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ORIGINAL ARTICLE

Effects of Feldenkrais Method on Chronic Neck/Scapular Pain in People With Visual Impairment: A Randomized Controlled Trial With One-Year Follow-Up

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Abstract

Objective: To determine whether the Feldenkrais method is an effective intervention for chronic neck/scapular pain in patients with visual impairment.

Design: Randomized controlled trial with an untreated control group.

Setting: Low vision center.

Participants: Patients (N=61) with visual impairment (mean, 53.3y) and nonspecific chronic (mean, 23.8y) neck/scapular pain.

Interventions: Participants were randomly assigned to the Feldenkrais method group (n=30) or untreated control group (n=31). Patients in the treatment group underwent one 2-hour Feldenkrais method session per week for 12 consecutive weeks.

Main Outcome Measures: Blind assessment of perceived pain (visual analog scale [VAS]) during physical therapist palpation of the left and right occipital, upper trapezius, and levator scapulae muscle areas; self-assessed degree of pain on the Visual, Musculoskeletal, and Balance Complaints questionnaire; and the Medical Outcomes Study 36-Item Short-Form Health Survey bodily pain scale.

Results: Patients undergoing Feldenkrais method reported significantly less pain than the controls according to the VAS and Visual, Musculoskeletal, and Balance Complaints questionnaire ratings at posttreatment follow-up and 1-year follow-up. There were no significant differences regarding the Medical Outcomes Study 36-Item Short-Form Health Survey bodily pain scale ratings.

Conclusions: Feldenkrais method is an effective intervention for chronic neck/scapular pain in patients with visual impairment.

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Chronic neck/scapular pain is common in the adult population, with a point prevalence of approximately 15%.[1-3] It causes significant impairment and is one of the most frequent causes of long-term sickness-related absence from work,[4] resulting in high costs for the individual and society.[5] Recent research has revealed that the oculomotor load impact on neck/scapular muscular activity level[6] and visual deficits is associated with a high risk of neck/scapular pain.[7,8] However, during treatment of neck/scapular pain in individuals with visual impairment, their visual deficits are rarely taken into consideration.

A large variety of treatments are available to address neck/scapular pain. Although no obvious single treatment modality has been shown to be the most efficient,[9-11] systematic reviews indicate that multimodal rehabilitation has the strongest evidence for effectively alleviating chronic neck/scapular pain.[4] Among multimodal rehabilitation interventions, Feldenkrais[12] method may be of particular benefit for those with visual impairment. This is because Feldenkrais method is based on hands-on kinesthetic communication, which does not require visual ability. Through gentle touch, the therapist directs the client's attention to different parts of the body. Subsequently, the client is guided hands-on to a greater awareness of his or her movement patterns and to new patterns of movement that leads to reduced muscle tension and pain. Hence, because it is already built around a pedagogy that uses the tactile and proprioceptive

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senses, Feldenkrais method does not need to be adapted to fit people with visual impairments. However, the efficiency of Feldenkrais method to improve motor performance has been debatable mainly because of the poor-quality research and lack of randomized controlled trials.[13] There are even fewer studies focused on neck/scapular pain. To the best of our knowledge, there is only 1 randomized controlled trial that has addressed the efficiency of Feldenkrais method regarding a reduction of neck/scapular pain. This study, by Lundblad et al,[14] offers fairly strong evidence for the efficiency of Feldenkrais method over ordinary clinical practice physiotherapy in reducing neck/scapular pain in workers who are women. These results then motivate further examination of Feldenkrais method. The aim of this study was to investigate to what extent Feldenkrais method is efficient in reducing neck/scapular pain in patients with visual impairment.

Methods

Participants

All individuals between 18 and 67 years of age who are registered at the Low Vision Centre at Örebro County Council and living in Örebro County (n=1422) received a questionnaire regarding their visual status, musculoskeletal complaints, and health. In all, 768 individuals (54%) returned the questionnaire. Among them, 211 individuals (33%) with the most pronounced neck/scapular complaints (traumatic origin or comorbidity of musculoskeletal-related disorders excluded) were asked to participate in the intervention study. Each had a mean score $\geq$4 (representing the 66th percentile in the population) out of a maximum 10 based on 5 musculoskeletal complaint items (Cronbach α reliability was .94) used in previous research.[8] Eventually, 61 individuals (29%) were approved to participate and were available for the intervention study.

