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# Prevalence of Sarcopenia among Elderly Individuals in Old Age Home in Bangladesh

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# Abstract

Sarcopenia is an age related disorder with progressive loss of skeletal muscle mass and function. It is a major clinical problem of older people with several adverse outcomes like physical disability, osteoporosis, poor quality of life, and increased risk of death. Sarcopenia is significantly associated with age, morbidity, obesity, self- reported physical disability, independent of ethnicity, income and health behaviors. The prevalence of sarcopenia is rising, which is as a result of population aging all over the world. The rapidly increasing elderly population is a new and important group in terms of social economic and changing cultural context. So there is a need to better understand the current magnitude and impact of sarcopenia in growing population. To find out the prevalence of sarcopenia in older adults (>60 years) in old age homes in Dhaka city was aim of the study. Face to face interview was conducted to take data by using SarQoL questionnaire in older persons residing in old age homes in Dhaka city. They were assessed by physical examinations, medical records and history taking. Average age of the respondents was 67.77±7.70 years. This study shows that 60% and 40% study subjects had sarcopenic and normal muscle mass and lower muscle performance was three times prevalent (77%) than normal muscle performance

(23%). More than half of the respondents showed poor physical performance. About 7.70% respondents had diminished leg muscle strength. Prevalence of sarcopenia among study subjects was 67% i.e. two out of three older persons were suffering from sarcopenia. Statistically significant association was found between sarcopenia and gender (p=0.021<0.05). Negative correlation was found between age of the older people and calf circumference and it is strongly statistically significant (p=0.001<0.05). Negative correlation was also found between age of the older people and grip strength and it is strongly statistically significant (p=0.001<0.05). It is concluded that prevalence of sarcopenia in Bangladesh is high enough to draw attention.

Key words: prevalence; sarcopenia; old people

# Introduction

Sarcopenia is one of the most important health problems in elderly with a high rate of adverse outcomes. However, several studies have investigated the prevalence of sarcopenia in the world, the results have been inconsistent [1]. Locally, there is no literature on prevalence of sarcopenia. The rapidly increasing elderly population is a new and important group in terms of social economic and changing cultural context.

The older persons, in Bangladesh, are passing their days amidst the tender care and support mostly provided by their extended families without any remarkable backing from the national level. However, the situation is in transition as the family pattern gradually shifting towards the nuclear type due to the change in values, migratory tendency of their offspring and poverty. Within 2050 it is assuming that size of the senior citizen will be around 20 percent of the total population in our country. It is predicting that high portion of older age group will be biggest challenge to the country's social, economic and healthcare in the future. However, they are prone to suffer with the problems of dependency and disability followed by increased burden of disease. Elderly people are usually vulnerable. Moreover, degenerative changes take place as age grows. Geriatric problems are ignored in medical education and profession. There is a lack of information and research on elderly in health sector.

#### Methods

This study focuses prevalence of sarcopenia among at a single point in a specified time. Considering time period and resource availability, experimental survey design was most feasible for this study. Study duration was 6 months (March to September 2020). This study was conducted at different old age homes of Dhaka division in Bangladesh. This area was conveniently selected for data collection and to get adequate sample of study population. This study was carried out among geriatric people irrespective in gender and reside in different old age homes in Dhaka division. Nonprobability convenient sampling technique was used to collect sample.

#### SarQol questionnaire

SarQoL is composed of 55 items translated into 22 questions rated on a 4-point Likert scale. The questionnaire is scored on 100 points. Higher score reflects a higher quality of life. Items are organized into seven domains: domain 1 'Physical and Mental Health' with 8 items; domain 2 'Locomotion' with 9 items; domain 3 'Body Composition' with 3 items; domain 4 'Functionality' with 14 items; domain 5 'Activities of daily living' with 15 items, domain 7 'Fears' with 4 items. Sarcopenic subjects presented a quality of life score of 54.7 (45.9–66.3) compared to a score of 67.8 (57.3–79.0) for non sarcopenic subjects [2].

