

Effect of Roods Approach on Dexterity of Hand for Grade 1 Disability in Leprosy

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ABSTRACT

Background: Leprosy is a chronic infectious disease affects the skin and peripheral nerves, leading to progressive physical disability if not diagnosed and treated early. Disability of hand effects on the activities of daily living so that testing and improving the dexterity of hand comes as major rehabilitation approach while treating the disease.

Aim: To study the effect of roods approach technique on dexterity of hand in grade1 disability in leprosy.

Objective: To evaluate the effect of roods approach technique on dexterity of hand for grade 1 disability in leprosy.

Methodology:

The study was done to determine the effect of roods approach on dexterity of hand for grade1 disability in leprosy. In the study, 30 patients were participated who were affected with leprosy grade 1 disability. The patients were assessed with sensory assessment and tested with eight dexterity tests to check the hand dexterity. Then they were received roods approach technique, 5 days in a week for 4 weeks. Then again patients were tested with the same dexterity tests. At the end of the study the data was analyzed and compared statistically by using paired t-test.

Result: The statistical data were shown the comparison of mean values of all dexterity tests, pre and post treatment along with their standard deviation. The values were compared within the group by applying paired t –test. It shows there is improvement in the dexterity of hand with $P < 0.0001$ after application of sensory motor integration technique.

Conclusion-Based on the statistical analysis and interpretations, the roods approach techniques were found significantly effective on improving the dexterity of hand in leprosy.

Keywords: Roods approach, Dexterity, Disability, Leprosy.

INTRODUCTION:

Leprosy is a chronic infectious disease caused by Mycobacterium leprae that affects the skin and peripheral nerves, leading to progressive physical disability and deformities if not diagnosed and treated early. Despite a significant reduction in its global prevalence since the World Health Organization (WHO) implemented the free multidrug therapy program in 1995, leprosy remains a major cause of morbidity owing to its associated long-term disabilities and sequel in an estimated 2 million people worldwide (1). The WHO goal is to reduce leprosy disabilities to a target of less than 1 per million populations through the strengthening of strategies for the prevention and reduction of deformities. These strategies include the early recognition and prioritization of individuals with leprosy with characteristics associated with

physical disability and the main focus of control programs and rehabilitation centers is to prevent and manage physical impairment to improve quality of life(2).

A 'disability classification' for use of leprosy has been advocated by WHO since 1960. According to the WHO disability classification (3).

Hand and feet

Grade 0: no anesthesia, no visible deformity or damage.

Grade 1: anesthesia present, but no visible deformity or damage. Grade 2: visible deformity or damage present.

*Each hand and foot is to be assessed and graded separately. "Damage "in this context includes ulcerations, shortening, disorganization, stiffness, and loss of part or all of the hand or foot(3)*The three-grade WHO disability grading system (0, 1, 2) has been in use for several years and has proved to be a good basis for measuring the magnitude of the problem and organizing physical rehabilitation activities at both individual and community levels (4).

Disability of hand affect predominantly on the activities of daily living so that testing and improving the dexterity of hand comes as major rehabilitation approach while treating the disease. This study is about finding the effect of R Functional Dexterity Tests (11) for grade 1 disability in leprosy. As physiotherapy plays very important role in management of disabilities, leprosy has been treated always with conventional methods of rehabilitation so disease needs to be treated with more advance techniques of rehabilitation.

Rood's Approach is a Neurophysiological approach which is based on reflexes of central nervous system. Basic concept of Rood's is that the motor patterns are developed from primitive reflexes through proper sensory stimuli to appropriate sensory receptors in normal sequential developmental pattern to improve motor performance. It even includes facilitatory and inhibitory techniques and including the principle motor output is dependent on sensory input there are chances that facilitatory techniques will be beneficial in improving sensory loss and inhibitory techniques will lead to decreased hypersensitivity and this sensory output will in turn improve motor performance (5).

Fast brief stimulus produces large synchronous motor output, a fast repetitive sensory input produces maintained response. In his study we have used facilitatory techniques such as tactile facilitation and some of the proprioceptive facilitatory techniques.

