



## Effects of Wrist Deviator to Improve Ulnar and Radial Deviation Among Ulnar Nerve Injury Patient

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### KEYWORDS

Wrist deviator, Radial and ulnar deviation, ROM and strengthening, Ulnar nerve patient.

### ABSTRACT:

**Aim:** To find out the effects of wrist deviator to improve ulnar and radial deviation among patients with ulnar nerve injury.

**Objectives:** To assess the ulnar nerve injury using Allen's test. Then using goniometer and kendal muscle strength to assess ROM and muscle strength of the affected extremity. To improve the radial and ulnar deviations using this therapeutic device. This assesses the therapeutic tool's impact on participants' ROM and muscle strength in ulnar and radial deviations

**Methodology:** The study was done among ulnar nerve injury patients in the age group of 20 – 60 years. Totally of 100 patients were selected according to the classification of peripheral nerve injury. Grade 2 nerve injury patients were included in this study. Then the therapeutic device was given to that group of nerve injury patients to improve ROM and muscle strength to increase radial and ulnar deviations. The pre-test and post-test were evaluated by the goniometer and Kendall muscle testing scale. And the outcomes of the post-test results were analyzed.

**Result:** The statistical analysis revealed a significant disparity between the pre-test and post-test results, leading to the rejection of the null hypothesis. This suggests that the intervention or treatment had a measurable impact on the measured variables.

**Conclusion:** From this study, it is concluded that there is greater improvement in ROM and muscle strength by using this wrist deviator among ulnar nerve injury patients.

### 1. Introduction

Hand therapy, a specialty practice area of occupational therapy, is typically concerned with treating orthopedic-based upper-extremity conditions to optimize the functional use of the hand and arm. Conditions seen by the occupational therapy practitioner specializing in this area include fractures of the hand and arm, lacerations and amputations, burns, and surgical repairs of tendons and nerves. Acquired conditions such as tendonitis, rheumatoid arthritis, arthritis and carpal tunnel syndrome are also treated by occupational therapy practitioners specializing in hand rehabilitation. Practitioners who treat clients with conditions of the hand or arm can do so without additional formal education in most states. However, many practitioners choose to gain several years of experience before treating hand clients, and

therapists may choose to become specially certified through the Hand Therapy certification commission.

The ability of the individual to execute daily tasks is impacted by hand injuries. Daily living activities (IADLs), relaxation and sleep, education, recreation, leisure, and social interaction all fall under this category. Depending on the degree, those who sustain hand injuries may face a variety of challenges in their regular work. The majority of people with unilateral hand injuries said that routine tasks like washing, dressing, cooking, and cleaning became more difficult to complete

Injury to peripheral nerves is a common and difficult-to-cure condition. The most frequent upper extremity peripheral nerve injury, ulnar nerve injuries, cause distal numbness and paralysis in the hand. High ulnar nerve



injuries present a special challenge since the distal motor endplates are so far away from the site of the injury. In comparison to most distal injuries, adult patients with ulnar nerve lacerations in the proximal forearm and cubital tunnel exhibit relatively poor intrinsic recovery after nerve repair or grafting. When the ulnar nerve is hurt or compressed, it becomes an ulnar nerve injury. Along with tingling, numbness, or paralysis in your hand and forearm, you might also feel discomfort close to your elbow. Conditions affecting the ulnar nerve, such as cubital tunnel syndrome and partial claw hands, can be brought on by elbow compression.

## 2. Methodology:

The study was conducted on a cohort of individuals aged between 20 and 60 who had experienced ulnar nerve injuries, specifically targeting Grade 2 cases as per the peripheral nerve injury classification. A total of 100 patients were selected for the research, evenly divided into a control group and an experimental group. The primary objective was to assess the impact of a therapeutic device designed to enhance range of motion (ROM) and muscle strength, particularly in radial and ulnar deviations, among these selected patients. Data was collected through pre and post-tests using goniometers and Kendall muscle testing scales. The study was carried out in the Thandalam, Tiruvallur, and Chennai districts, with subjects demonstrating mild to moderate ulnar nerve injury symptoms. Inclusion criteria encompassed individuals of both genders who fell within the specified age range and exhibited Grade 2 peripheral nerve injuries, as well as a willingness to participate. Exclusion criteria included patients with severe ulnar nerve injury symptoms, psychiatric issues, multiple injuries, and those requiring immediate surgery. The screening tool used for patient selection was Allen's test. This research employed a pre and post experimental design and a convenient sampling method, offering valuable insights into the effectiveness of the therapeutic intervention for ulnar nerve injury patients within the designated age group.

