# Correlation between Physical Development Diagnostic and Exercise in a Group of Teens from Garabet Ibraileanu High School of Iasi

Adriana Albu[a], Ionuţ Onose[b]*, Magda Negrea[c], Irina Crăcană[c], Raluca Mihaela Hodorcă[b]

* Corresponding author: Ionuţ Onose, onoseionut@yahoo.com

[a] *"Gr.T. Popa" University of Medicine and Pharmacy, 16 University Street, Iaşi, Romania*
[b] *"Al. I. Cuza" University, 3 Toma Cozma Street, Iaşi, Romania*
[c] *Garabet Ibraileanu College, 1 Oastei Street, Iaşi, Romania*

**Abstract**

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At present, the ideal of beauty in adolescents undergoes significant changes. The idea of fat and beautiful has disappeared, being replaced by the concept of flexible person. Sometimes this concept is exaggerated, so it is necessary to monitor the physical development of young people. Purpose: Assessing the relationship that exists between physical development of young people and the time granted to exercise. Material and methods: The study was conducted on a sample of 133 adolescents (37 boys and 96 girls) from Garabet Ibraileanu High School of Iasi. The diagnosis of physical development was established by evaluating the correlation between height and weight. Time for physical activity was obtained using a questionnaire. The results were processed using Pearson test. Results and discussion: Time for physical activity is in most cases up to 30 minutes (56.4%), which is very little. Student height has mean values in 60.9% of cases, as body weight (68.4%). Correlation between physical development and time for physical activity is not statistically significant (p> 0.05, Gl = 6, $\chi^2$ = 6.146). Harmonious development is present in 58.6% of students. If we correlate diagnostic development with time used in physical exercise, we find statistically insignificant differences (p> 0.05, Gl = 6, $\chi^2$ = 5.355), indicating the existence of poor information concerning the role of exercise in maintaining the health of young people. Conclusions: Students have little information about how to maintain a healthy body weight. They do not use the balanced diet-exercise association to keep fit.

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**Keywords:** Height; weight; teenagers; exercise.

## 1. Introduction

The image a person has on his own body implies a psychological element, being influenced by his self-respect and confidence (Albu et al., 2006: 26). The image of silhouette is important to a person's

happiness, even more important to teenage girls. Teenagers try to identify themselves with a beauty model, but frequently they cannot reach their ideal. Teenage girls want to be tall and thin, and boys handsome and with muscles (Calza & Contant, 1999: 134). They have a normal body shape, which does not meet their dreamed beauty ideal. Thus, it is possible to try severe diets (females) or to use some products which would help develop their muscular mass (males) (Craggs-Hinton, 2006: 15).

Identifying with the dreamed beauty ideal can also come with losing control and trying a very restrictive diet that affects the teenager's health (Maillet, 1997: 152).

To avoid some bad health problems, teenagers should be correctly informed about the ideal body weight, balanced diet and the purpose of physical exercise in maintaining their health (World Health Organisation, 1999). Accomplishing this is possible only through a close team work between family, teachers and doctors.

## 2. Materials and methods

Research was done at Garabet Ibraileanu College of Iasi, on a group of 133 teenagers of 14-16 years old. The distribution according to gender is unequal, being examined 96 girls (72.2%) and 37 boys (27.8%). Anthropological measures were done to these teenagers – height and body weight. The obtained results will be compared to the national standard reference ones. National Standards were obtained by actually measuring and weighting a statistically significant group of students in our country. Such an action has been done in Romania since 1964. Individual levels resulted from the measures allow calculating the national mean values and the standard error specific to each mean value. Average values are evaluated differently according to gender, age and studied parameter (weight, height). They are also calculated differently according to family's place of origin – urban, rural. Worldwide (except the U.S. and Australia), teenagers' development in cities is different from those in villages. It is unknown what causes the burst of these differences, but they exist and must be taken into consideration (Eveleth & Tanner, 1990: 202). The values between mean +/- sigma are considered average, those below mean - sigma can be low (between mean - sigma and mean - 2sigma) or very low (mean - 2sigma and mean - 3sigma) (Bardov, 2009: 384). The values above sum + sigma are considered high (between sum + sigma and sum + 2sigma) or very high (sum + 2sigma and sum + 3sigma). The values lower than sum - 3sigma and those higher than sum + 3sigma are considered pathological (Cordeanu et al., 2008). To avoid a too high dissipation of results, the discussions will be done on very low/low, average and high/very high values.

