

## THE EFFECTIVENESS OF POSTURAL BIOFEEDBACK IN THE PHYSICAL THERAPY OF PATIENTS WITH CERVICAL SPONDYLOSIS

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**ABSTRACT. Background.** The influence of biofeedback treatment with the help of the Global Postural System GPS 600 device combined with a physiotherapy program for the cervical spine proved to be beneficial. The presence of headaches and the sensitivity of the cervical spine given by arthrosis, require that the movements at this level must be done very carefully. **Aim.** The aim of this study is to prove the importance and benefits of biofeedback treatment using the Global Postural System GPS 600 combined with a physical therapy program in degenerative diseases of the cervical spine for adults involved in work activities that require maintaining a sitting position at the office **Subjects.** This study included 30 patients with the age between 28 to 59 years old, the mean age was 38 years. **Methods.** The methods used for evaluation were joint and muscle balance as well as the visual analogue scale of pain, and the evaluation data provided by the GPS 600 system. **Results.** At the end of the 14 days of biofeedback treatment and physical therapy program, all patients had a relief of symptoms and the alignment of the spine was significantly corrected. **Conclusion.** Biofeedback treatment using the Global Postural System GPS 600 combined with physical therapy is important in the recovery of degenerative diseases of the cervical spine both for the effect on the joints and for the general effect of postural balance.

**Keywords:** *physiotherapy, cervical pain, work posture, biofeedback.*

**REZUMAT. Eficiența biofeedback-ului postural în kinetoterapia pacienților cu spondiloză cervicală. Introducere.** Influența tratamentului biofeedback cu ajutorul dispozitivului Global Postural System GPS 600 combinată cu un program de kinetoterapie pentru coloana cervicală s-a dovedit a fi benefică. Prezența cefaleei și sensibilitatea coloanei cervicale datorate spondilartrozei necesită

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acordarea unei atenții deosebite mișcărilor de la acest nivel. **Scop.** Scopul acestui studiu este de a dovedi importanța și beneficiile tratamentului biofeedback folosind sistemul postural global GPS 600 combinat cu un program de kinetoterapie în bolile degenerative ale coloanei cervicale pentru adulții implicați în activități de lucru ce necesită menținerea unei poziții așezate la birou. **Subiecți.** Acest studiu a inclus 30 de pacienți cu vârsta cuprinsă între 28 și 59 de ani, vârsta medie fiind de 38 de ani. **Metode.** Metodele utilizate pentru evaluare au fost bilanțul articular și testul muscular, scala vizuală analogă a durerii și datele de evaluare furnizate de sistemul GPS 600. **Rezultate.** La sfârșitul celor 14 zile de tratament biofeedback și a unui program de kinetoterapie, toți pacienții au avut o reducere a simptomelor, iar alinierea coloanei vertebrale a fost îmbunătățită semnificativ. **Concluzii.** Tratamentul biofeedback cu ajutorul sistemului postural global GPS 600 combinat cu kinetoterapia este important în recuperarea pacienților cu boli degenerative ale coloanei cervicale atât în privința efectului asupra articulațiilor, cât și pentru efectul asupra echilibrului postural.

***Cuvinte cheie:** fizioterapie, durere cervicală, postură de lucru, biofeedback.*

## Background

The cervical spine is made up of specific anatomical elements through which it fulfils its role in the articular economy of the musculoskeletal system, ensuring both mobility and stability of the cephalic extremity. The attrition of this area, whose structure and resistance decrease under the evolution of the degenerative and inflammatory process leads to the suffering of the joints with special clinical manifestations, due to the very important anatomical vasculo-nervous formations with which it borders. The influence of biofeedback treatment with the Global Postural System GPS 600 and a special physiotherapy program on the cervical spine is much greater than it seems at first glance.

The presence of headaches and the sensitivity of the cervical spine given by cervicarthrosis, require that the movements at this level must be done very carefully. Biofeedback treatment with the help of the Global Postural System GPS 600 and a physical therapy program it has been shown to be superior to classical medicine drugs due to the improvement of function and quality of life (Holøyen PK & Stensdotter AK 2018, Chelaru HE & Buldus CF 2019).

Cervicarthrosis is a degenerative disease of the cervical spine who damage the joint structures: cartilage, periarticular *structures*, and neighbouring bone. The causes of cervicarthrosis *are* mechanical stress, metabolic disorders, vascular changes, ligament hyperlaxity, static disorders, congenital malformations (Held JP, Diziën O. 1998).

