The Effect of Aerobic Exercise on Work Performance, Fatigue, Depression, Pain and Quality of Life in Office Workers

Ofis Çalışanlarına Yönelik Aerobik Egzersizin İş Performansı, Yorgunluk, Depresyon, Ağrı Ve Yaşam Kalitesine Etkisi

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ABSTRACT

This study aims to create a habit of regular physical activity by adding aerobic exercise to the long-term sedentary working conditions that office workers are exposed to and to investigate the effects of this exercise performed under the guidance of a physiotherapist.

A total of 100 office workers (40 women and 60 men) participated in this study. Participants were divided into 2 groups as experimental and control groups. Both groups were administered questionnaires to assess work performance "Health and Work Performance Scale", fatigue "Fatigue Severity Scale", depression "Beck Depression Scale", pain "Cornell Musculoskeletal Questionnaire (CMDQ)", physical activity "International Physical Activity Questionnaire" and quality of life "SF-36 Quality of Life Questionnaire". Aerobic exercise protocol was applied to the experimental group for 12 weeks and aerobic exercise was not applied to the control group.

A statistically significant difference was found that physical activity, quality of life, health and work performance levels were higher and depression, pain and fatigue levels were lower in the group applying aerobic exercise protocol compared to the control group ($p<0.05$).

Keywords: Aerobic Exercise, Fatigue, Depression, Pain, Office Workers.

ÖZ

Bu çalışma, ofis çalışanlarının maruz kaldığı uzun süreli hareketsiz çalışma koşullarına aerobik egzersiz ekleyerek, düzenli fiziksel aktivite alışkanlığı oluşturmak ve fizyoterapist rehberliğinde gerçekleştirilen bu egzersizin etkilerini araştırmayı amaçlamaktadır.

Bu çalışmaya toplam 100 ofis çalışanı (40 kadın 60 erkek) katıldı. Katılımcılar deney ve kontrol grubu şeklinde eşit sayıda 2 gruba ayrıldı. Her iki gruba; iş performansı "Sağlık ve İş Performansı Ölçeği", yorgunluk "Yorgunluk Şiddeti Ölçeği", depresyon "Beck Depresyon Ölçeği", ağrı "Cornell Kas İskelet Sistemi Anketi(CMDQ)", fiziksel aktivite "Uluslararası Fiziksel Aktivite Anketi" ve yaşam kalitesini "SF-36 Yaşam Kalitesi Anketi" değerlendirmeye yönelik anketler yaptırıldı. Deney grubuna 12 hafta aerobik egzersiz protokolü uygulanıp kontrol grubuna aerobik egzersiz yaptırılmadı.

Aerobik egzersiz protokolü uygulayan grupta kontrol grubuna göre fiziksel aktivite, yaşam kalitesi, sağlık ve iş performansı düzeylerinin yüksek; depresyon, ağrı ve yorgunluk düzeylerinin ise düşük olduğu yönünde istatistiksel olarak anlamlı fark bulunmuştur ($p<0,05$).

Anahtar Kelimeler: Aerobik Egzersiz, Yorgunluk, Depresyon, Ağrı, Ofis Çalışanları

Highlights

- Aerobic exercise was found to be an effective technique for lowering musculoskeletal disorders, improving overall health, and increasing office workers' productivity and performance.
- Moderate-paced walking has been identified as a practical sort of aerobic exercise that office workers can easily add into their daily routine.

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INTRODUCTION

With today's increased workload, office occupations frequently entail lengthy hours of sitting at a desk and staring at computer screens. Because of the sedentary nature of these tasks, over time, office workers can suffer physically as a result of microtrauma-related conditions such as neck, back, and lower back discomfort.[1] Office workers experience absenteeism, lower quality of life, occupational change, and disability as a result of work-related musculoskeletal problems, all of which are recognized as significant contributors to increased medical spending. [2] It is seen that these individuals sitting at a desk in the same position for a long time causes asymmetry in their bodies, leading to the emergence of postural deformities. Regular physical activity has become a necessity due to the increasing workload and working conditions of these individuals.[3]