## 3. Duration:

The duration of this study was 6 months; the duration of intervention was given for 3 months (24 sessions) and each session was about 30 minutes for each patient. In between there will interval for muscle relaxation to decrease the stress created in the muscle.

## 4. Procedure:

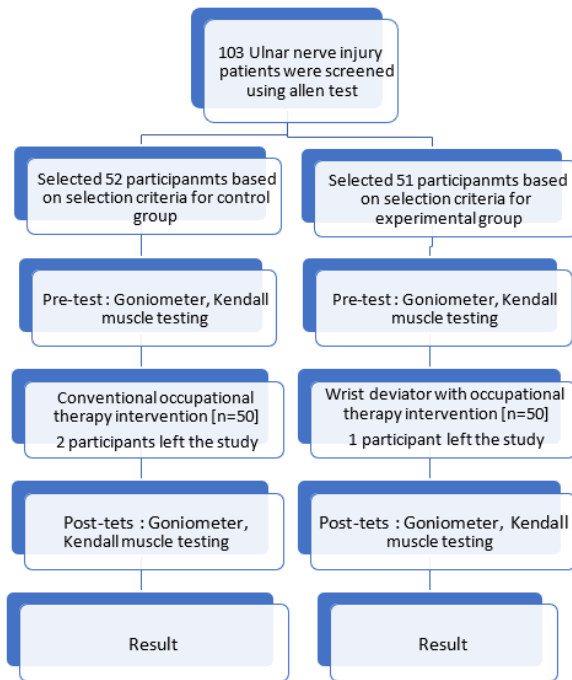
Totally hundred (100) subjects were selected according to inclusion criteria the ROM and MMT of ulnar and radial deviation among ulnar nerve injury patients is measured using the goniometer and Kendall muscle testing scale. The sample is divided equally, 50 samples in the control group and 50 samples in the experimental group. After the baseline data is obtained the experimental group underwent deviator board device [therapeutic device]. The therapy consists of a total of 24 sessions, 3 sessions per week on alternative days each session last for 30 minutes. After the sessions ROM and MMT are again administrated, to get the post-test value. the pre and post-test values are used to find out the result of the study.





**Intervention protocol:**

**Flow chart**



**Intervention for control group and experimental group:**

In this research study, both the control and experimental groups underwent interventions aimed at addressing ulnar nerve injury symptoms and improving wrist function. For the control group, the intervention included manual therapy involving both passive and active exercises, along with specific exercises for tendon gliding and nerve gliding. The experimental group received the same manual therapy and exercises, but they also had access to a wrist deviator designed to enhance wrist range of motion and muscle strength. These interventions were carefully designed to evaluate their effectiveness in patients with Grade 2 ulnar nerve injuries and were assessed through pre and post-testing using goniometers and Kendall muscle testing scales.

**Ethical and Cultural from Consideration:**

Ethical approval was obtained from the ethical committee of Saveetha College of Occupation Therapy. Permission was given each school HOD of the Saveetha medical college.

