Dissertation Traning

at

International Institute of Health Management Research [IIHMR], Delhi

Factors affecting hand grip strength in young adults

By

DR. SHALLY (PT)

Enroll no: PG/23/105, Session: (2023-25)

Under the guidance of

Nishikant Bele

Assossiate Professor, IIHMR, New Delhi

PGDM (Hospital and Health management)

2023-2025

International Institute of Health Management Research, New Delhi 2023-25

FEEDBACK FORM

Name of the student: Dr. Shally PT

Name of the organization in which Dissertation Has Been Completed: International Institute of Health Management Research [IIHMR], Delhi

Area of Dissertation: Factors affecting hand grip strength in young adults.

Attendance: Perfect adherence to dissertation norms

Objectives achieved: The student understood the details of the concept, worked on data collection and data analysis.

Deliverables: Literature review

Strengths: Hard work, diligence and proactiveness.

Suggestions for improvement:

Suggestions for Institute:

Signature of the Organization Mentor (Dissertation)

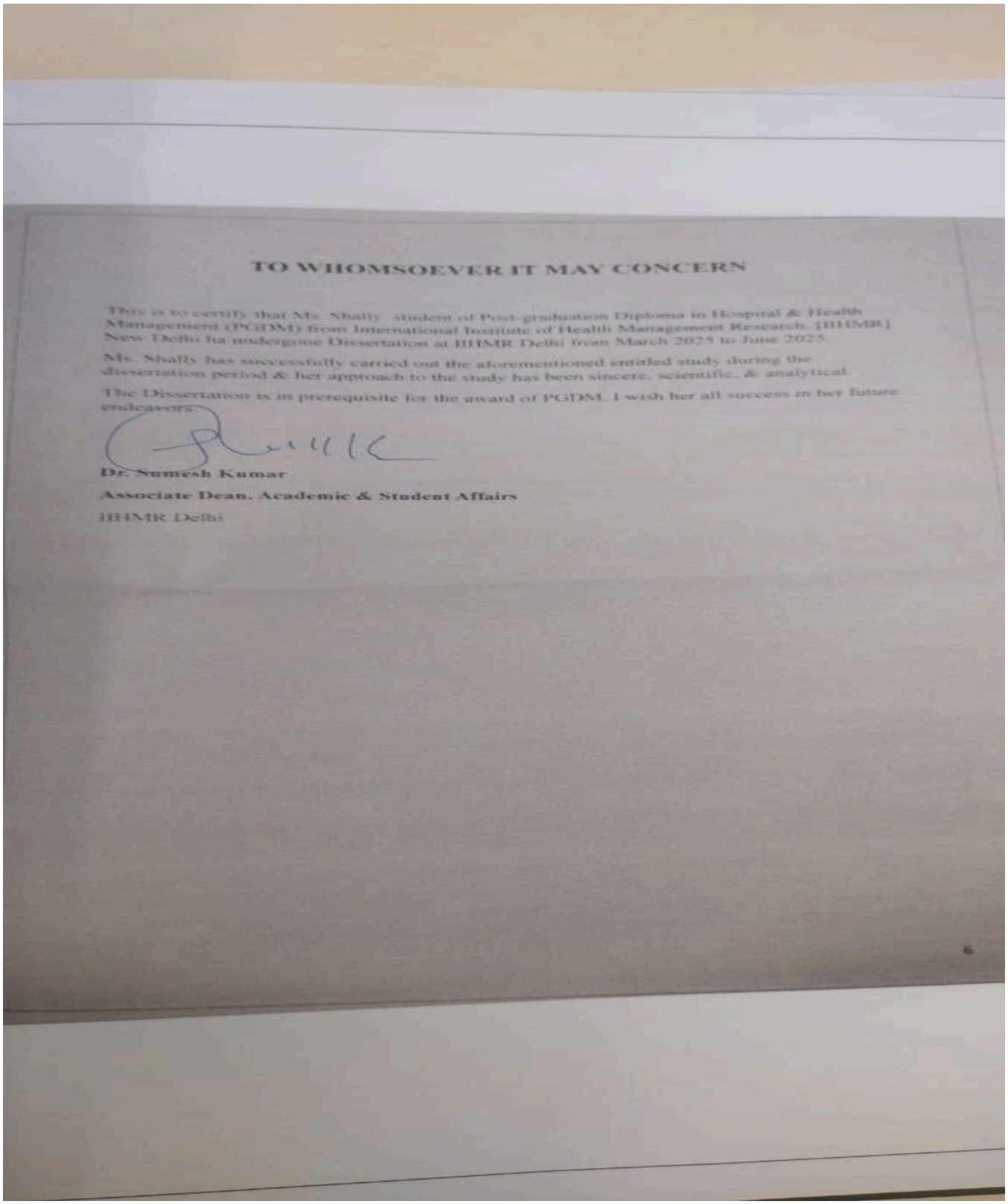
Date: 22-8-25

Place: IIHMR DELHI

CERTIFICATE

I hereby declare that the dissertation entitled **"FACTORS EFFECTING HAND GRIP STRENGTH IN YOUNG ADULTS"** embodies the original work done by me. This work has not been submitted to any other university.

Mentor
Nishikant Bele
Assistant Professor,
IIHMR, NEW Delhi, India



TO WHOMSOEVER IT MAY CONCERN

This is to certify that Ms. Shally student of Post-graduation Diploma in Hospital & Health Management (PGDM) from International Institute of Health Management Research, [IIHMR] New Delhi ha undergone Dissertation at IIHMR Delhi from March 2025 to June 2025.

Ms. Shally has successfully carried out the aforementioned entitled study during the dissertation period & her approach to the study has been sincere, scientific, & analytical.

The Dissertation is in prerequisite for the award of PGDM. I wish her all success in her future endeavors.

Dr. Sumesh Kumar

Associate Dean, Academic & Student Affairs

IIHMR Delhi

Certificate of Approval

