	X	S	N	X	S	N	X	S	
Boys	Length	09	143.11	5.134	09	144.44	8.07	09	146.11	6.37	C m
	Weight	09	35	5.19	09	36.22	3.96	09	39.22	7.57	kg
Girls	Length	06	135.3	5.92	06	137.5	4.92	06	144.66	2.50	C m
	Weight	06	29	4.85	06	34.5	3.61	06	38.5	5.50	kg

Table 1 – The results of the boys–girls comparison in each age group (6–9 years)

		06 Years			07 Years			08 Years			09 Years			Unit
		N	X	S	N	X	S	N	X	S	N	X	S	
Boys	Length	09	119.22	3.57	09	121.11	4.07	09	126.7	4.23	09	134.6	3.74	C m
	Weight	09	23.22	4.32	09	23.33	2.87	09	26.33	1.93	09	31.11	2.52	kg
Girls	Length	06	117.33	4.17	06	122.5	4.96	06	125	5.29	06	135.1	6.46	C m
	Weight	06	20.66	1.36	06	23.83	5.91	06	22.66	3.44	06	29.33	3.88	kg

**Table 2** represents the components (blocks) of the body and measuring blocks physical sample to examine the muscle mass that represents the bulk of the total weight of the body, reaching 9.08 kg in the category of 06 years males to ascend by 9.99 kg when class is 07 years down to 9.73 kg in class of 08 years, increases bone mass at the expense of muscle mass where there is a significant growth in total bone begins to escalate to up to 14.35.

In the category of 11–12 years it reached 06.44 kg – 06.78 kg, respectively, and this confirms the rapid growth of the mass bone of the child at this stage which falls within the changes that occur where the body is in the process are the bones after they soft becomes solid and strong. This explains the increase in bone mass and at this stage we see that the physical proportions moderate and become close similarities at the stage where related parties and increasing muscle growth and bone formation are stronger than ever before. Studies were continued until the end of puberty in the examined children because the period of puberty is the time of accelerated growth of skeletal muscles and final establishment of the somatotype [11].

The study provides the first descriptive account to the somatotype component in children between 6 and 10 years of age from urban and non-urban areas of L'Aquila and its province (Central Italy). Beside the analysis of the difference between these sub-groups our aim was to study the variations of somatotype components during growth, differences in somatotype between children from urban and non-urban environments, valued by t-test were not particularly appreciable [12].

Girls and boys from Sonora and Veracruz did not differ in height, weight and the BMI. Mean heights are at (girls) or below (boys) the medians of the USA growth charts, while mean weights are at (boys) or just below (girls) the 75th percentiles at most ages [13].

Our approach involves the use of an instrument for measuring body proportionality for the purpose of comparing growth of segments to body dimensions. The objective of this descriptive transversal study is to assess physical growth through body proportionality of school children, aged 6 to 12 years, living at the same place.

**Table 3** represents the components of the physical patterns of sample, the Rate of obesity in males is estimated at 0.5 at the age of 06 years, to climb and settle at the value of 01 and then nailed to board squads 0.5 to 1.5 at the age of 11 and 12 years old. In females, obesity rate have 0.5 at the age of 06 years to ascend to the value of 01 at the age of 07 years and then fall at the age of 08 years to continue to climb after that at the age of 09 years. The value of obesity at the age of 01, 10 and 11 years, then rose to 1.5 at the age of 12 years. We should note that the value of the table obesity sandwiched between [0.5 – 1.5] in males and females, indicating boiling lack of differences between them in fat or fat mass and this is due to the non-appearance of the sexual differences between them.

Published data regarding prevalence of overweight and obesity among children aged 6–12 years in Tanzania is scarce. This study was therefore conducted to determine the prevalence of overweight and obesity among children aged 6–12 years in Dodoma and Kinondoni Municipalities in Tanzania [14]. both boys and girls aged 10–12 years had significantly higher average body fat mass than their younger counterparts aged 6–9 years.

