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THE EFFECT OF ERGONOMIC ARRANGEMENTS ACCOMPANYING POSTURE EXERCISES FOR OFFICE WORKERS ON PAIN AND QUALITY OF LIFE

Gizem Gunendi¹, Ozlem Gungor², Hasan Kerem Alptekin^{2*}, Julide Oncu Alptekin³

1. Special GOP Hospital Physiotherapy and Rehabilitation Department, Turkey.

2. Graduate School of Health Sciences, Physiotherapy and Rehabilitation Department,

Bahcesehir University, Turkey.

3. Hamidiye Sisli Etfal Education And Research Hospital, Turkey.

ABSTRACT: Background: One of the most important problems affecting employees' business and quality of life negatively is work-related musculoskeletal disorders (MSDs) as stated in the latest report of the European Agency for Occupational Health and Safety (EU-OSHA). **Methods:** One hundred-three healthy office employees (23-54 years of age; mean 31.68) were participated in this study. A single centre, descriptive research was made in order to evaluate the effect of posture exercises and ergonomic arrangement by using Visual Analog Scale (VAS), Bragg posture scale, SF-36 quality of life scale, and Computer Workstation Assessment Form (OSHA). Baseline values were compared with the first month results (30th day). **Results:** Mean baseline VAS of 4.883 \pm 1.0830 was significantly decreased to 2.937 \pm 1.2244 at the end of study. Statistically significant improvement was observed in Bragg posture evaluation also (baseline 84.078 \pm 9.7956 versus 85.049 \pm 0.9268; p<0.05 versus baseline). Mean OSHA value of 26.600 at baseline was increased to 30.660 at final visit and it was statistically significant (p<0.05). SF-36 quality of life evaluation showed improvement (p<0.05). **Conclusion:** The results suggest that ergonomic arrangement accompanying the posture exercises improves quality of life of office employees. These results highlight the importance of ergonomic intervention and exercises in order to prevent work-related MSDs.

KEYWORDS: Physical therapy, ergonomics, posture exercise.

Corresponding Author: Dr. Hasan Kerem Alptekin* Ph.D.

Graduate School of Health Sciences, Bahçeşehir University, Turkey. Email Address: hasankerem.alptekin@hes.bau.edu.tr

Gunendi et al RJLBPCS 2018 1.INTRODUCTION

The term musculoskeletal disorder denotes health problems of the locomotor apparatus, i.e. muscles, tendons, the skeleton, cartilage, the vascular system, ligaments and nerves. Work-related musculo skeletal disorders (MSDs) include all musculoskeletal disorders that are induced or aggravated by work and the circumstances of its performance [1]. Moreover, one of the most important problems affecting employees' business life and quality of life negatively is work-related MSDs as stated in the latest report of the European Agency for Occupational Health and Safety (EU-OSHA) [1]. MSDs cover a broad range of health problems. The main groups are back pain/injuries and work-related upper limb disorders, commonly known as "repetitive strain injuries" (RSI). Lower limbs can also be affected. Lifting, poor posture and repetitive movements are among the causes and some types of disorders are associated with particular tasks or occupations. Treatment and recovery are often unsatisfactory especially for more chronic causes. The end result can even be permanent disability, with the loss of employment [1]. Work-related MSDs constitute a major component of occupational diseases (ODs), accounting for approximately 38.1% of all ODs in Europe [1,2]. In Turkey, Turkish Statistical Institute 2013 data [3] showed that the highest rate of persons suffered from a workrelated health problem was in "bone, joint or muscle problem which mainly affects back" as 24.9% and 50.7% of persons suffered from a work-related health problem in the last 12 months need to stay away from work due to this problem. [3]. When it comes to preventive measures of workrelated MSDs, recent European Survey on New and Emerging Risks (ESENER-2) across all countries including Turkey [4], reveals that 85% of the establishments that report the presence of risks of lifting or moving people or heavy loads have equipment in place to help with this or other physically heavy work [4]. According to ESENER-2 report, the second most frequently reported measure to prevent MSDs is the provision of ergonomic equipment (73 %), which again increases with establishment size and is most common in electricity, gas, steam and air conditioning supply (91 %), financial and insurance activities (88 %) and professional, scientific and technical activities (86 %) [4]. This study aims at examining the effect of ergonomic arrangement accompanying posture exercises on pain and quality of life of office workers.

