The effect of regular exercise on joint mobility in women working at desk jobs

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Abstract: The study investigated whether there is a difference between the joint mobility of female office workers who do and do not exercise using the Functional Movement Screening (FMS). Twenty females aged 35-40 volunteered to take part in the study. The study group participated in a fitness training program at the sports center where they were members, while the control group did not engage in any physical activity. The measurements were taken using the FMS test kit. Sigmaplot 11.0 software was used for the statistics of the study, the t-test for normally distributed data, and the Wilcoxon test for non-normally distributed data. The result of the study was a significant increase ($p < 0.005$) in the post-test total score of the study group, while there was no significant increase in the post-test total score of the control group. A statistically significant difference was found when comparing the posttest total scores of the study and control groups ($p < 0.001$). It was concluded that regular exercise can have a positive effect on the joint mobility of office workers.

Keywords: Exercise, Functional Movement Screening, Joint Mobility, Office Workers

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INTRODUCTION

Use of computers in the work place leads to a set of peculiar characteristics of the work station, which require workers to stay in a static posture for long periods of time. They spend a minimum of 40 hours per week sitting in front of a computer screen. Poor posture develops and becomes a habit, which eventually leads to muscle strain and contrib- ute to repetitive strain injury. Changing working conditions with the development of technology reduce the daily movement time of individuals, and the diseases caused by the decrease in physical activity are increasing daily. In the World Health Organization (WHO) research covering the years 2016–2025, it is stated that a sedentary lifestyle is the primary factor in the occurrence of diseases. In the research, it is stated that 1 million deaths (10% of the total population) in Europe annually are caused by inactivity. They think that the causes of diseases such as coronary heart disease (5%), both types of diabetes (7%), breast cancer (9%), and colon cancer (10%) are sedentary lifestyles It can be said that the level of joint mobility in individuals is also adversely affected by inactivity.

Mobility, or joint range of motion (ROM), is the potential of the joint to move naturally without any strain (Demirci, 2009). Joint range of motion is affected by the strength and flexibility of the soft tissues surrounding the joint and the shape and relationship of the joint structures. The range of motion of the joint decreases more with age. The limitation of movement in the joint causes a decrease in the joint range of motion. Compared to men, joint range of motion narrowing is more common in women with advancing age.

Problems such as head forward and shoulders rolling forward in people who spend a lot of time at a desk are called 'upper cross syndrome'. This disorder reduces the ability of the shoulder joint to extend and rotate outward, causing increased cervical strain and shoulder blade protraction. Injuries to the biceps tendon and rotator cuff may occur due to reduced joint mobility (Öngel, 2019). Prolonged immobilization of the joints can cause shortening and shrinkage of the muscles, ligaments, and joint capsule. Over time, a 'contracture' develops, which is a permanent problem that restricts movement. Even if the person's muscle strength improves and they are able to move, the contracture may prevent them

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from using natural movement patterns. For this reason, it is very important for people to incorporate the habit of physical activity into their daily lives.

Physical activity consists of activities that increase breathing and heart rate by using muscles and joints in daily life (Sucu, 2018). Physical activity has a positive effect on joint mobility and most body functions.

A sitting posture is defined as an upright posture in which the head and trunk are vertical, the lower legs are bent at about 90° at the hips and knees, and the feet are firmly planted on the ground. It is common for western workplace environments to be desk-based, with a high level of sittingand limited movement during work hours.Considering that workplace physical activity interventions can have positive effects on musculoskeletal pain, anxiety and depression symptoms,and work performance outcomes, there is reason to be concerned about the lack of movement and physical activity among desk-based workers (Revzan, 2023).

Based on this situation, it was aimed to investigate the effect of 8-week conditioning exercise on joint mobility in office workers aged 35-40 using the Functional Movement Screening (FMS) test.

MATERIAL AND METHOD

Research Design

It is an experimental study with pre-test and post-test evaluations in experimental and controlled groups.