The physical development diagnosis allows evaluating the relation between body height and weight. If the two markers are in the same sigmatic range, the pupil's development is harmonious (Gavăt, Albu, & Petrariu, 2006: 157). If they are in different sigmatic ranges, the development is inharmonious with more or less weight than height. The pupils were asked about the time they spend every day exercising. The answer possibilities are: less than 30 minutes, between 30 and 60 minutes, more than 60 minutes. The processing of results was done using Pearson test.

**3. Results**

The study starts from the time spent exercising every day, which is in most cases under 30 minutes (56.4%) (Table 1).

**Table 1.** Time pupils spend exercising

| Gender | Less than 30 min. | 30-60 min. | More than 60 min. |
|--------|-------------------|------------|-------------------|
| Male | 15 | 10 | 12 |
| Female | 60 | 27 | 9 |
| Total | 75 | 37 | 21 |
| % | 56.4 | 27.8 | 15.8 |

Attention falls on 15.8% of teenagers who spend more than 60 minutes a day exercising, which is a positive thing. Such answers appear in 32.4% of boys and 9.4% of girls, the calculated differences being statistically significant for a $p < 0.01$ (Gl = 2, $\chi^2 = 11.313$). Girls pay less attention to doing physical exercise, even if this is a key-element for maintaining body weight at normal values.

The research continues with evaluating the level of anthropological markers of the study group teenagers.

Height values are in most cases placed at an average level (60.9%), which shows the existence of a balanced growth of most teenagers in the study group. Placing height at a very low/low level appears in 11.3% of cases, whereas high/very high values are present in 27.1% of teenagers (Fig. 1).

There draws attention a teenager (0.8%) with pathological values (dwarfism) for height. The teenager should be medically examined in order to track down what caused this phenomenon.
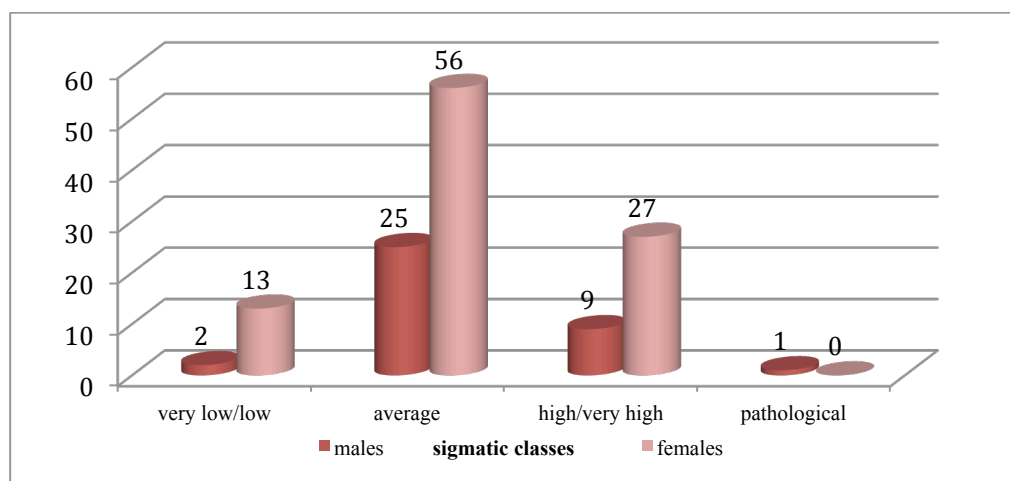


**Fig. 1.** Placing height values in sigmatic classes

The body weight of the examined teenagers falls especially in an average level (68.4%). Very low/ low values are present in 13.5% of teenagers, and the high/very high ones in 17.3% of cases. Attention falls on one pupil (0.8%) with a pathological weight (obesity), requesting a special medical exam.

Of course, it is necessary to evaluate the correlation between body weight and time spent on physical exercise (Table 2).

**Table 2.** Distribution of cases according to body weight and time spent on sport

| Body weight | Time spent on physical activities | | | Total | |
|---|---|---|---|---|---|
| | Less than 30 min. | 30-60 min. | More than 60 min | Nb. | % |
| Very low/low | 11 | 5 | 2 | 18 | 13.5 |
| Average | 55 | 22 | 14 | 91 | 68.4 |
| High/very high | 9 | 9 | 5 | 23 | 17.3 |
| Pathological | 0 | 1 | 0 | 1 | 0.8 |

The correlation body weight - time spent on physical activities highlights the statistically insignificant differences ($p > 0.05$, $Gl = 6$, $\chi^2 = 6.146$), which represents a problem. It is not the case to turn to the joint diet-physical exercise to obtain weight loss.