This could be due to the facts that, majority of children aged 10–12 years were at pre-adolescent/ adolescent stage. This is the stage when children attain a rapid growth spurt, characterized by rapid linear growth and deposition of fat mass. Boys tend to deposit more fat free mass than fat mass while girls tend to deposit more fat mass than fat free mass. In this stage also, many children start getting concerned about their own body images/shapes and often adopt unhealthy food choices and meal practices. Children in this age group, especially girls, tend to skip meals,

**Table 3** – The components (blocks) the body of the research sample

	Age	Weight Kg	Bone Mass	%	Fat Mass	%	Muscle Mass	%
Boys	06 Years	23.22	3.78	16.28	01.72	07.44	9.08	39.12
	07 Years	23.33	3.84	16.48	01.77	07.62	9.99	42.83
	08 Years	26.33	4.32	16.43	01.98	07.51	9.73	36.97
	09 Years	31.11	5.42	17.42	02.60	08.35	11.92	38.32
	10 Years	35.00	5.97	17.08	03.04	08.70	12.70	36.30
	11 Years	36.22	6.44	17.78	03.07	08.48	14.54	40.15
Girls	12 Years	39.22	6.78	17.30	04.13	10.53	14.35	36.59
	06 Years	20.66	3.58	17.34	01.72	08.70	09.68	46.84
	07 Years	23.83	3.62	15.21	01.81	08.48	0895	37.56
	08 Years	22.66	3.95	17.46	01.72	10.53	09.74	43.00
	09 Years	29.33	4.38	14.95	03.23	08.37	12.00	40.93
	10 Years	29.00	4.99	17.22	02.73	07.60	12.85	44.34
	11 Years	34.50	5.29	15.35	02.73	07.62	13.13	38.07
	12 Years	38.50	5.07	13.18	03.80	11.03	14.19	36.85

eat very little food and snack on high fat, high sugar foods/drinks [15].

Table 4 shows that muscle in males rate estimated 04 at the age of 06 years and 07 years while in class 08 years reached 4.15 to settle between [4.85 - 4.65] until the age of 12 years.

Table 4 – Identify the types of objects to sample

	Age	Component of Thinness	Component of Muscle	Component of obesity	style
Boys	06 Years	2.00	4.00	0.50	Muscular slim
	07 Years	2.50	4.00	1.00	Muscular slim
	08 Years	3.00	4.15	1.00	Muscular slim
	09 Years	2.50	4.65	1.00	Muscular slim
	10 Years	3.50	4.65	1.00	Muscular slim
	11 Years	3.50	4.85	1.50	Muscular slim
Girls	06 Years	2.50	4.00	0.50	Muscular slim
	07 Years	2.50	4.00	1.00	Muscular slim
	08 Years	3.00	4.00	0.50	Muscular slim
	09 Years	3.50	4.37	1.50	Muscular slim
	10 Years	3.50	5.00	1.00	Muscular slim
	11 Years	2.50	5.37	1.00	Muscular slim
12 Years	3.00	4.25	1.50	Muscular slim	

Rate thinness in males 02 at the age of 06 years to climb down to 03 at the age of 08 years and then come down to 2.5 at the age of 09 years to settle at 3.5 at the age of 10 and 11 years and then fall at 03 at the age of 12 years.

The females rate was slim 2.5 at the age of 06 years to climb down to 3.5 at the age of 09 and 10 years to fall when the value of 2.5 at the age of 11 years, then climb again to 03 at the age of 12 years.

Here we see that thinness limited component between 02 and 04 when the sexes. Having analyzed the results recorded in Table 3 we concluded that the dominant pattern at both boys and girls for all ages is muscular slim and is evidence of the control of muscle mass at this age.

Figures 1, 2, 3 represent summary of the study to determine the sample patterns and distribution patterns of objects on the card style.

Thinness is one of the biggest problems of children in our sample. Children in growing age need more varied nutrient to reach their full growth potential. Any obstruction during this stage leads to impaired physical and mental growth children of age range from 6–12. The recent study stated that under nutrition was better assessed as thinness (low body mass index for age) than as wasting (low weight for height) [16].

