No difference between postural exercises and strength and fitness exercises for early, non-specific, work-related upper limb disorders in visual display unit workers: a randomised trial

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Question: Are postural exercises delivered by Mensendieck/Cesar therapists more effective in decreasing pain, reducing disability and improving health-related quality of life in visual display unit workers with early non-specific work-related upper limb disorders than strength and fitness exercises delivered by physiotherapists? **Design:** Randomised trial with concealed allocation and intention-to-treat analysis. **Participants**: Eighty-eight (6 drop-outs) visual display unit workers with early non-specific work-related upper limb disorders. **Intervention:** One group received 10 weeks of postural exercises while the other group received 10 weeks of strength and fitness exercises. **Outcome measures:** Pain was measured with a 10-cm visual analogue scale, disability was measured with the Disabilities of Arm, Shoulder and Hand questionnaire, and health-related quality of life was measured with the Short Form-36. Number of participants experiencing upper limb complaints was also collected. Outcome measures were collected at baseline and again at 3, 6, and 12 months. **Results**: There was no significant difference in decrease in pain between the groups at 3 months (0.6 cm, 95% CI 0.0 to 1.2), 6 months (0.2, 95% CI –0.3 to 0.7), or at 12 months (0.1, 95% CI –0.6 to 0.8). Differences between the groups in upper limb complaints, disability, and health-related quality of life were also small and not significant at any measurement occasion. **Conclusion:** Postural exercises did not result in a better outcome than strength and fitness exercises. However, 55% of visual display unit workers with early non-specific work-related upper limb disorders reported being free of complaints one year after both interventions were commenced. **Trial registration**: ISRCTN15872455. **[van Eijsden-Besseling MD, Staal JB, van Attekum A, de Bie RA, van den Heuvel WJA (2008) No difference between postural exercises and strength and fitness exercises for early, non-specific, work-related upper limb disorders in visual display unit workers: a randomised trial. *Australian Journal of Physiotherapy* 54: 95–101]**

Key words: Randomized Controlled Trial, Early Intervention, Physiotherapy, Exercise Therapy.

Introduction

In the last decade a number of authors have addressed the multicausal origins of (Bongers 2003, Staal et al 2007, Van den Heuvel 2006) and risk factors for the development of non-specific work-related upper limb disorders in visual display unit workers (Health Council of the Netherlands 2000, Peereboom et al 2005/2006, Van Eijsden-Besseling 2004, IJmker et al 2006). However, research on the effectiveness of (multidisciplinary) therapies, especially in patients with early work-related upper limb disorders, is scarce (Karjalainen et al 2000, Konijnenberg et al 2001, Verhagen et al 2004). A recently-published systematic review of randomised and non-randomised studies investigating the effect of conservative interventions in patients with mainly chronic non-specific work-related upper limb disorders shows that there is ample room for improvement in the methodological quality of the majority of the studies (Verhagen et al 2007). Results are not conclusive and the evidence is conflicting when exercises are compared to no intervention (Smidt et al 2005, Verhagen et al 2007). Limited evidence, however, was found for the effectiveness of exercises when compared to massage, implementing breaks during computer work sessions, massage as supplemental intervention to manual therapy, and manual therapy as supplemental intervention to exercise (Verhagen et al 2007). Outcomes were measured mainly at the level of impairment, but rarely at the level of disability or quality of life (Konijnenberg et al 2001, Picavet and Hoeymans 2004, Verhagen et al 2007). One randomised controlled trial showed that patients with chronic non-specific work-related upper limb complaints benefited from multidisciplinary intervention consisting of psychological and physical sessions (Meijer et al 2006). However, no difference was found between the cost-effectiveness of multidisciplinary treatment and usual care. It can therefore be concluded that randomised studies with sound methodology are needed and that exercise therapy may be considered as a promising intervention. Moreover, we expect effective therapy in early non-specific work-related upper limb disorders to prevent impairments and disability becoming chronic.

