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ERGONOMIC ANALYSIS OF HOSPITAL WORKPLACE ENVIRONMENT: THE CASE OF A PUBLIC HOSPITAL IN DUZCE

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Abstract

With this study, it was aimed to investigate the ergonomics of the furniture used for the employees in a public hospital in Düzce. With the data obtained and interpreted for this purpose, it was possible to use the furniture used by the hospital staff more ergonomically. Within the scope of the study, 242 employees, consisting of nurses, midwives, health officers and employees working in polyclinics, were reached by face-to-face interview method and data were obtained. As a result of the statistical evaluation of the data obtained, it was determined that 26.4% of the participants did not have any knowledge about ergonomic working conditions, and 45% had partial knowledge. The situation that the participants are most satisfied with regarding the ergonomic designs of the work areas is the presence of sufficient amount of antiseptic and disinfectant substances where deemed necessary. In addition, the participants are pleased with the existence of the necessary compartments to ensure privacy, the regular cleaning of the work areas, and the adequate lighting of the work areas. It has been determined that the participants are least disturbed by whether the electrical cables are collected safely, whether the seats are suitable or not, and whether the office temperature is appropriate. Within the scope of the study, it was observed that the most basic health problem experienced by the employees depending on their working environment was the feeling of general fatigue and exhaustion, followed by low back and back pain and stress.

HASTANE İŞYERİ ORTAMININ ERGONOMİK ANALİZİ: DÜZCE'DE BİR KAMU HASTANESİ ÖRNEĞİ

Anahtar Kelimeler

Sağlık sektörü
Hastane
Mobilya
Ergonomi
Düzce

Öz

Yapılan bu çalışma ile Düzce ilinde bir kamu hastanesinde çalışanlarca kullanılan mobilyaların ergonomik açıdan kullanıcıya uygunluğunun araştırılması hedeflenmiştir. Bu amaçla elde edilen ve yorumlanan veriler ile hastane çalışanlarının kullandıkları mobilyaları daha ergonomik kullanımına imkân sağlanmıştır. Çalışma kapsamında hemşire, ebe, sağlık memuru ve polikliniklerde görevli çalışanlardan oluşan 242 çalışana yüz yüze görüşme yöntemiyle ulaşılmış ve veri alınmıştır. Elde edilen verilerin istatistiksel değerlendirilmesi sonucunda katılımcıların %26,4'ünün ergonomik çalışma koşulları konusunda herhangi bir bilgilerinin olmadığı, %45 oranında ise kısmen bilgilerinin olduğu belirlenmiştir. Katılımcıların çalışma alanlarının ergonomik tasarımları ile ilgili olarak en çok memnuniyet duydukları durum gerekli görülen yerlerde yeterli miktarda antiseptik ve dezenfektan maddesinin varlığıdır. Bunun yanında katılımcılar mahremiyeti sağlamak için gerekli bölmelerin varlığından, çalışma alanlarının düzenli temizliğinin yapılmasından, çalışma alanlarının yeterince aydınlatılmasından da memnuniyet duymaktadırlar. Katılımcıların elektrik kablolarının güvenli bir şekilde toplanıp toplanmamasından, oturulan koltukların uygun olup olmamasından, ofis sıcaklığının uygun olup olmamasından en az düzeyde rahatsızlık duydukları belirlenmiştir. Çalışma kapsamında çalışanların çalışma ortamlarına bağlı olarak yaşadıkları en temel sağlık sorunlarının genel yorgunluk ve bitkinlik hissi olduğu, bunu bel ve sırt ağrıları ve stresin takip ettiği tespit edilmiştir.

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1. Introduction

The word ergonomics, deriving from the Greek words “ergos” meaning “work” and “nomos” meaning “law” (Toka, 1978). The International Ergonomics Association (IEA) has defined ergonomics and defined it as a scientific discipline dealing with understanding and explaining the interaction between humans and other elements in a system. It has also been defined as a profession that develops and applies theory, principles, design methods to optimize both system performance and human well-being (Buckle, 2005; Hulley et al., 2013).

Ergonomics, it can also be defined as the interaction of the environment and the people who will use this environment with the environment, from the design of the work to the design of the product, from home life to business life, even the activities of rest times. In addition, ergonomics also deals with the relationship between humans and machines in certain work and environmental conditions (Güler, 2000).