The participants (10 men, 51 women) had a mean age of 53.3±10.3 years. Baseline characteristics of the participants are shown in table 1. There were no significant differences between participants in the treatment and control groups regarding any of the baseline characteristics.

Each participant had 1 to 4 ophthalmic diagnoses. Most prevalent were presbyopia (n=22), myopia (n=12), intraocular lens (n=8), keratoconus (n=8), and field-of-vision defects (n=8). Best-corrected near binocular visual acuity was estimated by an optometrist using a logarithm of the Minimum Angle of Resolution Early Treatment of Diabetic Retinopathy Study chart or the Bailey-Lovie low vision 4-letter chart for visual acuity <20/400.

Chronic pain was defined as having had pain >3 months. The participants estimated that they had had neck/scapular pain ranging from 2 to 50 years (mean, 23.8±15.9y). Therefore, all participants had chronic neck/scapular pain. All but 1 of the participants were right handed.

Participants provided written informed consent prior to participating in the study. The regional ethics review board in Uppsala, Sweden, approved the study protocol (2010/206).

List of abbreviations:

SF-36 **Medical Outcomes Study 36-Item Short-Form Health Survey**
VAS **visual analog scale**

Table 1 Participants' characteristics at baseline and differences between groups

Variable	Total (N=61)	Treatment Group (n=30)	Control Group (n=31)	Δ	*P*
Sex (male/female)	10/51	5/25	5/26		.960
Age (y)	53.3±10.3	51.9±10.2	54.7±10.3		.280
BMI	25.8±3.8	26.5±3.6	25.3±4.1		.320
Duration of neck/scapular pain (y)	23.8±15.9	27.0±18.3	20.3±12.3		.660
Near binocular acuity (log unit)	0.60±0.69	0.57±0.69	0.40±0.50		.850
Near binocular acuity (decimal)	0.64±0.47	0.60±0.41	0.68±0.53		.550
Reading distance (cm)	28.9±12.4	27.2±11.5	30.8±13.2		.080
Minimum readable font size (point)	8.3±8.0	10.3±10.0	6.3±4.6		.310
VFQ-NAS	54.3±23.9	52.9±22.5	55.6±25.4		.180

NOTE. Values are n, mean ± SD, or as otherwise indicated. Statistical evaluations were made by a chi-square test or *t* test where appropriate. Abbreviations: BMI, body mass index; Minimum readable font size, smallest readable character of a font measured in points; Reading distance, distance from eye to text using vision aids; VFQ-NAS, National Eye Institute Visual Functioning Questionnaire-near activity scale.

Randomization

The 61 individuals eligible for the study were randomized to either a treatment group or a control group. A computer-generated table of random numbers was used. To minimize confounding because of major changes in the eye at about 45 years of age (eg, presbyopia) and because women report more neck- and scapula-related pain than men,[15] a stratified randomization procedure was performed to secure an equal sex and age ratio between the groups.

Intervention

Participants were allocated to 1 of 2 arms: Feldenkrais method and untreated controls. Feldenkrais method was conducted in sessions held by an experienced licensed Feldenkrais method physiotherapist. There was 1 session per week that lasted 2 hours for 12 consecutive weeks. The aim of Feldenkrais method was to increase awareness about sensory afferents, explore habitual but unconscious muscular patterns, break stereotyped movement patterns, and enable self-care for pain in the neck/scapular area. Feldenkrais method was applied in 2 parallel forms[12]: awareness through movement and functional integration. The awareness through movement lessons was organized around a functional theme and consisted of specialized verbally directed movements to increase the sensorimotor awareness and coordination of different body actions. These lessons were given to the whole group simultaneously. The functional integration lessons were given individually to each participant during the sessions. Functional integration focused on each patient's individual functional problem by using mostly nonverbal guiding techniques. Time was set aside during each session for discussion and reflections on experiencing the movements. At the start of the study, the patients received 3 compact disks containing some of the exercises used during the awareness through movement lessons.[16] They were to be used for home practice between sessions.