Physically sedentary lifestyles are causing serious health problems today. The World Health Organisation (WHO) reports that cardiovascular diseases cause 17.9 million deaths worldwide each year, with 80% of these deaths attributed to preventable risk factors such as unhealthy diet and lack of physical activity.[4] Sedentary lifestyles among office workers accumulate physical tiredness, increasing the risk of cardiovascular disease. According to the literature, regular physical activity can help avoid many chronic diseases and early deaths, including cardiovascular disease, diabetes, cancer, osteoporosis, hypertension, obesity, and depression.[5] Physical activity and aerobic exercise have been shown to improve cardiovascular illnesses and heart function. Aerobic activities promote balance and coordination while also improving cardiovascular health and development of bones. While aerobic activities improve muscle strength, flexibility, and aerobic capacity, they are also known to have physiological effects that make individuals feel good by reducing stress through the release of endorphins.[6]

Office workers need a place outside the hospital to reduce the risk of musculoskeletal and cardiovascular system disorders due to the difficulty of utilising health services due to their busy work life. [7] Considering that not all institutions have in-house physiotherapy clinics, it is precisely at this point that exercise-based rehabilitation practices come into play and draw attention as a solution to all these problems in office workers. In our study, we aim to close this gap by providing office workers with aerobic exercise habits. Aerobic exercise, recognised as an effective intervention tool, is highly recommended for the management and even prevention of many chronic diseases faced by office workers. Recent reviews investigating the effects of exercise on the health of office workers have reported significant and protective effects of exercise on musculoskeletal pain symptoms. [8, 9]

The literature mostly focuses on posture exercise, respiratory exercise, and office workouts for office workers. The majority of research have used information and remote monitoring.[10, 11] In addition, pain, depression, stress and fatigue levels of office workers have been the subject of interest, but solutions to these problems have been limited. This study was planned to create exercise habits in office workers and to investigate the effects of regular physical activity accompanied by a physiotherapist by adding aerobic exercise to the sedentary working conditions of office workers ranging between 3-8 hours, which we have seen to be lacking in the literature. In addition, this study is unique in terms of having office workers perform aerobic exercise for 12 weeks regularly under the supervision of a physiotherapist and evaluating the effects of aerobic exercise on work performance, fatigue, depression, pain and quality of life.

MATERIALS AND METHODS

Ethical Aspects of the Research

Office workers at Erzurum Technical University were included in this study. Informed consent form was signed by all participants. Ethical approval was obtained from Erzurum Technical University Scientific Research and Publication Ethics Committee (Number of Meetings: 11, Number of Decisions: 20, Date: 19.10.2023). The study was conducted in accordance with the Declaration of Helsinki.

Participants

100 office workers were divided into 2 groups of equal numbers as experimental and control using stratified randomisation method. Strata were randomly assigned using the Windows-based SPSS 22.0 (IBM Corporation, Armonk, NY, USA) package programme. [12] The study comprised office workers aged 20 to 45 who had been working for at least 6 months, had no systemic disease, had written permission to walk from a specialized physician, and volunteered to participate. Individuals who did not meet the above criteria, had difficulty communicating verbally, had musculoskeletal surgery within the last 6 months, worked in a setting other than office work (kitchen, cleaning, etc.), had a physical disability, or wanted to leave the study during the data collection phase were not included.

Power Analysis

The G*Power 3.1.9.4 tool was used to establish the minimal number of patients needed for the trial during the priori power analysis. According to the priori analysis, the study's effect size was 0.8 (high effect size), its power was 0.95 at a significance level of 0.05 with a 95% confidence interval, and both groups should include 35 participants. These results indicate that the sample size is at the appropriate level. [10] However, 100 participants were included in the study considering that the participants dropped out of the study.

Evaluations

After the experimental and control groups were established, questionnaires on work performance, fatigue, depression, pain, physical activity, and quality of life were administered to both groups. The experimental group followed an aerobic exercise routine for 12 weeks, but the control group did not. Demographic data including age, gender, height, weight, education, smoking status, occupation, daily working time, daily fixed sitting time, and working year were collected.

