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Effectiveness of Educational Approach to Ergonomic Interventions in Preventing Work Related Upper Extremity Musculoskeletal Symptoms Among Computer Users at Tertiary Care Hospital Belagavi

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ABSTRACT:

Background: Work-related upper extremity musculoskeletal symptoms (WUEMSS) are common among computer users due to prolonged sitting, repetitive movements, poor workstation design, and lack of ergonomic awareness. These symptoms can lead to pain, reduced productivity, activity limitations, and decreased quality of life. Educational ergonomic interventions play an important role in promoting proper posture and preventing such problems. **Objectives:** The objectives of the study were to assess the baseline knowledge on ergonomic intervention among computer users, to assess work-related upper extremity musculoskeletal symptoms among computer users, and to evaluate the effectiveness of an educational approach on ergonomic interventions for preventing work-related musculoskeletal symptoms. **Method:** An evaluative research approach with a pre-test and post-test control group design was used. A total of 78 participants were selected through purposive sampling and divided equally into experimental (n=39) and control (n=39) groups. Data were collected using the Nordic Musculoskeletal Questionnaire (NMQ), Visual Analogue Scale (VAS), and a structured knowledge questionnaire. The experimental group received ergonomic education, while the control group followed routine practice. Post-test evaluation was conducted using the same tools. **Findings:** Baseline results showed no significant differences between groups. Post-intervention, the experimental group demonstrated significant improvement in ergonomic knowledge and reduction in pain, activity limitation, and work-related upper extremity musculoskeletal symptoms ($p<0.05$). **Conclusion:**Educational ergonomic interventions are effective in improving knowledge and reducing work-related musculoskeletal symptoms among computer users.

INTRODUCTION:

Fundamentally, ergonomics is the science of creating a workplace that meets the demands of employees rather than making them adjust to their surroundings. This strategy includes everything from keyboard placement and chair height to workstation arrangement and workspace flow. In order to provide a better and more productive work environment, proper ergonomic practices seek to lessen physical strain on the body, avoid injuries, and improve comfort.[1]

The study of ergonomics aims to create the more productive workspace while reducing the risk of damage by striking a balance between the demands of a job and an individual's and the workplace's capabilities. Ergonomics' main objective has historically been to lower the incidence of WMSD. In terms of ergonomics, the lowering of WMSD is thought to be the biggest concern. Some of the more prevalent WMSD include injuries to the back, neck, and upper extremities. Research has shown that certain motions and combinations of motions at work, such as lifting, twisting, prolonged sitting, squatting, and repetitive motions, put people at higher risk of developing WMSD. Ergonomics can lower the risk of disease and accidents, boost worker productivity, and raise job satisfaction.[2]

Musculoskeletal diseases (MSDs) are one of the most prevalent and well researched effects of inadequate ergonomics. These conditions impact the tendons, muscles, joints, and other connective tissues and are frequently brought on by awkward postures, extended sitting, or repetitive strain. Inadequate workstation configurations are often linked to conditions like carpal tunnel syndrome, persistent back pain, and neck strain. According to a study that emphasises the high frequency of MSDs among office workers, poor workstation configurations, such as seating configurations, monitor orientation, and keyboard placement, are directly linked to neck, shoulder, upper back, and lower back pain.[3]

MSDs affect 1.71 billion people worldwide.[4]
Work-related skeletal diseases (WMSDs) are among the most common occupational health problems affecting individuals who use computers often. These conditions primarily impact the muscles, tendons, ligaments, nerves, and joints, with the neck, shoulder, arm, wrist, and hand areas being particularly affected.[5]

Various risks could arise from improper computer setup and use. The most prevalent issue is tendinitis, which is characterised by inflammation of the tendons and localised discomfort in the hand, wrist, elbow, or forearm. Fatigue, strained muscles, and eventually discomfort can result from poor posture. Long-term computer use may cause pain or discomfort in your hands, wrists, arms, shoulders, upper back, or neck.[6]

Designing workstations with ergonomics in mind is essential to preventing health problems associated to ergonomics. Including height-adjustable workstations, ergonomic seats, and office accessories that promote natural posture are important workplace practices. It's important to set up workstations correctly, with monitors at eye level and keyboards and mice easily accessible. To stretch, move, and reset posture, regular movement breaks are also essential.[3]
Educational strategies are essential for raising awareness and increasing understanding of ergonomic solutions. Computer users can better grasp proper posture, the significance of adjusting their workstations, and the necessity of stretching exercises to lessen muscle tension by receiving structured ergonomic instruction. Research indicates that office workers' posture is greatly improved and their musculoskeletal discomfort is decreased by ergonomic training programs. By promoting the adoption of healthy work habits, education helps to avoid long-term issues associated with repeated work.[7]

