ORIGINAL ARTICLE

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Physical therapy vs. medical treatment of musculoskeletal disorders in dentistry – a randomised prospective study

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Abstract

Introduction and objective. Musculoskeletal disorders are frequently met in dentistry.

Objectives. To show the efficiency of rehabilitation and to make correlations among patients' pain levels, their overall health status, and the number of days of work absenteeism.

Materials and method. A total of 390 dentists diagnosed with low back pain, scapulohumeral periarthritis, cervicobrachial neuralgia, hand osteoarthritis, tendinitis or tenosynovitis of the upper limb, carpal tunnel syndrome, spinal deformities and fibromyalgia, were followed in a 2-year prospective study. For each ailment the patients were divided into two groups. Group 1 followed both medical and rehabilitation treatment, while group 2 followed medical treatment. The patients were assessed by the visual analogue scale (VAS), the Health Assessment Questionnaire adapted for Dentists (HAQD) and the number of days of absenteeism.

Results. VAS scores did not significantly differ between the two groups at the beginning of the study but were significantly lower at final assessment. HAQD scores were significantly lower at one-year and two-year assessments in Group 1. The number of days of absenteeism did not differ significantly between the two groups at the initial assessment. Nevertheless, the number of days of absenteeism was significantly higher for Group 2 patients at the end of the study. For increased values of the visual analogue scale at the beginning and at the end of the study, the significantly increased numbers of days of absenteeism and of health assessment questionnaire scores were associated.

Conclusions: Improvements of functional parameters and increase in work productivity were recorded in dentists who followed physical therapy.

Key words

musculoskeletal diseases, dentistry, rehabilitation, assessment, absenteeism

INTRODUCTION

Due to their everyday work, dentists deal with a series of overloads that have an effect on their general health status. The term 'overload' can be defined as 'the cause of an aberrant response of the human biologic system to physical, mental and biomechanical overloads specific to certain over-dimensioned professional activities' [1]. In other words, it is a question of excessive effort of human body systems and apparatuses during the working process that exceeds their normally considered functional capacity.

Musculoskeletal disorders caused by professional activity are frequently met in dentistry [2, 3, 4, 5, 6, 7, 8] and it is estimated that every year approximately 70% of dentists have different types of musculoskeletal complaints [4]. Among these, low back pain, pain in the shoulders and at the neck level seem to be the most common sites of pain [8]. The musculoskeletal disorders met in dentistry are the results of forced and prolonged working positions that have to permit an optimal visualisation of the working field, namely the patient's mouth. This results in increased pressure on the intervertebral discs and diminished mobility, leading to secondary muscular ischaemia and to low back pain [9]. Repetitive movements of the arms and hands are also known as musculoskeletal risk factors [10, 11].

Working in dentistry supposes exposure to vibrations with multiple medical consequences that can sometimes be very serious. The danger for the body is represented by the transfer of mechanical vibrations from medical equipment to human structures. The effects of vibrations upon the human body depend upon various factors, such as intensity, frequency field, type of vibrations, direction, penetration point and total exposure time. It is supposed that the negative effect of local vibrations is between 5–100 Hz, the most noxious vibrations being those of low frequency, namely vibrations below 16 Hz. Mechanical vibrations result from different medical devices used in dentistry. The main source of vibrations is represented by low speed and high speed devices, as well as by ultrasound-based devices. The vibrations emitted by these devices are transmitted directly from the handles of the instruments to the operator's hand, thus constituting the local vibrations [12, 13].

Epidemiologic studies have shown that among dentists the symptoms involving the musculoskeletal system, and especially the upper extremities, are useful in determining the complaints characteristic for this profession. These complaints can be one or more of the following: pain of the vertebral column, knee or foot pain, paraesthesia of the fingers or upper extremities, decrease in dexterity of the, morning stiffness, pain and swollen wrists, pain in elbows or shoulders, and even acute low back pain [14, 15, 16, 17].

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It has been reported that female dentists have more musculoskeletal complaints than their male colleagues [13, 18, 19], while it seems that younger dentists have more musculoskeletal complaints than older ones. Besides that, these complaints are even greater if the dentist has an associated psychosocial stress factor [20].

OBJECTIVES

The main objective of the study was to show the efficiency of rehabilitation therapy applied in dentists diagnosed with the most frequently-met musculoskeletal disorders in this professional category. Another objective was to make certain correlations among patients' pain levels, their overall health status, and the number of days of work absenteeism due to musculoskeletal complaints.

