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A Randomized Controlled Trial Evaluating the Effects of New Task Chairs on Shoulder and Neck Pain Among Sewing Machine Operators

The Los Angeles Garment Study

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Study Design. This is a 4-month randomized controlled trial to evaluate the effect of chair design on neck/shoulder pain among sewing machine operators.

Objective. Determine whether a chair with a curved seat pan leads to improved changes in monthly neck/shoulder pain scores compared with a control intervention.

Summary of Background Data. Sewing machine operators experience a high prevalence and severity of neck and shoulder pain in comparison to other working populations probably due to the sustained shoulder abduction and neck and upper back flexion required of the task. An adjustable height task chair that supports a forward sitting posture may reduce these posture-related risk factors and reduce neck/shoulder pain.

Materials and Methods. A total of 277 sewing machine operators with neck/shoulder pain were assigned to receive 1) miscellaneous items (control group), 2) a chair with a flat seat pan plus miscellaneous items, or 3) a chair with a curved seat pan plus miscellaneous items. Participants completed a monthly questionnaire assessing neck/shoulder pain severity.

Results. Based on estimates of pain score changes from a repeat-measures linear regression, participants who received the flat seat chair experienced a decline in pain of 0.14 (95% confidence interval, 0.07–0.22) points per month compared with those in the control group, while those who received the curved seat experienced a decline of 0.34 (95% confidence interval, 0.28–0.41) points per month compared with those in the control group. These estimates did not change after adjustment for potential covariates.

Conclusions. These findings demonstrate that an adjustable height task chair with a curved seat pan can reduce neck and shoulder pain severity among sewing machine operators.

Key words: neck pain, shoulder pain, randomized controlled trial, occupational health, chair design. **Spine 2007; 32:931–938**

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It has been reported that sewing machine operators experience more chronic neck or shoulder pain than other working populations.[1–5] In a cross-sectional study of 224 sewing machine operators, 67% reported neck or shoulder pain; based on physical examinations, 24% were diagnosed with tension neck syndrome and 20% with cervical syndrome.[6] In another study, physical examinations were performed on sewing operators and hospital workers randomly sampled from age-matched strata. Sewing machine operators received diagnoses of cervical syndrome, cervicobrachial fibromyalgia, and rotator cuff syndrome more often than hospital workers.[7]

In 2000, the garment industry employed 11 million workers worldwide with approximately 350,000 workers in the United States.[8] The Los Angeles basin is home to the largest garment production center in the United States. Most of the work is done by minimum wage, nonunion, immigrant women in shops that employ fewer than 20 people.[9] Sewing machine operators perform precision tasks at a relatively fast pace with work cycles of 30 to 60 seconds. This repetitive, stereotyped work is typically performed on nonadjustable workstations and chairs. The task demands and the lack of adjustability of the workstations may lead to sustained awkward postures, such as cervical and thoracic spine flexion and shoulder elevation and abduction (Figure 1), which may result in elevated rates of neck and shoulder pain.[6,7,10–13]

A pilot study by our group, carried out at sewing shops in Oakland, CA, evaluated a variety of workstation interventions with the goal of reducing neck, thoracic and lumbar spine flexion, shoulder elevation, and shoulder abduction during garment work. Examples of the workstation changes we studied were: sloping of the work surface toward the operator; adding side tables to support the material and reduce reach; providing reading glasses; adding task lamps; providing a foam wedge for the seat; providing a new chair; and adding a foot rest. Ultimately, the intervention that appeared most likely to reduce risk factors for neck and shoulder pain was a new task chair with a curved, 2-part seat pan (Figure 2) based on principles proposed for industrial work.[14–16] Theoretically, the 2-part seat pan supports the forward leaning posture by allowing a more

Figure 1. Typical posture of sewing operator with a conventional chair. Note flexed postures of thoracic and cervical spine and abduction of shoulder. Note also that the operator increased the height of the chair with paper cones.