This study was designed to compare the effectiveness of two exercise programs in visual display unit workers with early non-specific work-related upper limb disorders – postural exercises delivered by Mensendieck/Cesar therapists and strength and fitness exercises delivered by physiotherapists. The Mensendieck/Cesar approach is in use in the Netherlands, in Scandinavian countries, and in France. The approach combines exercise and education in order to improve posture and movement habits in relation

to everyday activities (Hildebrandt et al 2000, Soukup et al 1999, Soukup et al 2001, VvOCM 2005). Visual display unit workers were chosen because they represent a relevant (and homogeneous) group at risk of developing non-specific work-related upper limb disorders (Peereboom et al 2005/2006, Van den Heuvel 2006).

The research question for this study was:

> Are postural exercises delivered by Mensendieck/Cesar therapists more effective in decreasing pain, reducing disability, and improving health related quality of life in visual display unit workers with early non-specific work-related upper limb disorders than strength and fitness exercises delivered by physiotherapists?

Clinical observation led to the hypothesis that postural exercises according to the Mensendieck/Cesar approach would be more effective than strength and fitness exercises.

Method

Design

A prospective randomised clinical trial was conducted. Patients were recruited by advertisement in local newspapers, through personal contact with occupational physicians of large companies, and by mailing to general practitioners. An occupational physician who was blinded to allocation sequence was involved in the selection of eligible participants. Within two weeks after selection and invitation of eligible patients to participate, baseline data were collected at one of two research locations, either the Maastricht University Hospital or the Institute for Rehabilitation Research in Hoensbroek. Participants were randomised to the postural exercise group or the strength and fitness exercise group in strata depending on the duration of the complaints (with a cut-off point at 6 weeks). Blocks of four were generated for each stratum by means of a computer generated random sequence table. Randomisation was concealed because a research assistant, who was not involved in the selection of the participants, allocated participants to groups using a list of random numbers which was generated before commencement of the study. Because both interventions were active, blinding of participants or therapists was not possible. In both groups, the 10-week intervention started within one week after baseline measures were collected. Outcome measures were collected at baseline and at 3, 6, and 12 months where the same questionnaires were completed using a computer under supervision of a research assistant. The research assistant instructed participants about the questionnaires, which had to be completed by using a computer in the participant's usual manner. The computer workstation was custom-made for this purpose for each participant. Only the pain outcome measure was assessed by the participants filling in the forms by pen during four sequential working days. Although the research assistant was blinded to group allocation, all outcome measures were self-reports so they were not blind. The completion of the questionnaires by the participants took approximately one hour each time.

Participants

Visual display unit workers were included if they: had been visual display unit workers for more than 3 months; were experiencing their first non-specific work-related upper limb disorder; had symptoms lasting more than two weeks but less than three months; and were between 20 and 45 years of age.

Visual display unit workers were defined as employees performing computer work, with or without the use of a mouse, for at least 20 hours per week and for at least four hours continuously per day. Non-specific work-related upper limb disorders were described as pains and tingles in the upper back, neck, shoulders, arms or hands, related and restricted to visual display unit work, ie, not yet present during other everyday activities (Sluiter et al 2001). Each worker completed the SALTSA questionnaire (Sluiter et al 2001) which is designed to diagnose 'early stage non-specific work-related upper limb disorder' and to exclude other kinds of specific work-related upper limb disorders.

Participants were excluded if they had: non-specific upper limb complaints during other daily activities (eg, brushing teeth and driving the car); specific work-related upper limb disorders (eg, carpal tunnel syndrome, tennis elbow, golfers elbow, tendonitis, de Quervain's tenosynovitis); other musculoskeletal conditions (eg, fibromyalgia, hypermobility syndromes); or were pregnant or partly or fully on sick leave; or had previously received therapy, or postural exercise therapy within the last five years.

