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Correlation Between Hand Grip Strength And Functional Mobility In Elderly Patients

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Abstract
Aim- *To study Correlation between hand grip strength and functional mobility in elderly patients*
Background-*. Low muscle strength is normal and significant in geriatric syndromes including frailty and sarcopenia.Therefore, early estimation of actual execution in the old is necessary. Hand grip strength can be measured to evaluate hand muscle strength, while the timed up-and-go test (TUGT) is used to assess functional mobility*
Material & Method- *Study was done on 50 elderly pateints at Panchsheel Orthopedic centre, Kangra from august to October 2021. Hand grip strength was measured using the Jamar dynamometer.Functional mobility measurement bytimed up-and-go test (TUGT) The outcomes were investigated utilizing SPSS rendition 20. Hand grip strength and functional mobility data were each analyzed univariantly with the Kolmogorov-Smirnov test to determine data distribution. The correlation between the two variables was measured using the Pearson and Spearman tests for normally and abnormally distributed data, respectively.*
Result- *We measured average hand grip strength and functional mobility in elderly patients and found a significantly meaningful moderate correlation between them (P = 0.000. r = −0.568). Average mean hand grip strength was 19.1 ± 7.00 kg and average median functional mobility was 12.8 (5.9–30.9) seconds.*
Conclusion- *There is a significant correlation between hand grip strength and functional mobility in the elderly (r = −0.568, p = 0.000).Early diagnosis will facilitate the planning of appropriate interventions in order to prevent disability and mortality in elderly.*
Keywords- *Elderly, handgrip strength, TUGT.*

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I. Introduction

Aging is associated with progressive loss of muscle mass with a simultaneous increase in fat mass [(1)]Reduction in physical ability and muscle mass is called sarcopenia. Sarcopenia is a major problem in the elderly due to its strong relationship with higher risk of falls, resulting in increased morbidity and mortality [(2)].Handgrip muscle strength is the maximum force developed during maximal voluntary contraction under a given set of conditions[(3)]. It can be quantified by measuring the amount of static force that a person's hand can squeeze around a dynamometer[(4)] .Low handgrip strength (HGS) is a strong predictor of mobility impairment, both in women and men[(5)]The TUGT is utilized every now and again to evaluate versatility in older patients since it can gauge numerous parts of useful portability, like strength, strolling velocity, soundness, and intellectual capacity immediately [(6)]The TUGT is likewise a productive instrument to evaluate for hazard of falls in the old.

II. Materials &Methods

A cross-sectional study was done on 50 patients at the Panchsheel Orthopedic centre,kangra , Himachal Pradesh from august to October 2021., . Inclusion criteria were patients aged >60 years without pain in the extremities, extremity fracture, , neurosensory disease, depression, alcohol consumption, or apparent acute diseases. Data regarding age, sex, nutrition status (based on the Mini Nutritional Assessment questionnaire), comorbid diseases, hand grip strength, and functional mobility were obtained by interview and direct measurement.

Hand grip strength was measured using the Jamar dynamometer. Subjects were asked to sit on a chair and use of the Jamar dynamometer was illustrated. Subjects were told to grip the dynamometer comfortably with their right hand and squeeze it as hard as they could until the pointer needle halted at a certain number. The test was repeated using the other hand. Measurements were repeated three times for each hand. Highest hand grip strength value was used for calculation.

Functional mobility measurement by TUGT began with the subjects sitting on a chair and leaning against the back support. Subjects were instructed to stand up and walk straight for three meters as comfortably as possible. Then, they turned around and walked back to the chair. The results were analyzed using SPSS version 20 .Hand grip strength and functional mobility data were each analyzed univariantly with the Kolmogorov-Smirnov test to determine data distribution. The correlation between the two variables was measured using the Pearson and Spearman tests for normally and abnormally distributed data, respectively

