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Original Article / Özgün Araştırma

Evaluation of the effects of ergonomics and exercise training on pain and quality of life in desk workers

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Abstract

Aim: This study aimed to evaluate the effectiveness of exercise and ergonomics training on neck and low back pain and quality of life in secretaries working as office-based staff in a hospital setting.

Methods: This semi-experimental pretest–posttest study was conducted with 100 secretaries working at a tertiary hospital. Participants received a 45-minute interactive training session including desk exercises and ergonomic principles. For four weeks following the training, weekly reminders were provided to support exercise implementation and adherence to ergonomic rules. Data were collected before and after the training using the Participant Information Form, the Neck Disability Index (NDI), the Oswestry Low Back Pain Scale, and the SF-36 Quality of Life Questionnaire. The dependent variables were neck and back pain levels, as well as quality of life scores. The independent variables were demographic and work-related characteristics. Data were analyzed using SPSS 18.0. Descriptive statistics, Wilcoxon signed-rank test for dependent group comparisons, and Mann–Whitney U test for between-group comparisons were applied. The significance level was set at $p<0.05$.

Results: The mean age of participants was 37.90±6.44 years, and 74% were female. Following the training, NDI and Oswestry scores significantly decreased ($p=0.009$; $p=0.024$, respectively), while SF-36 total score significantly increased ($p=0.001$). Significant improvements in pain and quality of life scores were also observed among women, daytime workers, and those who developed musculoskeletal pain after starting the job ($p<0.05$).

Conclusion: Exercise and ergonomics training effectively reduce neck and low back pain and improve quality of life among desk-based employees.

Keywords: Exercise, education, ergonomics, desk workers, quality of life

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Masa Başı Çalışanlarına Verilen Ergonomi ve Egzersiz Eğitiminin, Ağrı ve Yaşam Kalitesine Etkisinin Değerlendirilmesi

Öz

Amaç: Bu çalışma, hastane ortamında masa başı çalışan sekreterlerde egzersiz ve ergonomi eğitiminin boyun ve bel ağrısı ile yaşam kalitesi üzerindeki etkinliğini değerlendirmeyi amaçlamaktadır.

Yöntemler: Öntest-sontest desenli yarı deneysel bir araştırma olarak tasarlanan bu çalışma, bir üçüncü basamak hastanede görev yapan 100 sekreter ile yürütülmüştür. Katılımcılara 45 dakikalık interaktif bir eğitim verilmiş, ardından dört hafta boyunca haftada bir kez masa başı egzersizlerin uygulanması ve ergonomik ilkelerin hatırlatılması sağlanmıştır. Veriler müdahale öncesi ve sonrası dönemde toplanmıştır. Bağımlı değişkenler boyun ve bel ağrısı düzeyi ile yaşam kalitesi skorları; bağımsız değişkenler ise demografik ve iş yaşamıyla ilgili özelliklerdir. Veri toplama araçları; Katılımcı Bilgi Formu, Boyun Disabilite İndeksi, Oswestry Bel Ağrısı Skalası ve SF-36 Yaşam Kalitesi Anketi'dir. Veriler SPSS 18.0 ile analiz edilmiş; tanımlayıcı istatistiklerin yanı sıra bağımlı grup karşılaştırmalarında Wilcoxon işaretli sıra testi, gruplar arası karşılaştırmalarda Mann–Whitney U testi kullanılmıştır. Anlamlılık düzeyi $p<0,05$ olarak kabul edilmiştir.

Bulgular: Katılımcıların yaş ortalaması 37,90±6,44 yıl olup %74'ü kadındı. Müdahale sonrasında Boyun Disabilite İndeksi ve Oswestry Bel Ağrısı Skalası puanlarında anlamlı azalma ($p=0,009$; $p=0,024$) ve SF-36 toplam puanında anlamlı artış ($p=0,001$) gözlenmiştir. Kadınlarda, sadece gündüz vardiyasında çalışanlarda ve işe başladıktan sonra kas-iskelet sistemi ağrısı gelişenlerde, ağrı ve yaşam kalitesi skorlarında müdahale sonrası anlamlı iyileşme saptanmıştır ($p<0,05$).

