



## Effectiveness of ergonomics training on work related musculoskeletal disorders among rubber tappers at Kanniyakumari District

Mrs. Anbumalar. J, M.Sc (N), Dr. Shanthi, PhD (N), Dr. Arzta Sophiya, PhD (N)

Ph.D Scholar, Rani Meyyammai College of Nursing, Chitambaram, Annamalai University, Tamilnadu.

Email id: [anbumalar04@gmail.com](mailto:anbumalar04@gmail.com) Mob: 948686903

Lecturer, Govt. College of Nursing, Cuddalore, Chidambaram, The Tamilnadu Dr MGR medical university

Email id: s. [shanthivenkat@gmail.com](mailto:shanthivenkat@gmail.com) mob-9080693561.

Associate Professor, Christian College of nursing, Neyyoor, The Tamilnadu Dr MGR medical university

Volume 6, Issue 15, Sep 2024

Received: 15 July 2024

Accepted: 25 Aug 2024

Published: 05 Sep 2024

[doi: 10.48047/AFJBS.6.15.2024.1584-1590](https://doi.org/10.48047/AFJBS.6.15.2024.1584-1590)

### **Abstract**

**Background:** Rubber tapping causes various health problems among rubber tapping workers. It varies from simple musculoskeletal aches to more serious and complicated structural damage to bone, muscles, tendons and nerves of musculoskeletal system. The present study was conducted in rubber tapping workers in Kanyakumari District. Work-related musculoskeletal disorders are major causes of absenteeism, increased costs, and human injuries among computer users. This study aimed to examine the effects of ergonomics training and corrective exercises on musculoskeletal disorders among rubber tapping workers.

**Material and Methods:** This preexperimental study was conducted among 30 rubber tapping workers who participated in training programs, including correct sitting postures, workplace layouts, and corrective exercises. For this purpose, training programs and corrective exercises were employed in four one-hour sessions in one week and 16 one-hour sessions in eight weeks.

**Results:** Musculoskeletal disorder prevalence, postures, and workplace layouts were assessed using the modified Nordic Questionnaire and a researcher-made checklist. Accordingly, the highest prevalence was observed among rubber tappers its observed that in the lower back 14 (46.67%), neck 04 (26.67%), and knees 10 (66.67%), and others 02 (13.33%) in pre test. Whereas in post test its observed that in the lower back 06 (20%), neck 01 (6.67%), and knees 4 (26.67%), others 02 (6.67%) and 17 (56.67) have no marked Muscular skeletal Disorders. Differences in the rates of proper postures and workplace layouts were statistically significant before and after the ergonomic training so that 81.25% of postures and 47.8% of workplace layouts were improved. The results showed that training programs on ergonomics principles and corrective movements reduced musculoskeletal disorders among rubber tapping workers within the range of 10.5 to 52.6%.

**Conclusions:** Increasing employee awareness of appropriate postures, workplace layouts, and corrective movements effectively reduced musculoskeletal disorders in rubber tapping workers.

**Keywords:** Training, Ergonomics, Exercise, Posture, rubber tapping workers, Musculoskeletal.

## **Introduction**

Musculoskeletal disorders (MSDs) are globally responsible for deterioration in the quality of work, disability and distress among the workers and also pose a social as well as work related burden. Prevalence of WRMDs varies between 30-80% based on the recent global estimate given by the world health organisation (WHO). Musculoskeletal disorders were found out to be a significant problem according to the studies conducted in developed countries like United States, Netherland and United Kingdom as MSD leads to loss of work time and also result in notable disability.

Ergonomics is the science that deals with assessing an individual's efficiency in a working environment and it concentrates on placing a right person in a right job. Disorders of muscles, skeleton, and related tissue, which have been empirically shown or suspected to have been caused by workplace activity was the definition of work- related musculoskeletal disorders (WRMDs) given by occupational health safety associations (OSHA). WRMDs are also known as cumulative trauma disorders (CTDs) or repetitive strain injuries (RSIs) as the joint, muscles, tendons and nerves are affected due to repetitive stress on them for longer duration.