In the USA, cervicarthrosis is common, being estimated at 2% of those who are hospitalized. It is the most common cause of spinal cord dysfunction in patients older than 55 years. Based on radiological investigations, 90% of men over 50 years of age and 90% of women over 60 years of age have degenerative changes in the cervical spine. Internationally, the evaluators reported a study of 225 patients with headaches, 143 (64%) had cervical osteoarthritis (cervical spondylosis) and 80 people without headaches 29 (36%) had the same condition (Liang H, et al. 2020).

The development of cervicarthrosis is a long-lasting process. Patients may either remain asymptomatic or have mild neck pain. Long periods of disability are typical and there are cases in which the patient's condition progressively deteriorates (Rodríguez-López ES, et al. 2019).

### **Research framing**

To highlight the benefits of biofeedback treatment using the Global Postural System GPS 600 and the need for physical therapy on patients who maintain a sitting position at the office for 5-6 hours a day, we chose 30 patients with cervical osteoarthritis, employed in various specializations that involves working in the office and maintaining a sitting position between 6-8 hours a day. We studied patients between the ages of 28 to 59, the average age was 46 years.

The subjects investigated in this study developed changes in posture caused by working in a sitting position between 6-8 hours.

Distribution of the patients by the place of their origin: we studied 30 patients, of which 20 patients came from urban areas and 10 patients from rural areas.

Distribution of patients by the number of their work: we studied 30 patients, of which 12 patients had work 6 hours / day in a sitting position and 18 patients had work 8 hours / day in a sitting position.

### **Hypothesis**

The biofeedback treatment with the Global Postural System GPS 600 combined with a special spine physiotherapy program improves the function of the spine if it is applied individually based on clinical and functional diagnosis. The aim of this study is to demonstrate the importance of biofeedback treatment with the help of the Global Postural System GPS 600 and the physiotherapy program in the recovery of cervical spine diseases in patients who have a job that involves a long stay at the office. The differences that appear at the functional diagnosis will be observed.

## **Aim**

The aim of this study is to prove the importance and benefits of biofeedback treatment using the Global Postural System GPS 600 combined with a physical therapy program in degenerative diseases of the cervical spine for adults involved in work activities that require maintaining a sitting position at the office Materials

The study took place within the HC Kinetic Med Recovery Centre in Cluj Napoca, which is equipped with 2 physiotherapy rooms, 3 massage rooms, 1 diagnostic and treatment room with GPS 600 device.

## **Methods**

As methods of evaluating the patients, we used posture assessment and spine alignment, joint and muscle balance and analogue visual pain scale and evaluation with the GPS 600 device. We applied all these methods both at the beginning of the treatment and at the end of the physiotherapy sessions.

Other methods used were bibliographic study, observation method, anamnesis, statistical analysis, and graphical representation.

The method used for the applied postural re-education was the one through biofeedback on the GPS 600 device combined with a physiotherapy program.

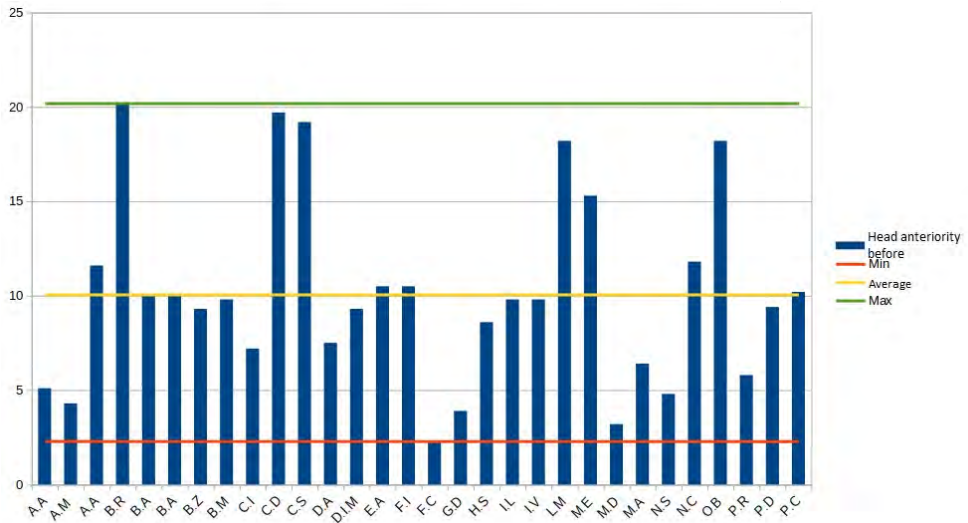
The treatments for re-educating the posture with the GPS 600 device were carried out as follows: the subjects came to treatment 5 days / week for 2 weeks.