Research Group

The study group consisted of women aged 35–40 who had never exercised (sedentary) and who worked in office jobs such as lawyers, psychologists, financial advisors, engineers, and civil servants. The participants were randomized into two groups: the experimental group and the control group. The necessary permissions for this research were obtained from the Gazi University Ethics Committee, number 2022-390, dated 03, 19, 2022. Informed consent form was signed by all participants before the study.

Data Collection Tools

Participants were measured using the Functional Movement Screening (FMS) kit. The measurements were taken by a qualified person with a Level 1 certificate. The FMS test kit consists of a deep squat, hurdle step, line lunge, shoulder mobility, active straight leg raise, trunk stability push-up, rotational stability parameters, and control tests. Participants were given a score of 0–3 for each movement. Independent scores were given for the left and right sides of the body in the movements of hurdle step, line lunge, shoulder mobility, active straight leg raise, and rotational stability. General scoring rules: if there is pain while performing the movement, 0 points; if there is loss of balance while performing the exercise and inability to perform the movement, 1 point; if the movement is performed almost accurately without feeling pain, 2 points; if the movement is performed completely accurately, 3 points. The total score was determined as 21 (Altundağ, at all. 2021). No warm-up was performed on the participants before the measurement. The movements to be performed before the test were shown and described to the participants. The subjects were informed about the test before the measurement and were told to repeat the movements three times and to report if they felt any pain (Cengizhan & Eyüboğlu, 2017).

Analysing the Data

Data were analysed using Sigmaplot 11.0 software for descriptive statistics, normality tests and comparison statistics. When comparing two independent groups, the paired t-test was used for normally distributed data and the Wilcoxon test was used for unnormally distributed data. When comparing two unrelated groups, the t-test was used for normally classified data and the Mann-Whitney U test was used for unnormally classified data.

RESULT

Table 1. Comparison of FMS pre-test and post-test scores in the study group

FMS Parameters	Pre-Test (n= 10)		Post Test (n= 10)		p
	x	*SS*	*x*	*SS*	
Deep Squat	2,300	0,483	2,600	0,516	0,250
Right Hurdle Step	2,400	0,516	2,600	0,516	0,500
Left Hurdle Step	2,400	0,516	2,600	0,516	0,500
Right Inline Lunge	2,200	0,789	2,600	0,516	0,125
Left Inline Lunge	2,100	0,738	2,400	0,516	0,250
Right Shoulder Mobility	2,700	0,483	2,700	0,483	1,000
Left Shoulder Mobility	2,400	0,516	2,500	0,527	1,000
Right Active Staright-Leg Raise	2,200	0,632	2,700	0,483	0,063
Left Active Straight-Leg Raise	2,200	0,632	2,500	0,527	0,250
Trunk Stability Push-Up	1,600	0,516	1,800	0,422	0,500
Right Rotary Stability	2,200	0,632	2,200	0,632	1,000
Left Rotary Stability	2,200	0,632	2,200	0,632	1,000
Total Points	15,000	2,582	16,500	1,900	0,003**

*p<0,05; **p<0,01

After comparing the pre-test and post-test scores of the study group, a statistically highly significant result was observed for the total score variable (p=0.003).

Table 2. Comparison of FMS pre- and post-test scores in the control group

FMS Parameters	Pre-Test (n= 10)		Post Test (n= 10)		p
	x	*SS*	*x*	*SS*	
Deep Squat	2,100	0,568	2,200	0,422	1,000
Right Hurdle Step	1,700	0.483	1,700	0,483	1,000
Left Hurdle Step	1,700	0,483	1,700	0,483	1,000
Right Inline Lunge	1,600	0,516	1,700	0,483	1,000
Left Inline Lunge	1,700	0,483	1,700	0,483	1,000
Right Shoulder Mobility	2,400	0,843	2,400	0,843	1,000
Left Shoulder Mobility	2,400	0,843	2,500	0,707	1,000
Right Active Staright-Leg Raise	2,200	0,632	2,200	0,632	1,000
Left Active Straight-Leg Raise	2,200	0,632	2,200	0,632	1,000
Trunk Stability Push-Up	1,100	0,568	1,100	0,568	1,000
Right Rotary Stability	1,300	0,483	1,300	0,483	1,000
Left Rotary Stability	1,400	0,516	1,400	0,516	1,000
Total Points	12,300	2,584	12,500	2,369	0,500

