



Evaluation of the Impact of an Ergonomics-Based Educational Program on Preventing Neck Pain Among Employees of a Telecommunications Services Company in Tehran

Parisa Aghaei Malayeri

Master's in Health, Safety and Environment Engineering, Department of Civil and Environmental Engineering (Kish Internatiol Campus), Amirkabir University of Technology, Tehran, Iran.

parisaagaei5@gmail.com

Doi : <https://doi.org/10.55248/gengpi.5.0924.2626>

ABSTRACT

Background and Objective: Incorrect spinal postures of employees during work can lead to an increased risk of neck pain among them. Various studies have shown a high prevalence of musculoskeletal disorders, including neck pain, among employees. Therefore, the aim of this study is to investigate the impact of an educational/exercise program including ergonomic recommendations and on-the-job exercises for preventing neck pain on changing the behavior of employees.

Method: This semi-experimental study was conducted on 90 employees in two test and control groups in 2022 at the Tehran Quality Telecom Company. A researcher-made questionnaire was used to assess the awareness, attitude, and behavior of employees regarding correct neck posture. The educational/exercise program was shared through mobile phones and social networks to increase awareness and change attitudes, reducing incorrect behaviors of employees. Data were collected before the intervention and three months after the intervention.

Results: The study showed that employees gained lower scores in terms of awareness, attitude, and behavior before the intervention. There were no significant differences in demographic characteristics and study variables between the test and control groups, while after the educational/exercise program, the average scores of employees in the test group significantly increased in all three areas of awareness, attitude, and behavior compared to the control group.

Conclusion: This study demonstrated that an ergonomics-based educational program can be effective in changing the behavior of employees to prevent neck pain. Therefore, it is recommended to use virtual educational programs for other employees of the company as well.

Keywords: Virtual educational program, Employees, Neck pain, Ergonomics principles, Exercise

Introduction

Work and man are two main and inseparable parts of existence that must be planned in a way that is compatible with each other. The lack of harmony and proportionality between a person's abilities and the type of work he does or the responsibility he is given causes many issues and problems, including the occurrence of accidents and diseases. He pointed out the problems caused by work and the low productivity of the workforce.

To prevent the occurrence of such issues and ensure the [health](#) of the workforce, ergonomics, as an efficient solution, rushes to help people. The application of ergonomics in the design of processes and the modification of people's behavior along with training has a great impact on increasing production, reducing medical costs, increasing job satisfaction, increasing productivity and, in general, the processing of workforce and increasing national income and [economic](#) benefits. It causes [1]. With the advent of the industrial revolution and technological progress in various fields, humans used machines to perform their daily tasks instead of using their body parts. The machine life of the present era has brought many industrial and technological advances to mankind and has become the source of valuable services for humans, but it also includes and has many complications. One of the effects of these symptoms is endangering the physical and mental health of people, which is mainly due to factors such as lack of movement, incorrect habits, doing repetitive work for a long time, skeletal-structural factors, lack of familiarity with the proper [physics](#) and [mechanics](#) of the body. And performing unbalanced and wrong movements in life. Among the risk factors of skeletal-muscular disorders, factors caused by work, poor posture, and doing repetitive work in the long term are among the most important ones [2]. The severity of these disorders affects different organs of the body such as muscles, bones, tendons, ligaments, joints, nerves and blood vessels and will cause any injury or disorder with pain or inflammation [3]. Musculoskeletal disorders, if they occur in the work environment, are called work-related musculoskeletal disorders (WMSDS¹). Based on the [research](#),