Güler C. (2004) stated that ergonomics has basically three main components: physical, cognitive, and organizational ergonomics. He also stated that these basic components work in relation with each other in an interdisciplinary field such as anatomy, physiology, psychology, engineering, and design.

Information processing of the work done in cognitive ergonomics is carried out. The main application areas of cognitive ergonomics are to develop control and computer programs that will minimize the possibility of error and increase human performance.

In physical ergonomics, the relationship between people's physical activities and the work done in these activities is discussed, considering the anatomical, anthropometric, physiological, and biomechanical characteristics of people. Posture positions during work, operations related to the materials to be processed, repetitive movements, musculoskeletal systems used in relation to work, their movements, occupational health and safety constitute the basic working areas of physical ergonomics.

Organizational ergonomics seeks to organize people and work to best effect. This component deals with optimizing sociotechnical systems, including organizational structures, policies, and processes. The fields of study of organizational ergonomics include communication, team resource management, job design, organization of working hours, teamwork, and quality management (Güler, 2004).

As in every field and working conditions, there are various risk areas in health institutions and working areas in health institutions. Occupational health and safety of both patients and healthcare workers should be considered in these risk areas. At this point, it is important to create ergonomic working areas in health institutions. The main risk areas of hospitals and the components that need to be ergonomically considered can be listed as risk areas such as lighting the areas used, ventilation of the environments, magnetic fields in the work area, work-machine interactions. If ergonomic arrangements cannot be made in these risk areas, work-related diseases may occur. Undesirable problems and musculoskeletal disorders occur due to penetrating or cutting tool injuries, allergic reactions, infectious diseases, cancer, burns, slips and falls, due to the inability to create ergonomically good environments in healthcare workers. At the same time, health workers experience problems such as fatigue, sleep disorders, obesity, decrease in job satisfaction, work accidents, burnout, malpractice due to unfavorable ergonomic working conditions, especially the inability to regulate working hours (Abdul Rahman et al., 2017; Liu et al., 2019; Ndejjo et al., 2015; Saygun, 2012).

In the report of the US National Health and Human Agency; It is stated that approximately 1.8 million American workers suffer from problems related to musculoskeletal disorders each year. It was seen in the report that more than 15% of these musculoskeletal disorders with a high rate were identified as problems by private sector health workers (Weinstein, 2000). In another study, in addition to not paying attention to the principles of posture and protection in the formation of occupational pain and diseases related to healthcare workers, it has been determined that the role of environmental ergonomic factors is great. All studies carried out in terms of ergonomics show why ergonomics is important in hospitals in terms of both eliminating problems and preventing the emergence of problems (Dıraçoğlu, 2006).

A wide variety of materials or equipment are used in hospitals, such as material cabinets, locker rooms, polyclinic and service counters, wooden and steel furniture in waiting areas, patient beds, examination tables, patient transport stretchers. The ergonomic features of these furniture used are important for their compatibility with the human body.

Furniture used in hospitals should be designed for patients to pass the hospital process more comfortably and for healthcare professionals to work in an ergonomic environment. Flexible and ergonomic, comfortable, and productive working environments should be created in hospitals that fully meet the needs of not only patients but also health personnel, that do not restrict mobility.

Ergonomic considerations should be considered when arranging work environments. The productivity of the employees increases in ergonomic working conditions and this increase is reflected in the performance of the

employees, minimizing the workforce losses. The harmony of individuals working in a physically comfortable environment with their work positively affects the work psychology of the employees.

The main purpose of this study is to investigate the ergonomics of the furniture used by the employees of Düzce Atatürk State Hospital in Düzce. The data obtained and interpreted for this purpose will contribute to the more ergonomic use of the furniture used by Düzce Atatürk State Hospital employees.

2. Scientific Literature Review

By Aydın et al. (2008) the recorded office environments and the features used were ergonomically analyzed by considering the consequences of incorrect arrangements made in academic and administrative office environments at Karadeniz Technical University.

In the study conducted by Gedik et al. (2017) on the work-related discomforts of academic and administrative staff working at Düzce University during office work, it was determined that the participants did not receive any training on office ergonomics and experienced discomfort due to the unsuitability of the desks they used.