One last side which needs to be carefully studied is the physical development diagnosis. A pupil who has the height and weight placed in the same sigmatic range has a harmonious development with very low, low, average, high or very high markers. If the two anthropometrical markers are in different ranges, then the development is unharmonious with more or less weight than height.

In the study group, the percentage of 58.6% harmoniously developed teenagers is definitely insufficient. The age of 14-16 is associated with an increasingly slower growth, thus reducing the opportunities to surprise the pupil in one of the alternative growth moments (either in length or weight) (Fig. 2).
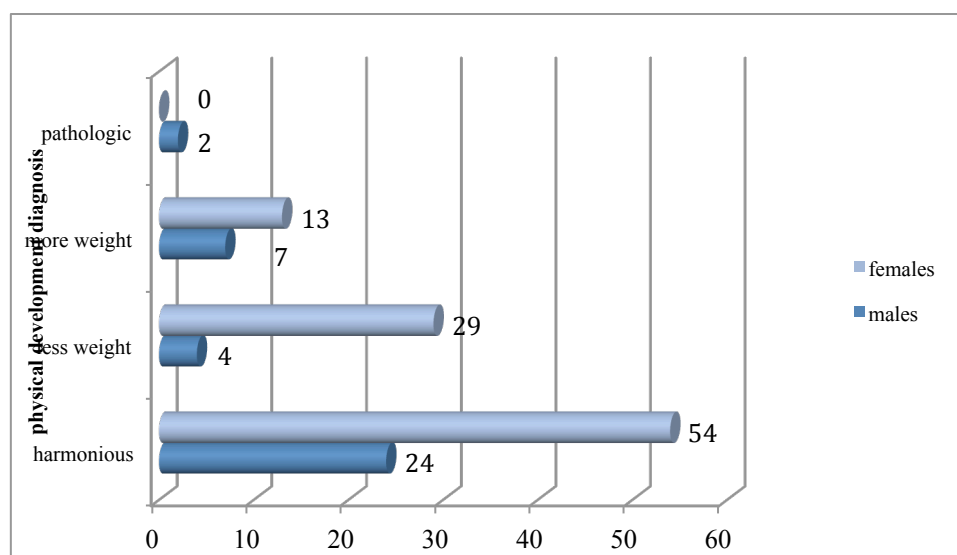


**Fig. 2.** Physical development diagnosis for males and females

The obtained results are important because the calculated differences are statistically significant for a $p < 0.05$ ($Gl = 3$, $\chi^2 = 9.606$). For females, the percentage of those with a disharmonious growth with minus balance is higher compared to the result for males. Girls are very preoccupied with their body

look and especially identifying themselves with some models with 90-60-90 size. They go to exaggerated diets that lead them to disharmony with weight shortage, case in which their health could be harmed.

It is necessary to accomplish the correlation between physical development diagnosis and time spent on physical exercise to know teenage girls' course (if they are on a diet and physical exercise or just diet) (Table 3).

The calculated differences are statistically insignificant (p> 0.05, Gl = 6, $\chi^2$ = 5.355), which is not a positive factor. Teenagers with disharmonious development with more weight should increase the time spent on physical activities in order to come back to the desired weight. The obtained insignificant differences suggest low concern for this, even if sport plays an essential role in ensuring a balanced body weight.

**Table 3.** Correlation between physyical development diagnosis and time spent on doing sport

| Development diagnosis | Daily time spent on moving | | | Total | |
|---|---|---|---|---|---|
| | Less than 30 min | 30-60 min. | More than 60 min. | Nb. | % |
| Harmonious | 48 | 18 | 12 | 78 | 58.6 |
| Disharmonious with more weight | 9 | 9 | 2 | 20 | 15.0 |
| Disharmonious with weight shortage | 17 | 9 | 7 | 33 | 24.8 |
| Pathological | 1 | 1 | 0 | 2 | 1.5 |

The information the study group teenagers has is not enough, which involves the need of starting an adequate educational programme for this.

## 4. Discussions and conclusions

Internationally, physical development is evaluated using a wide variety of markers represented by: height, weight, chest and head circumference, sitting height, arm  length, biiliac and biacromial width, upper arm and calf circumference, triceps and subscapular skinfold. For these markers, there are national reference values, thus making possible a complete evaluation of teenagers' physical growth. There are countries where reference values were set 100 years ago (1900's). In Romania, the reference values are only for height and weight, limiting the evaluation of physical development only to these two markers. Measuring other markers without the possibility of measuring it to national standards is an action which lacks practical finality (Eveleth & Tanner, 1990: 34).

