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Research Article

Ergonomic risk factors of female nurses with musculoskeletal pain are higher

Kas iskelet sistemi ağrısı olan kadın hemşirelerin ergonomik risk faktörü daha yüksektir

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Abstract

Aim: The aim of this study is to examine the pain with female nurses with musculoskeletal pain complaints. It is the determination of the difference between the female colleagues without complaints in terms of occupational-related ergonomic risks. **Materials and Methods:** The population of the study consisted of female nurses who have been providing professional nursing services for at least 6 months in the research and practice hospital affiliated to Süleyman Demirel University. During the study; the demographic information form, Visual Analog Scale, Work Role Functionality Questionnaire, Short Form 12 (SF-12) Health Survey Questionnaire and ErgoEnf-Questionnaire Survey of Ergonomic Risks Among Nursing Workers-TR (ErgoEnf-TR) were used. After the participants were informed about the research and their consents were obtained, relevant data collection tools were applied to female nurses using the face-to-face interview technique. **Results:** One hundred four female working in nursing services participated to the study. While 59.6% (n=62) of the individuals included in the study stated that they did not experience musculoskeletal pain in the last six months (Group control), 40.4% (n=42) of them stated that they had musculoskeletal system pain in the last six months. (Group painful). Between the groups; a statistically significant difference was found in the degree of pain felt in the last week, in the physical sub-dimension of general quality of life and in the biomechanical, organizational and psychosocial factors of the ergonomic risk assessment questionnaire ($p< 0.05$). **Conclusion:** Among the female nurses participating in our research, the participants who have had musculoskeletal pain for the last 6 months, according to those without pain complaints; It has a higher degree of pain felt in the last week, a physical subscale score of lower overall quality of life, and a higher risk when higher ergonomic risk assessment is performed.

Öz

Amaç: Bu çalışmanın amacı, kas-iskelet sistemi kaynaklı ağrı şikayeti olan kadın hemşireler ile ağrı şikayeti olmayan kadın meslektaşları arasında, maruz kalınan meslek ile ilişkili ergonomik riskler açısından farkın belirlenmesidir. **Gereç ve Yöntem:** Süleyman Demirel Üniversitesi Araştırma ve Uygulama Hastanesinde en az 6 aydır profesyonel olarak hemşirelik hizmeti veren kadın hemşireler çalışmanın evrenini oluşturmuştur. Çalışma sırasında; araştırmacılarca oluşturulmuş demografik bilgi formu, Görsel Ağrı Skalası, Çalışma Rolü İşlevselliği Anketi, Yaşam Kalitesi Ölçeği Kısa Form 12 (SF-12) ile Hemşirelik Hizmeti Verenlerin Ergonomik Risklerini Değerlendirme Anketi kullanılmıştır. Katılımcılar araştırma hakkında bilgilendirilip onamları alındıktan sonra kadın hemşirelere yüz yüze görüşme tekniği kullanılarak ilgili veri toplama araçları uygulanmıştır. **Bulgular:** Çalışmaya hemşirelik hizmetlerinde görev alan 104 kadın katılmıştır. Araştırmaya dahil edilen bireylerin %59,6 (n=62)'sı son altı ayda kas iskelet sistemi ağrısı yaşamadığını beyan ederken (Grup kontrol), %40,4 (n=42)'ü son altı ayda kas iskelet sistemi ağrısı yakınmasına sahip olduğunu (Grup ağrılı) söylemiştir. Gruplar arasında; son 1 haftada hissedilen ağrı derecesinde, genel yaşam kalitesinin fiziksel alt boyutunda, ergonomik risk değerlendirme anketinin biyomekanik ile organizasyonel ve psikososyal faktörlerinde istatistiksel anlamlı fark tespit edilmiştir ($p<0.05$). **Sonuç:** Araştırmamıza katılan kadın hemşireler arasında son 6 aydır kas-iskelet sistemi kaynaklı ağrısı olan katılımcılar, ağrı şikayeti olmayanlara göre; son 1 haftada daha yüksek hissedilen ağrı derecesine, daha düşük genel yaşam kalitesinin fiziksel alt boyut skoruna ve daha yüksek ergonomik riske sahiptir.