MATERIAL & METHOD:

A Evaluative research approach was conducted with objectively to assess the baseline knowledge on ergonomic intervention among computer users, to assess work-related upper extremity musculoskeletal symptoms among computer users, and to evaluate the effectiveness of an educational approach on ergonomic interventions for preventing work-related musculoskeletal symptoms.at a tertiary care hospital Belagavi among computer users who are working at the hospital.

A total of 78 participants (39 experimental and 39 control)wereparticipants are selected through purposive samplingtechnique and by using a true experimental research design with a pre-test, post-test control group.

Regularly use Computer workers who report work -related upper extremity symptoms, and Willing to take part in training program are included those with pre-existing or severe musculoskeletal disorders like Rheumatoid Arthritis, Osteomyelitis are excluded.

Data were collected using a structured socio-demographic proforma and the standardized Nordic Musclo-skeletal Questionnaire scale (NMQ), Visual Analogue Scale (VAS) and Knowledge assessment questionnaires for ergonomic intervention guide.Ethical clearance was obtained prior to the studt, and informed consent was secured from all participants. Ergomomic knowledge was assessed at baseline using the tools.

The pre-test was conducted to assess computer users' existing knowledge regarding ergonomics using a structured knowledge assessment questionnaire and related tools. Following this, an ergonomic intervention guide was implemented among the participants. After a period of seven days, a post-test was administered using the same structured questionnaire and tools to evaluate changes in knowledge and outcomes. The collected data were systematically organized, tabulated, and analyzed for interpretation. Data analysis involved descriptive statistics and inferential tests such as the Shapiro-Wilk test, Wilcoxon signed-rank test, Mann–Whitney U test, test to determine the significance of findings.

RESULT:

Table:1 Equivelance of Experiment group and Control group with demographic characteristics

Demographic characteristics	Experiment group	%	Control group	%	Total	%	Chi-square	p-value
Age groups								
20-29 years	14	35.90	15	38.46	29	37.18	0.8680	0.8330
30-39 years	15	38.46	12	30.77	27	34.62		
40-49 years	7	17.95	7	17.95	14	17.95		
>=50 years	3	7.69	5	12.82	8	10.26		
Gender								
Male	6	15.38	5	12.82	11	14.10	0.1060	0.7450
Female	33	84.62	34	87.18	67	85.90		
Marital status								
Married	10	25.64	10	25.64	20	25.64	0.0000	1.0000
Single	29	74.36	29	74.36	58	74.36		
Years of experience in current job								
1-5 years	13	33.33	12	30.77	25	32.05	1.5810	0.4540
6-10 years	15	38.46	11	28.21	26	33.33		
> 10 years	11	28.21	16	41.03	27	34.62		
Breaks taken during computer work								
Irregular breaks	27	69.23	25	64.10	52	66.67	0.2310	0.6310
No breaks	12	30.77	14	35.90	26	33.33		
Workstation Setup								
Ergonomically arranged	7	17.95	6	15.38	13	16.67	0.2820	0.8680
Not ergonomically arranged	22	56.41	21	53.85	43	55.13		
Not sure	10	25.64	12	30.77	22	28.21		
Total	39	100.00	39	100.00	78	100.00		

The age distribution was comparable between the Experiment group and Control group. In the Experiment group, 14 participants (35.90%) were aged 20-29 years, 15 (38.46%) were aged 30-39 years, 7 (17.95%) were aged 40-49 years, and 3 (7.69%) were aged 50 years or above. In the Control group, 15 (38.46%) were aged 20-29 years, 12 (30.77%) were aged 30-39 years, 7 (17.95%) were aged 40-49 years, and 5 (12.82%) were aged 50 years or above. The chi-square test yielded a value of 0.8680 with a p-value of 0.8330, indicating no statistically significant difference between the two groups.

The gender distribution was similar across both groups. In the Experiment group, 6 participants (15.38%) were male and 33 (84.62%) were female. In the Control group, 5 (12.82%) were male and 34 (87.18%) were female. The chi-square test yielded a value of 0.1060 with a p-value of 0.7450, indicating no statistically significant difference between the two groups.