Work Performance

The Health and Work Performance Scale was developed to evaluate the performance of office workers. This scale was created to assess employees' work efficiency and to track absenteeism and presenteeism. Kuru and Balkan evaluated the questionnaire's Turkish validity and reliability. It has pioneered several studies to better understand the links between fitness, health, and work performance, as well as to mitigate these losses. [13]

Fatigue

The Fatigue Severity Scale was used to measure the fatigue of the participants. In this scale, which has proven validity and reliability, the person indicates how much he/she agrees with each item by choosing a number from 1 to 7. 1=strongly disagrees, 7=strongly agrees. The score range of the scale consisting of a total of 9 questions is 9-63. A score of 36 or higher indicates severe fatigue. [14]

Level of Depression

The Beck Depression Inventory was used to determine depression levels. It was created to assess the risk of depression, the intensity of depressive symptoms, and their progression in adults. It is a scale that has been demonstrated to be valid and reliable. A score of 0-9 indicates no depression, 10-16 indicates mild depression, 17-24 indicates moderate depression, and 25 or more points indicates severe depression. [15]

Pain

The pain levels of office workers were assessed using the Cornell Musculoskeletal Questionnaire (CMDQ). It is a questionnaire developed by Cornell University and validated in Turkish by Erdinç et al. The CMDQ evaluates the frequency and intensity of pain or discomfort in 11 different body parts (neck, shoulder, back, upper arm, waist, forearm, wrist, hip, upper leg, knee, and lower leg) over the last 7 days, as well as its impact on work performance. [16]

Level of Physical Activity

The International Physical Activity Questionnaire was used to assess physical activity levels. Öztürk conducted validity and reliability studies on a questionnaire for university students, which measures sitting, walking, moderately vigorous activities, and time spent in vigorous activities. [17]

Quality of Life

SF-36 Quality of Life Questionnaire was used to evaluate the quality of life of office workers. The validity and reliability of the 'Quality of Life (SF36) Questionnaire' in Turkey was performed by Koçyiğit et al. [18] SF-36 consists of physical function (10 items), social function (2 items), physical role (4 items), emotional role (3 items), mental health (5 items), vitality (4 items), pain (2 items) and general health (5 items) sub-dimensions. In this scale where health is analysed in eight components, higher scores indicate a better level of health. [18]

The Aerobic Exercise Protocol

The exprimental group was given moderate-paced walking exercise three days a week for 12 weeks under the supervision of a physiotherapist.The experimental group was required to walk at a moderate pace for 20 minutes (min) during the first three weeks, 30 minutes between the fourth and eighth weeks, and 40 minutes during the final four weeksThe first and last 10 minutes of each walk were instructed to be taken at a modest pace, including warm-up and cool-down periods. After a total of 12 weeks, all scales were used as a post-test.

Statistical Analysis

All statistical analyses were performed using Statistical Package for the Social Sciences (SPSS) version 22.0 (IBM Corporation, Armonk, New York, USA). It was determined that the data did not show normal distribution according to Skewness and Kurtosis values. Continuous variables were expressed as mean ± standard deviation and categorical variables as number and percentage. Since the data were not normally distributed, Mann-Whitney U test was used for comparison of independent group differences and Wilcoxon test was used for comparison before and after aerobic exercise.

RESULTS AND DISCUSSION

100 office workers took part in the study. The average age of 30 male office workers in the exercise group was 39.40 ± 5.39 years. Their BMI was 26.30 ± 3.46 before exercise and 25.71±2.85 after exercise. The educational level was 70% (21 people) undergraduate and 30% (9 people) postgraduate. The average age of 20 female office workers was 39.35±9.68 years, with 60% (12 people) bachelor's degree. The control group comprised 30 male office workers with an average age of 39.87±6.99 years and a BMI of 26.51±3.50. Their educational levels were 6.7% (2 people) high school, 20% (6 people) associate degree, and 73.3% (22 people) bachelor's degree.BMI values of 25.72±4.81 before exercise and 25.43±4.14 after exercise. Their educational levels were 10% (2 people) high school, 30% (6 people) associate degree, and the average age of 20 female office workers was 38.60±9.23 years, and their BMI was 25.51±4.51. Their educational background was 55% undergraduate (11 people) and 45% postgraduate (9 people).

