

## ASSESSMENT OF CORRECT BODY POSTURE FOR THE ERGONOMIC DESIGN IN INDUSTRIAL SETTINGS

LAZAR POPOVICI ELENA<sup>1</sup>, PRAISLER MIRELA\*, MUSAT MARIA MATHLEN<sup>3</sup>

<sup>1</sup>*“Dunarea de Jos” University of Galati, Domnească Street no. 47, Galați, Romania*

<sup>2</sup>*“Dunarea de Jos” University of Galati, Domnească Street no. 47, Galați, Romania*

<sup>3</sup>*“Emil Gârleanu” Special School of Galati, Gării Street no. 66, Galați, Romania*

**Abstract:** The inclusion of disabled young people in the economic and social life is a transversal objective in all the policies and programmes of the European Community. One way to overcome their handicap is to correct or diminish the physical deficiencies that prevent them from being hired in industrial settings. In most of the cases, mild physical disabilities are easily correctable in terms of regular school activities, if discovered before the modification of the tissue structure. This study presents an exploratory analysis that might help to design the ergonomics of the working areas in which disabled young people could be involved.

**Keywords:** ergonomics, disability, adjusting, correct body posture, industry

### 1. INTRODUCTION

The teenagers' physical disabilities detection, prevention and correction issue is a general concern for both the parents and the teachers that are in charge of their education and upbringing. On the occasion of the school medical evaluations that are meant to evaluate children's health status and to assess the students' physical development, it was found that only few of them have a correct body posture. Posture is the function of the human body that is based on the synergetic and coordinated activity of the locomotor apparatus, the central and peripheral nervous system, with the help of which body stability and equilibrium are maintained constant among the body segments and between the body and the environment [1, 2].

Defective postures represent total or partial shape and body function derivations from the norm which can be adjusted and super-adjusted by means of the implementation of the rectification procedure. These derivations appear due to various factors like for instance hereditary predispositions, body constitution, motility disorders or badly shaped habits or even the weakening of the muscles' functional capacity. This category includes the global defective postures: Cytophatic, rigid plan, asymmetric as well as mild segment deficiencies manifested as follows: head and neck leaning forward or sideways, onward or asymmetric shoulders, bending thorax, spine

---

\* Corresponding author, e-mail: [Mirela.Praisler@ugal.ro](mailto:Mirela.Praisler@ugal.ro)

cytophatic, lordosis or scoliosis aspects, valgum or flexed knees, defective feet position. Detected before the modification of the tissue structure, mild physical disabilities are often adjustable by regular Physical Education at school [1].

## 2. EXPERIMENTAL

In the next section we set about to establish the segment deficient posture frequency of the students at the “Emil Garleanu” Special School of Galati. A group of 70 middle-school students aged 14 to 19, diagnosed with mental deficiencies, has been taken under observation, of which 35.71% girls and 64.28% boys. The research took place in the period 15<sup>th</sup> of September – 15<sup>th</sup> of October, 2009-2010 school year.

We carried out the somatoscopic examination by means of the anthropometric frame, analysing each student *from behind* (head, shoulders, spine, hips, legs, knees, plantar arch), and then *sideways* (neck, thorax, shoulders, back, torso, abdomen, lordosis) [3, 4]. The gathered data have been centralized in a database and it will then be compared to the final results. These examinations represent the *ab initio* testing, after which a typical recovery programme will be used on mental deficient children, so as to examine the final results of the recovery and assess the progress.

## 3. RESULTS AND INTERPRETATION

The data obtained through the somatoscopic test highlight the results obtained during the evaluation from behind (Table 1 and Figure 1) as well as sideways (Table 2 and Figure 2).

Table 1. Somatoscopic test from behind.

