A randomized, controlled study of the pain- and tension-reducing effects of 15 min workplace massage treatments versus seated rest for nurses in a large teaching hospital

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A randomized, controlled study of the pain- and tension-reducing effects of 15 min workplace massage treatments versus seated rest for nurses in a large teaching hospital.
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OBJECTIVES: To evaluate whether a series of eight 15 min, on-site massage treatments would be effective in reducing pain and tension in nursing staff at a large teaching hospital.

HYPOTHESES: On-site massage treatment would result in reduced pain intensity and tension levels and increased relaxation compared with a control group receiving seated rest.

DESIGN: Randomized, controlled trial of eight sessions of Swedish massage therapy versus eight sessions of seated rest.

PARTICIPANTS: Thirty-two hospital staff (29 registered nurses and three clerical staff) volunteers.

SETTING: Participants were recruited from a tertiary care centre.

OUTCOME MEASURES: Pulse rate (beats/min), pain measured using a 10 cm Visual Analogue Scale (VAS), tension (VAS), relaxation (yes/no) and the Profile of Mood States (POMS) were measured before and after each session.

RESULTS: The groups did not differ significantly on baseline demographic variables or in attendance rates. Post-treatment VAS pain, VAS tension, and total POMS scores showed the same pattern of results: one-way ANCOVAs revealed a significant effect of the covariate (mean pretreatment score averaged across sessions attended) and a significant main effect for groups indicating that post-treatment pain, tension and POMS scores were significantly lower in the massage group than in he seated rest group (all $P<0.001$). A greater proportion of the massage group reported a sense of relaxation, and had pain and tension relief that persisted for up to a day or longer post massage ($P<0.0009$).

CONCLUSIONS: The provision of on-site massage treatments for nursing staff at a large teaching hospital resulted in significant reductions in pain and tension levels and an increase in overall mood compared with a control group that received seated rest.

Key Words: *Massage therapy; Pain; Randomized clinical trial*

Étude randomisée contrôlée sur les effets d'un massage de 15 minutes en milieu de travail sur la douleur et la tension par opposition au repos en position assise pour les infirmières d'un grand hôpital universitaire

OBJECTIFS : Évaluer si une série de huit massages de 15 minutes administrés sur place soulagerait efficacement la douleur et la tension du personnel infirmier d'un grand hôpital universitaire.

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HYPOTHÈSES : Le massage thérapeutique en milieu de travail entraînerait un soulagement de la douleur et de la tension et accroîtrait la relaxation en comparaison avec le repos en position assise.
MODÈLE : Essai randomisé contrôlé de huit séances de massage suédois thérapeutique par rapport à huit séances de repos en position assise.
PARTICIPANTS : Trente-deux membres volontaires du personnel hospitalier (29 infirmières autorisées et trois employés généraux).
CONTEXTE : Les participants ont été recrutés dans un centre de soins tertiaires.
MESURES PARAMÉTRIQUES : Pulsations cardiaques (battements/minute), douleur selon une échelle analogique visuelle, tension selon une échelle analogique visuelle, relaxation (oui, non) et le questionnaire *Profile of Mood States* (POMS) ont servi pour la mesure des paramètres avant et après chaque séance.
RÉSULTATS : Les groupes n'étaient pas significativement différents au départ sur le plan des variables démographiques ou des taux de participation. Les mesures post-thérapeutiques de la douleur, de la tension et les indices POMS globaux ont donné le même type de résultats : l'analyse simple de la covariance a révélé un effet significatif de la covariable (indice préthérapeutique moyen pondéré pour tenir compte des séances appliquées) et un effet principal significatif pour les groupes indiquant que la douleur, la tension et les indices POMS post-thérapeutiques étaient significativement plus bas dans le groupe sous massage thérapeutique que dans le groupe assigné au repos en position assise (tous : $p < 0,001$). Une proportion plus grande du groupe traité par massage a signalé une sensation de relaxation et un soulagement de la douleur et de la tension qui ont persisté pendant au moins un jour ($p < 0,0009$).
CONCLUSION : La prestation de massages thérapeutiques sur place au personnel infirmier d'un grand hôpital universitaire a donné lieu à des réductions significatives de la douleur et une amélioration globale de l'humeur en comparaison avec un groupe témoin assigné à des périodes de repos en position assise.