Demographic data such as sex, age, number of working hours, and level of education were obtained at baseline. Participants were labeled as 'highly educated' if they had at least a bachelor's degree. Because the onset and course of non-specific, work-related, upper limb disorders are influenced by physical, psychosocial, and personal factors, these were measured at baseline (Gerhards 2006, Peereboom et al 2005/2006, Roelofs 2002, Van den Heuvel 2006, Van Eijsden-Besseling et al 2004, IJmker et al 2006). Perfectionism (neurotic) was measured by the Multidimensional Perfectionism Scale (Flos 1998, Frost & Marten 1990, Purdon et al 1999), state and trait anxiety were measured by the State-Trait Anxiety Inventory (Furer et al 1995, Spielberger 1983), self-reported physical fitness level was measured by the Groningen Fitness Questionnaire (Van Heuvelen et al 1997), experienced job stress at the workplace was measured by the Job Stress Survey (De Wolff et al 2002, Spielberger et al 1998), and pain catastrophising thoughts by the Pain Catastrophizing Scale (Sullivan et al 1998, Van Damme et al 2000, Van Damme et al 2002).

Intervention

One group of participants received postural exercises according to the Mensendieck/Cesar approach in The Netherlands. Postural exercises according to Bess Mensendieck on the one hand and Maria Cesar on the other do not differ basically and both therapies and their training programs have been assimilated since the fusion of both societies in 2004 (VvOCM 2005). The Mensendieck/Cesar approach promotes a method of body posture and movement education by exercises in which integration of body and mind takes place in order to consciously improve 'poor' body posture and 'bad' movement habits in relation to everyday activities. The core of the approach is to make use of feedback from muscle, joint, tendon, and ligaments by means of audiovisual and proprioceptive signals. It is hypothesised that this feedback, repeatedly offered to and transformed in the central nervous system, will lead in the long term to automatic improvement of spinal and peripheral postural and movement habits with generalisation to daily activities, aiming at decreasing complaints. Verbal

Table 1. Intervention schedules for the postural exercise and strength and fitness exercise groups.

Weeks	Postural exercise group	Sessions	Strength and fitness exercise group	Sessions
1–3	2 × 1 hr/wk	6	3 × 0.5 hr/wk	9
4–6	1 × 1 hr/wk	3	2 × 0.5 hr/wk	6
7–8	1 × 0.5 hr/wk	2	1 × 0.5 hr/wk	2
9 Exercises at home		0		0
10 Final session	0.5 hr	1	0.5 hr	1
Total	10.5	12	9	18

instructions and demonstration by the therapist, as well as the use of mirrors, are essential. Video taping the participant for feedback is also valuable (VvOCM 2005). Training in patient-specific everyday activities such as computer work forms a part of this approach (Soukup et al 2001) so it can be categorised as functional. Patients are expected to do their postural exercises at home in front of a mirror and at their work place. Therapists are not allowed to touch their patients. The accredited training to become a Mensendieck/Cesar therapist takes three years fulltime; it differs from the accredited training by the Royal Dutch Physiotherapy Association to become a physiotherapist, where training takes four years fulltime. The four Mensendieck/Cesar therapists involved in this study attended workshops and were trained practically in treating patients with non-specific work-related upper limb disorders according to the clinical practice guidelines issued by their professional organisation (Bredero et al 2000). They were not physiotherapists.

The other group of participants received strength and fitness exercises delivered by four physiotherapists who attended a course for work-related upper limb disorders based on the latest evidence. They did not use electrotherapy or massage. Apart from local exercises to address painful areas, active spinal and peripheral muscle training and fitness exercises were part of the intervention. The focus was on improvement of muscle condition for long-lasting static postures.

Participants in both arms of the trial received 10 weeks of intervention because, based on our clinical experience, this dosage is needed to prevent early non-specific work-related upper limb disorders become chronic (Meijer et al 2006). The postural exercise group received 12 sessions as compared to 18 for the strength and fitness exercise group (Table 1). However, the postural exercise group received 1.5 hours more intervention than the strength and fitness exercise group. The week before the final session, all participants did their exercises at home. Intervention was paid for by health insurance. Appendix 1 provides more detail of the trial method (see eAddenda for Appendix 1).

Outcome measures

Pain was measured at the location with the highest intensity using the 10-cm horizontal numerical visual analogue scale according to Jensen and Mc Farland (1993). Pain was noted by the participants over four sequential working days at four fixed times per day (1100, 1400, 1700, and 2000 hours) to get a clear impression of the pain experienced throughout the whole working week. Therefore, this outcome measure consisted of the average of 16 visual analogue scale scores over four days, with a higher rating indicating a higher intensity of pain. According to Jensen & Mc Farland (1993) this instrument has a good test-retest reliability, internal consistency, and validity.