Sonuç: Egzersiz ve ergonomi eğitimi, masa başı çalışan sekreterlerde boyun ve bel ağrısını azaltmakta; yaşam kalitesini artırmaktadır.

Anahtar kelimeler: Egzersiz, eğitim, ergonomi, masa başı çalışanı, yaşam kalitesi.

INTRODUCTION

Musculoskeletal health is the health of the system of muscles, bones, joints and connective tissues. Musculoskeletal diseases (MSDs) are a group of more than 150 diseases and conditions that cause temporary or lifelong disability in people[1]. They are reported to be the leading cause of rehabilitation needs worldwide, accounting for approximately two-thirds of all adults requiring rehabilitation[2]. MSDs also account for 17% of all YLDs (Years Lost due to Disability) worldwide and are the leading cause of years lived with disability worldwide, with approximately 149 million YLDs (1). In Turkey, low back pain ranked first among the top 10 causes of YLD in 2019, and MSDs such as neck pain ranked 10th[3].

Musculoskeletal disorders (MSDs) are the most common work-related health problem and are caused by a variety of hazards at work and can lead to pain, reduced mobility and injury. When they develop due to work, they are called work-related MSDs, and repeated forced movements in the work environment, use of the body in poor positions and ergonomic deficiencies play an important role in the development of these diseases[4]. MSDs, which are caused by both poor working conditions and inadequate precautions, occupy an important place among health problems, accounting for about half of all occupational diseases[5]. MSDs play a crucial role in people's absenteeism, reduced quality of life and work-related accidents[6]. As technology develops around the world, the use of computers in the workplace is increasing. While the introduction of computers in workplaces increases productivity, it also causes many health problems, especially work-related MSDs, by causing changes in work organisation and the development of new risk factors[7]. While in the past, work-related MSDs were considered to be a problem only for industrial workers, in

recent years it has been found that desk workers and computer users are also at high risk of these diseases[8].

The increasing incidence of musculoskeletal disorders (MSDs) in the workplace is becoming a critical concern not only for employees but also for institutions and society as a whole. Desk-based workers, including secretaries, are particularly vulnerable due to prolonged sitting, static posture, and repetitive tasks. These risk factors are strongly associated with the development of MSDs, particularly in the neck and lower back regions. For all these reasons, it is crucial to understand the prevalence, causes, and preventive strategies of MSDs in desk workers, and to recognize the importance of training and training methods aimed at preventing these diseases.

Several studies in the literature have evaluated the incidence of MSDs in desk workers and assessed the ergonomic suitability of work environments[9,10]. Moreover, several training studies involving training and exercise programs have been conducted with desk workers in various institutions across Turkey[11,12]. However, no training study has been found that specifically focuses on secretaries working in healthcare institutions. This gap in the literature highlights the need for a targeted study aimed at addressing musculoskeletal health in this specific group.

To fill this gap, this study was designed to determine the incidence of MSDs, neck and low back pain, and quality of life among secretaries working in hospitals. The study also aimed to provide proper desk posture training, educate participants on exercises they can perform at their desks, and evaluate the effectiveness of the ergonomics and exercise training provided among hospital-based desk workers. It is believed that this research can contribute to the development of preventive strategies to protect against MSDs and emphasize the importance of training programs to reduce staff losses due to these conditions. Furthermore, the study aims to shed light on simple yet effective trainings, such as training and exercises, that can be applied in workplaces to improve working conditions and minimize health problems among employees, alongside broader initiatives for occupational health and safety.

In addition to evaluating the overall effectiveness of the training, this study also investigates whether the outcomes of the ergonomics and exercise program differ based on participants' demographic and occupational characteristics. The research aims to identify whether training leads to a reduction in the frequency and severity of musculoskeletal complaints and whether it improves the quality of life of the participants.

Research Questions:

- What is the baseline prevalence of musculoskeletal disorders, neck pain, and low back pain among secretaries working in hospitals?
- Does ergonomics and exercise training lead to a reduction in the frequency and severity of musculoskeletal complaints?
- Does the training improve participants' quality of life?
- Do post- training changes in pain and quality of life scores differ according to demographic characteristics (e.g., gender, age, marital status) and work-related factors (e.g., work hours, shift type, pain onset after employment)?