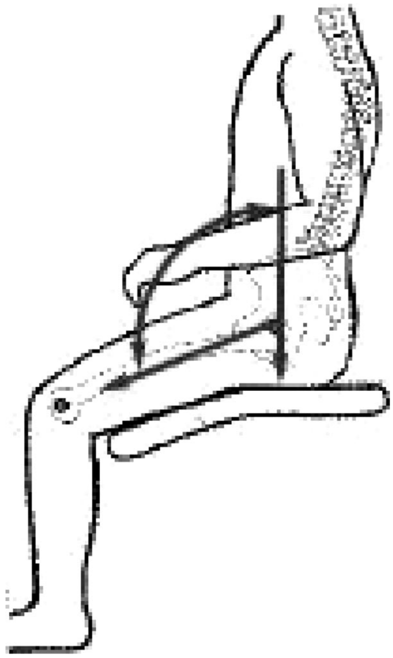

Figure 2. Design concept for a task chair with a 2-part, curved seat pan, which supports forward leaning by allowing a more open thigh-torso angle and preserving lumbar lordosis.

open thigh-torso angle, thereby retaining the lumbar curvature and a less kyphotic thoracic spine. The pelvis is supported on the more horizontal rear part of the seat to prevent forward sliding associated with a forward sloping seat pan. The seat was also adjustable in height and slope to accommodate different task demands and employees of different stature.

The purpose of the intervention study we are reporting here was to compare the impact of this new task chair, a conventional task chair, and a placebo intervention on neck and shoulder pain in industrial sewing operators. The primary outcomes evaluated were monthly neck and shoulder pain severity. The null hypothesis was that the change in neck and shoulder pain scores would be the same in all 3 intervention groups over a 4-month period.

Materials and Methods

Subjects and Shops. This is a randomized controlled trial with 2 treatment arms and 1 control arm with repeated outcome assessments over a 4-month period. Subjects were recruited from a convenience sample of 13 garment shops in Los Angeles, CA. The types of garments sewn in these shops included shirts, jackets, gowns, lingerie, blouses, skirts, pants, and jeans. All employees were eligible to participate if they performed sewing machine work for more than 20 hours per week, were not in a probationary period, had worked for at least 3 months, and did not have an active workers' compensation claim. The majority of the sewing machine operators worked on single/double needle straight-stitch, overlock, and cover-stitch machines. The study was approved by the Offices for the Protection of Research Subjects at the University of California, Los Angeles, and all participants provided written informed consent.

Interventions. A typical sewing workstation has a flat surface (51×122 cm) that can be adjusted by a mechanic to heights of 76 to 86 cm, but the height is usually fixed at 76 cm. The chairs are usually fixed height, made of metal or wood, with flat, padded seat pans. The work surface is usually above elbow height. Lighting varies widely between shops with some having very poor lighting to others with good general and task lighting.

Subjects were randomized to 3 groups: 1) the control group, which received miscellaneous items, 2) intervention group, with curved seat pan chair and miscellaneous items, and 3) intervention group, with flat seat pan chair and miscellaneous items. The curved seat pan chair (Figure 3) was custom designed for use in the garment industry based on the principles discussed in the introduction. The seat pan (43 cm depth $\times$ 46 cm wide) had 2 surface elements: a horizontal rear half and downward sloping front half and included a fore/aft tilt mechanism (11° range). It also included a short height back support with a lumbar curve (30 cm wide $\times$ 28 cm high, 23° pitch) (Soma Ergonomics, Berkeley, CA). The flat seat pan group received a conventional task chair with a flat seat pan (46 cm depth $\times$ 48 cm wide) and a flat backrest with minimal lumbar and sacral support (36 cm wide $\times$ 41 cm high) (model BH3J, Soma Ergonomics, Berkeley, CA). The back support was taller on this chair to provide the appearance of substantial support and importance. The other features of the chairs were identical: seat pan cushioning and cover material, seat pan range of height adjustment (38–50 cm), the chair swivel, and glides were used for the floor interface, not casters.

The miscellaneous items provided to all subjects were a footrest, a small table-top storage box for items such as scis-

Figure 3. The task chair with a flat seat pan is on the left, and the chair with a curved seat pan is on the right. Both chairs are adjustable in height. The chairs have no castors so that they do not move during sewing.

sors, a side table, a task lamp, and reading glasses. The miscellaneous items could be used or rejected by the subjects. The side table (61 cm wide × 46 cm high × 91 cm long) was designed to support bundles of garments or fabric. The task lamp was fluorescent with a long adjustable arm (DS-98K, Kanasm, Korea) that generated less heat than the usual lamps. Subjects were offered glasses for use during garment work and could choose from a selection of reading glasses (strength 125 to 400, [1/4] diopter increments). Only 41 of 277 subjects elected to use the glasses. If the sewing pedal was narrow and could only be used by 1 foot, a footrest was provided to support the other foot.

