

THE FUNCTIONAL RECOVERY OF STATIC VERTEBRAL DISORDERS CAUSED BY THE SCHEUERMANN DISEASE

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Abstract: *We suppose that setting a suitable kinotherapy program, associated with the patient's cooperation, can deliver significant results in the functional recovery of static vertebral disorders caused by the Scheuermann disease. The purpose of this study is creating a kinetic program to recover the spine considering the other curves that are correctly positioned: cervical, lombar, dorsal.*

In the following research I used appropriate kinotherapy recovery methods such as: electrotherapy, hydrokinotherapy, massage, exercise, reaching notable results. As evaluation methods I used the Schober test, the Harvard test, the articular balance.

The efficiency of the implemented program determined a 13 cm improvement regarding the Schober test, a 14 degrees increase of the spine flexion and a 22% improvement in the Harvard test.

Key words: *Scheuermann disease, recovery, spine*

1. Introduction

An important role in the locomotive system has the spine. This connects the segments that make up the chest and the pelvis. Any misalignment of a vertebra will cause a disturbance of body symmetry, sometimes with major influence on internal organs: heart, lungs.

For this reason, both curative and therapeutic treatment is needed. The Scheuermann disorder is a pathology that occurs during growth, which is manifested

by dorsal hyperplasia. Pain is associated with and determined by changes in the vertebral bodies. Adolescent illness, as it is called, forces our specialists to conceive as soon as possible a physiotherapeutic treatment to release the anterior part of the vertebral bodies from the weight that leads to deformations.

The discovery of some methods of premature and systematic application of physiotherapeutic means and procedures by which to stop the evolution of the disease and the possible deformations can

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yield significant results in order to recover the static disorder caused by Scheuermann disease.

Modern medicine is not limited only to the outcome of medical treatment, but on the contrary tries as far as possible to give the patient the functional capacity for an active life.

Physical therapy plays an important role in functional recovery. Modern physical therapy seeks to minimize prolonged pathological leakage, focusing on the preservation and recovery of the function affected by the disease.

In addition to its curative role, physiotherapy has a preventive role by re-educating local statics, by toning and relaxing the muscles in a postural and general kinetic reeducation.

The spine, which has great functional importance, consists of 33 or 34 vertebrae, 344 articular surfaces, 24 intervertebral discs and 365 ligaments with 730 insertion points. There are 730 direct action muscles on it.

The spine is made up of vertebrae that differ in shape, size and number by region:

1. The cervical region - 7 vertebrae (the first two are called atlas and axis due to the support function they perform)
2. The chest region - 12 vertebrae
3. The lumbar region - 5 vertebrae
4. The sacral region - 5 vertebrae
5. The coccygeal region 4 or 5 vertebrae.[5]

The vertebrae in each region have the main role of fulfilling the two important functions of the column:

1. The function of bearing the weight of the head, trunk and upper limbs;
2. The function of ensuring sufficient mobility.

1. **Scoliosis** is the disease that consists of the lateral deflection of the spine,

especially in the dorsal region, due to the weakening of vertebral ligaments or vertebral disease. Usually the spine curves in the form of the letter, S 'or, C'.

2. **Lordosis** is a deviation of the spine, in the sagittal plane, with anterior convexity, by accentuating the physiological curves.
3. **Back plan** is a deficiency consisting of wiping or reversing the physiological curves of the spine, which causes changes in the position of the ribs, shoulder blades, scapular belt and especially of the chest.
4. **Kyphosis** represents an anterior and posterior curvature of the thoracic spine. The term 'Kyphosis' generally refers to an excessive bending of more than 50 degrees.

Classification of kyphosis at children and adolescents:

1. Postural kyphosis

2. This type of kyphosis occurs especially on adolescents. The evolution of kyphosis is generally gradual. Appears frequently at girls. It is often accompanied by a bent backward curvature of the lumbar spine.