# Hand Grip strength

This tool is used to measure the hand grip strength by an isometric Jamar dynamometer, subjects is seated and instructed to keep their elbow at 90° and squeeze the dynamometer maximally Three trials will be conducted for dominant hand and the best result is analysed, handgrip strength (<26 kg for men and <18 kg for women) (Sammons Preston Rolyan, Bolingbrook, IL) [3].

#### Short physical performance battery (SPPB)

The SPPB is a three test: a hierarchical assessment of standing balance, a short walk at usual elderly pace and standing five times from a seated position in a chair. To test Balance participants are asked to remain standing with their feet as close together and hold that position for 10 seconds, for Gait speed, the time required to travel is 4 m at usual pace is measured. The test is repeated twice and analyzed the shorter time of two. The standing test from chair is performed where the participants are asked to stand and sit in chair five times as quickly as they could with arms crossed over the chest [4].

Study participants were selected from the elderly population aged over 60 who are resides in different old homes in Dhaka city. All participants of the study were given a university approved consent form. In addition, the research process was explained in full. Research started only after received of a signed consent form from the participants. Data were collected from structured questionnaire which includes variables. Participants were free to withdraw their participations without prejudice. Computer technology SPSS (version 20) was used for classification, differentiation, presentation and analysis of data. Descriptive as well as inferential statistics were used to analyze data. Data were presented in graphs and tables. The study commenced only after obtaining approval from the Institutional Human Research Ethics Committee which considers the protection of rights of participants and their welfare. Confidentiality of identity and health status records kept for all participants who took part in this study.

R	lesu	lts

Age group	Frequency	Percentage
Mean±SD	67.77±7.70	
60-70	229	76.3
71-80	55	18.3
81-90	11	3.7
>90	5	1.7
Total	300	100.0

Table 1. Age group distribution of the respondents.

Table 1 shows that average age of the respondents was 67.77±7.70 years. Most of the study subjects (76.3%)

belonged to 60-70 years followed by 18.3% from 71-80 years and 3.7% from 81-90 years respectively.

Female was about triple fold (74%) than male (26%).



Figure 1. Gender distribution.

This doughnut shows that 60% and 40% study subjects had sarcopenic and normal muscle mass. The cut-off threshold for calf circumference was 33 cm for both male and female.





Gender	Muscle strength		Total
	Normal	Low	
	n(%)	n(%)	
Male	18(6)	60(20)	78(26)
Female	105(35)	117(39)	222(74)
Total	123(41)	177(59)	300(100)

*Table 2.* Muscle strength (grip strength) of the respondents.

**Note:** EWGSOP2 sarcopenia cut-off points for low muscle strength by grip strength i.e men <27 kg, female <16 kg

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Table 2 shows that among 78 male respondents 18(6%) had normal muscle strength and 60(20%) had low muscle strength whereas 105(35%) and 117(39%) female respondents had normal muscle strength and low muscle strength respectively.

The pie chart shows that lower muscle performance was three times prevalent (77%) than normal muscle performance (23%). A single cut-off speed  $\leq$ 0.8 m/s is advised by EWGSOP2 as an indicator of severe sarcopenia.



Figure 3. Gait speed of the respondents.

Normal and diminished balance were 43% and 57% i.e. more than half of the respondents showed poor physical performance.



Figure 4. Balance condition of the respondents.

About 7.70% respondents had diminished leg muscle strength.

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Figure 5. Leg muscle strength condition.

