Original Article

Comparison on hand grip strength of non-dominant hand among Physiotherapists and other Healthcare Providers

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Abstract

Objective: To compare hand grip strength of non-dominant hand among physiotherapists and other healthcare providers
Study design: It was a A cross-sectional comparative study design.
Place and duration of study: The study was conducted from June 2024 to September 2024.
Material and Methods: This study was conducted on hand grip strength of non-dominant hand among physiotherapists and other healthcare providers. Data was collected through non probability purposive sampling technique. We had 92 participants (46 physiotherapists and 46 healthcare providers i.e.; Nurses, dentists and general surgeon), both male and female aged 25 to 45 years old with the minimum experience of 2 years. Data was collected from public and private hospitals of Rawalpindi. Hand grip strength was assessed after obtaining consent forms from participants. After taking informed consent data was collected using hand held dynamometer.
Results: Data was analyzed using SPSS version 27. Statistical analysis revealed no significant difference ($p>0.05$) in non-dominant hand grip strength between physiotherapists and other healthcare providers.
Conclusion: The study revealed no statistically significant difference in non-dominant hand grip strength between physiotherapists and other healthcare professionals. It indicates that variations of grip strength are more closely influenced by personal elements such as age, gender and activity level rather than professional occupation.
Keywords: Hand Grip strength, Dynamometer, Non-dominant hand, Physiotherapist, Healthcare providers

1. Introduction

Grip strength refers to the overall power and force produced by the muscles in the forearm and hand reflecting the highest level of tension or force generated. [(1)]

The hand is an indispensable and inevitable component of the human body as it has a variety of uses ranging from delicate to forceful movements.[(2)] Hand Grip Strength (HGS) is an objective measure of physical capabilities, and an indicator of whole body strength. As a measure of upper limb functionality, hand grip strength (HGS) reflects changes in muscle strength, physical function, and everyday task performance.[(3)]

Hand grip strength (HGS) serves as a frequently utilized method for evaluating muscle function within clinical environments. It is recognized for its swiftness, affordability, and ease of use. Moreover, HGS exhibits notable reliability in both test-retest and inter-rater scenarios.[(4)] Handgrip strength could serve as a sufficient gauge for overall muscle strength. It offers affordability and can be efficiently employed in clinical setting.[(5)]

Success in occupations that require a lot of manual tasks, like physiotherapy, surgery and dentistry require having a firm grip. The significance of this quality may vary depending on the differences in employment responsibilities, work settings and equipment.[(6)]

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The human hand is highly specialized and complex structure with many intricate parts that cooperate to provide delicate touch and precise movement.[7] The human hand is composed of 27 bones, divided into three groups such as 8 carpal bones, 5 metacarpal bones and 14 phalanges.[8] The joints of hand includes distal radioulnar joint,[9] Carpometacarpal (CMC) joint, Metacarpophalangeal (MCP) joint, Interphalangeal (IP) joints.[10]

The muscles of hand are divided into two groups; intrinsic muscles and extrinsic muscles. The intrinsic muscles work together to control finger movements, including flexion, extension, adduction, and abduction. This group includes thenar muscles, hypothenar muscles, lumbricals and interossei muscles.[11] The extrinsic muscles work together to enable various hand movements such as Flexion, extension, pronation, supination.[12] Hand receives its blood supply from radial artery and ulnar artery.[13] The hand is innervated by median nerve, ulnar nerve and radial nerve.[7]

Hand grip is of various types such as precision pinch, power grip and span grasp.[14] Hand grip strength can be influenced by factors such as; age, gender, ethnicity, activities of daily living and functions that heavily rely on manual dexterity.[15] Symptoms of diminished hand grip strength include experiencing pain, numbness, challenges in grasping objects, muscle weakness, propensity for items to slip from the hand.[16]

The evaluation of hand grip strength employs various assessment methods, which are influenced by the availability of tools and the specific objectives of the assessment. The main methods used to measure hand grip strength include hand dynamometry[17] and manual muscle testing.[18] The Medical Research Council Manual Muscle Testing scale is a widely accepted method for assessing muscle strength. This evaluation technique involves testing specific muscles against the examiner's resistance, grading strength on a 0-5 scale. The scale measures muscle function, ranging from grade 0 indicates no muscle contraction, grade 1 indicates barely perceptible muscle contraction, grade 2 indicates movement possible only when gravity is neutralized, grade 3 indicates full range of motion against gravity without resistance, grade 4 indicates full range of motion against moderate resistance, grade 5 indicates full range of motion against maximum resistance.[19]

