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Research Article

Prevalence and risk factors of sarcopenia: a study in a tertiary care centre

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ABSTRACT

Background: Sarcopenia is characterized by progressive and generalized loss of skeletal muscle mass and strength. The known causes for sarcopenia are usually age related, changes in tissue secretions or response to hormonal factors, changes in dietary intake, protein metabolism and disuse atrophy. This study was conducted to identify the predictors for sarcopenia among the elderly patients in our area.
Methods: 678 patients above the age of 60 years and 50 young patients between the age of 18-40 years (to establish a baseline value) were recruited into the study. Height and weight were measured for all the patients, and BMI was calculated. Lean body mass, appendicular skeletal muscle mass (ASM), and total skeletal mass (TSM) was measured from the controls as well as the patients.
Results: Out of the 678 patients, 346 were males and 332 were females. The prevalence of sarcopenia was found to be 15.3% among the elderly males and 20.5% among the females. The lean body mass and the appendicular skeletal mass were significantly more in males than females. Of the risk factors which we studied, there was no significance between the sarcopenic and non sarcopenic individuals. There was a significant difference in the other metabolic factors such as lower protein levels and lower steroid hormones although the numbers were very small in our study.
Conclusions: This confirms that the relative muscle mass in significantly lower among the elderly population as compared to the younger generation. Sarcopenia is found to increase the likely hood of disability in these patients independent of the age, weight, BMI, other factors of morbidity and health factors. Therefore, criteria for estimating prevalences of sarcopenia are needed for public health planning purposes.

Keywords: Sarcopenia, Elderly patients, Appendicular skeletal mass, Total skeletal mass, Lean body mass

INTRODUCTION

Aging is known to be a natural process but is associated with significant decline in neuromuscular function and performance.[1,2] Sarcopenia is a syndrome which is characterized by progressive and generalized loss of skeletal muscle mass and strength. It has a high risk of adverse outcomes such as decreased function of lower limbs, physical disability and poor quality of life.[3-6]

The known causes for sarcopenia are usually age related, changes in tissue secretions or response to hormonal factors, changes in dietary intake, protein metabolism and disuse atrophy.[7-9]

The age and sex adjusted sarcopenia is estimated to vary from 6% to 24%, depending on the definition and measure of muscle mass.[10-12] In a cohort study in New Mexico, the prevalence was greater than 50% in people over 80 years of age.[11]

Decline in muscle mass leads to decline in active function of the person. The Framingham disability study found that the ability to perform heavy house hold work, walk a longer distance or climbing stairs reduced with age thereby requiring help to perform these daily activities.[13]

The best way to treat the severity of sarcopenia is to know and identify the significant predictors. Free testosterone, physical activity, cardiovascular disease and insulin like growth factor are significant predictors of muscle mass in men and total fat mass and physical activity are significantly associated with muscle mass in women.[14]

This study was therefore conducted to identify the predictors for sarcopenia among the elderly patients in our area.

METHODS

This study was performed by the department of Medicine in Kalinga institute of Medical sciences with duration of two years. 678 patients above the age of 60 years were recruited into the study. To establish a base line for comparison of the extent of sarcopenia, 50 young patients between the ages of 18-40 years were also recruited.

The study was thoroughly explained to both the categories of patients and informed consent was taken from all of them. Lean body mass, appendicular skeletal muscle mass (ASM), and total skeletal mass (TSM) was measured from the controls to establish a normal range in our community.

Lean body mass and muscle mass were collected from the elderly patients. All elderly patients who had come to our OPD during the study period were included into the study. Only those who didn't give consent were excluded from the study.

All patients were asked standard questions of smoking, alcohol consumption and frequency of load bearing exercise. Medical conditions which needed long term treatment, details of medications were noted. Other details such as contraceptive use duration, age of menarche and menopause were taken from the women.

Height and weight were measured for all the patients, and BMI was calculated.

Independent student t test was used for statistical analysis. A p value of <0.05 was considered significant.

RESULTS

Out of the 678 patients, 346 were males and 332 were females. Sarcopenia has been defined as a relative total skeletal mass of more than 2 standard deviations below the respective normal means for young persons. Based on this, the prevalence of sarcopenia was found to be 15.3% among the elderly males and 20.5% among the females.

Table 1: Prevalence of sarcopenia based on total skeletal mass index.

Men		Women	
Reference value	No of elderly patients with 2 SD below reference values (%)	Reference values	No of elderly patients with 2 SD below reference values (%)
36.4±3.1	53 (15.3%)	29.4±4.3	68 (20.5%)

The males were older, heavier than the females, though their body index was lesser however, it was not significant. The lean body mass and the appendicular skeletal mass however were significantly more in males than females.

