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Original Research Article

Fine Motor Affection in Manual Labourers

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ABSTRACT

The purpose of this study was to find the fine motor affection in manual labourers.
Methodology: In this study sample of 48 male labourers were taken with the age group of 20-50 years. All the subjects were tested using fine motor components of Jebsen Hand Function Test to find fine motor affection in them.
Result: The non-dominant hand was affected more than the dominant hand for the activity of card turning by 35%, simulated feeding by 7% and Checkers by 12.5%, whereas the activity of simulated feeding showed 4% more affection of the dominant hand. When the sample was divided into two groups by work years of less than and more than 10 years, the activity of Card Turning showed similar affection on both hands for both groups. The dominant hand (12%) and non-dominant hand (8%) were affected in the activity of Small Common Objects in the group who worked for more than 10 years compared to the other group. In the activity of Simulated Feeding and Checkers, the dominant hand was affected similarly in both the groups. In the non-dominant hand the affection seen was 13% and 15% more in the group who worked for more than 10 years compared to the group that worked less than 10 years respectively for the activity of Simulated Feeding and Checkers. When the two groups were compared there was no significant difference between the groups for fine motor affection.
Conclusion: The study concludes that the fine motor activity is affected in the manual labourers, non-dominant hand was affected more than the dominant.

Key words: Fine motor, Jebsen Hand Function Test, Manual Labourers.

INTRODUCTION

Labour is the amount of physical, mental and social effort used to produce goods and services. Most of the labourers work at construction sites doing work like lifting heavy weights, digging, breaking rocks, etc. and others work in fields like farming and mining. The most common musculoskeletal problems in this community were low back pain followed by upper and lower extremity pain. A study of prevalence of musculoskeletal problems in Kanpur farmers (n=300) showed disorders of lower back pain (60%); knee pain (39%), shoulder pain (22%), and neck pain (10%). [1] Another study concluded the systematic review identified the prevalence of MSDs by body region in farmers and established that LBP was the most common MSD, followed by upper and then lower extremity MSDs. [2]

Negative emotional states associated with low-status jobs, combined with a lack of economic resources, are also likely to reduce the individual's motivation to seek proper medical treatment and, thus, increase the risk that transient symptoms develop into chronic illness. [3] A prospective study of the complications of primary shoulder dislocation revealed that complications post

injury was more likely in manual labourers than office workers. [4] Musculoskeletal problems in upper limb especially wrist is known to reduce the fine motor activity. [5]

Manual dexterity is any motor skills that require greater control of the small muscles than large ones, esp. for hand-eye coordination or for precise hand and finger movement. Fine motor skills include handwriting, sewing, and fastening buttons, etc. Some methods to objectively assess fine motor function are Purdue's peg board, 9-hole pin test, Jebsen Hand Function Test, Finger Tapping Test, pinch dynamometer, etc. Jebsen Hand Function Test may be somewhat useful for predictions of functional hand use in activities of daily living. [6]

Manual labourers work for 5-6 hours/ day for 6 days of the week doing repetitive work of picking up marble slabs and transferring them from one place to another and loading and unloading in the trucks for delivery. It is well documented that physically monotonous or repetitive work is associated with an increase in neck, shoulder, and low back pain problems. [3] Most of the subjects complained about low back pain and shoulder and forearm pain in general.

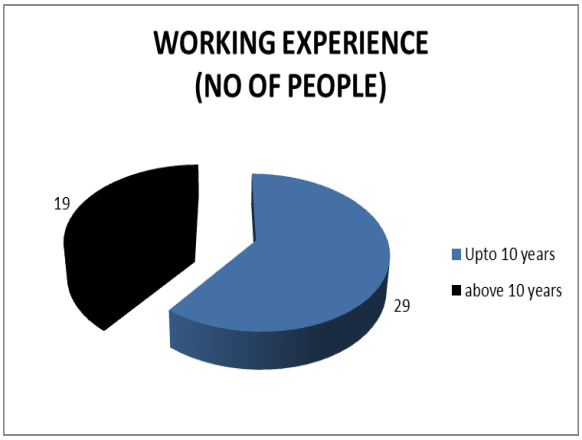
This purpose of this study was to find out whether chronic heavy weight lifting affects the hand dexterity in manual labourers; also to find whether work experience has any effects on the hand function in manual laborers' using Jebsen Hand Function Test.

METHODOLOGY

- **Study design:** Cross Sectional study.
- **Subjects:** Labourers working in marble factory.
- **Duration:** 5 months.
- **Sample size:** 48 Subjects.
- **Ethical Approval:** The study was approved by institutional Ethics and Research committee of D.Y. Patil University. Written informed consent form was taken from all subjects and their identification information was kept confidential.
- **Procedure:** This study was conducted to find out the fine motor affection in manual labourers. The sample size taken was 48, age group from 20-50 years. The subjects were explained the entire procedure. Jebsen hand function test was used to assess the subject; it contains 5 components for fine motor assessment out which the subjects performed 2nd, 3rd, 4th and 5th activities. The 1st activity of writing wasn't assessed as the subjects were illiterate. The activities were first done by the non-dominant hand and then the dominant hand. The time taken to complete the task was noted and compared to normal values and then was used for further analysis.