The marital status distribution was identical across both groups. In the Experiment group, 10 participants

(25.64%) were married and 29 (74.36%) were single. In the Control group, 10 (25.64%) were married and 29 (74.36%) were single. The chi-square test yielded a value of 0.0000 with a p-value of 1.0000, confirming perfect comparability between the two groups on this characteristic.

The distribution of work experience was comparable between the two groups. In the Experiment group, 13 participants (33.33%) had 1-5 years of experience, 15 (38.46%) had 6-10 years, and 11 (28.21%) had more than 10 years. In the Control group, 12 (30.77%) had 1-5 years, 11 (28.21%) had 6-10 years, and 16 (41.03%) had more than 10 years. Although the Control group had a slightly higher proportion of participants with over 10 years of experience (16, 41.03%), the chi-square test yielded a value of 1.5810 with a p-value of 0.4540, indicating no statistically significant difference between the two groups.

The pattern of break-taking was similar across both groups. In the Experiment group, 27 participants (69.23%) reported taking irregular breaks and 12 (30.77%) reported taking no breaks. In the Control group, 25 (64.10%) reported taking irregular breaks and 14 (35.90%) reported taking no breaks. No participants in either group reported taking regular breaks. The chi-square test yielded a value of 0.2310 with a p-value of 0.6310, indicating no statistically significant difference between the two groups.

The distribution of workstation ergonomics was comparable across both groups. In the Experiment group, 7 participants (17.95%) reported their workstation was ergonomically arranged, 22 (56.41%) reported it was not ergonomically arranged, and 10 (25.64%) were not sure. In the Control group, 6 (15.38%) reported it was ergonomically arranged, 21 (53.85%) reported it was not ergonomically arranged, and 12 (30.77%) were not sure. The chi-square test yielded a value of 0.2820 with a p-value of 0.8680, indicating no statistically significant difference between the two groups.

Table:2 Comparison of study group and non-study group with pretest and posttest levels of knowledge.

Levels of knowledge	Experiment group	%	Control groups	%	Total	%	Chi-square	p-value
Pre-test levels								
<=50%	19	48.72	27	69.23	46	58.97	3.3910	0.0660
>50%	20	51.28	12	30.77	32	41.03		
Post-test levels								
<=50%	0	0.00	26	66.67	26	33.33	39.0000	0.0001*
>50%	39	100.00	13	33.33	52	66.67		
Total	39	100.00	39	100.00	78	100.00		

*p<0.05

Table:3 : Normality of pretest and posttest scores of all variables in two groups by Shapiro-Wilk test.

Variables	Time points	Group	Shapiro-Wilk	df	P-value
Symptoms in last 7 days	Pretest	Experiment group	0.9030	39	0.0030*
		Control group	0.8060	39	0.0001*
	Posttest	Experiment group	0.8900	39	0.0010*
		Control group	0.8650	39	0.0001*
	Difference	Experiment group	0.7890	39	0.0001*
		Control group	0.5410	39	0.0001*
Activity limitation due to pain	Pretest	Experiment group	0.8820	39	0.0010*
		Control group	0.8630	39	0.0001*
	Posttest	Experiment group	0.8270	39	0.0001*
		Control group	0.8850	39	0.0010*
	Difference	Experiment group	0.8250	39	0.0001*
		Control group	0.6820	39	0.0001*
VAS	Pretest	Experiment group	0.9440	39	0.0510
		Control group	0.9390	39	0.0370*
	Posttest	Experiment group	0.8590	39	0.0001*
		Control group	0.9440	39	0.0500*
	Difference	Experiment group	0.7440	39	0.0001*
		Control group	0.3690	39	0.0001*
Knowledge	Pretest	Experiment group	0.8630	39	0.0001*
		Control group	0.8930	39	0.0010*
	Posttest	Experiment group	0.8500	39	0.0001*
		Control group	0.9170	39	0.0070*
	Difference	Experiment group	0.9360	39	0.0280*
		Control group	0.4600	39	0.0001*

*p<0.05
Note that, the pretest and posttest scores of all variables in two groups by Shapiro-Wilk test not follow normal distribution. Therefore, the non-parametric tests were applied.