In the study by Parlar (2008) in which the healthy working environments of healthcare workers were analyzed, it was stated that the working environments contain various health and safety hazards. In the study, healthcare personnel face biological, chemical, physical, environmental, psycho-social and biomechanical risks in the hospital environment and this requires making the working environment suitable for health conditions, eliminating some danger possibilities, arranging working hours, working order appropriate to physiological characteristics, It has been stated that this problem can be solved by ensuring that the tools and equipment used are compatible with the task and the person using it.

In the study conducted by Gedik et al. (2015) in which the negative situations encountered by employees in offices and while working with computers were examined, it was determined that one third of the participants had no knowledge about ergonomic working conditions and almost all of the participants did not receive any training on ergonomic working conditions. While it was determined that there was not much discomfort from the furniture equipment used within the scope of the study, it was determined that there was discomfort due to the ergonomic inadequacy of the office working environment.

In the study conducted by Özmen et al. (2009) in which the negativities that caused low back pain were examined by non-physician health workers in a private health institution operating in Bursa, it was determined that 60% of the participants did not complain about low back pain. In the study, it was stated that nursing involves many negative factors arising from the working environment and is a stressful profession with intense workload. By making the working environment ergonomic, positive results will emerge in terms of the employee's daily life activities, health and safety, which will positively affect people's work efficiency stated.

In the study conducted by Çetin et al. (2015) in which the satisfaction of academic and administrative staff working at Dokuz Eylül University was investigated with the chairs they used in office environments, it was stated that serious musculoskeletal disorders occurred due to inadequate workplace arrangements in office environments. How chairs used in office environments should be ergonomically designed to eliminate discomfort is discussed within the scope of the study.

3. Methods

The research population consists of the administrative staff working in Düzce Atatürk State Hospital (DASH). It is recorded in the records that there was a total of 650 personnel (nurses, midwives, health officers and employees working in polyclinics) working in the units related to the use of the materials examined within the scope of the study at the time of the study (Anonymous, 2022).

Although it was aimed to reach all DASH administrative personnel within the scope of the study, 242 employees could be reached. It is assumed that the sample reached with the help of the sample determination formula applied in limited societies is statistically representative of the population with 95% confidence level and 5% margin of error (Lomeshow et al., 1990). The questionnaires obtained from the sample reached within the scope of the study were statistically evaluated with the help of the Statistical Package for the Social Sciences (SPSS, 2003) package program.

In the study, data were tried to be obtained by using the questionnaire form developed by the researchers using the literature. The questionnaire form used within the scope of the study consists of 16 questions and 80 judgments in 4 sections. In the first part of the questionnaire, some demographic characteristics of the participants were discussed with 6 questions. In the second part of the questionnaire, the situation of the participants regarding ergonomic working conditions was investigated with 2 questions. In the third part of the questionnaire, questions about the ergonomic designs of the objects used were included.

In this context, the objects used by the participants were determined with 2 questions and 13 judgments, the design of the working areas with 15 judgments, the design of the computer desk/desk they used with 7 judgments, the design of the study chairs with 8 judgments, and the design of the material cabinets used during the study with 12 judgments. In the fourth and last part of the questionnaire, the negativities encountered in the working environment were tried to

be dealt with by 12 jurisdictions, and the discomforts due to the working environment were tried to be dealt with by 13 jurisdictions. Likert-style questions were used in the data acquisition tool used within the scope of the study (Aydın, et al., 2008; Çetin et al., 2015; Gedik et al., 2015; Gedik et al., 2017; Parlar, 2008; Özcan et al., 2011; Özmen et al., 2009).

For the questionnaire used in the study, the Düzce University Scientific Research and Publication Ethics Committee dated 29/04/2022 and Ethics Committee Permission Certificate, numbered 162515, stating that "There is no Ethical and Scientific Inconvenience" in conducting such a scientific study in Düzce Atatürk State Hospital was obtained. Within the scope of the study, permission was obtained from Düzce Atatürk State Hospital with the number E-58230125-929 dated 16.05.2022 to conduct such a scientific study. The study was carried out between 01/05/2022-01/08/2022 with face-to-face interview technique.