2. MATERIALS AND METHODS

In our study, 120 office employees were selected. It was deemed suitable to exclude 17 individuals of 120 participants from the sample cluster for various reasons. A single centre, descriptive research was conducted for researching the effect of ergonomic arrangement accompanying posture exercises on pain and quality of life and the obtained results were statistically evaluated. The lower age limit was 18 and upper age limit was 60 within the scope of the study. Moreover, all groups consisted of healthy individuals working in an office. 60 women and 60 men were included in the study.

Criteria of inclusion in the study:

Women and men in the age range of 18-60 who work in an office;

Gunendi et al RJLBPCS 2018 www.rjlbpcs.com Life Science Informatics Publications The participants who have read the information form and sign the approval form;

The participants who have been qualified by a specialist physician as "the individuals not considered under any risk in terms of doing exercises" as a result of a comprehensive examination; prior to their participation in the study;

The participants who have been qualified by a specialist physician as "the individuals without any systemic disease" as a result of a comprehensive examination; prior to their participation in the study.

Criteria of exclusion in the study:

The individuals not being in the age range of 18-60;

The participants who have been qualified by a specialist physician as "the individuals considered under a risk in terms of doing exercises" as a result of a comprehensive examination; prior to their participation in the study;

The participants who have been qualified by a specialist physician as "the individuals with any systemic disease" as a result of a comprehensive examination; prior to their participation in the study;

The participants who have been qualified by a specialist physician as "pregnant" as a result of a comprehensive examination; prior to their participation in the study;

The individuals who have read the information form but have not signed the approval form;

The participants who participate in the study on the first day but are unable to get involved in the survey study conducted at the end of the 30th day for any reason (annual leave, quitting for personal reasons, failure to continue regular exercise etc.).

In the first phase of the study, the individuals who met the inclusion criteria were informed about required exercises, postural arrangements. All participants were given the same exercise program and ergonomic recommendations. The individuals were received routine exercise treatments based on randomization, and regularly followed for 30 days and final evaluation was made.

The assessment tools in this study were Visual Analog Scale (VAS), Bragg posture scale, SF-36 quality of life scale, and Computer Workstation Assessment Form (OSHA).

Assessment Tools

VAS

Firstly, a survey study was performed including demographical attributes as age, gender, education level, dominant hand. Furthermore, a Visual Analog Scale (VAS) was used to measure the severity of pain. The results of the first evaluation survey (0th day) and of the first month survey (30th day) were compared. The results of demographical evaluation was expressed in distribution percentages. VAS evaluations, on the other hand, was assessed by means of a measurement of the point to be marked on a plane with the range of 0 and 10 by the researcher and entry of the same in the data table. VAS scores were shown in Table 1.

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Bragg posture scale

Bragg posture scale was used to determine postural disorders. The results of the first evaluation survey (0th day) and of the first month survey (30th day) were compared statistically. The evaluation of the Bragg posture scale was performed by the researcher and it was assessed on the basis of the distribution between scores 100 and 0 of the total results based on 0 (weak), 5 (medium) and 10 (good) values.

SF-36

SF-36 scale was used to evaluate the effect of posture exercises and ergonomic arrangements on quality of life. The results of the first evaluation survey (0th day) and of the first month survey (30th day) were compared statistically. During the evaluation of the SF-36 scale, eight parameters among the evaluation criteria namely physical function, body pain, the role of physical function in life, general health perception, strength, social functionality, emotional functionality and mental health were assessed through a rating system between zero (0) and one hundred (100). Zero shows maximum restriction whereas one hundred indicates minimal or unavailable restriction in terms of the interpretation of such rating.

Computer Workstation Assessment Form (OSHA)

OSHA was used for the assessment of the work environment of the participants in terms of ergonomics. The results of the first evaluation survey (0th day) and of the first month survey (30th day) were compared. The effect of ergonomic efficiency on pain rating and thus quality of life was evaluated in the light of the scoring values between 0 and 33 for the organization and assessment of the compliance of the work environment with ergonomics. High values show that the efficiency of ergonomic arrangement increases whereas the values close to zero show that the efficiency of ergonomic arrangement decreases.

Statistical Analysis

 $IBM^{\ensuremath{\mathbb{R}}}$ SPSS[®] Statistics version 21 program was used for the evaluation of the findings obtained from the participants. The statistical significance level was founded to be p < 0.05 and the sample cluster was determined to be n= 103.