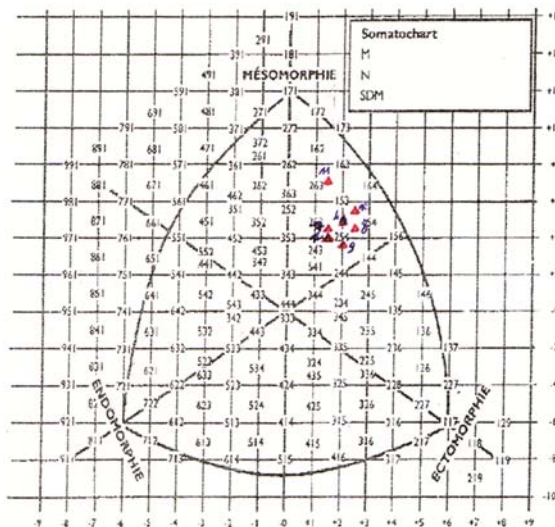


Figure 1. Distribution of body on the card style

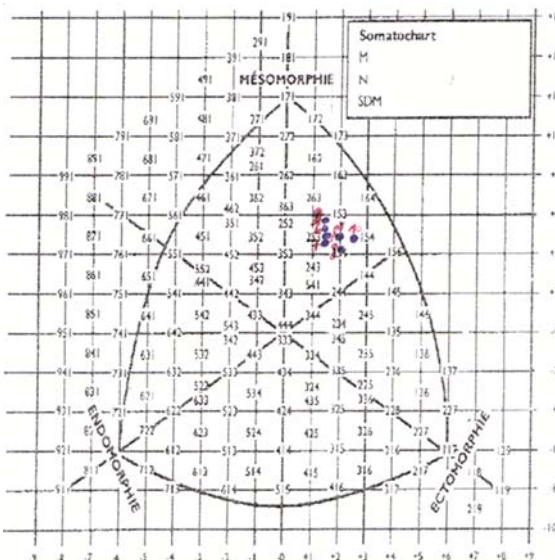


Figure 2. Distribution of gird SDM on the card style

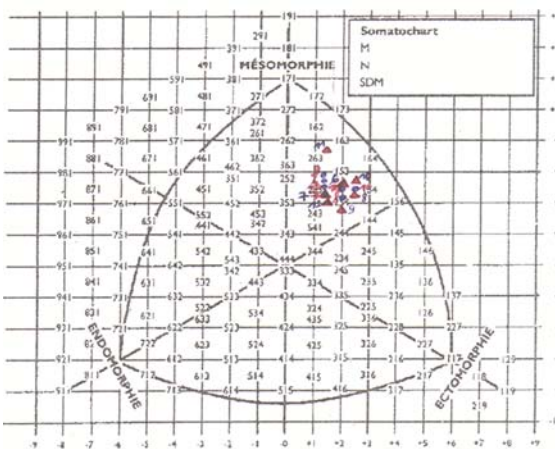


Figure 3. Distribution patterns (body and gird) on the style card

**Conclusions.** The results obtained in different measurements of conducted anthropometry research sample included 105 people of the age group (06–12 years old). After the study, researchers found the following conclusions:

1. The dominant pattern in the age group (06–12 years old) is a muscular slim.
2. There is no difference between males and females in the components of their style.
3. The stand on the reality of physical construction anthropometry in children is the main face of the

pedagogical educational efforts on the elementary school level where they are through the diagnosis and evaluation of the child's condition.

**Prospects for further research.** The results obtained are considered partial to a simple but encouraging sample to further expand the sample to other communities, from different geographical areas and under the influence of different feeding environments to obtain wider results and other factors that affect the results.

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### СОМАТОТИП 6–12-РІЧНИХ ДІТЕЙ, КОТРІ НАВЧАЮТЬСЯ У ПОЧАТКОВИХ ШКОЛАХ ЗАХІДНОГО РЕГІОНУ АЛЖИРУ

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**Резюме.** В сучасній теорії і практиці фізичного виховання одним із важливих методів аналізу рівня дитячого розвитку є визначення соматотипу. Цей метод дозволяє достатньо якісно визначати важливі морфологічні характеристики і відповідно дає інформацію щодо моторних можливостей досліджуваних. Важливим з точки зору розвитку організму може бути встановлення змін, які відбуваються в процесі бурхливого зростання дитячого організму, зокрема в період з 6 до 12 років.

*Мета дослідження:* проаналізувати еволюцію соматотипу протягом зростання дітей від 6 до 12 років.

*Методи та методологія.* В основі методів дослідження було антропометричне вимірювання. У дослідженні прийняли участь 105 дітей: 42 хлопця і 63 дівчини віком 6–12 років, які навчаються в початковій школі міста Тахар Джеллул (західний регіон Алжиру). Для обох статевих груп навчання здійснювалося окремо.