The data obtained from the scale used in the study were subjected to validity and reliability analysis before being subjected to statistical evaluation. The Cronbach's Alpha Coefficient was checked for the reliability level of the scale used within the scope of the study and consists of 2 different sections, and the sampling adequacy measure and (Kaiser Mayer Olkin (KMO)) Barlett's sphericity test results were examined for the validity analysis. The validity and reliability analysis results of the sca used in the study are shown in Table 1.

Table 1. Validity, Reliability, and Results of the Questionnaire Used for Hospital Staff

Scale sub-dimensions	Validity Result		Reliability Result
	KMO Value	Barlett Value	Cronbach's Alpha Coefficient
Objects used in work environments			0.697
Design of the workspace	0.811	13839.82	0.881
computer desk/desk design			0.874
office chair design			0.888
Material cabinet design			0.928
Negatives of the working environment			0.824
Disturbances due to the work environment			0.812
All scale results			0.929

It has been determined that both the individual sub-dimensions of the scale used in the study and the reliability results of the whole scale alone do not have a negative problem in terms of reliability. In addition, it has been determined that the results obtained because of the statistical analyzes do not contain any negativity in terms of validity (Kalaycı, 2016; Özdamar, 2010). As a result of the validity analysis of the scales used, the KMO value was calculated as 0.811 and the result of Bartlett's Sphericity test was calculated as 13839.82. Reliability analysis results for the scales used vary between 0.697 and 0.928, and the reliability result for the whole scale was calculated as 0.929 (Table 1).

4. Results

4.1 Some Demographic Characteristics of the Participants

In the study in which the ergonomic analysis of furniture and equipment elements used by Düzce Atatürk State Hospital employees was made, 69% of the personnel of the institution reached were women and 31% were men. When the working units of the personnel of the participating institutions were examined, it was determined that 34.3% worked in inpatient services, 28.1% in polyclinics, 15.3% in intensive care units, 14.1% in emergency services and 8.3% in other service units.

When the titles of the participants reached within the scope of the study are examined, they are predominantly nurse (40.9%), medical secretary at 21.5%, doctor at 14%, health officer at 12.8% and other titles at 10.8% (officer, physiotherapist). It has been determined that there are personnel working (such as audiologists). 49.6% of the participants reached within the scope of the research are between the ages of 36-50, 36% are between the ages of 26-35, 11.2% are aged 25 and under, and 3.3% are aged 55 and over.

When the educational status of the participants is examined, it has been determined that 54.5% of the participants have undergraduate level, 17.8% associate degree level, 14.9% graduate level and 12.8% high school level education level.

When the professional experiences of the employees reached within the scope of the study are examined, 28.9% have 11-15 years of experience, 23.6% have 4-10 years of experience, 20.2% have 16-19 years of experience, 16.1% have 3 years of experience, less experience and 11.2% have 20 or more years of experience.

4.2 Analysis of Participants' Information on Ergonomic Working Conditions

DASH employees were asked whether they had any information about ergonomic working conditions, and it was determined that 26.4% of the participants did not have any information about ergonomic working conditions, and 45% had partial knowledge of 28.6% fully ergonomic working conditions. Gedik T. (2021) in his study; 52.6% of the participants were partially informed about ergonomic working conditions, 29.9% were not, and 17.5% had information about ergonomic working conditions. In

a study conducted by Saygı B. (2019) on Adıyaman Municipality office workers, it was stated that 63% of the participants received training on occupational health and safety, and 81% of these training participants found these trainings useful.

When the participant health workers were asked whether they wanted to receive information/training on ergonomic working conditions, 55.4% of the participants did not want to receive any training/information about ergonomic working conditions, and 44.6% of them did not want to receive any training/information about ergonomic working conditions. their wishes have been determined. Gedik T. (2021) in his study; It was seen that 56.2% of the participants wanted to receive information about ergonomic working conditions, and 43.8% did not want to receive information about ergonomic working conditions.

In a study conducted by Ülgüdür & Dedeli Caydam (2020) it was argued that as the ergonomic knowledge level of healthcare professional's decreases, occupational musculoskeletal disorders increase and accordingly, the workplace of healthcare professionals should be supported and regulated by posture and ergonomic working conditions.