Those receiving a new chair were instructed to adjust the seat pan height and slope so that the feet were comfortably supported on the footrest and pedal, the table was slightly below the elbow height, and the pressure was evenly distributed under the thighs, and the backrest provided support in the lower back. The use of the assigned interventions by workers was confirmed at a visit to the worksite 1 month after the intervention.

Data Collection. Participants completed a baseline questionnaire 1 to 2 months before the beginning of the intervention period, then completed 4 follow-up symptom questionnaires at 1-month intervals following the intervention. All information was collected in face-to-face interviews conducted in the language of the participant (Spanish, Cantonese, Mandarin Chinese, or English).

The baseline questionnaire elicited information on: symptoms, demographic factors, work-organizational factors, and work-related psychosocial factors.[17] Musculoskeletal symptom intensity and frequency in the past 4 weeks were assessed by asking each subject to self-report pain frequency and pain intensity for 6 body regions. Work factors included the number of different sewing machines operated; variety of tasks performed (number of different types of sewing tasks performed in the past 4 weeks), pay method (piece rate *vs.* hourly rate), shop size, years of employment in the garment industry, hours and days worked per week, maximum work cycle, total amount of time at rest in a day, number of rest periods in a day, and the work-rest ratio. Psychosocial work characteristics included 33 items from the Job Content Questionnaire.[18]

The monthly questionnaire was administered by trained interviewers at the workplace and elicited information on: days and hours worked in the past month, machines used, sewing tasks performed, pain during the last month, and workplace changes. For 6 body regions, including neck and shoulder, subjects were asked if they had any pain that bothered them for 1 or more days in the past month. They rated the intensity of the pain on a 5-point numerical scale, with 1 being "a little painful" to 5 being "very painful."

Data Analysis. Data analysis followed an intention-to-treat approach applied to the subset of participants who at baseline reported having experienced neck or shoulder pain in the past month. The primary outcome was the change in pain intensity scores from the 4 monthly questionnaires following the intervention. Pain score change over time comparing the 2 treatment arms and the control arm was analyzed using a repeat-measures linear regression model with a first-order autoregressive covariance structure. Specifically, the slope of pain score change in the control group was set to zero, and the estimates for the 2 intervention groups are presented here as the difference in the slope of pain score change comparing the 2 intervention groups and the control group. Power calculations predicted an ability to detect a difference of 50% in the change in pain scores with sample sizes of 150 per group (beta = 0.2, alpha = 0.05). Missing data on the monthly symptom questionnaire were imputed by replacing the missing value with the mean pain score from the same treatment group at the corresponding time point. Potential effect measure modification, due to baseline pain, age, gender, days worked per week, was assessed in *post hoc* stratified analyses to evaluate the nonuniformity of the intervention effects across categories of these factors. The choice for these predictors and their particular cutoff values were based on results from a cross-sectional analysis.[18] All statistical analyses were performed using statistical software SAS, version 9.1 (SAS Institute, Cary, NC).

Results

Between October 2003 and March 2005, 13 of 29 garment shops contacted agreed to participate. From these shops, 560 subjects were contacted, 520 were eligible, agreed to participate in this study, and completed the baseline questionnaire. Fourteen (2.5%) subjects refused to participate and 21 (3.8%) subjects did not meet the eligibility criteria. Detailed demographic data for the 520 subjects were presented elsewhere.[18] Before randomization of these potential participants to our interventions, 40 dropped out, leaving 480 subjects for participation and randomization. A flow chart tracking the number of subjects from recruitment to study completion is presented in Figure 4.