METHODS

Participants

This study was designed as a single-group, semi-experimental (quasi-experimental) training study with a pretest-posttest design. The research was conducted in a tertiary hospital in Türkiye, and the target population (study universe) consisted of 384 secretaries actively

working at the institution during the study period.

To determine the minimum sample size, a priori power analysis was performed using the G*Power 3.1 software based on the Wilcoxon signed-rank test. With a Type I error probability (α) of 0.05, a power of 0.80 (1–β), and a small effect size of 0.3, the minimum required sample size was calculated as 94 participants. To allow for potential dropouts or incomplete data, 106 secretaries who met the inclusion criteria were initially recruited into the study.

Of these, 6 participants were excluded from the final analysis due to missing or incomplete responses in either the pretest or posttest forms. As a result, the study was completed with data from 100 participants.

Participants were selected through voluntary sampling. The inclusion criteria were: (1) working as a secretary in the hospital at the time of data collection, (2) voluntarily agreeing to participate in the study, and (3) completing both the pretest and posttest questionnaires fully. Secretaries who did not meet these criteria or who submitted incomplete forms were excluded from the analysis.

All participants were informed about the purpose, procedures, and confidentiality of the study before participation. Written informed consent was obtained from each participant prior to data collection.

Variables

In this study, the dependent variables were pain levels (measured by the Neck Disability Index and the Oswestry Disability Index) and quality of life scores (measured by the SF-36). The independent variables included demographic and occupational factors such as gender, marital status, education level, shift type, and whether the pain started after beginning the job.

MEASURES

Personal Information Form

A 16-question data collection form was created to obtain demographic, work life and MSD information about the participants. The first 4 questions of the form were questions about demographic information such as age, gender, marital status and education level. The 8 questions in the data collection form asked about characteristics related to work life, such as working hours, work system and time spent in front of the computer. The remaining 4 questions were about the diagnosis of MSD, hospital admission and the status of obtaining a medical report.

Neck Disability Index

The first four items of the Neck Disability Index (NDI) assess subjective symptoms (pain intensity, headaches, concentration, and sleep), while the remaining six items are related to activities of daily living (personal care, lifting, reading, work life, driving, and recreation). The NDI is a Likert-type scale, with each item scored from 0 to 5, resulting in a total score range of 0 to 50. Higher scores indicate greater levels of disability. The NDI is evaluated based on the total score, and no subscale scores are calculated separately. The index was originally developed by Vernon and Mior in 1991, and its Turkish validity and reliability were confirmed by Aslan et al[13,14]. In the Turkish adaptation study, the scale demonstrated high internal consistency, with a Cronbach's alpha coefficient of 0.8814. In the present study, the Cronbach's alpha coefficient for the NDI was calculated as 0.79, indicating acceptable internal reliability.

Oswestry Disability Index

The Oswestry Disability Index (ODI), developed in 1980, is one of the most widely used tools for measuring disability in individuals with low

back pain (LBP). It consists of 10 items assessing various domains of daily functioning: pain intensity, personal care, lifting, walking, sitting, standing, sleeping, social life, traveling, and employment/homemaking. Each item is scored on a 6-point Likert-type scale ranging from 0 to 5, with higher scores indicating greater levels of disability. The total score is obtained by summing the item scores and converting the result into a percentage; higher percentages indicate more severe disability. The Turkish validity and reliability study of the ODI was conducted by Yakut et al. in 2004. In that study, the scale demonstrated excellent internal consistency, with a Cronbach's alpha coefficient of 0.91[15,16]. In the present study, the Cronbach's alpha coefficient for the ODI was calculated as 0.87, indicating a high level of reliability.

Short Form-36 Quality of Life Survey (SF-36)

The Short Form-36 Quality of Life Survey (SF-36) is a widely used instrument for assessing quality of life, particularly in individuals with various musculoskeletal disorders (MSDs). It evaluates the individual's health status over the previous four weeks and consists of 36 items. The scale comprises eight subscales: physical functioning, social functioning, role limitations due to physical problems, bodily pain, mental health, role limitations due to emotional problems, vitality, and general health perceptions. Each subscale is scored separately, and higher scores indicate better perceived health or functioning in that domain. The SF-36 is a Likert-type scale, with varying response formats depending on the subscale (e.g., 2-point, 3-point, 5-point, or 6-point scales)[17]. The Turkish version of the SF-36 was validated by Koçyiğit et al. in 1999, demonstrating good psychometric properties[18]. In that study, the scale showed satisfactory internal consistency. In the present study, the Cronbach's alpha coefficient for the SF-36 was calculated as 0.93, indicating excellent internal reliability.