Disability was measured with the Disabilities of the Arm, Shoulder and Hand (SooHoo et al 2002, Veehof et al 2002). At least 27 of the 30 items must be completed to calculate a score ranging from 0 to 100. A lower score indicates less disability. Veehof et al (2002) showed that the Dutch language version of this measure has excellent internal consistency (Cronbach's alpha 0.95) while test-retest reliability and concurrent validity are satisfactory.

Health-related quality of life was measured with the generic Short Form-36 questionnaire (Hays et al 1993, Picavet and Hoeymans 2004, Van der Zee and Sanderman 1993). The Short Form-36 consists of 36 questions divided over 8 subscales, and one question about change in health experienced during the past year. The total sum score of the Short Form-36 was used which ranges from 0 to 100. The higher the total score, the higher the quality of life. The subscales can be used to compare persons with different chronic conditions. The reliability of most of the subscales in chronic populations is higher than 0.80, while the homogeneity is higher than 0.50, indicating a strong unidimensional hierarchical scale (Moorer et al 2001).

The number of participants experiencing upper limb complaints was measured by asking participants to answer YES/NO to the question 'Do you still experience non-specific work-related upper limb complaints?'

Data analysis

The expected improvement in pain in the postural exercise group was set at 60%, and for the strength and fitness exercise group at 40%, implying a minimal clinically relevant difference of 20%, correlating with 20 mm difference on the horizontal visual analogue scale. These expected improvements in pain were based on past clinical experience. With an alpha of 0.05 and a 1-beta of 80% in total, 94 visual display unit workers were needed to provide sufficient power to answer the research questions.

Data were analysed by a blinded statistician. Data were checked for missing values and normality. Each follow-up time point was analysed separately and the analyses were carried out according to the intention-to-treat principle. Missing values were replaced by the last observation carried forward method. Differences in baseline characteristics and baseline values of the outcome measures between the postural exercise group and the strength and fitness exercise group were tested with an independent samples t-test ($\alpha = 0.05$). The three outcome measures pain, functional disability, and quality of life were analysed by means of linear regression analysis. In the event of significant differences between baseline characteristics and baseline values of the outcome measures between the two groups, adjustments were made in the linear regression analyses.

Table 2. Baseline characteristics of the postural exercise and strength and fitness exercise groups.

	Postural exercise group (n = 44)	Strength and fitness exercise group (n = 44)	*p* value
Gender, M:F	19:25	19:25	–
Education, High:Low	29:15	30:14	–
Age (yr), mean (SD)	33.3 (7.7)	34.8 (7.7)	0.38
Multidimensional Perfectionism Scale* (29 to 145), mean (SD)	62.7 (16.4)	63.2 (18.7)	0.89
State Anxiety Inventory* (20 to 80), mean (SD)	32.9 (8.9)	33.1 (10.6)	0.93
Trait Anxiety Inventory* (20 to 80), mean (SD)	34.5 (9.9)	35.3 (9.8)	0.69
Self-reported fitness (9 to 45), mean (SD)	26.9 (2.8)	26.7 (2.1)	0.64
Fitness mark (1 to 10), mean (SD)	7.0 (1.1)	7.2 (1.5)	0.38
Job Stress Survey* (0 to 81), mean (SD)	16.2 (10.7)	15.6 (10.0)	0.82
Pain Catastrophizing Scale (0 to 52), mean (SD)	22.5 (6.6)	25.5 (6.3)	0.04
Duration of complaints			
< 6 weeks (n = 16)	8	8	
> 6 weeks (n = 72)	36	36	
Working hours per week, mean (SD)	37.2 (10.7)	38.5 (6.3)	0.5