Of the 480 participants that we randomized into 3 groups, 277 (57.7%) reported neck or shoulder pain in the past month on the baseline questionnaire. The mean pain score at baseline was 2.4 (±1.0); 50.2% reported a pain score of 3 or more and 11.9% reported a pain score of 4 or more. All participants were immigrant workers, with a mean age of 37.4 years (range, 18–65 years); the majority were female (65.7%), Hispanic (73.3%) or

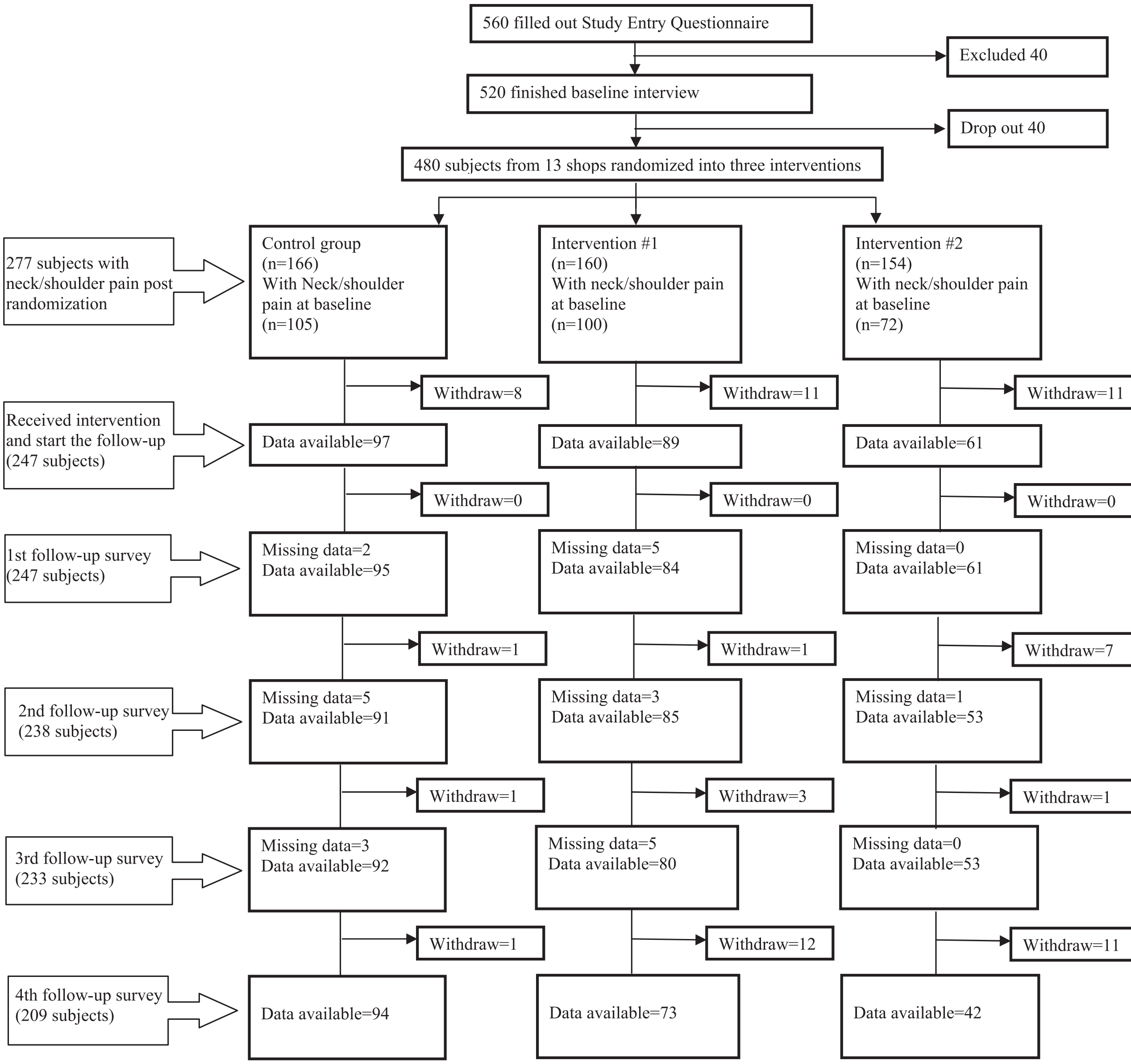

Figure 4. Flow chart tracking subjects from recruitment to study completion.