4.3 Objects Used by Participants in Their Work Areas and Their Ergonomic Analysis

While 66.1% of DASH employees stated that there is any object/accessory that visually relaxes them or their work, 33.9% stated that there is no such object/accessory. The percentages of finding objects used by DASH employees reached within the scope of the study are shown in Table 2.

Table 2. Objects Used in the Workspace and Their Percentage of Presence

Objects used	Yes there is (%)	No there's not (%)
Table	98.3	1.7
Chair	98.3	1.7
Height adjustable swivel work chair	83.9	16.1
Computer	97.1	2.9
Computer desk	83.5	16.5
Curtains, blinds to protect from sun and light	78.5	21.5
Bookcase	33.1	66.9
Cabinet with drawers and shelves	82.2	17.8
Guest couch	71.5	28.5
Television, radio	40.5	59.5
Objects with a psychological effect such as flowers, paintings, etc.	46.7	53.3
Telephone, fax	84.7	15.3
Coffee table	62.4	37.6

It was determined that the least found objects in the work areas/offices of the participants working in different units of DASH are communication tools such as bookshelves, television/radio, objects with psychological effects such as flowers, paintings, and coffee tables.

Table 3 shows the results of DASH employees grouping the ergonomic design of work areas according to their importance levels. A statistically significant grouping emerged as 3 groups because of the clustering analysis performed on the data of the participants regarding the ergonomic design of their work areas ($p<0.05$). The final cluster centers of these 3 groups are 3.75 for the 1st group; It was determined as 3.39 for the 2nd group and 2.55 for the 3rd group.

Table 3. Cluster Analysis Results of the Features Related to the Ergonomic Design of the Participants' Workplaces

Judgments	$\bar{x}$	σ	Group	Distance
There are sufficient antiseptic and disinfectant materials in the working areas where necessary.	3.99	1.084	1	0.237
There are ideal materials-environments (such as curtains, screens, or practice rooms) to ensure privacy in work areas.	3.81	1.203	1	0.057
Working areas are cleaned regularly.	3.78	1.138	1	0.027
The work area is adequately and properly illuminated.	3.75	1.143	1	0.003
Fire extinguisher systems/tools are sufficient in working areas	3.7	1.199	1	0.053
The work area is adequately ventilated.	3.64	1.285	1	0.113
The work area is adequately and properly heated.	3.6	1.184	1	0.153
Communication and information flow in working areas can be done without any problems.	3.51	1.253	2	0.117
The workplace has sufficient space and volume.	3.46	1.153	2	0.067
The working area is adequately and properly cooled.	3.42	1.264	2	0.026
There are dirty-clean material areas in the working areas.	3.38	1.434	2	0.013
Private resting areas are sufficient in the working areas.	3.15	1.484	2	0.243
The walls are painted with a calming/calming color paint.	2.67	1.485	3	0.12
I know what the dimensions of the workspace should be.	2.43	1.325	3	0.12

Likert scale: 1 Least common, 2 Rarely encountered, 3 Most common
x̄: Arithmetic mean, σ: Standard deviation

As a result of the clustering analysis, the situation that the participants were most satisfied with regarding the ergonomic designs of the working areas was that there were enough antiseptic and disinfectant materials in the places deemed necessary. In addition, the participants are pleased with the existence of the necessary partitions to ensure privacy, the regular cleaning of the work areas, and the adequate lighting of the work areas. It has been shown that the participants have the lowest level of knowledge about the working environment, and they do not know what the dimensions of the working areas should be, and the walls of the working environments are not painted with an appropriate/calming color.

In a study conducted by the İlçe A. (2007) on nurses working in the intensive care units of Ege University and Dokuz Eylül University Hospitals, it was determined that the dark colors used in the ground color were not suitable for the nurses in terms of ergonomic environmental arrangement, and the light colors used on the walls were found suitable by the nurses.

In a study conducted by Saygı (2019) on municipal employees in Adıyaman province in 2019, it was stated that women's understanding of cleaning differs from that of men, and it was suggested that working conditions could be improved for employees if the cleaning was done more regularly and in a way, that would make the employee comfortable.

In a study conducted by Griffiths H. (2006) it was stated that environmental risk factors such as work surfaces and height of furniture are very important especially in lifting patients in hospitals.