MATERIALS AND METHOD

The study was approved by the Ethics Committee of Timisoara University of Medicine and Pharmacy in Romania. Written informed consent was obtained from all participants.

A total of 587 dentists agreed to participate in the prospective 2-year study. The dentists required a medical consultation by a rehabilitation specialist for their musculoskeletal complaints. The inclusion criteria were one of the following musculoskeletal disorders: low back pain, scapulohumeral periarthritis, cervicobrachial neuralgia, hand osteoarthritis, tendinitis or tenosynovitis of the upper limb, carpal tunnel syndrome, spinal deformities (scoliosis, kyphosis, hyperlordosis of the cervical or lumbar vertebral column) or fibromyalgia. The exclusion criteria were musculoskeletal disorders that required surgery, contraindications of non-steroidal anti-inflammatory drugs and contraindications of antalgics, pregnancy or lactation.

Dentists were recruited from the western part of Romania, from both urban and rural environments. There was a total number of 390 dentists at the end of the 2-year study. The other participants were lost to follow-up (retired, deceased, or moved to another city or country).

For each of the eight musculoskeletal disorders the patients were randomly allocated into two study groups through a computer-generated randomisation schedule performed by one of the investigators who was not involved in the recruitment or treatment of the patients.

Group 1 patients followed both a medical treatment (symptomatic: non-steroidal anti-inflammatory drugs, with or without gastric protection with proton pump inhibitors; antalgics or muscular relaxants), and a rehabilitation treatment according to international guides adapted to disease stage and activity. All Group 1 patients followed two rehabilitation programmes per year (10 sessions every 6 months), consisting of electrotherapy, massage and kinesitherapy. The rehabilitation treatment was performed in the Rehabilitation Department of Timisoara City University and Emergency Hospital. During the 2-year study, the patients completed a home- adapted rehabilitation programme. They also followed balanced professional activity, including an adequate break programme during the working period.

Group 2 patients (control group) followed only a medical treatment consisting in a symptomatic therapy (non-steroidal anti-inflammatory drugs, with or without gastric protection with proton pump inhibitors, antalgics or muscular relaxants). This treatment was required only in the acute phases of ailments. Group 2 patients did not follow a rehabilitation programme and did not adhere to an adequate working schedule adapted to their professional activity.

The patients' distribution into the two study groups according to their primary musculoskeletal disease is presented in detail in Table 1.

Table 1. Patients' distribution (incl. gender and mean age) into the two study groups, according to musculoskeletal disorder.

Musculoskeletal disorder	Group 1		Group 2	
	Female	Male	Female	Male
	Mean age (SD)		Mean age (SD)	
Low back pain	20 48.94 (10.89)	15 43.35 (10.12)	15 47.21 (11.35)	10 44.77 (10.91)
Scapulohumeral periarthritis	17 47.18 (10.08)	13 44.41 (10.25)	12 44.72 (9.8)	8 43.85 (9.44)
Cervicobrachial neuralgia	15 42.68 (9.84)	15 46.64 (9.78)	12 45.72 (9.93)	8 43.28 (9.28)
Hand osteoarthritis	16 49.13 (10.79)	14 45.38 (9.73)	12 46.54 (9.14)	8 43.48 (7.84)
Tendinitis/ tenosynovitis of upper limb	20 46.26 (10.38)	15 48.28 (10.14)	14 45.93 (10.94)	11 48.31 (9.35)
Carpal tunnel syndrome	11 45.85 (9.91)	9 43.25 (9.75)	5 43.75 (9.25)	5 42.51 (9.49)
Spinal deformities	21 46.9 (10.28)	14 44.38 (9.18)	15 46.85 (10.79)	10 46.34 (9.21)
Fibromyalgia	14 44.91 (9.12)	6 43.87 (9.37)	5 42.25 (9.55)	5 41.75 (9.25)
Total No. of patients	235		155	

SD – Standard Deviation

The patients in both groups were assessed by using the visual analogue scale (VAS), the Health Assessment Questionnaire adapted for Dentists (HAQD) (see Appendix 1) and the number of days of absenteeism due to musculoskeletal disorders. It must be mentioned that the Health Assessment Questionnaire adapted for Dentists represents the authors' personal contribution and was created taking into account the main medical and professional problems caused by musculoskeletal disorders. This questionnaire assessed the following aspects: number of months or years that a dentist has been practising his profession, amount of daily work time, presence of musculoskeletal pain in the spine or upper limb during the last month, length of time this pain persists during one working day, after how many working hours this pain appears, difficulties in handling medical instruments, necessity of using antalgic or anti-inflammatory treatment, necessity of unscheduled breaks because of the musculoskeletal complaints, necessity of consulting a rehabilitation specialist, and the number of days of work disability due to musculoskeletal disorders.