Domain	Mean±SD score	Minimum score	Maximum score
Physical and mental health	50.49 <b>±</b> 11.36	27.77	89.97
Locomotion	54.23 <b>±</b> 5.97	27.78	66.67
Body composition	50.29 <b>±</b> 9.92	29.17	83.33
Functionality	55.29 <b>±</b> 11.92	26.92	96.43
Activities of daily living	46.72 <b>±</b> 12.13	19.64	90.00
Leisure activities	32.75 <b>±</b> 10.91	16.62	66.50
Fears	74.16 <b>±</b> 13.78	50.00	100.00

# Table 3. Domain wise quality of life the respondents.

SarQoL is composed of 55 items translated into 22 questions. The questionnaire is scored on 100 points. Higher score reflects a higher quality of life. Items are organized into seven domains: domain 1 'Physical and Mental Health' (mean score 50.49±11.36) with 8 items; domain 2 'Locomotion' (mean score 54.23±5.97) with 9 items; domain 3 'Body Composition' (mean score 50.29±9.92) with 3 items; domain 4 'Functionality' (mean score 55.29±11.92) with 14 items; domain 5 'Activities of daily living' (mean score 46.7,2±12.13) with 15 items, domain 6 'Leisure activities' (mean score 32.75±10.91) with 2 items, and, at last, domain 7 'Fears' (mean score 74.16±13.78) with 4 items. Sarcopenic subjects presented a quality of life score of 54.7 (45.9–66.3) compared to a score of 67.8 (57.3–79.0) for non sarcopenic subjects.

Prevalence of sarcopenia among study subjects was 67% i.e. two out of three older persons were suffering from sarcopenia.

 33%
 Sarcopenic

 67%
 Non-sarcopenic

# Figure 6. Prevalence of sarcopenia.

Statistically significant association was found between sarcopenia and gender (p=0.021<0.05).

Gender	Sarcopenia		Total	χ2	p
	Present	Absent			e
	n(%)	n(%)			
Male	44(14.7)	34(11.3)	78(26. 0)	5.34	0.021
Female	157(52.3)	65(21.7)	222(74 .0)	6	
Total	201(67.0)	99(33.0)	300(10 0.0)		

# Table 4. Association between sarcopenia and gender.

Table shows negative correlation between age of the older people and calf circumference and it is strongly statistically significant (p=0.001<0.05). So we can say that age has strong influence on calf circumference.

Correlation			
Age	Calf circumference		
	Pearson correlation	-0.285	
	Sig. (2-tailed)	0.001	
	Ν	300	
Calf circumference	Age		
	Pearson correlation	-0.285	
	Sig. (2-tailed)	0.001	
	Ν	300	

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# *Table 5. Relationship between age and calf circumference.*

Table shows negative correlation between age of the older people and grip strength and it is strongly statistically significant (p=0.001<0.05). So we can say that age has strong influence on grip strength.

Correlation			
Age	Grip strength		
	Pearson correlation	-0.317	
	Sig. (2-tailed)	0.001	
	N	300	
Grip strength	Age		
	Pearson correlation	-0.317	
	Sig. (2-tailed)	0.001	
	Ν	300	

#### Table 6. Relationship between age and grip strength.

Table shows positive correlation between age of the older people and sarcopenia score and it is not statistically significant (p=0.631>0.05).

Correlation			
Age	Sarcopenia score		
	Pearson correlation	0.028	
	Sig. (2-tailed)	0.631	
	Ν	300	
Sarcopenia score	Age		
	Pearson correlation	0.028	
	Sig. (2-tailed)	0.631	
	N	300	

*Table 7.* Relationship between age and sarcopenia score.

# Discussion

Sarcopenia is an age-related disease described by a progressive loss of muscle mass and function [5]. In

