

## BIOMECHANICAL EVALUATION OF MOBILITY STRENGTH FOR MENTALLY DEFICIENT CHILDREN

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**Abstract:** Assessment is absolutely necessary for an efficient development and it sets precise objectives. After the analysis of the subjects their progress is indicated by the kinesitherapy evaluation. The results were obtained through measurements and were then statistically introduced in an Excel data base, the following step being comparing them with the final measurements. We were thus able to tell whether there was any improvement registered as a result of the entire programme at which the subjects participated, or if on the contrary, they continue to present the same deviations from the average values that are typical of their age.

**Keywords:** assessment, mobility, strength, mental deficiencies.

### 1. INTRODUCTION

The kinesitherapeutic assessment must result in an efficient strategy, thus being both the first and the last accomplishment of the physical therapist during the functional recovery assistance process. It is absolutely imperative to take into account the fact that man is seen as a dynamic, complex system.

Therefore, the general objectives of medical kinetology must be adjusted to the age, the sex, the temper, the general knowledge level as well as the comprehension capacity of the subjects [1]. To this end, assessment is the evaluation method that best adjudges for a certain situation both qualitatively and quantitatively [2].

The assessment is the first step and plays a vital role in establishing the objectives and in choosing the treatment methods in the medical recovery programs. It highlights each patient's pathology and disease stage of evolution by using exact clinical elements, possible functional implication of morbid association and their potential influences obtained through physical-kinetic therapy.

All these clinical and functional results are being analyzed, keeping in mind the patient's social and individual characteristics [1, 3]. The selection, dosage and association method of these factors are accomplished by using a monitoring system through which qualitative parameters are associated with adequate quantitative variable. These parameters are a measure of the treatment results, excluding the patient's availability [2].

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## 2. EXPERIMENTAL CONDITIONS

A number of 70 middle school students from “Emil Garleanu” Special School of Galati, aged between 14 and 19 years old, with a gender distribution of 31.42% girls and 68.75% boys, have been examined during a month at the beginning of the school year. The monitoring tests have been made in the sports hall of the “Emil Garleanu” Special School, which is 8 m x 7 m large, and has the following facilities: anthropometric frame, ergo bicycle, espaliers, goniometer, gymnastics benches, medical balls, inclined area, ladder, medical gymnastics mattresses, weight pulley, walking lane, different dumbbells, sticks, strings, rings, as well as research materials. Electronic scales, metric lane were used after preliminary instructions on the usage and the data acquiring method. These tests [4, 5] represent the initial measurements after which a typical recovery program is used for children with mental deficiencies, in order to evaluate the efficiency of the recovery program [6, 7].

## 3. RESEARCH METHODS

Taking into consideration the fact that the objective measurement of the body joint mobility and of muscular strength may identify possible spine deficiencies in the case of the children with mentally disabled, the mobility was evaluated by measuring the body flexion, body extension, right lateral body bending, and left lateral body bending. Strength was assessed by measuring the abdominal plus psoas test, the abdominal minus psoas test, the psoas test, the lower back muscles, as well as the upper back muscles.

## 4. RESULTS AND INTERPRETATION

### 4.1. Mobility assessment

The results obtained during the mobility assessment are presented in Figure 1. It shows that the body flexion evaluation averages increase with the age of the mentally disordered subjects, the most important difference being recorded between the 5<sup>th</sup> and 6<sup>th</sup> graders.