Table 4 shows the results of grouping the ergonomic designs of the computer desk/desk that DASH employees use in their workspaces according to their importance levels. A statistically significant grouping structure emerged as 3 groups because of the clustering analysis performed on the data of the ergonomic design-related features of the computer desk/desk that the participants used in their work areas ($p<0.05$). The final cluster centers of these 3 groups are 3.21 for the 1st group; It was determined as 2.75 for the 2nd group and 2.36 for the 3rd group.

Table 4. Cluster Analysis Results of the Ergonomic Design-Related Features of the Computer Desk/Desk That the Participants Used in Their Work Areas

Judgments	x̄	σ	Group	Distance
The height of the computer desk is sufficient and suitable	3.29	1.307	1	0.08
The space of the computer desk is sufficient and convenient	3.29	1.320	1	0.08
The computer desk has sufficient weight and rigidity.	3.17	1.265	1	0.04
The footprint of the printer does not adversely affect the working conditions.	3.09	1.456	1	0.12
There are suitable shelves on the desk where files can be placed.	2.85	1.576	2	0.10
Desk lamp (if equipped) illuminates the work area appropriately	2.65	1.490	2	0.10
I know what the dimensions of the computer desk should be	2.36	1.335	3	0.00

Likert scale: 1 Least common, 2 Rarely encountered, 3 Most common
x̄: Arithmetic mean, σ: Standard deviation

As a result of the cluster analysis, it was determined that the participants agreed with the adequacy and suitability of the height of the computer desks/desk they used, and the adequacy and suitability of the space used for the computer desk/desk at the highest rate. It was determined that the participants were least involved in knowing what size the computer desk/desk used should be ergonomically.

Table 5. Cluster Analysis Results of the Ergonomic Design-Related Features of the Chairs Used by the Participants in Their Work Areas

Judgments	x̄	σ	Group	Distance
The chair is convenient and has adjustable height	3.67	1.304	1	0.118
The seating surface of the chair has a suitable profile.	3.6	1.26	1	0.048
The distance of the chair from the keyboard is sufficient and appropriate.	3.59	1.276	1	0.038
The chair back has a suitable slope and height for my back.	3.46	1.367	1	0.092
Chair armrests (if any) have adequate and suitable position.	3.44	1.351	1	0.112
The chair back supports my waist appropriately.	3.17	1.474	2	0.00

There is a suitable space volume and footrest that the feet can step on.	2.68	1.536	3	0.19
I know what the dimensions of the chair should be	2.3	1.359	3	0.19

Likert scale: 1 Least common, 2 Rarely encountered, 3 Most Common
x̄: Arithmetic mean, σ: Standard deviation

Table 5 shows the results of grouping the ergonomic design features of the chairs used by DASH employees in their workplaces according to their importance levels. As a result of the clustering analysis on the ergonomic design-related features of the chairs used by the participants in their work areas, a statistically significant grouping structure emerged as 3 groups ($p<0.05$). The final cluster centers of these 3 groups are 3.55 for the 1st group; it was determined as 3.17 for the 2nd group and 2.49 for the 3rd group.

As a result of the cluster analysis, the ergonomic analysis of the chairs used by the participants revealed that the chairs have an appropriate and adjustable height mechanism, which is the most accepted judgment by the participants. Participants give their consent to the suitability of the ergonomic design of the chair with an elevated level of participation. The participants showed the lowest participation in whether they knew what ergonomic dimensions the chairs they used should have and stated that they knew little. Table 6 shows the results of grouping the ergonomic design of the material cabinets used by DASH employees in their work areas according to their importance levels.