*The higher the score, the more the attribute applies

Results

Flow of participants through the trial

Flow of participants through the trial is presented in Figure 1. Participants were selected from the 313 potential participants who contacted us and were diagnosed between May 2003 and February 2005. Many potential participants had to be excluded for various and in some cases multiple reasons: 133 had complaints for more than three months, 77 had already received therapy, 46 were older than 45 years, 38 lived too far away, two refused randomisation, four refused to participate due to private circumstances, and 70 due to other reasons consistent with the predefined exclusion criteria. As 88 participants (28%) met the inclusion criteria and were willing to participate. 44 participants were randomised to each arm of the trial. The groups were comparable at baseline for nearly all variables. The only significant difference between the postural exercise and the strength and fitness exercise group concerned the score on the Pain Catastrophizing Scale ($p = 0.04$) in that the strength and fitness exercise group demonstrated more catastrophising thoughts (Table 2) which was adjusted for in the analyses.

Between baseline and three months there were six drop outs. There were four dropouts from the postural exercise group: stress from losing job and increase in complaints (n = 1), recruited participant too late for the first session (n = 1), time pressure of job (n = 2). There were two dropouts from the strength and fitness exercise group: participant wanted alternative intervention after 3 sessions (n = 1), participant did not want to comply with study requirements (n = 1).

Compliance with intervention

To make both groups comparable, we converted the number of sessions to 30-min sessions. Mean number of 30-min sessions attended was 14.3 out of 18 (SD 4.2) for the strength and fitness exercise group and 17 out of 21 (SD 3.6) for the postural exercise group. One participant in each group never attended, one participant in the strength and fitness exercise group stopped attending after three sessions, and three participants in the postural exercise group stopped attending after 5, 9, and 14 sessions respectively. All other participants only stopped when they were free of complaints. After accounting for participants who stopped attending because they were free of complaints, compliance was 96% in the strength and fitness exercise group and 94% in the postural exercise group.

Effect of intervention

Group data for pain, disability, and quality of life are presented in Table 3; data for number of participants experiencing upper limb complaints appear in Table 4.

At 3 months, the strength and fitness exercise group had decreased their pain 0.6 cm (95% CI 0.0 to 1.2, $p = 0.05$) more than the postural exercise group on the 10-cm visual analogue scale. However, this difference was not maintained at 6 and 12 months. Otherwise no significant differences between the groups were observed. Overall, there were only small improvements from baseline to one year.

Answers to 'Do you still experience non-specific work-related upper limb complaints?' showed that complaints decreased gradually over the year and that about 55% of both groups were free of pain at the end of one year (Table 4).

Discussion

The prevalence of non-specific work-related upper limb disorders among visual display unit workers in The Netherlands, and also worldwide, is high. Non-specific work-related upper limb disorders tend-if untreated-to become chronic very easily (Meijer et al 2006). Daily practice in our tertiary referral centre for non-specific work-related upper limb disorders shows this. Almost no research has been done on early intervention with respect to early non-specific work-related upper limb disorders. Two types of therapy were compared in this study, postural exercises delivered by Mensendieck/Cesar therapists and strength and fitness exercises delivered by physiotherapists. Although clinical observations in our centre gave the impression that patients benefited more from postural exercises than from strength and fitness exercises, this was not substantiated.