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INTRODUCTION

The close relationship between musculoskeletal problems and ergonomic risks in the professional work environment has been demonstrated by many studies (1-3). The nursing profession is among the 'Stressful Professions' because it has some risks in the working environment and a relatively intense workload (3). Health professionals (midwife, midwife assistant, technician, etc.) providing various nursing services, especially nurses, during their shifts; They are exposed to movements that force their body postures, traumas caused by repetitive and inappropriate movements, and various ergonomic risks as a result of disproportionate or inappropriate use of different parts of their bodies (4). Moreover, healthcare professionals and especially nurses, in addition to working in ergonomically inadequate environments, have to work under various and multiple stress factors such as role confusion, overtime pressure, high rate of technological device use, irregular shift or shift hours, and frequent witnessing of deaths due to their profession. (5). In addition to these physical loads, factors such as psychosocial stress in the work environment also disrupt the physiological functioning of the musculoskeletal system and lay the groundwork for possible injuries (1). While evaluating the effects of all these risk factors on musculoskeletal disorders, it should be kept in mind that the nursing profession, by its nature, is directly related to human life and does not accept mistakes (1, 2). For this reason, nurses should be aware that in the event of a possible musculoskeletal injury, this situation may also lead to risks that may have various consequences for patients receiving nursing services.

Musculoskeletal disorders related to the profession of people who provide nursing services are among the leading causes of occupational accidents and socioeconomic problems in both developing and developed countries (1). It is very important to bring the ergonomic conditions in the working environment to the optimal level and to establish the relevant regulations within the framework of a program in preventing these disorders that occur as a result of various reasons (6). Before the occurrence of various possible problems in the musculoskeletal system, especially the complaints of muscle and joint pain; Risk analysis of individuals and the regular repetition of these risk analyzes, and training on ergonomic risks at regular intervals are other important issues in preventing these problems. In case of musculoskeletal disorders, early interventions with appropriate approaches to these problems can lead to the progress of the current problem and prevent the emergence of larger disorders and therefore serious reductions in work efficiency (2).

Both the nurses themselves and the employer, that is, the hospital management, have important responsibilities in preventing the musculoskeletal problems in nurses. Health professionals providing nursing services, in order to protect against ergonomic risks; should have responsibilities such as being aware of personal ergonomic risk factors, not being hasty while working during working hours, working with the highest level of attention possible, and being a role model by warning other colleagues about various dangerous behaviors that may pose ergonomic risks (7). As for the managers; They have roles such as supplying appropriate materials and equipment, regularly organizing trainings on ergonomic risks and ensuring ergonomic regulation of working hours, raising awareness and guiding employees in the institution about ergonomic risk factors (5, 7). If both the employees and the people in the management work in a coordinated manner for a common goal, the health and well-being of the employees will increase and thus the efficiency of the employer from the employee will be optimized (1).

In our country, the number of studies examining the relationship between various health professionals, especially nurses, musculoskeletal system problems and ergonomic risks in current working environments is quite low. As researchers, we aimed to determine whether there is a difference between the ergonomic risks faced by female nurses with musculoskeletal pain complaints compared to female nurses without pain complaints.

MATERIALS AND METHODS

The study was carried out at Süleyman Demirel University Medical Faculty Hospital between May 2021 and August 2021. The population of the study consisted of female nurses who have been providing professional nursing services for at least 6 months. Female nurses who were professionally providing nursing services for less than six months were excluded from the study. The demographic information form created by the researchers, Visual Analog Scale (VAS), Work Role Functionality Questionnaire, Short Form 12 (SF-12) Health Survey Questionnaire and ErgoEnf-Questionnaire Survey of Ergonomic Risks Among Nursing Workers-TR (ErgoEnf-TR) conducted by Ercan et al were used during the study (8).

However, in order to determine the location of the pain, a questionnaire prepared by the researchers was prepared in which the participants could choose more than one region.

In the study, 120 female nurses who met the inclusion criteria were reached, and 114 of these nurses agreed to participate in the study. After the participants were informed about the study in accordance with The Declaration of Helsinki and their consents were obtained, relevant data collection tools were applied to the individuals using the face-to-face interview technique.

Data Collection Tools Used in The Study

Visual Analog Scale: Visual analog scale was used to assess the severity of pain (if any) associated with the musculoskeletal system in nursing service providers. A visual scale of 0-10 cm was used in the assessment of the visual pain scale. In this scale, the number "0" means "no pain at all" and "10" means "there is unbearable pain". The level of pain increases as it progresses from '0 to' 10 (9).