The growing recognition of the changing work environment and the negative impact of job stress on health (1-3) has led to efforts to reduce workplace stress (4-7), and to facilitate coping and a sense of control (5). Massage therapy is being used with increasing frequency to treat pain, stress and burn-out in the general population (8,9) and among health care professionals (4-6,10,11). Recent randomized, controlled studies have shown massage therapy to be effective in reducing a variety of negative mood states including depression, anxiety, fatigue and confusion (5,10,12,13).

However, because of long working hours and time constraints due to shift work, massage therapy is not a feasible option for hospital nurses unless it can be worksite based. We are not aware of any studies that have assessed the feasibility and efficacy of on-site massage therapy for pain and stress reduction in nurses in a large teaching hospital. The aim of the present study was to evaluate whether a series of eight 15 min, on-site massage treatments would be effective in reducing pain and tension in nursing staff at a large teaching hospital. On the basis of the results of a pilot study, we hypothesized that massage treatment would result in reduced pain intensity and tension levels, and increased levels of relaxation compared with a control group receiving eight sessions of seated rest.

PATIENTS AND METHODS

Approval to carry out the study was obtained from The Toronto Hospital Committee for Research on Human Subjects. All participants gave their informed, written consent to participate before entering the study.

Sample size estimation

Before the beginning of the study, it was estimated that a sample size of 18 patients per group would be required to detect a between-group mean difference in pain of 1.2 cm (measured on a 10 cm Visual Analogue Scale [VAS]) using a type I error rate of 0.05, a Type II error rate of 0.1 (ie, power = 0.9) and a within-group standard deviation of 1.04 cm (14). The mean and SD were obtained from a pilot study carried out with 12 participants undergoing eight massage sessions at The Toronto Hospital, Toronto, Ontario under the same conditions as in the present study. The data obtained from this pilot study reflect the reduction in pain intensity obtained when the mean pretreatment and post-treatment pain scores for the eight sessions were compared by paired Student's *t* test.

Participants

Thirty-four staff members (22 women; 2 men) from four Toronto Hospital units volunteered to participate in the study. These were the Multi-Organ Transplant Unit, two dialysis units and the Post-Anaesthetic Care Unit. Nurses from a fifth nursing unit had volunteered to participate, but the unit was closed down due to institutional downsizing and layoffs before the treatment sessions were scheduled. The mean age of the sample was 39.1 6 years. Twenty-nine participants were registered nurses and three were clerical staff.

Measures

At the beginning of the first session, participants completed a brief questionnaire measuring demographic information. The following three measures were obtained immediately before and after each treatment.

Pulse rate: The radial pulse rate was measured over a period of 60 s.

Pain, tension, headache and relaxation: Participants completed a brief questionnaire that assessed the presence and location of pain and tension in the head, neck or shoulders, as well as the presence of headache and degree of relaxation. The degree of pain, tension and headache was assessed with a 10 cm VAS (15) with end points that were labelled with appropriate descriptors (eg, for pain VAS, 'no pain' and 'worst possible pain'). Relaxation was assessed by a forced-choice (yes/no) question.

Profile of mood states: The profile of mood states (POMS) (16) is a self-administered inventory that assesses six current

mood states: tension-anxiety, depression-dejection, anger-hostility, vigour-activity, fatigue-inertia and confusion-bewilderment using 65 adjectives rated on a five-point Likert scale. A total mood disturbance score can also be calculated that consists of a weighted score from each subscale. The POMS subscales have internal consistency coefficients that range from 0.84 to 0.95 and a fair degree of test-retest reliability (16). In the present study, only the total POMS score was used.

Duration of treatment effects: At the beginning of sessions 2 through 8, participants completed a five-point forced choice evaluation form that assessed the duration of pain relief, tension reduction and relaxation that resulted from the previous session (eg, for pain relief, the five-point scale consisted of 0=no pain to relieve, 1=no pain relief, 2=less than 1 h of pain relief, 3=more than 1 h but less than 24 h of pain relief and 4=more than 24 h of pain relief).

Procedure

Staff were recruited by placing a notice in The Toronto Hospital newsletter and by postings at The Toronto Hospital requesting nursing and nonclinical staff to participate in a research project involving workplace massage treatment. The notice stated that participants would receive either eight weekly, 15 min sessions of head, neck and shoulder massage or eight weekly sessions of seated rest. The following were the exclusion criteria for the study: recent head, neck or shoulder surgery, pins or joint fusion in the head or neck, a diagnosis of cancer, epilepsy, anemia or diabetes, or a history of easy bruising, earaches, sinus infections or vascular migraines.

