

**STUDY ON THE APPLICABILITY OF 10% RULE OF DOMINANCE IN
NORMAL HEALTHY LEFT HANDED STUDENTS OF KLE UNIVERSITY
- AN OBSERVATIONAL STUDY**

**STUDIUL OBSERVAȚIONAL PRIVIND APLICABILITATEA REGULII
DE 10% A DOMINANȚEI MÂINII STÂNGI LA STUDENȚII SĂNĂTOȘI
DIN UNIVERSITATEA KLE**

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Cuvinte cheie: forța prehensiunii, dinamometru Jamar, dominanța mâinii stângi, Universitatea KLE

Abstract

Background. Research has been done in various places on the grip strength of left and right hand on left handed individuals. Some researchers have found that there is no difference in grip strength. Some suggests there is increased strength in dominant hand by 10%. May this difference be because of the change of place where the study been conducted. Present study has been done in KLE University on left handed students, to find the difference in grip strength, so that the gained data can be useful in hand rehabilitation.

Objectives. To measure the grip strength and the difference between dominant and non-dominant hands in left handed students of KLE University and to check the applicability of 10 percent rule of dominance of the left handed students of KLE University.

Design. 30 left handed individuals were enrolled in the study, whose handedness was determined by a handed questionnaire. Their maximum grip strength was determined with the help of a Jamar dynamometer.

Results. In this study we found out that, there is a difference in grip strength in left handed dominant individuals of KLE University of about 8.39%.

Conclusion. The difference in this grip strength in left handed subjects can be used by the clinician to acquire the preinjury strength level during rehabilitation.

Rezumat

Introducere. S-au efectuat studii în diferite locuri asupra forței prehensiunii la dreptaci și stângaci. Unii cercetători au descoperit că nu există diferențe semnificative ale forței prehensiunii. Alte studii sugerează o dominanță de 10% a forței mai mari în mâna dominantă. Această diferență se poate datora locului diferit unde s-a efectuat studiul. Acest studiu s-a realizat la Universitatea KLE, pe studenții stângaci, pentru a descoperi diferențele în forța prehensiunii, astfel încât datele obținute să poată fi utilizate în recuperarea mâinii.

Obiective. Studiul de față își propune măsurarea forței prehensiunii și a diferenței dintre mâna dominantă și nondominantă la studenții stângaci de la Universitatea KLE și de a verifica aplicabilitatea regulii celor 10 procente a dominanței stângacilor din Universitatea KLE.

Design. 30 de stângaci au fost introduși în studiu, dominanța mâinii fiind stabilită printr-un chestionar. Forța maximă a prehensiunii a fost stabilită cu ajutorul dinamometrului Jamar.

Rezultate. În acest studiu s-a demonstrat că există o diferență de forță a prehensiunii la studenții stângaci din Universitatea KLE în proporție de 8.39%.

Concluzii. Diferența forței de prehensiune la stângaci poate fi folosită de clinician să obțină gradul de forță a prehensiunii avut înainte de incident.

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Introduction

The upper limb especially the hand is the part of the body that has to perform one of the complex and important tasks in any individual daily life. Grip strength measurement is an important component of hand rehabilitation because it assesses the patient's initial limitation as compared to the norms.

The grip strength is usually higher in the dominant hand. Most right handed dominant people have shown higher grip strength in their right hand compared to their left hand. But no differences in grip strength are seen in the left handed dominant individuals. [1] Several studies have been conducted to establish the normative data for grip strength measurements to be used as treatment guidelines. However, these studies did not address right and left-hand strength differences in relation to dominance. In case of hand injuries clinician usually take grip strength measure as their assessment tool to measure the effectiveness of rehabilitation intervention. So to assess the grip strength there is a general rule i.e. the 10% rule which states that a person's grip strength in dominant hand is approximately 10% stronger than in the non-dominant hand. For example, the grip strength goal for a patient with injured right (dominant) hand who has left (non-dominant) hand grip strength of 100 lb. should be 110 lb., excluding adjustment for the extent of injury and other variables. Betchol et al in 1954 observed that most patients presented a difference of around 5 to 10% between their dominant and non-dominant hands on grip strength measurements.

