Evaluation Of Ergonomic Risk And Its Prevalence In Osteoarticular Symptoms In The Administrative Staff Of A Municipal Decentralized Autonomous Government Of Imbabura – 2024

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Keywords:

Ergonomics, ROSA Methodology, Nordic Questionnaire.

ABSTRACT

Exposure of administrative staff to ergonomic risk can lead to the development of osteomyoarticular symptoms. The present study aims to evaluate the ergonomic risk and the prevalence of osteoarticular symptoms in the administrative staff of the Municipal Decentralized Autonomous Government of Imbabura. This study employed a quantitative, cross-sectional design to assess 64 administrative employees in November 2024. The participants were evaluated using the Standardized Nordic questionnaire to determine the prevalence of osteoarticular discomforts, and the ROSA method was used to assess the level of ergonomic risk. The Chi-square and Pearson correlation tests were used for statistical analysis. The results obtained indicate a high prevalence of discomfort at the neck (67.2%), lower back, and hand/wrist (43.8% respectively), with a very high level of ergonomic risk in 50% of administrative staff and a high level in 40.6% of them. A statistically significant relationship between ergonomic risk and osteoarticular discomfort ($p > 0.05$) was not found; however, a weak correlation was observed between neck discomfort and ergonomic risk ($p=0.071$). For this reason, it is important to take preventive ergonomic measures such as training, active breaks, or some type of occupational gymnastics program, as well as readjustment of workstations, to mitigate the identified risks.

INTRODUCTION

Ergonomics is defined as the interaction between man-machine and environment, regarding the physical or mental effort activities they carry out. (Olarte, 2019) While ergonomic risk refers to the set of situations or factors that are present in workplaces (Espín et al., 2018), being one of the main causes of developing musculoskeletal injuries due to their exposure (intensity, frequency and duration) (Chinchande & Molina, 2021), either due to inadequate static postures, extreme physical effort, repetitive movements or lack of breaks during the working day. (Carrasco et al., 2023)

The use of computers is currently found in all age groups and is related to a higher risk of developing musculoskeletal disorders (MSDs) (Gerr et al., 2006), as it mainly affects muscles, joints, and nerves of areas of the body such as the neck, back, and upper limbs. (Besharati et al., 2018)

Administrative work to develop efficiently and quickly requires computer assistance, with continuous working days of eight hours in front of computers. (Amri & Putra, 2022) They also perform activities such as writing, reading, typing, which are related to repetitive movements, mental workload, (Besharati et al., 2018) inappropriate or static postures incorrect for a long time leading to the development of MSDs.(Arshad et al., 2021)

The International Labor Organization (ILO) indicates that 278 million employees a year die due to accidents or occupational diseases at the workplace level, of which 2.4 million (86.3%) are due to occupational diseases and 380 deaths due to occupational accidents (13.7%), representing the 4% of the Global Gross Domestic Product (GDP) (Vellín & Escobar, 2022) In Latin America, economic losses due to work accidents or occupational diseases are between 9% and 12% of GDP, associating 30% of musculoskeletal diseases for work reasons. (Avila et al., 2023)

The World Health Organization (WHO) indicates that musculoskeletal disorders in 2017 were the leading cause of disability in the world, with low back pain being the main contributing factor (20% - 33%) and the main cause of work absenteeism.(Becerra-Paredes et al., 2020) According to the Global Burden of Disease Study (GBD), 17.37% of the years lived with disabilities correspond to musculoskeletal disorders. (Jin et al., 2025)

The use of computers in the workplace has increased in recent years, with a prevalence of musculoskeletal disorders between 10 and 62%. (Sonne et al., 2012) At the European level, a study found that 4% of workers performed repetitive movements, 50% had forced postures, which have led to musculoskeletal disorders representing more than 50% of occupational diseases. (Litardo et al., 2019) Ecuador is not exempt, according to the Council of Occupational Risks of the Ecuadorian Institute of Social Security, the musculoskeletal system is the most prone to suffer occupational diseases, closely related to the design of the place, forced postures and repetitive movements. (Mina & Martínez, 2024) That is why there is a need to establish the level of ergonomic risk in administrative staff and its relationship with the appearance of osteoarticular symptoms, since it has been shown that computer work represents a high level of physical demand and its evaluation will allow the implementation of preventive and corrective measures that reduce these injuries. (Guayaquil et al., 2024)

It's also important since MSDs are among the top 10 conditions associated with work, becoming an urgent health problem worldwide, not only because of the impact on patients, but also because of the economic burden due to absenteeism costs and health care (Tesfaye et al., 2022) highlighting the importance of occupational health and occupational well-being for productivity. (Guayaquil et al., 2024)

This shows that administrative staff is susceptible to MSD especially at the level of the neck/shoulders, upper and lower back due to sitting for long hours in uncomfortable postures, with computers at unadjusted heights, mice away from the body or misadjusted chairs. (de Barros et al., 2022) To counteract all these effects, ergonomics is applied allowing the staff to carry out their activities satisfactorily and ensuring occupational health and well-being. (Cercado et al., 2021)

This study aims to evaluate the ergonomic risk and the prevalence of osteoarticular symptoms in administrative staff and analyze the relationship that exists between them.