Procedure

Prior to the study, ethical approval was obtained from the Ethics Committee (Date/No: 03.06.2022/2022-3835), and institutional permission was granted by the Chief Physician of the hospital. Data were collected between 15 June and 30 July 2022. All secretaries working in the hospital were informed in advance about the date, time, and location of the planned ergonomics and movement training session.

On the day of the training, secretaries who attended were first informed about the study. Those who agreed to participate and provided informed consent were asked to complete the initial data collection forms. Each form was numbered, and participants were instructed to record their individual number for use in the post-training follow-up.

The training was conducted once in a conference hall within the hospital by a sports medicine specialist. The session lasted approximately 45 minutes and included two main components. First, an interactive presentation was delivered covering basic ergonomic principles, the importance of proper desk posture, and risk factors associated with musculoskeletal disorders (MSDs). Following the presentation, the trainer demonstrated specific desk-based exercises, which were then practiced together with the participants. Visual materials such as posters and printed handouts were used to support the presentation and facilitate learning of the exercises.

After the training session, a social media group was created including all participating secretaries. For the following four weeks, weekly reminders were sent to reinforce the ergonomic recommendations and desk exercises introduced during the training. Each reminder included visual instructions of the exercises to be performed.

One week after the final reminder, the same data collection form was administered to the

participants again. They were instructed to write their previously assigned number on the follow-up form to allow for paired data comparison.

Statistical Analysis

For the statistical analysis of the findings obtained in the study, the Statistical Packages for the Social Sciences (SPSS) 18.0 software package for Windows (SPSS Inc., Chicago, IL, US) was used. Descriptive statistics (frequency, percentage, mean, standard deviation, median and IQR) were used to analyse the research data. The relationship between non-normally distributed numerical data and categorical data was assessed using the Man-Whitney U test. The Wilcoxon signed-rank test was used to compare two dependent groups. The results were evaluated at a 95% confidence interval and a $p<0.05$ significance level.

RESULTS

The mean age of the participants was 37.90±6.44 years. Of the participants, 74.0% (n=74) were female, 77.0% (n=77) were married, and 64.0% (n=64) had a university education or higher. A total of 96.0% (n=96) worked in permanent daytime shifts, and 82.0% (n=82) reported having musculoskeletal disorders (MSDs) that developed after starting work. In the past year, 26.0% (n=26) were admitted to a hospital due to MSDs, and 10.0% (n=10) received a medical leave report due to MSDs (Table 1).

Table I: Demographic and work-related characteristics of participants

Characteristics		All participants (n=100)
		n (%)
Gender	Female	74 (74.0)
	Male	26 (26.0)
Marital status	Married	77 (77.0)
	Single	23 (23.0)
Educational status	High school or below	36 (36.0)
	University or above	64 (64.0)
Work system	Constant daytime	96 (96.0)
	Both daytime and nighttime	4 (4.0)
Presence of MSD that developed after starting work	Yes	82 (82.0)
	No	18 (18.0)
Rate of hospital admissions for MSD in the past year	Yes	26 (26.0)
	No	74 (74.0)
Rate of sick leave due to MSD in the past year	Yes	10 (10.0)
	No	90 (90.0)
		Median (1st-3rd Quartile)
Total working hours (/year)		13.0 (10.0-18.0)
Total working hours in current unit (/year)		7.0 (1.6-12.0)
Hours spent per day in front of a computer at work		8.0 (7.0-8.0)

MSD: Musculoskeletal system disease

The median Neck Disability Index (NDI) score decreased from 14.0 (IQR: 6.0-24.0) before the training to 6.0 (IQR: 2.0-21.5) after the training (p=0.009). The median Oswestry Disability Index (ODI) score decreased from 9.0 (IQR: 5.2-13.7) to 5.0 (IQR: 2.0-11.0) (p = 0.024). The median SF-36 total score increased from 57.7 (IQR: 46.9-74.1) to 67.7 (IQR: 59.6-76.1) (p=0.001). Scores increased significantly in the physical functioning (p=0.008), emotional well-being (p=0.025), general health perception (p=0.005), and other subscales, except for the "role limitations due to physical problems" subscale (p=0.182) (Table 2).