The following dissertation titled **Factors Affecting Hand Grip Strength in Young Adults : A Review Study .** at **IIHMR Delhi** is hereby approved as a certified study in management carried out and presented in a manner satisfactorily to warrant its acceptance as a prerequisite for the award of **PGDM (Hospital & Health Management)** for which it has been submitted. It is understood that by this approval the undersigned do not necessarily endorse or approve any statement made, opinion expressed or conclusion drawn therein but approve the dissertation only for the purpose it is submitted.

Dissertation Examination Committee for evaluation of dissertation.

Name	Signature
Dr. Archana Thapa	
Dr. Anuj Kumar Pandey	
Muniakshi Gautam	

CERTIFICATE BY SCHOLAR

This is to certify that the dissertation titled "**FACTORS EFFECTING HAND GRIP STRENGTH IN YOUNG ADULTS**" and submitted by Shally Enrolment No PG/23/105 under the supervision of Nishikant Bele Assistant Professor,IIHMR, NEW Delhi, India for award of PGDM (Hospital & Health Management) of the Institute carried out during the period from April 2025 to June 2025 embodies my original work and has not formed the basis for the award of any degree, diploma associate ship, fellowship, titles in this or any other Institute or other similar institution of higher learning.

Signature

Shally

7

IIHMR DELHI

INTERNATIONAL INSTITUTE OF HEALTH MANAGEMENT RESEARCH (IIHMR)

Plot No. 3, Sector 18A, Phase- II, Dwarka, New Delhi- 110075
Ph. +91-11-30418900, www.iihmrdelhi.edu.in

CERTIFICATE ON PLAGIARISM CHECK

Name of Student (in block letter)	Dr./Mr./Ms.: SHALLY (PT)		
Enrollment/Roll No.	PGP/23/105	Batch Year	2023-25
Course Specialization (Choose one)	Hospital Management	Health Management ✓	Healthcare IT
Name of Guide/Supervisor	Dr./ Prof. NISHIKANT Bele		
Title of the Dissertation/Summer Assignment	Factors affecting hand grip Strength in Young Adults.		
Plagiarism detect software used	"TURNITIN"		
Similar contents acceptable (%)	Up to 15 Percent as per policy		
Total words and % of similar contents Identified	10%		
Date of validation (DD/MM/YYYY)	19/12/2025		

Guide/Supervisor
Name: Nishikant Bele
Signature:

Student
Name: Dr. Shally (PT)
Signature: Shally

Report checked by

Institute Librarian

Signature:
Date:
Library Seal

Dean (Academics and Student Affairs)

Signature:
Date:
(Seal)

