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A study on efficacy of an ergonomic intervention programme on pain and disability among computer users

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Abstract
Aim: To evaluate the effects of an ergonomic intervention in musculoskeletal disorders in computer users.
Objective: To determine the effectiveness ofan ergonomic intervention on pain and disability among computer users
Materials: Inch tape Goniometer.
Methodology: 40 Patients with musculoskeletal disorders were selected based on the inclusion and exclusion criteria and subjects were then allocated into two groups group A and group B. Group A (n=20) will receive ergonomic advices and relaxation exercise Group B (n=20) will be advised to take hot packs for 15 to 20 minutes.
Outcome Measures: Cornell musculoskeletal discomfort questionnaire, Numerical Pain Rating Scale.
Statistical Analysis: The collected data was tabulated and analyzed using inferential statistics to assess all the parameters mean and standard deviation was used. To find out significant changes within the group of pre and post-test by unpaired t-test was used.
Results: Statistical Analysis of post-test, Cornell Musculoskeletal Discomfort Questionnaire (CMDQ) and Numerical Pain Rating Scale (NPRS) revealed that there is highly statistically significant difference seen in group A than group B.
Conclusion: This study concluded that ergonomic intervention can be incorporated for pain and disability which is more effective.

Keywords: ergonomic, pain, disability, computer users

Introduction

Musculoskeletal disorders (MSDs), Repetitive strain injury (RSI), are commonly reported by computer users worldwide, and these disorders can have detrimental effects on workers' health and productivity. Factors that predict the risk of developing Musculoskeletal disorders can be divided into individual, ergonomic, and psychosocial factors. The risk of developing is Musculoskeletal disorders among workers who have a high work strain, longer mouse and keyboard use, perceived high muscle tension, and previous Musculoskeletal disorders in the neck and shoulder.

This syndrome is characterized by disturbance in the balance between the load and physical capacity, preceded by activities that involve repeated movements or prolonged periods spent with one or more of the relevant body parts in a fixed position as one of the presumed etiological factors. In a work setting, ergonomics education/training is the best initial strategy to educate about computer ergonomics

Ergonomics is the 'science of work' and it is devoted to maximizing human performance without causing injuries or detrimentally affecting performance The work related portion of the injuries and resulting disability is potentially preventable. There are many approaches to intervening in the work place to reduce initial incidence and disability. For example work station design changes, employee training, wrist splints and back belts, job rotation and relaxation exercises.

Preliminary results of our ongoing study over 35,000 Indian IT professionals (2001-2009) found that 75% reported musculoskeletal symptoms related to work 55% got injured within a year of starting their first job. The average age of patients who developed Repetitive Strain Injury (RSI) was 27 years.

The purpose of any ergonomic intervention can be to improve worker comfort, safety and productivity of computer users with symptoms of MSDs. No intervention is associated with negative effects.

Background and Purpose

Musculoskeletal disorders are commonly reported among computer users. This study explored whether these disorders can be reduced by the provision of ergonomic intervention. It has been proposed as a conservative, noninvasive, and cost effective intervention to treat musculoskeletal disorders as it functions to correct the cause of repetitive micro traumas due to office work by adjusting posture, workstations design, and product selection. Lowering the physical exposure through ergonomic intervention is the traditional strategy to increase the work comfort in computer users.

Objective

- To determine the effectiveness of ergonomic intervention programme to reduce pain and disability among computer users.

Hypothesis

Aternative Hypothesis

There will be beneficial effect of ergonomic intervention among computer users

Methodology

Study design
Experimental study

Reference & Source population
This study was conducted with the computer users in Saveetha University, Chennai –602105, according to the inclusion and exclusion criteria

Sampling Technique
Convenient sampling technique

Sample size
40 individuals with musculoskeletal disorder.

Inclusion Criteria
- Age group – 25 to 45 years
- Both males and females
- Using computer for at least 4 to 5 hours per day intermittent/continuous
- Prolonged sitting position in office

Exclusion Criteria
- Pregnant women
- Persons with rheumatoid arthritis
- Ankylosing spondylitis
- Malignancy
- Vertebro basilar insufficiency
- Fractures or dislocation
- Recent undergone surgery
- Acute inflammatory condition
- Infection

Materials
1. Goniometry
2. Inch tape

Procedure
40 individuals with musculoskeletal disorder will be selected based on inclusion and exclusion criteria. Detailed procedure will be explained in patient's words and informed consent will be obtained from all the participants. Subjects will be assessed for presence of musculoskeletal disorders affecting various body regions. The participants asked to fill the questionnaires form about musculoskeletal symptoms and intensity or severity of pain experienced