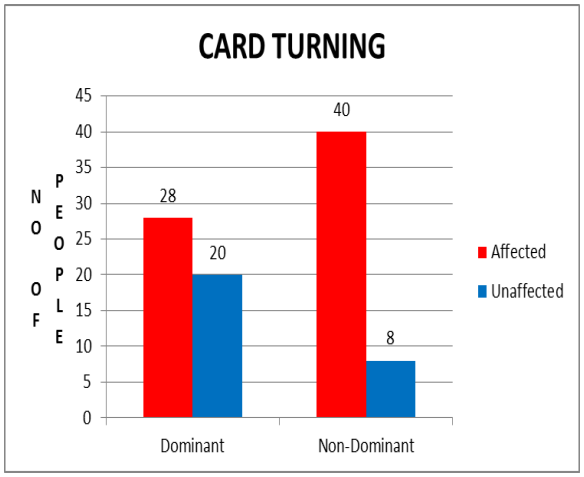
RESULT

In this study, 48 male samples were taken and were tested using Jebsen Hand Function Test. The graphs and its inferences of the analyzed data are as follows:



GRAPH 1: WORK EXPERIENCE

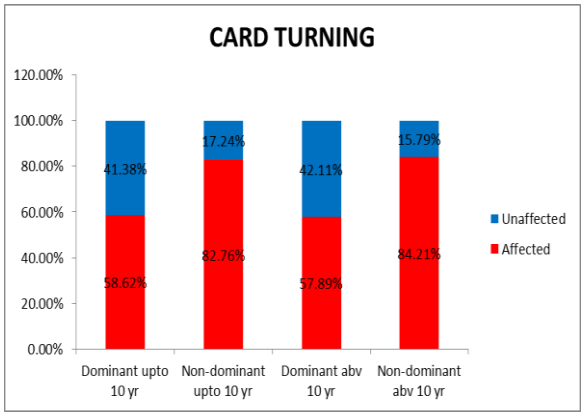
Inference: The above pie chart depicts the work experience of 50 people.
29 subjects have been working (lifting heavy weights) for 10 years and less.
21 subjects have been working (lifting heavy weights) for more than 10 years.



GRAPH 2: CARD TURNING

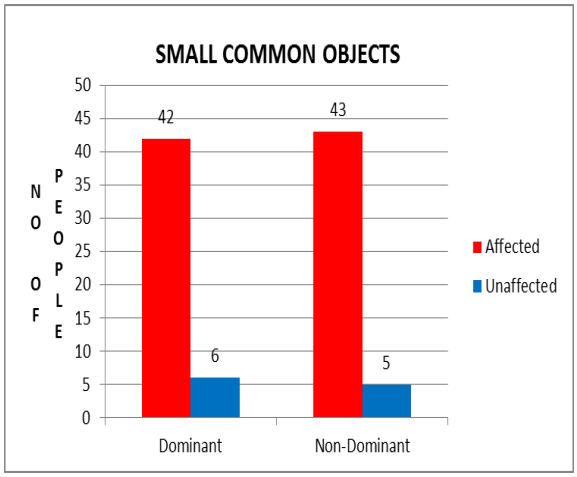
Inference: The bar graph shows that-

- 28 subjects out of 48 were affected on their Dominant hands in the activity of Card Turning.
- 40 subjects out of 48 were affected on their Non-Dominant hand were affected in the activity of Card Turning.
- The Non-Dominant hand of the subjects was more affected than the Dominant hand.



GRAPH 3: CARD TURNING

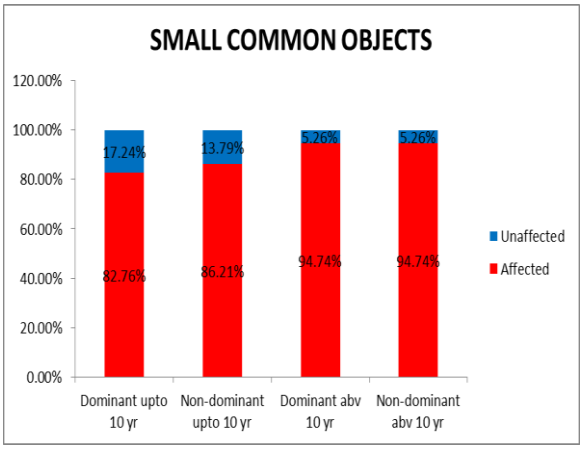
Inference: The above Bar Graph shows the affection of fine motor in relation to work experience (up to 10 years vs. above 10 years of work experience) during the activity of Card Turning. The graph denotes that the affection is similar in both Dominant and Non-Dominant hands in both groups.