In tactile/ exteroceptive facilitation :-

- 1. Light moving touch** :- it is mediated by A delta sensory fibers, stimulation of these fibers synapses with fusimotor system reciprocal innervations. This activates low threshold hair end organ and free nerve endings. Activates superficial mobilizing muscles. Increases corticosteroid levels in blood. Improves fluid and electrolyte balance. Increases resistance against disease. Application by finger tips/ soft brush/ cotton swab with frequency of 3-5 strokes such 10 sessions with 30 seconds rest period between two sessions.
- 2. Fast brushing**:- it is mediated by C fibers. fast brushing is applied over the dermatomes of the same segment that supplies the myotome to be facilitated. Effect of fast brushing lasts for 30 minutes and stimulates c fibers which sends many collaterals in the reflex arch system. Application by battery operated brush with frequency of 3-5 strokes such 10 sessions with 30 seconds rest period between two sessions.

3. **Icing** :- icing promotes facilitation of muscles and ANS responses. Can be applied with pressing ice cube or quick icing methods. In quick icing 3 strokes of ice cube/ ice pack can be given followed by blotting of water after each stroke such 10 sessions should be given.
4. **In proprioceptive facilitation:-** proprioceptive facilitation joint gives control over the motor response.
5. **Intrinsic stretching :-** it activates proprioceptors and implies the principal of reciprocal innervation. It promotes stability of scapulothoracic region bearing more weight on ulnar side of the hand which promoting resistive grasp of hand.

Physiotherapy treatment for neurological conditions includes conventional therapies & neurophysiological approaches. In which it is observed that neurophysiological approaches are more effective than conventional therapies in the improvement of the patient condition (6).

Functional dexterity tests used in this study are,

1. **The Box and Block test:** - It is simply administered test of gross manual dexterity. 150 blocks were used. The number of blocks transferred from one side of the box to the other side within one minute is scored. A 15 sec practice trial produces the actual test. The test can also be used to measure upper extremity endurance by counting the number of blocks the patient is able to rapidly transferred without fatigued.
2. **The Nine –Hole peg test:-** It is simple quick test for finger dexterity. the score is the time required to place nine pegs in board and remove them .The time required to do the task is the test result.
3. **The Jebsen’s Test of Hand Functions:** - It is the test device to evaluate a patient’s functional capacity. The test items are: -
 - Writing a specific sentence.
 - Turning over 3-inch by 5-inch cards.
 - Picking up small common objects and putting them in to container.
 - Stacking checkers/placing the coins on paper on specific marked points.
 - Moving empty cans.
 - Moving heavy cans.
 - The time required for each task is calculated. The test results of all above tests are documented.

STATEMENT OF THE PROBLEM:

In grade 1 disability of leprosy, dexterity of hand needs to be assessed and find out the effect of Roods approach over the dexterity of hand.

REVIEW OF LITERATURE:

WHO news details were searched for the prevalence of leprosy in India. Leprosy is endemic in several states and union territories of india, with annual case detection rate of 4.56 per 10000 population. The prevalence rate of leprosy is 0.4 per 10,000 population in the country. Of the new cases detected during 2020-2021 (1).

Vandana Yadav(6). There are conventional and advance intervention techniques possible in the rehabilitation of hemiplegia. Above all the techniques, Bobath, NDT, PNF, Roods approach, speech therapy, robotic devices, balance training and kinesiostapping are effective in the improvement of patient’s condition.

Dabholkar Tejashree Ajit(7), 60 subjects were randomly assigned into two groups. Experimental (Group-A), and Control group (Group-B), All patients were evaluated for baseline data of the above mentioned outcome measure. Neural tissue mobilization given for group A 3 times a week for 3 weeks. Follow-up evaluation was done at the end of each week and one week after 9th session. Conclusion was Nervous tissue mobilization is effective in improving pinch and grip strength as well as sensory hand function in leprosy.

Dr. Tushar Dhawale(12) , The Sensory re-education program was for 30 min 4 days of week for 4weeks.Experimental group 30 minutes of mirror with sensory re-education for 4 days per week for 4 weeks . Michigan Hand Outcome Questionnaire (MHQ) were evaluated before treatment and 4weeks after the treatment. Results: Post treatment experimental group shows significant improvement in hand functioning with leprosy patients with P value 0.001.

