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The efficiency of rehabilitation programs for computer workers with neck and shoulder musculoskeletal complaints

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Abstract. The purpose was to examine the efficiency of two interventions for neck-shoulder complaints to computer workers: a short-term physical therapeutic program and a home exercises program. *Material and method*. We performed a 6-month interventional therapeutic study on 164 computer workers with musculoskeletal neck-shoulder complaints who were divided in two groups. In the first phase (2 weeks) group I (92 subjects) followed a physical therapy intervention (electrotherapy and massage) and group II (72 subjects) followed the same physical therapy intervention and an exercise program. In the second phase (6 month) group I was the control group without therapeutic intervention and group II continued the home exercises program aimed to increase force and endurance for neck muscles. We monitored the evolution of pain scores Visual Analogue Scale (VAS), Neck Disability Index (NDI) and pressure pain threshold (PPT) measured by algometry. *Results*. After 10 sessions of physicall therapy all parameters were significantly better for both groups. Group II had a better evolution on functional score NDI. After 6 month all parameters (VAS, NDI, PPT) were significantly better for group II who performed a home exercises program. For the control group, the evolution was also good for VAS and NDI, but non significant for PPT. *Conclusions*. Analgesic electrotherapy and massage improves the symptoms for short and medium term, but strength and endurance exercises for neck muscles improves also physical functions
Key Words: *computer, neck, shoulder, exercises program*.

Introduction

Computer usage extends from informatics in all life domains both occupational and recreational. Statistics showed that more than half of European population uses computers to work (1) and this phenomenon increases continuously. Additionally the time spent in front of the computer and the use of tabulating devices rapidly increased in the last years.

This augmentation brings us to an increase of musculoskeletal complaints to computer users both professional and domestic (2). Musculoskeletal disorders to computer workers are included under the umbrella of repetitive strain injury localized mainly to neck-shoulder region (3). Most common diagnostic entities are tension neck syndrome or trapezius myalgia and cervical radicular syndrome.

Musculoskeletal complaints to computer workers are non-specifics and they have a low and medium intensity. The natural course of these disorders can be spontaneous recovery but there are cases with evolution to chronicisation and progressive dysfunction.

Medical addressability is low because of low intensity of the symptoms, self- medication tendency with temporary alleviation of complaints, but there are some time barriers for adherence to treatment, especially to physical treatment. We must emphasize work conditions for computer users: daily work time over 8 hours, time pressure for professional and domestic tasks. It is important to elaborate therapy programs following occupational patients profile, not time consuming, easy to include in daily schedule, especially for prophylactic long term management.

The purpose of this study was to examine the efficiency of two interventions for neck-shoulder complaints to computer workers: a complex physical short-term therapeutic program and a home exercises medium-term program.

Material and methods

We performed a 6-month interventional therapeutic study on computer workers with musculoskeletal neck and shoulder complaints