A variety of techniques are used to improve hand grip strength such as resistance training, therapeutic exercises and occupational therapy. Resistance training includes use of hand grippers[20] and dumbbell exercises.[21] The therapeutic exercises include putty exercises[22] and finger extension exercises.[23] Occupational therapy can be performed through task specific training it involves activities that mimic real-life tasks, like grasping door handles, twisting jar lids, or handling utensils.[24]

The study on hand grip strength of non-dominant hand among physical therapists and other healthcare providers holds significant implications for both clinical practice and occupational health. Previous research has thoroughly examined grip strength in a variety of groups, focusing mostly on the dominant hand; this study aims to fill the void by investigating the often-overlooked non-dominant hand. It offers insights into how professional training influences hand strength and helps create focused interventions to enhance hand function and avoid injuries.

2. Materials & Methods

A cross-sectional comparative study was conducted on hand grip strength of non-dominant hand between physiotherapist & other health care providers as nurses, dentist and general surgeons at public and private hospitals. The sample size was calculated by open Epi tool.[25] The total sample size was 92 in which 46 participants were physiotherapists and 46 participants were other health care providers (dentists, general surgeons & nurses). Non-probability purposive sampling was done. Those participants who met the inclusion criteria and gave consent were included in this study and others were exempted. The duration of this study was four months from June 2024 to September 2024. Normal healthy subjects (practicing

professionals) both male and female aged 25 - 45 years having experience of 2-3 years were included. Participants with history of inflammatory joint diseases in upper extremity, subjects with neurological disorders & subjects with injuries to upper extremity were excluded from this study. Prior consent was taken from all participants before inclusion in the study. The hand grip strength of participants was assessed by hand held dynamometer. Permission was obtained from the Ethical Review Committee of Center of Advanced Studies in Health &Technology (Ref.NO: CASHT/IRB/2024/007). Hand grip strength was assessed after obtaining consent forms from participants. Data was analyzed by SPSS version 27. Descriptive Statistics used to summarize the data and inferential statistics was performed to compare grip strength among physiotherapists and other health care providers. Independent t-test is a statistical test comparing the means of two independent groups (e.g., physiotherapists vs. other health care providers).

3. Results

The mean value of age in physiotherapist was 30 years and in health care providers was 33 years.

Table 1: Age of Participants

Age	Mean
Physiotherapists	30years
Other healthcare providers	33years

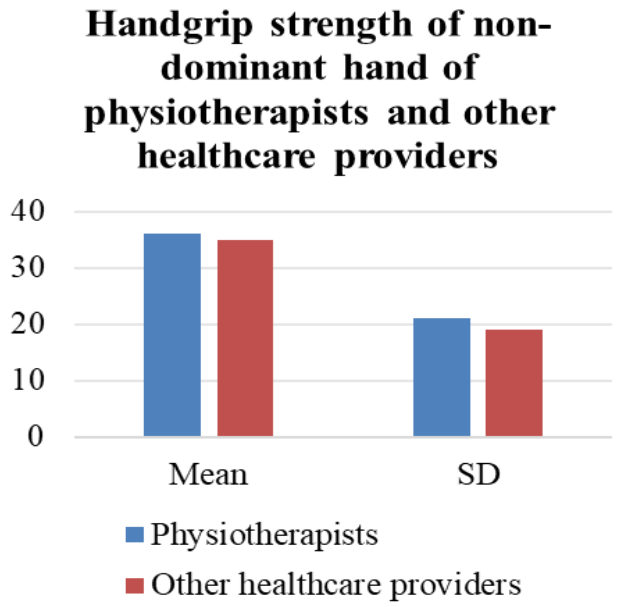
Out of total 92 participants, 52 (56%) participants were female and 40(44%) were male participants. Female participants representing majority whereas male participants representing minority.

The statistical analysis by independent sample t test yielded p value >0.05 showing that there is no statistical difference between hand grip strength of non-dominant hand of physiotherapists and other health care providers. The 95% confidence interval for the difference in mean ranged from -7.343 to 9.256.