Functional Dexterity Test(11), this is the quantitative scale for analysis of dexterity of hand using peg board activity.

Santoshdev P.(14) The study included 200 leprosy patients, of all patients, 21.25% had Grade 1 deformity, and Deformities of hand were most common in 44.48% . WHO Expert committee on leprosy. Sixth Report 1988.(World Health Organization Technical Report Series768) has given the ‘disability classification’

AIM:

To find the effect of Rood’s approach on dexterity of hand for grade 1 disability in leprosy.

OBJECTIVES:

1. To assess the leprosy grade 1 patients for hand dexterity.
2. To find the effect of Rood’s approach on dexterity of hand in leprosy grade 1 patients.

HYPOTHESIS:

NULL HYPOTHESIS: -

There are no effects of Rood’s approach on dexterity of hand in leprosy grade 1 disease.

ALTERNATE HYPOTHESIS:

There is improvement in hand dexterity in leprosy grade 1 disease by using Rood’s approach

METHODOLOGY:

Methods of research: Analytical and Observational

Sampling design and assumptions:

Sample size : 30

Sampling method : Random sampling method.

INCLUSION CRITERIA

1. Patients affected with Hanson’s disease with disability grade 1.
2. Sensory loss in clinical assessment by sensory assessment tests.
3. Muscle weakness assessed by Manual Muscle testing scale , grade 0-3.
4. Written, informed, valid consent.

EXCLUSION CRITERIA

1. Skin ulcers, blisters, cuts on hand.
2. Deformities of hand (claw hand, shredding of digits).
3. Other causes of neuropathy (Diabetic, alcoholic, sever cervical spondylitis).
4. Loss of mental acuity to follow test instructions.
5. Loss to follow up in OPD.

RESEARCH DESIGN

1. Patients with garde1 disability in leprosy are included according to inclusion and exclusion criteria with valid consent.
2. Patients are selected by simple random sampling method.
3. Each patient is assessed with sensory evaluation and manual muscle testing.
4. Patients then get assessed with three dexterity tests Box and Block test, Nine hole peg test and Jebson's test for hand functions and documented the results.
5. Then each patient is treated with Rood's approach with tactile facillitatory techniques such as light moving touch, fast brushing and icing and proprioceptive facillitatory technique such as intrinsic stretching.
6. Light moving touch is given by finger tips/ soft brush/ cotton swab with frequency of 3-5 strokes such 10 sessions with 30 seconds rest period between two sessions.
7. Fast brushing is given by battery operated brush with frequency of 3-5 strokes such 10 sessions with 30 seconds rest period between two sessions.
8. In quick icing 3 strokes of ice cube/ ice pack can be given followed by blotting of water after each stroke such 10 sessions should be given.
9. Intrinsic stretching is given for entire affected upper limb.
10. Treatment is given for 4 days week for 4 weeks.
11. Again all patients were assessed with three dexterity tests Box and Block test, Nine hole peg test and Jebson's test for hand functions and documented the results.
12. Comparison was done in dexterity tests outcomes for pre and post treatment.

METHODS OF DATA COLLECTION:-

- Data is collected in Excel sheet with parameters of dexterity.
- With confidentiality.

METHODS OF DATA ANALYSIS

- Data analysis is done with Paired T test (pre and post)

RESULTS: -

This study includes 30 patients affected with Hansen's disease showing early neuropathy symptoms, in that 17 male and 13 were female patients.