METHODOLOGY

The following research is quantitative, not experimental with a cross-sectional, descriptive, correlational and analytical design.

The study population was made up of a universe of 64 administrative staff, who occupy positions such as director, boss, office worker, technician, inspector, syndic attorney, promoter, property registrar or general secretary in the Municipal Decentralized Autonomous Government of San Miguel de Urcuquí during the month of November 2024.

For the selection of participants, the following criteria were established:

Inclusion criteria: servers who perform administrative functions, accepted informed consent and with a minimum seniority of 6 months.

Exclusion criteria: servers who did not wish to participate, had diagnosed musculoskeletal disease or were on vacation.

The ergonomic risks of the aforementioned positions were evaluated through the application of the ROSA method (Rapid Office Strain Assessment), which considers forced and static postures of the neck, back, shoulders, arms, wrists, and legs. The initial evaluation analyzes the characteristics of the seat and the way of sitting, location, distribution and use of peripherals (monitor, phone, mouse and keyboard), as well as the time of exposure to these postures. (Alvarado et al., 2024) Applying this method will result in a measured risk level and an estimate of the actions that will be taken in the position to reduce that risk. (Torres et al., 2020)

For the assessment of osteoarticular symptoms, the instrument called Standardized Nordic Questionnaire was used, which allows for to identification of the presence of musculoskeletal problems in people exposed to physical demands, especially of the biomechanical type.(Avila et al., 2023)

The investigation began with the analysis of risks present through the GTC 45 matrix. Subsequently, authorization was requested by the highest authority to apply the appropriate instruments and techniques for the study population. The instruments were reproduced about the sample and a cell phone camera was used to document the method. It was socialized with the administrative staff before the data collection, informed consent was given, and the instruments and techniques were applied.

Standardized measurement instruments with statistical content validity were used, such as the ROSA method which allowed the establishment of ergonomic risk factors and to know the osteoarticular symptoms, the standardized Nordic questionnaire was applied. The results were entered and tabulated through the Excel spreadsheet and subsequently analyzed in the statistical software SPSS Statistics 23. Statistical tests such as the chi-square test and Pearson correlation with a level of statistical significance of $p < 0.05$ were used.

The study did not present use, modification or experimentation with natural elements, they were handled under the Treaty of Helsinki, complying with the principle of autonomy. The entire study population knew the objective of the research prior to its authorization with informed consent. In addition, the investigation presented no risk to the participants.

RESULTS

In **Table 1.** Socio-demographic and labor data of 64 participants were evaluated, of which 57.8% correspond to women and 42.2% to men. Concerning age, it is observed that most are aged between 31 and 60 years or older. When evaluating the body mass index (BMI) according to the parameters of the World Health Organization (WHO), it was found that 48.4% of employees are overweight, followed by 26.6% with normal weight and a low percentage presents obesity. 100% of employees work 40 hours a week and are right-handed, most of them taking active breaks. It can be seen that, about seniority, most employees are carrying out the same activities between 1 and 20 years and a low percentage <1 year or > 20 years.

Table 1. Socio-demographic data

Socio-demographic data	Frequency (n)	Prevalence (%)
SEX		
Man	27	42.2%
Woman	37	57.8%
AGES		
20 to 30 years	5	7.8%
31 to 40 years	22	34.4%
41 to 50 years	21	32.8%
51 to 60 years	13	20.3%

60 or more	3	4.7%
BMI		
Normal	17	26.6%
Overweight	31	48.4%
Obesity I	12	18.8%
Obesity II	3	4.7%
Obesity III	1	1.6%
WEEKLY WORKING HOURS		
40 hours	64	100%
ACTIVE BREAKS		
Yes	25	39.1%
No	39	60.9%
LATERALITY		
Right-handed	64	100%
SENIORITY		
< 1 Year	10	15.6%
1 to 10 years	29	45.3%
11 to 20 years	15	23.4%
21 to 30 years	5	7.8%

Table 2. shows the prevalence of osteoarticular symptoms reported by participants in different regions of the body in the last 12 months, being the neck (67.2%), lower back, hand/wrist 43.8%, respectively) and shoulder (42.2%) is the most affected, while the elbow/forearm (12.5%) is the least affected. Of these people, only a low percentage received treatment, the areas with the greatest medical care being the neck, lower back and shoulders. While in the last 7 days they report greater discomfort at the neck level in 24 people, at the level of 17 people in the lower back and 16 people at the level of upper back, hand/wrist and knees.