Of the risk factors which we studied, there was no significance between the sarcopenic and non sarcopenic individuals. There was a significant difference in the other metabolic factors such as lower protein levels and lower steroid hormones although the numbers were very small in our study.

Table 2: Details of elderly male and female patients.

Characteristics	Males	Reference group	Females	Reference group
Age in years	73.9±3.4	29.4±4.1	70.1± 2.8	28.5±8.2
Weight	66.4±2.9	60.9±7.3	63.9±4.1	55.3±6.6
BMI	25.9±3.5	24.3±3.1	27.1±1.9	23.3±4.7
Lean body mass (kg)	28.1±3.8	32.5±2.8	24.1±3.1*	29.1±4.3
Body fat %	26.1±21	17.9±3.8	35.1±4.9*	22.6±3.7
Appendicular skeletal muscle mass	19.1±2.1	26.7±5.8	11.9±3.4*	17.2±4.3
ASM/height^2	7.1±1.5	8.9±1.8	6.0±1.3	7.4±2.1
Total skeletal mass	25.1±2.2	36.4±3.1	17.3±3.6*	29.4±4.3

*= p value <0.001

Table 3: Risk factors among obese and non-obese individuals with sarcopenia.

	Sarcopenic obese individuals	Sarcopenic non-obese individuals	Non-sarcopenic obese individuals	Non-sarcopenic non-obese individuals
Cardiovascular disease	12.3%	17.1%	7.6%	12.9%
Hypertension	51.6%	48.2%	37.4%	26.5%
Arthritis	69.0%	45.2%	67.1%	32.1%
Diabetes	7.5%	1.4%	9.8%	6.5%
Hypercholestrolemia	33.2%	12.1%	36.4%	8.1%
Other metabolic syndromes	17.2%	2.9%	5.3%	3.1%*
Hip fractures	5.2%	0	9.8%	0
Any other fractures	13.6%	2.8%	11.7%	3.1%

DISCUSSION

This study was done to identify the prevalence of sarcopenia in the elderly population.

Previous studies have stated that muscle mass decreases with around 40% between the age of 20 and 60 and leg lean tissue decreases around 1% every year, though there are differences in the different genders. It is found to be more pronounced in men than in women.[15,16]

We had used younger population to build a reference; therefore their values are higher as they are in good health.

At present, there is insufficient data for forming any consensus on what exactly is "deficient" muscle mass or sarcopenia.

Sarcopenia has been defined as a relative total skeletal mass of more than 2 standard deviations below the respective normal means for young persons by many investigators.[3,11,12,17] We have used this method in our study to identify sarcopenia. Some other researchers have used other different indices to detect sarcopenia, including total muscle mass as a percentage of body weight, FFM/stature, FFM/fat mass ratio and muscle mass adjusted statistically for height and fat mass.[2,25-27]

In our study sarcopenia was quite prevalent among the elderly with a wide difference range in the total skeletal mass among the elderly and the younger age group. The prevalence of sarcopenia was found to be 15.3% among the elderly males and 20.5% among the females. This was in concordance with a study by Kim et al where they found the prevalence in males to be 5.1% and in females to be 14.2%.[28] Jenssen et al found 10% in women and 7% in men, both of which were slightly lower than our study.[3] Newman et al, in their study observed 11.5% of obese men and 14.4% of obese women to be sarcopenic, using the residual method.[4]

Our study has found as expected that men were taller than the women, had greater lean body mass and lesser % of body fat than women. The BMI was not much difference between the males and the females of the elderly's well as the reference age group.

There have been reports of many factors that contribute to sarcopenia including loss of α motor neurons as described by Janssen, lower levels of steroid hormones, dietary protein reduction and decreased physical activity. One of the limitations in our study was that we could not work on the said factors.[3,18-24]

There were not many studies on sarcopenia and obesity together. We, in our study tried to find an association between sarcopenic and nonsarcopenic obese and non obese individuals but there seemed to be no significant difference between them. Only in some of the metabolic syndromes, there was a significance. Baumgartner *et al* first described that there was an association between low relative muscle mass (ASM/height^2) and functional impairment and disability.[12,14] In his longitudinal study results, he showed that sarcopenic obese subjects at baseline were two or three times more likely to develop instrumental disability than lean sarcopenic or non-sarcopenic obese individuals.[29]

CONCLUSION

In our study we found the prevalence of sarcopenia to be around 15% in males and 20% in females among the elderly population. This confirms that the relative muscle mass in significantly lower among the elderly population as compared to the younger generation sarcopenia is found to increase the likelyhood of disability in these patients independent of the age, weight, BMI, other factors of morbidity and health factors. Therefore, it is one of the health problems which need continuous vigilance in our society. Moreover, a criteria for estimating prevalence's of sarcopenia are needed for public health planning purposes.

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