In the comparison of the exercise and control groups; Beck Depression Scale, Cornell Musculoskeletal Questionnaire (CMDQ), International Physical Activity

Questionnaire, SF-36 Quality of Life Questionnaire, Fatigue Severity Scale and Health and Work Performance Scale, a significant difference was observed in both male and female office workers only in the sub-assessment results of relative non-existence ($p<0.05$) (Table 1).

Table 1. Comparison of all parameters exercise and control groups.

			Exercise X±SD	Control X±SD	Z	p value
The Health and Work Performance Scale	Female	**absolute work absenteeism**	2.00±8.94	10.10±27.26	-0.407	0.684
		relative work absenteeism	0.82±0.37	1.02±1.46	-1.193	0.233
		absolute non-existence	84.50±11.90	81.50±16.31	-1.078	0.281
		relative non-existence	1.46±0.37	1.09±0.35	-3.139	**0.002****
	Male	**absolute work absenteeism**	3.66±15.86	11.13±33.25	-0.709	0.478
		relative work absenteeism	0.91±0.24	0.87±0.30	0.000	1.000
		absolute non-existence	89.33±12.29	77.00±23.36	-1.518	0.129
		relative non-existence	1.53±0.37	1.06±0.33	-4.098	**0.001****
The Fatigue Severity Scale	Female		3.06±1.43	4.38±1.57	-3.416	**0.001****
	Male		3.80±7.02	4.78±1.99	-2.863	**0.004****
Beck Depression Inventory	Female		7.95±3.22	11.40±5.35	-2.402	**0.016***
	Male		6.37±6.16	13.83±8.58	-4.299	**0.001****
Cornell Musculoskeletal Questionnaire	Female		30.17±36.78	53.05±58.66	-3.670	**0.001****
	Male		12.90±19.81	29.78±24.05	-2.397	**0.017***
The International Physical Activity Questionnaire	Female		4392.77±2434.83	2969.10±1235.33	-4.473	**0.001****
	Male		5745.46±3937.92	3454.23±2499.24	-2.012	**0.044***
SF-36 Quality of Life Questionnaire	Female		71.00±10.33	66.75±10.54	-2.463	**0.014***
	Male		75.83±10.09	66.66±8.33	-2.075	**0.038***

*= *(p<0.05)* , **= *(p<0.001)*

When the values before and after the exercise group were analysed, it was seen that there was a significant difference in the results of Beck Depression Scale, Cornell Musculoskeletal Questionnaire (CMDQ), International Physical Activity Questionnaire, SF-36 Quality of Life Questionnaire, Fatigue Severity Scale and Health and Work Performance Scale in the sub-assessment results of absolute absence at work and relative absence at work in both male and female office workers ($p<0.05$) (Table 2).

Table 2. Comparison of all parameters before and after exercise.

			Before Exercise X±SD	After Exercise X±SD	Z	p value
The Health and Work Performance Scale	Female	**absolute work absenteeism**	2.00±8.94	2.00±8.94	0.000	1.000
		relative work absenteeism	1.08±1.44	0.82±0.37	-0.447	0.655
		absolute non-existence	73.00±17.80	84.50±11.90	-3.219	**0.001****
		relative non-existence	1.02±0.42	1.46±0.37	-3.830	**0.001****
	Male	**absolute work absenteeism**	6.83±34.69	3.66±15.86	-0.971	0.331
		relative work absenteeism	0.96±0.33	0.91±0.24	-1.604	0.109
		absolute non-existence	80.33±22.96	89.33±12.29	-3.225	**0.001****
		relative non-existence	1.05±0.28	1.53±0.37	-4.266	**0.001****
The Fatigue Severity Scale	Female		4.30±1.54	3.06±1.43	-3.623	**0.001****
	Male		4.39±2.20	3.80±7.02	-4.079	**0.001****
Beck Depression Inventory	Female		11.45±6.22	7.95±3.22	-3.246	**0.001****
	Male		10.17±10.30	6.37±6.16	-3.667	**0.001****
Cornell Musculoskeletal Questionnaire	Female		39.95±59.12	30.17±36.78	-2.865	**0.004****
	Male		18.78±25.30	12.90±19.81	-4.291	**0.001****
The International Physical Activity Questionnaire	Female		3812.05±2747.39	4392.77±2434.83	-3.640	**0.001****
	Male		4480.56±4675.91	5745.46±3937.92	-4.203	**0.001****
SF-36 Quality of Life Questionnaire	Female		65.75±8.62	71.00±10.33	-2.034	**0.042***
	Male		68.83±12.36	75.83±10.09	-4.032	**0.001****

