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*Original article*

## OPTIMIZING THE CONTRIBUTION OF PHYSICAL THERAPY IN RESPIRATORY FUNCTION OF PATIENTS WITH ANKYLOSING SPONDYLITIS

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### Abstract

*Aim:* The ankylosing spondylitis is an inflammatory disease which affects the axial skeleton in most cases and obligatory the sacroiliac joints, but also with effects on the chest joints, capable to inquire, with different frequency and gravity of peripheral joints and realizes a wide range of extra-determination. The clinical spectrum ranges from a simple pelvic disease to a severe and progressive multisystem distress between these extremes hovering numerous clinical subsets which are not mutually exclusive. Purpose of this study consists in developing the strategy to recover the respiratory function at the patients with ankylosing spondylitis in different stages of pathology. The objectives of this work includes recovery prospects, the extent which this treatment ensures optimal results, determine the effectiveness of selected processes or means and removing the possibility of immediate complications and long-term targets for the patients with ankylosing spondylitis selected for this work.

*Methods:* literature review, the observation, the investigation, the experiment and the graphic representation.

To realize this study, I have selected 16 patients, males and females, from Municipal Hospital Dragasani, Department of Rheumatology, with ages between 26 and 54 years diagnosed with ankylosing spondylitis at different stages, both in terms of clinical and functional tests after applying laboratory examinations which were evaluated on the base of some established parameters for realizing this study before and after finishing the process of recovery.

*Results.* For this study, I established a series of parameters that were assessed both before and after 6 months of treatment, a treatment which was developed over a period of 3 months, and during the last 3 months the patient had to comply with the indications and recommendations of the attending rheumatologist and of the specialist in recovery medicine, carrying out correctly the exercise programs and gradual resumption of activities, to the extent of the possibilities.

*Conclusion:* To recover the respiratory function it is necessary some exercises targeted at the level of this segment, techniques of re-learning of all respiratory types even massage to increase the functionality of them.

*Key words:* ankylosing spondylitis, physical therapy, pathology, respiratory function.

### Introduction

Ankylosing spondylitis is a chronic inflammatory disease that predominantly affects the dorsal column, the inflammatory process starting frequently at the level of sacroiliac joints and progressing upwardly. The disease evolves towards fibrosis, ossification and ankylosis of dorsal column. (Cretu, 2003).

A study showed an incidence of 7.3 to 100.000 people per year. This number is comparable with that of a Finnish study which revealed a stable incidence of 8.7 to 100.000 people aged 16 or older. (Braun, 2011).

Ankylosing spondylitis (AS) diagnostic is based on clinical characteristics. It can be "primary" or "idiopathic", if it is not associated

with any other disease, and it is "secondary", if the disease is associated with psoriasis or chronic inflammatory intestinal diseases. (Şuteanu, 2003).

The pain is initially felt in the gluteal area, has a diffuse feature, is difficult to locate, its onset being insidious, but it can also be severe in this early stage; it is located at the level of sacroiliac joints, but it goes toward: iliac crest, greater trochanter area and then it goes down on the posterior side of the hip. (Paszta, 1997).

Breathing is a vital function of living organisms through which their exchange of oxygen and carbon dioxide with the environment is fulfilled, thus ensuring gas homeostasis involved in cellular metabolism. (Bota, 2000).

Breathing means all physical and chemical

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processes that provide gas exchange between the organism and environment. There is an external or pulmonary breathing and internal or tissue breathing that represent the final stage of respiratory exchanges. (Ocheana, 2008).

The lung is the organ specialized for breathing. Thanks to its large contact area, a rich vascularity and a specially adapted alveolar wall it provides this respiratory function, which is realized at the lung and cellular level. The blood is carrying continuously the oxygen from the lungs to the tissues and carbon dioxide from the tissues to the lungs. (Albu, 1984).

The main objective of spondylitis therapy is to maintain the mobility of non-affected segments and its improvement, when it is diminished due to inflammatory-ossification processes. This objective is fulfilled firstly by movement. In order to have the desired results, KINESIOTHERAPY must be instituted early, individualized, adjusted to the clinical form and evolutionary stage of each patient and continuous. (Sbenghe, 1999).

#### Research methods:

- Analysis of literature
- Observation
- Survey
- Experiment
- Graphic representation

#### Hypothesis

If the most efficient recovery means specific to ankylosing spondylitis are selected and applied, the improvement of respiratory parameters and patients' health status can be influenced.