3. Congenital kyphosis

This type of kyphosis is a malformation of the spine during fetal development. It can even determine the kyphosis in infants. This type of kyphosis may worsen as the baby grows. In some cases, congenital kyphosis can cause paralysis of the lower part of the body.

4. Scheuermann kyphosis

This type of kyphosis occurs mainly in adolescents aged between 12 and 18 years. This is the time when the vertebrae are still growing. It appears with a slightly higher frequency in boys. Adults who develop Scheuermann

kyphosis during childhood may experience pain as they age.

the inspiratory muscles (rhomboid, large serratus, small pectoral); [2]

2. Objectives

1. Discharge of affected areas by avoiding mechanical compression on them;
2. Avoiding the kickback and correcting it;
3. Prophylaxis of discarthrosis and their recovery;
4. Correction of compensatory lordosis;
5. Combating muscular atrophy and immobilization osteoporosis;
6. Respiratory re-education.

The term is individualized and depends on:

1. Age of the patient;
2. The severity of hyperkyphosis;
3. Existence of pain;
4. Respiratory or neurological damage.

The kinetic treatment includes:

1. Corrective and hypercorrective postural changes of the spine;
2. Vertebral gymnastics for straightening of the cervico-dorsal column with elongation of the large pectoral and toning of the muscles that fix the shoulder blades (large serratus, rhomboid, middle and lower trapezium);
3. Mobilization of the thoracic spine, in particular through extension exercises;
4. Cervico-dorsal-lumbar spine;
5. Toning of abdominal, paravertebral, pectoral and cervical muscles.
6. Respiratory gymnastics, to maintain the elasticity of the chest, tonifying

3. Material and Methods

Physiotherapy (galvanic current, diadynamic current, ultrasound, magnetodiaflux);

Galvanic current

The electrodes were applied by means of a water-immiscible hydrophilic layer. The current intensity was adjusted according to the tolerance threshold of the patient.

Diadynamic current

The hydrophilic tissue was well-soaked, well-squeezed and smooth, and the smooth electrode was applied over the treated area. It was fixed with sandbags. [6]

Massage

The massage was performed with the patient lying on the massage table in the facial lying position. It began with a smoothing, with both extended, starting from the lower part of the chest on the paravertebral muscles and the dorsal muscles, on the top of the trapeze, surrounding the shoulders. Then it followed the kneading with all its forms, then the frictions and finally the vibrations. After all of this, the massage ends with a smoothing. The massage ends with inspirational-breathing movements.

Hydrokinetotherapy

The use of water in the treatment of various diseases dates back to ancient times. The Chinese and later the Greeks and the Romanians laid the foundation for the indications and beneficial applications

of water exercises, since at the beginning of the eighteenth century, hydrokinetotherapy was increasingly developed as a non-specific treatment method in medical recovery programs.

Corrective exercises on the edge of the pool:

- lying down, lifting the spine from the ground and maintaining it 6-8 seconds;
- lying down, with a sack of sand under the thorax, lifting the trunk from the ground;
- from the knee position, with palm restraint, holding one hand to the heel of the same side and returning;
- from the knee position, with palm restraint, holding a hand at the opposite foot heel and returning;

Corrective exercises in small depth water:

- from the knee position, on the heel, seated, with hands on his neck, elbowing backwards with arc;
- from the knee position, on the heel, with his hands on the back of his head, leading the elbows backwards and overcoming the resistance of the physical therapist;
- walking with the rotating the arms backwards;
- walking back with the hands behind the back and the trunk in the extension;
- lunge walking, arms to the sides and extension at each step;
- lunge walking with a stick on the shoulder;

Correction exercises in medium depth water:

- wide Standing with arms extended to the sides, trunk extensions with arms lifting through the side, above the head, on the inspiring act and returning on the expiratory act;