*p<0,05; **p<0,01

After comparing the pre- and post-tests for the control group, no statistically significant result was found for the total score variable (p=0.500). The p-values of the FHT parameters remained constant between the pre- and post-tests (p=1,000).

Table 3. Comparison of FMS pre- and post-test scores in study and control groups

Total Points	Study Group (n= 10)		Control Group (n= 10)		P
	x	SS	x	SS	
Pre-Test Total Score	15,000	2,582	12,300	2,584	0,031
Post Test Total Score	16,500	1,900	12,500	2,369	<0,001**

*p<0,05; **p<0,01

A statistically significant difference (p<0.001) was observed when comparing the post-tests of the study and control groups.

DISCUSSION

This study was conducted to investigate the effect of regular exercise on the joint mobility scores of 20 female office workers aged 35–40 years. According to the results of the study, although there was no meaningful difference in the data of the study group when the movements were analyzed individually, the differences in the scores caused a significant difference in the whole test score and a considerable improvement in the whole post-test score compared to the whole pre-test score (p<0.005). It can be said that joint mobility developed with exercise; deep squats, line lunges, active straight leg raising, hurdle stepping, left shoulder mobility, and trunk stability push-up movements improved with an improvement in the mean post-test scores of the study group. The increase in deep squat, hurdle stepping, and online lunge test scores indicates an improvement in ankle, hip, and knee mobility and stability.

The increase in the study group's score on the trunk stability push-up movement shows that the mobility and stability of the pelvis and lumbar spine increased. The increase in scores on the active straight leg raising movement indicates that control of the trunk and pelvic position and hip joint ROM improved. The improvement in left shoulder mobility shows that the asymmetry present in the first test has been reduced, and it is also evident that the increased scapular and glenohumeral ROM has improved. The increase in score in the lunge movement shows that control of the trunk and thoracic spine has improved. The mean score of the study group in the rotational stability movement pattern remained constant between pre-test and post-test.

When analyzing the scores of the control group, although there was an increase in the deep squat, right line lunge, and left shoulder mobility scores, no significant difference was found to affect the overall score. In the other movements, the average score did not increase in the post-tests and remained constant.

When analyzing the scores of the control group, although there was an increase in the deep squat, right line lunge, and left shoulder mobility scores, no significant difference was found to affect the overall score. In the other movements, the average score did not increase in the post-tests and remained constant. When the post-test FMS total scores of the study and control groups were compared, a statistically meaningful difference was found between them (p<0.001). Similar studies were found in the literature; in a study conducted by Dağaşan (2019), it was concluded that regular Hatha yoga exercises performed on sedentary women had a positive effect on flexibility and posture, and in a study conducted by Karakaş (2017), sedentary women were regularly given Pilates exercises. It was concluded that there was a positive improvement in joint range of motion and flexibility. The research is parallel to the data in the literature.

CONCLUSION

After 8 weeks of exercise, the fact that there was a meaningful difference in total post-test scores between the groups, that there was no meaningful increase in the total post-test score of the control group, and that there was a meaningful improvement in the total post-test score of the study group compared to the total pre-test score makes the interpretation of the positive change in joint mobility through the effect of exercise on FMS scores more plausible.

Therefore, we may assume that regular exercise has a beneficial effect on the degree of joint mobility. It can be said that the fitness exercises performed on the study participants improved functional movement patterns and joint mobility levels. For future studies, it can be suggested that the exercise

program should improve flexibility and functional movement skills.

Author Note

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