Work Role Functionality Questionnaire: This questionnaire measures the strain percentage of a person during professional activities. The questionnaire consists of 5 sub-sections [work scheduling (5 items), output (7 items), physical (6 items), mental (6 items) and social (3 items)] and a total of 27 items. The Turkish validity and reliability of the questionnaire was determined by Irmak et al. (in 2011) (10).

Health Survey Questionnaire Short Form 12 (SF-12): This questionnaire will be used to determine health-related quality of life. SF-12 is an easy-to-apply quality of life scale created as a result of the shortening of SF-36. The scale consists of 12 questions that question the limitations in physical and social activities, activities in daily life, mental health and well-being, pain, and general health perception. According to the answers given to the questions, points are calculated in two subtitles as physical and mental health. SF-12 has two sub-scoring metrics as physical (PCS-12) and mental (MCS-12) components. An increase in the score indicates a state of well-being, and a decrease indicates a state of limitation. The Turkish validity and reliability of the questionnaire was determined by Koçyiğit et al. (11).

ErgoEnf-Questionnaire Survey of Ergonomic Risks Among Nursing Workers-TR (ErgoEnf-TR): Providers this questionnaire (1), originally developed by Coluci and Alexandre in 2014, consists of 4 parts (biomechanical factors (9 items), environmental factors/workplace (7 items), organizational factors (8 items), psychosocial factors (8 items) and a total of 32 items. The measurement tool in the Turkish version, whose Turkish validity and reliability study was carried out by Turkish version, consists of 3 parts [biomechanical factors (9 items), environmental factors/workplace (7 items), organizational and psychosocial factors (16 items)] and 32 items in total. The Turkish version of the questionnaire has a cronhbach alpha coefficient of 0.970 (8). Scoring is done separately for each section, and the higher the score, the higher the ergonomic risk.

Statistical analysis of data: Data from the study were analyzed with SPSS v 23 package program. Frequency, descriptive statistical tests, chi-square test and independent groups t test were used in the analyzes. Results are presented as mean ± standard deviation. P value was considered significant at the 0.05 level.

RESULTS

One hundred four female working in nursing services participated in the study. While 59.6% (n=62) of the individuals included in the study stated that they did not experience musculoskeletal pain in the last six months (Group control), 40.4% (n=42) of participants had musculoskeletal pain in the last six months (Group painful).

There was no difference between the groups in terms of age, body mass index, professional experience and task (Table 1 and Table 2). Of the participants with persistent pain for the last six months, 42.6% (n=18) of them were in the upper extremity, 31.1% (n=13) of them in the lower extremity, and 26.3% (n=11) of them in the spine (pain in the waist-back-neck) region.

Table 1. Age, body mass index and professional experience by groups

	Group control Mean ± SD	Group painful Mean ± SD	p value
Age (year)	40.13 ± 6.23	40.64 ± 7.33	0.702
Height (cm)	159.63 ± 5.58	161.31 ± 6.13	0.151
Body weight (kg)	65.58 ± 10.52	67.29 ± 9.52	0.402
BMI (kg/m²)	25.73 ± 3.99	25.85 ± 3.32	0.881
Professional experience (years)	18.14 ± 8.16	19.25 ± 7.74	0.491

SD: standard deviation, BMI: body mass index.

Table 2. Task distribution of the groups

	Group control % / n	Group painful % / n	p value
Nurse	66.1 / 41	76.1 / 32	0.069
Midwife	9.7 / 6	16.7 / 7	
Nurse/Midwife assistant	1.6 / 1	0/0	
Medical technician	0 / 0	2.4 / 1	
Medical imaging technician	11.3 / 7	2.4 / 1	
Other (reporter)	11,3 / 7	2,4 / 1	

A statistically significant difference was found in the degree of pain felt in the last week, in the physical sub-dimension of the general quality of life, in the biomechanical and organizational and psychosocial factors of the ergonomic risk assessment questionnaire between the groups ($p< 0.05$), (Table 3). No difference was found in work role functionality, mental subscale of general quality of life, and environmental factors of the ergonomic risk assessment questionnaire ($p> 0.05$), (Table 3).