- grabbed by the edge of the pool, extending the head and trunk, so that the ears are taken under water;
- the patient with the arms raised above the head, walking on the toes, on the heel;
- standing with the arms on the thighs, the patient performs simultaneously the extension of the trunk and the lifting of the arms above the head; [4]
- at the edge of the pool, the patient holds the bar with the back against the pool and bending forward;
- back against the pool, arms extended sideways grabbing the edge of the pool, lifting the knees at the chest is performed simultaneously;
- back against the pool, arms extended sideways grabbing the edge of the pool, lifting the knees to the chest alternately;
- back against the pool, arms extended sideways grabbing the edge of the pool, flexing the stretched lower limb on the pool simultaneously;
- back against the pool, arms extended sideways grabbing the edge of the pool, flexing the stretched lower limb alternative;
- back against the pool wall, shoulders back to reach the pool wall and return;
- swimming - back procedure;
- swimming - Reverse with both hands simultaneously; [3]

Physical Therapy

The program was carried out in 3 stages: Phase I - postural re-education was attempted. This lasted 5 to 7 weeks, accompanied by relaxation and the patient's learning to keep the correct body position;

Phase II - corrective stage. We worked on muscular toning, characteristic of deviations, being able to maintain the

correction. Then it went to the toning of the trunk and limb muscles;

Phase III - the consolidation and adaptation phase. Here we have tried to fix the results achieved so far. [1]

Applied tests

The Schober test. With this test we evaluated the mobility of the lumbar spine through the anterior torsion of the trunk.

The Harvard test. It is a maximal exercise trial, based on heart rate measurement in the post-effort recovery period. It is used to study the behavior of the cardiovascular apparatus during medium and intense efforts.

The balance of the spine's articular arch. This is the measurement of the movement amplitudes in the joints in all directions. The articulated motion amplitude expresses how to mobilize a segment and not the degree of motion. The modern trends in motion assessment of a joint are not to focus on mobility because it does not give enough data on the state of the structures involved in articular movement and, implicitly, the causes of its limitations. Together with the muscular it represents a basic analytical examination in physiotherapy. They are mandatory at the beginning and at the end of the treatment, but also interim evaluations provide important data on the

functioning state of the joint or muscle activity at that time, and based on the recorded data, it is possible to make decisions about changes or other useful interpretations of the proposed objectives. [7]

At the clinical examination, we noticed that the patient had very low articular mobility in the spine and the average return of heart rate after exercise. The patient had a normal motor and intellectual development, and during the research methods and techniques everything went well.

Being a young person, I recommended a carefully planned and constantly adapted physical therapy program.

Regarding the reduced physical activity, we recommended that it will be progressively adapted to the patient's preferences, with gradual increase in duration, degree and frequency of physical exercise. [8]

Following the recovery program, we collected data on the spine joint balance measurement, mobility testing, and patient effort that we have represented in the following tables and graphs:

4. Results and Discussions

4.1. The Schober test

Data obtained from the Schober sample (cm)

Table 1

Patient	Initial testing	Intermediate testing	Final testing
Lumbar zone	17 cm	24 cm	30 cm

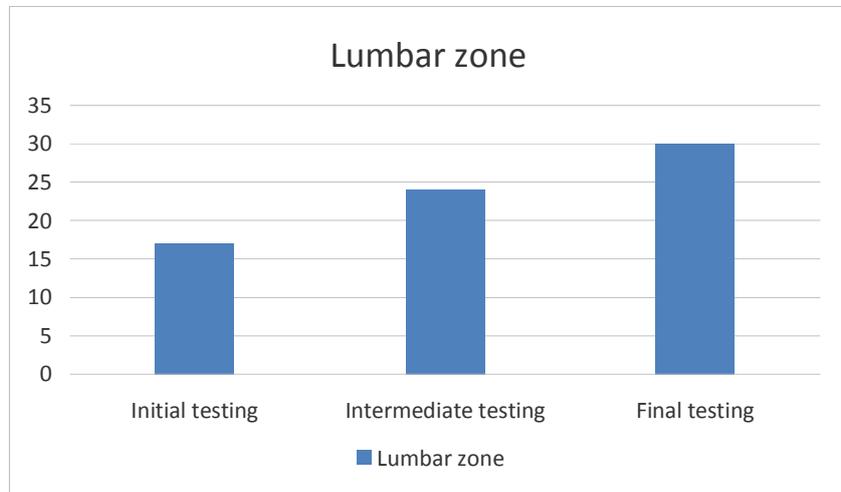


Fig. 1. Data obtained from the Schober test (cm)