Presentation of the group studied

This study was carried out during the period of January 2014 – March 2015, and we chose 16 patients from Dragasani City Hospital, Rheumatology Department as study population, patients diagnosed with ankylosing spondylitis both clinically and after the results of functional tests and of the aforementioned paraclinic and laboratory examinations.

The study population consisted of both males and females, with ages between 26 and 54, with stages 2, 3 and 4 of this pathology which affected the respiratory system and presented exertional dyspnea, and various occupations. Also, an important epidemiologic criterion was the environment from which the patients came.

It was intervened with KINESIOTHERAPY recovery methods after

performing respiratory and spirometry tests. Their results were compared before and after the recovery treatment.

KINESIOTHERAPY treatment was carried out over a period of 3 months for each patient, performing the testing of the established parameters both before and after starting the treatment, and upon its completion, as I wanted to prove the importance of KINESIOTHERAPY for the recovery of respiratory system function in patients with ankylosing spondylitis.

#### Results of the research

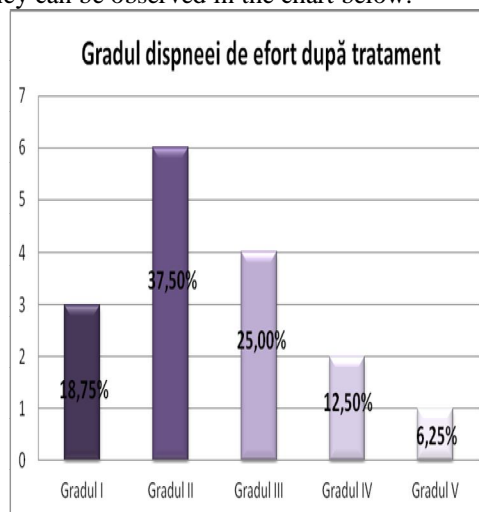
For this study, I established a series of parameters that were assessed both before and after 6 months of treatment, a treatment which was developed over a period of 3 months, and during the last 3 months the patient had to comply with the indications and recommendations of the attending rheumatologist and of the specialist in recovery medicine, carrying out correctly the exercise programs and gradual resumption of activities, to the extent of the possibilities.

The parameters assessed for the group of patients were the following:

- Exertional dyspnea;
- Thoracic pain during inhalation and exhalation;
- Hypotonia and hypotrophy of thoracic muscles;
- Respiratory tests;
- Spirometry tests.

1. Assessment of exertional dyspnea 6 months after the recovery treatment

I noticed greatly improved values compared to the initial values at 6 months after the treatment. They can be observed in the chart below:



Thus, patients with 1<sup>st</sup> degree exertional dyspnea were found in 18.75% of the patients, compared to the initial value of 6.25%, and an increase in the number of patients with slight exertional dyspnea after kinesitherapy treatment was observed. 2<sup>nd</sup> Degree dyspnea was found in the largest number of patients after treatment, also a percentage of 37.50% compared to the initial one of 12.50%. An increase in the number of patients with very slight and slight exertional dyspnea was observed, compared to the previous examination and with the patients with moderate, severe or very severe exertional dyspnea.

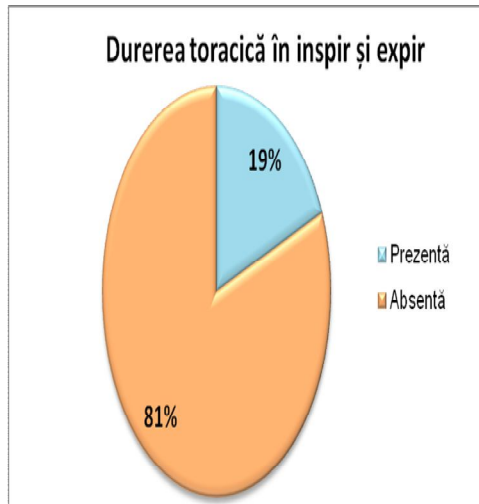
Moderate of 3<sup>rd</sup> degree dyspnea was found from the clinical point of view in a percentage of 25.00% of the patients, compared to the previous percentage of 12.50%, and a significant increase in the number of patients was observed compared to the initial number and the number of patients with increased severity dyspnea after the treatment was completed.

4<sup>th</sup> Degree exertional dyspnea, although severe dyspnea, was observed based on the clinical criteria and respiratory system examination in a percentage of 12.50%, much lower compared to the initial percentage of 37.50%, thus existing a very significant increase from the mathematic point of view. The last severity stage of exertional dyspnea, namely the 5<sup>th</sup> Degree or very severe was observed in only one case, also a percentage of 6.25% compared to the initial value of 31.25%, thus existing a significant improvement of the patients' condition, highlighted by the massive decrease of the percentage of patients out of the total who presented severe or very severe dyspnea, and by the increase in the number of patients with very slight, slight or moderate dyspnea.