The control group underwent no intervention. However, they were ensured participation in Feldenkrais method groups after termination of the current study.

All participants were asked to refrain from seeking additional treatment for their neck/scapular pain during the 12-week intervention period and not to attend any treatment apart from that given by their primary health care providers (usually information on head and shoulder posture, movement exercises, analgesics) during the 1-year follow-up period.

Outcome measure

The visual analog scale[17] (VAS) was rated over a range from 0 (no pain) to 100 (unbearable pain) during standardized palpation of the left and right occipital, upper trapezius, and levator scapulae muscle areas, which are related to neck/scapular pain.[18,19] The palpations were performed by a trained physical therapist who was blinded to the participant's group allocation.

A questionnaire containing the Visual, Musculoskeletal, and Balance Complaints questionnaire[8] and Medical Outcomes Study 36-Item Short-Form Health Survey[20] (SF-36) was sent to the participants. The Visual, Musculoskeletal, and Balance Complaints questionnaire is a self-rating questionnaire that consists of 15 items with 5 questions covering the visual, musculoskeletal, and balance complaints experienced during visual activities, respectively. Each item is rated on a scale from 1 (no problem) to 10 (always a problem). The 3 subscales have reasonable reliability with Cronbach α coefficients ranging from .81 to .88.[8] In the present study, only data from the Visual, Musculoskeletal, and Balance Complaints questionnaire, muscular complaints subscale were used.

The SF-36 is a self-rating generic measure multipurpose health survey with 36 questions. It yields an 8-scale profile of functional health and well-being scores.[20] In the present study, only data from the SF-36 bodily pain scale were used. The SF-36 bodily pain scale is based on 2 pain-related items in the SF-36 and ranges between 0 and 100. Higher scores represent greater functionality and well-being (ie, high scores on the SF-36 bodily pain scale represent less severe pain). Previous research on the SF-36 bodily pain scale showed good reliability in general populations in the United States[21] and Sweden.[22]

Masking and blinding

Individuals who collected the data were blinded to the patients' treatment allocation. Because of the nature of the intervention, it was not possible to blind the participants or the Feldenkrais method therapist to treatment allocation. Participants and the therapist were instructed not to reveal intervention allocation to individuals collecting outcome measures.

Data and statistical analysis

Descriptive statistics were conducted using SPSS version 21 software.[a] Differences between the treatment and control groups regarding changes in outcome variables were analyzed on an intention-to-treat basis. If data were missing, the last observation was carried forward. For exploratory reasons, all outcomes were also analyzed per protocol using only available data. These results did not differ from the intention-to-treat analysis, which therefore is presented. Normative distribution analyses on change data showed that they were approximately normally distributed. A Student t test was used to evaluate mean changes in outcome variables between groups and over time. Cohen d was used to measure the effect size of the treatment. The effect size was classified as small when $d \geq 0.2$, medium when $d \geq 0.5$, and large when $d \geq 0.8$. A 2-tailed probability value $<.05$ was considered to indicate statistical significance.

Results

Dropouts

A Consolidated Standards of Reporting Trials flowchart of the dropout rates is shown in figure 1. Five participants were lost to follow-up in each group. There were 2 additional dropouts in each group at 1-year follow-up. Hence, the total dropout rate was 20% in the treatment group and 23% in the control group. Dropouts in the treatment group gave travel time to sessions as the main reason for terminating their participation, whereas dropouts in the control group terminated participation because they were moving to another region or were not interested in continuing (no specific reason given). None of the dropouts reported neck/scapular pain as the reason for leaving the study. The total group of dropouts at 1-year follow-up (n = 14) did not differ significantly from the nondropouts (n = 47) regarding baseline age; sex ratio; VAS; Visual, Musculoskeletal, and Balance Complaints questionnaire, muscular complaints subscale; or SF-36 bodily pain scale ($P > .20$ for all).