Table II: Comparison of participants' NDI, ODI and SF-36 scores before and after training

Indexes	Before training	After training	p
	Median (IQR)	Median (IQR)	value*
Neck Disability Index (NDI)	14.0 (6.0-24.0)	6.0 (2.0-21.5)	**0.009**
Oswestry Disability Index (ODI)	9.0 (5.2-13.7)	5.0 (2.0-11.0)	**0.024**
SF-36 total score	57.7 (46.9-74.1)	67.7 (59.6-76.1)	**0.001**
Physical function	72.5 (50.0-93.7)	80.0 (65.0-95.0)	**0.008**
Impairment due to physical problems	75.0 (25.0-100.0)	50.0 (25.0-100.0)	0.182
Impairment due to emotional problems	33.0 (8.3-100.0)	66.6 (33.3-10.00)	**<0.001**
Energy level	50.0 (35.0-65.0)	60.0 (50.0-8.00)	**<0.001**
Emotional well-being	56.0 (44.0-72.0)	60.0 (52.0-76.0)	**0.025**
Social function	62.5 (50.0-75.0)	75.0 (50.0-87.5)	**<0.001**
Physical pain	55.0 (45.0-77.5)	67.5 (45.0-90.0)	**0.003**
General health perception	50.0 (40.0-70.0)	60.0 (45.0-80.0)	**0.005**

** Wilcoxon signed-rank test*

In the gender comparison, before the training, the median NDI score was 10.0 (IQR: 7.0-15.0) in females and 5.0 (IQR: 2.0-7.5) in males (p<0.001). After the training, the NDI score decreased to 6.0 (IQR: 2.0-11.0) in females and 4.0 (IQR: 0.7-7.7) in males (p=0.189). The ODI score decreased in females from 15.0 (IQR: 8.0-26.0) to 6.0 (IQR: 2.0-22.0) (p=0.025), and in males from 8.0 (IQR: 5.5-16.5) to 4.0 (IQR: 1.5-19.5) (p=0.525). SF-36 total scores increased in females from 55.2 (IQR: 45.4-70.7) to 67.4 (IQR: 58.4-74.5) (p<0.001), while the change in males was not significant (p=0.770).

For marital status, the NDI score decreased in single participants from 13.0 (IQR: 7.0-17.0) to 7.0 (IQR: 2.0-10.0) (p=0.012), and ODI score from 20.0 (IQR: 6.0-26.0) to 4.0 (IQR: 2.0-12.0) (p=0.008). In married participants, SF-36 score increased from 59.1 (IQR: 47.9-72.6) to 66.2 (IQR: 59.6-75.5) (p=0.004).

Among those with a high school education or lower, NDI decreased from 10.5 (IQR: 4.5-15.7) to 4.5 (IQR: 1.0-10.7) (p=0.035), and SF-36 score increased from 55.4 (IQR: 44.1-68.6) to 66.6 (IQR: 62.2-74.1) (p=0.002). No significant changes were observed in the university and above group.

In terms of working system, those working in continuous daytime shifts had reduced NDI (from 9.0 to 5.0, p=0.008) and ODI (from 14.0 to 6.0, p=0.023) scores and increased SF-36 scores (from 57.7 to 67.7, p=0.002). No significant changes were observed in the group working both day and night shifts (p>0.05).

As shown in Table 4, among participants who developed MSDs after starting work (n=82), NDI scores decreased from 10.0 to 5.0 (p=0.003), ODI scores from 16.0 to 6.0 (p=0.016), and SF-36 scores increased from 55.2 to 65.9 (p<0.001). Among those without MSDs (n=18), no significant changes were observed in any of the scales (p>0.05).

Among participants hospitalized for MSDs in the past year (n=26), SF-36 scores increased from 49.5 to 68.3 (p=0.004), while the change in NDI and ODI scores was not statistically significant. Between-group comparisons showed that participants with hospitalization had higher NDI and ODI scores and lower SF-36 scores than those without hospitalization (p=0.032, p=0.009, and p=0.016, respectively).