The conclusion that can be drawn from these statements proved by the inserted graphs is that the KINESIOTHERAPY treatment is extremely important in the recovery of respiratory system function in patients with ankylosing spondylitis.

## 2. Thoracic pain during inhalation and exhalation 6 months after the treatment

I noticed significant improvements from the clinical point of view relating to the thoracic pain of the group of patients, to inspiratory and expiratory movements of thoracic cavity. The percentages obtained at the second examination can be observed in the chart:

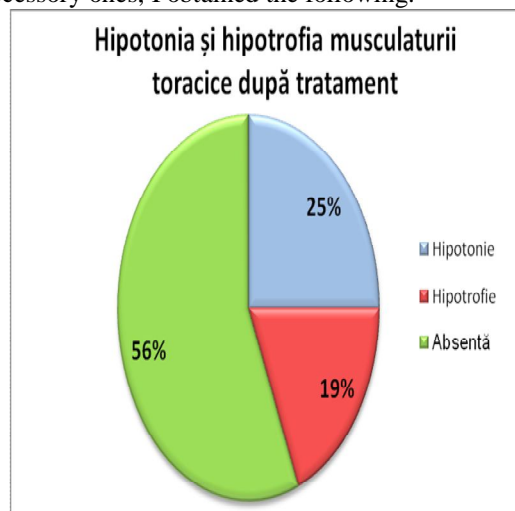


As it can be observed, the thoracic pain continued to a number of 3 patients representing a percentage of 19% out of the total, compared to the initial value of 69%. This parameter was absent in 13 subjects, although it is a much higher percentage compared to the initial one of 31%, namely 81%. Thus, improvements after the completion of treatment can be observed.

## 3. Hypotonia and hypotrophy of thoracic muscles after treatment

I considered necessary to reexamine this parameter, together with the mentioned ones, 6 months after the treatment.

Within the reexamination of the characteristics of thoracic cavity muscles, involving also the main respiratory muscles, and also the accessory ones, I obtained the following:



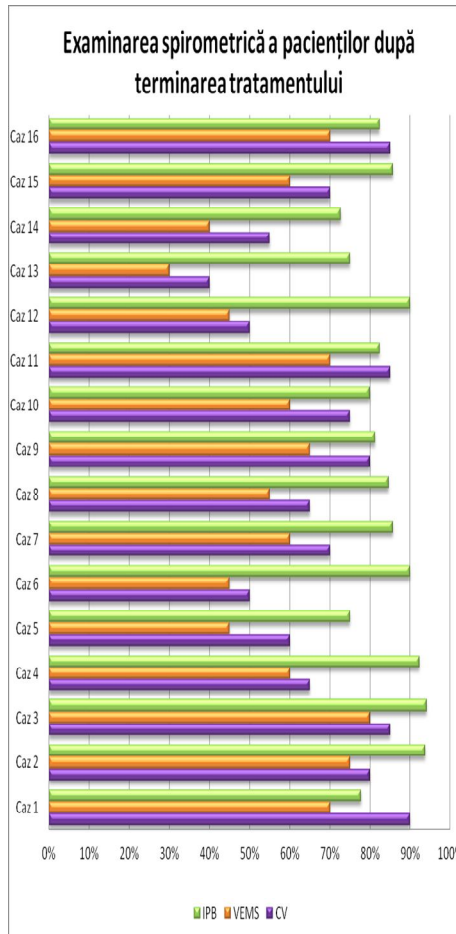
The signs of hypotonia of the muscles with respiratory function continued in 4 out of 16 cases, although a percentage of 25% out of the total

compared to the initially calculated percentage of 56%. Muscle hypotrophy, a parameter which is harder to correct, continued in a number of 3 patients, although 19%, much lower compared to the initially observed percentage of 31%. The parameter was absent in a percentage of 56% of the patients, a value significantly improved compared to the percentage of 13% found before starting the recovery treatment.