**5. Results:**

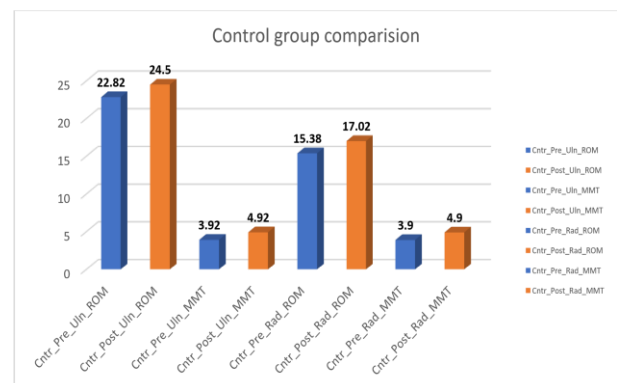
**Statistical analysis of pre- test and post- test in the control group: Table 1**

Test	Mean	SD	N	Z value	p value
Cntr_Pre_Uln_ROM	22.82	2.55303	50		
Cntr_Post_Uln_ROM	24.5	2.46816	50	-6.431	0.00*
Cntr_Pre_Uln_MMT	3.92	0.80407	50		
Cntr_Post_Uln_MMT	4.92	0.80407	50	-7.071	0.00*
Cntr_Pre_Rad_ROM	15.38	2.52247	50		
Cntr_Post_Rad_ROM	17.02	2.59112	50	-5.986	0.00*
Cntr_Pre_Rad_MMT	3.9	0.81441	50		
Cntr_Post_Rad_MMT	4.9	0.81441	50	-7.071	0.00*

\*Significant at 5% alpha level

Since the p value of 0.00 is lesser than 0.05, alternate hypothesis is accepted. Hence, there is statistically significant difference between pre- test and post test scores among the participants’ Ulnar and Radial Deviation ROM and Muscle power. This suggests that the intervention received by the group had significant improvement

**Comparison between the pre-test and post-test of the control group**





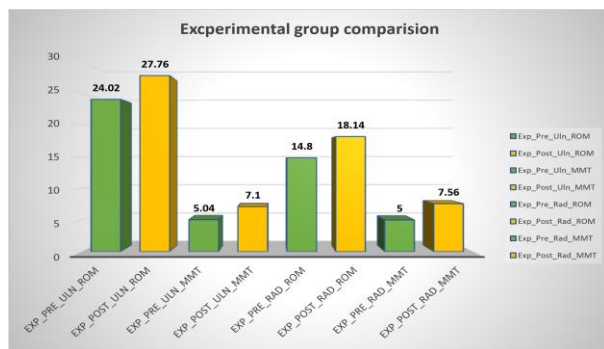
**Statistical analysis of pre-test and post-test in the experimental group Table 2**

Test	Mean	SD	N	Z value	p value
Exp_Pre_Uln_ROM	24.02	2.02525	50		
Exp_Post_Uln_ROM	27.76	2.14343	50	-6.33	0.00*
Exp_Pre_Uln_MMT	5.04	0.9026	50		
Exp_Post_Uln_MMT	7.1	0.97416	50	-6.693	0.00*
Exp_Pre_Rad_ROM	14.8	2.3819	50		
Exp_Post_Rad_ROM	18.14	2.39906	50	-6.279	0.00*
Exp_Pre_Rad_MMT	5	0.78246	50		
Exp_Post_Rad_MMT	7.56	0.88433	50	-6.317	0.00*

\*Significant at 5% alpha level

Since the p value of 0.00 is lesser than 0.05, alternate hypothesis is accepted. Hence, there is statistically significant difference between pre- test and post test scores among the participants’ Ulnar and Radial Deviation ROM and Muscle power. This suggests that the intervention received by the group had significant improvement.