Pretreatment comparisons

There were no significant differences between groups at baseline in regard to the VAS at any of the neck/scapular muscle areas ($P > .10$ for all); Visual, Musculoskeletal, and Balance Complaints questionnaire, muscular complaints subscale ($P > .170$); or SF-36 bodily pain scale ($P > .50$).

Effects of Feldenkrais method

The means and SDs of the VAS data from each of the 6 neck/scapular muscle areas; the Visual, Musculoskeletal, and Balance Complaints questionnaire, muscular complaints subscale ratings; and the SF-36 bodily pain scale scores are given in table 2. In the treatment group, no significant change was found between baseline and follow-up or the 1-year follow-up at any neck/scapular muscle areas. In the control group, however, a significant increase in pain was found at the occipital (left and right) and trapezius muscle areas during the follow-up, and these changes were still significant at 1-year follow-up. When comparing the differences among the baseline and 2 follow-ups in both groups (table 3), the treatment group had significantly less pain in the left occipital and trapezius muscle areas (left and right) than the control group during follow-up. At 1-year follow-up, the treatment group had significantly less pain in the left occipital and right trapezius muscular areas than the control group. In addition, the pain in the levator scapulae areas (left and right) from baseline to 1-year follow-up in the treatment group was significantly lower than observed in the control group.

As shown in table 2, the Visual, Musculoskeletal, and Balance Complaints questionnaire, muscular complaints subscale ratings significantly decreased at posttreatment follow-up and 1-year follow-up compared with baseline in the treatment group. In the control group, however, no significant difference was found between the baseline and 2 follow-ups. In addition and shown in table 3, the decrease in the Visual, Musculoskeletal,

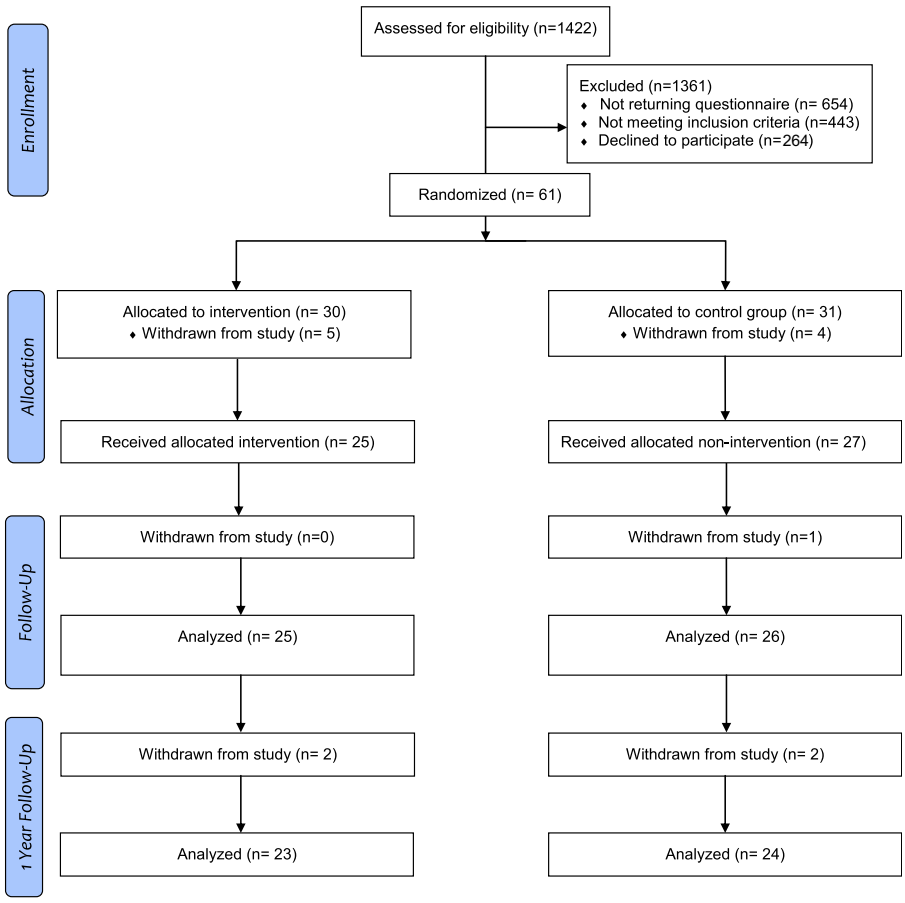

Fig 1 Consolidated Standards of Reporting Trials flowchart of the 2 arms of the study.

