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The efficiency of ergonomics, active break and stretching exercise program in office workers with chronic neck and back pain

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Abstract

The prevalence of chronic neck, shoulder and back pain in office workers is increasing rapidly. Chronic musculoskeletal pain has great socioeconomic impact as it is associated with reduced work performance and poor quality of life. The purpose of this study is to evaluate the influence of ergonomic modification, active rest, and stretching exercise programs on office workers' neck, upper back and shoulder pain. In our study, 74 patients aged between 22-50 years working in the office at the computer were evaluated. Brochures including ergonomic modification, active rest and stretching exercise program were given to the patients and necessary information was given. Visual Analogue Scale (VAS) was used to evaluate neck, shoulder and back pain and neck disability index (NDI) was used to evaluate functional outcomes. Evaluations were performed before treatment and at the first and third months after treatment. The VAS value, which was 5.39 ± 0.62 before the treatment, was 2.86 ± 1.40 at the first month after the treatment and 2.66 ± 1.15 at the third month after the treatment, and this improvement in the VAS score was statistically significant ($p<0.01$). While the NDI score was 21.91 ± 1.40 before the treatment, it was calculated as 12.77 ± 5.39 in the first month after the treatment and 12.02 ± 4.93 in the third month after the treatment, and this improvement in the NDI score was statistically significant ($p<0.01$). In conclusion, neck, shoulder and upper back pain can be reduced in patients working in the office environment with the help of ergonomics, stretching, and taking active breaks as much as working conditions allow.

Keywords: office workers, pain, neck, stretching, ergonomics, active breaks

1. Introduction

Today, desk-office workers have remained sedentary for extended periods due to computer usage. The repetitive strain of the musculoskeletal system related to poor-ergonomic equipment is called work-related musculoskeletal disorders (1-4). The prevalence of chronic neck, upper back, and shoulder pain experienced by office workers, has been increasing rapidly (5).It is reported that the prevalence of neck and shoulder pain is %55 and %38, respectively, in office workers (6). Chronic neck, back, and shoulder pain have a substantial socioeconomic impact because of associated with decreased job performance and poor life quality (7). Approximately the %56 of the reports received are due to diseases that are work-related musculoskeletal disorders (8). In the treatment of these patients, treatment methods such as exercises (9,10) manual therapy, massage, ergonomics, and group therapies are used (11). In addition, steps have been taken to prevent neck, shoulder and upper back pain or prevent its recurrence in recent years.

Although there have been many studies evaluating the effectiveness of methods including ergonomic modification, rest breaks and exercise, conflicting results have been reported. For example, in a randomized controlled study, Shariat et al. (12) compared ergonomic modification, exercise, ergonomic modification combined with exercise, and control groups with the Cornell Musculoskeletal Disorders Questionnaire, and they found significant improvement in all three treatment groups compared to baseline values and control group. however, they reported that there was no significant difference between the treatment groups.

In 2007 and 2013 reviews, the effectiveness of conservative interventions for the treatment of arm, neck or shoulder-related complaints in office workers was evaluated and it was reported that exercise had a similar effect on pain reduction, recovery, and sick leave when compared to the control group (13,14). However, this evidence was gathered from poor-quality studies.

The purpose of this study is to evaluate the influence of ergonomic modification, active rest, and stretching exercise programs on office workers' neck, upper back and shoulder pain.

2. Material and Methods

74 patients (60 female, 14 male) with neck, shoulder, and upper back pain, who applied to our polyclinic between 01/07/2021 and 30/11/2021, were included in our study. Inclusion criteria: A full-time office worker aged 22-50, with at least five years of work experience, with Visual Analog Scale (VAS) ⩾5/10cm moderate to severe neck, shoulder, or back pain for over three

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months. The exclusion criteria were determined as follows: VAS <5/10cm, pregnancy, history of trauma or surgery in the neck region, cervical radiculopathy, congenital spine anomaly, rheumatic disease, and tumor. Demographic characteristics such as age, gender, body mass index, sitting time/day, computer use time/day, comorbidities, history of muscle injury, and regular use of medicines like analgesics were recorded.

The patients were given exercise brochures to ensure that exercises were done correctly, and how to do each movement was shown by the specialist physician. The exercise program included neck, shoulder, trunk, upper back stretching as well as shoulder rolling exercises with ten repetitions of each exercise. It was recommended to be done in two sessions a day, five days a week, through four weeks (3).

For ergonomic intervention, brochures were given to the patients about the optimal height of the chair and desk, sitting posture, the distance and level between the eyes and the monitor, the position of the arm and elbow while holding the mouse, and they were asked to adjust their working position according to their workplace (15).

Each patient was demanded to take active breaks that they could adjust according to their working conditions, and it was recommended not to sit in a chair during breaks. It was stated that the frequency and duration of the breaks could be adjusted between 30 seconds and 15 minutes per break and 3-20 times per workday.

The primary outcome was the pain score measured using the VAS (16). For the severity of the pain, according to the VAS, the "no pain" is usually graded as 0 points, while the "worst pain imaginable" is 10 points. The Neck Disability Index (NDI) was used in the secondary outcomes to assess neck function and quality of life (17). Evaluations were made in the 1st and 3rd months after the treatment, at the first polyclinic treatment. Adjusting to the exercise program was determined by the frequency of exercise reported by the participants. Statistical method: Statistical analysis was performed by using the IBM SPSS Statistics 22 software (IBM Corp., Armonk, NY, USA). Means and standard deviations were used for baseline patient characteristics, and percentages were used for categorical variables. Paired T-test was used for pair wise comparisons of VAS and NDI scores before and after treatment, and change over time was evaluated by repeated analysis of variance analysis. The $P < 0.05$ was considered to be statistically significant.