## **Need for the study**

Among the rubber tappers workers, Musculoskeletal disorders (MSD) are injuries or dysfunctions affecting muscles, bones, nerves, tendons, ligaments, joints, cartilages and spinal discs. MSD include sprains, strains, tears and connective tissue injuries, several interventions are proposed to reduce work-related MSD rates, including work adjustments, re-engineering type modifications, and training in ergonomic principles, exercise pro- grams and smoking cessation campaigns. There is some evidence for Isometric and Isotonic Training in reducing work-related MSD.

## **Objectives of the Study**

- To assess the musculoskeletal disorders among Rubber tappers before and after the ergonomics training at Kanyakumari district.
- To find out the effectiveness of ergonomics training on work related musculoskeletal disorders among rubber tappers residing at kanyakumari District.
- To associate the post test work related musculoskeletal disorders with the selected demographic variables.

## **Hypotheses**

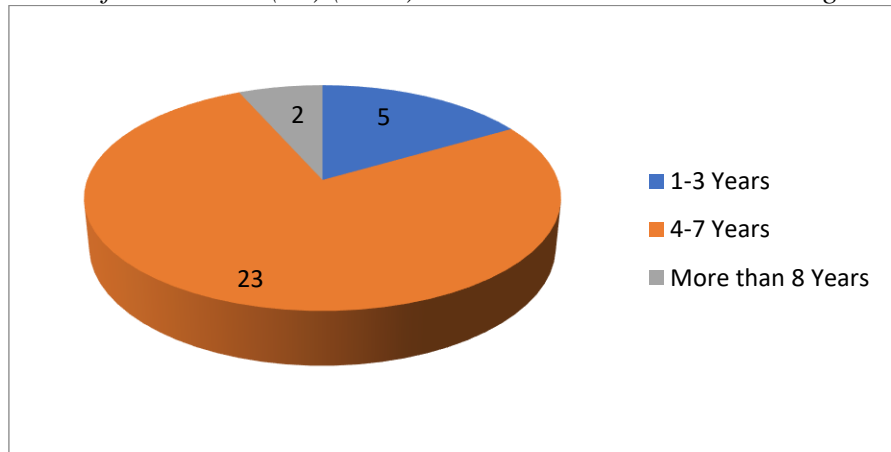
H1 - There is a significant difference between pre test and post test work related musculoskeletal disorders among the rubber tappers workers receiving ergonomics training.

**Methods and Data collection**

This study is a preexperimental research design with one group pre-test and post-test, The study was conducted using the Purposive sampling method. The statistical population of the study consisted of 30 rubber tappers workers. Participants were selected based on the following inclusion criteria: minimum one year of rubber tapping work, Have history of muscular skeletal Problems. The exclusion criteria were as follows: history of femur, leg and knee fracture, severe ligaments damages, osteoarthritis, previous knee surgery, patella tendon injuries, lumbar spine injuries. A week before the study, participants were briefed on the exercise protocol and completed the consent forms. Pre test was conducted using Nordic Questionnaire and a researcher-made checklist. Their demographic characteristics were measured at the same time. Ergonomics training exercises were administered for a period of 8 weeks, two sessions per week. Given that the highest effect on ergonomics training is 2 to 4 sets, and 10 reps, the program was designed in two four-week phases with the gradual progression difference. The Extensor Muscle Sling exercises are few in number. There are also very few exercises targeting both PFPS and Extensor Muscle Sling. For this reason, most of the research articles on ergonomics training exercises recommend 10 seconds of muscular contraction, duration which has been implemented in our research as well. After 8 weeks of ergonomics training exercises post test was done with the same scales