Asian (23.8%). Other characteristics of the participants were that 57.8% were overweight (body mass index >25), only 5.4% were current smokers, 43% had less than high school education, 85.6% had no health insurance, 81.2% had lived in the United States for more than 5 years, and 92.3% could speak only a few words or less of English. Differences in the demographic characteristics of the participants by treatment group were generally small (Table 1). However, some potential risk factors were not evenly distributed across groups, including gender, age, ethnicity, body mass index, education level, and years living in the United States.

From the time of randomization to the implementation of the interventions in the work places, 30 (10.8%) participants with neck or shoulder pain were lost to follow-up, leaving 247 subjects with neck or shoulder pain who received an intervention. Altogether, 25.4% of participants withdrew from the study after randomization: 30 (10.8%) before receiving an intervention, 0 (0%) at the first month, 9 (3.2%) at the second month, 5 (1.8%) at the third month, and 24 (8.7%) at the fourth month. During the 4-month follow-up, 24 monthly questionnaires (2.9% of all monthly questionnaires) were missing.

The unadjusted change in neck or shoulder pain severity scores over time by treatment group are presented in Figure 5a. The treatment group data adjusted to the pain score changes in the control group (slope = 0) are presented in Figure 5b. In the unadjusted analysis, the mean pain score in the control group increased over the follow-up period. In the flat chair intervention group, the pain also worsened over the follow-up period but the magnitude of increase was less than in the control group. In the curved chair intervention group, there was an improvement in mean pain scores during the follow-up period. We estimated significant differences in all 3 pairwise comparisons at each follow-up time point. In the repeated-measures linear regres-

Table 1. Demographic Characteristics of Subjects by Intervention Group

		Control Intervention (n = 105)		Flat Seat Intervention (n = 100)		Curved Seat Intervention (n = 72)	
Variable	Category	No.	%	No.	%	No.	%
Gender	Female	71	67.6	67	67.0	43	59.7
	Male	34	32.4	33	33.0	29	40.3
Age group (yr)	Mean (SD)	38.1	(8.5)	37.2	(9.2)	36.5	(10.7)
	<30 yr	19	18.1	18	18.0	26	36.1
	30–39 yr	42	40.0	41	41.0	14	19.4
	40–49 yr	33	31.4	30	30.0	22	30.6
	≥50 yr	11	10.5	11	11.0	10	13.9
Ethnicity	Asian/Pacific Islander	0	0.0	40	40.0	26	36.1
	Hispanic	103	98.1	55	55.0	45	62.5
	White	2	1.9	5	5.0	1	1.4
Marital status	Live alone	26	25.7	20	23.0	14	24.1
	Cohabitating but not married	38	37.6	20	23.0	9	15.5
	Married but separated	20	19.8	13	14.9	13	22.4
	Married and lives with spouse	17	16.8	34	39.1	22	37.9
Children at home	None	23	21.9	24	24.0	19	26.4
	≤5 yr	34	32.4	31	31.0	22	30.6
	>5 yr	48	45.7	45	45.0	31	43.1
BMI (kg/m^2)	Mean (SD)	27.4	(4.4)	24.8	(4.2)	26.1	(4.0)
	Underweight (<18.5)	0	0.0	2	2.2	0	0.0
	Normal (18.6–24.9)	30	28.8	52	57.1	25	39.7
	Overweight (25–29.9)	51	49.0	29	31.9	28	44.4
	Obese (>29.9)	23	22.1	8	8.8	10	15.9
Physical activity	None	42	40.0	38	38.0	24	33.3
	Less than once per week	5	4.8	8	8.0	8	11.1
	Once or twice per week	34	32.4	33	33.0	27	37.5
	Three or more times per week	24	22.9	21	21.0	13	18.1
Smoking	None	88	83.8	91	91.0	59	81.9
	Past smoker	11	10.5	6	6.0	7	9.7
	Current smoker	6	5.7	3	3.0	6	8.3
Medical history of systemic illness	No	86	81.9	82	82.0	57	79.2
	Yes	19	18.1	18	18.0	15	20.8
Medical history of musculoskeletal disorders	No	96	91.4	87	87.0	62	86.1
	Yes	9	8.6	13	13.0	10	13.9
Health insurance	No	88	83.8	88	88.0	61	84.7
	Yes	17	16.2	12	12.0	11	15.3
Education	Primary	61	58.1	31	31.0	27	37.5
	High school	39	37.1	63	63.0	41	56.9
	University or above	5	4.8	6	6.0	4	5.6
Years in United States	Mean (SD)	15.9	(8.0)	10.8	(5.9)	9.6	(5.4)
	<5 yr	12	11.4	21	21.0	19	26.4
	5–10 yr	10	9.5	20	20.0	21	29.2
	10–20 yr	25	23.8	37	37.0	21	29.2
	>20 yr	58	55.2	22	22.0	11	15.3
English ability	None at all	14	13.3	19	19.0	13	18.1
	Only a few words	84	80.0	74	74.0	49	68.1
	Enough to get by	5	4.8	7	7.0	10	13.9
	Very well	2	1.9	0	0.0	0	0.0