Table 6. Cluster Analysis Results of the Ergonomic Design-Related Features of the Material Cabinets Used by the Participants in Their Work Areas

Judgments	x̄	σ	Group	Distance
Required materials can be easily accessed in the material cabinets.	3.35	1.296	1	0.050
The compartments of the supply cabinets have the appropriate volume to place the medicines.	3.31	1.281	1	0.010
Material cabinets have sufficient space and volume	3.28	1.286	1	0.020
Material cabinets are suitably illuminated	3.26	1.283	1	0.040
The volume of the material cabinets is not large enough to block other work areas	3.20	1.331	2	0.035
Material cabinet drawers have sufficient volume	3.18	1.336	2	0.015
Material cabinet doors do not consume much space when opened	3.17	1.303	2	0.005
The edges of the material cabinets are made in such a way that they do not damage	3.11	1.377	2	0.055
I know what the dimensions of the material cabinets should be	2.19	1.324	3	0.000

Likert scale: 1 Least common, 2 Rarely encountered, 3 Most common
x̄: Arithmetic mean, σ: Standard deviation

A statistically significant grouping structure emerged as 3 groups because of the clustering analysis performed on the ergonomic design-related features of the material cabinets used by the participants in their work areas ($p<0.05$). The final cluster centers of these 3 groups are 3.55 for the 1st group; It was determined as 3.17 for the 2nd group and 2.49 for the 3rd group.

As a result of the cluster analysis, it was stated that the participants could easily reach the materials they wanted to use in the material cabinets they used, the cabinets used had a suitable volume for the drugs/materials to be placed in the cabinets, the spaces of the material cabinets were sufficient, and the relevant areas were well lit. Participants stated that they do not have much information about the ergonomic dimensions of the material cabinets they use at the lowest rate.

4.4 Analysis of Negativities and Disturbances in the Working Environment

Table 7 shows the results of DASH employees grouping the characteristics related to the negativities encountered in the working environment according to their importance levels.

As a result of the computational analysis on the characteristics related to the negativities faced by the participants in their working environment, a grouping structure targeted as observation emerged as 3 groups ($p<0.05$). The final cluster centers of these 3 emerging groups are 1.40 for the 1st group; It was determined as 154 for the 2nd group and 1.81 for the 3rd group.

Table 7. Cluster Analysis Results of the Characteristics Related to the Negativities Faced by the Participants in Their Working Environment

Judgments	x̄	σ	Group	Distance
Electrical wiring not secured	1,33	0.635	1	0.065
Seated seats are not suitable	1,36	0.568	1	0.035
Office temperature is not suitable	1,38	0.615	1	0.015
No screen filter	1,42	0.634	1	0.025
Office cleaning is not enough	1,43	0.673	1	0.035
Office lighting is not enough	1,45	0.657	1	0.055
There are electromagnetic fields in work areas	1,5	0.671	2	0.040
Eye not level with computer screen/patient monitor	1,51	0.677	2	0.030
Working environment is dusty especially desks and computer screens	1,52	0.701	2	0.020
Direct sunlight hitting the monitor/patient monitor	1,53	0.724	2	0.010
Keyboard cleaning is not enough	1,64	0.734	2	0.100
No standard computer desk	1,81	0.814	3	0.000

Likert scale: 1 Least common, 2 Rarely encountered, 3 Most common
x̄: Arithmetic mean, σ: Standard deviation

As a result of the group analysis, the participants mentioned the problems they encountered at the minimum level, such as whether the electrical cables were collected safely, whether the seats are suitable or not, and whether the office temperature is appropriate.

DASH employees stated that they experienced the lowest rate of negativity due to the lack of standard computer desks.

Okşak & Gökyay (2020) emphasized that lighting is very important for occupational health and safety in their study, and they found the lighting in the workplaces sufficient at a rate of 60.9% in their study in different sectors in Istanbul. In a study conducted by İlçe A. (2007) at Ege University and Dokuz Eylül University Hospitals, it was suggested that nurses working in intensive care units would encounter neck pain and other cervical problems in the long-term due to improperly placed monitor heights.

In a study by Weber S. (2006), it was stated that some health problems such as general fatigue, eye strain, carpal tunnel and other upper extremity neuropathies can be prevented by ergonomically arranging nurse work areas, computer use areas or writing areas. Table 8 shows the results of grouping the health problems related to the health problems of DASH employees according to their importance levels.

A statistically significant grouping structure emerged as 3 groups because of the clustering analysis performed on the characteristics related to the health problems that occur depending on the working environment of the participants ($p<0.05$). The final cluster centers of these 3 emerging groups are 1.02 for the 1st group; It was determined as 1.35 for the 2nd group and 1.55 for the 3rd group.