All the patients were assessed at the beginning of the study, after one year and after two years of therapy. These three assessments included the VAS and the HAQD. Additionally, at the beginning and at the end of the study, the number of days of absenteeism in the last working year (due to musculoskeletal disorders) was recorded.

Appendix 1. Health Assessment Questionnaire adapted for Dentists (HAQD)

1. How long have you been working as a dentist?

6-12 months	1-5 years	5-10 years	Over 10 years
☐	☐	☐	☐
1 point	2 points	3 points	4 points

2. How much time do you work as a dentist, on average, every day?

Less than 4 hours	4-6 hours	6-8 hours	More than 8 hours
☐	☐	☐	☐
1 point	2 points	3 points	4 points

3. Have you had any musculoskeletal pains at the trunk level (spinal pain or muscular pain) or in the upper extremity (shoulder, elbow, wrist or hand) over the past month?

Absence of pain	Mild pain	Moderate pain	Severe pain
☐	☐	☐	☐
1 point	2 points	3 points	4 points

4. How many hours have the musculoskeletal spinal or upper extremity pains lasted over the past month?

1-2 hours	2-6 hours	6-12 hours	All day long
☐	☐	☐	☐
1 point	2 points	3 points	4 points

5. After how many working hours have the musculoskeletal spinal or upper extremity pains appeared over the past month?

After more than 8 hours	Between 4-8 hours	Between 1- 4 hours	Immediately after starting professional activity
☐	☐	☐	☐
1 point	2 points	3 points	4 Points

6. Have you had any difficulties (because of the musculoskeletal complaints) in handling the medical equipment during your usual professional activities over the past month?

No difficulty	Mild difficulty	Moderate difficulty	Great difficulty
☐	☐	☐	☐
1 point	2 points	3 points	4 points

7. Have you needed any medication (antalgics, anti-inflammatory drugs) in order to relieve your musculoskeletal pains over the past month?

No medication	Occasionally (1-2 days)	3-5 days	More than 7 days
☐	☐	☐	☐
1 point	2 points	3 points	4 points

8. How many unscheduled breaks have you taken during your working programme because of musculoskeletal pains over the past month?

No breaks	Occasionally (1-2 days)	3-5 days	More than 7 days
☐	☐	☐	☐
1 point	2 points	3 points	4 points

9. Have you needed to consult a rehabilitation specialist for your musculoskeletal complaints over the past year?

No	1 consultation	2-3 consultations	More than 4 consultations
☐	☐	☐	☐
1 point	2 points	3 points	4 points

10. How many days of working disability have you recorded because of your musculoskeletal disorders over the past year?

No disability	1-7 days	7-14 days	More than 14 days
☐	☐	☐	☐
1 point	2 points	3 points	4 points

Total score (sum of all questions):

Statistical analysis of the obtained results was performed. In order to compare VAS values, HAQD scores, and the number of days of absenteeism in the same group of patients at different moments, the non-parametric Friedman test and Wilcoxon signed-rank test were used. For comparison of VAS values, HAQD scores, and the number of days of absenteeism between the two study groups, the non-parametric Mann-Whitney U test was applied. In order to make the correlations among VAS, HAQD score and the number of days of absenteeism, the Spearman's rank correlation coefficient was calculated. Data were analysed using SPSS version 16 and STATA 10, and the significance was assessed at the level of 0.05.

RESULTS

The results of the visual analogue scale in the two study groups for each of the assessed musculoskeletal disorders are presented in Table 2. When comparing VAS scores in the same study group, significant improvements at the intermediate and final evaluations were recorded.

Table 2. VAS in the two study groups at the beginning of the study, after 1 year and after 2 years of treatment.