After written informed consent had been obtained, participants were randomly assigned to receive either eight 15 min massage treatments or eight sessions of seated rest. A randomization schedule was prepared before the study that indicated the group to which each prospective participant would be assigned upon entry into the trial (14).

Sessions took place in common staff areas. At the beginning of the first session, participants gave written voluntary consent, completed a brief demographic questionnaire and were informed of the treatment group to which they had been assigned (massage or seated rest). Participants then had a pretreatment measure of pulse rate taken and completed pretreatment questionnaires (POMS and an assessment of pain, tension and relaxation). Following the treatment, participants completed the post-treatment questionnaires, and post-treatment pulse rate was measured. The procedure for all subsequent sessions followed the same format (ie, measurement of pulse rate, administration of questionnaires, treatment, administration of questionnaires, measurement of pulse rate) with the exception that participants also rated the duration of pain relief, tension relief and relaxation obtained from the previous session.

Massage group: When the questionnaires were completed, participants moved to a quieter corner of the room for the massage treatment. Participants were fully clothed and seated for the massage. The massage treatments were carried out by three professional registered massage therapists who used the Swedish massage technique. Each participant was assigned to one massage therapist for the duration of the study. The massage procedure consisted of the following:

static compressions across the upper trapezius using the heel of the hand;

squeezing of the deltoids;

lifting the shoulder girdle from the lateral border of the scapulas;

thumb kneading of the interscapular area from the inferior angle of the scapula up to the neck;

opposing thumb compressions along the nuchal ligament from the seventh cervical vertebra to the inion;

circular thumb kneading on both sides of the spine from the occiput down to the seventh cervical vertebra;

heel of the hand compression along the erectors down to the sacrum;

knuckle walking alternately from the sacrum up to the first thoracic vertebra;

thumb compression and kneading to the paraspinals from the first thoracic vertebra down to the sacrum;

palmar compressions to the lateral border of the back (ie, latissimus dorsi) on both sides;

knuckle kneading of the infraspinous fossa;

static thumb compression along the spine of the scapula, both inferior and superior;

circular thumb kneading and ischemic compression to the midtrapezius;

muscle squeezing to the anterior border of the upper trapezius using both hands, unilaterally;

ischemic pressure to scaleness;

the last two steps repeated on the other side;

fingertip circular kneading to the mastoid and medially to the nuchal ligament along the occiput of the skull, bilaterally;

compression of the web space of the hand, (thenar eminance to first digit);

mobilizations to the wrists;

muscle squeezing of the forearm, wrist to the elbow with circular thumb kneading over the common extensor tendon;

muscle squeezing of the upper arm from the elbow to the glenohumeral joint; and

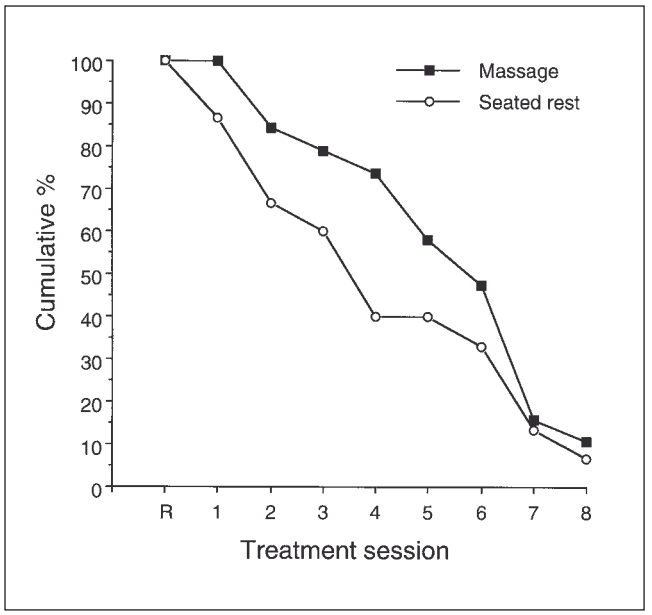

Figure 1) Attendance rates across sessions for the massage and seated rest groups showing the cumulative percentage of sessions attended. Kaplan-Meier survival analysis showed that the two groups did not differ significantly in the distribution of sessions attended over time. R Randomization

TABLE 1
Demographic and pretreatment clinical variables for the massage and seated rest groups.

