

Effects of Isometric and Isotonic Training on work related musculoskeletal disorders among rubber tappers residing in kanyakumari District.

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ABSTRACT

Background

Isometric and isotonic exercises are important modes of resistance training for enhancement of athletic performance. However, less is known about their effects on fitness and health in recreationally physically active individuals. 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.

Method: A total of 60 participants, all rubber tappers residing in kanyakumari District, with an average age of 30 - 50 years, were divided into control, experimental groups. Eight weeks of isometric and isotonic exercises were recommended to the participants The control group received no specific exercise program. Pre-test and post-test included the use of Stork balance test (SBT) and Pain Scale to assess the static, dynamic balance and pain level respectively. **Results:** After eight weeks of performing separate isometric and isotonic exercises on the lower and upper limbs, and according to the results of the pre-test and posttest a significant Decrease in leg pain level was observed ($P < 0.05$) and reduction in pain level **Conclusion:** isometric and isotonic exercises of lower limbs and upper Limbs showed a significant effect on the increased balance and pain Reduction Recommended exercises can be suggested according to the type of exercises as a factor for increasing static and dynamic balance.

The knee joint is one of the most important components of the motion chain which is directly involved in the movements and forces from the soles of the feet, ankles, and legs. This joint also transfers the forces applied to the hip, pelvis, and spine.

Rubber has playing a vital role in the plantation crops of India. Rubber is an elastic substance made from sticky; milky white liquid called latex extracted from the bark of the rubber tree (Hevea Brasiliensis) through a process called tapping. Rubber is a Brazil native crop introduced in India by the British; however, cultivation in commercial scale were initiated as early as 1873. It plays a vital role in the National Economy. In the early years rubber was grown only in Kerala and Kanyakumari District in Tamil Nadu. According to department of Economics and Statistics of Kanyakumari District there are 41 registered rubber estates with 7373.126 hectares of land in which there are 1998 male labourers and 988 female labourers. Land coverage under rubber plantation in Kanyakumari District is 27407 hectares. (District Statistical Handbook, 2015). This paper seeks to study the living and working condition of the rubber plantation and to analyze their level of income and expenditure in Kanyakumari district.

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 pre and post test level of ability to balance the limps among Rubber tappers at Kanyakumari district.
- To assess the pre and post test level of Pain level among Rubber tappers at Kanyakumari district in control and experimental group.
- To find out the effectiveness of Isometric and Isotonic Training on work related musculoskeletal disorders among rubber tappers residing at kanyakumari District in control and experimental group.

Hypotheses

H1 - There is a significant difference between post test levels of leg pain perception among the patients receiving Isometric and Isotonic Training in study group and control group.

Methods and Data collection

This study is a quasi-experimental research with pre-test and post-test, as well as a control group. The study was conducted using the Purposive sampling method. The statistical population of the study consisted of 60 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. Participants were divided into control group (30) and experimental Group (30). A week before the study, participants were briefed on the exercise protocol and completed the consent forms. Pre test was conducted using Stork balance test (SBT) and Pain Scale (VAS). Their demographic characteristics were measured at the same time. Isometric and isotonic exercises were administered for a period of 8 weeks, two sessions per week. Given that the highest effect on isometric and isotonic exercises 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 isometric and isotonic exercises recommend 10 seconds of muscular contraction, duration which has been implemented in our research as well. After 8 weeks of isometric and isotonic exercises post test was done with the same scales

Statistical Analyses

Data pertaining to the demographic variables of the respondents of control and experimental group. According to their age, in experimental group majority of subjects 13(43%) belongs to the age group of 40- 50 years and in control group majority of subjects 12(40%) belongs to the same age group, regarding gender in experimental group majority 28(93.33%) were male and same in control group majority 29 (96.67%) were male, regarding educational status in experimental group majority of subjects 12(40%) have secondary education, whereas in control group majority of subjects 12(40%) have no formal education as well have secondary education. According to habit in experimental group majority 12(40%) of them have no habits of smoking, alcoholism, tobacco chewing and like the same in control group majority of the subjects 11(37%) have no habits. Regarding their dietary pattern majority of the subjects 23(77%) in experimental group were non vegetarians and in control group majority 21(71%) of them were too. Regarding their work Experience majority of the subjects 23(77%) in experimental group were 5-7 Years and in control group majority 21(71%) of them belongs to same category.