Shally Pandey D report

ORIGINALITY REPORT

10%	7%	8%	4%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	Zheng-yang Xu, Deng-fa Gao, Ke Xu, Zi-qi Zhou, Ying-kun Guo. "The effect of posture on maximum grip strength measurements", Journal of Clinical Densitometry, 2021 Publication	2%
2	www.mdpi.com Internet Source	2%
3	bfpt.springeropen.com Internet Source	1%
4	Submitted to Coventry University Student Paper	1%
5	Suena Medeiros Parahiba, Stefanny Ronchi Spillere, Priccila Zuchinali, Gabriela dos Reis Padilha et al. "Handgrip strength in patients with acute decompensated heart failure: Accuracy as a predictor of malnutrition and prognostic value", Nutrition, 2021 Publication	1%
6	ijms.sums.ac.ir Internet Source	1%
7	pureportal.strath.ac.uk Internet Source	1%
8	www.nature.com Internet Source	1%

Certificate from Dissertation Advisory Committee

This is to certify that Ms. Shally, a graduate student of the PGDM (Hospital & Health Management) has worked under our guidance and supervision. He/ She is submitting this dissertation titled "**FACTORS EFFECTING HAND GRIP STRENGTH IN YOUNG ADULTS**" at "IIHMR, Delhi" in partial fulfilment of the requirements for the award of the PGDM (Hospital & Health Management).
This dissertation has the requisite standard and to the best of our knowledge no part of it has been reproduced from any other dissertation, monograph, report or book.

Institute Mentor Name, - A.N Ishikant Bele

Designation, - ~~Assistant~~ Associate professor

Organization - IIHMR, NEW DELHI, INDIA

Acknowledgment

First and foremost, I express my heartfelt gratitude to the **Almighty** for granting me the strength, resilience, and clarity of purpose to successfully complete this dissertation.

I am deeply grateful to **Nishikant Bele**, my esteemed mentor for his constant encouragement, insightful guidance, and mentorship throughout this journey. His expertise has been instrumental in shaping the direction and depth of this research.

I would like to extend my sincere thanks to the **Schools and People of Palwal,** for providing me the opportunity to conduct this study in their area. I am especially thankful to the girls and their families, whose cooperation, valuable time, and honest responses made this research possible.

I am incredibly thankful to my **family and friends** for their unwavering support, encouragement, and understanding especially during the challenging phases of this project. Their faith in me kept me motivated throughout.

Lastly, I would like to express my gratitude to everyone who contributed, directly or indirectly, to the successful completion of this dissertation. Each one of you holds a special place in this academic milestone.

Index

CHAPTER **page no.**

Abstract

Hand grip strength (HGS) is an important biomarker of overall health, functional capacity, and musculoskeletal fitness. It plays a vital role in daily activities and is increasingly recognized as a predictor of chronic disease, disability, and premature mortality. This dissertation systematically reviews the factors influencing hand grip strength in young adults aged 18–25 years. A total of 35 research articles published between 2010 and 2022 were screened, of which 15 met the inclusion criteria and were analyzed in detail. Findings indicate that multiple determinants including posture, body mass index (BMI), nutritional status, dominant hand use, smoking, bone mineral density, and exposure to environmental pollution significantly affect grip strength. Conversely, factors such as forward head and rounded shoulder posture, and moderate variations in muscle temperature, showed little or no effect. The review highlights that while lifestyle factors and physiological attributes enhance or impair HGS, abnormal postural deviations alone may not be predictive. These insights are clinically significant for healthcare professionals in assessing musculoskeletal function, designing rehabilitation programs, and

identifying early risks of chronic disease in young adults. However, limitations include the scarcity of direct studies on young populations and variability in study methodologies. Overall, this review emphasizes the need for standardized protocols and further longitudinal studies to strengthen the understanding of HGS as a diagnostic and prognostic tool.

CHAPTER 1

INTRODUCTION

The hand is one of the most important parts of the human body, as it plays a central role in both everyday life and specialized activities. From sports such as cricket, badminton, table tennis, and baseball to daily tasks like turning a doorknob, carrying groceries, or cleaning, our hands are constantly engaged.The strength of the hand reveals the impact of the musculature of the hand and forearm, which provides a proper grip. People with weak grips may have a tendency toward diagnosed conditions such as medial epicondylitis, otherwise referred to as golfer's elbow. While grip strength justifies attention, it is an indicator for physical development, injury prevention, and health. Researchers have identified handgrip strength as a valid biomarker of important physiological functions. Grip Strength has been associated with reduced risk of chronic disease and likely reduced risk of premature death [1]. The most common instrument for measurement is the dynamometer.