Pain will be measured in Numerical Pain Rating Scale (NPRS) and disability in Cornell Musculoskeletal Discomfort Questionnaires (CMDQ) the subjects were then allocated into two groups group A and group B

Exercise Prescription
Group A: (n=20)

Ergonomic intervention advices
- chair design: Fully adjustable with lumbar support of the back
- chair height: Hip slightly more than 90 degrees, feet on the floor
- Take breaks every 30 minutes
- Posture correction

Relaxation exercises

Alexander technique as an education or guidance system to improve posture and movement and to use muscle efficiently
- Neck free
- Head forward and up
- Back lengthen
- Keeping length
- Back widen
- Shoulder release and widen
- changing posture
- relaxed breathing

Group B: (n=20)

Subjects in group B were just asked to take hot packs for 15 – 20 minutes at night

Treatment Protocol
Sets: 3 sets
Repetitions: 5reps
Frequency: 5 days/week for 4 weeks
Rest time: 30 seconds between each set

Outcome Measures
- Numerical pain rating scale (NPRS)
- Cornell musculoskeletal discomfort questionnaire (CMDQ)

Statistical Analysis
The collected data was tabulated and analyzed using inferential statistics to assess all the parameters mean and standard deviation was used. To find out significant changes within the group of pre and post-test by unpaired t-test was used.

Table 1: Pre and post-test values of NPRS for both group A and group B

S. No	Statistical measurement	Pre Test – NPRS		Post Test - NPRS		t- value	p- value
		Mean	SD	Mean	SD		
1	Group A	8.25	1.11	0.5	0.51	20.49	<0.0001
2	Group B	8.1	1.07	5.2	0.89		

The above table reveals that pre- test and post -test values of numerical pain rating scale for both group A and group B.

The unpaired t-value (20.49) shows that there is extremely statistically significant change at $p<0.001$ over the study using numerical pain rating scale.

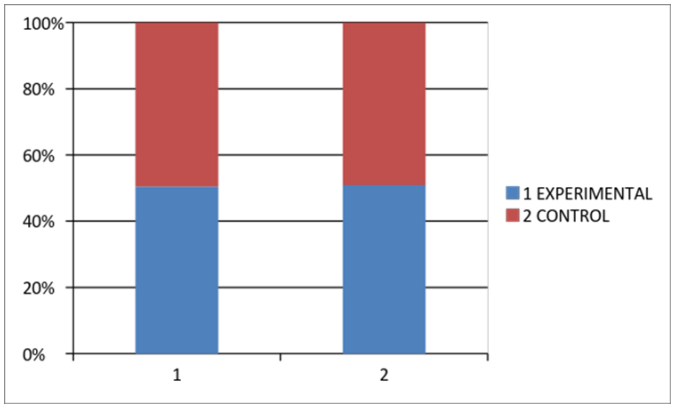

Fig 1: Graph showing pretest NPRS Score

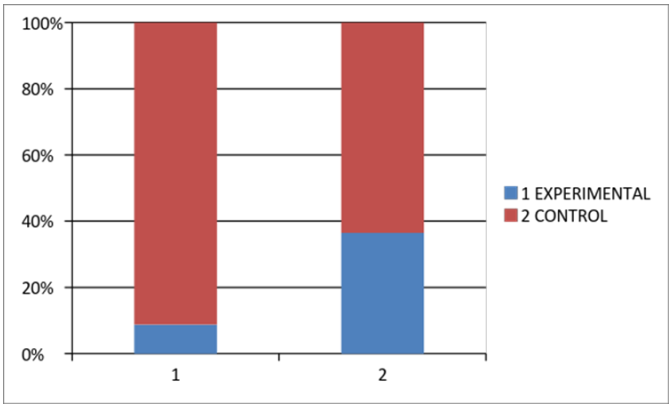

Fig 2: Graph showing post test NPRS score values

Table 2: Pre and post-test values of CMDQ for both group A and B

No	Statistical measurement	Pre Test -CMDQ		Post Test CMDQ		t- value	p- value
		Mean	SD	Mean	SD		
1	Group A	16.25	3.09	6.8	1.10	10.9156	<0.0001
2	Group B	16.95	2.39	12.5	2.06		

The above table reveals that pre test and post test values of Cornell Musculoskeletal Discomfort Questionnaire for both group A and group B.

The unpaired t-value (10.9156) shows that there is extremely statistically significant change at p<0.001 over the study using Cornell Musculoskeletal Discomfort Questionnaire.

