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A STUDY REGARDING THE IMPACT OF ALIMENTATION-PHYSICAL EXERCISE FOR THE DETERMINATION OF INTERMEDIATE ABILITIES (GRACE/MOBILITY) IN STUDENTS

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Problem Statement: Based on the research undertaken concerning the intermediate abilities, we aim to bring to the forefront a controversial debate regarding grace, otherwise named by specialists mobility or flexibility. This is a study focused on the individuals' ability of performing wide movements in either a passive or active manner, and the extend to which alimentation and physical exercise may determine them.

Purpose of Study: During lessons of Physical Education and Sports, we have undertaken this study on a group of 89 students, randomly chosen from the Faculty of Letters and Sciences. These subjects were organized according to the manner of the study, namely in three groups. Group I was made of 24 subjects, belonging to group number 40801; Group II was composed of 35 subjects, belonging to group number 4484; Group III was made of 30 subjects, belonging to group number 4074.

Research Methods and Techniques: The bibliographic study method; The observation method; The enquiry method (discussion, questionnaire, personal chart, etc.); The statistical-mathematical method; The graphic method.

Findings: The present research started from the hypothesis according to which the dietary type and Physical Education lessons influence the intermediate abilities (grace/mobility) and they may change these abilities, at a certain time, in the direction of maintaining, losing or improving them.

Conclusions: The dietary type and Physical Exercises determine the modification of the index of intermediate abilities (grace/mobility), as well as the individuals' ability of performing wide movements, in a passive or in an active manner.

Key words: Intermediate abilities, students, grace/mobility, physical exercise, alimentation.

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Introduction

Mobility is a determining factor of the amplitude and of movement efficiency, a quality of the articular system, which field researchers would argue that is genetically determined. Specialists have not agreed upon a specific term to designate it, in literature mobility has numerous synonymies and we may find it as "... flexibility, joint mobility, muscle extensibility, ligament, etc. ..." (Dragnea A., Bota A., 1999, p. 239).

If we were to define mobility, we know that it is "... the human ability to perform movements with large amplitude, on one's own force, or under the influence of outside forces" (apud Harre and Frey) quoted by (Dragnea A., Bota A., 1999, p. 239), but our purpose in this study is not to give definitions, but to observe situations regarding the research undertaken on mobility in time over the factors that determine it.

I was annoyed by an idea which did not give me peace, namely that something is missing, a component of the factors which determine mobility, this being the reason for which I looked for data, studies in both foreign and local literature, all regarding these factors. In parallel, I searched for this quality among students which were involved in the didactic process of training. These factors which determine mobility, we sought, as mentioned, in the reference literature, and noticed that in all the documents are specified, with few exceptions, only the following: the articular characteristic, muscle elasticity, environmental temperature, age, gender, mental fatigue, diurnal oscillations. Then I realized that no one speaks about or has studied the food component, what an individual ingests every day and how this dietary type, these habits may determine or influence mobility, modifications provided in articular structure, muscular, the type of food ingested and how these change the muscular-articular elasticity. We must specify that we have neither the possibilities for laboratory tests, nor the skills to research the structure of chemical, biological, physiological change, etc., but we have the competence and tools to study changes of the muscular-articular elasticity in Physical Education lessons, these being the subject of our research-acknowledgement.

Purpose of Study

We aim to bring to the forefront a study focused on the individuals' ability of performing wide movements in either a passive or active manner, as well as the extend to which nutrition and physical exercise may determine them or would have influence over this ability.

Research objectives

This section contains the presentation of the objectives which laid at the basis of our research:

- Identification of the researched group;
- Conceiving and implementing a set of specific tests for intermediate abilities (grace/mobility);
- Conceiving an observation protocol under the form of an enquiry (conversation) and a personal chart, etc., through which we will establish the dominant diet and the number of classes at which students participate for the Physical Education lesson;
- Performing the enquiry inside the group, for each individual separately;
- Implementing the set of test and registering the specific indicators for intermediate abilities (grace/mobility);
- Analyzing the researched group, based on the registered data, which was performed with the identification of causes that led to the eventual differentiation regarding the indices of mobility;
- Interpreting motives and circumstances in which differences occur between indices of intermediate abilities (grace/mobility).

Research hypothesis

The present research started from the hypothesis according to which the dietary type and Physical Education lessons may influence the intermediate abilities (grace/mobility) and they may change these abilities, at a certain time, in the direction of maintaining, losing or improving them.