*Результати.* Було виявлено, що характерними особливостями соматотипу для обох досліджуваних груп різного віку були невисока вага, відповідно низький вміст жирового та м'язового компоненту. В дослідженні не виявлено суттєвих відмінностей між групами дівчат та хлопців за вказаними показниками. Рухи хлопчиків, що навчаються у початкових школах Алжиру при виконанні нескладних фізичних вправ характеризувалися здебільшого важкістю і недостатньою координованістю, що є наслідком швидкого росту кісток і недостатнім розвитком м'язової маси у віці учасників дослідження. Для дівчат, своєю чергою, аналогічні рухи були менш складними, проте також спостерігалися складнощі з координованістю. Результати продемонстрували, що фактично немає статевих відмінностей і щодо жирової маси у досліджуваному віці. Спостерігалася також несуттєва різниця у пропорційності жирового і м'язового компоненту в групах дівчат і хлопців. Важливим у цьому віці залишається підбір адекватних рівню розвитку вправ. Це можуть бути засоби ігрового характеру, які не викликають відчуття монотонії. Проте, педагогу важливо правильно обирати їх обсяги та інтенсивність, щоб належним чином впливати на фізичний розвиток дитини.

*Висновки.* Віковому періоду 6–12 років у дітей, що навчаються в початкових школах Алжиру властивий переважно тип тілобудови, що характеризується невисоким вмістом жирового компоненту, тонкими м'язами та кістками. Це стосується як дівчат, так і хлопців. При цьому не спостерігається суттєвих розбіжностей у компонентному складі тіла обох груп досліджуваних.

**Ключові слова:** соматотип, школярі, вимірювання, зростання, антропометрія.

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### **СОМАТОТИП 6–12-ЛІТНИХ ДІТЕЙ, КОТОРІ УЧАТЬСЯ В НАЧАЛЬНИХ ШКОЛАХ ЗАПАДНОГО РЕГІОНА АЛЖИРА**

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*Резюме.* В современной теории и практике физического воспитания одним из важных методов анализа уровня детского развития является определение соматотипа. Этот метод позволяет достаточно качественно определять важные морфологические характеристики и соответственно дает информацию о моторных возможностях испытуемых. Важным с точки зрения развития организма может быть установление изменений, происходящих в процессе бурного роста детского организма, в частности в период с 6 до 12 лет.

*Цель исследования:* проанализировать эволюцию соматотипа на протяжении роста детей от 6 до 12 лет.

*Методы и методология.* В основе методов исследования были антропометрические измерения. В исследовании приняла участие 105 детей: 42 мальчика и 63 девушки в возрасте 6–12 лет, обучающихся в начальной школе города Тахар Джеллул (западный регион Алжира). Для обеих групп обучение осуществлялось отдельно.

*Результаты.* Установлено, что характерными особенностями соматотипа для обеих исследуемых групп разного возраста были невысокая вес, соответственно низкое содержание жирового и мышечного компонента. В исследовании не обнаружено существенных различий между группами девушек и парней по указанным показателям. Движения мальчиков, обучающихся в начальных школах Алжира, при выполнении несложных физических упражнений характеризовались в основном тяжестью и недостаточной скоординированностью, что является следствием быстрого роста костей и развитием мышечной массы в возрасте участников исследования. Для девушек, в свою очередь, аналогичные движения были менее сложными, однако также наблюдались сложности с скоординированностью. Результаты показали, что практически нет половых различий и по жировой массе в исследуемом возрасте. Наблюдалась также несущественная разница в пропорциональности жирового и мышечного компонента в группах девушек и парней. Важным в этом возрасте остается подбор адекватных уровню развития упражнений. Это могут быть средства игрового характера, которые не вызывают ощущения монотонии. Однако педагогу важно правильно выбирать их объемы и интенсивность, чтобы должным образом влиять на физическое развитие ребенка.

*Выводы.* Возрастному периоду 6–12 лет у детей, обучающихся в начальных школах Алжира, присущ преимущественно тип телосложения, характеризующийся низким содержанием жирового компонента, тонкими мышцами и костями. Это касается как девушек, так и парней. При этом не наблюдается существенных различий в компонентном составе тела обеих групп испытуемых.

**Ключевые слова:** соматотип, школьники, измерения, рост, антропометрия.

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