**Comparison between the pre-test and post-test of the experimental group**

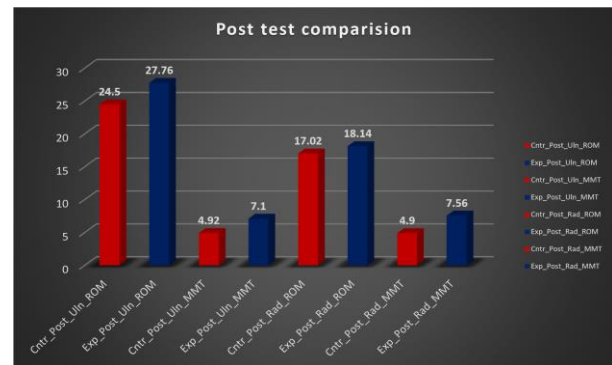


**Statistical analysis between the post- test scores of the control and experimental group**

Group	Mean	SD	N	Z value	p value
Cntr_Post_Uln_ROM	24.5	2.46816	50		
Exp_Post_Uln_ROM	27.76	2.14343	50	-4.3	0.00*
Cntr_Post_Uln_MMT	4.92	0.80407	50		
Exp_Post_Uln_MMT	7.1	0.97416	50	-4.858	0.00*
Cntr_Post_Rad_ROM	17.02	2.59112	50		
Exp_Post_Rad_ROM	18.14	2.39906	50	-4.858	0.00*
Cntr_Post_Rad_MMT	4.9	0.81441	50		
Exp_Post_Rad_MMT	7.56	0.88433	50	-8.276	0.00*

\*Significant at 5% alpha level

Since the p value of 0.00 is lesser than 0.05, alternate hypothesis is accepted. Hence, there is statistically significant difference between post test scores of control and experimental group participants’ Ulnar and Radial Deviation ROM and Muscle power. This suggests that the intervention received by the experimental group had more improvement when compared to the control group.



**6. Discussion:**

The aim of the study was to find out effect of radial and ulnar deviation’s ROM and muscle power using the wrist deviator among ulnar nerve injury patient. The samples were selected from the study from SAVEETHA HOSPITAL AT THANDALAM, POSSIBLE REHAB CENTRE AT TAMBARAM AND RIGHTS HOSPITAL AT KILPAUK. A total no. of. 100 patients with ulnar nerve injury were selected and divided equally into two groups, control group and experimental group, 50 samples in each group. The level of radial and ulnar deviation in both experimental and control groups were measured using goniometer and MMT. The experiment group alone underwent therapeutic tool to improvement ROM and muscle strength for a period of 2 and half months and control group underwent conventional occupational therapy intervention. Table 4.1 & Figure 1 showed the statistical analysis of pretest and posttest of ROM and MMT in the control group. The ‘P’ values less than 0.05 (p<0.05). Since the p-value of 0.00\* is lesser than 0.05, an alternate hypothesis is accepted. The results indicate that there was a significant improvement in radial and ulnar deviation. The results were obtained with the conventional occupational therapy program. The findings of the result in accordance with the previous study **R3 HAMID REZA ROSTAMI 2016** suggested that the results proved the improvement of recovery in impaired function through occupational therapy program. Table 4.2 & Figure 2 shows the statistical



analysis of pretest and posttest ROM and MMT in the experimental group. The “p” values less than 0.05 ( $p < 0.05$ ). Since the p-value of 0.00\* is lesser than 0.05, an alternate hypothesis is accepted. The results indicated there was an improvement in radial and ulnar deviation. The results were obtained with the therapeutic tool. **R5 Jaiyoung Ryu 1991** suggested that the results proved the effect of tool on ulnar and radial deviation of affected wrist. Table 4.3 & Figure 3 showed the statistical analysis of post-test of ROM and MMT in between control and experiment group. Since the p-value is lesser than 0.05, an alternate hypothesis is accepted. The results indicated that there was more improvement in ulnar and radial deviation in experimental group when compared with the control group. It proved the effect of wrist deviator improving ROM and muscle power, ulnar and radial deviation. The result is supported by the previous article **R7. Judy C. Colditz 1984** suggested that the results proved the improvement of ulnar and radial deviations.

## 7. Conclusion:

The study investigated the effect of wrist deviator to improve ulnar and radial deviation among ulnar nerve injury patients. The study was conducted over a period of 2 and a half months. Totally 100 clients with ulnar nerve injury patients. 50 samples were in control group and 50 samples were in experimental group. Pre-test and post-test for both groups by using goniometer and Kendall muscle testing scale. Experimental group underwent the therapeutic tool whereas control group received only conventional occupational therapy. The result showed that there was significant improvement in the experimental group than the control group after training in wrist deviator as an intervention. Thus, the study proved the effect of wrist deviator to improve ulnar and radial deviation among ulnar nerve injury patients.

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**Conflicting Interest:** None

**Ethics Clearance:** Approval from Institution Scientific Review Board (ISRB) was obtained prior to the study.

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