and Balance Complaints questionnaire, muscular complaints subscale at follow-up in the treatment group was significantly larger than the decrease in the control group. Finally, no significant change was found in the SF-36 bodily pain scale scores at posttreatment follow-up and 1-year follow-up, either within or between groups. For all outcome variables, the effect size of the significant changes was medium to large.

Adherence

Mean adherence to the Feldenkrais method sessions in the treatment group (sessions completed/total number of possible sessions) was 64.3%. Among the 25 patients in the Feldenkrais method group at follow-up, 18 (72%) completed >50% of the exercise sessions, 6 (24%) completed 25% to 49%, and 1 (4%) attended <25% of the sessions.

Discussion

The study showed that Feldenkrais method was associated with a positive change in neck/scapular pain with a medium to large effect size on statistically significant outcome variables. However, the outcome was asymmetrical. That is, in regard to the VAS during palpation, the pain worsened in the control group but was approximately the same in the treatment group. In contrast, in regard to the Visual, Musculoskeletal, and Balance Complaints questionnaire, muscular complaints subscale, the pain decreased in the treatment group but was approximately the same in the control group. There was no significant change in the SF-36 bodily pain scale.

This asymmetrical result may in part be explained by the way the outcome variables were measured. The VAS was measured during palpation on muscular sites, therefore unveiling any latent sources of pain. The Visual, Musculoskeletal, and Balance Complaints questionnaire, muscular complaints subscale, on the other hand, is an unobtrusive measure of pain, therefore revealing the actual unprovoked experience of pain. The VAS and Visual, Musculoskeletal, and Balance Complaints questionnaire, muscular complaints subscale would therefore measure different aspects of pain, which is suggested by an observed positive but weak correlation ($r=.224$, $P=.082$). In addition, the result is consistent with pain sensitization.[23] That is, repeated exposure to pain lowers the threshold for pain and increases responsiveness to later stimuli. Consequently, left untreated, neck/scapular pain may increase over time (as indicated by the VAS in the control group), whereas pain development may halt (as indicated by the VAS in the treatment group) or decrease when treated. However, more measurements before and after any intervention are needed to test this hypothesis more firmly.

On the level of change in pain, the results of the present study are in keeping with previous evaluations on workers who are women,[14] showing that Feldenkrais method is efficient in reducing chronic neck/scapular pain in individuals with visual impairment. It could point to a secondary longer-term consequence of a new strategy of motor control leading to a less pain-motivated pattern

Table 2 Perceived pain on the VAS during palpation of neck/scapular muscle areas, VMB-M scores, and SF-36-BPS scores at baseline, follow-up, and 1-year follow-up

Outcome Variable	Baseline	Follow-Up	1-y Follow-Up
Treatment group (n=30)			
VAS			
Occipital left	32.2±23.4	33.0±23.3	50.0±28.3
Occipital right	30.8±25.7	33.3±27.3	32.2±22.3
Trapezius left	39.6±29.4	40.1±28.1	37.6±27.3
Trapezius right	53.2±28.5	52.5±28.4	43.4±28.2
Levator scapulae left	42.1±29.6	39.3±29.3	54.9±24.5
Levator scapulae right	49.8±28.0	50.0±28.3	35.5±26.1
VMB-M	6.8±1.6	5.6±1.7*	5.8±1.7*
SF-36-BPS	46.9±21.1	48.9±22.7	47.6±22.0
Control group (n=31)			
VAS			
Occipital left	25.8±21.3	40.5±23.9*	39.4±22.3*
Occipital right	34.8±23.7	44.2±26.1†	47.2±25.0‡
Trapezius left	27.5±21.5	46.5±26.0*	43.3±23.8*
Trapezius right	39.7±23.7	58.7±22.6*	59.2±23.1*
Levator scapulae left	35.8±26.4	41.8±19.6	42.7±23.0
Levator scapulae right	49.1±23.8	55.3±23.2	55.4±24.5
VMB-M	6.2±1.6	5.8±2.1	5.6±2.2
SF-36-BPS	51.4±28.5	52.9±22.6	47.2±23.0