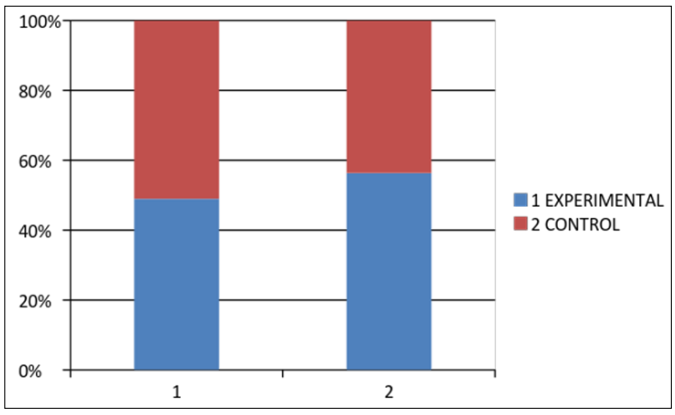

Fig 3: Graph showing pre test CMDQ score

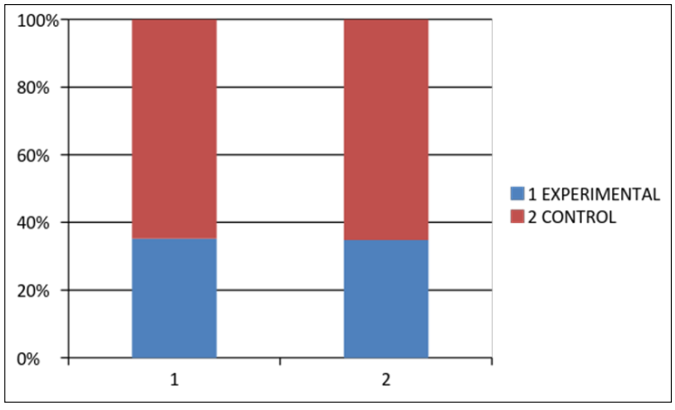

Fig 4: Graph showing post test CMDQ score

Results

From statistical analysis made with the quantitative data revealed extremely statistically significant difference between the Group A and Group B and also within the group. The post test mean value of Numerical Pain Rating Scale (NPRS) scale in Group A is 0.5and in group B is 5.2. The post test mean value of Cornell Musculoskeletal Discomfort Questionnaire (CMDQ) scale in Group A is 6.8 and in group B 12.5. This shows that NPRS and CMDQ in group A were improving than group B, P<0.001.

Statistical Analysis of post-test, (NPRS) Numerical Pain Rating Scale and (CMDQ) Cornell Musculoskeletal Discomfort Questionnaire revealed that there is high statistically significant difference seen in group A than group B.

Discussion

Musculoskeletal disorders (MSDs), Repetitive strain injury (RSI), are commonly reported by computer users worldwide. The risk of developing is Musculoskeletal disorders among workers who have a high work strain, longer mouse and keyboard use, perceived high muscle tension, and previous MSDs in the neck and shoulder. Ergonomics is the 'science of work' and it is devoted to maximizing human performance without causing injuries or detrimentally affecting performance.

The aim of this study was to determine the effectiveness of an ergonomic intervention programme to reduce pain and disability among computer users.40 individuals with musculoskeletal disorder will be selected based on inclusion and exclusion criteria. Group allocation will be conveniently divided into two groups: Group A (n=20) will receive ergonomic intervention and relaxation exercise and Group B (n=20) were just asked to take hot packs for 15 – 20 minutes at night for a period of 4 weeks.

In the present study the subjects were chosen from age group 25 to 45 years. The data obtained from the study was

statistically analyzed using unpaired t test. The result of the study revealed that there was decrease in pain by NPRS Numerical pain rating scale and an improvement of CMDQ Cornell musculoskeletal discomfort questionnaire scores in both group A and B after the respective protocol

Hence, the result of this study proves that, there is a beneficial effect of ergonomic intervention in pain and disability among computer users.

Limitations

1. Small sample size.
2. Ergonomically modified set up workstation.
3. Muscle power should be assessed with Electromyographic analysis.

Future recommendations

1. A study with large sample size is recommended
2. Implement an ongoing training program to enable each to be aware of the relevant factors concerning musculoskeletal disorders. Workers should be given education about the types of the work related musculoskeletal disorders and causes of these disorders.

Conclusion

It was found that group receiving self-relaxation exercises and ergonomic advice showed better carry over effect during treatment phase and more during follow up phase as compared to group receiving conventional management alone. Thus, the findings of this study suggest that ergonomic intervention can be incorporated for pain and disability is more effective than conventional management alone. These results not only provide important information to the workers who use a computer frequently, but also deeply interpret the causes of musculoskeletal disorders. It is hoped to determine proper improvement ways to eliminate these key risk factors and then to prevent from occupational injuries. This study was done to prove the effectiveness of ergonomic intervention to reduce the pain and disability and improve the health for computer users.

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