#### 4. Spirometry tests 6 months after the treatment

6 months after the treatment I carried out a new spirometry examination, registering the values obtained from all the 16 subjects in the table inserted below and in the adjacent chart:

	<i>CV</i>	<i>VEMS</i>	<i>IPB</i>
<i>Case 1</i>	90%	70%	77.78%
<i>Case 2</i>	80%	75%	93.75%
<i>Case 3</i>	85%	80%	94.12%
<i>Case 4</i>	65%	60%	92.31%
<i>Case 5</i>	60%	45%	75.00%
<i>Case 6</i>	50%	45%	90.00%
<i>Case 7</i>	70%	60%	85.71%
<i>Case 8</i>	65%	55%	84.62%
<i>Case 9</i>	80%	65%	81.25%
<i>Case 10</i>	75%	60%	80.00%
<i>Case 11</i>	85%	70%	82.35%
<i>Case 12</i>	50%	45%	90.00%
<i>Case 13</i>	40%	30%	75.00%
<i>Case 14</i>	55%	40%	72.73%
<i>Case 15</i>	70%	60%	85.71%
<i>Case 16</i>	85%	70%	82.35%



#### 5. Respiratory tests

6 months after the treatment, I noticed values of the *vital capacity* comprised between 40-90%, compared to the initial values of 30-75%, and 4 of them, although a percentage of 25%, did not present symptoms of exertional dyspnea and had values of the *vital capacity* comprised between 85-90%. It is necessary to mention that before starting the treatment no patient presented normal values of the *vital capacity*, according to previous graphic demonstrations.

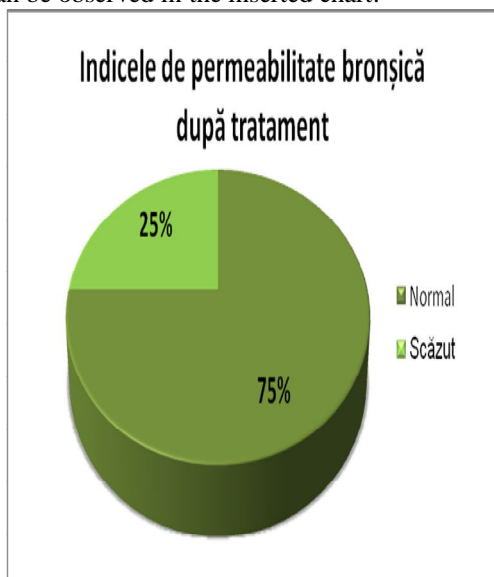
Slight dyspnea was observed in 7 of the 16 cases, which represents a percentage of 43.75%, compared to the initial percentage of 31%, observed before treatment. Moderate dyspnea was found in a number of 4 of the 16 cases studied, representing a percentage of 25%; compared to moderate dyspnea before starting the treatment which was present in 31.25% out of the total subjects, this is a significantly lower percentage, because of the increase of the number of patients with slight stages of exertional dyspnea. In only one case I found signs of severe dyspnea during the final assessment, with a VC of

40%, representing a percentage of 6.25%; compared to the initial results of spirometry examinations, where the severe dysfunction was observed in a percentage of 25% of the patients, the incidence of this parameter is much lower. Upon the completion of the treatment, I did not notice signs of very severe dyspnea, compared to initial examinations, where a number of 2 out of 16 patients were found in this category.

The Maximum Expiratory Volume per Second (MEVS) presented also extremely significant modifications. A slight restriction was observed in 6 of the 16 patients, although in a percentage of 37.5%, much higher compared to the initial value of 6.25%. A moderate restrictive syndrome was observed based on this parameter in a number of 5 patients, although 31.25% out of the total, a percentage equal to the one of the initial examination. Severe symptoms were observed, based on MEVS examination, in a percentage of 31.25%, although a number of 5 patients, a much lower percentage compared to the one initially obtained of 56.25%.

Vital capacity and maximum expiratory volume per second increased significantly from the clinical point of view after the treatment for recovering respiratory function of patients with ankylosing spondylitis, as demonstrated by the charts inserted and compared.

Bronchial permeability index also had modifications from the clinical and mathematic point of view, but not as sweeping as in the case of previous parameters. Therefore, normal values were observed in a large number of patients, as it can be observed in the inserted chart:



A normal BPI index was observed in 12 patients, although a percentage of 75% out of the total. A slightly lower index was presented in a number of 4 patients, although a value of 25%, as it can be observed in the previous table.

### Discussions

Rusu 2014 in his PhD thesis titled – Possibilities and limits for preventing restrictive ventilation dysfunction in ankylosing spondylitis through the contribution of KINESIOTHERAPY makes reference to the importance of KINESIOTHERAPY in recovering breathing through KINESIOTHERAPY in people with ankylosing spondylitis. To assess the respiratory function he used DIE Index (difference between inhalation and exhalation) or thoracic expansion (over 5 cm = normal thoracic elasticity), as well as the vital capacity test (VC<75% is considered a restrictive respiratory dysfunction)

Another research paper is carried out by Berea 2012 named Recovery treatment of ankylosing spondylitis, which approaches KINESIOTHERAPY in the recovery of the respiratory function in people with ankylosing spondylitis.