Handgrip strength is influenced by many factors, including age, posture, medical history, injuries, psychological state, and physical fitness. Research has indicated declines in grip strength with age, disability, and can impact health and quality of life. This review study attempts to notate these differences. The American Society of Hand Therapists (ASHT) has identified a "standard" method for grip strength measurements and will help improve consistency in grip strength measures and definitions. In their protocol, participants should sit upright with their feet flat on the floor, shoulders relaxed with a neutral position, and elbows bent to a 90-degree angle.

Statement of Problem:

WHAT ARE THE FACTORS EFFECTING HAND GRIP STRENGTH IN YOUNG ADULTS

Purpose of the study :

To find out factors effecting the strength of hand griping young adults

Alternate hypothesis

There will be many factors that will be affecting Hand grip strength.

Null hypothesis

There will be no factors effecting hand grip strength.

Clinical significance

- This study will help health professionals to diagnose muscle related problems while assessing and training hand grip strength.

Primary Objective

- To make convenient assessment and rehabilitation of hand muscle strength

Variables

- Independent: Factors which are affecting hand grip.
- Dependent: Hand grip strength.

Key words

Dynamometer: - A device use to measure hand grip strength.

Sarcopenia: - Involve accelerated loss of muscle function and its mass.

Fatigability: - extreme tiredness resulting from physical exertion or illness

CHAPTER 2

METHEDOLOGY

This review explored the literature, identifying a good number of factors that influence handgrip strength among young adults. Based on carefully articulated inclusion criteria, a total of 35 research papers were amassed, assessed for quality and relevance to the review, and used them to explore young adults' handgrip strength. Of the 35 papers, 20 did not fully satisfy the criteria, either as a result of duplicate occurrence of data, limited information provided, or incomplete results. Since unconditional confidence was required in the trustworthiness of the final analysis 15 was determined to be suitable to include, after all 15 provided substantial and reliable information.

The final selection included studies in English due to the reliability and clarity of interpretation of English-language studies, while excluding papers from other languages to eliminate misinterpretation, and to ensure constancy without misleading variability. Other studies that contained overlapping findings, or other insufficient reporting of the determinants of young adults' handgrip strength were trashcanned. This review approach at hand contributed to a more concise and reliable understanding of the variables producing variability to explain the variation in handgrip strength among young adults..

Source of study

Data were collected by hand review from library of Sanskrit university as well as through various databases search such as PubMed, ResearchGate, NCIB

Study design

Literature review

Participation criteria

Inclusion criteria:

a) The articles which are included in this review study are those which are published from year 2010 to 2022 and come under title " factors effecting hand grip strength" .

b) All genders were included in the study.

c) Age between 18 to 25 years.

Exclusion criteria:

Those articles are excluded which are published before 2010. Also those studies are excluded which are done on elder polulation.

Study design

Systematic review:

Procedure:

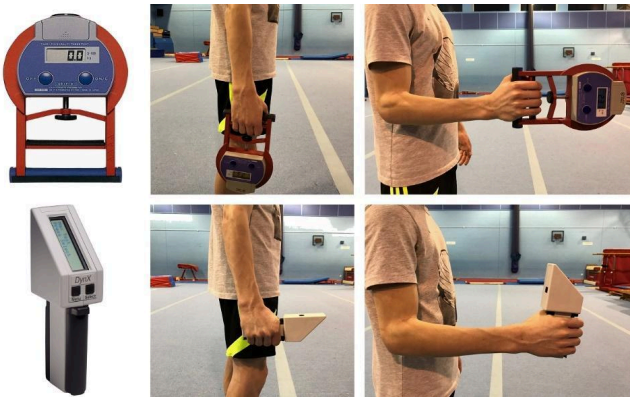
Data was collected by reviewing various articles pertaining to factors effecting hand grip Strength in various peer journal. Information was filtered as per the article the articles published in the time span of last 12 years (2010 to 2022). Both male and female genders are included

In studies who are aged between 18-25 years (young adults). Exclude studies are those which are done on old adults and senior citizens. All articles and studies are Thorley rude while this review of literature has done.