	Group 1 **VAS** (SD)			Group 2 **VAS** (SD)		
	Initial	**Inter-mediate**	**Final**	**Initial**	**Inter-mediate**	**Final**
Low back pain (n_1–35; n_2–25)	7 (0.686)	5.09* (0.658)	3.23* (0.69)	6.84 (0.8)	6.04** (0.611)	5.6* (0.577)
Scapulohumeral periarthritis (n_1–30; n_2–20)	6.93 (0.74)	5.33* (0.844)	3.63* (1.098)	7 (0.725)	6.15* (0.587)	5.5* (0.607)
Cervicobrachial neuralgia (n_1–30; n_2–20)	6.93 (0.64)	5.31* (0.994)	3.87* (1.332)	7 (0.716)	6.45** (0.605)	5.4* (0.754)
Hand osteoarthritis (n_1–30; n_2–20)	7.07 (0.691)	5.03* (0.809)	2.93* (0.785)	6.95 (0.686)	6.15* (0.671)	5.2* (0.696)
Tendinitis/ tenosynovitis of the upper limb (n_1–35; n_2–25)	7.17 (0.707)	5.06* (0.838)	2.97* (0.664)	7.2 (0.7)	6.52* (0.586)	5.28* (0.678)
Carpal tunnel syndrome (n_1–20; n_2–10)	7.2 (0.696)	5* (0.725)	3.1* (0.852)	7.3 (0.675)	6.3** (0.675)	5.6** (0.516)
Spinal deformities (n_1–35; n_2–25)	6.89 (0.832)	5.37* (0.843)	2.94* (0.802)	7.08 (0.702)	6.64** (0.638)	5.32* (0.802)
Fibromyalgia (n_1–20; n_2–10)	6.83 (0.721)	5.24* (0.814)	3.58* (0.998)	6.65 (0.715)	6.33* (0.568)	5.33* (0.612)

n_1 – No. of patients in Group 1; n_2 – No. of patients in Group 2; SD – Standard Deviation
* – statistically significant improvement (p<0.001)
** – statistically significant improvement (p<0.05)

HAQD scores in the two study groups for each of the assessed musculoskeletal disorders are presented in Table 3. When comparing HAQD scores in the same study group significant improvements at the intermediate and final assessments were also noticed.

Regarding the number of days of absenteeism due to musculoskeletal complaints in the last year, there were significantly lower values at final assessments in both study groups (Tab. 4).

Table 3. HAQD scores in the two study groups at the beginning of the study, after 1 year and after 2 years of treatment.

	Group 1			Group 2		
	HAQD (SD)			**HAQD** (SD)		
	Initial	**Inter-mediate**	**Final**	**Initial**	**Inter-mediate**	**Final**
Low back pain (n_1–35; n_2–25)	28.91 (1.314)	23.46* (1.54)	13.89* (2.361)	28.20 (1.323)	26.52* (1.262)	24.84* (1.179)
Scapulohumeral periarthritis (n_1–30; n_2–20)	29.2 (1.215)	24.37* (1.81)	15.8* (4.27)	28.35 (1.387)	26.3* (1.218)	24.2* (1.473)
Cervicobrachial neuralgia (n_1–30; n_2–20)	28.8 (1.157)	24.57* (2.112)	16.77* (4.732)	29.05 (1.099)	27.05* (1.191)	23.6* (2.137)
Hand osteoarthritis (n_1–30; n_2–20)	29.47 (1.358)	24.1* (1.296)	13.3* (1.055)	28.55 (1.432)	26.15* (1.565)	24* (1.747)
Tendinitis/ tenosynovitis of the upper limb (n_1–35; n_2–25)	29.83 (1.098)	24* (1.237)	13.26* (0.852)	28.92 (1.47)	26.08* (1.352)	23.56* (1.044)
Carpal tunnel syndrome (n_1–20; n_2–10)	29.1 (1.553)	24.35* (1.461)	14.5* (1.051)	28.7 (1.252)	26.7** (1.337)	24.1** (2.558)
Spinal deformities (n_1–35; n_2–25)	28.83 (1.361)	23.34* (1.878)	13.69* (1.549)	28.72 (1.021)	26.72* (1.339)	23* (1.893)
Fibromyalgia (n_1–20; n_2–10)	28.94 (1.114)	24.52* (1.711)	16.89* (3.38)	28.88 (1.187)	27.11* (1.088)	24.15* (1.347)

n_1 – No. of patients in Group 1; n_2 – No. of patients in group 2; SD – Standard Deviation
* – statistically significant improvement (p<0.001)
** – statistically significant improvement (p<0.05)

Table 4. No. of days of absenteeism in the last year in the two study groups at initial and final assessments.