Table 3. Results of measurement tools according to the groups

	Group control Mean ± SD	Group painful Mean ± SD	p value
VAS	2.89 ± 2.04	5.14 ± 2.44	0.001 *
WRFQ	74.13 ± 24.43	68.60 ± 21.23	0.235
SF-12			
PCS-12	40.83 ± 9.80	35.68 ± 7.42	0.003 *
MCS-12	40.92 ± 9.08	38.57 ± 8.72	0.191
ErgoEnf-TR			
Biomechanical factors	54.69 ± 19.66	67.98 ± 20.52	0.001 *
Environmental factors	47.83 ± 22.82	54.38 ± 26.45	0.181
Organizational and psychosocial factors	52.72 ± 23.67	64.73 ± 21.72	0.010 *

SD: standard deviation, VAS: Visual Analog Score in the last 1 week, WRFQ: Work Role Functionality Questionnaire SF-12: Health Survey Questionnaire Short Form 12, ErgoEnf-TR: ErgoEnf-Questionnaire Survey of Ergonomic Risks Among Nursing Workers-TR, PCS-12: Physical Component Score, MCS-12: Mental Component Score.

*: p value is significant at the 0.05 level. Independent Samples t Test was applied.

DISCUSSION

It is essential that healthcare professionals, including nurses, provide a quality and efficient health service to patients, and that healthcare professionals' personal well-being and welfare levels should be at an optimal level (12). However, due to the nature of the nursing profession, in some cases; Nurses can develop musculoskeletal problems as a result of negative working conditions such as time pressure, negative communication environment that may occur with administrators, and working without breaks even for a short time and standing for a long time (13). In addition to these stressor factors caused by the working environment, the nursing profession; It is a profession that is particularly prone to negative individual ergonomic risks such as positioning patients with high weight, working in an inappropriate posture for a long time while serving during the treatment process, malnutrition and poor sleep patterns. This situation contributes to the increase in the incidence of musculoskeletal diseases in nurses (5).

In our research, individuals with pain from the musculoskeletal system for the last 6 months feel pain in the upper extremity, lower extremity and spine (waist-back-neck) region, in order of frequency. In a study conducted in Brazil in 2012 with 301 nurse participants, it was reported that participants with pain in the last 6 months mostly complained of pain in the back and waist region, followed by pain in the upper extremity (13). Similarly, in an investigation conducted abroad with 858 female nurse participants in 2004, participants most frequently complained of pain caused by the musculoskeletal system in the lumbar region (14). In addition, some factors such as age, length of working hours, being a mother, trauma history, smoking and changes in psychosocial conditions have been accepted as risks for low back pain (14). In another study conducted in Italy with 70 nurses, 83% of whom were female, the participants; reported that they mostly experienced musculoskeletal pain originating from the lower extremities (knee, hip, ankle) and secondary to the upper extremity (shoulder, elbow, wrist) (15). In another recent survey involving 321 healthcare professionals in our country, 31.4% of the healthcare professionals participating in the survey described work-related musculoskeletal complaints (16). In line with the statements of both male and female healthcare professionals in the same study, it was found that they most frequently suffered from musculoskeletal pain in the waist and back region (16). As the reasons for these proportional differences in which region is the most common pain complaints arising from the musculoskeletal system; The different working hours, cultural differences, variability of workloads and ergonomic conditions of the healthcare professionals participating in the studies can be said to vary considerably even in different centers in the same country.

Among the female nurses participating in our research, the pain levels of the participants who have complained of musculoskeletal pain for the last 6 months, assessed by the visual pain scale, were statistically significantly higher than the participants who did not have musculoskeletal pain in the last 6 months. In a recent analysis conducted in our country where the majority of the participants were nurses, 31.5% of the healthcare professionals participating in the study stated that they had musculoskeletal complaints related to their profession and lasted for at least 2 weeks (16). In another research conducted in Italy in 2008 and on 113 healthcare workers including nurses, healthcare workers with pain complaints in the last week, due to some individual reasons such as inappropriate ergonomic conditions and wrong posture; It has been reported that there are health problems such as myofascial pain, various disorders in the waist and neck regions, tendinitis, and impingement syndromes (17). Employees who provide health services, especially nurses; They lead a life open to occupational musculoskeletal diseases, in a sense, by being exposed to many ergonomic risks such as long shift times, stressful work life, lifting repetitive heavy loads more frequently than other professions (2, 3, 6).