Variable	Massage (n=19)	Seated rest (n=13)	P
Sex (% male)	5	8	ns
Exercises (%)	63	67	ns
Wears contact lenses (%)	17	9	ns
Has tension headaches (%)	83	42	0.05
Occupation (% RNs)	89	92	ns
Age (years)	38±5.7	42±7.7	ns
Height (cm)	168±9.7	165±11.2	ns
Weight (kg)	65±16.6	61±9.1	ns
Number of sessions	4.7±2.2	4.0±2.5	ns
Number of days between sessions	12±5.5	17±13.2	ns

ns Not significant; RNs Registered nurses. Values are mean ± SD unless otherwise specified

specific thumb and forefinger squeezing applied to the anterior and posterior border of the deltoids.

Seated rest group: Participants were required to sit quietly for 15 min in a lounge chair or a straight back chair with no obvious distractions (such as reading, listening to music, watching television or conversing with others).

Data reduction and statistical analyses

To simplify data analysis and presentation, and because of the small sample size and variation in the number of sessions attended, the treatment outcome data were not analyzed on a session-by-session basis. Instead, pre-treatment and post-treatment variables (pain, tension, relaxation, pulse rate, POMS) were averaged across sessions within subjects and were analyzed as the mean percentage change from pre-treatment level and/or the percentage of participants reporting symptom reduction.

Demographic and baseline clinical variables were analyzed by Student's *t* test for independent samples or ^{2} test for two-way tables. Drop-out rates for the two groups were compared by Kaplan-Meier survival analysis using the log rank test to ascertain statistical significance. For each participant, the mean pretreatment and post-treatment values for pain, tension, pulse rate and the POMS were calculated based on the number of sessions attended. VAS pain scores, VAS tension scores, pulse rate and the POMS were then analyzed by one-way ANCOVA using the mean pretreatment rating across sessions as the covariate, the mean post-treatment rating across sessions as the dependent variable and group (massage versus seated rest) as the independent samples factor. Thus, only one ANCOVA was performed for each outcome variable.

The reported duration of pain relief, tension relief and relaxation was analyzed by separate ^{2} tests for two-way tables. Significant effects were followed up with subsequent ^{2} tests using a multiple comparison procedure to determine the pattern of significance between the groups (17). In these instances, the type I error rate was adjusted using Bonferroni's correction for multiple tests of significance (ie, alpha ÷ number of tests).

All data are presented as mean ± SD unless otherwise specified. Data analyses were carried out using SPSS for Windows 8.1 (SPSS Inc, Chicago, Illinois). $P<0.05$ was considered statistically significant.

RESULTS

Drop-out and attendance rates

In total, 19 participants were randomly assigned to the massage group and 15 were randomly assigned to the seated rest group. Two participants withdrew immediately upon learning that they had been assigned to the seated rest group. Demographic and baseline clinical data from these two participants were not included in the statistical analyses. Kaplan-Meier survival analysis did not reveal a significant difference between the groups in the distribution of the number of sessions attended over time (Figure 1). The number of completed treatment sessions ranged from one to eight. The mean number of sessions completed by the massage group (4.7±2.2) was not significantly different from that of the seated rest group (4.0±2.5). The groups did not differ significantly in the mean number of days between sessions (massage 12.1±5.5; seated rest 16.7±13.2).

TABLE 2
Mean ± SD Visual Analogue Scale pain intensity ratings for the massage and seated rest groups before and after each treatment session

	Massage group		Seated rest group	
Session	Pre-treatment	Post-treatment	Pre-treatment	Post-treatment
1	2.3±2.53 (18)	0.5±0.94 (18)	1.6±1.79 (13)	1.2±1.30 (13)
2	1.8±2.42 (16)	0.4±1.08 (16)	1.5±2.64 (10)	0.8±1.81 (10)
3	2.8±2.70 (16)	1.1±1.89 (15)	2.2±2.90 (8)	1.3±1.69 (9)
4	2.5±2.54 (13)	0.5±0.77 (14)	1.2±2.86 (6)	1.2±2.82 (6)
5	1.8±2.28 (11)	0.2±0.49 (11)	1.5±3.0 (6)	0.0±0.0 (5)
6	0.9±1.6 (9)	0.0±0.0 (9)	2.7±3.70 (5)	1.3±2.50 (4)
7	0.0±0.0 (3)	0.0±0.0 (3)	1.9±2.69 (2)	0.7±0.92 (2)
8	2.3±3.25 (2)	0.0±0.0 (2)	2.9±0.0 (1)	0.8±0.0 (1)