¹ Work related Musculoskeletal Disorders

musculoskeletal disorders related to work are considered to be the main cause of lost working days, reduction of work quality, increase of medical costs and human injuries of the workforce [4,5]. One of the tools that is currently growing rapidly in many societies and has forced people to work with it for hours without moving, is the computer [2]. Neck pain is the most common musculoskeletal complaint in computer users, who perform monotonous repetitive movements such as typing and moving the mouse during their work activities. The prevalence of this disorder in computer users has been reported up to 31% [6]. The prevention of musculoskeletal disorders in a working population requires the evaluation of job-related factors and individual characteristics and the diagnosis of the relationship between these factors and disorders. So that the World Health Organization, the American Occupational Safety and Health Administration and the British Occupational Safety and Health Administration have placed special emphasis on the control and prevention of these disorders and have made it one of their work priorities [7]. Considering that the nature of the job of the personnel of telecommunication systems is such that it always exposes them to physical and mental fatigue caused by the implementation and maintenance of communication infrastructures, research on this issue is very important. These occupational pressures and injuries can negatively affect the services they receive from doing their work (which applies to all members of society). All these points point to the importance of the issue and attention to the physical and [mental health](#) of the personnel working in telecommunications companies, which ultimately leads to the improvement of communication and information exchange in [society](#) [8, 9]. One of the most practical ways to reduce work-related risks is to carry out ergonomic interventions and use physiotherapy methods to prevent musculoskeletal disorders. In this regard, one of the most common sub-branches of physiotherapy is exercise therapy (stretching movements, strength and range of motion), which is widely used today. Also, since there is a relationship between ergonomics and neck pain prevention [behaviors](#) in [computer](#) users, so following the training program based on ergonomic principles can be our guide in reaching the correct results. Considering that very few researchers have investigated the effect of a coherent training program based on the principles of ergonomics and exercise in preventing neck pain in office personnel; Therefore, this research tries to investigate the impact and importance of ergonomic and exercise interventions in order to change the preventive behaviors of the human workforce, which are the biggest and most important sources of communication and telecommunication systems. Along with the progress in various industries, the ways of threatening human health against diseases have also changed. Since the middle of the 20th century, we have seen a decrease in infectious diseases and an increase in diseases and complications related to industrial life, such as accidents and cardiovascular and musculoskeletal diseases in a worrying way. Musculoskeletal disorders are one of the biggest occupational health problems in industrialized countries and also one of the main reasons for the discomfort and disability of working people, increasing work compensations and reducing productivity in developing countries [10]. Constantly working with the computer and performing tasks in a static and sitting position can be considered as one of the risk factors of musculoskeletal disorders. Since the spread of these disorders is one of the most important problems of occupational health in the workplace and causes a lot of financial and human damage, preventing their occurrence seems necessary. Musculoskeletal disorders rank fourth in total disability in Iran [11]. Today, with the advancement of technology and the necessity of public access to the fastest means of communication, extracting and exchanging information, the number of organizations providing telecommunication services is increasing [12]. The high importance of the health of the employees of these organizations and their important role in the lives of members of the society, the limited research conducted in the field of effective factors in the prevention of neck pain and musculoskeletal disorders in employees and the effect of a coherent and multifaceted program of ergonomics (including training) The principles of ergonomics and the implementation of a written sports program) in reducing neck pain of telecommunications company personnel make it necessary to study how to improve the health status of employees. Also, due to the high importance of sports and corrective exercises in the prevention of neck pain, which is an undeniable issue, this research has tried to address this issue. Using the results of this research, effective measures can be taken to increase the awareness, attitude and behavior of employees. Based on what was mentioned, the main objectives of the research can be stated as follows:

1. Determining and comparing the average score of knowledge of employees regarding the principles of ergonomics and exercise to perform neck pain prevention behaviors in the test and control groups before and after training.
2. Determining and comparing the average score of employees' attitudes regarding the principles of ergonomics and exercise to perform neck pain prevention behaviors in the test and control groups before and after the training.
3. Determining and comparing the average score of employees' behavior in relation to the principles of ergonomics and exercise to perform neck pain prevention behaviors in the test and control groups before and after the training.

Research method

The research community in this study was the employees working in the telecommunication service provider company of the first role of quality in Tehran.

NAK Company has three main centers in Tehran. From among the centers, according to the licenses obtained and the type of employees' activities (which were mainly with computers), the Kimia building, located in Shahrak-e Gharb, was selected. In order to determine the sample size, by asking the human resources unit, it was determined that almost 110 employees have the conditions to participate in the research; Therefore, it was decided that all 110 people, if eligible, were included in the study by census; But 90 people agreed to participate in the study, using a simple random method, they were divided into two groups of 45 people, control and test; That is, 45 people were selected as the control group and another 45 people were selected as the test group, among which three people from the second group did not cooperate due to personal reasons and left the group. In this study, in addition to demographic characteristics, a researcher-made questionnaire of employees' knowledge, attitude and behavior was used.

The necessity of designing a standard questionnaire regarding the measurement of knowledge, attitude and behavior of employees came to the fore when many efforts to find an acceptable questionnaire were unsuccessful. Therefore, after consulting with professors and experts in this field, the