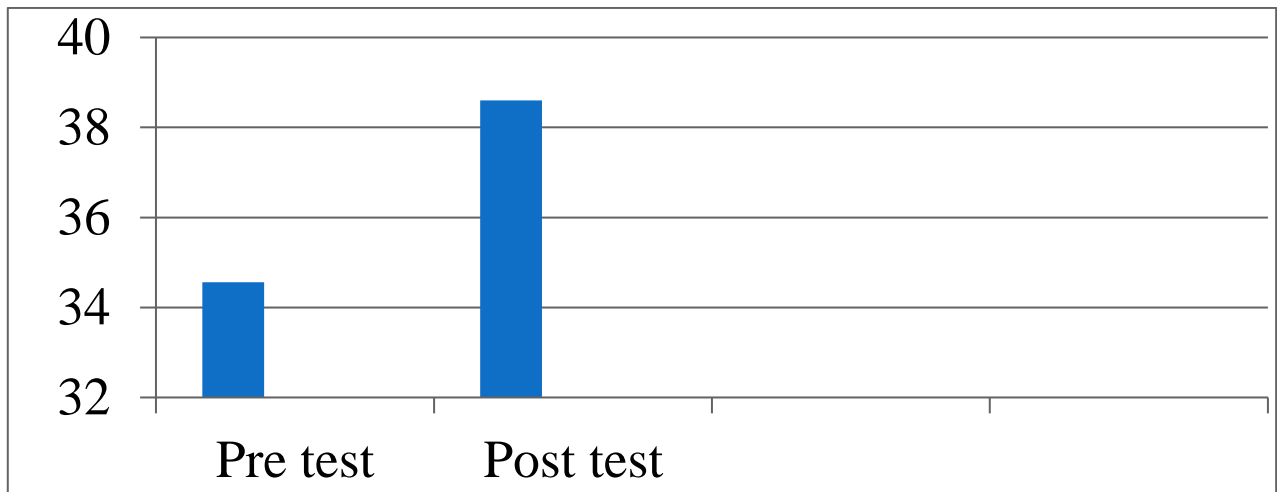
The statistical analysis of the data was done using paired t -test . Student's paired t- test was used to find the effects of roods approach techniques on the dexterity.

Pre and post treatment values of dexterity tests were calculated.

1. Block & box test :-

t - value	sig (2-tailed)
16.66	< 0.0001

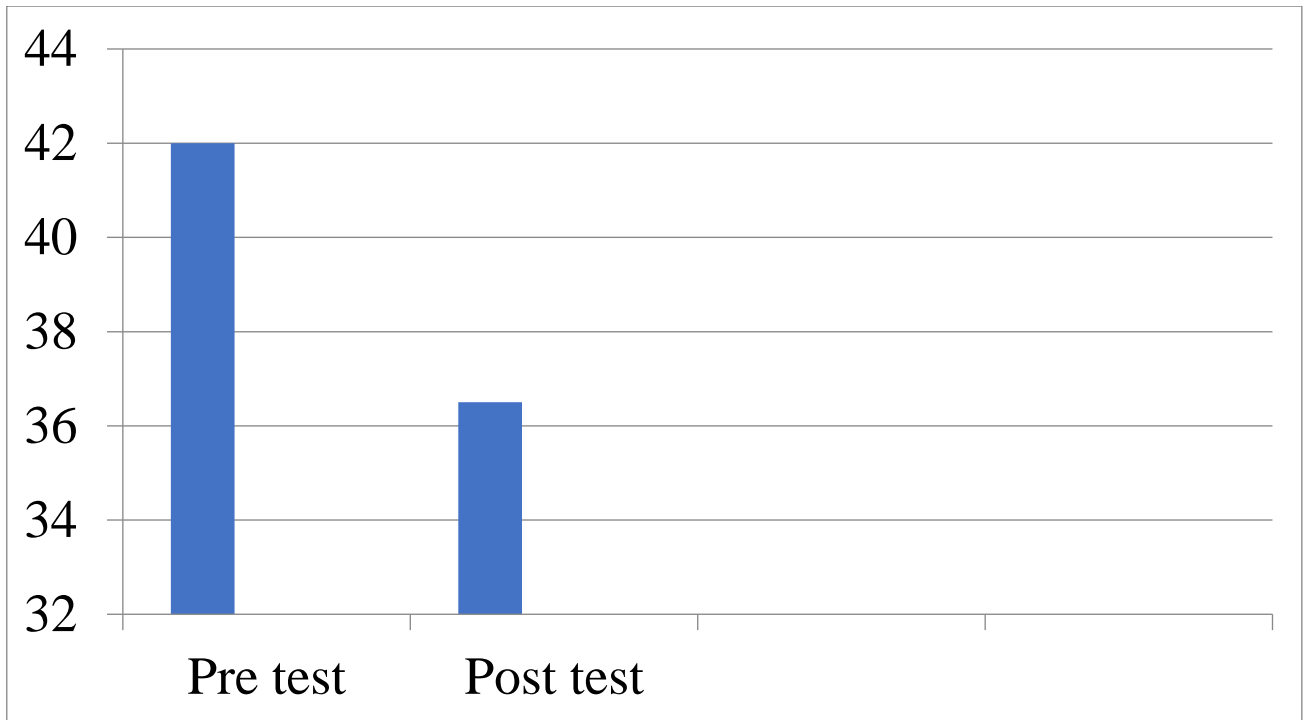
	Minimum	Maximum	Mean	SD
Pre test	25	42	34.56	5.315
Post test	27	47	38.6	5.775