3. RESULTS AND DISCUSSION

60 women and 60 men were included in the study. It was deemed suitable to exclude 17 participants from the sample cluster for various reasons. Demographical attributes of the participants were shown in Table 2. According to this table, the number of women and men in the research group in the age range of 23-52 was quite close to each other (51.5% women and 48.5% men). Our working group consisted of graduate individuals with a rate of 61.2% based on the comparisons of the education level. The majority of the participants (about 80 percent) dominantly use their right hand.

VAS assessment results

The findings obtained from the pain assessments performed with the use of VAS method among the

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Bragg posture assessment results

The assessments performed at the beginning of the study with the help of the Bragg posture rating method were presented in Table 5. Average postures of the individuals were calculated to be 84.078 \pm 9.7956 as a result of the assessment made with this method (between 100 and 0). The assessments performed at the end of the study with the help of the Bragg posture rating method were presented in Table 5. Average postures of the individuals were calculated to be 85.049 \pm 0.9268 as a result of the assessment made with this method (between 100 and 0). Paired samples T-test was selected as the statistical assessment method for the beginning and end of the study. The results were shown in Table 6 (p < 0.05).

SF-36 quality of life assessment results

The assessments performed with the use of SF-36 general health criteria survey at the beginning (0th day) and end (30th day) of the study were presented in Table 7. Paired samples T-test was selected as the statistical assessment method for the beginning and end of the study. The results are presented in Table 8 (p < 0.05).

OSHA assessment results

The results of the survey study performed with a Computer Workstation Assessment Form (OSHA) used for the assessment of the work environment in terms of ergonomics at the beginning (0th day) and end (30th day) of the study are presented in Table 9. Paired samples T-test was selected as the statistical assessment method for the beginning and end of the study. The results were shown in Table 10 (p < 0.05).

4. CONCLUSION

The scientific studies conducted suggest that the aetiology of work-related MSDs is based on personal considerations, work environment, psychosocial state, ergonomic factors and several derivative parameters [5-10]. Office work due to computer use is now a job with a high prevalence of work-related MSDs [8]. Most office workers now routinely use a computer and its accessories as a part of their equipment in the workplace and this equipment creates many ergonomic risk factors, especially awkward postures [9]. Therefore, musculoskeletal complaints in different parts of the body, especially, neck, shoulder, wrist and hand are common in this occupational group [8-10]. We

Gunendi et al RJLBPCS 2018 www.rjlbpcs.com Life Science Informatics Publications spend the majority of our business life in offices, and generally in front of a computer. In addition to the abovementioned factors in the occurrence of work related MSDs in office workers, such reasons as reading and writing tasks in an inappropriate position, non-compliant ergonomic arrangement with the work, incorrect lighting, staying inactive for a long period of time or insufficient resting periods can also be aetiologically mentioned [11,12]. Many MSDs affecting upper and lower extremities are accepted as an occupational disease in law in our country closely following the developments both in the Continental Europe and in the world. A Musculoskeletal Disorders and Ergonomics Unit has been established in the Department of Physical Therapy and Rehabilitation in Istanbul Medical Faculty of Istanbul University in consideration of the insufficiency of the studies on protection against MSDs and ergonomics for employees in Turkey [13]. There are some studies highlighting the importance of effective ergonomics programs for the prevention of work related MSDs for office workers [11,14-18]. The success of preventive ergonomics programs will be possible if employers and employees are accordingly trained and behave in accordance with this training. Moreover, applying a control mechanism for the risks identified as a result of a risk analysis and assessment to be performed in work environments will ensure the management and even the prevention of these types of diseases. Some other studies are also available which underline that desk jobs requiring long working times and working at a stable position for office workers are aetiologically effective in the diseases of upper and lower extremities [10,19-21]. Our study was designed to examine the effect of ergonomic arrangement accompanying posture exercises on pain and quality of life of office workers. The number of women was higher than men in terms of the gender distribution as a result of demographical examination of the participants involved in the study. The graduate individuals were on the first rank with the rate of 61.2% based on the assessments on education level and literacy. About 80% of the participants dominantly used their right hands. Age range of the participants was between 23 and 52 and the average of age was 31.68. VAS assessment scale method was used during the pain assessments of the individuals. Average VAS0 (VAS -0^{th} day) value was calculated to be 4.883 \pm 1.0830 according to the initial survey made prior to the exercise program and ergonomic arrangement. This means that our working group is in the moderate pain scale at the beginning of the study. Average VAS30 (VAS $- 30^{\text{th}}$ day) value was calculated to be 2.937 ± 1.2244 according to the survey made following the exercise program and ergonomic arrangement. This shows that our working group is in the slight pain scale at the end of the study. Posture assessments of the individuals participating in our study were made by the researcher with the use of the Bragg posture assessment method. The average score obtained at the beginning of the study is 84.078. This score was 85.049 at the end of the study The posture assessments rated in the range of 0 (zero) and 100 are regarded as good posture if the score was close to one hundred whereas the score close to zero was regarded as bad posture. Although significance theoretically exists in the statistical interpretation of this score, no clinical