Table 2: Handgrip strength of non-dominant hand of physiotherapists and other healthcare providers

Non dominant hand grip strength	Mean	S.D	P value
Physiotherapists	35.70	20.720	0.819
Other health care providers	34.74	19.720	0.819

Mean hand grip strength of non-dominant hand of Physiotherapist is 35.7 and standard deviation of hand grip strength of non-dominant hand is 20.720 , whereas mean hand grip strength of non-dominant hand of other health care providers is 34.74 and standard deviation of hand grip strength of non-dominant hand of other health care providers is 19.325.



Graph 1: Handgrip strength of non-dominant hand of physiotherapists and other healthcare providers

4. Discussion

This study compared the grip strength of non-dominant hand in healthcare professionals and physiotherapists. The analysis showed that both the two groups have no significant difference in hand grip strength, suggesting

that physiotherapists do not have stronger hand grip strength of non-dominant hand than other healthcare professionals.

The result of this study was aligned with a previous study "Comparison of Hand Grip Strength among Chefs and Non-Chefs" which is conducted in 2022 by Mazhar, F., Amjad, F., & Ahmad, investigated hand grip strength among chefs and non-chefs in Lahore restaurants and hotels. Electronic dynamometer was used by researcher to find the hand grip strength of both dominant and non-dominant hand. The results showed that chefs had a mean hand grip strength of 39.90 kg in their dominant hand and 38.36 kg in their non-dominant hand. In comparison non-chefs had a mean hand grip strength of 38.54 kg in their dominant hand and 37.15 kg in their non-dominant hand. Results showed that study found no significant difference in hand grip strength between chefs and non-chefs, indicating that both groups have similar hand grip strength.[26]

The results of current study can be compared to the research "Comparison of Hand Grip Strength Between Physiotherapy Students and Dental Students" by Neha Lakshmanan et al. (2024), who found physiotherapy students have stronger hand grip strength than dental students.[25] In contrast, this study included practicing professionals, such as physiotherapists and other healthcare providers (dentists, surgeons, and nurses), all of whom have been practicing for two years or more. This approach allows us to investigate how occupation affects hand grip strength among experienced professionals, rather than focusing solely on students from specific disciplines

A study "Relationship of hand grip strength, physical activity and anthropometric characteristics of Male and Female physiotherapy students" by Tsekoura et al. (2023) sheds light on hand grip strength differences between young men and women. Their study of 276 Greek students found men generally have stronger grips, with muscle mass, gender, and body measurements playing key roles. Interesting fact is that only regular physical activity boosted grip strength in women.[27] In contrast, current study explored non-dominant hand grip strength among healthcare professionals, focusing on occupation rather than gender or physical activity. Surprisingly, we found no significant differences in grip strength between physiotherapists and other healthcare providers. These findings highlight the complex factors understanding these differences can help tailor strategies for improving grip strength and overall well-being.

This study investigated non-dominant hand grip strength among physiotherapists and other healthcare professionals comparison with a study "Hand grip strength determination for healthy males in Saudi Arabia: A study of the relationship with age, body mass index, hand length and forearm circumference using a hand-held dynamometer" by Alahmari et al. (2016), who studied hand grip strength in healthy Saudi males and identified hand length, age, and forearm circumference as significant predictors, with age negatively correlated with grip strength.[28] Grip strength is more closely related to individual characteristics such as age and gender than professional occupation is suggested by minimal mean difference and non-significant p- value. This suggested that grip strength is not necessarily a distinguishing factor between physiotherapists and other healthcare professionals.

Conclusion:

The study revealed no statistically significant difference in non-dominant hand grip strength between physiotherapists and other healthcare professionals. It indicates that variations of grip strength are more closely influenced by personal elements such as age and gender rather than professional occupation.

Limitations of the study:

The cross-sectional design limits the ability to infer causality or observe changes over time, suggesting the need for longitudinal research. Additionally, while the sample provides useful data, it may not fully represent all professional roles or demographics, potentially affecting generalizability. Future research should further explore the impact of individual demographic factors on grip strength and investigate potential implications for occupational health and ergonomics. Additionally, longitudinal studies could provide deeper

insights into how grip strength evolves over time within various professional groups

Disclosure & Conflict of Interest:

The authors have no conflict of interest. This research didn't receive any specific grant from funding agencies in the public, commercial or not for profit sectors.

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