2. The nine –hole peg test:

t - value	sig (2-tailed)
15.095	< 0.0001

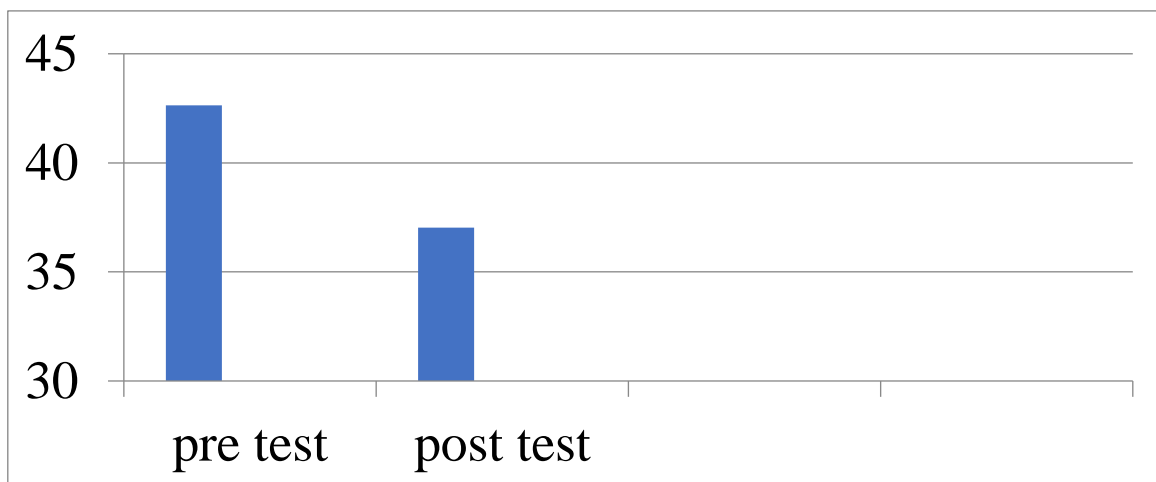
	Minimum	Maximum	Mean	SD
Pre test	25	60	42	8.077
Post test	20	55	36.5	8.008