	Normal posture		Defective posture		Deficiency	
	No	%	No	%	No	%
Head	46	65.71	21	30	3	4.28
Shoulders	22	31.42	45	<b>64.28</b>	3	4.28
Spine	43	61.42	23	32.85	4	5.71
Hips	57	81.42	12	17.14	1	1.42
Legs	69	<b>98.57</b>	1	1.42	0	0
Knees	55	78.57	12	17.14	3	4.28
Plantar arch	17	24.28	42	60	11	<b>15.71</b>

### 3.1. From behind

1. *Normal posture- the feet - 98.57%* presents the highest percentage, followed by the percentage of the hips' posture, 81.42%, the knees posture– 78.57%, the head – 65.71%, spine – 61.42%, shoulders – 31.42%, and plantar arch posture– 24.28%.
2. *Defective posture – shoulder posture* has the highest percentage-**64.28%**, closely followed by the **plantar arch – 60%**, the spine – 32.85%, the head – 30%, the hips and the knee posture – 17.14%, and last but not least, the legs posture – 1.42%.
3. *Deficiency* – the plantar arch has the highest percentage – **15.71%** of the children suffer from splay foot, then spine deficiencies with a percentage of 5.71%, with left or right scoliosis, then the same percentage has been registered for the head, shoulders and knees levels – 4.28%. The head tilted to the left or to the right, the fallen shoulders or the deficient knees have registered the same value whereas the hips value is 1.42%.

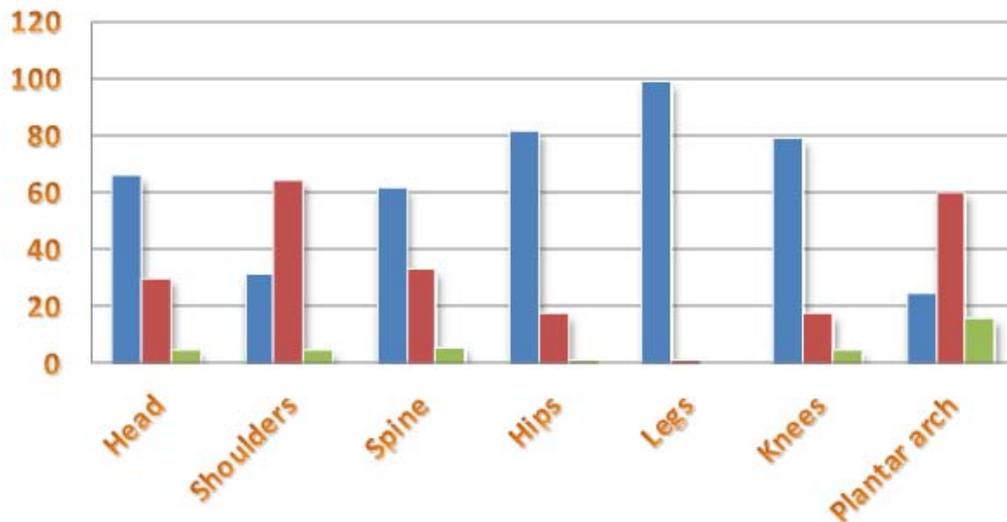


Fig. 1. Somatoscopic evaluation from behind: normal posture, defective posture and deficiency.

Table 2. Somatoscopic test sideways.

	Normal posture		Defective posture		Deficiency	
	No	%	No	%	No	%
Neck	35	50	26	37.14	9	<b>12.58</b>
Thorax	53	75.71	13	18.57	4	5.71
Shoulders	33	47.14	30	<b>42.85</b>	7	10
Back	52	74.28	15	21.42	3	4.28
Torso	57	<b>81.42</b>	11	15.71	2	2.85
Abdomen	40	57.14	24	34.28	6	8.57
Lordosis	44	62.85	22	31.42	4	5.71

### 3.2. Sideways

1. *Normal posture* - the most frequent one is the **torso** posture – **81.42%**, then comes the thorax posture – 75.71%, then the back one – 74.28%, then the lordotic one – 62.85%, followed by the abdomen posture – 57.14%, and last but not least by the neck posture - 50% and the shoulders posture 47.14%.
2. *Defective posture* – **shoulder posture** has the highest percentage - **42.85%**, closely followed by the neck posture – 37.14, the abdomen posture – 34.28%, the lordotic posture – 31.42%, the back posture with a percentage of 21.42%, the thorax posture – 18.57%, and last but not least, the torso posture – 15.71%.
3. *Deficiency* – the highest percentage is registered by the **neck posture** – **12.85%**, followed by the neck posture – 10%, the abdomen posture – 8.57%, the thorax and lordotic posture – 5.71%, the back posture – 4.28%, and the torso posture – 2.85%.