Table:4 Comparison of Experiment group and Control group with pretest and posttest scores of Symptoms in last 7 days by Mann-Whitney U test

Time points	Experiment group				Control group				U-value	Z-value	P-value
	Mean	SD	Median	Mean rank	Mean	SD	Median	Mean rank			
Pretest	3.33	1.08	3.00	35.40	3.64	1.31	4.00	43.60	600.5	-1.5939	0.1109
Posttest	2.33	1.38	2.00	29.94	3.59	1.35	4.00	49.06	387.5	-3.7225	0.0002*
Difference	1.00	0.65	1.00	53.62	0.05	0.39	0.00	25.38	210.0	5.4964	0.0001*

*p<0.05

The analysis compares an Experiment group and a Control group across three time points using the Mann-Whitney U test.
At pretest, the groups were statistically equivalent, with the Experiment group showing a mean of scores of Symptoms in last 7 days is 3.33 (SD = 1.08, median = 3.00) and the Control group a mean of scores of Symptoms in last 7 days is 3.64 (SD = 1.31, median = 4.00). The p-value of 0.1109 indicates no significant baseline difference between Experiment group and Control group.

At posttest, a significant divergence emerged. The Experiment group's scores dropped to a mean of scores of Symptoms in last 7 days is 2.33 (SD = 1.38, median = 2.00), while the Control group remained stable at a mean of scores of Symptoms in last 7 days is 3.59 (SD = 1.35, median = 4.00). The p-value of 0.0002 reflects a statistically significant difference between the groups; with the Experiment groups lower mean rank (29.94 vs. 49.06) indicating consistently lower scores following the intervention.

The Experiment group demonstrated a substantial mean change in Symptoms in last 7 days of 1.00 (SD = 0.65, median = 1.00), whereas the Control group showed virtually no change, in Symptoms in last 7 days with a mean of 0.05 (SD = 0.39, median = 0.00). The p-value of 0.0001, the lowest in the table, confirms a highly significant difference in the amount of change between groups. It means that, the change in scores of Symptoms in last 7 days is significantly higher in Experiment group as compared to Control group.

Table:5 Resemblance of pretest and posttest scores of Symptoms in last 7 days in Experimental group and Compaired group by Wilcoxon matched pairs test

Group		Mean	SD	Mean Diff.	SD Diff.	% of change	Z-value	P-value
Experiment group	Pretest	3.33	1.08					
	Posttest	2.33	1.38	1.00	0.65	30.00	4.8599	0.0001*
Control group	Pretest	3.64	1.31					
	Posttest	3.59	1.35	0.05	0.39	1.41	0.7338	0.4631

*p<0.05

The Wilcoxon matched-pairs test was used to evaluate changes in symptoms within each group from pretest to posttest.

In the Experiment group, the mean score decreased from 3.33 (SD = 1.08, median = 3.00) at pretest to 2.33 (SD = 1.38, median = 2.00) at posttest, yielding a mean difference of 1.00 (SD = 0.65) and a 30.00% reduction. This change was highly significant, with a Z-value of 4.8599 and a p-value of 0.0001.

In the Control group showed virtually no change, with mean scores of 3.64 (SD = 1.31, median = 4.00) at pretest and 3.59 (SD = 1.35, median = 4.00) at posttest, resulting in a mean difference of only 0.05 (SD = 0.39) and a 1.41% reduction. The Wilcoxon test confirmed this change was not statistically significant (Z = 0.7338, p = 0.4631). Collectively, these results indicate that the intervention led to a significant reduction in symptoms within the Experiment group, while the Control group remained stable over time, confirming the effectiveness of the intervention.

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Table:6 Linkness between program group and routine group with pretest and posttest scores of Activity limitation due to pain by Mann-Whitney U test

Time points	Experiment group				Control group				U-value	Z-value	P-value
	Mean	SD	Median	Mean rank	Mean	SD	Median	Mean rank			
Pretest	2.10	0.97	2.00	35.23	2.41	1.12	3.00	43.77	594.0	-1.6589	0.0971
Posttest	0.90	0.85	1.00	26.64	2.38	1.18	3.00	52.36	259.0	-5.0067	0.0001*
Difference	1.21	0.70	1.00	54.60	0.03	0.63	0.00	24.40	171.5	5.8811	0.0001*

Table:7 Equlance between pretest and posttest scores of Activity limitation due to pain in both the group by Wilcoxon matched pairs test

