

Original Research Article

Association between Osteosarcopenia and Obesity among Elderly Patients Visiting Tertiary Care Hospitals, Lahore

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Abstract: Osteoporosis (low bone mineral density) together with sarcopenia (muscle loss) appears to effect the fat content of elderly patients and leads to obesity. The objective was to find out the association between osteosarcopenia and obesity among elderly patients visiting tertiary care hospitals, Lahore. The present study was a cross sectional study. The duration of the study was 4 months. 237 osteosarcopenic elderly patients ≥ 50 years of age visiting tertiary care hospitals, Lahore participated in this study. A questionnaire was used to collect data regarding demographics, anthropometric measures and dietary intake along with physical examination for the diagnosis of osteosarcopenia. Mean age was 71 years and mean BMI was 33 kg/m². Results showed strong association between osteosarcopenia and obesity. (p value <0.05) A strong association was found between osteosarcopenia and obesity among the elderly patients. Thus, dietary modifications and awareness regarding this syndrome can be very beneficial among elderly population in order to reduce the incidence.

Keywords: osteoporosis, sarcopenia, obesity, diet, exercise, lifestyle, aging.

INTRODUCTION

Aging is frequently linked with diseases, in addition to the physical changes occurring to body composition and bone (Inglis, J. E. *et al.*, 2017). As a person ages, one of the common conditions occurring is osteosarcopenia that is linked with significant morbidity and mortality (Edwards, M. H. *et al.*, 2015). A phenomenon that is known as obesity is highly prevalent in age-related muscle and bone loss (Hirschfeld, H. P. *et al.*, 2017). Obesity is defined as abnormal or excess fat accumulation that impairs health (He, W. *et al.*, 2015). Ilich and colleagues, in 2014 coined the term “osteosarcopenic obesity” (Ilich, J. Z. *et al.*, 2014).

A loss of muscle and skeletal mass along with function is also related with a sedentary lifestyle. An increase in fat content is associated with inflammation that leads to abnormalities in muscle and skeletal mass, size and function. Consequently, nonexistent activity further reduces muscle functions and mass caused due to obesity derived inflammation. Furthermore, the reduced muscle mass results in a further decrease in

physical activity (Ormsbee, M. J. *et al.*, 2014). Excessive fat content causes inflammatory cytokines that might trigger bone resorption while also reducing the strength of bone (Gonnelli, S. *et al.*, 2014). Risk factors of osteosarcopenic obesity includes genetic factors, aging, hormonal such as endocrine factors, lifestyle factors – (poor diet, physical activity, and smoking) (Curtis, E. *et al.*, 2015) and chronic diseases (JafariNasabian, P. 2018).

It is an important strategy to optimize lifestyle factors that are known to influence strength and peak bone mass (Cosman, F. *et al.*, 2014). Amongst them, physical activity modifications and dietary patterns are the top most to be executed. Nutritional modifications to alleviate and/or prevent osteosarcopenia include sufficient intake of magnesium, protein, vitamin D, calcium and increased intake of foods consisting of fiber and omega-3 polyunsaturated fatty acids (JafariNasabian, P. *et al.*, 2017). Alternative activities (pilates, yoga, tai chi) may be better suited for older adults than the conventional exercises (Inglis, J. E. *et al.*, 2017). They are considered low bearing exercises

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not only physically sustaining the body, but also enhancing stability and quality of life (J Kelly, O., & C Gilman, J. 2017). Suggesting exercise (even low baring) is required to maintain or improve balance, muscle power and reduce adiposity (Inglis, J. E. *et al.*, 2017).

Vitamin D is a vital element for our health. Also known as sunshine hormone, it is activated by sunlight exposure and plays key roles for the various metabolic activities in our body including our bone health, (Holick, M.F. 2011) muscle functioning and strength (Mastaglia, S. R. *et al.*, 2011).

METHODOLOGY

The present study was a cross sectional study. The duration of the study was 4 months. 237 osteosarcopenic elderly patients ≥50 years of age participated in this study out of which 117 (49.4%) were male while 120 (50.6%) were female. Data was obtained from Sir Ganga Ram Hospital and Services Hospital, Lahore. The questionnaire comprised of questions regarding anthropometric measures, dietary intake recall, lifestyle and exercise regime were included and filled by the participants. Patients suffering from osteosarcopenia above the age of 50 were included. SPSS software was used for the data analysis. Chi-Square test was used to find out the association between osteosarcopenia and obesity among the elderly patients.