necessity of creating a questionnaire with appropriate validity and reliability was revealed. To design and compile the questionnaire, first, questions from [scientific sources](#) and according to the opinion of experts (health education, physical therapy, ergonomics and occupational health) and studies conducted on the examination of awareness and attitude as well as existing standards regarding ergonomic behaviors to prevent Neck pain was extracted. These questions were designed in three dimensions (attitude, behavior and awareness). After review and modification, the questionnaire included 28 questions, among which 14 questions were in the field of awareness, 9 questions were in the field of attitude, and 5 questions were in the field of behavior. In the area of knowledge, the questions were designed in the form of four options, and the maximum score that could be obtained in this part was 28 and the minimum score was 14. This means that every employee who gets a higher score has a higher level of awareness. In the field of attitude, the questions were designed in the form of a five-part Likert scale: "Totally agree 5", "I agree 4", "I have no opinion 3", "I disagree 2" and "Totally disagree 1" and the maximum score that can be obtained in this part is 45 and The minimum score that could be obtained was 9 points. This means that every employee who gets a higher score has a better attitude towards his work. In the field of behavior, the questions were designed in the form of a five-point Likert scale "always 5", "often 4", "sometimes 3", "rarely 2" and "never 1", the maximum points that can be obtained in this part 25 and the minimum score was 5. This means that every employee who gets a higher score performs more correctly behavior towards the care and prevention of neck pain. After validating its questions, this questionnaire reached an acceptable level of validity, which showed that it is capable of measuring the mentioned areas and can be used in research works.

Research results

In this chapter, in order to analyze the collected data in detail, the descriptive indices of the studied variables have been calculated first. For this purpose, descriptive indicators such as statistical population, average and standard deviation, as well as the examination of demographic variables in the form of tables and graphs have been detailed. First, using Table 1, the ages of the participants in the study are compared.

Table 1. Checking the age of the participants in the study

Minimum	Maximum	Deviation from the norm	Average	Number	Condition
23	41	4.8	30.31	45	Test Group
22	41	5.45	29.57	45	Control group
22	41	5.12	29.94	90	Total

Based on the above table, the number of people participating in the study was 90, who were divided into two groups, test and control. The average age of the test group was reported to be 30.31 years, the oldest person in this group was 41 years old and the youngest person was 23 years old. The control group was between 22 and 41 years old. The average age of all participants in the study was calculated as 29.94 years.

Table 2: Comparison of the number of age groups by separating the test and control groups

Percent	Total	Control Group	Test Group	Age
4.4	4	1	0	22
2.2	2	1	1	23
4.4	4	0	4	24
14.4	13	9	4	25
6.7	6	4	2	26
5.6	5	3	2	27
6.7	6	1	5	28
11.1	10	5	5	29
6.7	6	2	4	30
1.1	1	0	1	31
3.3	3	0	3	32
3.3	3	0	3	33
7.8	7	6	1	34

8.9	8	5	3	35
2.2	2	0	2	36
3.3	3	1	2	38
2.2	2	1	1	39
2.2	2	2	0	40
4.4	3	1	2	41

In the above table, the age groups have been compared according to their membership in the test or control group, which shows that the 29-year-old age group had the highest frequency in this study, and the 31-year-old age group had the lowest frequency. Diagrams 1 and 2 also show the same thing.

