

# THE EFFECT OF PHYSIOTHERAPY IN ASSESSING THE AMPLITUDE OF SPINE MOVEMENT IN PATIENTS WITH SCOLIOSIS

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**Abstract:** *The present work contains a predominant idea regarding making a contribution in order to clarify some particular aspects of scoliotic attitude. The purpose of this work is to present a therapeutic protocol in the scoliotic attitude that includes information about the patients' recovery. The purpose of corrective gymnastics is: correcting the spine by toning the back muscles, reducing costal gibbosity by mobilizing the spine and untwisting the vertebral bodies, straightening the pelvis and balancing the shoulder girdle, developing the mobility of the chest, creating a correct posture reflex.*

**Key words:** *therapeutic protocol, scoliotic attitude, recovery program,*

## 1. Introduction

The spine is the most important component of the bony skeleton and the locomotor system, by default. It serves as an anchor point for all the other elements that make up the human body. It is the central axis of our physical structure. Consequently, its condition will reflect on our entire being [5].

The spine is divided into four regions, each of which is normally made up of a fixed number of vertebrae. The vertebrae in each region have morphofunctional characteristics related to the fulfilment of the two important functions of the human spine: the function of supporting the weight of the head, trunk and upper limbs,

and the function of ensuring sufficient mobility [1].

Scoliosis is a deformation in the frontal plane of the spine, which can be located in one or more of its regions [2], for the most correct definition of scoliosis we must take into account three elements:

1. The first element is the frontal curvature of the spine, with the rotation of the vertebrae, a rotation that we find present more or less accentuated in all scoliosis, regardless of etiology, and without which even the compensation curves could not be formed;
2. The second element must include the compensation and reducibility of the scoliotic curvature. A scoliotic

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curvature that does not tend to compensate superiorly or inferiorly in orthostatism and that disappears easily in decubitus or when suspended, is rather a scoliotic or antalgic attitude;

3. The third element must be the echo of the rotation and lateral deviation of the spine on the neighbouring regions. A scoliosis even at its onset, in contrast to the scoliotic attitude, leads to changes in the diameters of the chest, the rib arches, the sternum, and the lombo-abdominal muscles.

## 2. Physical therapy program

Physiotherapy treatment consists of three stages, namely:

- in the first stage it will be identified the vicious posture that caused the appearance of scoliosis, correcting the defects through position exercises that start from the usual one, i.e. the incorrect one and reach the correct one.
- the second stage is correction and is very important because, thanks to exercises to straighten the posture, this will improve. To maintain the posture, toning the muscles of the trunk and limbs is also important. This stage lasts several months and the treatment consists of at least 3 sessions per week, with a specialized physiotherapist.
- the third stage consists of consolidation and readjustment, in which the results that have been obtained will be fixed [6].

The exercises used in the recovery program are structured according to the evolution of the condition, the doctor's advice and the patient's movement possibilities. Increasing the number of repetitions or sets, as well as diversifying the types of exercises, was done gradually [4].

The physical exercises applied in the recovery treatment of vertebral scoliosis aim to exercise the muscle tone and the sense of correct attitude of the whole body, but especially of the back.

The means used in this sense consist of static and dynamic exercises performed through movements of the trunk, lower and upper limbs, breathing exercises, applied crawling and balance exercises, recovery and relaxation exercises, exercises with weight-bearing objects (stick, medicine ball, dumbbell, extensor) which are very often used in the correction of scoliosis [3].

### 2.1. The objectives of the kinetotherapeutic program

The kinetotherapeutic treatment is applied from the beginning in all forms of scoliosis and at all ages, even in infants.

The treatment of scoliosis through physical exercise aims to achieve the following objectives:

- improving the posture of the spine – the correction of scoliosis is done by: fixed positions maintained corrective or hyper corrective: supine, lateral, ventral, from sitting, from standing; cushions, scrolls, the back of the chair, the wall are used. Positioning the lower or upper limbs is a frequently used modality. The positions are maintained during the breaks of the gymnastics program but also when the corset is removed.
- increasing the flexibility of the column - the scoliotic spine is a rigid spine, with mobility especially in the scoliotic area. Soft tissues contribute to this limitation of mobility through retractions. Attempting global mobilization of the spine will only achieve movements in

the unaffected areas of the spine. For this reason, flexibility exercises are done from special positions that block segments of the spine, leaving movement possible only in the desired segments.

- increase in muscle strength - since scoliosis produces asymmetric changes in the tone and length of the paravertebral muscles, supporting the spine, and even other muscle groups, muscle toning must be done selectively:
  - a) toning the abdominal muscles, which is mandatory. It is usually practiced to raise the trunk with bent knees, to strengthen the abdominal muscles and oblique, the hands next to the body or before the hands at the back of the head, the hands above the head, represent as many stages of grading;
  - b) toning the large buttocks;
  - c) toning and rebalancing the paravertebral muscles - the main objective of recovery in scoliosis. The paravertebral muscles on the side of the concavity are shortened and with low tone because they do not exert an effort to support the spine, which tends to lean towards the concavity, while the paravertebral muscles on the side of the convexity are elongated and with increased tone, since they oppose the tendency to fall (inclination) of the column on the opposite side.
- improving breathing - in scoliosis, it is necessary to improve the respiratory function through appropriate respiratory exercises.
- general body training - the most suitable and effective means for training the body of these deficiencies

are made up of elements of physical therapy, elements chosen from different sports, practiced but not in their complexity and with a competitive character, but for the harmonious toning of the entire musculature, the improvement of major functions and the correction of deficiencies spine and other body segments.