CHAPTER 3

RESULTS

- In 2021, Zheng Yang Xu and Deng Fe Gao conducted a study examining the effect of posture on maximum grip strength. Their findings showed that grip strength values were higher when participants were assessed in a standing position with the elbow fully extended, compared to measurements taken while sitting—the posture that is most commonly recommended in clinical practice. Based on these results, the authors emphasized that both clinicians and researchers should carefully consider the posture adopted during assessment, as selecting the most suitable and consistent position is essential for obtaining accurate and reliable measurements of grip strength.



In 2020, Dalia Mohammed Mosaad, Amr Almaz Abdel-Aziem, and Ghada Ismail Mohamed conducted an experimental study to assess how forward head posture (FHP) and rounded shoulder posture (RSP) impact handgrip strength in healthy young adults. They found that FHP and RSP had no effect on grip strength in asymptomatic

individuals. Consequently, this means that these postures do not enhance or typically reduce grip strength in this group. However, the authors suggested that future research might focus on symptomatic individuals utilizing the postural assessment and documenting their clinical symptoms before the grip strength assessments because these findings could be valuable in preventing a domino effect of complications for the upper extremities.

- Abdalla Alrashdan, Atef M. Ghaleb and Malek Almobarek. They conducted study Normative Static Grip Strength of Saudi Arabia's Population and Influences of Numerous Factors on Grip Strength. The goal of this study was to explore how various factors like gender, age, hand size, and BMI influence grip strength among the Saudi Arabian population. The hypotheses driving this research suggested that gender, age, hand measurement, and BMI play a significant role in determining grip strength. Overall, the results aligned with findings from a previous study conducted in some.

Anna Flood, Alexis Chung, Hayley Parker, Victoria Kearns, and Therese A. O'Sullivan conducted a study to determine whether handgrip strength (HGS) could be used as an indicator of nutritional status in patient populations. They found that HGS is an independent indicator nutritional status of an individual and can indicate change in nutritional status as assessed by the PG-SGA score and category. Nevertheless, they felt more studies need to be completed to determine whether HGS can be an accurate screening tool for identifying risk of malnutrition in patients.

- R.E. Anakwe, J.S. Huntley, and J.E. Mceachan conducted a study in 2010 comparing grip strength with forearm circumference in a healthy population. Their study found that the grip strength from the dominant hand was greater than that of the non-dominant hand. They also found within their data that sarcopenia (loss of muscle mass) begins occurring after the age of 35, leading to decreases in the size of the forearm in men and women.

  •Mark W. Cornwall and Deepak conducted a study in 2018, which focused on how temperature affects muscle force and rate of force development in men and women. Their results stated that there was no change in muscle strength when muscle temperature was in the range of 27°C to 40°C. However, when muscle temperature dropped below 27°C there was a clear decline in isometric grip strength and endurance. Furthermore, higher temperatures generally provided a slight increase in grip strength.

  •As recently in 2015, Siti Nur Baait Biniti Mohd Sokran, Vikram Mohan, Kamaria Kamaruddin, Mohd Daud Sulaiman, Yahya Awang, Ida Rosmini Binti Othman, and Smiley Jesu Priya Victor conducted a study on handgrip strength (HGS) and myocardial oxygen consumption among patients who underwent coronary artery bypass grafting (CABG). Their results indicated a relationship between HGS and

oxygen consumption before and after surgery. Given this, the researchers proposed using HGS to assess oxygen consumption in cardiac patients.

- In 2019, Burke W. studied grip strength, grip strength endurance, and age. Their findings indicated that maximum grip strength endurance was almost double grip strength endurance for the same age group. Burke also noted that peripheral muscle fatigue has a direct relationship with grip strength outcomes.
- In 2014, Saud O., Nowall S., and Mohammed N. studied cigarette smoking as a factor associated with grip strength and fatigue resistance. They found smokers had less grip strength and became fatigued more quickly than non-smokers. The study indicated the chemicals found in cigarette smoke, along with inflammatory processes in the body, increase muscle breakdown (proteolysis) and decrease proteosynthesis, which collectively lead to the loss of muscle.
- In 2020, a team of researchers (Hualiang Lin, Yanfei Guo, Zengliang Ruan, Paul Kowal, Qian Di, Yang Zheng, Jianpeng Xiao, Emiel O. Hoogendijk, Elsa Dent, Michael G. Vaughn, Steven W. Howard, Zheng Cao, Wenjun Ma, Zhengmin Min Qian, and Fan Wu) examined the effects of indoor and outdoor air pollution on handgrip strength in adults across six low- and middle-income countries. Their results indicated that exposure to both indoor and outdoor air pollution could be an important risk factor for reduced handgrip strength, which, in turn, is an indication of poorer health and lower functional status.