Among participants who received medical leave for MSDs in the past year (n=10), NDI scores decreased from 12.5 to 7.5 (p=0.036), and SF-36 scores increased from 46.5 to 69.4 (p=0.017). Similar patterns were observed in those who did not receive medical leave (n=90), with NDI decreasing (p=0.040) and SF-36 increasing (p=0.012). No significant change in ODI was observed in either group.

Table III: Comparison of participants' NDI, ODI and SF-36 total scores before and after training with their socio-demographic characteristics

Variables	n (%)	Neck Disability Index (NDI)			Oswestry Disability Index (ODI)			SF-36 total score		
		Before training	After training	p**	Before training	After training	p**	Before training	After training	p**
		Median (IQR)	Median (IQR)		Median (IQR)	Median (IQR)		Median (IQR)	Median (IQR)	
Gender										
Female	74 (74.0)	10.0 (7.0-15.0)	6.0 (2.0-11.0)	**0.006**	15.0(8.0-26.0)	6.0 (2.0-22.0)	**0.025**	55.2 (45.4-70.7)	67.4 (58.4-74.5)	**<0.001**
Male	26 (26.0)	5.0 (2.0-7.5)	4.0 (0.7-7.7)	0.943	8.0(5.5-16.5)	4.0 (1.5-19.5)	0.525	69.8 (57.0-81.7)	67.8 (62.1-88.8)	0.770
p*		**<0.001**	0.189		**0.028**	0.467		**0.008**	0.182	
Marital status										
Married	77 (77.0)	9.0 (5.0-12.0)	5.0 (1.5-11.5)	0.103	14.0(6.0-21.0)	6.0 (2.0-23.0)	0.261	59.1 (47.9-72.6)	66.2 (59.6-75.5)	**0.004**
Single	23 (23.0)	13.0 (7.0-17.0)	7.0 (2.0-10.0)	**0.012**	20.0(6.0-26.0)	4.0 (2.0-12.0)	**0.008**	56.3 (43.8-80.2)	68.3 (58.8-76.9)	0.162
p*		0.097	0.793		0.389	0.398		0.867	0.646	
Educational Status										
High school and below	36 (36.0)	10.5 (4.5-15.7)	4.5 (1.0-10.7)	**0.035**	16.0(8.0-25.5)	5.0 (2.0-23.0)	0.104	55.4 (44.1-68.6)	66.6 (62.2-74.1)	**0.002**
University and above	64 (64.0)	8.0 (5.2-13.0)	5.0 (2.0-11.7)	0.129	13.0(6.0-22.0)	6.0 (2.0-21.5)	0.114	60.7 (47.6-77.3)	68.4 (58.2-76.3)	0.136
p*		0.216	0.640		0.207	0.894		0.172	0.906	
Working system										
Continuous daytime	96 (96.0)	9.0 (6.0-13.7)	5.0 (1.2-11.0)	**0.008**	14.0(6.0-24.0)	6.0 (2.0-20.0)	**0.023**	57.7 (46.9-74.1)	67.7 (59.0-76.1)	**0.002**
Both day and night	4 (4.0)	3.0 (1.5-12.7)	6.5 (4.5-9.2)	0.715	12.0(5.5-21.5)	15.0(1.5-25.5)	0.999	58.9 (44.9-87.8)	65.9 (62.7-84.9)	0.465
p*		0.703	0.678		0.142	0.629		0.806	0.678	

Mann-Whitney U test * Wilcoxon signed-rank test*

Table IV: Comparison of participants' NDI, ODI and SF-36 total scores before and after training with responses to MSD questions