Number of participants is shown in parentheses

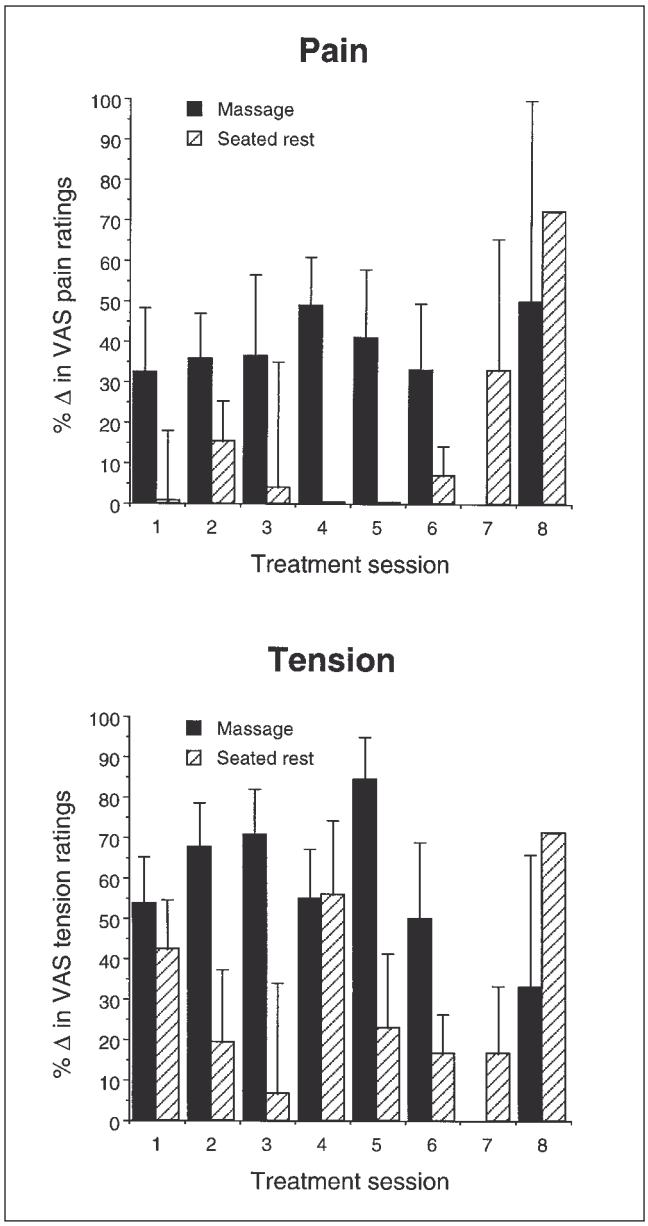

Figure 2) A session-by-session histogram of the percentage change in Visual Analogue Scale (VAS) pain ratings (**top**) and tension ratings (**bottom**) from pretreatment to post-treatment reported by participants in the massage and seated rest groups. See Tables 2 and 3 for the number of participants in the two groups attending each of the eight sessions.

Demographic and baseline clinical variables

Table 1 shows the demographic and baseline clinical data for participants in the massage group (n=19) and seated rest group (n=13) who received at least one massage treatment or one session of seated rest. Eighty-nine per cent (n=17) of the massage group and 92% (n=12) of the seated rest group were registered nurses. The remaining participants were clerical staff. Each treatment group had only one male participant. At the initial interview, before treatment, participants in the massage group reported regularly experiencing tension headaches more frequently than did participants in the seated rest group (P<0.05). There were no other significant group differences in baseline demographic or clinical variables.

Effects of treatment on pain intensity

Pain in the head, neck and/or shoulders before treatment was reported in 47.1% of participants in the massage group and 48.4% of participants in the seated rest group. After treatment, 21.8% of participants in the massage group and 43.7% of participants in the seated rest group reported pain. Thus, a significantly greater proportion of participants in the massage group (25.2%) reported pain relief after treatment than in the seated rest group (4.7%; P<0.05).

Table 2 contains the mean SD pain intensity ratings for the massage and seated rest groups before and after each session. ANCOVA showed a significant effect of the covariate (mean pretreatment pain intensity across sessions attended) and a significant main effect for groups indicating that pain after treatment was significantly lower in the massage group (0.4±0.62 cm) than in the seated rest group (1.1±1.22 cm, P<0.001). This is a 59% and 3% reduction in pain in the massage and seated rest groups, respectively (P<0.05). Figure 2 shows the reduction in pain intensity from pretreatment to post-treatment reported by participants in the two groups.