III. Results

Normality tests using Kolmogorov-Smirnov test for data on hand grip strength and functional mobility data using SPSS Statistics 20.0 for Windows (IBM, Armonk, NY, USA). Correlation calculation was done using nonparametric Spearmann correlation test. Mean hand grip strength measured in elderly patients in the clinic is shown in Table 1. Median functional mobility measured with TUGT in study subjects is shown in Table 2

Table 1Mean Hand Grip Strength

Mean hand grip strength	Number (Kg)
Overall (Kg)	19.1 ± 7.0
Male patients (Kg)	22.3 ± 6.99
Female patients (Kg)	15.1± 4.55

Table 2 Median functional mobility

Median functional mobility mean	Seconds (range)
Overall (S)	12.8 (5.9-30.9)
Male patients	11.6(5.9- 30.9)
Female patients	13.4(10.5- 26.4)

A significant correlation between hand grip strength and functional mobility was shown (P = 0.000, r −0.568;

IV. Discussion

Hand Grip Strength

In the light of agreement of the Asian Working Group for Sarcopenia (AWGS), the threshold for hand grip strength was 26.0 and 18.0 kg for male and female patients, respectively [7,8]. Our study subjects had mean hand grip strengths below the threshold of Asian hand grip strength. .Furthermore , ethnic differences of the study subjects can affect hand grip strength due to differences in body size, body shape, nutrition, physical activity patterns, culture, and prevalence of fragility [9]. The equivalent can be seen from the study of Koopman et al. [10] who compared hand grip strength in subjects from Ghana and The Netherlands, and reported that differences in height, weight, and body mass index were related with differences in hand grip strength in both populations. Because the difference in hand grip strength is based on region, Asian countries set their own standard thresholds for hand grip strength.. In addition, ethnic differences of the study subjects can affect hand grip strength due to differences in body size, body shape, nutrition, physical activity patterns, culture, and prevalence of fragility . The equivalent can be seen from the study of Koopman et al. who compared hand grip strength in subjects from Ghana and The Netherlands, and reported that differences in height, weight, and body mass index were associated with differences in hand grip strength in both populations.

TUGT

TUGT value in our study was contrasted to reference values in different studies. Compared to the meta-analysis by Bohannon et al. [12] our TUGT value was greater, indicating that our subjects required more time to complete the TUGT. Nevertheless, their study subjects and inclusion criteria varied, and they were also of diverse ethnicities; thus, their TUGT results also varied .

Correlation between Hand Grip Strength and Functional Mobility

The correlation between hand grip strength and functional mobility in our study was different from that reported by Singh et al. [13] who did not find a significant correlation between dominant hand grip strength and TUGT. This distinction can be attributed to the fact that our study subjects were from the policlinic, and TUGT is a sensitive test for elderly with some functional weakness . However, besides this finding, both studies have the similar models and functional conditions. Other than that study, to our knowledge, no other studies have correlated hand grip strength with TUGT directly. Singh et al. studied the correlation between various physical performance tests and physiologic fall risk, including hand grip strength and TUGT, and found a low significant correlation with TUGT (r = 0.27). No correlation was found with hand grip strength, indicating no significant correlation with physiologic fall risk.

We concluded that hand grip strength and functional mobility have a moderate correlation ($r = -0.568$). Therefore, increase in hand grip strength will result in shorter time needed to complete the TUGT. With that correlation, hand grip strength or functional mobility measurement with TUGT only is sufficient to demonstrate the physical strength of a person holistically. Between the two variables, functional mobility is easier to apply because the instruments needed are simpler and, therefore, this test is easier to apply in a geriatric health facility with limited resources. Therefore, functional mobility measurement with TUGT only is sufficient to demonstrate hand grip strength without measuring hand grip strength directly

V. Conclusion

There is a significant correlation between hand grip strength and functional mobility in the elderly ($r = -0.568$, $p = 0.000$).

HGS assessment can be a simple, fast, and inexpensive way to assess the prevalence of mobility limitations and functional performance. Early diagnosis will facilitate the planning and application of appropriate interventions in order to prevent disability and mortality in elderly

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