3.The Jebsen’s tests for hand functions:-

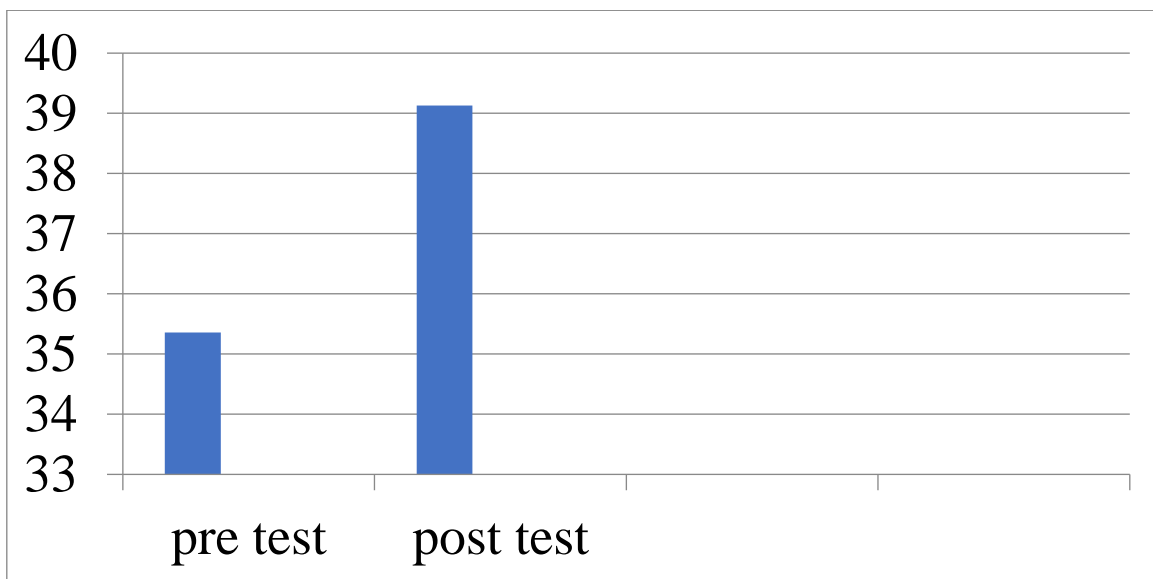
a. Writing a specific sentence

	Minimum	Maximum	Mean	SD
Pre test	30	65	42.63	8.286
Post test	25	55	37.03	8.791
t - value		sig (2- tailed)		
10.72		< 0.0001		



b. Number of cards can turn in one minute:-

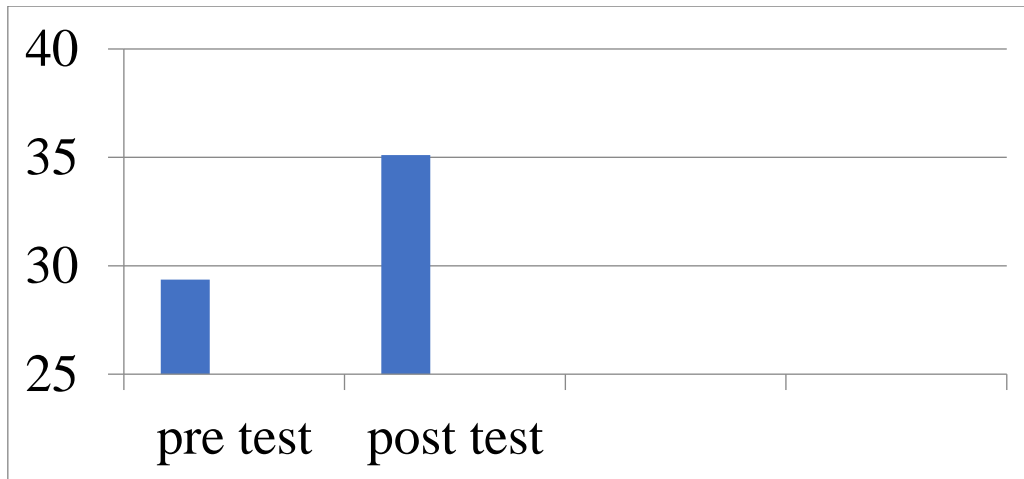
	Minimum	Maximum	Mean	SD
Pre test	20	45	35.36	6.037
Post test	25	50	39.13	6.004
t - value		sig (2 –tailed)		
13.742		< 0.0001		