who followed rehabilitation program.
The participants were recruited from patients of Rehabilitation Ambulatories from Timisoara.
The inclusion criteria were: consent of the patient, neck and shoulder musculoskeletal complaints related to computer work, (musculoskeletal complaints in the neck and shoulder region for more than 3 month (chronic pain) during the past year but no more than in 3 bodily regions in order to exclude generalized musculoskeletal diseases, computer work more than 4 hours/day, 5 days/week, no previous medical interventions for musculoskeletal complaints.
The exclusion criteria were: musculoskeletal neck and shoulder complaints do to generalized chronic arthritis, musculoskeletal neck and shoulder complaints secondary to trauma or neurological diseases, chronic use of medication for generalized diseases, pregnant women.
The general data collection was conducted with a self-reported questionnaire elaborated on the base of questionnaires internationally confirmed: Nordic Musculoskeletal Questionnaire (NMQ) (4), Dutch Musculoskeletal Questionnaire (DMQ) (5).
All participants passed a complete medical examination.
After the selection, 222 subjects started the study. All subjects were informed about the purpose and course of the study and they signed written informed consent to participate in compliance with The Declaration of Helsinki.
We divided the participants in two groups: group I – 110 subjects and group II – 112 subjects.
During the study, 68 subjects withdrawn (18 subjects of group I and 40 subjects of group II). They were not included in the analysis. At the end, the number of effective participants was 164: 92 subjects for group I and 72 subjects for group II.
Study protocol. The trial was divided in two phases.
In the first phase (2 weeks) group I (92 subjects) followed a physical therapy intervention for symptoms alleviating - interferential current, ultrasound, analgesic TENS applications, classical massage – and group II (72 subjects) followed the same physical therapy intervention plus an exercise program.
In the second phase (6-month) group I was considered the control group, without therapeutic intervention and group II continued the exercises program at home, for 6 month.
All the subjects followed three evaluations (T1, T2, T3). T1: Initial evaluation consisting in a clinical examination, self-reported questionnaire about computer work and musculoskeletal complaints and an assessment of neck pain with VAS (Visual Analogue Scale), NDI (Neck Disability Index questionnaire), pressure pain threshold (PPT) for most sensitive point of two (right and left) measured on the middle side of superior trapezius with a digital pressure algometer; T2: 2 week after, an evaluation with VAS of pain, NDI and PPT in the same superior trapezius middle as T1; T3: 6 month after, an evaluation with VAS of pain, NDI and PPT in the same superior trapezius middle as T1 and T2
Therapeutically interventions. For both groups the first phase intervention for symptoms alleviating consists in: interferential current bipolar applications and analgesic TENS applications on superior trapezius muscles, ultrasound applications on the same region, classical massage for neck and shoulder region. In addition group two followed an exercises program therapy.
This intervention lasted 10 sessions in conformity with National Insurance Recommendation.
All the subjects followed the therapeutic program in first phase under physiotherapist supervision.
Exercises program. The aim of the exercise program was to target the painful neck muscles with simple and inexpensive training equipment. For 6-month term the exercises program aims to increase force and endurance for neck region muscles, mainly trapezius muscle.
The training session lasted 30 minutes and respected the progressivity principle for intensity. In the second phase, group II continued the exercise program at home for 6 months. Training recommendation was: at least 3 sessions per week.
The program design was: 5-minute warming up (on place running and jumping with arms mobilizations) and 20 minute specific neck exercises (mobilizations of neck and arms, progressive resistance exercises for trapezius muscle with dumbbells).
To avoid handgrip stress and back pain the dumbbells was 1-2.5 kg weight. Repetition number for each exercise was 10 to 20 repetitions in two series.
At the end of session: 5-minute cool down (on place running and jumping with arms mobilizations) (Fig. 1).

Figure 1. Exercises program for neck-shoulders complaints

Results

During the study, 68 subjects withdrawn (18 subjects of group I and 40 subjects of group II) and we didn't include them in the analysis. At the baseline, demographical parameters of two groups were similar (Table I). We observed a predominance of women for both group – 82.6% in group I and 77.8% in group II. The clinical diagnosis were: tension neck syndrome (52.2% in group I, 50% in group II), cervical radicular syndrome (32.6% in group I, 27.8% in group II), non-specific neck and shoulders complaints (15.2% in group I, 22.2% in group II).

After 10 sessions therapeutical programs (T2) all parameters (VAS, NDI, PPT) were significantly better for both groups (p<0.001, Table II).
There were no significantly statistic differences between groups after physical therapy for pain parameters (VAS, PPT) (Table II). The functional index NDI was significantly statistic better (p=0.02) for group II with therapeutical exercises.
After 6 month (T3) all parameters (VAS, NDI, PPT) were significantly better for group II who performed home exercises program (Table II).
For control group I the evolution was good and significantly statistic for VAS and NDI parameters, but non statistic significant for PPT (Table III).
The changes in value were significantly higher for VAS and NDI parameters for group II who performed home exercises program (Table III). The changes in value were non significantly for PPT between two groups (Table III).