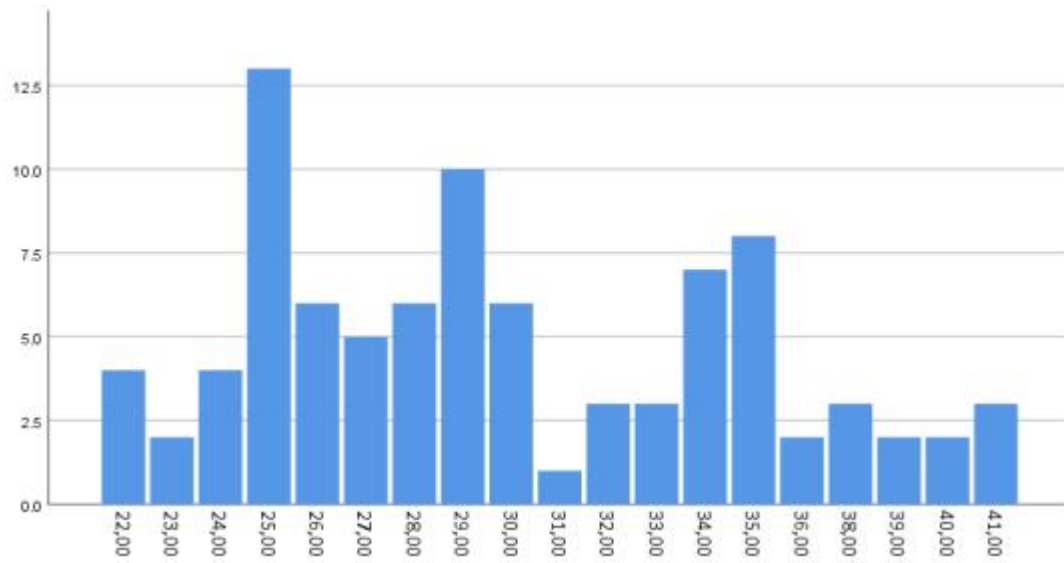


Chart 1. Frequency of age groups participating in the study

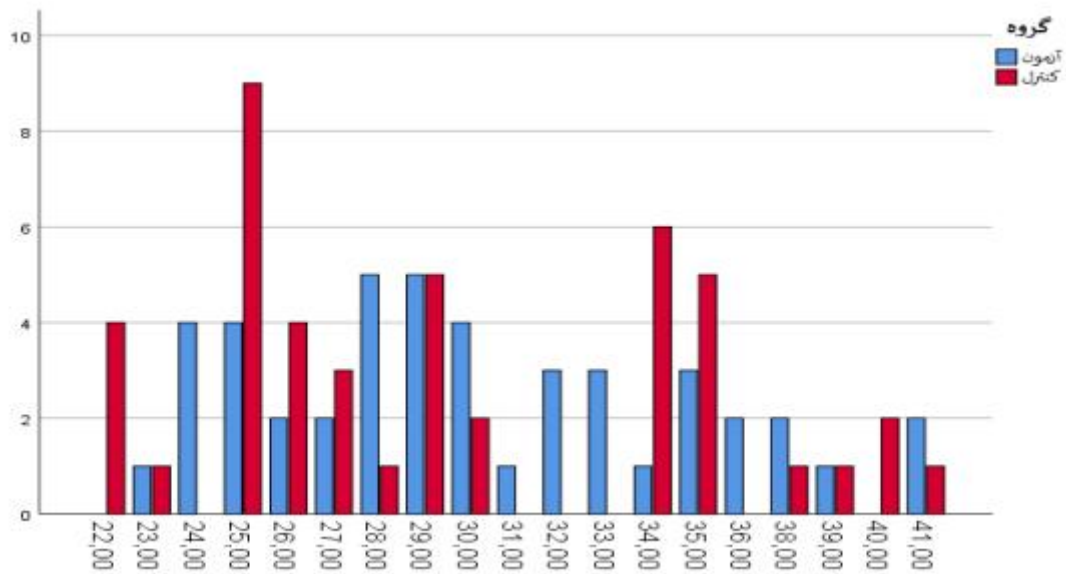


Chart 2. The number of age groups participating in the study, separating the test and control groups

Another demographic variable investigated in the current study was the history of employees, which were sorted by SPSS after data collection and analysis. The primary results are summarized in Table 3.

Table 3 Review of work records of people participating in the study

Minimum	Maximum	Deviation from the norm	Average	Number	
1	19	4.82	7.35	45	Test group
1	18	5.21	6.77	45	Control group
1	19	5.007	7.06	90	Total

The above table shows that the studied employees had work records from 1 year to 19 years. Also, the working experience of the test group was more than the control group with an average of 7.35. The average work history of all employees has been calculated as 7.06, which shows that the majority of the studied society had good work experience. This item is described in detail in Table 4.

Table 4: Comparison of the work records of the participants in the study by separating the test and control groups

Percent	Total	Control group	Test group	Work experience (years)
12.2	11	6	5	1
11.1	10	6	4	2
8.9	8	6	2	3
5.6	5	3	2	4
7.8	7	2	5	5
11.1	10	5	5	6
5.6	5	1	4	7
1.1	1	0	1	8
3.3	3	0	3	9
4.4	4	1	3	10
4.4	4	3	1	11
11.1	10	7	3	12
2.2	2	0	2	13
3.3	3	1	2	15
2.2	2	1	1	16
2.2	2	2	0	17
2.2	2	1	1	18
1.1	1	0	1	19

The above table shows the work records of the employees participating in the study, separated by the test and control groups, according to which the employees with 1 year of work experience have the largest population among the people in the research. On the other hand, elderly people with high work records are less often seen in the current research, and one of the reasons for this can be pointed to the company's young personnel. In the following, using charts 3 and 4, this issue is better analyzed. In the graphs below, it is easy to see that employees with 1 to 7 years of work history have the highest population density among the people participating in the study.