4.2. The Harvard Test

Table 2

Cardiac Frequency in the Rebound After effort (b / min)

Pulse 1 minute after effort	Pulse 2 minutes after effort	Pulse 3 minutes after effort
115 b/min	103 b/min	90 b/min

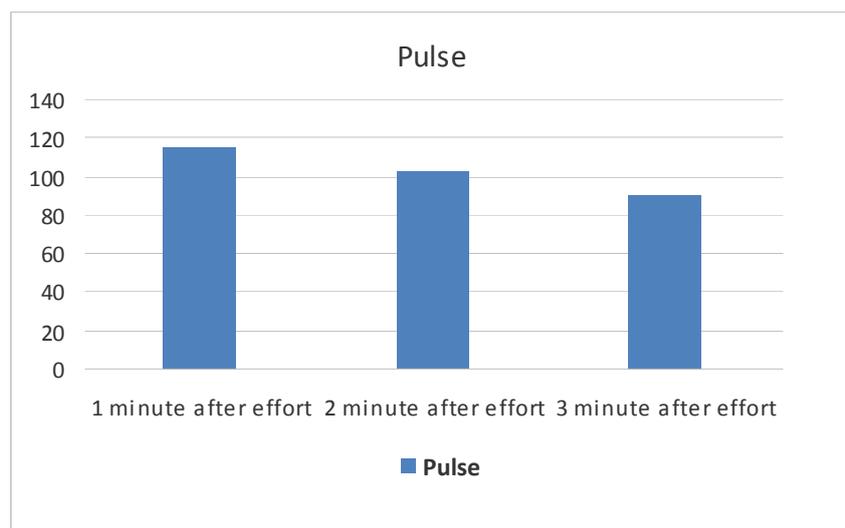


Fig. 2. Pulse returns after effort

4.3. The articular balance of spine

Data obtained from the articular balance of the spine (°)

Table 3

Patient	Initial testing	Intermediate testing	Final testing
Flexion	62°	69°	76°
Extension	7°	13°	17°
Laterality	6°	12°	19°
Rotation	19°	27°	33°

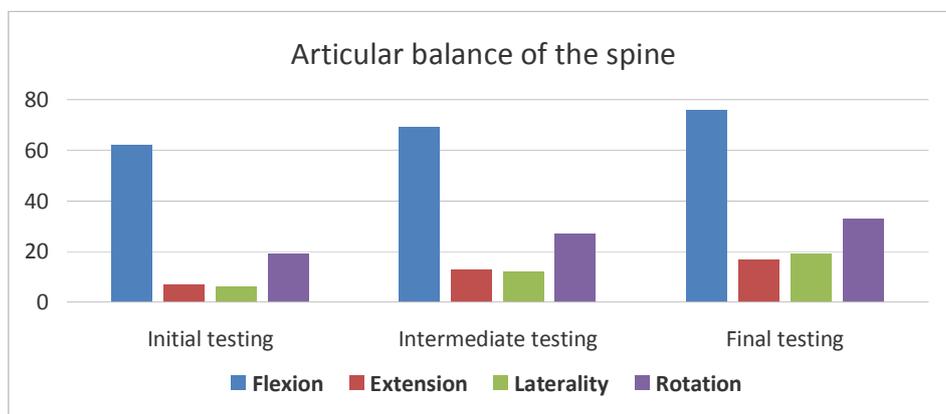


Fig. 3. Graphical representation obtained from the articular balance of the spine (°)

5. Conclusions

From the study, which was carried out during 2018-2019, from December to March, the following were observed:

1. The treatment of the kyphosis should not be understood separately, but in a much wider context than the strict correction of the dorsal curvature as it occurs with deviations from normal of the shoulders, shoulder blade, thorax and other areas;
2. The exercise programs were aimed to correct the kyphosis, but also included corrective elements for associated deficiencies;
3. Kyphosis having a primary value, its correction will also lead to the correction of associated deficiencies, the existence of which is secondary, depending on the kyphosis;

4. Concurrent correction and associated deficiencies resulted in a favorable accelerated influence of the recovery of the kyphosis curve;
5. The physiotherapeutical treatment was beneficial when applied early with the occurrence of pain or vertebral desalination.