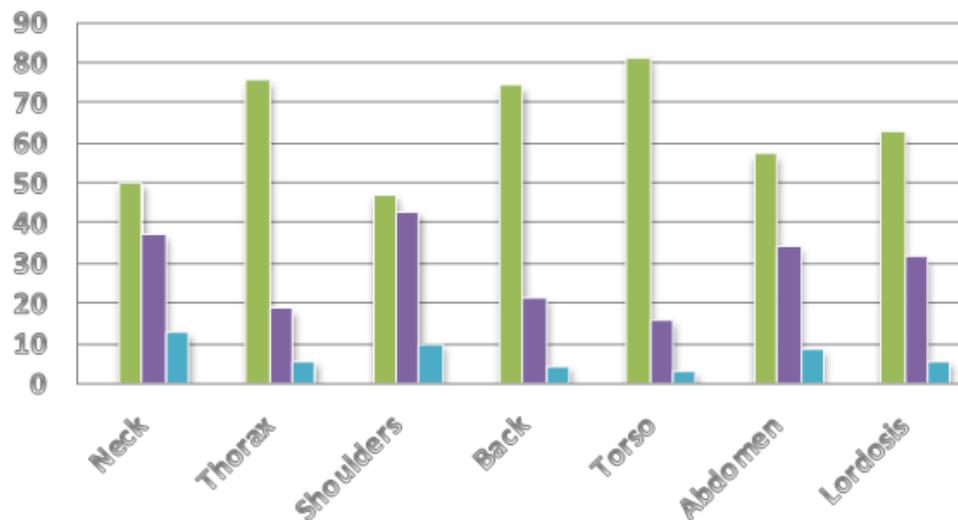


Fig. 2. Somatoscopic evaluation sideways: normal posture, defective posture and deficiency.

#### 4. CONCLUSIONS

The underdevelopment of the support and movement apparatus as well as the early school years' special requirements impose the children a prolonged static effort in the sitting position. A student spends 8 to 12 hours a day in this position, which leads to the adopting of incorrect position that triggers the deficient postures.

Defective postures can be adjusted through specially designed exercises. The adjustment to a correct body posture should become a fundamental aim, and should start as early as possible. In order to avoid the transformation of these habits into deficiencies, measurements must be done systematically during the entire period in which the growth and physical development takes place.

As we could see in the present case study, special attention must be offered to the head, shoulders, spine and thorax posture because they turned out to have the highest percentages. This is because the spine, the main apparatus, undergoes changes due to students' vicious sitting posture. However, greater emphasis must be put on the deficiencies, for they need an adjusting programme adapted to its complexity.

#### AKNOWLEDGMENT

This work has been partially carried out within the projects POSDRU 6/1.5/S/15 - 6853 - SIMBAD and POSDRU 86/1.2/S/63951 - EUPD. The authors are grateful for the financial support.

#### REFERENCES

- [1] Fozza, C., *Indrumar privind corectarea deficientelor fizice la elevi*, Ed. I.E.F.S., Bucuresti, 1972.
- [2] Marcu, V., Stan, Z., Bastiurea, E., Chiculită, C., *Determinarea dezechilibrelor musculare prezente la nivelul trunchiului – Metodă si aparat*, Ed. Academica, Galati, 2008.
- [3] Dragnea, A., *Măsurarea si evaluarea în educatie fizică si sport*, Ed. Sport Turism, Bucuresti, 1984.
- [4] Cordon, M., *Kinetologie medicala*, Ed. Axa, Bucuresti, 1999.