Effects of treatment on tension levels

Tension before treatment was reported in 64.3% of participants in the massage group and 70.7% of participants in the seated rest group. After treatment, 18.4% of participants in the massage group and 59.8% of participants in the seated rest group reported tension. Thus, a significantly greater proportion of participants in the massage group (45.9%) reported

TABLE 3
Mean ± SD Visual Analogue Scale tension ratings for the massage and seated rest groups before and after each treatment session

	Massage group		Seated rest group	
Session	Pre-treatment	Post-treatment	Pre-treatment	Post-treatment
1	2.6±2.77 (18)	0.1±0.46 (19)	3.5±2.70 (13)	1.4±1.85 (13)
2	3.3±2.56 (16)	0.7±1.69 (16)	3.7±1.95 (10)	2.7±2.45 (9)
3	3.3±2.76 (14)	0.3±0.53 (16)	2.7±2.96 (8)	1.0±1.58 (9)
4	2.5±2.70 (14)	0.6±1.31 (14)	4.9±2.96 (6)	2.0±3.02 (6)
5	4.1±2.22 (11)	0.5±1.51 (11)	3.2±3.71 (6)	0.7±1.76 (5)
6	2.8±2.84 (9)	0.0±0.0 (8)	3.3±3.31 (5)	2.5±2.67 (5)
7	0.0±0.0 (2)	0.0±0.0 (3)	1.5±2.12 (2)	1.0±1.41 (2)
8	3.0±4.17 (2)	1.0±1.41 (2)	2.8±0.0 (1)	0.8±0.0 (1)

Number of participants is shown in parentheses

TABLE 4
Mean ± SD pulse rate (beats/min) for the massage and seated rest groups before and after each treatment session

	Massage group		Seated rest group	
Session	Pre-treatment	Post-treatment	Pre-treatment	Post-treatment
1	80±7.4 (18)	70±5.3 (19)	72±7.5 (13)	69±8.4 (13)
2	82±6.4 (16)	75±10.7 (16)	78±7.7 (10)	73±6.6 (10)
3	86±11.3 (16)	75±9.2 (16)	80±9.5 (9)	75±7.4 (9)
4	84±12.7 (14)	77±11.0 (14)	73±6.6 (5)	75±9.1 (6)
5	81±9.4 (11)	79±8.9 (11)	78±10.0 (6)	81±11.2 (6)
6	78±10.4 (9)	76±10.0 (9)	77±5.0 (5)	72±6.0 (5)
7	92±24.3 (3)	84±18.0 (3)	75±4.2 (2)	72±8.5 (2)
8	78±0.0 (2)	69±4.2 (2)	78±0.0 (1)	78±0.0 (1)

Number of participants is shown in parentheses

a reduction in tension than in the seated rest group (10.9%; P<0.05).

Table 3 contains the mean SD tension ratings for the massage and seated rest groups before and after each session. ANCOVA showed a significant effect of the covariate (mean pretreatment tension level across sessions attended) and a significant main effect for groups indicating that tension level after treatment was significantly lower in the massage group (0.4±0.61 cm) than in the seated rest group (1.7±1.6 cm, P<0.001). This is a 60% and 26% reduction in pain in the massage and seated rest groups, respectively (P<0.05). Figure 2 shows the reduction in pain and tension from pre-treatment to post-treatment reported by participants in the two groups.

Effects of treatment on headache

Although participants in the massage group reported a higher tendency to experience tension headaches regularly when asked at the initial assessment before any treatment (Table 1), the groups did not differ significantly in terms of the presence or severity of headache during the course of treatment. Across the eight sessions, there were nine reports of headache in the massage group and six reports of headache in the seated rest group. The mean ± SD intensity of headache before and after treatment was 2.0±1.78 and 0.8±1.06, respectively, for the massage group and 1.1±1.46 and 2.0±2.69, respectively, for the seated rest group. The results of the ANCOVA did not show any significant effects.

Effects of treatment on degree of relaxation

There were no significant differences between the groups in the proportion of participants who reported feeling relaxed before or after massage or seated rest. The mean percentage increase from pretreatment to post-treatment in the proportion of participants who reported feeling relaxed was 58±26.4% for the massage group and 67±32.0% for the seated rest group (P>0.05).