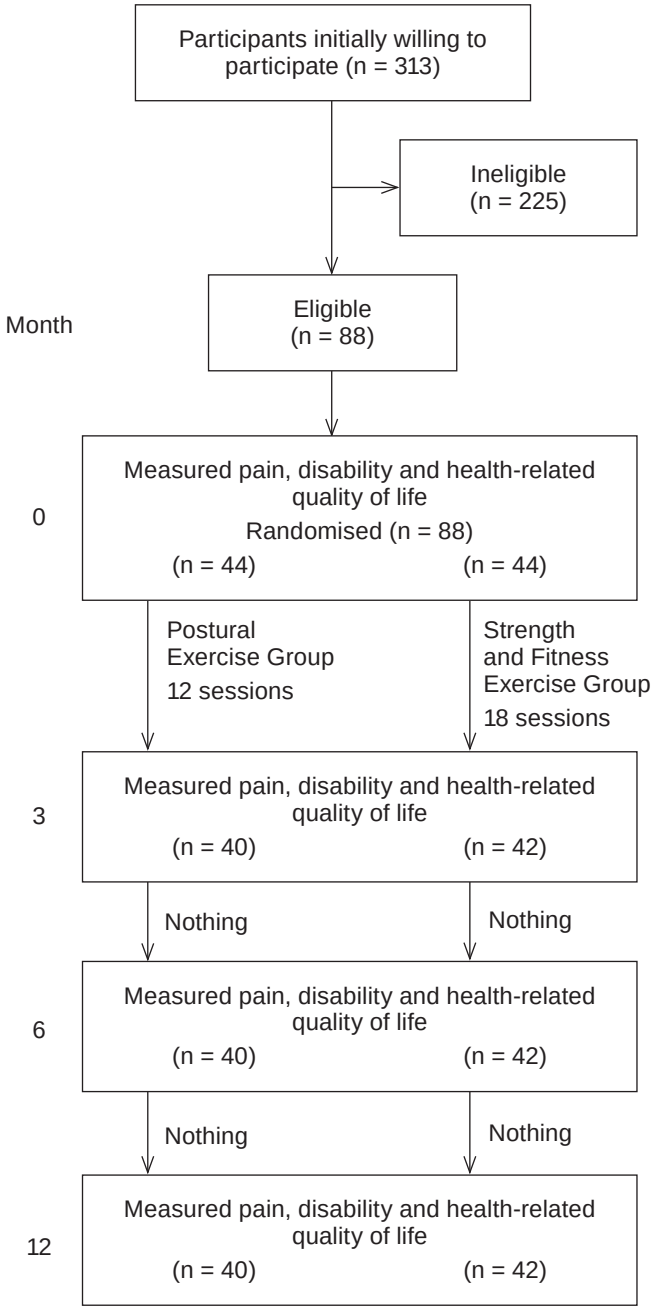

Figure 1. Design and flow of participants through the trial.

Earlier research in Norway (Soukup et al 1999) in low back pain patients showed that postural exercises according to the Mensendieck approach reduced the occurrence of recurrent episodes of low back pain. Intervention delivered by Cesar therapists has been shown to be as effective for low back pain as intervention delivered by physiotherapists (Hildebrandt et al 2000). Together with our favorable clinical observations this supported our choice to study the effects of postural exercises in patients with work-related upper limb disorders.

Almost no significant difference was found between the postural exercises and the strength and fitness exercises in outcome at either the impairment level or the disability level, or regarding health-related quality of life. About 55% of visual display unit workers with early non-specific work-related upper limb disorders reported being free of complaints one year after having started early intervention. We are not sure whether these improvements are caused

Table 3. Mean (SD) of both groups, mean (SD) difference within both groups, and mean (95% CI) difference between postural exercise and strength and fitness exercise group for pain, disability, and quality of life at 3, 6, and 12 months.

Outcome	Groups								Difference within groups						Difference between groups*			
	Month 0		Month 3		Month 6		Month 12		Month 3 minus Month 0		Month 6 minus Month 0		Month 12 minus Month 0		Month 3 minus Month 0	Month 6 minus Month 0	Month 12 minus Month 0	
	PE	SFE	PE	SFE	PE	SFE	PE	SFE	PE	SFE	PE	SFE	PE	SFE	PE minus SFE	PE minus SFE	PE minus SFE	
Pain																		
VAS	2.9	2.6	1.9	1.1	1.3	1.1	1.4	1.4	–1.0	–1.5	–1.5	–1.5	–1.4	–1.2	0.6	0.2	0.1	
(0 to 10 cm)	(1.5)	(1.8)	(1.9)	(1.3)	(1.3)	(1.3)	(1.7)	(1.5)	(1.9)	(1.4)	(1.7)	(1.5)	(2.1)	(1.6)	(0.0 to 1.2)	(–0.3 to 0.7)	(–0.6 to 0.8)	
Disability																		
DASH	15	16	11	9	10	8	9	8	–4	–7	–5	–8	–6	–8	3	3	1	
(0 to 100)	(10)	(12)	(10)	(10)	(9)	(10)	(10)	(10)	(8)	(11)	(10)	(9)	(11)	(11)	(–1 to 6)	(–1 to 6)	(–3 to 5)	
QoL																		
SF-36	71	71	71.0	72	72	72	72	72	1	1	2	1	2	1	–1	0	0	
(0 to 100)	(2)	(2)	(2.5)	(2)	(2)	(3)	(2)	(3)	(2)	(2)	(2)	(7)	(3)	(3)	(–2 to 0)	(–1 to 1)	(–1 to 1)	