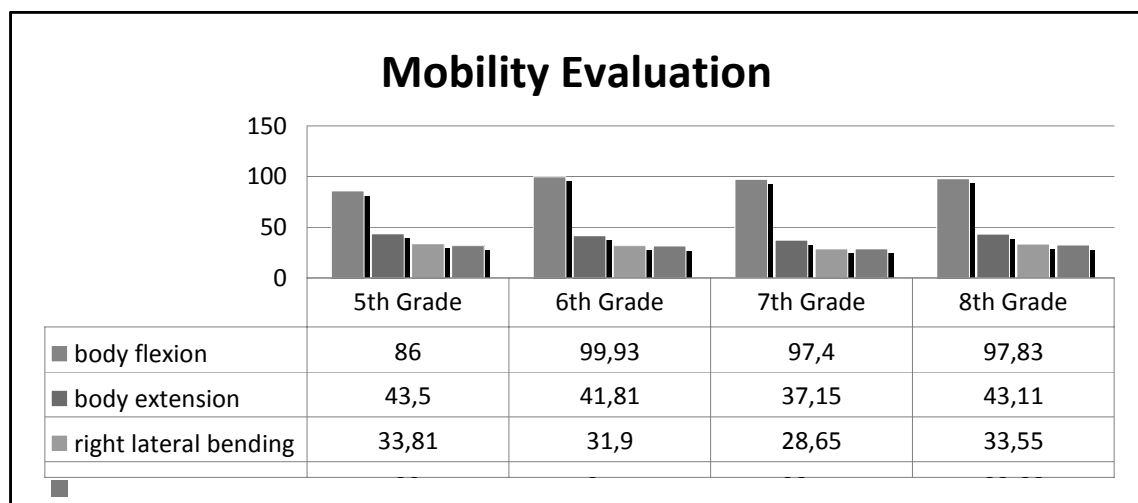


Fig. 1. Comparative analysis of the average values obtained with Body Mobility Assessment Tests.

This may be explained by the gender distribution of the subjects: 37.5% girls and 87.5% boys for the 5<sup>th</sup> grade and 31.25% girls and 56.25% boys for the 6<sup>th</sup> grade, knowing that girls start gaining significantly in height around this age, while boys tend to do so much later. However, as the measurements have been done at the beginning of the school year, the results may also be due to the fact that the 5<sup>th</sup> graders have not yet benefited from adequate physical training like the 6<sup>th</sup> – 8<sup>th</sup> graders did. This last explanation is also supported by the fact that the differences between the body flexion capacities of the 6<sup>th</sup> – 8<sup>th</sup> graders does not differ statistically very much.

Regarding the body extension, the largest capacity is recorded for the 5<sup>th</sup> and 8<sup>th</sup> graders, with a minimum recorded for the 7<sup>th</sup> graders, and a maximum for the 5<sup>th</sup> graders. Again, gender distribution and physical developmental patterns may be the explanation, as the analyzed groups are formed by: 30% girls and 70% boys for the 7<sup>th</sup> grade and 37.5% girls and 62.5% boys for the 5<sup>th</sup> grade.

The capacity of body extension is clearly correlated with the capacity of right and left lateral bending. We can observe that the same variation pattern is encountered for all three parameters. As in the case of body extension, both the capacity of right lateral bending and of left lateral bending have minimum values for the 7<sup>th</sup> graders, and a maximum for the 5<sup>th</sup> graders. It seems that the pattern has the strongest intensity for the body extension capacity and for the right lateral bending capacity: the body extension capacity of the 7<sup>th</sup> graders represent 85.40% of that of the 5<sup>th</sup> graders, the right lateral bending of the 7<sup>th</sup> graders represent 84.73% of that of the 5<sup>th</sup> graders, and the left lateral bending of the 7<sup>th</sup> graders represent 89.84% of that of the 5<sup>th</sup> graders. It is interesting to underline that the *minimum* of capacity of body extension, right and left lateral bending is recorded immediately the next year after the *maximum* of the body flexion capacity is reached.

#### 4.2. Strength Assessment

The results obtained during the strength assessment are presented in Figure 2. Figure 2 indicates that the 5<sup>th</sup> graders register the highest average values for all the body strength assessment tests. The Abdominal + Psoas test has yielded the lowest value in the case of the 6<sup>th</sup> graders and the highest value in the case of the 5<sup>th</sup> graders. The determined values are approximately directly proportional to the age of the subjects, with the exception of the 5<sup>th</sup> graders.