3. Results

The study consisted of 74 participants, 60 of which were women while 14 of which were men. The average age of the patients was 39.4 (between 22-50) years, and the average symptom duration was 17.9 (5-39) months. The average time spent on computers was 6.1 hours a day (2-8 hours) and % 35.1 of the patients had to use analgesics due to neck and back pain (Table 1).

Table 1. Demographic data of the patients included in the study

Age (year)	39.4 ± 8.0
Female sex, n (%)	60 (81)
BMI	25.6 ± 8.1
Computer usage duration (hours/day)	6.1 ± 1.9
Symptom duration (months)	17.9 ± 8.7
Regular analgesic usage, n (%)	26 (35.1)

BMI: Body Mass Index

While the pre-treatment VAS value was 5.39 ± 0.62, it was calculated as 2.86 ± 1.40 in the first month after the treatment and 2.66 ± 1.15 in the third month after the treatment. This improvement in the VAS score was found to be statistically significant in the first month after the treatment ($p<0.01$), and it continued to progress in the third month after treatment. While the pre-treatment NDI score was 21.91 ± 1.40, it was calculated as 12.77 ± 5.39 in the first month of post-treatment and 12.02 ± 4.93 in the third month of post-treatment. This improvement in NDI score was statistically significant in the first month of post-treatment ($p<0.01$) and continued to progress in the third month of treatment (Table 2).

Table 2. Change in VAS and NDI values before and after treatment.

	Pre-treatment	Post-treatment (1st month)	Post-treatment (3rd month)	p
VAS	5.39 ± 0.62	2.86 ± 1.40	2.66 ± 1.15	<0.01
NDI	21.91 ± 1.40	12.77 ± 5.39	12.02±4.93	<0.01

4. Discussion

The most important finding of this study is that stretching exercises, arranging ergonomics and taking active breaks as long as workplace conditions allow have positive effects on reducing neck, shoulder and back pain in patients who work at a computer for a long time. The results of this study support other studies in the literature. For instance, Irmak et al.[18] in a randomized controlled study with 39 desk-worker patients, reported that a 10-week exercise scheme reduced pain perception in office workers. Tunwattanapong et al. (3) gave 96 patients with neck pain an informative brochure showing the correct position and ergonomics to be applied during daily work. In addition to the treatment group, they performed neck and shoulder stretching exercises five days a week and twice a day for four weeks. They reported that exercise reduced pain, improved neck functions and increased quality of life in office workers with chronic neck and shoulder pain.

Many studies emphasize that strengthening exercises to the shoulder, arm, and hand muscles can relieve neck or shoulder pain in office workers (19-22).Johnston et al. (23) in a randomized controlled study with 740 patients, through 12 weeks, the group which was given exercise and the group which was promoted health but not given exercise group are compared after ergonomics training, given to the patients and

at the 12th week, it was reported that there had been neck pain relief in the exercise group (p=0.02), however, they reported that the improvement in pain intensity could not be sustained in both groups at 12 months. The better combination to gain the maximum benefit from the exercises is to combine stretching exercises with the acute to sub-acute phase of musculoskeletal pain, followed by strengthening exercises with pain reduction (3). In this study, we did not recommend strengthening exercises to patients; we only recommended stretching exercises because our study aimed to treat acute and sub-acute neck and back pain periods.

Many studies show that ergonomics and breaks are adequate to prevent pain in office workers who suffer from the treatment of musculoskeletal pain (24-27). Akkarakittichoke et al. (24) reported that active breaks and ergonomic interventions shortened recovery time and reduced recurrence of neck and low back pain in 193 high-risk office workers. Breaks allow for a reduction in computer exposure time and muscle relaxation. A field research (28) on office sitting posture and sedentary time demonstrated that, on average, employees sit for extended periods without taking a break. Still, with a schedule reminding them to take a break, it was highly adaptable to take short breaks every hour. We did not apply for a standardized break program in our study. We proposed a program in which the patients determine the break frequency and duration in accordance with their working hours at the workplace. A decrease in the frequency of musculoskeletal pain, discomfort, and reporting has been reported owing to ergonomics (29). There is also evidence that ergonomic office interventions effectively reduce costs associated with musculoskeletal disorders and can increase employee productivity (30). A systematic review showed moderate-quality evidence of no benefit from isolated ergonomic interventions for pain reduction (31). Hence, we suppose that ergonomic interventions should not be isolated; instead, they should be combined with active break and exercise schemes.

There is some restrictions in our study. The first is the absence of a control group in our study. Another of which is the short tracking period. We cannot know whether the effect of the applied treatment will be maintained for a lengthy period. Another restriction is that the exercise program is carried out, the frequency and duration of active breaks are not standardized, and the assessment is according to the patient's statement.

In conclusion, neck, shoulder and upper back pain can be reduced in patients working in the office environment with the help of ergonomics, stretching, and taking active breaks as much as working conditions allow.

Conflict of interest

The authors declared no conflict of interest.

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None to declare.

Authors' contributions

Concept: O.Ç., Design: O.Ç., Data Collection or Processing: O.Ç., Analysis or Interpretation: O.Ç., Literature Search: O.Ç., Writing: O.Ç.

Ethical Statement

Approval was obtained from İstanbul Medipol University Non-Invasive Clinical Research Ethics Committee, the study started. The ethics committee decision date is 16/02/2023 and the number of ethical committee decisions is 190.

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