The physical therapy program associated with physiotherapy means led to:

- a. Relieving the vertebral pain and its disappearance;
- b. Reduction of pathological curves;
- c. Creating a tonus of attitude, necessary to maintain correction;
- d. Increased tonus of paravertebral muscles;
- e. Unlocking the chest;
- f. Improving functional parameters specific to pulmonary function.

6. Physical exercise as a basic means of physiotherapy was applied in the form of dynamic and static exercises. Along with dynamic exercises, backbone spraying and recovery were accomplished by stretching exercises and vertebral elongations on the inclined plane (gym bench), which quickly improved the collar's retraction by stretching the anterior ligament that is retracted. Under the recovery program, the patient received a program of hygiene rules of the posture that should be applied during the day and night to maintain the results of the recovery therapy that achieved the objective of maintaining the correction. A real benefit was the posture awareness exercises in the kinetoprophylaxy program, where the corrective positions learned in the gym are applied in everyday life. Motion treatment will be continued to strengthen and maintain the results.

Recommendations:

- sleeping on a hard bed;
- ball sports and especially those requiring trunk stretching: basketball, volleyball,
- handball and swimming;
- educating the patient is essential for the "hygiene" measures of the back, improving the posture and performing physiotherapy;
- personalized clinical or radiological assessments at 6 to 12 months;
- anti-inflammatory treatment;
- physiotherapy and postural rehabilitation.

Interdictions:

- maintaining fixed positions over long periods of time;
- exposure to cold;
- lifting weights;
- constipation;
- cold and flu.

References

1. Bondoc-Ionescu, D., Bondoc-Ionescu, C., Martoma, A., Sabău, E.: *Concepte asupra proceselor de refacere și recuperare în sport (Concepts of recovery and recovery in sports)*. Braşov, Editura Universităţii din Braşov, 2018, p. 123-125.
2. Cioroiu, S.: *Ghid practic pentru recuperarea kinetică a deficienţelor fizice – volumul I (Practical Guide to Kinetic Recovery of Physical Deficiencies - Volume I)*. Braşov, Editura Universităţii Transilvania din Braşov, Braşov, 2010, p. 35-40.
3. Cioroiu, S.: *Ghid practic pentru recuperarea kinetică a deficienţelor fizice (Practical Guide to Kinetic Recovery of Physical Deficiencies – Vol. II)*. Braşov, Editura Universităţii Transilvania din Braşov, 2016, p. 10-16.
4. Cioroiu, S.: *Hidrokinetoterapia deficienţelor fizice (Hydrokinesis of physical deficiencies)*. Braşov, Editura Universităţii din Braşov, 2012, p. 34-40.
5. Cioroiu, S.: *Kinetoterapie de la teorie la practică (Physical therapy from theory to practice)*. Braşov, Editura Universităţii Transilvania din Braşov, 2012, p. 45-48.
6. Rădulescu, A.: *Electroterapie (Electrotherapy)*. Bucureşti, Editura Medicală, 2005, p. 109-111, 164-166,
7. Sbenghe, T.: *Kinetologie profilactică, terapeutică și de recuperare (Prophylactic, therapeutic and recovery kinesiology)*. Bucureşti, Editura Medicală, 1987, p. 54-55.
8. Turcu, I.: *Metodologia cercetării în educație fizică și sport (Methodology of research in physical education and sport)*. Braşov, Editura Universitatii Transilvania, 2007, p. 29-31.