



Correlation of Hand Grip, Gait Speed, Physical Activity with Frailty Index in Geriatric Population

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ABSTRACT

The Geriatric syndrome includes a series of representation which may be related to ageing such as delirium, falls, incontinence and frailty. Frailty is a common clinical syndrome in geriatric population that supports the weight of enhancing the risk of poor health outcomes, including the falls incident, disability, hospitalization and mortality. This study aims to find out the Correlation of Hand Grip, Gait Speed and Physical Activity with Frailty Index in Geriatric Population. It is an observational study done with convenient sampling with 40 participants of both the sexes were selected based on the selection criteria. The frailty of participants was assessed by a questionnaire which contains 41 components known as "Frailty Index". An administered interviewer reported that. Hand-Held Dynamometer measured hand Grip. A 10-meter walk test assessed gait speed. The Physical Activity Scale assessed physical activity for The Elderly (PASE). The results showed that PASE Score, for the age group between 60-69 years people have high PASE score 100.9 than the age group of peoples 70-79 years, 80-89 years and 90-97 years with a score of 71.49, 36.17, 6.5 respectively. There is a negative correlation of frailty index with hand grip ($r = -0.314$), gait speed ($r = -0.313$) and Physical activity. The study concluded that there was a negative correlation of handgrip, gait speed and physical activity with frailty index in the geriatric population.

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INTRODUCTION

Frailty is age-related syndromes which have a higher risk of health problems, such as fall, institutionalization, hospitalization, illness and decease, independently of age (Kendhapedi and Devasenapathy, 2019). Purely frailty is a progressing vulnerability

to an indigent resolution of equilibrium which is followed by stress and lead to add on the risk of adverse outcome such as disability (Clegg *et al.*, 2013). Old age people with frailty will have reduced reserve capacity of various physiological systems. As per the census up to 2011 geriatric population accounts for up to 8%, which is expected to get doubled or even more in four decades (Pilania *et al.*, 2019).

Frailty becomes one of the significant provocation issues in elderly healthcare. Physical frailty and broader frailty are the two important components of frailty and the distinction between these two. It adds physical, psychological and communal deficits. Frailty found common in females more than males. Frailty can be modifiable at an early age. The study of frailty assessment also used to stratify the risk and inform clinical decisions in a surgical procedure, cancer treatment and kidney transplantation (Schoenborn *et al.*, 2018).

Frailty concept was introduced in the literature of geriatric medicine and gerontology for almost two decades. Frail patients of adverse outcomes and they require more care, personalization of interventions, and modification of standard protocols. Older frail adults are more likely to be hospitalized under emergency in medical services, and they should be hospitalized for an extended length of stay. Identification of frailty indication will improve the clinical decision making and health outcomes within acute cure (Theou *et al.*, 2018).

Frailty generally guides the fundamental genetic and underlying environmental circumstances and also the combination of epigenetic mechanisms, which regulates differential expression of genes in cells. The cerebrum, endocrine gland immune system and skeletal system are related to each other in the study of the development of frailty and also essential to recognize the frailty. Reason for the frailty is mainly due to declining primarily in pituitary hormones and secondly decreased oestradiol and testosterone and adrenocortical cell (Clegg *et al.*, 2013). This study aims to find out the Correlation of Hand Grip, Gait Speed and Physical Activity with Frailty Index in Geriatric Population.

MATERIALS AND METHODS

This study was an observational study which was done with a convenient sampling of 40 inmates at Sivanadha Gurukulam in Chengalpattu District. Before the study, Ethical clearance was obtained from the Departmental ethical committee, and permission also obtained from school authorities, then the study was preceded. The inclusion criteria were 60 to 97 years, able to follow comments, able to walk with is without support. The exclusion criteria were Wheelchair bounded elders, severe cardiac or respiratory problems. Informed consent was obtained after explaining clearly about the study.

Every Individual Frailty was measured by using a questionnaire which contains 41 components known as "Frailty Index". The administered interviewer reported that. Hand-Held Dynamometer measured hand Grip. Hand Grip Strength was assessed in sitting with an elbow in a semi flexed position and the forearm in the mid prone position. Average of three trials was taken. Gait speed was assessed by 10-meter walk test. Gait velocity was assessed using Timed Ten-Meter Walk Test where the participant was expected to walk for a distance of ten meters at a stretch without any external support the time taken for the participant to cover the intermediate six meters, i.e. two meters to eight meters. The Physical Activity Scale measured physi-

cal activity for the Elderly (PASE). After administrating the questionnaire, the data were recorded and tabulated.

RESULTS

Statistical analysis was done using IBM Statistical Package For Social Science(SPSS) Version 20. The demographic and assessment data were analyzed using descriptive analysis, and the correlation between the variables was done using Pearson correlation (2-tailed).