Operational approach and subjects involved

During lessons of Physical Education and Sports, we have undertaken this study on a group of 89 students (girls), randomly chosen from the Faculty of Letters and Sciences. These subjects were organized according to the manner of the study, namely in three groups. Group I was made of 24 subjects, belonging to group number 40801; Group II was composed of 35 subjects, belonging to group number 4484; Group III was made of 30 subjects, belonging to group number 4074.

Research methods

Methods which laid at the basis of our research were:

The bibliographic study method (we studied both local and foreign literature);

- The observation method, the enquiry method, personal chart, motor tests;
- The statistical-mathematical method;
- The graphic method.

Results obtained and their interpretation

It is important to note, before performing the analysis and interpretation of data, that in the reference literature, as emphasized above, all attention was focused on the following factors: the articular characteristic, muscle elasticity, environmental temperature, age, gender, mental fatigue, diurnal oscillations, and that no specialist mentions nutrition or its influence over the muscular-articular elasticity.

The new factor that could influence mobility and is not mentioned in any study is nutrition, to which we would add physical exercise to maintain or improve it. In order to observe the dietary type we undertook an enquiry regarding dominant types of food systematically consumed. **It is important to keep in mind that the entire research is an acknowledgement.**

We consider that it would have been interesting to perform chemical or structural analysis in the laboratory of various blood, muscle, or articular components, however, as we have not disposed from these facilities, we stopped first at the stage of investigation and application of motor test, leaving the study open for field specialists who could perform blood tests and muscle structures.

The present research developed in three phases:

Phase I – or the phase of enquiry regarding the number of Physical Education classes attended, the dietary type and the dominant food component;

Phase II – the phase of implementation for Test No. 1;

Phase III – the phase of implementation for Test No. 2.

Phase I – or the phase of enquiry both at an individual and at a group level. We have undertaken this enquiry with the purpose of having as exact data as possible regarding the dietary type and the dominant food component.

Questions from the enquiry were the following:

Enquiry – Recorded indicators for the dietary type, dominant food and the Physical Education activity of the researched students
Table No. 1

Questions asked to the researched group	Answers %				
	Any type of meat (beef, pork, chicken)	Milk products, eggs and sometimes vegetables	Vegetables, fruits and 2x/week meat	Fish + fruits + vegetables and sometimes meat	Total
1. From what does your diet consist mostly?	20 students- 22.48 %	31 students - 34.83 %	24 students - 26.96 %	14 students - 15.73 %	89 students 100 %
2. What do you consume on a daily basis?	20 students - 22.48 %	31 students - 34.83 %	24 students - 26.96 %	14 students - 15.73 %	89 students 100 %
3. Which are the types of food you can not renounce to?	35 students - 39.32 %	20 students - 22.48 %	30 students - 33.71 %	4 students - 4.49 %	89 students 100 %
4. How many lessons of Physical Education do you attend to during a semester?	20 students answered - at 8-10 h 22.48 %	31 students au answered - at 10-12 h 34.83 %	24 students au answered - at 14 h 26.96 %	14 students au answered - at 10-12 h 15.73 %	89 students 100 %

As a consequence of performing this enquiry, we observed significant differences at the level of the researched group for the indicators food-physical exercise (see Table No. 1).

Following this analysis, we determined that:

- A number of **20 students**, meaning a percentage of 22.48 % **are consumers of any type of meat (beef, pork, chicken),** and they attend Physical Education classes only **8-10 times** in a semester, which means that they have a small number of participations and an increased deficit regarding physical exercise;
- A number of **31 students**, meaning a percentage of 34.83 % **are consumers of milk products, eggs and sometimes vegetables,** and they attend Physical Education classes only **10-**

12 times in a semester, which means that they have a medium number of participations and that they exercise moderately;

- A number of 24 **students**, meaning a percentage of 26.96 % **are consumers of vegetables, fruits and 2x/week meat,** and they attend all 14 Physical Education classes in a semester, which means that they have a big number of participations and that they exercise systematically;
- A number of **14 students**, meaning a percentage of 15.73 % **are consumers of milk products, fish, fruits, vegetables and sometimes meat,** and they attend Physical Education classes only **10-12 times** in a semester, which means that they have a medium number of participations and that they exercise moderately;

Phase II – the phase of implementation for Test No. 1;

Tests were designed to measure the overall mobility, on the one hand (and here we refer to that of the spine and the mobility of the hip and shoulder articulation), and secondly the specific mobility when referring to other type of tests within the discipline.

Considering that the activity performed by students is specific to the Physical Education lesson, we believe it is normal to test and measure for our research only the general mobility, meaning the mobility that manifests itself in the main articulations.