The goals intended in this study are targeted on three main directions represented by: evaluating the time pupils spend doing physical activity; evaluating physical development of the study group teenagers; evaluating the correlation between the teenagers' physical development and the time they spend doing physical exercise.

Physical exercise is considered to be an external (environmental) factor which plays an important role in the normal growth and development of children and teenagers, by stressing the respiratory and cardiovascular systems, influencing the nutritional shifts and the neuro-endocrine control system. For

the study group, the time spent on physical activity is deficient, especially for females. They do not use sport as an essential means of constant maintenance of their body weight (Godeau, Arnaud, & Navarro, 2008: 115).

The second aimed objective is evaluating physical development of the study group teenagers. The evaluation is done by subsuming height and weight values in sigmatic classes, and also by establishing the physical development diagnosis.

Height is placed especially at an average level. The obtained results must be correctly interpreted because the child's height is genetically determined, thus there appears a positive correlation between son/daughter and parents. We cannot expect to be a progress of the pupil's height up to 1.80-1.90 m in a family in which both parents are 1.60-1.70 m tall (Papalia & Olds, 1990: 79).

The height values noted in the genetic code are reached only in auspicious living conditions (family's adequate socio-economic level). A pupil who has in the genetic code a low value of height cannot reach a higher level, even if he/she has good living conditions or does physical exercises systematically. This is a situation which should be known by coaches of different sports, especially in which average or high height is an advantage.

On the other side, nowadays we notice the evolution of an accelerated growth phenomenon, appearing higher values of children's height since birth, and the growth ends sooner (at 18, and not at 20 as it was 30-40 years ago) (Alexander, 2010: 92; Albu & Rada, 2014). This aspect should be taken into account when we want to select some teenagers to guide them to a certain sport (Eveleth & Tanner, 1990: 205; Ştirbu, Miu, & Simalcsik, 2003).

The second studied anthropometric marker is body weight, which has average values in most pupils measured. Teenagers with a high/very high body weight should go into diet and also do some physical exercise, this leading to: increasing energy consumption, increasing basic metabolism, appetite and stress control (Godeau, Arnaud, & Navarro, 2008: 109). Weight loss without physical exercise has negative effects on the body composition. Diet, used as a single means of reducing body weight, leads to losing fat and soft tissue. Interrupting the diet will favour the achieved weight gain, especially because of the fat tissue (World Health Organisation, 2000).

During the intensive growth period, as the prepuberal one (10-11 years old for girls and 12-13 for boys), the diagnosis of disharmonious development is frequently met. Growth is not regular, the periods of length growth alternating with those of thickness growth, thus the child is frequently disharmoniously developed. To better know the situation, it is necessary to do some measure at certain periods of time (between 3 and 6 months) (World Health Organisation, 2007). In the following stages, of beginning of puberty and puberty in progress, the growth becomes slower, thus there is a clear development towards children's harmonious development. In the study group, the situation is not very encouraging, because harmonious development appears in only 60% of cases, which is quite low.

The last studied aspect is the one which tries to evaluate the correlation between physical development and time spent on physical exercise. The obtained results are not satisfying, because there is no increase in the time spent on sport activities by teenagers with a disharmonious development with more weight. National programmes should be directed towards this, and not to modifying food habits. Distribution of fruit in schools (especially apples) has not got positive impact, because our population

eat them on a wide scale. It would be more efficient to guide teenagers towards sport, but frequently specialists within the Ministry of Education reduced the number of sport classes in the school curriculum.

The results obtained in this study coincide with those in foreign literature. French data of the Health Behaviour in School-aged Children 2006, an international investigation, point out the same problems (Godeau, Arnaud, & Navarro, 2008: 115). The time teenagers spend doing sport is totally insufficient, being less in females than males. According to international recommendation, teenagers should do at least one hour of intensive physical activity a week.

Mass-media  does not pay enough attention to this aspect either. In TV shows, one can often see adds regarding nutrition ("for your health eat vegetables and fruit every day"), but one cannot see adds guiding pupils to do sport (Braconnier,1999: 145).

The presented study is one of the first nationally accomplished, which lays emphasis on the relation between the levels of anthropometrical markers and students' physical activity. Although it is a pilot study (done on 133 teenagers), the obtained results are important, because they provide the specialists data supporting the need to develop some coherent programmes for guiding teenagers to healthy life habits.

In conclusion, we can say that the study group teenagers have little information regarding the adequate means of maintaining health and getting an aesthetic body shape. Doing sport, added to a balanced diet, is the key to a normal development of children and teenagers.

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