Handedness described by three things.

1. The relative preference for one hand in performance of various unimanual tasks.
2. The greater skilfulness of one hand in performance of these tasks or
3. Greater strength of one hand.

In the present climate of clinical and cost effectiveness the rehabilitation clinicians must set goals for their treatment. One of the most frequently used goals of therapy is to return to preinjury or pre illness muscle strength. Predicting pre injury muscle strength creates certain problems. Many treatment protocols compare the strength of injured limb with that of the uninjured limb. This is useful when preinjury muscle strength is same in both sides. Problem arises when this is not in case for example comparing hand strength. So the need for this study will be by knowing the grip strength values it will be easier to set goals to return to the pre injury or pre illness muscle strength and also to check the utility of 10% rule of dominance in left handed individuals.

Methods

The present observational study was conducted at the colleges in different faculties of KLE University, Belgaum. A notice was put on the various colleges in all faculties, asking the left handed students to volunteer. A total of 30 left handed students were taken purposely from any of the faculties of KLE University. Before taken into study the subjects were screened for the inclusion criteria to meet.

Inclusion Criteria:

- Left hand dominant male and female students.
- Age 18-25 years.
- Normal upper limb strength i.e. without any injury and disease.

Exclusion Criteria:

- Any restriction of movement in upper limb may be due to orthopaedic or neurological causes.
- Any disease or injury affecting hand function.

A brief interview was taken to determine the handedness of the subjects by using handedness questionnaire before taking the grip strength measurement. [2]

Jamar dynamometer was used for taking the grip strength measurement. It is one of the universally accepted instruments to measure the grip strength. Jamar dynamometer is considered as a reliable and valid instrument for measuring the grip strength. [3]

Each participants were measured for grip strength of both left hand and right hand. The participant was made to sit with foot flat on the ground, shoulder adducted and neutrally rotated, elbow flexed to 90 degrees, forearm neutral, wrist between 0-30 degrees of extension and 0-15 degrees of ulnar deviation. [4] Participants were instructed to press the hand handle of dynamometer or to press as maximum as possible. The participants were asked to maintain that force on hand span handle of the dynamometer for about 3secs. Three trails were done with a resting period of 60 sec for both left and right hand. [5] Readings were taken in the dynamometer.

Statistical analysis

Statistical data analysis were performed by statistician who was blinded to the study by using Microsoft excel and SPSS software. Mean of three trail of power grip of dominant and non-dominant hands were calculated for each individual. Percentage of each individual are calculated using the formula $(1-NDH/DH) 100$ for all the 30 subjects. The resultant data was used in the SPSS software for further descriptive and inferential statistics.



Fig 1. Left hand Measurement



Fig 2. Right hand measurement

Results

Significant difference exist between the left and right handed individuals and the difference accounts about 8.39%.

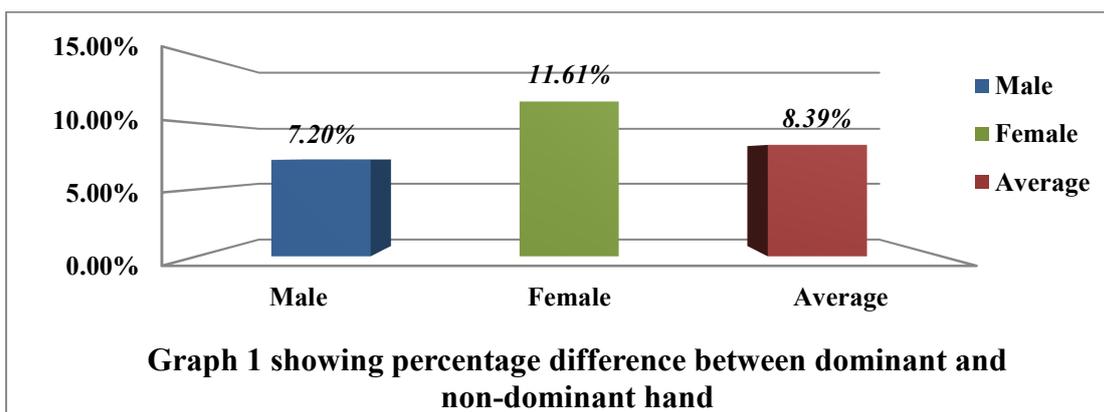


Table- Grip Strength in terms of percentage(%)