The tests used by us within the study were:

Test No. 1:

The evaluation of complex mobility of the torso muscles (spinal column) and of the legs (posterior thigh muscles, ischio-calf and haunch muscles, tricepsural). It was a general test of mobility: torso-hip-feet, and was executed sitting in upright position, with feet on the ground, arms go overhead, through the motion forward-up, bending the torso to forward, flexion and bending the torso, gripping ankles with both hands, knees remain perfectly stretched, the head goes with the forehead towards the knees and remains pressed against them for three seconds.

For the evaluation of this task, we had grades as following:

-**very good** (VG) the torso is perfectly pressed against the thighs and the forehead touches the knees;

-**good** (G) the torso is not pressed against the thighs, the forehead touches the knees;

-**sufficient** (S) the forehead does not touch the knees;

-**insufficient** (IS) there is a significant distance between the torso and the thighs.

Registered indicators for the evaluation of complex mobility after the application of Test No. 1, according to the dietary type
Table No. 2

Test No. 1. Grades recorded for the evaluation of complex mobility	**The type of food consumed and the number of students who scored the corresponding grade for the respective typology Answers in %**			
	Any type of meat (beef, pork, chicken)	**Milk products, eggs and sometimes vegetables**	**Vegetables, fruits and 2x/week meat**	**Fish + fruits + vegetables and sometimes meat**
1. **very good** (VG)	20 students - 22.48 %	-	24 students – 26.96 %	-
2. **good** (G)	-	31 students - 34.83 %	-	14 students - 15.73 %
3. **sufficient** (S)	20 students - 22.48 %	-	-	-
4. **insufficient** (IS)	-	-	-	-

As a result of the implementation of Test No. 1 and according to the data from Table No. 2, we may observe the recorded grades for the evaluation of complex mobility, the type of food consumed and the number of students who scored the corresponding grade for the respective typology.

Important. We observe that:

- **the highest grade - Very good –** for this exercise was scored by a number of 24 students,

meaning a percentage of 26.96 % who are **vegetables, fruits and 2x/week meat consumers, who participate at all Physical Education classes, 14 classes in a semester**, which means they have an increased number of participations and that they systematically perform physical exercise, **an aspect which we believe that influenced in a positive manner the elasticity of the articular mobility;**

- the lowest grade – Sufficient - for this exercise was scored by a number of **20** students, meaning a percentage of 22.48 % who are meat consumers of any type (beef, pork, chicken), and they attend Physical Education classes only **8-10 times** in a semester, which means that they have a small number of participations and an increased deficit regarding physical exercise, **an aspect which we believe that influenced in a negative manner the elasticity of the articular mobility;**

Test No. 2:

The evaluation of combined mobility regarding the spinal column and the hip articulation.

Through this test, we measured the flexing ability of the spinal column and of the hip articulation.

We measured the flexing ability of the spinal column and of the hip articulation, as well as of the torso and legs muscles. The starting position was from sitting with the legs spread on a gymnastics bench, where we measured the distance from the torso to the ground as following: in front of the bench, on the ground at the same height we had a graded line, under the form of a reversed T with numbers on the external face, from up to down: in the first half, the first 10 centimetres from the top to the ground, numbers are negative and start from 0 to 10 upwards (ex.:- 1;-2;-3 etc.), and for the next 10 centimetres, in the second half below 0 upwards, the numbers start from 1 to +26 (ex. +1; +2; +3, ...+15; +16; +17 etc).

For the evaluation of this exercise, we considered the following indicators registered:

- If there are indicators with minus (-), and start from 0 to - 10 then mobility is **weak**;
- If there are indicators with plus (+) and start from 1-10 then mobility is **good**;
- If there are indicators with plus (+) from 11-20 then mobility is **very good**;
- If there are indicators with plus (+) 21- then mobility is **excellent**.

Registered indicators for the evaluation of combined mobility of the spinal column and the hip articulation after the application of Test No.2, according to the dietary type
Table No. 3

