Considerations on the Growth and Development of Children with Visual Impairments

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Abstract

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This paper aims to reveal whether there are significant differences between the weight and height growth rate of children with visual impairments and that of children without sensory disorders. The aim of the study is to assess some parameters of growth, physiological markers of the quantitative accumulation process by which the body increases its weight and height. We used the following research methods: bibliographic study, case study, observation, weighing, height measurement and questionnaire. The subjects were selected among pupils with visual impairments, with particular comorbidities, from Special Secondary School for Visually Impaired of Bucharest, being enrolled in the 3rd grade. Inclusion criteria for the subjects of our study were the presence of vision impairment, and exclusion criteria were related to pupils with visual blindness. The findings and results highlight that the visually impaired are malnourished, which, on the long term, influences height, and on the short term, weight. Due to the dynamic data analysis, it has been found that the height, weight and body mass index of children with visual impairments is below the average child of the same age without sensory disturbances.

Keywords: Amblyopia; height; weight.

1. Introduction

"The evolution of the human body from the zygote stage to adulthood is characterized by the complex process of growth and development" (Oprişescu, 2007: 5).

Growth and development are dynamic actions involving a variety of morphological, psychological and intellectual permanent changes, which occur in an orderly sequencing, characteristic to the species.

"Body weight is the sum of weight structures that make up the body" (Cordun, 2009: 83), and "body height is the expression of skeletal growth" (Cordun, 2009: 71).

"Amblyopia is a fairly common disease affecting between 1% and 2% of the population of most developed countries" (Flynn, 1991: 183).

Amblyopia refers to the unilateral or (rarely) bilateral loss of vision, whose cause is the inadequate development of neuroretinitis during childhood, because of abnormal binocular interaction.

The weight and height growth rate varies from one child to another, depending on genetic factors and the presence or absence of sensory disorders. Also, quantitative accumulation which increases the body weight and height is influenced by age, gender and physical activity.

People with visual impairments give up practicing physical activities and gradually go to inactivity. Since early ages, children with amblyopia abandon physical activity, which is reflected in the physical development of their body, particularly at the bone and muscle levels. The general appearance of the body reveals dull muscles.

According to Teodorescu, Bota and Stănescu (2003: 92), the results described in specialized literature prove that, at the age of 7 years, the delays in physical development are of about 2 years, and at the age of 17, they will be of 1 year.

Another factor influencing growth and development is represented by nutrition. It consists of ingesting foods containing proteins, carbohydrates, lipids, vitamins, fibres and minerals, for providing the human body with energy to carry out daily activities.

To ensure growth and development proper for their age, the child nutrition must be balanced (quantitatively and qualitatively) and diversified, and physical activity should not be missing.

The study aims to assess some parameters of growth, physiological markers of the quantitative accumulation process by which the body increases its weight and height.

2. Materials and methods

For this study, there were used both qualitative and quantitative research methods:

- *Bibliographical study* consisted in consulting informative materials referring to visual impairments, kinanthropometry and nutrition.
- *The case study* was conducted on a group of 5 visually impaired subjects.
- *Observation* was used for the subjective assessment of children's motor behaviour, as regards the execution of adapted exercises during physical education classes.

2.1. Assessment methods

- *Weight measurement* was performed using a rod weighing, under standard conditions, in the morning, before the first meal. The subjects were completely naked.
- *Height measurement* was performed using a taliometer (height meter), which directly determines the distance between vertex and sole plane. The subjects, in standing upright position, had to reach the taliometer with their opisthocranion (external occipital protuberance), shoulder blades, buttocks and heels. The head was kept the chin to chest, gaze was horizontal, so that the imaginary line (Frankfurt line) joining the upper edge of the ear canal (tragion) with the lower orbit to be perpendicular to the

graduated taliometer rod. The subjects' height was measured in the morning, after being completely stripped for not having major physiological changes.

- *Calculation of body mass index (BMI)* targeted the ratio between current weight (in kg) and height squared (in m^2), for assessing the risk of overweight; BMI = current weight/ height^2.

- *The questionnaire* was applied to obtain a conclusive result regarding the eating habits of children with visual impairments. It contains 11 items with predefined responses referring to the nutrition habits of the participants.

The *subjects* were selected among pupils with visual impairments from Special Secondary School for Visually Impaired of Bucharest, being enrolled in the 3rd grade. They were 5 in number, and the group was made up based on inclusion and exclusion criteria.

Inclusion criteria:

- child diagnosed with amblyopia;
- secondary comorbidities to the diagnosis of amblyopia;
- age of participants: 9-11 years;
- mental and physical ability to decode the instructions and perform the required activities;
- attendance of the educational unit where the research was to take place.

Exclusion criteria:

- total blindness;
- mental and physical incapacity to cooperate during the study;
- age under 9 years;
- age over 11 years;
- participation in a previous study.

Table 1 presents the diagnosis of subjects included in the study.