Gunendi et al RJLBPCS 2018 www.rjlbpcs.com Life Science Informatics Publications assessment can be performed due to such limitations as time and number of participants. OSHA assessment method was employed to determine whether the individuals participating in the study had complied with ergonomic arrangements. The range of 0 (zero) -33 was designated as the assessment criteria in this assessment method and measurements were performed in the incremental range from incorrect ergonomic arrangement to correct ergonomic arrangement. The result of the researches for the first day was 26.600 and this value increased to 30.660 at the end of the study. As can be understood from this data, our working group complied with the ergonomic arrangement. Statistical and clinical significance was observed in the values obtained at the beginning and end of the study within the scope of SF-36 survey in which the effect of the ergonomic arrangement accompanying the exercise applied to our working group on quality of life. As can be understood from Table 8, statistical significance (p < 0.05) was ensured in eight out of eight different parameters affecting individual quality of life. This change was quite obvious in the parameters such as the role of physical function in the life on individuals, body pain and emotional functionality. It has been determined as a result of the assessments made in our study where the effect of ergonomic arrangement accompanying the posture exercise on individuals' pain and quality of life had been examined in a combined manner that an obvious decrease was achieved in the pain rating of individuals thanks to the exercise program and ergonomic arrangement within the first month. This is accepted as a parameter increasing the quality of life in a positive way. When our study was demographically assessed, on the other hand, an evaluation between genders cannot be made due to the insufficiency of the number of participants although gender distributions were pretty close to each other. Moreover, other demographical attributes and assessments on quality of life could not be determined as restrictive characteristics not only because of insufficiency in number but also because the lack of primary priority of the study. Physiotherapeutic treatment approaches and exercises are important for the elimination of work-related MSDs. The studies proving that physical exercise approaches provide fruitful results in pain treatment support the assumption that the quality of life of office workers suffering from MSDs can be enhanced in this way [22]. When the technological diseases which have been included in literature due to the current use of computers in today's world are examined, important underlying reasons are desk jobs and computer hardware that are non-compliant with ergonomics. Patient training, exercise, ergonomic arrangements, physiotherapy agents, injection treatments and some integrative medicine approaches are recommended for the treatment process of these diseases [22]. On the other side, it has been suggested by our study that the pain which is not related to technology but result from ergonomic disorders can be reduced at an early stage through ergonomic arrangements and thus, the occurrence of disease can be prevented and not only the quality of life of individuals can be enhanced but also labour losses can be prevented thanks to the protective approach and in consequence, monetary and non-monetary gains can be ensured. It must additionally be stated that work motivation is important

Gunendi et al RJLBPCS 2018 www.rjlbpcs.com Life Science Informatics Publications for the enhancement of work efficiency of employees. If the individuals with imperfect ergonomic conditions lose their motivation, this will lead to labour losses particularly in the works requiring creativity and to damages both for the individual and economy due to this loss. Individuals will not complete their tasks in a timely manner when they do not have suitable ergonomic conditions; they will have a worry for their work and be physically forced. Individuals may also encounter with severe health problems when other musculoskeletal system disorders related to ergonomic inconvenience are combined with posture disorders affected from psychological situations. Even though ergonomic arrangement generally reduce pain complaints of employees, these may also lead to an increase in pain for employees who work in the same position for a long period of time and in whose bodies ergonomic disorders are compensated. It would be better to provide recommendations following the evaluation of individuals instead of a standardized approach prior to ergonomic arrangement.

5.ACKNOWLEDGEMENT

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6. CONFLICT OF INTEREST

There is no conflict of interest present between the authors.

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