sion model, the difference in the slope of pain score change was 0.14 (95% confidence interval, 0.07–0.22) points (on a 0–5 scale) per month between the flat chair intervention group and the control group, while the difference in the slope of pain score change was 0.34 (95% confidence interval, 0.28–0.41) per month between the curved chair intervention group and the control group. Adjustment for 7 covariates (Table 2) did not significantly change the findings from the crude analysis.

The results from the *post hoc* stratified analyses are shown in Table 3. Participants in the curved chair intervention group with baseline pain score ≤2 had slightly more pain improvement than those with a baseline pain score >2. Participants with a history of systemic illness had larger improvement in mean pain scores in both intervention groups than those without a history of systemic illness. Participants in the curved chair intervention group who had less total rest time, low job control, low job demands, low social support, and high perceived physical isometric workload (all examined separately) had larger pain improvement, compared with their counterparts. No significant differences in the estimates for the intervention effects on pain improvement were found when stratifying according to the following factors: ethnicity, medical history of MSD, workdays per week, perceived physical workload, number of rests in a day, pay

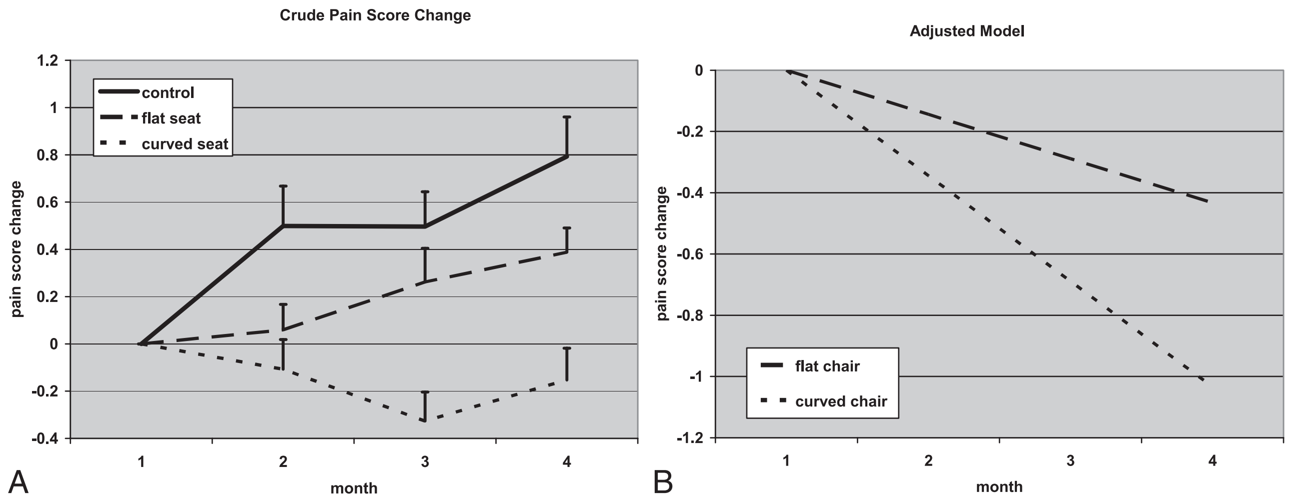

Figure 5. Pain score changes between months 1 and 4. Crude pain score changes (**A**) and model of pain score slope relative to control group (**B**).

method, job stress, job dissatisfaction, job security, perceived physical exertion, and perceived physical workload (data not shown).