- Last, in 2018, Anna Kopiczko, Karol Gryko and Monika Łopuszańska-Dawid investigated the relationship between bone mineral density, handgrip strength, smoking status, and physical activity in young Polish men (N=172). The results indicated that around three-quarters of the men with low bone density had reduced handgrip strength, with an average decrease of 63.2 N or more. This is an emblematic indicates suggests that reduced bone density and weaker grip strength are closely related in this cohort.

• Daniel Prieto-Alhambra, Aleksandra Turkiewicz, Carlen Reyes, Simon Timpka, Björn Rosengren, Martin Englund. They researched Smoking and Alcohol Intake but

Not Muscle Strength in Young Men Increase Fracture Risk at Middle Age in 2019. They concluded that low HGS measures are not associated with fracture risk at older age. More recently, other prospective studies reported an excess hazard of fracture in men with low HGS ranging from 5% to 233% and a 5% decrease in fracture risk for every 1 kg increase in muscle strength.

• In 2021, Rodrigo R. P. Duarte, M. Cristina Gonzalez, Jacqueline F. Oliveira, Maíra Ribas Goulart, and Iran Castro looked at the relationship between nutritional and functional parameters and severity of congestive heart failure. They found an inverse relationship between handgrip strength and carotid IMT and EMT in young women. This indicates that greater muscular strength is associated with a lower risk of cardiovascular disease (CVD) in young women, which may positively influence subclinical carotid atherosclerosis, regardless of physical activity levels.

CHAPTER:4

DISCUSSION

Systematic reviews/meta-analyses to summarize the current research on factors influencing hand grip strength of young adults. This systematic review of all 15 articles led me to conclude that there are many factors influencing hand grip muscle strength and also there are some factors which has no influence on hand grip strength. Posture is one of the important factors in strength of hand grip for instance the grip strength is greater when measured in the siting posture compared to the standing posture [6] There is no effect of any abnormal postures such as forward head right shoulder posture (FHRSP) and right shoulder posture (RSP) on strength of hand grip [7]. And one other article concluded that the KGS is very much depended of the person's BMI [8]. Nutritional status of client may be assessed using grip strength as it has been found that people with poorer nutritional status had lower HGS [9]. It has been also found that a subject's HGS of dominant hand in comparison to non-dominant hand [10]. However, there was a study conducted in 2018 of hand grip strength was observed that the temperature has either no or little effect on hand grip strength [11].Adequate amount of oxygen is required to our body if so doesn’t happen then it will

affect HGS [12]. Also smoking, bone density of hand, alcohol consumption and persons suffering from CHF as decreased hand grip strength [17 18 19 20 & 21]

CHAPTER 5

CONCLUSION

Multiple factors influence hand grip strength, including temperature, myocardial oxygen levels, CHF patients, body mass index, arm girth, nutritional status, substance abuse and malignancy, which are all positively correlated with maximal hand grip strength - until reaching, or near, normal levels. On the other hand, age, obesity and sedentary habits decreased HGS. Other factors that had little or no effect on HGS measurements included temperature and postural abnormalities.

CHAPTER 6

Limitations

- There were more articles but not relevant to the population sought in this review study.
- Plus, there were not a lot of direct studies related to our topic available.
- Limited physiological factors.
- Scrutinising was tough because of the volume of articles.

