Original Article 1

NORMATIVE REFERENCE VALUES OF HAND GRIP STRENGTH AMONG GERIATRIC POPULATION OF LAHORE

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Abstract

Background: Ability to perform daily activities independently is crucial for the quality of life of the geriatric population. The objective of this study was reduced muscle strength is one of the major contributors to functional decline in geriatric population. Muscle strength is considered as an important part of examining the patient physically. The grip strength measurement through dynamometric method is highly valuable for indicating the major outcomes.

Material and Methods: A cross-sectional study was conducted at Farooq Hospital Lahore. (February 2023 to May 2023) in which the technique of non-probability convenient sampling was used, in order to collect data from 148 participants, among the geriatric population of Lahore.

Results: The average normative value of hand grip strength was determined using the upper extremity functional scale of the participants. The normative reference values for this cross-sectional study were 17.9 kg for women and 26.2 kg for men.

Conclusion: Normative reference values provide crucial benchmarks for assessing overall muscle strength in geriatric population.

Keywords: Normative refence values, Hand grip strength, Muscle strength

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INTRODUCTION

The ability to perform daily activities independently is crucial for the quality of life of the geriatric population. Reduced muscle strength is one of the major contributors to functional decline in older adults. It has been noticed widely and has been discussed in various publications that the grip strength measurement through dynamometric method is highly valuable for indicating the major outcomes.[1] Hand grip strength (HGS) is a simple and reliable measure of overall muscle strength, and it has been widely used to assess the functional ability of the geriatric population.[2] Muscle strength and effective hand grip is associated with ageing in human beings. Ageing involves various physiological changes in the body with the risk of occurrence of various chronic diseases. The physiological changes due to ageing are complex in nature and involves two geriatric syndromes named as Sarcopenia and frailty. Sarcopenia is defined as the geriatric syndrome which involves the decrease in muscle mass of an individual due to age. It involves the loss of muscle mass and its function in geriatric population. This further leads to the adverse outcomes including the reduction in lifespan and increased risk of death with disability. The diagnosis criteria is divided

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into stages of pre-sarcopenia, sarcopenia and severe sarcopenia according to the overall performance and strength. HGS is typically regarded as a routine component of a standard physical examination in clinical settings, alongside vital sign measurements. HGS evaluates the maximum voluntary strength of the hand and is commonly assessed using a dynamometer. Its simplicity and minimal training requirement make it a useful tool for screening and risk stratification of muscular strength and neuromuscular function, as well as indirectly assessing cardiovascular or pulmonary health, nutritional status, and identifying frailty and sarcopenia.[3] Normative reference values for HGS refer to the values obtained from a healthy and representative population, and they are used to determine whether an individual's grip strength falls within the expected range for their age, gender, and other relevant characteristics. [4] The normative values for HGS vary widely among different populations and ethnicities, and they also change with age.[5] Therefore, it is essential to establish age- and gender-specific normative values for hand grip strength among the geriatric population to accurately assess muscle strength and identify individuals at risk of functional decline.[6] Several studies have reported on the normative values for HGS among the elderly. For instance, it has been reported that the normative values for grip strength ranged from 16 to 30 kg for women and from 23 to 49 kg for men aged 60-69 years.[7] Similarly, it has been found that the normative values for grip strength ranged from 14.3 to 28.5 kg for women and from 21.4 to 46.4 kg for men aged 70-74 years.[8] These values serve as a reference point for identifying individuals who are at risk of functional decline and for tracking changes in muscle strength over time. Despite the importance of normative reference values for hand grip strength, there are several challenges associated with establishing these values. Firstly, the definition of what constitutes normal or abnormal grip strength varies widely among different studies and organizations. Secondly, there are several methodological issues related to the measurement of grip strength, such as the choice of dynamometer, the posture of the participant, and the number of measurements taken. These methodological issues can lead to discrepancies in the reported normative values and limit the comparability of different studies. Furthermore, there is a need to establish normative values specific to different populations and settings, as well as to determine the association between grip strength and other clinical outcomes.[9] The importance of normative reference values for HGS among the geriatric population is further highlighted by the fact that reduced grip strength has been associated with several adverse health outcomes. For instance, low grip strength has been linked to an increased risk of falls, functional decline, disability, and mortality among older adults.[10] So far, no studies have been performed in Pakistan which would determine the hand grip strength among geriatric population, which would point out certain underlying diseases related to hand grip strength such as cardiovascular diseases and other neurological deficits. Also, no certain standard has been developed in the region so far to determine normative reference values with respect to hand grip strength. The objective of this study is to measure the hand grip strength of geriatric population of Pakistan, and to determine the normative reference values of HGS among these population.