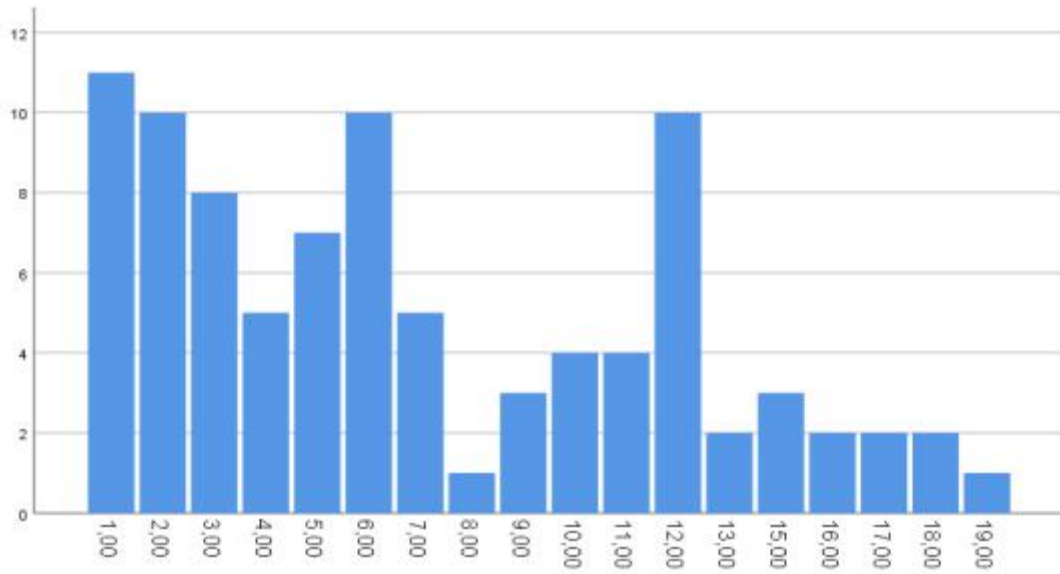


Chart 3 of the number of work records of the participants in the study by separating the test and control groups

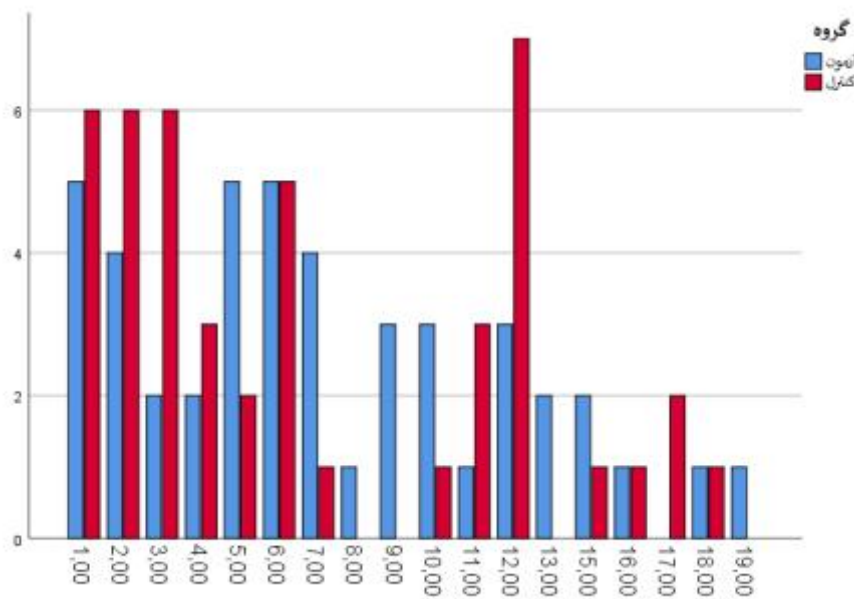


Chart 4, the abundance of work records of the people participating in the study

Another thing that the employees present in the study were asked to answer was the department of the place of service. In this study, the researcher's effort was based on the fact that people from all the units in the company were present to participate in the intervention so that more accurate and relevant results could be obtained. Table 5 shows the information about this variable.

Percent	Total	Control group	Test group	Department of service
18.9	17	6	11	Network Planning
14.4	13	8	5	Network Rollout
12.2	11	7	4	HSE
12.2	11	7	4	IT Help Desk
11.1	10	5	5	Network Optimization

11.1	10	4	6	Network Operation
11.1	10	5	5	SAM
8.9	8	3	5	PMO

Based on the information included in the above table, it can be seen that the present employees participated in the intervention from 8 different parts of the company. Employees of the Network Planning department with 17 people had the largest number of participants among the people present in the study. It should be mentioned that PMO employees had the least number of participants with 8 people.

The last demographic variable for which the related data was collected was the activity outside working hours, which the employees in the research answered with two options: "Yes" and "No". The information related to this demographic variable is presented in Table 6 separately for the two test and control groups.

Table 6: Examination of the activities outside working hours of the participants in the study

Percent	Number	Situation	Activities outside working hours
14.5	13	Yes	Test group
35.5	32	No	
12.2	11	Yes	Control group
37.7	34	No	
26.7	24	Yes	Total
73.2	66	No	

According to the above table, it can be concluded that the majority of people participating in the study did not have any activities outside of working hours. Table 6 shows that only 14.4% of the employees of the test group and 12.2% of the employees of the control group had activities outside of working hours, and in total 26.7% of all employees in the study had activities outside of working hours. have had, which of course is not a high number. Diagrams 5 and 6 also confirm this conclusion.