GRAPH 4: SMALL COMMON OBJECTS

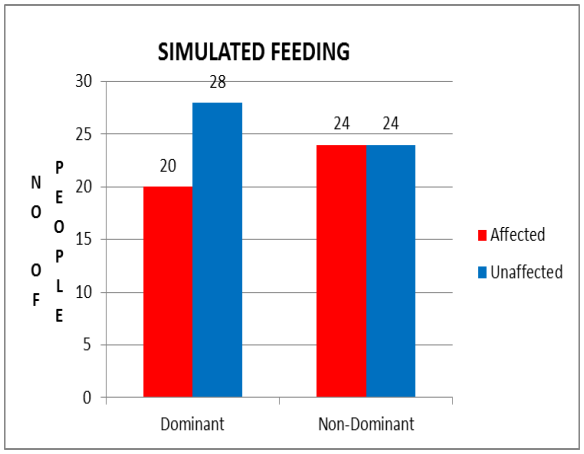
Inference: the above graph shows

- 43 subjects were affected out of 48 on their Dominant hand in the activity of picking up small objects.
- 42 subjects were affected out of 48 on their Non-Dominant hand in the activity of picking up small objects.
- The affection in the Dominant hand and Non-Dominant hand is the same.



GRAPH 5: SMALL COMMON OBJECTS

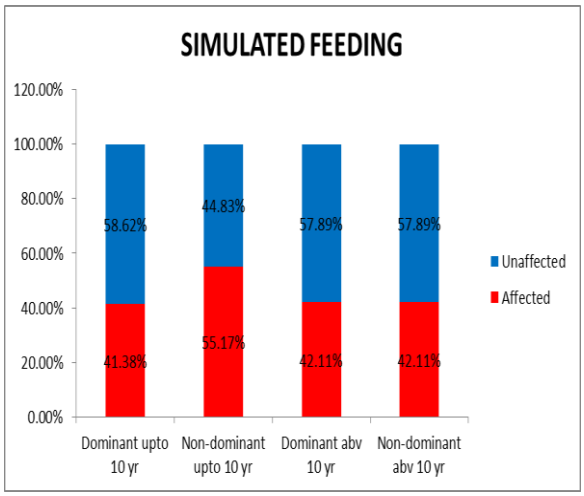
Inference: The above Bar Graph shows the affection of fine motor in relation to work experience (up to 10 years vs. above 10 years of work experience) during the activity of Small Common Objects. The graph denotes that the affection is greater in both Dominant and Non-Dominant in group with work experience of more than 10years by 12% and 8% respectively.



GRAPH 6: SIMULATED FEEDING

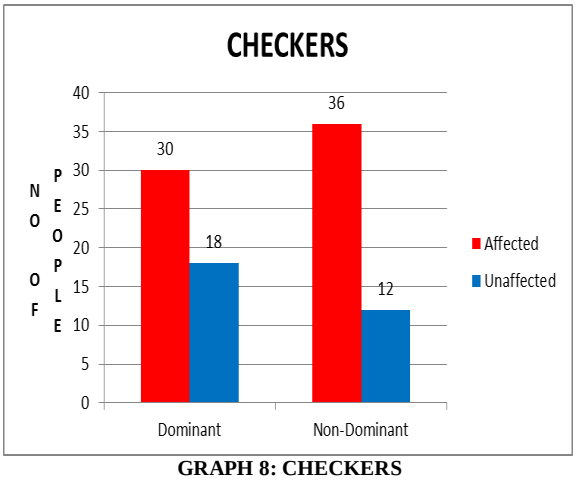
Inference: The above graph shows that-

- 20 subjects out of 48 were affected on their Dominant hand in the activity of simulated feeding.
- 24 subjects out of 48 were affected on their Non-dominant hand in the activity of simulated feeding.
- The Non-Dominant hand is more affected than the Dominant.



GRAPH 7: SIMULATED FEEDING

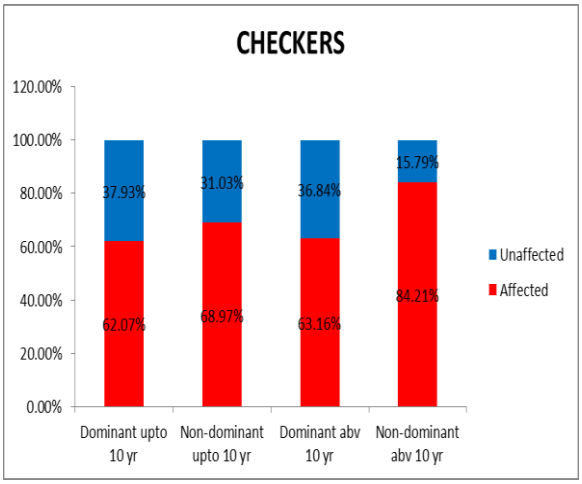
Inference: The above Bar Graph shows the affection of fine motor in relation to work experience (up to 10 years vs. above 10 years of work experience) during the activity of simulated feeding. The graph shows that the affection is same in Dominant but is 13% greater in group with work experience of more than 10years.