Table 2. Nordic Questionnaire results of people with discomfort

Body area	**Discomfort in the last 12 months**		**They received medical attention**		**Discomfort in the last 7 days**	
	n	**%**	**n**	**%**	**N**	**%**
Neck	43	(67.2%)	12	(18,8%)	24	(37,5%)
Shoulder	27	(42.2%)	7	(10,9%)	13	(20,3%)
High back	25	(39.1%)	4	(6,3%)	16	(25%)
Low back	28	43.8%)	9	(14,1%)	17	(26,6%)
Elbow/forearm	8	(12.5%)	2	(3,1%)	7	(10,9%)
Hand/Wrist	28	(43.8%)	5	(7,8%)	16	(25%)
Hips/legs	11	(17.2%)	3	(4,7%)	6	(9,4%)
Knees	24	(37.5%)	4	(6,3%)	16	(25%)
Ankles/feet	9	(14.1%)	1	(1,6%)	6	(9,4%)

Meanwhile, **Tabla 3.** presents the levels of ergonomic risk in the administrative staff evaluated using the ROSA method. The risk levels are classified as insignificant, improvable, high, very high and

extreme. Half of the servers (50%) have very high ergonomic risk, followed by high risk (40.6%) and improvable (9.6%), which indicates the need for ergonomic interventions to avoid health complications.

Table 3. Ergonomic risk level in administrative staff according to the ROSA method

Risk level	Description	% of personnel affected	N° People
Inappreciable	No intervention required	0	0%
Improvable	You can improve some elements	9.4%	6
High	Requires changes	40.6%	26
Very High	Requires action	50%	32
Extreme	Immediate action	0%	0
Total		100%	64

Finally, **Table 4.**shows that there is no statistically significant relationship between the level of ergonomic risk present in the administrative staff with the discomforts that refer to the level of the neck (p=0.145), shoulder (p=0.295), higher back (p=0.434), lower back (p=0.943), elbow/forearm (p=0.590), hand/wrist (p=0.669), hips/legs (p=0.944), knees (p=0.762) and ankles/feet (p=0.934), according to the Chi^2 values. While Pearson's correlation indicated that in most pairs the correlation is very low and not significant, except in the neck (p=0.071). Therefore, it is evident that osteoarticular discomfort could also occur for other causes and not only for ergonomic risk.

Tabla 4 Relationship between ergonomic risk and osteoarticular discomfort

	DISCOMFORT		**RISK OF LEVEL**						
BODY AREA		N	VERY HIGH	HIGH	IMPROVABLE	Chi^2	p	r	p
NECK	Yes	43	19 (44.2%)	18 (41.9 %)	6 (14%)	3.865	0.145	0.227	0.071
	No	21	13 (40	8 (30.8 %)	0 (0%)				
SHOULDER	Yes	27	11 (40.7%)	14 (51.9 %)	2 (7,4%)	2.443	0.295	0.095	0.455
	No	37	21 (56.8%)	12 (32.4 %)	4 (10.8%)				
HIGH ACK	Yes	25	10 (44%)	12 (48%)	3 (12%)	1.671	0.434	0.154	0.223
	No	39	22 (56.4%)	14 (39.5 %)	3 (7,7%)				
LOW BACK	Yes	28	14 (50%)	11 (39.3 %)	3 (10.7%)	0.117	0.943	0.018	0.887
	No	36	18 (50%)	15 (41.7 %)	3 (8.3%)				
ELBOW/ FOREARM	Yes	8	4 (50%)	4 (50%)	0 (0%)	1.055	0.590	-0.054	0.671
	No	56	28	22	6				

			(50%)	(39.3 %)	(10.7%)				
HAND/WRIST	Yes	28	13 (46.4%)	13 (46.4 %)	2 (7.1%)	0.804	0.669	0.018	0.887
	No	36	19 (52.8%)	13 (36.1 %)	4 (11.1%)				
HIPS/LEGS	Yes	11	6 (54.5%)	4 (36.4 %)	1 (9.1%)	0.115	0.944	-0.034	0.792
	No	53	26 (49.1%)	22 (41.5 %)	5 (9.4%)				
KNEES	Yes	24	11 (45.8%)	10 (41.7 %)	3 (12,5%)	0.544	0.762	0.086	0.498
	No	40	21 (52.5%)	16 (40%)	3 (7.5%)				
ANKLEES/FEET	Yes	9	4 (44.4%)	4 (44.4 %)	1 (11,1%)	0.136	0.934	0.045	0.724
	No	55	28 (50.9%)	22 (40%)	5 (9.1%)				