At the end of the study, subjects completed a brief exit interview. Most subjects reported that it took less than 5 days to get used to the study workstation setup (control group, 90.1%; flat seat group, 50.0%; curved seat group, 67.3%). When asked how they felt about the new workplace design compared with their old setup, almost all reported that it was better or much better (control group, 91.2%; flat seat group, 92.7%; curved seat group, 89.8%).

Discussion

This study demonstrates that garment workers with neck or shoulder pain who are provided with an adjustable height, flat seat pan task chair will experience less neck or shoulder pain over a 4-month period compared with a control group. Garment workers provided with an adjustable height, curved seat pan task chair experience an even greater decline in neck or shoulder pain. The protective effect of the chairs persisted after adjustment for potential confounders. Based on the *post hoc* stratified analysis, the beneficial effects of the curved seat pan chair was somewhat greater for garment workers who had less pain at baseline, reported a history of systemic illness, total rest time at work less than 35 minutes, low job control, low job demands, low social support, and greater isometric work load.

The effect size for the pain reduction over the 4 month period for the curved chair is 0.70 (0.94/1.24, score change/SD of change score), a moderate effect. Unfortunately, other outcome measures, such as the Neck Disability Index,[19] were not used to assess the clinical relevance of this change. However, the baseline pain severity (2.4 ± 1.0 on a 5-point scale) reported by garment workers is similar, after normalization, to that reported by patients seeking care in general practitioner offices for neck and shoulder symptoms (5.1 ± 2.2 on a 10-point scale).[20]

Herbert *et al*[21] demonstrated that the introduction of chairs with adjustable height seat pans and back rests among 36 garment workers could reduce symptom severity in the neck, shoulder, elbow, and forearm regions over a 6-month period. A limitation of the study was the absence of a concurrent control group. As discussed in

Table 2. Unadjusted and Adjusted Estimates (95% CI) of Difference in Slopes of Pain Score Change Over Time Based on the Repeated-Measures Linear Regression Models

Covariate	Flat Seat Intervention	Curved Seat Intervention	Difference Between Curved and Flat Seat
Unadjusted	−0.14 (−0.22, −0.07)	−0.34 (−0.41, −0.28)	−0.20 (−0.29, −0.10)
Adjusted variables			
Age	−0.12 (−0.21, −0.03)	−0.31 (−0.39, −0.23)	−0.19 (−0.29, −0.09)
Gender	−0.11 (−0.20, −0.02)	−0.31 (−0.39, −0.23)	−0.20 (−0.30, −0.10)
Ethnicity	−0.11 (−0.20, −0.02)	−0.31 (−0.39, −0.23)	−0.20 (−0.29, −0.10)
Education level	−0.11 (−0.20, −0.02)	−0.31 (−0.39, −0.23)	−0.20 (−0.30, −0.10)
Years in United States	−0.12 (−0.21, −0.03)	−0.31 (−0.39, −0.23)	−0.19 (−0.29, −0.10)
BMI	−0.11 (−0.20, −0.02)	−0.31 (−0.39, −0.23)	−0.20 (−0.30, −0.10)
Shop type (small/large)	−0.11 (−0.20, −0.02)	−0.31 (−0.39, −0.23)	−0.20 (−0.30, −0.11)

The first two columns show the estimates of difference in slopes of pain score change over time between two intervention groups and the control group, and last column shows the difference in slopes between two intervention groups (*i.e.*, slope of control group was set to 0).