*= *(p<0.05)* , **= *(p<0.001*

In the comprehensive sub-parameter evaluations of the International Physical Activity Questionnaire in the exercise group; when the pre- and post-exercise findings were analysed, it was observed that there was no significant difference in moderately vigorous and vigorous activities (p>0.05), but there was a significant difference in the time spent in walking and sitting activities (p<0.05) in both male and female office workers (Table 3).

Table 3. Comparison of The International Physical Activity Questionnaire before and after exercise.

			Before Exercise X±SD	After Exercise X±SD	Z	p value
The International Physical Activity Questionnaire	Female	**intense**	360.00±776.71	360.00±776.71	0.000	1.000
		moderate intensity	220.00±502.54	231.57±513.56	0.000	1.000
		sitting	2802.97±1885.97	3149.47±1681.42	-2.060	**0.039***
		walking	429.07±517.39	674.85±440.85	-3.568	**0.001****
	Male	**intense**	594.90±1228.39	594.90±1228.39	0.000	1.000
		moderate intensity	464.26±1420.10	464.26±1420.10	0.000	1.000
		sitting	2463.00±2271.26	3471.00±1706.61	-2.828	**0.005****
		walking	1000.53±1878.34	1257.30±1790.35	-4.147	**0.001****

*= *(p<0.05)* , **= *(p<0.001*

In the CMDQ evaluation, when the pre- and post-exercise findings were analysed, it was observed that there was a difference in the frequency, severity and ability to work in 11 different body regions (neck, shoulder, back, upper arm, waist, forearm, wrist, hip, upper leg, knee and lower leg) in men, whereas no difference was found in women only in the hip (p=0.068) (Table 4).

Table 4. Comparison of Cornell Musculoskeletal Questionnaire before and after exercise.

			Before Exercise X±SD	After Exercise X±SD	Z	p value
Cornell Musculoskeletal Questionnaire	Female	**neck**	5.22±4.90	4.42±4.49	-3.112	**0.002****
		shoulder	7.15±9.29	5.80±8.03	-2.943	**0.003****
		back	5.20±5.52	4.15±4.58	-3.200	**0.001****
		upper arm	3.22±7.60	2.50±5.65	-2.032	**0.042***
		lumbal	2.70±4.76	2.00±3.69	-2.371	**0.018***
		forearm	2.65±7.01	2.15±5.88	-2.060	**0.039***
		wrist	2.77±7.02	2.15±5.84	-2.207	**0.027***
		hip	1.12±3.46	0.70±2.29	-1.826	0.068
		upper leg	2.22±6.79	1.75±5.64	-2.032	**0.042***
		knee	5.22±7.72	4.30±6.63	-2.829	**0.005****
		lower leg	2.25±6.81	1.75±5.64	-2.023	**0.043***
	Male	**neck**	2.71±3.17	1.91±2.38	-3.967	**0.001****
		shoulder	3.13±5.47	2.30±4.85	-3.322	**0.001****
		back	2.90±3.30	1.88±2.51	-3.849	**0.001****
		upper arm	0.81±1.64	0.40±1.00	-2.539	**0.011***
		lumbal	2.48±3.15	1.61±2.31	-3.419	**0.001****
		forearm	0.45±1.08	0.26±0.63	-2.060	**0.039***
		wrist	0.71±2.17	0.46±1.52	-2.032	**0.042***
		hip	0.73±1.56	0.50±1.19	-2.414	**0.016***
		upper leg	1.65±5.04	1.43±4.74	-2.041	**0.041***
		knee	1.56±3.75	1.05±2.65	-2.384	**0.017***
		lower leg	1.61±5.26	1.06±3.74	-2.226	**0.026***

*= *(p<0.05)* , **= *(p<0.001)*

This cross-sectional study was completed with 100 office workers. In the study, it was found that office workers who performed moderate-paced walking exercise three days a week for 12 weeks had higher levels of physical activity, quality of life, health and work performance and lower levels of depression, pain and fatigue than office workers who did not perform aerobic exercise.