Table 1. Diagnosis of subjects included in the study

| Subjects	Diagnosis
Subject 1	Hyperopic astigmatism
Subject 2	Congenital horizontal nystagmus Convergent strabismus Hyperopia with functional amblyopia
Subject 3	Myopia Cataract Hyperkinetic syndrome, behavioural disorders Marshall syndrome
Subject 4	Evisceration, prosthesis Moderate delay in mental development Severe delay in language development (expressive and receptive language)
Subject 5	Papillary hypoplasia Convergent strabismus Horizontal-gyratory nystagmus

We mention that the research was conducted based on the informed consent of the parents and the school management. According to the research ethics, we committed to keep confidential the identity of the subjects.

## 3. Results

Table 2. Physical characteristics of subjects

Subjects	Age (years)	Gender	Variables					
			Height (cm)		Weight (kg)		BMI (kg/m^2)	
			Children with amblyopia	WHO Average	Children with amblyopia	WHO Average	Children with amblyopia	WHO Average
Subject 1	9 years and 5 months	G	142	135	52	29. 7	25.78	16.3
Subject 2	9 years and 8 months	G	143	136.6	29	30.6	14.18	16.4
Subject 3	9 years and 7 months	B	132	135.6	30	29.8	17.21	16.3
Subject 4	10 years and 2 months	B	132	138.6	25.5	31.2	14.63	16.5
Subject 5	9 years and one month	B	133	133	25	28. 3	14.13	16.1

Table 2 shows the individual characteristics of the subjects. Anthropometric measurements were compared with the growth charts made by the World Health Organization (WHO) (2007), corresponding to the age of participants included in the study. We have not found values for visually impaired children in national or international studies.
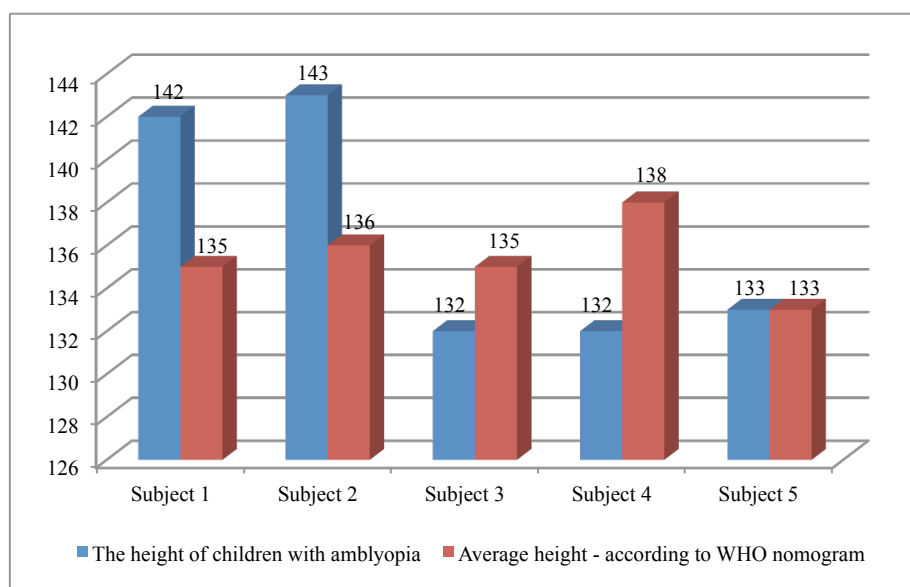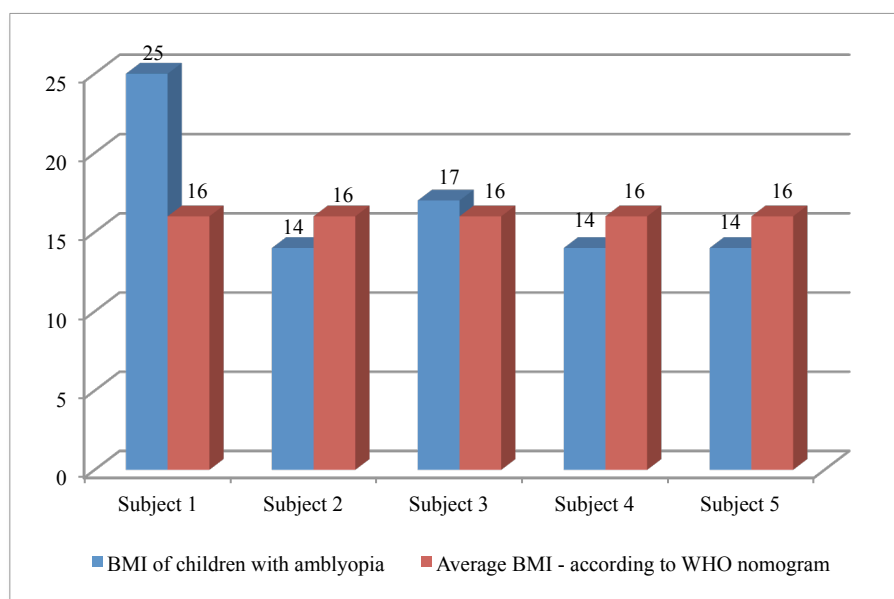