Table 3. Estimates (95% CI) of Difference in Slopes of Pain Score Change Over Time Based on the *Post Hoc* Stratified Analyses

Covariate	Flat Seat Intervention	Curved Seat Intervention	Difference Between Curved and Flat Seat
Baseline pain score			
≤2 (n = 138)	−0.13 (−0.28, 0.01)	−0.37 (−0.51, −0.24)	−0.24 (−0.38, −0.10)
>2 (n = 139)	−0.14 (−0.31, 0.03)	−0.31 (−0.45, −0.16)	−0.17 (−0.34, 0.01)
History of systemic illness			
With (n = 52)	−0.21 (−0.45, −0.01)	−0.51 (−0.72, −0.30)	−0.29 (−0.61, −0.02)
Without (n = 225)	−0.13 (−0.20, −0.05)	−0.31 (−0.37, −0.25)	−0.18 (−0.27, −0.09)
Total rest time per day			
≤35 min (n = 40)	−0.09 (−0.28, −0.09)	−0.42 (−0.59, −0.26)	−0.32 (−0.55, −0.10)
>35 min (n = 237)	−0.14 (−0.22, −0.06)	−0.31 (−0.37, −0.24)	−0.17 (−0.27, −0.06)
Job control			
High (n = 141)	−0.12 (−0.21, −0.04)	−0.27 (−0.35, −0.20)	−0.15 (−0.27, −0.03)
Low (n = 136)	−0.17 (−0.29, −0.05)	−0.45 (−0.55, −0.35)	−0.27 (−0.43, −0.12)
Job demands			
High (n = 135)	−0.09 (−0.19, 0.01)	−0.30 (−0.38, −0.21)	−0.21 (−0.34, −0.07)
Low (n = 142)	−0.21 (−0.31, −0.11)	−0.41 (−0.49, −0.32)	−0.20 (−0.33, −0.06)
Social support			
High (n = 178)	−0.14 (−0.24, −0.05)	−0.30 (−0.37, −0.22)	−0.15 (−0.28, −0.03)
Low (n = 99)	−0.15 (−0.26, −0.03)	−0.44 (−0.55, −0.33)	−0.29 (−0.46, −0.14)
Perceived physical isometric workload			
High (n = 118)	−0.18 (−0.28, −0.08)	−0.44 (−0.53, −0.35)	−0.26 (−0.40, −0.13)
Low (n = 158)	−0.07 (−0.18, 0.03)	−0.22 (−0.31, −0.14)	−0.15 (−0.28, −0.02)

The first two columns show the estimates of difference in slopes of pain score change over time between two intervention groups and the control group. The last column shows the difference in slopes between two intervention groups (*i.e.*, slope of control group was set to 0).

the introduction, chair height adjustment, especially increasing the height relative to a conventional chair height, may allow sewing to be done with less shoulder abduction and thereby reduce shoulder muscle load and pain. In addition, the curved seat pan may support a more forward leaning posture and preserve lumbar lordosis and reduce cervical and thoracic spine flexion. A limitation of our study is that we did not measure seat height changes nor the shoulder, neck, or thoracic postures after the intervention.

Other potential limitations of our study include the small number of shops involved, the loss to follow-up, and the lack of blinding of subjects. The 13 shops studied were a sample of convenience, but the size of the shops and the ethnicity of their employees are representative of the garment shops in the Los Angeles area.[9] Approximately 25% of subjects dropped out or were lost to follow-up during the course of the study. Most of this loss was due to subjects leaving the job. Strengths of the study were the high participation rate of subjects within shops, the large sample size, and the excellent compliance with use of the primary interventions (*e.g.*, chairs). Another possible source of bias is that it was not possible to blind subjects to their intervention. However, the large number of miscellaneous items given to all study participants appears to have masked the items which were really being evaluated (*e.g.*, chairs), as was intended. All 3 groups perceived their intervention equally positively.

■ Conclusion

The study demonstrates that garment workers may experience a decline in neck/shoulder pain if they are provided with adjustable height task chairs, especially if the chair has a forward curved seat pan. The beneficial effects were slightly greater for garment workers with a systemic medical illness and for those who perceived a high physical isometric workload. The findings may be generalizable to other seated jobs that are visually demanding and involve the repetitive manipulation of material or parts. Healthcare providers may consider recommending an adjustable height task chair with a curved seat pan for patients with neck or shoulder pain who are garment workers or who perform forward sitting tasks. Finally, owners of sewing companies should consider providing such a task chair for their employees as a way of reducing pain and loss of trained workers due to impaired health.

■ Key Points

- Garment workers experience a high prevalence of neck/shoulder pain.
- A task chair with an adjustable height curved seat pan may reduce pain in the neck/shoulder region.
- A chair with a flat seat pan may also reduce pain, but not by as much.

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