Effects of treatment on POMS

ANCOVA showed a significant effect of the covariate (mean pretreatment total POMS score across sessions attended) and a significant main effect for groups indicating that overall mood state after treatment was significantly more positive in the massage group (–15.3±14.16) than in the seated rest group (–2.6 ±14.98, P<0.001).

Effects of treatment on pulse rate

Table 4 contains the mean SD pulse rates for the massage and seated rest groups before and after each session. ANCOVA showed a significant effect of the covariate (mean pretreatment pulse rate across sessions attended), but the group main effect was not significant (P>0.05) indicating that mean post-treatment pulse rate was not significantly different between the groups when corrected for pretreatment pulse rate (massage group 74.0±6.4 beats/min; seated rest group 73.0±5.9 beats/min, P<0.05). This, in part, is due to the significantly higher pre-treatment pulse rate in the massage group (82.0±7.8 beats/min) compared to the seated rest group

(76.0±6.6 bpm). Overall, post-treatment pulse rate was reduced by 9.3% in the massage group and by 3.8% in the seated rest group (P<0.05).

Reported duration of treatment effects

Participants reported, on a five-point scale, the duration of pain relief, tension relief and relaxation that resulted from the previous session. The pattern of the results was the same for the duration of pain relief, relief of tension and relaxation. ^{2} test for two-way tables showed that there was a significant difference between the groups in the proportion of participants reporting the various degrees of relief and relaxation (Table 5). Multiple comparisons showed that a greater proportion of participants in the massage group reported feeling a sense of relaxation and had pain and tension relief lasting 1 h or more, while a greater proportion of participants in the seated rest group reported no relaxation or relief at all, or an effect that lasted less than 1 h (all P<0.0009).

TABLE 5
Frequency (percentage) of reported duration of pain relief, relief of tension and relaxation following massage or seated rest

	Massage group	Seated rest group	χ^2 P value
Pain relief			P<0.0009
None	2 (6%)	10 (48%)	
Less than 1 h	7 (19%)	6 (29%)	
Between 1 h and 24 h	19 (53%)	4 (19%)	
More than 24 h	8 (22%)	1 (5%)	
Tension relief			P<0.0009
None	2 (3%)	6 (19%)	
Less than 1 h	8 (12%)	11 (35%)	
Between 1 h and 24 h	47 (71%)	12 (39%)	
More than 24 h	9 (14%)	2 (7%)	
Relaxation			P<0.0009
None	1 (1.4%)	2 (5%)	
Less than 1 h	8 (11.4%)	23 (61%)	
Between 1 h and 24 h	54 (77.1%)	11 (29%)	
More than 24 h	7 (10%)	2 (5%)	

DISCUSSION

This is the first study to demonstrated the benefits of an eight-session, worksite-based massage therapy program for pain and tension experienced by a sample of nurses working in a large teaching hospital. The results indicate that on-site massage treatment for nursing staff significantly reduced pain intensity and tension levels compared with a control condition consisting of seated rest. In addition, the massage treatments resulted in a greater percentage of participants reporting a sense of relaxation and a significant improvement in overall mood. Finally, these effects were reported to have lasted longer in the massage group than in the seated rest group. Pain relief, tension reduction and relaxation were reported to have persisted for up to a day or longer in more than 70% of the massage group participants.

Although post-treatment pulse rate was not significantly different between the groups when pretreatment pulse rate was used as a covariate, this lack of effect appeared to be due to the significantly higher pretreatment pulse rate in the massage group. We cannot explain why pretreatment pulse rate was higher in the massage group. Treatment factors cannot explain the group difference: the two groups were treated identically before receiving massage or seated rest. When the data were analyzed to show the percentage reduction in pulse rate from pretreatment to post-treatment level, the massage group showed a significantly greater reduction than did the seated rest group (ie, 9.3% versus 3.8%, respectively). These findings fit well both with the greater reduction in pain and tension reported by the massage group participants and with the increased percentage of participants reporting relaxation following massage. The results are also consistent with recent controlled (12) and uncontrolled (4,6) studies that have examined changes in hemodynamic variables after massage therapy. For example, Field et al (12) found a significant reduction in pulse rate following 30 min massage treatments, but not after relaxation therapy, for depressed adolescent mothers. However, because pulse rate was measured shortly after the participants arrived for the session, we do not know whether the higher pretreatment values in the massage group reflect a higher resting heart rate or the effects of physical exertion and an insufficient period of time to become habituated. Further research is needed to clarify the relationship between massage therapy and pulse rate.