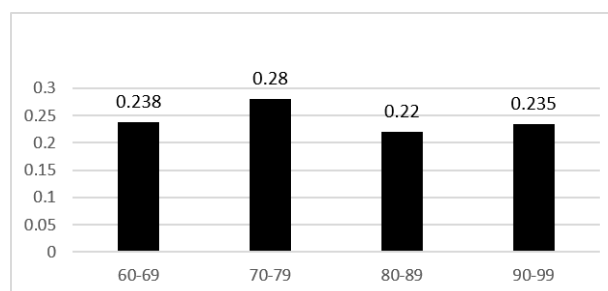


Figure 1: Frailty index with respect to age

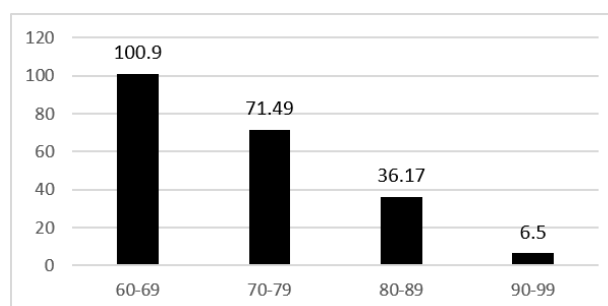


Figure 2: PASE score with respect to age

The population of the study is done in senior citizens who are in the age class of 60 years to 97 years. The age class of sixty to sixty-nine years and seventy to seventy-nine years there was an equal distribution of 14 samples respectively. Whereas in the age class of eighty to eighty-nine years and ninety to ninety-nine years there were 10 and 2 samples respectively. Each respondent was contacted individually and collected the data. The information was sought for the dimensions like Handgrip, Gait speed, Physical activity with frailty index.

Figure 1 signifies the average score of frailty among 60-69 years is 0.238, which is considered to be pre-frail and the average score of frailty among 70-79 years is 0.28, which is considered to be frail. The Figure 2 signifies that when comparing the PASE Score, the age group between 60-69 years people have more PASE score 100.9 than the age group of peoples 70-79 years, 80-89 years and 90-97 years with a score of 71.49, 36.17, 6.5 respectively.

Table 1: Descriptive Statistics - Mean, Standard Deviation for Age, Sex, BMI, Gait Speed, PASE Score, Grip Strength and Frailty Index

	Mean	SD
Age	73.98	8.991
Gender	1.55	.504
BMI	27.5925	3.0422147
Average self selected velocity	.791400	.2481662
Average fast velocity (m/s)	.851875	.2024646
Physical activity scale for the elders	69.106750	70.3073243
Grip Strength	25.38	13.885
Frailty	.249250	.1009541

Table 2: Correlation of Hand Grip, Gait Speed, Physical Activity with Frailty Index

		Average self-Selected velocity (m/s)	Average fast velocity (m/s)	PASE score	Grip strength	Frailty
Age	r value	-0.277	-0.395*	-0.27	-0.333*	-0.025
	p value	0.084	0.012	0.092	0.036	0.878
Gender	r value	-0.027	-0.111	0.86	-0.305	0.165
	p value	0.87	0.496	0.599	0.056	0.31
BMI	r value	-0.048	-0.133	-0.019	-0.237	-0.037
	p value	0.768	0.414	0.907	0.141	0.821

Table 3: Correlation of Frailty with Average self-selected velocity, Average fast velocity, PASE score and Grip strength

		Frailty
Average self-selected velocity (m/s)	r value	-0.230
	p value	0.154
Average fast velocity (m/s)	r value	-0.313*
	p value	0.049
PASE score	r value	-0.119
	p value	0.464
Grip strength (Pounds)	r value	-0.314*
	p value	0.048

From the Table 1, Table 2 and Table 3, it is observed that there is a negative correlation exist between the Frailty Index and Average Fast Velocity (-0.313) and Hand Grip (-0.314). This indicates that fast velocity and the handgrip is decreasing as frailty increasing. Since this study was conducted among the geriatric population aged between 60 years to 97 years, the finding indicates the actual status of the physical condition of the senior citizens.

DISCUSSION

The study includes 40 participants with 25 male and 15 women. 35% of the participants were between the age 60-69, 35% of the participant were between

the age 70-79, 25% of the participant were between the age 80-89 age, and 5% of the participant were between the age 90-97.

The scores of the frailty index reveal that all the participants were either pre-frail or frail, between the age of 60-69 majority participants were pre-frail, the progression of age the participant there was a study increased of frailty index score. This is according to a study conducted by Kirubakaran, et al. 2019, stated that there was a strong positive correlation between age and frailty which was due to the deterioration of physiological reserve and other age-related physiological changes.

From the result obtained, it can be noted that as the age increases, there was a decline in grip strength

and also an inverse relationship establish in frailty and grip strength. This result is supported by the study conducted by Dudzińska-Griszek *et al.* (2017) and Abe *et al.* (2016), where he stated that the reduced grip strength is due to the influence of the bidirectional relationship between physical and mental functioning such as depression combined with a decrease in muscle strength. From the score obtained from the PASE questionnaire can be observed that physical functioning between the age of 60-69 is higher comparatively older age groups.

It can also be observed that the PASE score decreases with the progression of age groups which indicates the signs of progressive decline in the physical activity with increasing age. This is going in hand with (da Silva *et al.*, 2019; Milanovic *et al.*, 2013), wherein he stated that the increasing age there was an insufficient level of physical activity which put them under the risk of frailty and health complication.

From the above result, it also is seen that there is a negative correlation exist between the average fast velocity and frailty. With progressing age, there is a reduced trunk muscle co-activation which leads to postural instability during gait. There is an excessive co-activation of lower limb muscles leading to fatigue. Therefore, the fatigue and the postural instability leads to decreased gait speed in the geriatric population (Lee *et al.*, 2017; de Almeida Busch *et al.*, 2015).

CONCLUSION

The study concluded that there was a negative correlation of handgrip, gait speed, physical activity with frailty index in the geriatric population. The limitations of the study are significantly less sample size, and the study was done only in institutionalized elders with an improper distribution of ages. And the recommendations of the study are both institutionalized elders and community-dwelling older adults can be included, and the results can be compared. Intervention program can also be included in the study, and the psychological status of the participants can also be assessed.

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Conflict of Interest

The authors declare that they have no conflict of interest for this study.

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