addition, sarcopenia is a major clinical problem in public health of older people; with some adverse outcomes such as disability, poor quality of life, and increased risk of death [6-8]. The prevalence of sarcopenia is rising, which is as a result of population aging all over the world. The present study found that mean age of the respondents was 67.77±7.70 years whereas female was more than male. This study shows that 60% had sarcopenic muscle mass and lower muscle performance was three times prevalent than normal muscle performance. More than half of the respondents showed poor physical performance. About 7.70% respondents had diminished leg muscle strength. Prevalence of sarcopenia among study subjects was 67% i.e. two out of three older persons were suffering from sarcopenia. Statistically significant association was found between sarcopenia and gender. Negative correlation was found between age of the older people and calf circumference and it is strongly statistically significant. Negative correlation was also found between age of the older people and grip strength and it is strongly statistically significant. Some studies [9-10] reported higher relative reduction of muscle mass in men than in women and therefore, the highest prevalence of sarcopenia (50%) was found among men older than 80 years while only 43.8% of the women of the same age group corresponded to the definitions of sarcopenia [11-12]. In contrast, other studies yielded high rates of sarcopenia among women younger than 80 years [12]. Various endogenous and exogenous factors influence on prevalence of sarcopenia. After the eighth decade of life, testosterone concentrations in human males decline rapidly which may contribute to the decrease in lean body mass and the increase in sarcopenia. In relation to the type of elderly population, the prevalence of sarcopenia was higher in elderly people in the rehabilitation units, followed by nursing homes and hospitalized in previous studies [13-15]. These results can be attributed to racial characteristics, body size, cultural background, dietary regimes, and life quality of the elderly between the Asian and non-Asian individuals in different countries. Also, the cut-off points for the Asian populations [16] are lower than for the non-Asian individuals [17] in both genders, with young people of the same ethnic group as reference. In addition, the mean appendicular muscle mass of young Asians was about 15% lower than that of non-Asians even after height adjustments [18]. Therefore, low muscle mass in young Asians will effect in lower prevalence of sarcopenia in the old people. Furthermore, sarcopenia may be less prevalent in Asians due to differences in lifestyle such as a better dietary aspect and higher levels of activity than the Western populations, which act as protective factors

against sarcopenia [19]. Another important factor to estimate prevalence of sarcopenia is tools that use to evaluate muscle mass and diagnose sarcopenia. These results suggest that the prevalence of sarcopenia should be tool-based approach dependent. Actually the increase in life expectancy has become a primary risk factor for morbidity and disability, displacing morbidity and mortality risks from younger to older groups. As a consequence, the entire society will become tasked with the care of a greater proportion of people with chronic diseases. The use of various diagnostic criteria for sarcopenia has returned a range of prevalence rates spanning from 2 to 34% in epidemiological studies [20]. Early diagnosis and intervention are extremely important to arrest the disability cascade that accompanies a clinical condition with this potential prevalence and well-known negative outcomes. Recently, in a systematic review on sarcopenia prevalence in Brazil, Diz et al [109]. found that of the 31 analyzed studies, 11(35.5%) used all or some of the criteria recommended by the EWGSOP, and the overall prevalence of sarcopenia was 17%. Most of these studies used the cut-off points for hand grip strength and gait speed proposed by EWGSOP, and the estimated prevalence ranged from 4.1 to 65%. Consequently, one should be careful of uncritically accepting these results. There are many explanations for this huge variation in prevalence. Most explanations involve biases introduced during sample selection, the aforementioned use of different tools, and the cut-off values chosen to determine hand grip strength and gait speed. Limitations of studies are very common in research work. The limitations of the present study need to be considered. First, age was determined by verbal response. Second, grouping according to different cutoff points for parameters of sarcopenia and different definitions were led to reader's confusion. So, analyses were based on tool of muscle mass measurement. Third, the present study was conducted in a very short period of time. Fourth Dual Energy X-Ray Absorptiometry (DXA) and Bio-electrical Impedance Analysis (BIA) were not affordable.

#### Conclusion

Sarcopenia is a common condition among older individuals and is associated with adverse health outcomes. The present study was an attempt to assess the prevalence of sarcopenia in old age home in Bangladesh. As far as I know this was the first study in my country on sarcopenia. Prevalence of sarcopenia among study subjects was 67% i.e. two out of three older persons were suffering from sarcopenia. Statistically significant association was found between sarcopenia and gender. Negative correlation was found between age of the older people and calf circumference and it is strongly statistically significant. Negative correlation was also found between age of the older people and grip strength and it is strongly statistically significant. It is concluded that prevalence of sarcopenia in Bangladesh is high.

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