MATERIAL AND METHODS

The study sample consisted of people of both the genders aged above 65 years from different regions of Lahore. The study was conducted from February 2023 to May 2023 IRB Letter # REC-19-2025 during which the data was collected regularly. The objectives of the study were explained to each participant individually. The population was screened on the basis of the inclusion and exclusion criteria. The questionnaire comprised of demographic data and upper extremity functional index. People of both the genders between the ages of 65-100

were involved in the study, who belonged to different regions of Lahore. It was made sure that the participants were apparently fit, and those who volunteered for the study. People of both the genders who declined to participate, were excluded from the research. It was made sure that people suffering from cognitive impairments, diabetes and neurological diseases were excluded from the study.

RESULTS

The average normative value of HGS was determined using the upper extremity functional scale of the participants.
The normative reference values for this cross-sectional study were 17.9 kg for women and 26.2 kg for men.

Table: 1
Demographic data: Gender of participants

Gender	Frequency (n)	Percent (%)
Male	97	65.5
Female	51	34.5
Total	148	100.0

Table: 2
Demographic data: Gender of participants

Statistic	Value
Mean	4.9932
Std. Deviation	2.16495
Minimum	1.00
Maximum	10.00

Upper extremity functional scale score of participants ranged from 1-10 with mean value of 4.998+2.16

DISCUSSION

Hand Grip strength is used as a general indicator to determine the strength for some important outcomes. The measurements of HGS are required for getting the population-specific values to interpret the desired outcomes. The issue of HGS is prevalent among older adults, yet there is a lack of research on this topic, particularly in context of Pakistan. This study involved 148 participants, and a substantial majority of 31 individuals reported experiencing this issue of hand grip strength. Similarly, a cross-sectional study was conducted in British community to determine the differences among the HGS using the age and gender-stratified normative data to determine the HGS. The results indicated that the normative data deducted from the developing regions was lower with a Z-score of (-0.85 SDs).[11]
In the same way, a study conducted in the community of Germany compared the prevalence of sarcopenia and to determine its effect on the HGS and physical performance. This study measured the muscle strength using the HGS, skeletal muscle mass index (SMI) using the (DXA) dual energy X-ray absorptiometry and TUG (timed up and go test) as their functional parameter. The results indicated that the sarcopenia was prevalent with 24.3% as compare to reduced SMI, with reduced strength for grip (4.1%) having limited mobility of (2.4%). It was concluded that the reduced strength is strongly associated with the physical performance of an individual as compared to the reduced muscle mass.[12]
The average normative value of HGS was determined using the upper extremity functional scale score of participants, and among those participants, our cross-sectional study determined that the normative values for grip strength ranged from 14.3 to 28.5 kg for women and from 21.4 to 46.4 kg for men aged 70-74 years. These values would serve as a reference point for identifying individuals who are at risk of functional decline and for tracking changes in muscle strength over time.[13]
Normative values for adult handgrip strength (HGS) have been extensively reported over the past several decades. However, most of these standards have been derived from samples taken within specific cities or regions rather than from nationally representative

populations. Furthermore, they often focus on a narrow age range, typically older adults instead of encompassing the entire adult lifespan, including early, middle, and late adulthood.[14] While muscular strength cannot be represented by a single indicator, it is most commonly evaluated through handgrip strength (HGS) measured using a handgrip dynamometer. This method is practical and highly recommended for use in clinical, research, and community environments.

HGS testing offers a simple, safe, non-invasive, and reliable approach to assessing muscle strength across all age groups. It can be easily administered by personnel with limited training and allows for straightforward scoring and interpretation.[15] The assessment of strength capacity through handgrip strength demonstrates moderate to high construct validity and is associated with lower exclusion and dropout rates in epidemiological studies compared to more complex evaluations of total body or major muscle group strength. Additionally, handgrip dynamometers have become increasingly cost-effective, with research showing that inexpensive models produce HGS readings comparable to standard devices. HGS measurements hold strong clinical significance, as reduced grip strength is incorporated into diagnostic algorithms and assessment frameworks for conditions such as sarcopenia, dynapenia, and frailty. Moreover, HGS serves as an effective surveillance indicator for tracking long-term health trends in populations and for assessing and monitoring the impact of public health interventions.[16]

CONCLUSION

Based on the findings of this Study, it was observed that then mean normative reference values for this cross sectional study were 17.9 kg for women and 26.2 kg for men

CONFLICT OF INTEREST

None

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AUTHOR'S CONTRIBUTIONS

SA: Data Collection, Analysis and synopsis writing
MMA: Data Analysis and final draft
HB: Assistance in literature Review
SK: Assistance in Data collection

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