During the treatment, the patients had to maintain their body position / posture as indicated by the device that the posture should be balanced. During each treatment, the correct posture was maintained 10 times for 20 seconds.

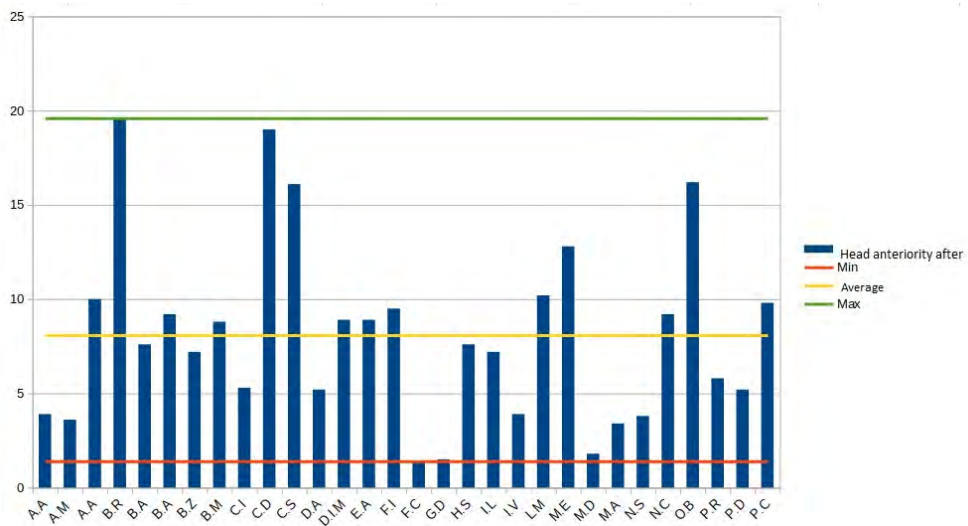
The individualized kinetotherapy treatments consisted in performing 15 exercises of 7 series of 10 repetitions, 2 weeks 5 days / week.

## **Results**

The data from the GPS 600 posturograph regarding head anteriority before and after the intervention are showed in figures 1 and 2.