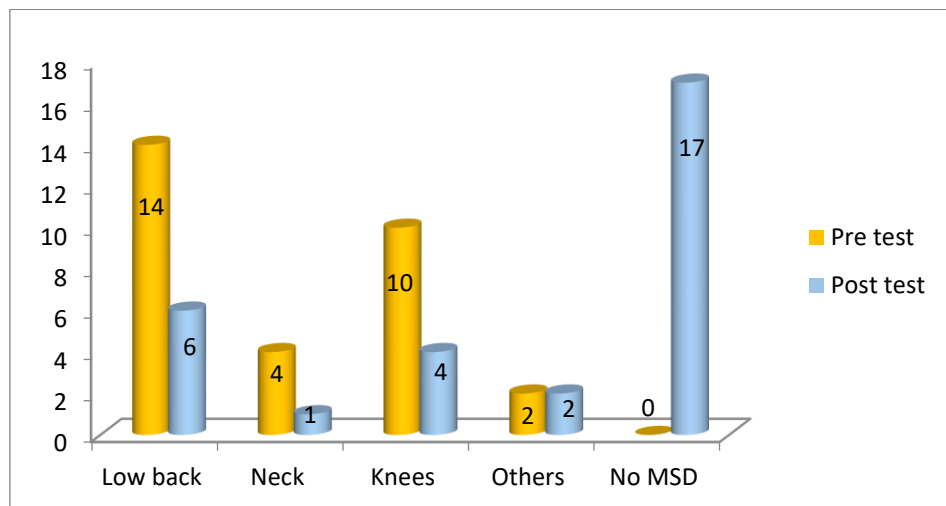
**Statistical Analyses**

Data pertaining to the demographic variables of the respondents of Rubber tappers. According to their age, in experimental group majority of subjects 15(50%) belongs to the age group of 40- 50 years, regarding gender majority 28(93.33%) were male regarding educational status majority of subjects 12(40%) have secondary education, According to habit group majority 12(40%) of them have no habits of smoking, alcoholism, tobacco chewing. Regarding their dietary pattern majority of the subjects 23(77%) were non vegetarians. Regarding their work Experience majority of the subjects 23(77%) were 4 -7 Years.



**Figure: 1 Frequency Distribution of samples according to work experience**

Above diagram describe about Frequency Distribution of samples according to work experience majority of them belongs 23(76.67%) were 4 -7 Years. 5(16.67%) and remaining 2 (6.67%) under the category of 1-3 years Experience.



**Figure 2: Frequency Distribution of work related musculoskeletal disorders among rubber tappers in pre test and post test**

Above diagram describe about the highest prevalence of work related musculoskeletal disorders among rubber tappers its observed that in the lower back 14 (46.67%), neck 04 (13.33%), and knees 10 (33.33%), and others 02 (6.67%) in pre test. Whereas in post test its observed that in the lower back 06 (20%), neck 01 (3.33%), and knees 4 (13.33%), others 02 (6.67%) and 17 (56.67%) have no marked Muscular skeletal Disorders.

**Comparison of pre and post test level of work related musculoskeletal disorders among rubber tappers receiving ergonomics training.**

**Table 1: comparison of mean, standard deviation and unpaired “t” test on pre and post test level of work related musculoskeletal disorders among rubber tappers receiving ergonomics training.** n=30

Variables	Mean	SD	t Value
Pre test	2.24	0.81.	10.13*
Post test	5.38	1.29	

**Significant at  $p \leq 0.05$**

Table represents the comparison of mean, standard deviation and unpaired “t” test on pre and post test level of work related musculoskeletal disorders among rubber tappers receiving ergonomics training. In pre test mean was 2.24 with the standard deviation 0.81. In post test mean score was 5.38 with the standard deviation 1.29. The estimated unpaired “t” test value was 10.13\* which was significant at  $p \leq 0.05$ . It shows that ergonomics training was effective and reduced the level of work related musculoskeletal disorders. Hence the research hypothesis was accepted.

Differences in the rates of proper postures and workplace layouts were statistically significant before and after the ergonomic training so that 81.25% of postures and 47.8% of workplace layouts were improved. The results showed that training programs on ergonomics principles and corrective movements reduced musculoskeletal disorders among rubber tapping workers within the range of 10.5 to 52.6%.