Variables	n (%)	Neck Disability Index (NDI)			Oswestry Disability Index (ODI)			SF-36 total score		
		Before training	After training	p**	Before training	After training	p**	Before training	After training	p**
		Median (IQR)	Median (IQR)		Median (IQR)	Median (IQR)		Median (IQR)	Median (IQR)	
Presence of MSDs occurring after starting work										
Yes	82 (82.0)	10.0 (6.7-15.0)	5.0 (1.7-11.2)	**0.003**	16.0 (10.0-26.0)	6.0 (2.0-22.0)	**0.016**	55.2 (44.2-69.7)	65.9 (58.1-75.3)	**<0.001**
None	18 (18.0)	3.5 (0.7-7.0)	4.0 (1.5-8.2)	0.583	6.0 (2.0-8.5)	3.0 (0-16.5)	0.794	79.5 (69.4-84.5)	71.6 (64.3-79.8)	0.061
p*		**<0.001**	0.361		**<0.001**	0.159		**<0.001**	0.066	
Hospitalisation for MSD in the last year										
Yes	26 (26.0)	12.0 (6.0-19.0)	5.5 (1.7-17.0)	0.061	20.0 (11.5-31.0)	16.0 (3.5-36.5)	0.290	49.5 (40.3-65.6)	68.3 (61.4-75.4)	**0.004**
None	74 (74.0)	8.5 (5.0-12.2)	5.0 (1.7-10.2)	0.059	12.0 (6.0-20.0)	4.0 (2.0-20.0)	0.053	61.8 (49.4-75.6)	67.4 (59.4-76.2)	0.057
p*		**0.032**	0.488		**0.009**	**0.027**		**0.016**	0.922	
Received medical advice due to MSD in past year										
Yes	10 (10.0)	12.5 (7.0-21.2)	7.5 (4.0-12.2)	**0.036**	25.0 (18.5-35.0)	15.0 (5.5-25.0)	0.154	46.5 (31.5-59.3)	69.4 (60.6-78.6)	**0.017**
None	90 (90.0)	9.0 (5.0-13.0)	5.0 (1.0-11.0)	**0.040**	12.0 (6.0-22.0)	5.0 (2.0-20.0)	0.052	59.6 (47.9-75.6)	67.7 (59.4-76.0)	**0.012**
p*		0.075	0.313		**0.007**	0.091		**0.022**	0.730	

Mann-Whitney U test* Wilcoxon signed-rank test*

DISCUSSION

In this study, which was designed to determine the incidence of MSDs, neck and back pain and quality of life of secretaries working in hospitals, to teach them correct posture at the desk, to train them in exercises that can be done at the desk and to examine the effectiveness of the ergonomics and exercise training given, 82.0% of the participants had symptoms after starting work. They were found to have declared that they had MSDs. In various studies conducted with office workers in the existing literature, the percentage of those who reported muscle pain in at least one body part was found to be similar to this study[6,19]. A study of office workers in Lithuania reported that 65.7% of the sample had neck pain, 50.5% had shoulder pain and 56.1% had low back pain[20]. A similar study in Australia found that 76% of office workers had neck pain, 71% had shoulder pain and 65% had low back pain[21]. It can be assumed that the higher prevalence of MSDs in this study compared to studies in some countries is due to the fact that body parts were not surveyed individually and MSDs were assessed by interview. In addition, the prevalence of MSDs is likely to vary according to the type of occupation, the work performed and the tool used to inquire about these disorders.

In this study, around a quarter of the participants had been admitted to hospital for MSDs in the previous year, and one in ten had taken sick leave as a result. Similar studies conducted among office workers reported that the rate of hospitalisation for MSDs was 30%[22]. Another study found that 34.4% of the sample took sick leave because of MSDs[23]. A study using data from the UK, France and Finland found that MSDs were the most common cause of sickness absence[24]. MSDs are considered to be a major cause of long-term sickness absence. Differences in the rates of hospitalisation and sickness absence in the literature may be due to changes in the time period considered and the way in which information is collected (from records or from individuals). Nevertheless, the high prevalence of both hospital admissions and sickness absence in MSDs is a notable finding.

The training used in this study was found to reduce participants' scores on the NDI and ODI, while increasing their scores on the SF-36. Some studies conducted on office workers show that ergonomics training is effective in reducing the incidence and cost of MSDs and increasing work efficiency, job satisfaction and quality of life[10,25]. In the existing literature, there are studies that show that exercise trainings reduce work-related MSDs among workers and improve their quality of life[26]. A meta-analysis study conducted to determine the effectiveness of exercises for office workers with neck pain reported that strengthening exercises in particular were effective in improving both neck pain and quality of life[27]. The positive results in the literature and in this study suggest that both ergonomics and exercise training programmes have a multifaceted effect, covering other areas such as work-related costs, quality of life, job satisfaction and MSD complaints.