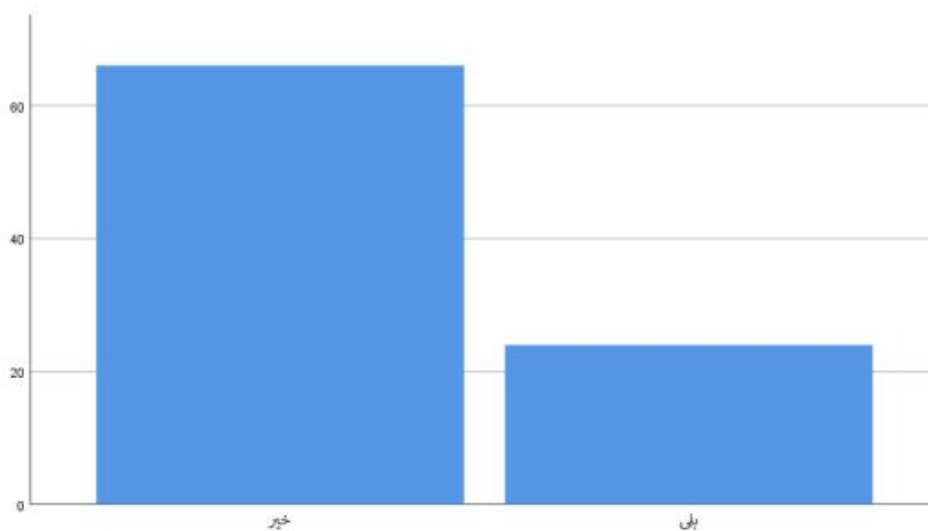


Figure 5. Examination of the activity outside working hours of the people participating in the study

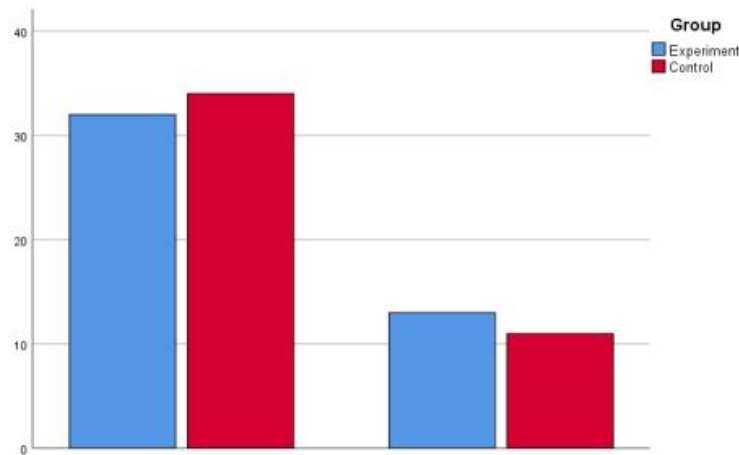


Diagram 6: Examining people's activities outside of working hours, separating the test and control groups

Table 7: Comparison of the condition of the test and control groups in terms of demographic variables

P-value	Average / Status	Numbers	Group	Variable
0.16	30.31	45	Test	Age (years)
	25.97	45	Control	
0.56	7.35	45	Test	Work experience (years)
	6.77	45	Control	
0.24	13 man	45	Test	Having an activity outside of working hours
	11 man	45	Control	
0.056	-	45	Test	Service unit
	-	45	Control	

The result of the P-values obtained from the test is greater than the default error of 0.05, which indicates the absence of significant differences in demographic variables between the two test and control groups. After the review of descriptive statistics, statistical tests were conducted among the employees of the two experimental and control groups to determine the effectiveness of the intervention. It should be mentioned that the questionnaire that was provided to the people in the study consisted of three areas of awareness, attitude and behavior, which was distributed to the employees on two occasions with an interval of three months. There were 90 employees present in the intervention, who were divided into two groups of 45 people, test and control. Unfortunately, after a short period of time, 3 members of the test group left the intervention and the number of members of the test group was reduced to 42 people. Thus, in the second round of data collection, the number of people who answered the questions was less than the number of people participating in the first round. Before performing the analytical tests, it is necessary to ensure the normal or non-normal distribution of the data. This is measured by Kolmogorov-Smirnov tests. SPSS 26 software was used to check the normal or non-normal distribution of the data collected from the measurement of awareness, attitude and behavior. It should be mentioned that if the results of these tests have a significance level of less than 0.05, the assumption of normality of the data cannot be accepted, which means that the data have a non-normal distribution. The results of this test are shown in Table 7.