	Group 1		Group 2	
	Days of absenteeism (SD)		**Days of absenteeism** (SD)	
	Initial	**Final**	**Initial**	**Final**
Low back pain (n_1–35; n_2–25)	6.51 (0.919)	2.97* (0.747)	6.44 (0.917)	5.52* (0.653)
Scapulohumeral periarthritis (n_1–30; n_2–20)	6.57 (0.935)	3.6* (1.329)	6.5 (0.889)	5.55** (0.686)
Cervicobrachial neuralgia (n_1–30; n_2–20)	6.73 (1.015)	4.03* (1.377)	6.4 (1.046)	5.65** (0.813)
Hand osteoarthritis (n_1–30; n_2–20)	6.83 (0.791)	3.13* (0.73)	6.45 (0.826)	5.6* (0.754)
Tendinitis/tenosynovitis of upper limb (n_1–35; n_2–25)	6.83 (0.785)	3.09* (0.612)	6.72 (0.792)	5.76* (0.723)
Carpal tunnel syndrome (n_1–20; n_2–10)	6.9 (0.912)	3.5* (0.761)	6 (0.943)	5.3** (0.949)
Spinal deformities (n_1–35; n_2–25)	6.51 (1.011)	2.89* (0.631)	6.36 (1.036)	5.52* (0.77)
Fibromyalgia (n_1–20; n_2–10)	6.52 (0.942)	3.78* (1.211)	6.77 (0.742)	5.88** (0.791)

n_1 – No. of patients in Group 1; n_2 – number of patients in Group 2; SD – Standard Deviation;
* – statistically significant improvement (p<0.001)
** – statistically significant improvement (p<0.05)

The correlations due to their everyday work between VAS and the number of days of absenteeism and between HAQD score and the number of days of absenteeism at the beginning and at the end of the study in the two study groups are presented in detail in Table 5.

After completing the prospective study, it was noticed that acute musculoskeletal disorders, such as tendinitis,

Table 5. Correlations between VAS and number of days of absenteeism, and between HAQD score and number of days of absenteeism at the beginning and at the end of the study.

	$VAS_{initial}$- $Absenteeism_{initial}$		VAS_{final}-$Absenteeism_{final}$		$HAQD_{initial}$-$Absenteeism_{initial}$		$HAQD_{final}$-$Absenteism_{final}$	
	Group 1	Group 2	Group 1	Group 2	Group 1	Group 2	Group 1	Group 2
Low back pain (n_1–35; n_2–25)	0.334 $p=0.009^{s}$	0.078 $p=0.85^{ns}$	0.817 $p<0.001^{s}$	0.080 $p=0.82^{ns}$	0.067 $p=0.612^{ns}$	0.054 $p=0.68^{ns}$	0.780 $p<0.001^{s}$	0.069 $p=0.59^{ns}$
Scapulohumeral periarthritis (n_1–30; n_2–20)	0.326 $p=0.021^{s}$	0.086 $p=0.77^{ns}$	0.813 $p<0.001^{s}$	0.557 $p=0.008^{s}$	0.026 $p=0.857^{ns}$	0.029 $p=0.84^{ns}$	0.843 $p<0.001^{s}$	0.033 $p=0.82^{ns}$
Cervicobrachial neuralgia (n_1–30; n_2–20)	0.057 $p=0.69^{ns}$	0.066 $p=0.71^{ns}$	0.797 $p<0.001^{s}$	0.07 $p=0.67^{ns}$	0.034 $p=0.93^{ns}$	0.067 $p=0.7^{ns}$	0.872 $p<0.001^{s}$	0.089 $p=0.75^{ns}$
Hand osteoarthritis (n_1–30; n_2–20)	0.348 $p=0.013^{s}$	0.245 $p=0.17^{ns}$	0.844 $p<0.001^{s}$	0.061 $p=0.59^{ns}$	0.180 $p=0.21^{ns}$	0.176 $p=0.25^{ns}$	0.861 $p<0.001^{s}$	0.079 $p=0.48^{ns}$
Tendinitis/tenosynovitis of upper limb (n_1–35; n_2–25)	0.447 $p<0.001^{s}$	0.579 $p=0.02^{s}$	0.872 $p<0.001^{s}$	0.06 $p=0.89^{ns}$	0.138 $p=0.29^{ns}$	0.105 $p=0.33^{ns}$	0.857 $p<0.001^{s}$	0.108 $p=0.32^{ns}$
Carpal tunnel syndrome (n_1–20; n_2–10)	0.041 $p=0.828^{ns}$	0.078 $p=0.67^{ns}$	0.702 $p<0.001^{s}$	0.043 $p=0.80^{ns}$	0.069 $p=0.717^{ns}$	0.034 $p=0.92^{ns}$	0.735 $p<0.001^{s}$	0.106 $p=0.57^{ns}$
Spinal deformities (n_1–35; n_2–25)	0.018 $p=0.894^{ns}$	0.48 $p=0.035^{s}$	0.807 $p<0.001^{s}$	0.023 $p=0.74^{ns}$	0.111 $p=0.398^{ns}$	0.671 $p=0.003^{s}$	0.835 $p<0.001^{s}$	0.0333 $p=0.62^{ns}$
Fibromyalgia (n_1–20; n_2–10)	0.316 $p=0.022^{s}$	0.541 $p=0.007^{s}$	0.812 $p<0.001^{s}$	0.134 $p=0.07^{ns}$	0.025 $p=0.846^{ns}$	0.33 $p=0.02^{s}$	0.839 $p<0.001^{s}$	0.081 $p=0.53^{ns}$