### **Discussion**

The major finding of the study was summarized as follows. Data pertaining to the demographic variables of the respondents of Rubber tappers. According to their age, in experimental group majority of subjects 15(50%) belongs to the age group of 40- 50 years, regarding gender majority 28(93.33%) were male regarding educational status majority of subjects 12(40%) have secondary education, According to habit group majority 12(40%) of them have no habits of smoking, alcoholism, tobacco chewing. Regarding their dietary pattern majority of the subjects 23(77%) were non vegetarians. Regarding their work Experience majority of the subjects 23(77%) were 4 -7 Years.

about the highest prevalence of work related musculoskeletal disorders among rubber tappers its observed that in the lower back 14 (46.67%), neck 04 (13.33%), and knees 10 (33.33%), and others 02 (6.67%) in pre test. Whereas in post test its observed that in the

lower back 06 (20%), neck 01 (3.33%), and knees 4 (13.33%), others 02 (6.67%) and 17 (56.67%) have no marked Muscular skeletal Disorders.

Comparison of mean, standard deviation and unpaired “t” test on pre and post test level of work related musculoskeletal disorders among rubber tappers receiving ergonomics training. In pre test mean was 2.24 with the standard deviation 0.81. In post test mean score was 5.38 with the standard deviation 1.29. The estimated unpaired “t” test value was 10.13\* which was significant at  $p \leq 0.05$ . It shows that ergonomics training was effective and reduced the level of work related musculoskeletal disorders. Hence the research hypothesis was accepted.

Differences in the rates of proper postures and workplace layouts were statistically significant before and after the ergonomic training so that 81.25% of postures and 47.8% of workplace layouts were improved. The results showed that training programs on ergonomics principles and corrective movements reduced musculoskeletal disorders among rubber tapping workers within the range of 10.5 to 52.6%.

## **CONCLUSION**

The study was done to evaluate the effectiveness of ergonomics training on work related musculoskeletal disorders among rubber tappers residing in kanyakumari District. It found that ergonomics training significantly given impact in reducing the level of musculoskeletal disorders among rubber tappers.

## **RECOMMENDATIONS**

The following steps can be undertaken to strengthen the study.

- A study can be conducted among large sample.
- A study can be conducted for the other health related issues.
- A study can conduct as a quasi experimental Study.

## **REFERENCES**

1. Walker-Bone K and Palmer K T (2002), “Musculoskeletal disorders in farmers and farm workers”, *Journal of Occupational Medicine*, Vol. 52, No. 8, pp. 441-450, available at <http://dx.doi.org/10.1093/occmed/52.8.441>.
2. Asyraf C D, Rosnah M Y and Zulkiflle L A (2007), “Preliminary Of Prevalence Of Musculoskeletal Disorders Among Malaysia Rubber Tappers”, *Proceeding of Agriculture Ergonomics Development Conference IEA Press, Kuala Lumpur*.
3. Danwanichakul P, Werathirachot R, Kongkaew C and Loykulnant S (2011), “Coagulation of Skim Natural Rubber Latex Using Chitosan or Polyacrylamide as an Alternative to Sulfuric Acid”, *European Journal of Scientific Research*, Vol. 62, No. 4, pp. 537-547.

4. Kuorinka I, Jonsson B, Kilbom A *et al.* (2007), "Standardized Nordic Questionnaire for the analysis of musculoskeletal symptoms", *Journal of Applied Ergonomic*, Vol. 18, No. 3, pp. 233 -237.
5. Shan C L, Adon M Y B, Rahman A B A, Hassan S T S and Ismail K B (2012), "Prevalence of Neck Pain and Associated Factors with Personal Characteristics, Physical Workloads and Psychosocial among Male Rubber Workers in FELDA Settlement Malaysia", *Global Journal of Health Science*, Vol. 4, No. 1.
6. Lee P, Helewa A, Goldsmith CH, Smythe HA, Stitt LW (2001) Low back pain: prevalence and risk factors in an industrial setting. *J Rheumatol* 28(2): 346-351.
7. Juul-Kristensen B, Jensen C (2005) Self-reported workplace related ergonomic conditions as prognostic factors for musculoskeletal symptoms: the "BIT" follow up study on office workers. *Occup Environ Med* 62(3): 188-194.
8. Andersen JH, Haahr JP, Frost P (2007) Risk factors for more severe regional musculoskeletal symptoms: a two-year prospective study of a general working population. *Arthritis Rheum* 56(4): 1355-1364.