Group	Time point	Mean	SD	Mean Diff.	SD Diff.	% of change	Z-value	P-value
Experiment group	Pretest	2.10	0.97					
	Post-test	0.90	0.85	1.21	0.70	57.32	5.0862	0.0001*
Control group	Pretest	2.41	1.12					
	Post-test	2.38	1.18	0.03	0.63	1.06	0.2369	0.8127

*p < 0.05

Table:8 similitude of study group and referance group with pretest and posttest scores of VAS by Mann-Whitney U test

Time points	Experiment group				Control group				U-value	Z-value	P-value
	Mean	SD	Median	Mean rank	Mean	SD	Median	Mean rank			
Pretest	4.33	1.71	4.00	38.63	4.46	1.67	4.00	40.37	726.5	-0.3348	0.7378
Posttest	2.28	1.49	2.00	26.77	4.44	1.68	4.00	52.23	264.0	-4.9567	0.0001*
Difference	2.05	0.76	2.00	58.77	0.03	0.28	0.00	20.23	9.0	7.5050	0.0001*

*p<0.05

Table:9 Pretest and posttest scores of VAS by Wilcoxon matched pairs test

Group	Time point	Mean	SD	Mean Diff.	SD Diff.	% of change	Z-value	P-value
Experiment group	Pretest	4.33	1.71					
	Posttest	2.28	1.49	2.05	0.76	47.34	5.4424	0.0001*
Control group	Pretest	4.46	1.67					
	Posttest	4.44	1.68	0.03	0.28	0.57	0.5345	0.5930

*p < 0.05

Table:10 comparability of Experimental group and non- Experimental group with pretest and posttest scores of Knowledge by Mann-Whitney U test

Time points	Experiment group				Control group				U-value	Z-value	P-value
	Mean	SD	Median	Mean rank	Mean	SD	Median	Mean rank			
Pretest	7.77	1.65	9.00	43.76	7.21	1.88	7.00	35.24	594.5	1.6539	0.0981
Posttest	15.51	0.82	16.0	59.00	7.67	2.09	8.00	20.00	0.0	7.5950	0.0001*
Difference	7.74	1.96	7.00	58.05	0.74	1.89	0.00	20.95	37.0	7.2252	0.0001*

*p<0.05

Table:11 Comparison of pretest and posttest scores of VAS in both the groups by Wilcoxon matched pairs test

Group	Time point	Mean	SD	Mean Diff.	SD Diff.	% of change	Z-value	P-value
Experiment group	Pretest	7.77	1.65					
	Posttest	15.51	0.82	-7.74	1.96	-99.67	5.4424	0.0001*
Control group	Pretest	7.21	1.88					
	Posttest	7.67	2.09	-0.46	0.85	-6.41	3.0386	0.0024*

*p < 0.05

DISCUSSION:

The current study used a true experimental design with an experimental and control group to evaluate the impact of the ergonomic intervention on symptoms during the previous seven days, activity limitation due to pain, pain severity (VAS), and participant knowledge.

Baseline Characteristics and Pre-Intervention Findings:

The current study showed that all baseline factors, including as age, gender, marital status, job experience, break patterns, and workstation configuration, were comparable across the experimental and control groups. Prior to intervention, all comparisons produced non-significant p-values ($p > 0.05$), demonstrating group homogeneity. This baseline equivalency increases the study's internal validity and reduces selection bias.

Comparability across groups was also guaranteed by stringent inclusion criteria and randomization in earlier research, including randomized trials compiled in the Cochrane review by Victor Cw Hoe et al. As a result, both the present and earlier research provide a solid basis for assessing the effectiveness of interventions.[8]

Effect of Ergonomic Intervention Guide:
The intervention in the present study resulted in statistically significant improvements across multiple outcomes:

- **Symptoms (last 7 days):** Significant reduction ($p = 0.0001$)
- **Pain (VAS):** 47.34% reduction ($p = 0.0001$)
- **Activity limitation:** Marked decrease ($p = 0.0001$)
- **Knowledge:** Substantial improvement, with all participants achieving >50% post-test scores

In contrast, the control group showed minimal or no change across these variables.
Prior research, including Lee et al., found improvements in musculoskeletal discomfort, although not in all anatomical sites, especially in the neck, shoulder, upper back, and wrist regions. Furthermore, only a few therapies (such as arm supports in conjunction with other mouse gadgets) showed moderate improvements, according to the Cochrane review's contradictory result. Therefore, in comparison to previous research, the new study shows a wider and more consistent benefit of ergonomic intervention.[9]

Interpretation and Mechanism of Findings:
The combination of the intervention's educational and physical components may account for the favourable results seen in this study:

Biomechanical correction: Better posture and workstation alignment probably lessened the strain on the upper limb and neck tissues.