GRAPH 8: CHECKERS

Inference: The above graphs shows that-

- 30 out of 48 subjects were affected on their Dominant hand for the activity of stacking Checkers.
- 36 out of 48 subjects were affected on their Non-dominant hand for the activity of stacking Checkers.
- The affection in the Dominant hand and Non-Dominant hand is the similar.



GRAPH 9: CHECKERS

Inference: The above Bar Graph shows the affection of fine motor in relation to work experience (up to 10 years vs. above 10 years of work experience) during the activity of Checkers. The graph shows that the affection is greater in Non-Dominant in group with work experience of more than 10years by 15% and same in Dominant hand.

DISCUSSION

This study was conducted to find the affection of hand dexterity in manual laborers. For the study, 48 manual laborers were assessed using Jebsen Hand function Test.

Among the 48 subjects, majority belonged to the age group 20-30 years. They occupied 52% of the total population. The age group of 30-40 years was the second largest being 22% of total number of people. The findings of the study based on the objectives are as follows:

a) To assess fine motor function of hand in manual laborers:

According to graph 2(Card Turning) - The non-dominant hand (83%) was more affected than dominant hand (48%).

According graph 4 (Small Common Objects) – The affection was similar on both hands; 85% and 89% on the non-dominant hand and dominant hand respectively.

According to graph 6 (Simulated Feeding), non-dominant hand (50%) was more affected than dominant hand (42%). The affection in this activity was the least compared to other activities.

According to Graph 8 (Checkers), there was 75% affection on the non-dominant hand and 62.5% affection on the dominant hand.

Therefore the study says that both the hands of the manual laborers were grossly affected in fine motor skills; the non-dominant hand more than the dominant hand despite the normal time range being more than that of the dominant in Jebsen's Hand Function Test. According to Critical decline in fine motor hand movements in human aging, Fine motor performance was better in the dominant hand regardless of age. [7] These results may be partially explained by people living in a world designed for right-handers. [8,9]

Manual asymmetry refers to the tendency to favor one hand for performance of skilled manual tasks, and is important in every sensory and motor function. [10]

A study that compared dominant and non-dominant hand strength in both right- and left-handed participants found no significant differences between the hands in the left-handed group, and observed small but significant differences between the dominant and non-dominant hands in the right-handed group. [11]

These results indicate that manual asymmetries were task specific. Such task specificity was interpreted to be the result of different sensorimotor requirements imposed by each motor task in association with motor experiences accumulated over the lifetime. [12]

b) To find out if there is a co-relation between the number of work years and affection in fine motor function:

Among the 48 subjects that were assessed, 29 of the 48 (60%) subjects have been working for 10 years and less and the rest 19 (40%) were working for more than 10 years.

In the 1st activity of Card Turning, graph 3 shows the affection in Dominant hand and Non-Dominant hand of both groups. Upon statistical analysis, it was found that there was no significant difference between the dominant hands ($p=0.589211$) and non-dominant hands ($p=0.44174$) of both groups.

In the 2nd activity of Small Common Objects, graph 5 shows the affection in Dominant hand and Non-Dominant hand in both groups. Upon statistical analysis, it was found that there was no significant difference between the dominant hands ($p=0.403752$) and non-dominant hands ($p=0.092649$).

In the 3rd activity of Simulated Feeding, graph 7 shows the affection in non-dominant hand and dominant hand of both groups. Upon statistical analysis, it was found that there was no significant difference between the dominant hands

(0.956354) and non-dominant hands (p=0.526336) of both groups.

In the 4th activity of Checkers, graph 9 shows the affection in Non-Dominant and Dominant hand of both groups. Upon statistical analysis, it was found that there was no significant difference between the dominant hands (p=0.316732) and non-dominant hands (p=0.373232) of both groups.

Thus based on the study it was found that the fine motor function was affected in manual laborers, but work experience has no influence on hand dexterity.

CONCLUSION

This study concludes that hand dexterity was affected in the manual laborers working in marble factory. Their non-dominant hand was more affected than their dominant. The activity of small common objects was most affected followed by card turning and checkers. The activity of simulated feeding was the least affected.

This study also concludes that the work experience had no significant influence on fine motor activities of manual laborers.

Conflict of Interest: Nil

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