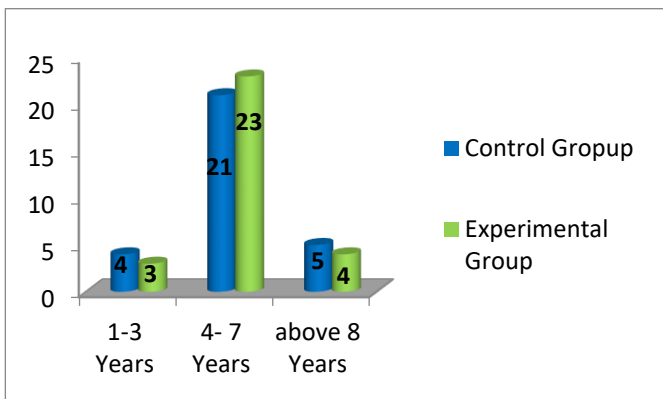


Figure: 1 Frequency Distribution of samples according to work experience

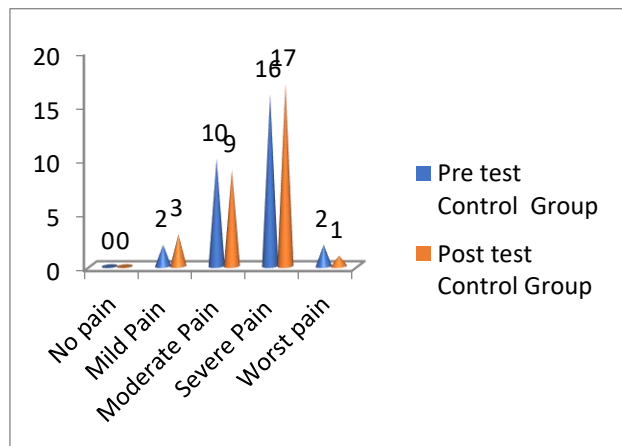


Figure 2: Frequency Distribution of leg pain among the rubber tapers in control Group

Above diagram describe about control group leg pain in pre test majority 16 (53.33%) had severe leg pain, in post test majority 17(56.67%) had severe leg pain.

Figure 3 shows, in experimental group pretest majority 16(53.33%) had severe leg pain and post test pain level reduced significantly and majority 14(46.67%) had mild pain, 10(33.33%) had moderate pain, 6 (20%) doesn't have leg pain and only 2(6.667%) had severe leg pain.

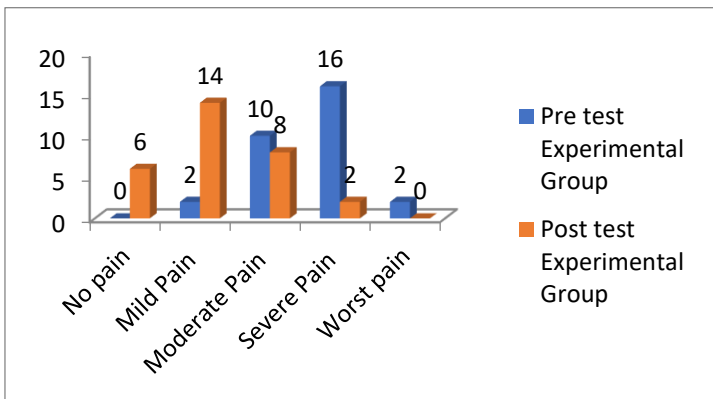


Figure 3: Frequency Distribution of leg pain among the rubber tapers in Experimental Group

Comparison of post test level of leg pain perception among patients receiving isometric and isotonic training in study group and control group.

Table 1: comparison of mean, standard deviation and unpaired “t” test on post test level leg pain perception among patients receiving isometric and isotonic training in study group and control group.

n=60

Variables	Group	Mean	SD	t Value
Level of leg pain	Control group n = 30	5.38	1.21	10.03*
	Experimental group n = 30	2.24	0.81	

Significant at $p \leq 0.05$

Table represents the comparison of the mean, standard deviation and unpaired 't' test value on post test level of pain perception among patients receiving isometric and isotonic training in study group and control group. The mean score on level of pain perception among patients

receiving isometric and isotonic training in Experimental group was 2.24 with the standard deviation 0.81. In control group, the 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 isometric and isotonic training was effective and reduced the level of leg pain perception. Hence the research hypothesis was accepted.

DISCUSSION

The major finding of the study was summarized as follows. Data pertaining to the demographic variables of the respondents of control and experimental group. According to their age, in experimental group majority of subjects 13(43%) belongs to the age group of 40- 50 years and in control group majority of subjects 12(40%) belongs to the same age group, regarding gender in experimental group majority 28(93.33%) were male and same in control group majority 29 (96.67%) were male, regarding educational status in experimental group majority of subjects 12(40%) have secondary education, whereas in control group majority of subjects 12(40%) have no formal education as well have secondary education. According to habit in experimental group majority 12(40%) of them have no habits of smoking, alcoholism, tobacco chewing and like the same in control group majority of the subjects 11(37%) have no habits. Regarding their dietary pattern majority of the subjects 23(77%) in experimental group were non vegetarians and in control group majority 21(71%) of them were too. Regarding their work Experience majority of the subjects 23(77%) in experimental group were 5-7 Years and in control group majority 21(71%) of them belongs to same category.

Describing about control group leg pain in pre test majority 16 (53.33%) had severe leg pain, in post test majority 17(56.67%) had severe leg pain, in experimental group pretest majority 16(53.33%) had severe leg pain and post test pain level reduced significantly and majority 14(46.67%) had mild pain, 10(33.33%) had moderate pain, 6 (20%) doesn't have leg pain and only 2(6.667%) had severe leg pain.

Regarding comparison of the mean, standard deviation and unpaired 't' test value on post test level of pain perception among patients receiving isometric and isotonic training in study group and control group. The mean score on level of pain perception among patients receiving isometric and isotonic training in Experimental group was 2.24 with the standard deviation 0.81. In control group, the 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 isometric and isotonic training was effective and reduced the level of leg pain perception. Hence the research hypothesis was accepted.

CONCLUSION

The study was done to evaluate the effectiveness of Isometric and Isotonic Training on work related musculoskeletal disorders among rubber tappers residing in kanyakumari District. It found

that Isometric and Isotonic Training significantly given impact in reducing the level of leg pain 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 to assess the effectiveness of Isometric and Isotonic Training on work related musculoskeletal disorders among rubber tappers.
- A study can be conducted for the other health related issues.

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