Reduction of muscle load: Ergonomic modifications may have reduced static loading and repetitive tension.
Modification of behaviour: Better work habits were promoted by increased awareness and understanding.
This study's addition of an educational component appears to have improved adherence and effectiveness, in contrast to studies that only focus on equipment change. This is consistent with the idea that ergonomic interventions work better when they address both cognitive and physical aspects.

Comparison with Previous Studies
The results of this study show larger overall effects but are only partially compatible with previous research. This study confirms that ergonomic treatments might lessen musculoskeletal discomfort, much like Lee et al.[9] However, the new study demonstrates substantial gains across all outcomes, in contrast to earlier studies that revealed selective or small improvements. This analysis offers stronger and more comprehensive support for ergonomic solutions than the Cochrane review by Victor Cw Hoe et al[8]., which emphasised conflicting findings.

The inclusion of knowledge assessment, which demonstrated significant improvement and may account for the higher effectiveness seen, is a crucial differentiator of the current study.

The study has significant ramifications for occupational and clinical health practice. It implies that putting such changes into practice can be an easy, affordable, and non-invasive way to boost productivity, lessen discomfort, and improve worker health. However, the study's shortcomings, such as its small sample size and population-specific focus, may hinder its generalisability. To further validate the results, larger sample sizes, longer follow-up times, and comparisons with alternative therapies are advised for future research.

CONCLUSION:

According to the current study, office workers' musculoskeletal complaints, pain severity, and activity constraint can all be significantly reduced with a planned ergonomic intervention program. Furthermore, it greatly increases understanding of ergonomic techniques.

All outcome indicators showed persistent improvements, and the intervention clearly outperformed no intervention.

REFERENCE

1. Workplace Wellness: The Importance of Ergonomic Practices [Internet]. Corporatewellnessmagazine.com. 2024. Available from: https://www.corporatewellnessmagazine.com/article/workplace-wellness-the-importance-of-ergonomic-practices
2. Edwards C, Nyemkuna Fortingo, Franklin E. Ergonomics [Internet]. Nih.gov. StatPearls Publishing; 2024. Available from: https://www.ncbi.nlm.nih.gov/books/NBK580551/?utm
3. Cabrera R. 6 Long-Term Health Effects of Bad Ergonomics [Internet]. Lofty Furniture. 2025. Available from: https://loftyfurniture.com/blog/effects-of-bad-ergonomics/
4. World Health Organization. Musculoskeletal health [Internet]. World Health Organization. 2022. Available from: https://www.who.int/news-room/fact-sheets/detail/musculoskeletal-conditions
5. Demissie B, Bayih ET, Demmelash AA. A systematic review of work-related musculoskeletal disorders and risk factors among computer users. Heliyon [Internet]. 2024 Feb 15;10(3):e25075.
6. Princeton University. Ergonomics & Computer Use | University Health Services [Internet]. Princeton.edu. 2019. Available from: https://uhs.princeton.edu/health-resources/ergonomics-computer-use
7. Shariat A, Cleland JA, Danaee M, Kargarfard M, Sangelaji B, Tamrin SBM. Effects of stretching exercise training and ergonomic modifications on musculoskeletal discomforts of office workers: a randomized controlled trial. Brazilian Journal of Physical Therapy [Internet]. 2018 Mar;22(2):144–53. Available from: https://www.sciencedirect.com/science/article/pii/S1413355517304148?via%3Dihub
8. Hoe VC, Urquhart DM, Kelsall HL, Sim MR. Ergonomic design and training for preventing work-related musculoskeletal disorders of the upper limb and neck in adults. Cochrane Database of Systematic Reviews. 2012 Aug 15;
9. LEE S, De BARROS FC, De CASTRO CSM, SATO T de O. Effect of an ergonomic intervention involving workstation adjustments on musculoskeletal pain in office workers—a randomized controlled clinical trial. Industrial Health [Internet]. 2020 Nov 28;59(2). Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC8010160/