n_1 – No. of patients in Group 1; n_2 – No. of patients in Group 2; ^{s} – significant; ^{ns} – not significant

tenosynovitis, scapulohumeral periarthritis or cervicobrachial neuralgia, are more common in young dentists. On the other hand, chronic musculoskeletal disorders, such as hand osteoarthritis or low back pain are more frequently met in adult and older dentists.

The dentists who had longer professional experience, over the years had acquired certain protection measures concerning their professional postures and gestures. These measures are either unknown or neglected by young dentists. In addition, dentists under the age of 40 had an overcrowded and overextended (exceeding eight hours) daily working programme most of the time, without taking into consideration any rest breaks.

DISCUSSION

The prevention of musculoskeletal disorders in dentistry represents an important aim in order to perform an optimal long-term professional activity. This is why dentists should use ergonomic medical equipment and should be aware of the necessity of taking short periodic breaks during their daily activity. The importance of respecting a daily working programme that must not exceed eight hours should be stressed. Alternation of working gestures that can cause musculoskeletal complaints should be also considered; for example, activities using vibrations should be used alternatively with those that need different types of gestures, such as teeth extraction or pulpectomies.

At the same time, dentists should respect a correct life style, learn to perform a minimal home-adapted kinesitherapy programme that has in view relaxation, stretching and general strengthening. This programme should be individualised for each musculoskeletal disorder. Two minimal kinesitherapy programme are recommended that should be performed at home, and differ according to the acute or chronic type of musculoskeletal disorder. These programs must be learnt at the end of the rehabilitation treatment. They last 10–20 minutes per session, and 15 sessions are needed (one session every 2 days), twice a year. A minimal kinesitherapy programme is also recommended that must be performed daily in the dental surgery. This programme lasts five minutes, and should be performed in the middle of the working programme.

A periodic assessment of the dentists should be taken into account. This can be made by using the Health Assessment Questionnaire adapted for Dentists that has in view the early detection and an adequate medical and rehabilitation treatment of musculoskeletal disorders specific for this professional category. The questionnaire can be easily applied, also to include general practitioners (GPs), and thus detect musculoskeletal complaints and direct the dentist to a specialised rehabilitation centre.

CONCLUSION

For all the assessed musculoskeletal diseases VAS scores were not significantly different between the two groups at the beginning of the study. Nevertheless, these values were significantly lower at the intermediate and final assessments. Also, for Group 1 patients after the combined therapies, HAQD scores were significantly lower at the one-year and two-year assessments. The number of days of absenteeism did not differ significantly between the two groups at the initial assessment. However, the number of days of absenteeism was significantly increased for Group 2 patients at the end of the study. For increased values of the visual analogue scale at the beginning and at the end of the study, the significantly increased numbers of days of absenteeism and of health assessment questionnaire scores were associated.

Improvements were noted in the functional parameters and in an increase in work productivity in those dentists who followed the combined medical and rehabilitation treatment. The latter has to be supervised and performed stage-by-stage, and has to begin in a specialised rehabilitation centre and continued afterwards with an individualised home-adapted physical therapy programme.

The majority of assessed dentists, diagnosed with different musculoskeletal disorders and treated in a complex manner

by using both medical and rehabilitation therapy, indicates the importance of maintaining specific orthopaedic rules, as well as the necessity of learning a certain type of physical therapy programme. Such a programme should be individualised for each dentist, and adapted to the dentist's age and his/her associated medical problems.

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