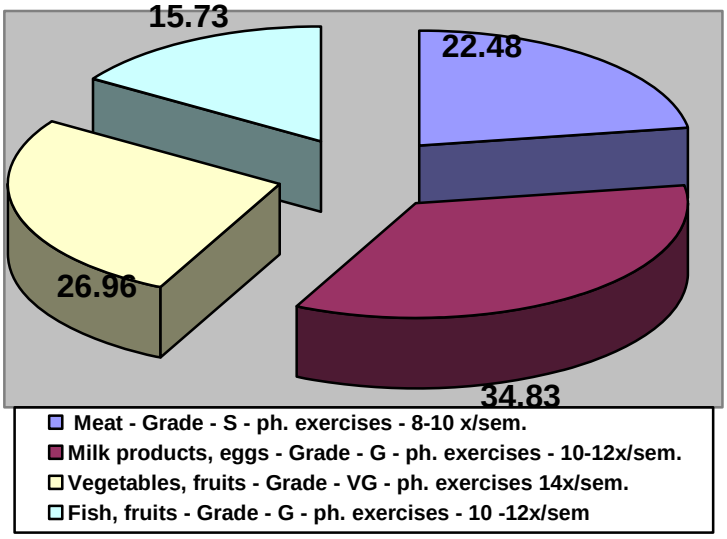
Test No. 2. Grades recorded for the evaluation of combined mobility	**The type of food consumed and the number of students who scored the corresponding grade for the respective typology Answers in %**			
	Any type of meat (beef, pork, chicken)	**Milk products, eggs and sometimes vegetables**	**Vegetables, fruits and 2x/week meat**	**Fish + fruits + vegetables and sometimes meat**
1. **Excellent -** If there are indicators with plus (+) 21- then mobility is **excellent** (EX. +)	-	-	3 students – 3.38 %	-
2. **Very good -** If there are indicators with plus (+) from 11-20 then mobility is **very good** (VG +)	-	-	21 students – 23.59 %	4 students – 4.49 %
3. **Good** - If there are indicators with plus (+) and start from 1-10 then mobility is **good** (G)	-	31 students - 34.83 %	-	10 students – 11.23 %
4. **Weak** - If there are indicators with minus (-), and start from 0 to - 10 then mobility is **weak (S)**	20 students – 22.48 %	-	-	-

As a result of the application of Test No.2, and according to data from Table No. 3 we may observe the grades registered at the **evaluation of combined mobility of the spinal column**

and hip articulation, the type of food consumed and the number of students who scored the corresponding grade for the respective typology, and the fact that the situation is similar to the data recorded after the application of Test No. 1. The Very Good grade was scored again by students who are **vegetables, fruits and 2x/week meat consumers, who participate at all Physical Education classes, 14 classes in a semester**, and who systematically perform physical exercise. **Students who are meat consumers of any type (beef, pork, chicken), and who attended** Physical Education classes only **8-10 times** in a semester, obtained the lowest grade, having a significantly decreased mobility.

With the purpose of emphasizing the aspects connected with the impact diet-physical exercise in the determination of intermediate abilities (grace/mobility) for students, we recorded all result in Tables number 1, 2, and 3 and we represented them under the form of a graphical map, namely Graph No. 1.

Registered indicators for the dominant dietary type, the evaluation of complex mobility and the grade obtained



Graph No. 1 Representative graph, a comparative representation for the recorded indicators and grades obtained for mobility

All the obtained results tend to confirm the hypothesis and to prove that the dietary type and Physical Education lessons may influence the intermediate abilities (grace/mobility) and they may change these abilities, at a certain time, in the direction of maintaining, losing or improving them. All of them practice physical exercise, but we believe that the difference for the articular mobility is made by their diet. It is clear that, in one way or another, regardless of the number of participations, 8 times or 14 times per semester, all students are involved in the Physical Education activity, as they all exercise in the firs part of the lesson, in link of harmonious physical development. In spite of this, the aspect mentioned does not make the difference, but it may maintain or improve mobility (see Tables 1, 2, and 3 and Graph No. 1). The number of exercises differs and, of course, may influence the elasticity of mobility. We believe, though, that only by working in group, the dietary type-physical exercises pair determine the modification of the index regarding intermediate abilities (grace/mobility) and the capacity of individuals to perform wide movements in either a passive or active manner.

Conclusions

- The best mobility and the Very Good grade were scored, after the application of the two tests, by students who are **vegetables, fruits and 2x/week meat consumers, who participate at all Physical Education classes, 14 classes in a semester**, and who systematically perform physical exercise;

- **Students who are meat consumers of any type (beef, pork, chicken), and who attended** Physical Education classes only **8-10 times** in a semester, obtained the lowest grade, having a significantly decreased mobility.
- All of them practice physical exercise, but we believe that the difference for the articular mobility is made by their diet;
- Regardless of the number of participations, all students are involved in the Physical Education activity, as they all exercise in the firs part of the lesson, in link of harmonious physical development. In spite of this, the aspect mentioned does not make the difference, but it may maintain or improve mobility;
- All the obtained results tend to confirm the hypothesis and to prove that the dietary type and physical exercise may influence the intermediate abilities (grace/mobility) and they may change these abilities, at a certain time, in the direction of maintaining, losing or improving them (see Tables 1, 2, and 3 and Graph No. 1).
- Only by working in group, the dietary type-physical exercises pair determines the modification of the index regarding intermediate abilities (grace/mobility) and we believe that this aspect could represent an open study for field specialists.

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