Office workers spend approximately 71-80% of their working time in a sitting position and the frequency of changing their position is low. It has been stated that exercise is an important and indispensable factor in the prevention of risk factors related to musculoskeletal disorders caused by these sedentary lifestyles. [3] Walking, which is the

most preferred type of aerobic exercise, is a good alternative for people who are sedentary and/or have never participated in an exercise programme before. At the same time, it is a type of activity that can be done without causing excessive stress on the body and risk of injury and can be used to disrupt sedentary behaviour. [19] In light of this knowledge, the moderate-paced walking exercise we used in our study is a basic and uncomplicated activity that may be incorporated into daily routines for office workers who spend the majority of their time sitting and are unable to compensate for their sedentary behaviors outside of work.

Exercise programmes for office workers are becoming increasingly popular due to their potential benefits such as reduced absenteeism and increased work productivity. These exercise programmes have been shown to have a positive impact on employee productivity, job satisfaction and absenteeism.[8] In this regard, aerobic exercise, which is the focus of the relevant programs, is widely regarded as a health promotion intervention and can also be viewed by businesses as a method for increasing employee productivity. Walking, a type of aerobic exercise, expands the hippocampus, enhances memory, and aids in the execution of complicated cognitive tasks by promoting focus and concentration. A six-month study of a large group of office workers discovered a positive association between commitment to exercise and employees' job performance.[20] Similarly, fitness programmes for white-collar workers have been shown to have a significant impact on their fitness, productivity and absenteeism. [21] In parallel with the literature, the findings of our study emphasise that compared to office workers who do not engage in aerobic exercise, mood and performance improved in the exercising group, leading to better concentration, work-based relationships and higher resilience to stress.

The potential physiological effects of exercise include increased blood circulation, decreased intervertebral disc pressure, removal of lactic acid in muscle and increased alertness with psycho-physiological stimulation.[22] Given these effects, exercise is expected to relieve weariness and boost performance. Ezati et al. found that an eight-week aerobic exercise intervention reduced the total fatigue score and its components in a sample of university students.[23] De Vries et al. also reported that aerobic exercise may be effective in reducing fatigue.[24] The results of the mentioned studies are consistent with the results of our study. In our study, it was observed that fatigue levels decreased in office workers who performed moderate-paced walking exercise compared to those who did not. We think that this significant difference in fatigue may be the result of the physiological effects of exercise mentioned above, as well as the positive effect of increased physical activity level on the cardiovascular system. At the same time, since the exercise protocol we applied included warm-up and cool-down periods and the exercise intensity was not too high, it may have negatively affected the fatigue results in participants who were already tired at the beginning, and these possibilities were excluded and more effective results were obtained.

Exercise increases the release of neurotransmitters such as serotonin in all age groups and both sexes, lowering negative mood, depression, and anxiety while also increasing cognitive performance and self-esteem.[25] Aerobic exercise has also proven to be an effective treatment for mild to moderate depression.[5] In a study by Legrand and Neff, aerobic exercise and stretching exercises were added to the pharmacological treatment of inpatients for depression, and a significant reduction in depressive symptoms assessed by the Beck Depression Inventory (BDI) was shown in the aerobic exercise group compared to the group receiving only pharmacological treatment. Furthermore, a stronger effect was found for the aerobic exercise group compared to the stretching group.[26] In contrast, Buschert et al. found no beneficial effect of 3 to 4 weeks of aerobic exercise on depressive symptoms in a sample of 38 depressed inpatients.[27] In a study conducted in office workers, it has been

shown that depression in office workers is related to the duration of computer use.[28] In our study, in which the sample consisted of office workers, it was concluded that depression levels decreased with aerobic exercise programme.