c. Number of small objects can put into container in one minute:-

	Minimum	Maximum	Mean	SD
Pre test	20	40	29.36	4.560
Post test	22	45	35.1	5.320

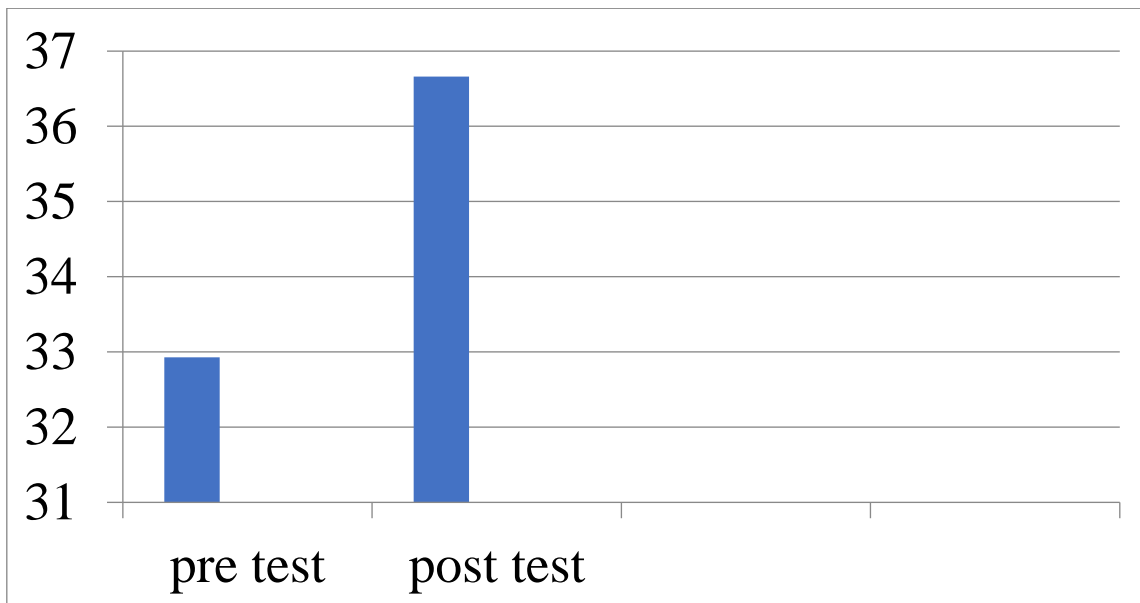
t -value	sig (2 –tailed)
15.319	< 0.0001



d. Number of coins can place on marked points in one minute: -

	Minimum	Maximum	Mean	SD
Pre test	25	39	32.93	5.132
Post test	28	40	36.66	5.188

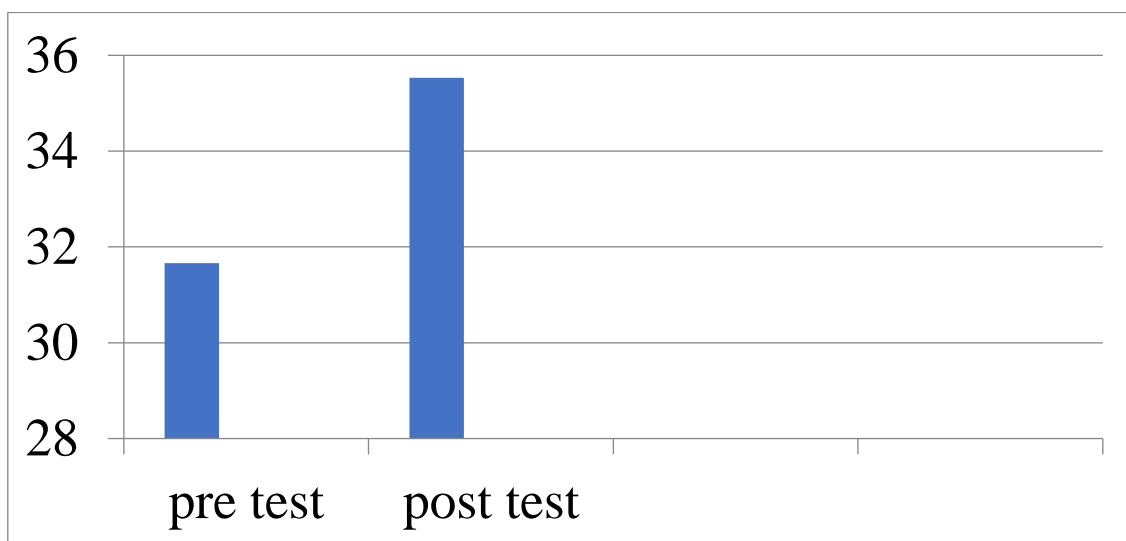
t - value	sig (2 –tailed)
13.779	< 0.0001