Male	Female	Average	SD
7.02%	11.61%	8.39%	8.39±3.81

Discussion

The result of this observational study demonstrates that there is a difference of an average of 8.39% between the dominant and Non-dominant hand of the students of KLE University. The present study observed that, out of 30 subjects (Male = 21 subjects, Female= 9 subjects) males has an average higher grip strength of 7.02% and females have 11.61% in their dominant left hand. Since it is difficult to get exact 10% difference and in this study the difference is almost near to 10%, which justifies the 10% rule of dominance.

Incel et al conducted a study on the grip strength on both left and right handed individual, and found statistically significant difference in strength between the hands. [1] The present study observed similar finding in which there is significant difference in the stronger hand being the dominant hand. But this doesn't go in case of left handed individual where he had found only 3.20%. A study by Shubha Arora [6] they observed marked difference of about 14% to 32% in pinch strength in left handed subjects. Since pinch strength is also a component of grip strength or pinch strength in a way can directly influence grip strength, here in the present study we observed marked difference of 8.39% in the grip strength in left handed dominant subjects. So the present study have similar observation as by Shubha Arora. In a study by Crosby et al [7], they have stated that no difference exist between dominant and non-dominant hand in left handed subjects, so this study contradict with our study, where a difference of 8.39% is observed. The present study observed similar results with the study by Rama Krishna et al [8] as they have also observed a difference of 8.16% in the left handed dominant individuals. Another study conducted by Bhagya [9] on the applicability of 10% rule of dominance on normal healthy left handed individual found the difference of about 8% on the dominant left hand. So this study also shows the dominant left hand grip strength about 8.39% more in left hand dominant subjects and goes with this study. This difference may be due to the comfortability in the present mechanical world as in the past those work which need powerful grasp has been changed to prehensile activities. Many of the tasks which require powerful grasp patterns have been changed into delicate prehensile activities i.e. easy methods and mechanized ways of life styles are being adapted paving way for handedness to play its role.

Secondly, the focus has been increased in the left handed dominant individuals and their performance of work. In the present world of human science enhancing and improving the function of right hemisphere of these individuals are in focus, which may be one of the reasons in this difference in the left handed individuals. The positioning of the hand while measuring grip strength may also be one of the reasons for this result. In this study we have used the standardized positioning of the upper limb given by American Society of Hand.

Therapists (ASHT), which also influences the result in favour of left handed individuals. But in this study we have found that the difference in the right hander's is more than the left hander's, this may be due to the variation in the architectural materials that is predominantly made and meant for right handed dominant individuals. So during rehabilitation, we have to rehabilitate both right and left hand in the left hand dominant individuals because of these architectural variations.

Conclusion

The difference observed was 8.39% with the variation between 7.02 (in females) and 11.62 (in males) which is near to 10% and hence 10% rule of Dominance is justified. The difference in the grip strength in the left handed students of KLE University can be used by the clinician here to acquire the preinjury grip strength during rehabilitation. Since the difference we found was about 8.39% in the left handed dominant individuals of KLE University, this result can also be considered elsewhere for proper rehabilitation purpose.

Limitations

- Small sample size.
- This study has only considered students; hence these results cannot be generalized to other occupations e.g. manual workers.

Clinical application

Knowing the grip strength values it will be easier to set goals to return to the pre injury or pre illness muscle strength.

Conflicts of Interest. The author declare that there is no conflict of interest.

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