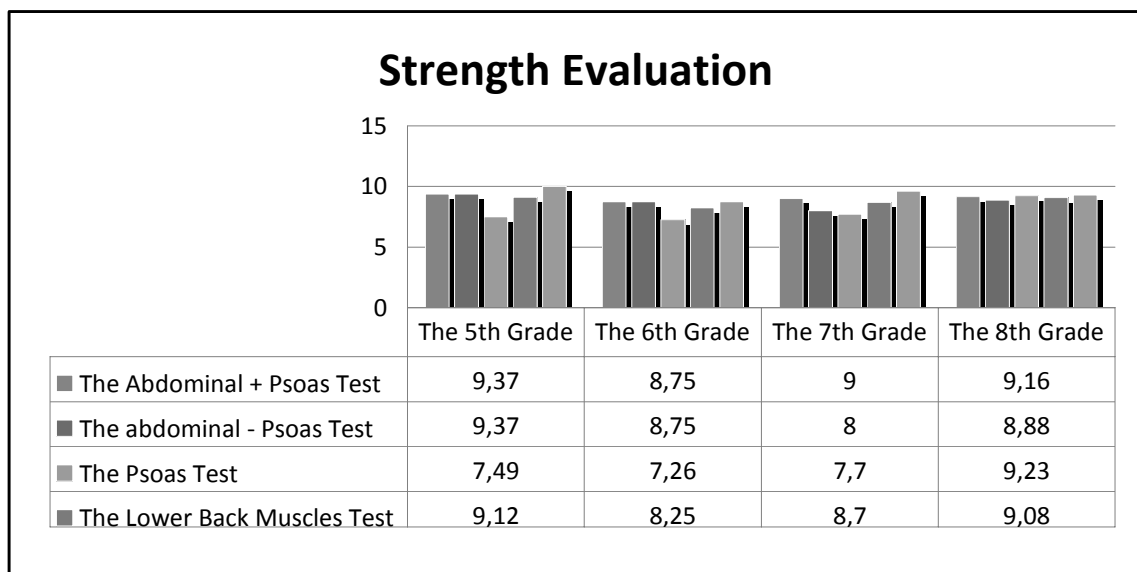


Fig. 2. Comparative analysis of the average values obtained with Body Strength Assessment Tests.

The Abdominal –Psoas test results have the lowest value in the case of the 7<sup>th</sup> graders and the highest in the case of the 5<sup>th</sup> graders. The trend regarding the direct proportionality of the results with the age of the subjects observed for the Abdominal + Psoas test is found in the case of the Abdominal –Psoas test as well.

This trend does not seem to be the result of the gender distribution of each age group, since in all age groups included a larger number of boys than of girls: the 5<sup>th</sup> grade group included 37.5% girls and 62.5% boys, the 6<sup>th</sup> grade group included 31.25% girls and 68.75% boys, the 7<sup>th</sup> grade group included 30% girls and 70% boys, and the 8<sup>th</sup> grade group included 27.77% girls and 72.22% boys.

The Psoas test registered the lowest values in the case of the 6<sup>th</sup> grade followed by values increasing nearly directly proportionally to the age of the subjects. However, in this case, the maximum value is recorded for the 8<sup>th</sup> graders and not for the 5<sup>th</sup> graders.

The body strength capacity as measured by the lower back muscles test and the upper back muscles test follow the same variation pattern as the Abdominal + Psoas and the Abdominal –Psoas tests: the lowest values are characterizing 6<sup>th</sup> graders, whereas the 5<sup>th</sup> graders are characterized by the highest ones. The body strength capacity of the lower back muscles and of the upper back muscles measured for the 6<sup>th</sup> graders represents 90.46% and 87.3%, respectively, of that recorded in the case of the 5<sup>th</sup> graders.

## 5. CONCLUSIONS

Whereas mobility evaluation demonstrated that the body flexion capacity of the disabled group of students is not problematic, the body extension and the lateral bending tests indicated that an intensive recuperating program is highly needed. It is well known that mobility varies from one subject to another and it is determined by the shape and tone of the articular surfaces, the elasticity of the ligaments, tendons and muscle fiber. Physical training can improve the capacity of using these anatomic body parts.

The harmonious muscular development is the most important factor when considering the spine's health and implicitly the well being of the entire organism. The set of biomechanical test that we have proposed have indicated which are the most needed overall body development programmes needed by the tested disabled students, in this case being those to maintain and enhance the muscular strength.

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