Table 8. Cluster Analysis Results of Characteristics Related to Health Problems That Occur Depending on the Working Environment of the Participants.

Judgments	x̄	σ	Group	Distance
General tiredness and fatigue	1,02	0,16	1	0,074
Back and waist pain	1,05	0,23	1	0,044
Stress	1,07	0,25	1	0,024
Neck pain	1,15	0,36	1	0,056
Headache	1,18	0,39	1	0,086
Eye ailments	1,29	0,45	3	0,03
Shoulder and/or arm pain	1,35	0,48	3	0,03
Wrist and/or hand pain	1,45	0,5	2	0,045
Knee pain	1,47	0,5	2	0,025
Foot and/or ankle pain	1,46	0,5	2	0,035
Muscle tightness	1,51	0,5	2	0,015
Hip and/or leg pain	1,53	0,5	2	0,035
Elbow and/or forearm pain	1,55	0,5	2	0,055

Likert scale: 1 Least common, 2 Rarely encountered, 3 Most common
x̄: Arithmetic mean, σ: Standard deviation

As a result of the group analysis, the most basic health problem experienced by the participants depending on their working environment is general fatigue and exhaustion. This is followed by low back and back pain and stress. The lowest health problems experienced by DASH employee's due to their working environment were determined as elbow and/or forearm pain, hip and/or leg pain and muscle tightness. Babayiğit & Kurt (2013) stated that ergonomic factors also play a major role in the formation of occupational pain and diseases related to healthcare workers, as well as not paying attention to the principles of posture and protection.

In the study conducted by Tel & Karadağ (2001) it was seen that besides mental problems (such as anxiety, helplessness, depression) in employees, physical complaints (such as insomnia, muscle tension, fatigue) were observed, but these complaints did not decrease their work motivation and reduced work efficiency. It was stated that the thoughts of quitting the job appeared in the

employees.

As a result of the developing technology, the use of computers is now encountered in every phase of life. Occupational musculoskeletal disorders are frequently seen among all other healthcare professionals, such as physicians and nurses, due to the ergonomic incompatibility of computers and information technologies in the health sector, as in all other sectors (Hedge et al., 2011). In a study by Nielsen & Trinkoff (2003) it was determined that upper extremity musculoskeletal disorders occur in approximately 32% of the cases due to ergonomically inappropriate work on computers and equipment used by nurses.

In a study conducted by the İlçe A. (2007) at Ege University and Dokuz Eylül University Hospitals, it was stated that 80.1% of the nurses working in the intensive care units did not have a musculoskeletal disorder diagnosed by the physician, while approximately 71% of the nurses working in the ergonomically not well-designed environments. It was determined that the diagnosis of low back-neck pain was made in the second half of the study.

5. Conclusion

The situation that the participants are most satisfied with regarding the ergonomic designs of the work areas is the availability of sufficient amount of antiseptic and disinfectant materials were deemed necessary. It has been shown that the participants have the lowest level of knowledge about the working environment, and they do not know what the dimensions of the working areas should be, and the walls of the working environments are not painted with an appropriate/calming color. If the productivity of the employees is to be high and healthy, arrangements must be made in accordance with ergonomic principles in the workplaces.

It was stated that the participants experienced the most negativity due to the lack of standard computer desks regarding the negativities they encountered in their working environment. Within the scope of the study, it was observed that the most basic health problem experienced by the employees depending on their working environment was the feeling of general fatigue and exhaustion, followed by low back and back pain and stress. Inappropriately designed work environments cause musculoskeletal disorders on employees. With work environments that will be designed ergonomically, such inconveniences will be eliminated as preventable inconveniences.

All kinds of operations in the health sector are generally aimed at serving patients. Failure in any of these services may cause irreversible results in patients receiving service from the health institution. Because; The working environments of the employees should be arranged according to ergonomic elements and the employees should be provided to work more motivated by minimizing the general feeling of fatigue and exhaustion arising from the working environment.

Ergonomic designs, which can be considered as a user-centered design work in every field, can also enable employees to work more efficiently in hospital environments. In line with the recommendations of both national and international ergonomics organizations, units providing health services should also plan working environments that will provide their own institutional advantage according to this recommendation.

Conflict of Interest

No conflicts of interest have been declared by the authors.

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