Office workers who spend long hours in uncomfortable positions are more susceptible to developing conditions that might cause musculoskeletal discomfort due to poor working postures, and employees' musculoskeletal function and pain symptoms.[29] In a different study conducted with office workers, the most common body parts with pain were reported to be the upper back (69.6%) and neck (65.2%) Therefore, it is important to plan interventions to overcome the harmful effects of prolonged sitting and musculoskeletal pain in this study group. One of the most important interventions is exercise. In a systematic review of the effects of exercise on pain symptoms, all ten studies analysed showed significant improvements with exercise in reducing pain in the trapezius muscle in the shoulders, wrists, cervical, dorsal and lumbar spine.[30] An exercise reminder software programme was reported to help reduce office workers' perceived pain, and the associated exercise intervention positively affected physical well-being.[31] Aerobic exercise therapy was used in addition to conventional exercises in office workers with mechanical chronic low back pain, and the group that received additional aerobic activity, including 30 minutes of walking three times a week for eight weeks, showed a reduction in pain severity and disability.[32] In parallel with the literature, in our study, a decrease in neck, shoulder, back, upper arm, waist, forearm, wrist, hip, upper leg, knee and lower leg pain levels was observed in the aerobic exercise group.

Quality of life is an important concept related to individuals working in offices and is a structure that affects the overall life satisfaction and emotional functioning of employees. Office workers' job satisfaction and quality of life may be affected by being in a fixed environment requiring long hours and becoming immobilised due to increased computer use. In a study, aerobic exercise was performed 3 days a week for a period of 8 weeks and was shown to be an effective intervention to reduce pain intensity, functional disability, general work-related stress and improve quality of life in office workers.[33] Some authors have reported that exercise contributes to the quality of life of employees, creating a respite from the rhythm, rigour and monotony of work. [34]

In many studies in the literature, it has been stated that aerobic exercise has a positive effect on physical activity level. [3, 7, 35] However, in a study, sedentary adults were made to walk intermittently and continuously for 10 weeks and no significant change was observed in light physical activity from the physical activity level measured by accelerometer. Improvement was observed in moderate physical activity levels from baseline to 6 weeks, but returned to baseline measurements in weeks.[36] In our study, no change was observed in moderate and vigorous physical activity, whereas a decrease in time spent sitting and an increase in time spent walking were observed. Blue-collar workers show significantly higher occupational physical activity and therefore tend to engage in more moderate and vigorous activity types, whereas white-collar workers spend most of their time at work sitting and performing light occupational activities.[37] Considering that the target group of the study consisted of office workers with sedentary work characteristics, these results suggest that participation in physical activity may be due to differences between occupational categories. On the other hand, since the questions in the International Physical Activity Questionnaire focus on long-term and moderate to high intensity activities, it may have been insufficient to assess physical activity in these areas in office workers.

CONCLUSION AND RECOMMENDATION

In conclusion, this study emphasises the positive effects of regular moderate-paced walking exercise on physical and psychological health in office workers. The 12-week walking exercise performed three days a week increased physical activity levels, improved quality of life and increased work performance. In addition, significant reductions in depression, pain and fatigue levels were observed in the exercise group. These findings suggest that walking exercise is an appropriate intervention for office workers who are at risk due to sedentary lifestyle. It is concluded that exercise is an important tool for preventing musculoskeletal disorders and improving general health as well as increasing work performance and productivity in office workers.

Research Limitations

The study's limitations include a small sample size and a brief 12-week intervention, which may affect the generalisability and long-term assessment of results. Controlling for factors like nutrition and sleep and expanding research to different occupational groups or larger samples could improve generalisability.

Supporting Organization

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Conflict Of Interest

There is no conflict of interest between the authors in this study.

Contributions By Authors

The parts of the study contributed by the authors who contributed to the study are stated below. All authors have read and accepted the published version of the manuscript.

K.K; Contributed to the writing of the study - review, editing, supervision.

G.K; Contributed to the data collection and analysis process of the study.

A.N; Contributed to the data collection and analysis process of the study.

B.M; Contributed to the data collection and analysis process of the study.

G.D;Contributed to the research, conceptualization,methodology development and analysis of the study.

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