Table 8 Kolmogorov-Smirnov test to check the normal distribution of the studied variables

P-value	Deviation from the norm	Average	Group	Variable
0.07	3.75	20.95	Test	Consciousness
0.09	3.90	20.86	Control	
0.08	6.36	27	Test	Attitude
0.067	5.65	26.93	Control	
0.08	3.86	15.97	Test	Behaviour
0.06	3.49	15.91	Control	

As can be seen from the above table, the P-value for all three areas is higher than the significance level of 0.05. This means that the collected data have a normal distribution and the assumption of non-normality of the data is rejected. It should be mentioned that if the data distribution is non-normal, non-parametric tests should be used. However, since the data collected from the current research have a normal distribution, the conditions for using parametric tests such as paired T and independent T have been prepared. In the following, first, using the independent T-test, the comparison between the average scores of the two test and control groups will be made. In addition to the comparison of the average scores of the two groups, using the significance level of 0.05, which is known as P-value or Sig, the relationship is significant or insignificant. It is checked between two groups. This means that if the obtained P-value is smaller than the significance level of 0.05, the assumption of significance is confirmed. Table 8 shows the descriptive statistics of the independent T-test for the awareness variable.

Table 9. Descriptive statistics of the independent T-test of the variable of awareness in the test and control groups

Deviation from the norm	Average score	Numbers	Group	Period
3.75	20.95	45	Test	Before intervention
3.90	20.86	45	Control	
2.67	25.11	42	Test	After the intervention
3.95	21.20	45	Control	

The above table shows descriptive statistics including the number of members of each group, average scores and standard deviation. Based on the findings of this table, it can be clearly seen that the average knowledge score of the test group had a significant difference before and after the intervention. This means that the knowledge level of the test group increased from 20.95 to 11.25 after the intervention. While the average knowledge score of the control group did not differ much. The results of the independent T-test, which are shown in Table 9, compare the level of awareness in the test and control groups. By using this table, it is possible to understand how different the level of awareness of the employees of the test and control groups was before and after the intervention. The test statistics and degree of freedom are also included in this table.

Table 10 Independent T-test to compare the knowledge of test and control groups

P-value	t	Df	Group	Period
0.88	0.11	88	Test	Before intervention
			Control	
<0.0001	5.49	85	Test	After the intervention
			Control	

After conducting the independent T-test, the results of which are shown in Table 9, it was found that there was no significant difference between the test and control groups in the field of awareness before the intervention. This is because the obtained P-value, which was reported as 0.88, was higher than the significance level of 0.05. Meanwhile, the P-value obtained for the two test and control groups was significant after the intervention. This shows the improvement of the knowledge of the test group compared to the control group. In the following, the implementation of the same test, independent T, for two other areas, namely attitude and behavior, is devoted. Table 10 shows the descriptive statistics of the independent T-test for the attitude variable. By using this table, the average scores before and after the intervention can be compared with each other.

Table 11. Descriptive statistics of the independent T-test of the attitude variable in the test and control groups

Deviation from the norm	Average score	Numbers	Group	Period
6.36	27.01	45	Test	Before intervention
5.65	26.93	45	Control	
4.83	32.17	42	Test	After the intervention
5.84	27.42	45	Control	

The above table shows the descriptive statistics including the number of members of each group, average scores and standard deviation. Based on the findings of this table, it can be clearly seen that the average attitude score of the test group, before and after the intervention, had a significant difference. This means that the knowledge level of the test group increased from 27.01 to 32.17 after the intervention. While the average knowledge score of the control group did not differ much. The results of the independent T-test, which are shown in Table 11, compare the level of attitude in the test and control groups. By using this table, we can understand how much the attitudes of the employees of the test and control groups differed before and after the intervention. The test statistics and degree of freedom are also included in this table.

Table 12 Independent T-test to compare the attitude of the test and control groups

P-value	t	df	Group	Period
0.93	0.08	88	Test	Before intervention
			Control	
<0.0001	6.40	85	Test	After the intervention
			Control	

After performing the independent T-test to compare the attitude variable in the test and control groups, the results of which are shown in Table 11, it was found that there was no significant difference between the test and control groups in the field of attitude before the intervention. This is because the obtained P-value, which was reported as 0.95, was higher than the significance level of 0.05. Meanwhile, the P-value obtained for the two test and control groups was significant after the intervention. This shows the effect of the intervention in increasing the attitude of the test group. At the end, the independent T-test for the behavior variable is performed. Table 12 shows the descriptive statistics of the independent T-test for the behavior variable. By using this table, the average scores before and after the intervention can be compared with each other. Also, in addition to the average scores, the number and standard deviation of each group are included in the table.

The above table shows the descriptive statistics including the number of members of each group, average scores and standard deviation. Based on the findings of this table, it can be clearly seen that the average behavior score of the test group, before and after the intervention, had a significant difference. This means that the average score of the test group has increased from 15.97 to 20.35 after the intervention. While the average behavior score of the control group did not differ much before and after the intervention. The results of the independent T-test, which are shown in Table 12, compare the significance of the intervention's effect on behavior change in the test and control groups. Test statistics and degrees of freedom are also included in this table.