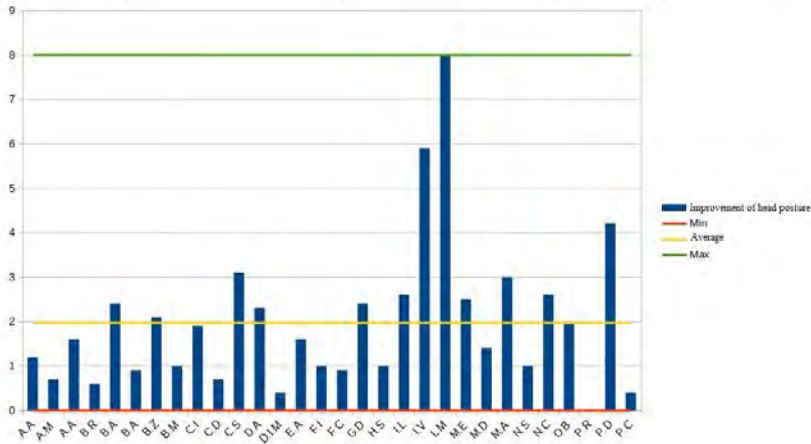


**Figure 1.** Head anteriority before the intervention (cm)



**Figure 2.** Head anteriority after the intervention (cm)

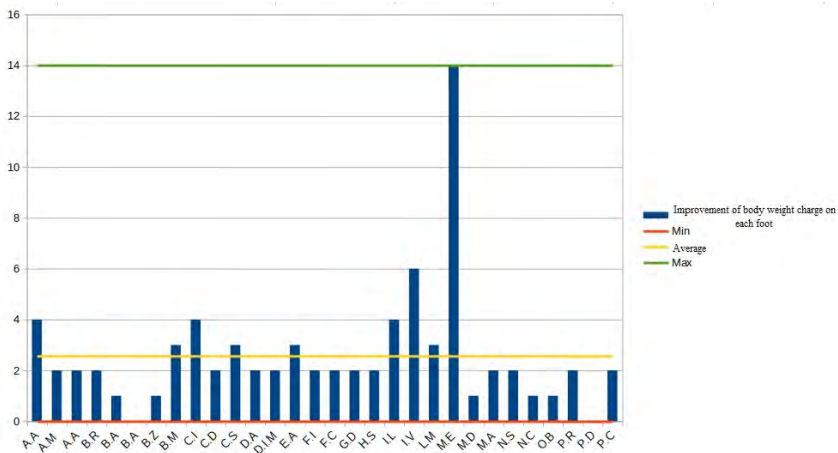
The improvement of head posture analysis is shown in figure nr.3



**Figure 3.** The improvement of head posture analysis

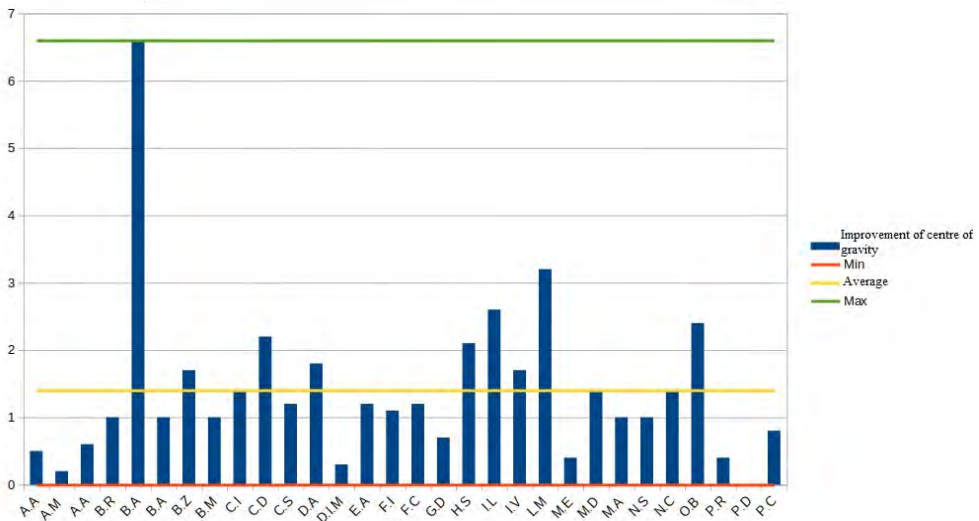
The anteriority of the head changed as follows: at 12 people the anteriority of the head was corrected between 0.0-1.0 cm; at 6 people the anteriority of the head was corrected between 1.1-2.0 cm; at 8 people the anteriority of the head was corrected between 2.1-3.0 cm; at 4 people the anteriority of the head was corrected between 3.1-8.0 cm.

The comparison analysis of data from the GPS 600 posturograph regarding weight charge on each foot before and after the intervention is shown in figure 4.



**Figure 4.** The improvement of body weight charge on each foot

The improvement of centre of gravity oscillations analysis is shown in figure nr.5



**Figure 5.** The improvement of centre of gravity oscillations

At the end of the 14 days of treatment, the group of 30 patients have significantly corrected the alignment of the spine and the postural balance.

The post-treatment joint assessment showed that the degree of mobility improved in all patients. On average, the increase in mobility in all patients was 1.5 cm. The patients with cervical osteoarthritis had an increase in mobility between 1 and 2.

Muscle testing performed before and after treatment shows that all patients reached higher values of muscle strength by 1 unit.

The pain decreased significantly in all patients by 2-4 degrees proving the effectiveness of the physiotherapeutic treatment combined with the biofeedback treatment with the Global Postural System GPS 600.

All these differences from joint balance, muscle testing and pain assessment, reduction of head anteriority show the effectiveness of the individualized applied treatment.

## Conclusion

The postural deficits identified with the Global Postural System GPS 600 device produced over time musculoskeletal injuries associated with the office work posture in a prolonged position.

Physical therapy is important in recovering the damage of the cervical spine through the effect on the joints as well as through general effect.

Physical therapy applied individually according to the pathology of the patients, helped to alleviate the symptoms caused by cervicarthrosis.

The biofeedback treatment with the Global Postural System GPS 600 changed the memory of the muscles, leading the muscle fibres to maintain the newly learned position.

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