Depending on the pathology stages that were observed in the patients from the studied group, I found an increased incidence of the 4<sup>th</sup> stage, a medium one for the 3<sup>rd</sup> stage, the smallest one being in the slight stage of ankylosing spondylitis. During the initial assessment I noticed a very high weight of the 4<sup>th</sup> degree exertional dyspnea and a slightly lower one of the 5<sup>th</sup> degree, in the detriment of easier degrees of exertional dyspnea, and during the final assessment I noticed improvements of this parameter, observing a higher weight of the patients with 2<sup>nd</sup> degree exertional dyspnea, followed by the 3<sup>rd</sup> degree from the incidence point of view. The severe degrees of exertional dyspnea were observed in a very low number of patients compared to the initial assessment.

In relation to the respiratory parameters obtained by means of spirometry examinations, namely the vital capacity, maximum expiratory volume per second and calculation of bronchial permeability index based on them, I noticed an increase in these volumes at the final examination, compared to the initial examination, and thus a reduction of the restrictive respiratory syndrome due to the ankylosis of the thoracic cavity joints, as well as of the hypotrophy and atrophy of main and accessory respiratory muscles, with impact on the diaphragmatic movements, were found.



## Conclusions

Ankylosing spondylitis, which is a rheumatic, chronic, suspensive disease, known for a very long time, still provides numerous aspects that need specifications, especially in the chapter of pathogenesis and management of complications, co-morbidity and functional recovery.

Ankylosing spondylitis is marked by epidemiologic parameters defined in the literature: the onset age of the disease was situated around the age of 26, it belongs to both genders in a proportion of 2:1 in favor of males, both social-economic environments, urban and rural in pretty close proportions. Personal pathologic history, alcoholism and smoking are identified with an increased frequency of the ankylosing spondylitis, according to specialty studies, and they contribute greatly to the evolution of this disease, initialing forms with severe evolution in most patients and limiting the therapeutic response.

Although the diagnostic totals up characteristic elements, it is usually established late when patients are in more advanced stages of the pathology, and the symptoms appear years before the diagnostic. Ankylosing spondylitis is extremely rarely diagnosed in early forms.

Beside the early diagnostic, which enables an efficient therapeutic approach of the respiratory system in particular, a correct monitoring is necessary, set out by parameters strictly defined in the present, relating to the pain at thoracic level, modifications of thoracic muscles, as well as respiratory and spirometry tests, along with routine laboratory analyses.

The fundamental objective of the therapy for ankylosing spondylitis was to maintain the mobility of unaffected segments and to improve the function of the affected segments. In the respiratory system, it is necessary to target spirometry parameters and the pain during inhalation and exhalation or the reduced mobilization capacity due to muscular hypotonia or hypotrophy.

In order to recover the respiratory function exercises targeted at the level of this segment, techniques for re-learning all respiratory types and massage techniques to relax thoracic muscles in order to increase their functionality are needed.

It can be stated that the general condition, and implicitly the respiratory function of the patients selected for this study improved

significantly after applying the specialty treatment, a condition reflected mainly by the examination of exertional dyspnea, and by the result of spirometry tests.

In conclusion, we can state that kinesiotherapy means are essential for the increase of respiratory parameters and the decrease of exertional dyspnea in patients with ankylosing spondylitis with response on the respiratory system.

## Acknowledgments

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## References

- Albu C, Rascarache I, 1984, *Știți să respirați corect*, Editura Sport- Turism, București, pag.21;
- Braun J, Baraliakos X, Boehm H, 2011, First update of the ASAS/EULAR recommendations for the management of ankylosing spondylitis;
- Bota C, 2000, *Fiziologie*, Editura Globus, Bucuresti, pag. 69;
- Crețu A, 2003, *Ghid clinic și terapeutic fizical-kinetic în bolile reumatice*. Editura Bren, București, pag. 122;
- Ochiana G, 2008, *Kinetoterapia în afecțiunile respiratorii*, Editura Pim, pag.7;
- Pasztai Z, et al. 1997, *Locul și importanța tratamentului kinetic în recuperarea complexă a pacienților cu spondilită anchilozantă*, în *Revista Română de Kinetoterapie*, Oradea;
- Sbenghe T, 1999, *Bazele teoretice și practice ale kinetoterapiei*, Editura Medicală, București, pag .87;
- Șteanu S, Ionescu V, Moanja M, 2003, *Clinica și tratamentul bolilor reumatice*, Editura Medicală, București.