e. Number of empty cans can move in one minute: -

	Minimum	Maximum	Mean	SD
Pre test	20	48	31.66	7.004
Post test	22	50	35.53	7.036

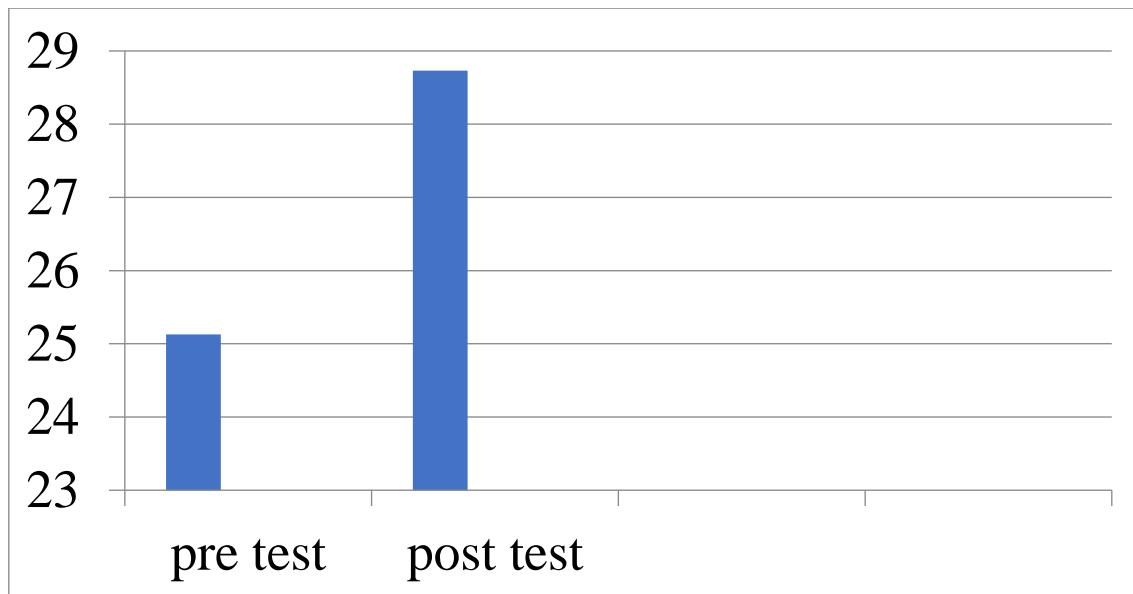
t – value	sig (2 – tailed)
11.92	< 0.0001



f. Number of heavy cans can move in one minute: -

	Minimum	Maximum	Mean	SD
Pre test	10	40	25.13	6.811
Post test	12	45	28.73	7.168

t – value	sig (2- tailed)
14.292	< 0.0001



DISCUSSION:

- Leprosy is one of the leading causes of physical disabilities which contribute to intense social stigma resulting in discrimination of patients and their families
- As a single disease entity, leprosy is one of the foremost causes of deformities and crippling. Several factors are associated with deformities in leprosy.
- Due to peripheral neuropathy of hand and feet, patient enable to carry out the daily living activities.
- Aim of this study was to find the effects of roods approach on the dexterity of hand in grade 1 leprosy patients.
- There was 30 patients, showing early neuropathy symptoms were participated in the study.
- They all were tested with the dexterity tests, then they received the roods technique for four weeks and again they were tested with dexterity tests.
- Pre and post treatment results were compared and calculated with paired t-test.
- In all the dexterity tests P values were extremely significant i.e.<0.0001.

CONCLUSION

Based on the statistical analysis and interpretations, the roods approach techniques is significantly effective on improving the dexterity of hand in leprosy grade 1. Thus the alternate hypothesis is proved.

LIMITATIONS, SUGGESTIONS AND RECOMMENDATIONS

Limitations

- The sample size was small.
- The study duration was small
- Limited literature reviews on effects of roods approach techniques in leprosy patients to support the study.

Recommendations And Suggestions

- Studies with longer treatment duration should be conducted.
- The study should conduct with large sample size.
- Other different dexterity tests can be used for study.
- Patients with particular gender or particular age groups can be taken for further studies.
- Home exercise program can be given with equal importance as OPD treatment sessions.

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