Studies in the literature report that the incidence of MSDs is higher in women than in men. Studies that look at specific parts of the body have found that the frequency of pain in specific areas, such as the neck, shoulders and back, is higher in women than in men. Most epidemiological studies on low back pain show that there are small differences between the sexes[25,28]. In this study, it was found that women's neck and back pain was higher than men's and their quality of life score was lower in the pre- training assessment. After training, women's neck and back pain scores decreased and their quality of life scores increased, while there was no significant change in men's scores on all three scales. An training study of stretching exercises in office workers found a reduction in neck pain in women, similar to this

study. In contrast to this study, men's complaints of low back pain were found to decrease significantly with the training[25]. The results of this study showed that women had more MSD complaints than men and that they benefited more from the training than men. Physiological and anthropometric differences between men and women may explain the higher incidence of MSDs in women, the decrease in neck and low back pain scores, and the increase in quality of life scores with training. In addition, in Turkish culture, women's high responsibility for domestic work in addition to their work at the workplace may suggest that female secretaries may experience more physical and mental strain because they are more active at home than men in addition to their work at the workplace. This situation can be seen as an effective reason for the differences in both MSD incidence and scale scores. However, all these reasons are only predictions.

This study found that neck and low back pain scores decreased and quality of life scores increased in those working continuous day shifts compared to pre- training levels. Increasing working hours and desk time at work have been identified as important risk factors for the incidence of MSDs in office workers. Studies report that time spent in front of a computer has a linear relationship with the incidence of MSDs[29,30]. It can be said that the time spent at the desk and the work intensity of those who work continuously during the day in the hospital is high in parallel with the patient density. Therefore, it is an expected finding that they will benefit more from the training.

This study found that the neck pain, low back pain and quality of life scores of those who reported MSDs at baseline changed positively with the training. MSDs are the most common work-related health problem, affecting millions of workers in Europe. In the United States, Scandinavian countries and Japan, MSDs are reported to account for around a third of all occupational diseases recorded and are the largest group of occupational diseases8. This suggests that more effective training in desk exercises and ergonomics may be beneficial in reducing the prevalence of work-related musculoskeletal problems among those who report that their MSDs started after working. The fact that a large part of human life is devoted to work, the importance of work in people's lives and the close relationship between workplace conditions and health show that such training and practices should not be limited to research and highlight the importance of occupational health and safety departments applying routine programmes to all workers.

LIMITATIONS

Our study has several limitations. The lack of a control group in the study and the relatively small sample size prevent the generalisation of the findings. In addition, only desk workers working as secretaries in the medical faculty were included in the study. The study did not use a diagnostic method to determine the incidence of MSDs, but evaluated the answers given by the participants. For neck and back pain, self-administered scales were used. For this reason, there may have been fewer or more reports because the answers given are individual and not confirmed by diagnostic methods. For these reasons, there is a need for studies that include a larger sample of desk workers with different jobs and work intensities, that control for psychological, individual and job characteristics, and that evaluate the effectiveness of the training through a randomised controlled trial. Despite the above limitations, this study highlights that short-term training and reminders that can be delivered in a hospital setting can be an effective method of reducing MSD symptoms and related complaints, and contributes to the literature on the importance of this topic.

CONCLUSION

This training study, conducted with secretaries working in various departments of the Medical Faculty Hospital, incorporated interactive ergonomics and exercise training, supplemented by weekly reminders. The findings revealed a significant reduction in neck and lower back pain scores, along with an improvement in quality of life. The training was particularly effective in reducing neck and back pain and enhancing quality of life among women, employees working permanent day shifts, and those who developed MSDs after starting their jobs.

These results highlight that both simple, short-duration exercises that can be performed at a desk and ergonomic training are viable methods for managing MSD-related complaints. Furthermore, the findings of this study can inform strategies and workplace trainings aimed at reducing the prevalence of MSDs among desk workers. Given the widespread occurrence of MSDs in this population, implementing training sessions at regular but brief intervals may serve as an effective preventive approach against these disorders.

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