DISCUSSION

This study aimed to evaluate the prevalence of osteoarticular discomfort and the level of ergonomic risk present in 64 administrative workers. The results obtained through the application of Pearson correlations and the obtaining of Chi^2 indicate that there is no significant statistical relationship between them, however, a weak significant correlation was evidenced at the neck level.

When evaluating the demographic and work characteristics of the participants, a slight predominance of women was found (57.8%) reflecting a typical gender distribution in administrative environments, which could influence the presence of osteoarticular disorders. This can be seen in the study conducted by Umar et al. (2019) of 100 computer employees in Pakistan, where it was found that musculoskeletal discomforts were mostly in women (43.0 ± 33.6) than in men (16.9 ± 20.8) with a significant association between gender and discomfort ($p = 0.001$).

The age of distribution reveals that most participants are in the range between 31 and 50 years (67.2%), which is important since in these age ranges there are people with the most productive years, but they are also more susceptible to injuries either due to inadequate posture, stress or repetitive movements during the working day.

As for the body mass index (BMI), a high percentage of overweight employees was found (48.4%), being an additional risk factor for developing musculoskeletal disorders, since excess weight generates an additional load on the joints of the spine and lower limbs.

The prevalence of osteomioarticular symptoms in participants was 67.2% at the neck level, followed by lower back and hands/wrist (43.8% each) coinciding with the study by Okezue et al. (2020) which reports that the areas most affected by MDS in administrative staff were the lumbar area (58.1%), wrists/hands (53%) and shoulders (50.2%). Likewise, the study by James et al. (2018) conducted on academic staff of a university in Australia indicated that the most reported symptomatic areas were the neck (60%), shoulders (53%) and lower back (47%).

In this study it was found that most of the administrative staff did not receive medical treatment, being the areas for which they most sought medical attention being the neck (18.8%) and lower back (14.1%). In addition, in the last 7 days the prevalence of discomfort is maintained mainly in the neck (37.7%),

upper back (25%) and lower back (26.6%), contrasting with the study by AlOmar et al. (2021) carried out on office workers of a Saudi University confirmed that despite the high prevalence of musculoskeletal discomfort, only a small part of the workers sought medical attention (30%) and the areas with the greatest discomfort in the last 7 days were shoulder (15.1%), neck (14.4%) and lower back (15.7%).

When analyzing the levels of ergonomic risk, it was found that half of the participants have a very high risk (50%), followed by high risk (40.6%) and only a low percentage has an improvable risk (9.4%) according to the application of the ROSA method, indicating the urgent need to implement ergonomic measures to improve working conditions. These results coincide with the study by Motamedzadeh et al. (2021) which found a high-risk level (greater that 5) in banking personnel in Iran. While Cano (2022) found a high ergonomic risk level in 40 people evaluated (44%) and 49 with a very high-risk level (53.8%), requiring rapid action.

Despite not showing a statistically significant relationship between osteomyoarticular discomfort and ergonomic risk in the different body areas of the administrative staff, a weak statistical correlation (r= 0.227, p= 0.071) was observed at the neck level. This can be contrasted with the study conducted by Mohammadipour et al., (2018) in which no significant correlations were found between the final ROSA score and discomfort in different areas of the body, except in the lower back (r = 0.412, p=0.026)

This suggests that factors such as overweight and obesity, young age and lack of knowledge about postural hygiene or seniority could influence the development of these, indicating the need to implement improvements in the work ergonomics of the municipality and programs that reduce the impact or development of musculoskeletal disorders.

CONCLUSION

The present study did not show a statistically significant correlation through the Pearson method; however, the percentage analysis has shown a high prevalence of osteoarticular discomfort at the neck and hand/wrist level and a very high level of ergonomic risk in half of the administrative staff evaluated.

The poor design of the workplace, inadequate organization of the workspace, static and inadequate postures when performing administrative activities during long hours of work, as well as being overweight, gender, age or other socio-demographic data contribute to the development or aggravation of these discomforts.

The implementation of ergonomic measures such as the height regulation of chairs, better arrangement of peripherals and the promotion of active pauses is essential to prevent musculoskeletal complications in the future. These interventions could not only reduce osteoarticular discomfort but also improve the productivity and general well-being of administrative employees.

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