After conducting the independent T-test to compare the behavior variable in the test and control groups, the results of which are shown in Table 12, it was found that there was no significant difference between the test and control groups in the field of attitude before the intervention. This is because the obtained P-value, which was reported as 0.93, was higher than the significance level of 0.05. Meanwhile, the P-value obtained for the two test and control groups was significant after the intervention. This shows the effect of the intervention in improving the behavior score of the test group.

Research results and suggestions

The present study demonstrated that awareness, attitude, and behavior are meaningful when considered together. Behavior during work requires having the correct and practical attitude. Additionally, awareness is also necessary for attitude. Through a proper and cohesive educational program, these three mentioned factors can be effectively strengthened, ultimately leading to the prevention of musculoskeletal disorders such as neck pain. This proper and cohesive program is carried out through an ergonomics intervention, where ergonomic principles regarding proper movements and postures during work are taught, and these teachings, conducted in a virtual space, proved to be effective.

1. In most of the mentioned studies, there is a positive attitude and high satisfaction among students and faculty members regarding the use of virtual education. However, considering that the impact of virtual education on learning and learner satisfaction can vary depending on the method used, there is a need for more extensive studies in this area in our country.
2. Due to the prevalence of musculoskeletal disorders such as neck pain, paying attention to the results of such research is more important than ever before, and it is recommended that more emphasis be placed on teaching and implementing ergonomic principles and serious exercise routines.
3. The use of online questionnaires in a way that if a question is not fully completed, the individual cannot proceed to the next question. This approach not only allows for more accurate results but also eliminates the need for researchers to physically visit the research field.

References

1. Health, s.a.e.m., *Macroergonomics in organizations*. 1389: Public relations of Iran's National Oil Products Refining and Distribution Company
2. Hossein Taheri, R.M., Vazgen Minasian, Abdolkarim Karimi, *The Effects of an Eight-Week Selected Therapeutic Exercises Course and Self-Treatment by Pamphlet Programs on the Rate of Chronic Neck Pain and Disability among Computer Users* Journal of Isfahan Medical School, 2011
3. Fereydoon Laal, R.F.M., Davoud Balarak, Mahdi Mohammadi, Elahe Dortaj, Abdolali Khammar, *Relationship between musculoskeletal disorders and anthropometric indices among bus drivers in Zahedan city*. International Journal of Occupational Safety and Ergonomics, Aug 2017
4. Abdollah Gholami, A.S., Roghayeh Abedini, Marzieh Sahranavard, *Ergonomic assessment of musculoskeletal disorders risk by rapid upper limb assessment (RULA) technique in a porcelain manufacturing factory*. Journal of Research & Health, 2014

5. Zahra Zamanian, H.D., Hojjatolah Setoodeh, Ebrahim Nazari-poor, Abdollah Haghayegh, Saeed Shaban Sarvestani, *Risk Assessment of Musculoskeletal Disorders and Determination of the Associated Factors among Workers of a Dairy Products Factory*. Journal of Health Sciences & Surveillance System, 2014
6. Asieh Mansouri, E.M.F., Mansour Shamsipour, Jalil Makarem, *Neck Pain and Some of its Risk Factors among Office Workers* Knowledge & Health, 2012
7. Elham Akhlaghi Pirposhteh, A.K., Ali Salehi Sahl Abadi, *Evaluation the Prevalence of Musculoskeletal Disorders Among the Medical Staff of Selected hospitals of Shahid Beheshti University of Medical Sciences in 2018*. Journal of Safety Promotion and Injury Prevention, summer 2019
8. Morteza Pajoohnia, M.M.R., Firouz Valipour, Mehdi Raei, *Ergonomic Assessment of Risk Factors for Musculoskeletal Disorders of the Administrative Staff in Military Center Using ROSA*. Paramedical Sciences and Military Health, 2022
9. Sayyed Habibollah Mirghafoori, M.S.R., Ghazale Naddafi, *Assessing the Efficiency of the Telecommunication Companies in the Iran's Provinces*. Journal of New Economy and Commerce, 1390
10. Antonio C Santos, M.B., Karen F Rosa, Vinicius A Amantéa, Ricardo M Xavier, *Impact on the quality of life of an educational program for the prevention of work-related musculoskeletal disorders: A randomized controlled trial*. BMC Public Health, 2011
11. A Choobineh, E.N., A. Arjmandzadeh, A. Mohamadbaigi, *Musculoskeletal Disorders among Bank Computer Operators*. Iran Occupational Health, 2006
12. M. Pourmiri, F.K., *The effect of regular sports activity on the mental health and time management of employees of the Iran Telecommunication Company in Isfahan region*. Journal of Olympic Socio-Cultural Studies