Table I. Demographical parameters at the baseline

Parameters	**Group I**	**Group II**
Men, n (%)	16 (17.4)	16 (22.2)
Women, n (%)	76 (82.6)	56 (77.8)
Age (years), mean±SD	38.78 ±6.35	36.94±6.31
BMI, mean±SD	25.81±2.72	25.66±2.43
Computer daily work (hours) mean±SD	6.91±1.76	6.77±1.89

n-number of subjects, SD-standard deviation, BMI-Body Mass Index

Table II. Evolution of the clinical parameters after 10 sessions program (T2-T1)

Variable		**T1**	**T2**	**p***
VAS, mean±SD	Group I	5.82±0.97	3.1±1.09	<0.001
	Group II	5.69±1.19	2.6±1.16	<0.001
	p**	NS	NS	
NDI, mean±SD	Group I	29.05±6.78	18.59±5.62	<0.001
	Group II	29.68±5.07	15.47±6.85	<0.001
	p**	NS	0.02	
PPT, kPa/cm^2 mean±SD	Group I	203.42±42.94	313.78±57.26	<0.001
	Group II	215.16±44.82	309.29±61.52	<0.001
	p**	NS	NS	

p* - in-group p value, p** - between-groups p value, NS-non-significant,
p<0.05 – significant, p<0.001 – extremely significant

Table III. Evolution of the clinical parameters after 6 month (T3-T2)

Variable		**T2**	**T3**	**p***
VAS, mean±SD	Group I	3.1±1.09	2.43±1.43	0.01
	Group II	2.6±1.16	0.97±0.59	<0.001
	p**	NS	<0.001	
NDI, mean±SD	Group I	18.59±5.62	14.9±6.84	0.006
	Group II	15.47±6.85	8.55±5.64	<0.001
	p**	0.02	<0.001	
PPT, kPa/cm^2 mean±SD	Group I	313.78±57.26	323.4±62.5	NS
	Group II	309.29±61.52	346.44±65.91	0.01
	p**	NS	NS	

p* - in-group p value, p** - between-groups p value, NS-non-significant,
p<0.05 – significant, p<0.001 – extremely significant

Discussion and conclusions

The subjects of these study are computer workers, 26-52 years aged with neck-shoulder complaints. The majority of patients with work-related neck and arm complaints were women, observations are similar to other studies (6,7). The most frequent diagnosis was tension neck syndrome or trapezius myalgia.

The high frequence of this diagnosis to computer workers can be explained to the great degree of postural solicilation of cervical muscles during computer activity (8).

All subjects showed a good evolution after 10 seances of physicall or physicall kinetic therapy. The pain amelioration, assesed with VAS and algometry, was good for both group and shows the analgetic effect of complex physical therapy program. The imediat effect of some physicall therapy modalities like TENS or interferential current was indicated in Hou and all study in 2002 (9). In addition, the exercises program for group II improved significantly functional status assesed by NDI.

After 6 month the group with home exercises program had better results for pain and functional parameters. These results are similar with different other studies and show that strengh and endurance training for cervical muscles induces analgesia and improves the functional status (10-13).

The exercise program was adapted for home environment (dumbelles are simple/low-cost equipement) and the program duration, 30 minutes daily, can easily be included in any daily schedule. Adherence rate for the exercises programm was 63.4%– 72 subjects performed all program (out of 112 subjects from the start).

Pain and functionality amelioration for the control group can be explained by a better atention to ergonomy rules (discussed with the patients at the first visit) and by the effect of the physical therapy in the medium term. Limitations of this study are given by the follow-up period – 6 month, which represents a medium term follow-up. We intend an extension of the home exercise training period to 12 month with a new assesement.

In conclusion, computer workers with neck and arm disorders can beneficiate of a complex physical therapy program. Analgesic electrotherapy and massage improve the symptoms for short and medium term, but strength and endurance exercises for neck muscles also improves physical functionality. We recommend strength and endurance exercises for neck muscles as a good home exercises program, able to influence the course of computer work-related musculoskeletal complaints.

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