Profession-related musculoskeletal problems can reduce the productivity in the relevant profession by affecting the health levels of the employees as well as having negative effects on their work performance (10). One of the many measurement tools in the evaluation of study performance is the Work Role Functionality Questionnaire. Using this measurement tool, in a survey conducted abroad with 301 nurses as participants, nurses describing symptoms related to the musculoskeletal system compared to their colleagues without musculoskeletal relationship symptoms, the study program of the WRFQ was determined by statistical analysis of productivity and physical sub-dimensions. It took significantly lower values (13). Similarly, in our research, the participants in the Group painful score were lower than the participants in the Group control. However, this difference between the two groups is not statistically significant.

When nurses are evaluated in terms of general quality of life, they are considered to be a stressful occupational group with the effect of many factors mentioned above and risky for various health problems (5). When we look at the general quality of life that we evaluated with the SF-12 measurement tool in our study, the SF-12 PCS (physical component score) values were found to be statistically significantly lower than the control group of the nurses who experienced pain from the musculoskeletal system for the last 6 months. In a research conducted with 41 nurses in the United States and evaluating the quality of life with SF-12, both physical and mental component scores of the participants were found to be lower in participants with any musculoskeletal system disorders (18). In another recent enquiry conducted abroad on 585 nurse participants, 74% of whom were female nurses, the average scores of the MCS and PCS sub-dimensions of the SF-12 measurement tool were calculated as 50.00 ± 7.910 and 49.96 ± 7.139, respectively (19). SF-12 sub-dimension scores obtained in both studies were higher than the values obtained in our research. An increase in the score obtained in the SF-12 quality of life measurement tool indicates a state of well-being, and a decrease indicates a state of limitation. Among the reasons for this difference; it can be interpreted that the sample in which the studies were conducted originated from variables such as different countries, age, gender and working environment.

Occupation-related disorders are inevitable, especially in the presence of a mismatch between the physical needs of healthcare professionals and the physical capacities of healthcare professionals working in these jobs (20). Musculoskeletal disorders are the most common diseases among occupational healthcare professionals and other occupational groups, which are based on this ergonomic incompatibility (21). Another reason for the high prevalence of musculoskeletal disorders among health professionals is that health information technologies, which have developed rapidly in recent years, often lack ergonomically adequate suitability (22). Among health professionals, individuals who provide nursing services are at higher risk for musculoskeletal disorders (20).

The validity and reliability study of the Turkish version in our research was performed by Ercan et al. As a result of the responses given by the participants to the 'ErgoEnf-TR', female nurses with musculoskeletal pain complaints for the last 6 months compared to nurses without pain complaints in all 3 parts of the related measurement tool (1.Biomechanical Factors, 2. Environmental Factors, 3. Organizational and Psychosocial Factors) ergonomic risk scores are higher. However, a statistically significant difference was found between the two groups in the scores of the sections named biomechanics and organizational and psychosocial factors ($p< 0.05$).

Thus, it is concluded that 'female nurses suffering from pain from the musculoskeletal system are exposed to various ergonomic risks at different levels'. Ergonomically appropriate designs to be made in health institutions will prevent the development of the mentioned musculoskeletal disorders and the occurrence of medical errors that may occur due to the road (20). The basic conditions underlying the health service providers, who are working with the aim of protecting the health level of individuals, maintaining and improving their well-being, to provide qualified care services; Ergonomic evaluation of working areas, making relevant arrangements and providing ergonomics training periodically (2).

CONCLUSION

Among the female nurses participating in our research, the participants who have had musculoskeletal pain for the last 6 months, according to those without pain complaints; It has a higher degree of pain felt in the last week, lower overall quality of life physical subscale score, and higher ergonomic risk. In order to minimize these risks faced, healthcare workers on a periodic basis; Training and exercise programs that include the concept of ergonomics, health problems that may arise due to occupation, and appropriate measures that can be taken as primary and secondary to combat these problems should be given.

In addition, the main duty of the hospital management is to design the working environments of nurses in line with ergonomic recommendations that have international and scientific reality and to regularly inspect their working environments. With the ergonomic design and taking precautions, the efficiency of the work will increase significantly.

Ethics approval: The study was approved at the meeting numbered 356 of the local ethics committee held on 17/11/2020.

Author contributions: Study design: SE, CÇ; Data collection: AC, HTA, EA, FHK; Data analysis: SE; Draft preparation: SE, HTA; Critical review for content: SE, CÇ, AC; Final approval of the version to be published: SE, CÇ.

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