NOTE. Values are mean ± SD.
Abbreviations: SF-36-BPS, SF-36 bodily pain scale; VMB-M, Visual, Musculoskeletal, and Balance Complaints questionnaire, musculoskeletal complaints subscale.
* $P<.001$ compared with baseline.
† $P<.05$; ‡ $P<.01$.

of behavior (eg, less avoidance, less guarding, less recuperation). However, none of the participants in the present study were totally relieved of neck/scapular pain at follow-up or 1-year follow-up. This is consistent with prognostic studies that have noted the persistent, often recurrent, nature of nonspecific neck/scapular pain.[24] A slow recovery rate is to be expected given the chronic nature of the neck/scapular pain and given that the participants have had neck/scapular pain for 23 years on average. Therefore, the results were deemed acceptable. It is possible that an extension of the treatment period or more frequent sessions would result in total relief of pain for some individuals, but further research is needed to determine if this is true.

Table 3 Differences in outcome variable change between treatment group and control group

	Baseline vs Follow-Up		Baseline vs 1-y Follow-Up	
Outcome Variable	ΔM±SE	*d*	ΔM ±SE	*d*
VAS				
Occipital left	−14.17*±5.01	.75	−13.67*±5.03	.71
Occipital right	−7.82±5.66	.36	−6.92±5.39	.32
Trapezius left	−18.50*±6.18	.78	−11.04±6.25	.46
Trapezius right	−19.67†±5.83	.88	−18.65*±5.79	.84
Levator scapulae left	−8.87±6.06	.38	−12.69‡±5.61	.59
Levator scapulae right	−5.99±5.91	.26	−15.64*±5.76	.71
VMB-M	−0.83‡±0.40	.53	−0.34±0.37	.24
SF-36-BPS	0.45±5.17	.02	4.83±6.32	.20

Abbreviations: *d*, Cohen *d* effect size ≥0.2 (small), ≥0.5 (medium), and ≥0.8 (large); ΔM, mean difference; SE, standard error of mean difference; SF-36-BPS, SF-36 bodily pain scale; VMB-M, Visual, Musculoskeletal, and Balance Complaints questionnaire, musculoskeletal complaints subscale.
* $P<.01$; † $P<.001$; ‡ $P<.05$.

The present study used different outcome variables of pain, and the follow-up period was relatively long (1y), which enabled us to evaluate whether observed effects of the Feldenkrais method intervention were short and transient. However, because we did not include any other treatment arms, we cannot conclude whether Feldenkrais method is more effective than other therapies.

Study limitations

A potential limitation of this study, as with most nonmedical intervention studies, is that it is not able to blind patients or therapists to treatment allocation. Therefore, we cannot rule out influences of nonblinding on the participants responses. Another limitation is that about one fifth of the participants were lost at 1-year follow up. This dropout rate, however, is below the recommended 30% limit for long-term studies.[25] Because the dropouts did not differ on any outcome variable, it is unlikely the dropouts biased the results.

Conclusions

This study demonstrated positive effects of Feldenkrais method, suggesting that there is reason for practitioners and their patients with visual impairments to evaluate the use of Feldenkrais method for chronic neck/scapular pain.

Supplier

a. SPSS Inc, 233 S Wacker Dr, 11th Fl, Chicago, IL 60606.

Keyword

Neck pain; Randomized controlled trials; Rehabilitation; Treatment outcome; Visual impairment

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