### 3. Material and Methods

The research sample was a group of 15 patients with a positive diagnosis of idiopathic vertebral scoliosis of different types and in different stages of evolution. In the framework of the research, the evaluation of the amplitude of the movement of the spine in the scoliotic attitude focused on recording the degree of actual mobility of the two areas of the spine: the cervical area and the lumbar area:

- a) *Evaluation of the mobility of the cervical region:* the Stibor test - the spinous apophysis of the S1 sacral vertebra (landmark 1) and the C7 cervical vertebra (landmark 2) is determined. The distance between the two landmarks is measured, then trunk flexion is performed, which normally increases the distance between the two landmarks by 10 cm.
- b) *Evaluation of the mobility of the lumbar region:* the Schober test determines the spinous apophysis of the S1 sacral vertebra (marker 1). Measure proximally 10 cm (marker 2) and then flex the trunk, which normally increases the distance between the two marks by 5cm.

#### 4. Results and Discussions

Table 1

##### *Vertebral mobility indices*

Test	Schober			Stibor		
	Day 1	Day 14	Result	Day 1	Day 14	Result
1	14	15	improve	9	10	improve
2	14	14,5	improve	8	9	improve
3	12	13	improve	8	10	much ameliorated
4	13	15	much ameliorated	8	9	improve
5	14	14,5	improve	8	10	much ameliorated
6	11	13	much ameliorated	9	10	improve
7	14	15	improve	7	9	much ameliorated
8	12	13,5	improve	7	8	improve
9	14	15	improve	7	8	improve
10	12	12,5	improve	8	10	much ameliorated
11	12	13	improve	9	10	improve
12	14	15	improve	6	8	much
13	13	14	improve	8	10	much
14	12	14	much ameliorated	8	9	improve
15	14	15	improved	8	9	improve

##### *Average evolution of mobility indices*

Table 2

Test	Schober		Stibor	
	Day1	Day 14	Day 1	Day 14
Lot	13	14,13	7,87	9,27

In table 1, the analysis of the Schober index was carried out with the aim of following the mobility of the lumbar spine especially in patients with this type of scoliosis, but also with relevance for other types of scoliosis. This is an objective means of assessing the evolution of the scoliotic curvature throughout the treatment.

Analyzing the evolution of the Schober index for this batch, we can say that it changed in the case of all 15 patients for (100%) of the patients undergoing treatment. The change recorded values between 0.5 and 2 (cm), representing how much the vertebral mobility increased in these patients.

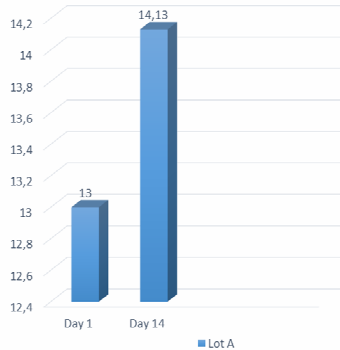


Fig. 1. Average evolution of the Schober index

Looking at the group, we can say that, under the influence of the kinetotherapeutic treatment, the situation improved for all patients.

We can see that the average value of the Schober index increased by 1.13 cm on day twenty-four compared to day one, table 2 and figure 1.

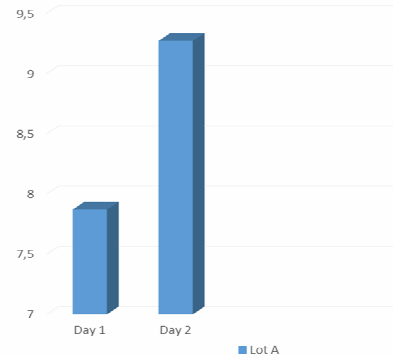


Fig. 3. Average evolution of the Stibor index

Therefore, if under the influence of the treatment the situation of all patients improved in terms of the mobility of the dorso-lumbar spine (observed fact from the evolution of the Stibor index), in its absence only in the case of 13.4% of patients this improved, in the remaining 86.6 % remaining unchanged, figure 2.

Also, the effect of the treatment on the batch is very well observed in the evolution of the average value of the Stibor index, figure 3. Thus, it increased by 1.40.

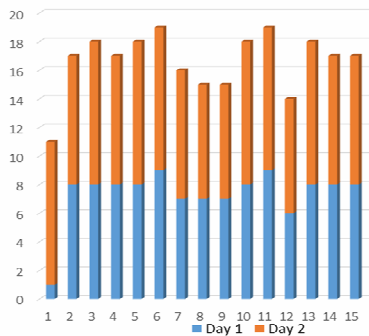


Fig. 2 The evolution of the Stibor index

Following the analysis of the evolution of the values of this index, in the case of the batch we observe that in the case of 9 patients (60%) it increased by one unit and for 6 (40%) patients it increased by two units. This is due to the treatment applied to which the patients were subjected.

### 5. Conclusions

The present analysis was carried out taking into account the final results obtained for the parameters that were followed throughout the study period (fourteen days), namely: the evolution of the vertebral mobility indices.

Thus, after the kinetic treatment, the following results can be observed: the situation of no patient worsened (0%), in the case of (9.17%) the state of health remained stable, and for (90.83%) of the patients the situation improved. The high percentage of improved patients clearly shows the effectiveness of the treatment

carried out and the achievement of the intended goal in terms of: improvement/improvement of vertebral mobility indices.

The application of recuperative treatment is mandatory to have a good evolution of patients with scoliosis, physical therapy proving to be the most effective treatment procedure for all types of scoliosis, at all ages and in all clinical situations of the patient with scoliosis, with the need to repeat it in the course of the years.

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