References

1. MANAGEMENT OF POSTURAL LOW BACK PAIN AMONG THE INFORMATION TECHNOLOGY PROFESSIONALS: A MULTIPLE THERAPUETIC INTERVENTION APPROACH Vengata Subramani Manoharan *, Subramanian Ganesh sundaram, Jacob Isaac Jason. Physiotherapy Department, Faculty of Pharmacy and Health Sciences, Universiti Kuala Lumpur- Royal College of Medicine Perak, Malaysia.
2. Clinical definition of sarcopenia Valter Santilli, Andrea Bernetti, Massimiliano Mangone, Marco Paoloni Clin Cases Miner Bone Metab. 2014 Sep-Dec; 11(3): 177–180. Published online 2014 Dec 10
3. Differences in handgrip strength protocols to identify sarcopenia and frailty - a systematic review A R Sousa-Santos 1, T F Amaral 2
4. hechtman O, Davenport R, Malcolm M, Nabavi D. Reliability and validity of the BTE-Primus grip tool. J Hand Ther. 2003; 16:36-42. 11.
5. Shechtman O, Gestewitz L, Kimble C. Reliability and validity of the DynEx dynamometer. J Hand Ther. 2005; 18:339-347.
6. Xu, Z., Gao, D., Xu, K., Zhou, Z., & Guo, Y. (2021). *The Effect of Posture on Maximum Grip Strength Measurements. Journal of Clinical Densitometry.*
7. Dalia Mohammed Mosaad, Amr Almaz Abdel-aziem3 and Ghada Ismail Mohamed. Effect of forward head and rounded shoulder posture on hand grip strength in asymptomatic young adults.
8. Abdalla Alrashdan, Atef M. Ghaleb and Malek Almobarek. Normative Static Grip Strength of Saudi Arabia's Population and Influences of Numerous Factors on Grip Strength.

9. Anna Flood, Alexis Chung, Hayley Parker, Victoria Kearns and Therese A O Sullivan. The use of hand grip strength as predictor of nutritional status in patient.
10. R. E. Anakwe, J. S. Huntley and J. E. Mceachan Grip strength and forearm circumference in a healthy population.
11. Mark W. Cornwall and Deepak. Effect of temperature on muscle force and rate of force production in men and women.
12. . Sokran SN, Mohan V, Kamaruddin K, Sulaiman MD, Awang Y, Othman IR, Victor SJ. Hand Grip Strength and Myocardial Oxygen Consumption Index among Coronary Artery Bypass Grafting Patients, Iran J Med Sci. 2015;40:335-40.
13. Cortopassi F, Celli B, Divo M, Pinto-Plata V. (). Longitudinal changes in hand grip strength, hyperinflation and 6-minute walk distance in COPD patients and a control group, Chest. 2015 May 21. doi: 10.1378/chest.14-2878.
14. Burke W. The relation of grip strength and grip strength endurance to age, Journal of Applied Physiology. 1953;5:628-30.
15. Saud O, Nowall S, Mohammed N. Smoking Impact on Grip Strength and Fatigue Resistance: Implications for Exercise and Hand Therapy Practice, JPAH. 2014;11:1025-31.
16. Cruz-Jentoft AJ, Baeyens JP, Bauer Jurgen M, et al. 2010 € Sarcopenia: European consensus on definition and diagnosis: report of the European Working Group on Sarcopenia in older people.
17. Hualiang Lin, Yanfei Guo, Zengliang Ruan, Paul Kowal, Qian Di, Yang Zheng, Jianpeng Xiao, Emiel O Hoogendijk, Elsa Dent, Michael G Vaughn, Steven W Howard, Zheng Cao, Wenjun Ma, Zhengmin Min Qian, Fan Wu. Association of Indoor and Outdoor Air Pollution With Hand-Grip Strength Among Adults in Six Low- and Middle-Income Countries.

18. *Anna Kopiczko 1 , Karol Gryko 2 , Monika Łopuszańska-Dawid* Bone mineral density, hand grip strength, smoking status and physical activity in Polish young men Epub 2018 Aug 14.
19. Timothy Howarth, Belinda Davison, Gurmeet Singh Grip strength among Indigenous and non-Indigenous Australian adults: a longitudinal study of the effects of birth size and current size.BMJ Open. 2019 .
20. Daniel Prieto-Alhambra, Aleksandra Turkiewicz, Carlen Reyes, Simon Timpka, Björn Rosengren, Martin Englund. Smoking and Alcohol Intake but Not Muscle Strength in Young Men Increase Fracture Risk at Middle Age: A Cohort Study Linked to the Swedish National Patient Registry Epub 2019.
21. Rodrigo R P Duarte, M Cristina Gonzalez, Jacqueline F Oliveira, Maíra Ribas Goulart, Iran Castro. Is there an association between the nutritional and functional parameters and congestive heart failure severity?