PE = postural exercise group, SFE = strength and fitness exercise group; * = mean difference and 95% CI from regression analysis with baseline scores and pain catastrophising scores as covariates; VAS = visual analogue scale, DASH = Disabilities of the Arm, Shoulder and Hand, QoL = quality of life

Table 4. Number of participants (%) with complaints in both groups and relative risk (95% CI) between groups.

Outcome	Groups						Relative risk between groups		
	Month 3		Month 6		Month 12		Month 3	Month 6	Month 12
	PE	SFE	PE	SFE	PE	SFE	PE relative to SFE	PE relative to SFE	PE relative to SFE
Complaints	30 (68)	28 (64)	21 (48)	21 (48)	19 (43)	20 (46)	1.07 (0.79 to 1.45)	1.00 (0.65 to 1.55)	0.95 (0.59 to 1.52)

PE = postural exercise group, SFE = strength and fitness exercise group

by the interventions since we did not include a waiting-list control group. In two Dutch cohort studies on the prognosis of non-specific upper limb complaints similar results were found. Feleus et al (2006) reported a recovery rate of 54% in a general practice, and Karels et al (2007) and reported a recovery rate of 60% after six months in a physiotherapy practice; but in both cases no information about the actual content of the intervention was provided. Therefore, patient preferences may play an important role in the decision of which intervention to choose. Both therapies were about equal in terms of therapist cost. The outcomes were reached with 1.5 hours less strength and fitness exercises than postural exercises. On the other hand, there were fewer sessions delivered by the Mensendieck/Cesar therapists compared with the physiotherapists (12 compared to 18).

This randomised trial is the first of its kind in early non-specific work-related upper limb disorders. Our centre for non-specific work-related upper limb disorders hosts more than 1500 patients, while each week new patients are being admitted. We had therefore expected that there would be an overwhelming number of patients applying to participate in this research project. However, many efforts had to be made to find potential participants. Finally, after extension of the original inclusion period by three months, 313 patients applied and only 88 persons (28%) were included. The most likely explanation for the low inclusion rate is that patients with early non-specific work-related upper limb disorders, who met the inclusion criteria, were very interested in our study but could not find the time, due to constraints at work and were hoping that their complaints would disappear without professional help. On the other hand there were many patients with chronic complaints lasting longer than three months (n = 133) who strongly desired to participate but did not meet the inclusion criteria. These observations convinced us that it would not be feasible for ethical reasons to select and follow another control group with early non-specific work-related upper limb complaints without giving any type of therapy (ie, a waiting-list control group).

Possibly, both therapies resemble each other too much to find significant differences in outcomes. At baseline there was only a moderate intensity of pain (ie, less than 3 cm on a 10-cm visual analogue scale), and a small amount of disability (about 15%) which may have elicited floor effects, while the scores for health-related quality of life (about 70%) are rather good**.** This is understandable because we were dealing with early non-specific work-related upper limb disorders. Remarkable on the other hand is the high score at baseline on the Pain Catastrophizing Scale in these visual display unit workers with early complaints. Scores on the State and Trait Anxiety Inventories, the Multidimensional Perfectionism Scale, and the Job Stress Survey at baseline suggested that participants were not particularly anxious, perfectionist, or stressed (Table 2).

Randomised trials of larger groups of visual display unit workers are recommended to arrive at more conclusive results. In future, personality and psychosocial work-related risk factors (Gerhards 2006, Van den Heuvel 2006, Van Eijsden et al 2004) and inter-related coping mechanisms should be the focus of intervention since both physically-oriented exercise programs led to the same outcome in this study.

eAddenda: Appendix 1 available at www.physiotherapy.asn.au

Ethics: This research project was approved by the Medical Ethical Committee of the University Hospital of Maastricht.

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