The drop-out rate among participants in the massage group was much higher than we had anticipated despite the reported benefits obtained. Surprisingly, only one participant completed all eight massage treatments; the average number of sessions attended was 4.7, which did not differ significantly from that of the control group (4.0 sessions). Other studies have not reported drop-out rates. It is our impression that the scheduling difficulties, longer than expected intervals between sessions and low rates of attendance in the present study were, in large part, due to the stress associated with hospital restructuring initiatives and downsizing that were occurring at the time the study was conducted. This is supported by a lower drop-out rate in our pilot study that was carried out several months earlier, before the implementation of these institutional changes, which employed the same massage therapists at the same hospital. In that study, the mean number of sessions completed was 6.4, not one participant dropped out until session five, and 33% of participants completed all eight massage treatments (18).

A limitation of the present study is the use of a control group that received seated rest rather than a treatment with demonstrated efficacy (eg, relaxation therapy). Use of a con-

trol condition with limited benefit may have led to maximal differences in efficacy between the groups. As such, we cannot comment on the mechanism(s) by which massage therapy exerts its beneficial effects (eg, stress reduction, relaxation or attention diversion). Although the drop-out rate did not differ for the two groups overall, the fact that two participants dropped out upon receiving their group assignment to seated rest raises the possibility that subjects were preselected for their belief that massage is efficacious and seated rest is not.

In summary, the provision of on-site massage treatments for nursing staff at a large teaching hospital resulted in significant reductions in pain and tension levels compared with a control group that received seated rest. In spite of these beneficial effects, the drop-out rate in the massage group was much higher than we had anticipated. Further research is warranted to examine the feasibility of instituting a hospital-wide massage therapy program. The effects of such a program on job satisfaction, performance and absenteeism remain to be determined.

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REFERENCES

1. Rest KM. Worker participation in occupational health programs: establishing a central role. AAOHN J 1996;44:221-5.
2. Gushue J. Increasing workplace stress means occupational medicine will be a growth area. CMAJ 1996;155:1310-3.
3. Ferrara-Love R. Layoff survivor sickness: How to cope when you do not lose your job. J Peria nesth Nurs 1998;4:236-8.
4. Cady SH, Jones GE. Massage therapy as a workplace intervention for reduction of stress. Percept Mot Skills 1997;84:157-8.
5. Field T, Quintino O, Henteleff T, Wells-Keife L, Delvecchio-Feinberg G. Job stress reduction therapies. Altern Ther Health Med 1997;3:54-6.
6. Lewis L. Caring for the carers. Mod Midwife 1995;5:7-10.
7. Cooper CL, Cartwright S. An intervention strategy for workplace stress. J Psychosom Res 1997;43:7-16.
8. Wainapel SF, Thomas AD, Kahan BS. Use of alternative therapies by rehabilitation outpatients. Arch Phys Med Rehab 1998;79:1003-5.
9. Drivdahl CE, Miser WF. The use of alternative health care by a family practice population. J Am Board Fam Pract 1998;11:193-9.
10. Field T, Ironson G, Scafidi F, et al. Massage therapy reduces anxiety and enhances EEG pattern of alertness and math computations. Int J Neurosci 1996;86:197-205.
11. MacDonald G. Massage as a respite intervention for primary caregivers. Am J Hosp Palliat Care 1998;15:43-7.
12. Field T, Grizzle N, Scafidi F, Schanberg S. Massage and relaxation therapies' effects on depressed adolescent mothers. Adolescence 1996;31:903-11.
13. Field TM. Massage therapy effects. Am Psychol 1998;53:1270-81.
14. Dallal GE. DESIGN: A Supplementary Module for SYSTAT and SYGRAPH. Evanston: SYSTAT, 1988.
15. Huskisson E. Visual analogue scales. In: Melzack R, ed. Pain Measurement and Assessment. New York: Raven Press, 1983:33-7.
16. McNair DM, Lorr M, Droppleman LF. EITS Manual for the Profile of Mood States (POMS). San Diego: Educational and Industrial Testing Service, 1971.
17. Glantz SA. Primer of Biostatistics, 4th edn. New York: McGraw-Hill, 1997.
18. Katz J, Wowk A, Culp D, Wakeling H. Pain and tension are reduced among hospital nurses after on-site massage treatments: A pilot study. J Perianesth Nurs 1999;14:128-33.