Chart 1. Assessment of subjects' height

In Chart 1, we see that, related to subjects' age, the girls are taller than average WHO nomogram, and two of the boys have a height lower than WHO standards. One subject has an average height, according to WHO nomogram.
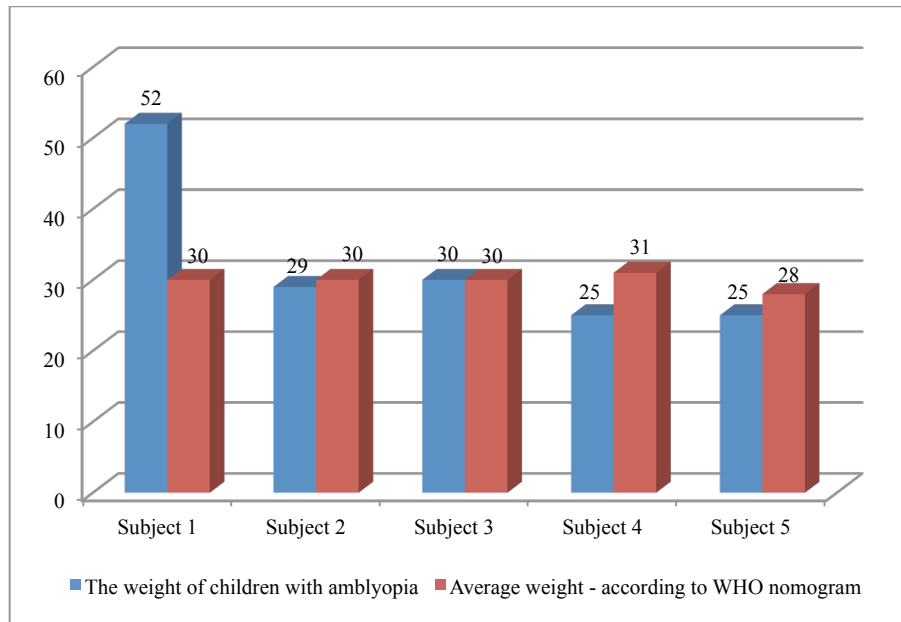
Chart 2. Assessment of subjects' body weight

Chart 2 shows the weight of children with amblyopia. We find that one subject weighs 70% more than the average, one subject falls within the average, and 3 subjects are underweight, according to average weight of WHO nomogram.

Chart 3. Assessment of subjects' body mass index

Chart 3 shows the body mass index of investigated subjects:

- Subject 1 is overweight, having a body mass index of 25.78 (kg/m^2).

- Subject 2 is underweight, having a body mass index of 14.18 (kg/m^2).

- Subject 3 is slightly above average, having a body mass index of 17.21 (kg/m^2).

- Subject 4 is underweight, having a body mass index of 14.63 (kg/m^2).

- Subject 5 is underweight, having a body mass index of 14.13 (kg/m^2).

  Interpretation of the questionnaire survey results has revealed the following:

- Regarding breakfast, only 2 subjects mention that they always take this meal before going to school; one subject eats breakfast sometimes, and one never eats breakfast;

- At lunch, all children eat soup 2-3 times per week;

- 4 out of the 5 subjects mention they consume milk every day;

- One out of the 5 subjects (number 4) does not eat vegetables, having a BMI indicating underweight;

- Only one subject eats fish 2-3 times a week; 2 subjects never eat fish; one subject sometimes eats fish;

- 3 out of the 5 children eat fruits every day; 2 subjects eat fruits 2-3 times a week;

- 3 out of the 5 subjects consume sodas daily, including subject no. 1, who is overweight;

- 3 participants eat sweets every day, also including subject no. 1, who is overweight;

- 3 subjects do not consume fast food products;

- 4 out of the 5 children with amblyopia consider they have healthy eating habits, including subject no. 1, who is overweight.

4. Discussions and conclusions

After assessing the subjects' height, related to age, we have found that the participants have average values which correspond to the growth charts made by the World Health Organization. Regarding the girls' height, it is higher than the average WHO nomogram. This may be due to the fact that the values of World Health Organization nomogram are achieved in 2007, and it is possible that, in the meantime, the secular trend have had an impact on the somatic development, and data may not be consistent with current individual characteristics of children without sensory disorders.

As regards the average weight of children with amblyopia compared to the average values of WHO nomogram, we can say that subject no. 1 has a weight notably higher than the average, and one subject is within the WHO average. For the other 3 subjects of the study, we find that the values obtained by anthropometric measurements are below the average indicated by WHO, results being confirmed by calculating the body mass index.

We believe that visual impairment causes changes in the anthropometric values compared to subjects of the same age without sensory disturbances. Therefore, we consider that the diet of visually impaired children requires special attention, both quantitatively and qualitatively.

The novelty of the study resides in the fact that we have not found research studies on this topic.

The values of anthropometric measurements performed for children with amblyopia are below the average values provided by WHO for healthy children of the same age.

The phenomenon of accelerated growth may be the cause of differences regarding the inconsistency with the reference values, according to the growth charts provided by WHO.

The underweight present in most of the children studied might be a consequence of the unbalanced diet, both quantitatively and qualitatively.

Acknowledgements

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