The rules and regulations set by the ethical committee of University of Lahore will be followed while conducting the research and the rights of the research participants was respected. Written informed consent was taken from all the participants prior to participation. All information and collected data was kept confidential. Participants remained anonymous throughout the study. The subject was that there were no disadvantages or risk on the procedure of the study.

Result

A comparative research approach was used in this study. The association between osteosarcopenia and obesity was found out by Chi Square test. All patients participated were sarcopenic as part of the inclusion criteria. However the patients varied in terms of BMD score and BMI.

Table -1- Correlation between BMD score and BMI

		BMD Score		P Value
		Osteopenia	Osteoporosis	
BMI	Normal	1	4	0.041
	Overweight	11	57	
	Obese	15	149	
Total		27	210	

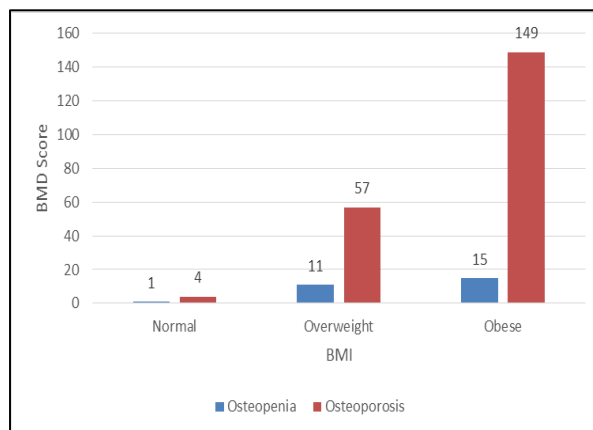


Figure-1 - Correlation between BMD score and BMI

According to Table -1, p value was less than 0.05 and was found to be significant. It rejected the null hypotheses and proved strong association between osteosarcopenia and obesity.

Table-2 – Frequency and percentage distribution of prevalence of exercise

Prevalence of Exercise	Frequency	Percent
Yes	67	28.3
No	170	71.7

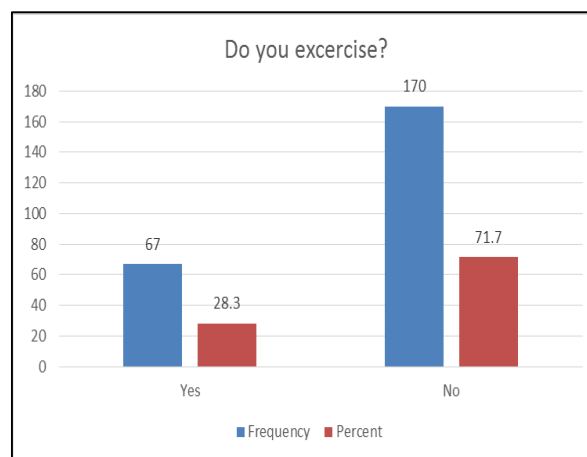


Figure-2 – Frequency and percentage distribution of prevalence of exercise

According to Table-1 and Figure-1, it was seen that out of the 237 patients, only 67 (28.3%) patients were doing physical activity that included a 20 minute walk while 170 (71.7%) of patients were not doing any kind of physical activity.

Table-3 – Frequency and percentage distribution of incidence of skipping meals

Skipping Meals	Frequency	Percent
Yes	172	72.6
No	64	27.0

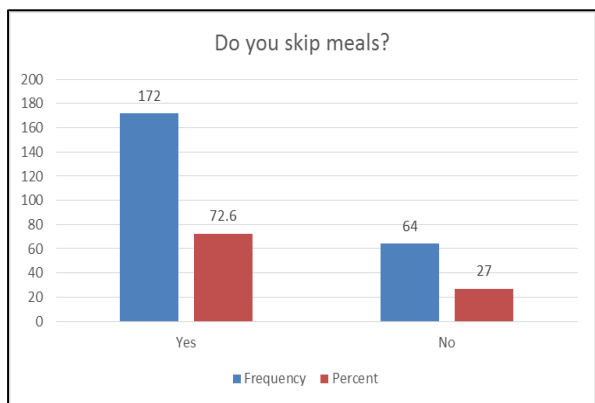


Figure-3 – Frequency and percentage distribution of incidence of skipping meals

According to Table-2 and Figure-2, it is seen that out the 237 patients, 172 (72.6%) patients had a habit of skipping meals while 64 (27%) patients had optimum 3 meals daily.

Table-4 – Frequency and percentage distribution of hours spent under sunlight

Hours under Sunlight	Frequency	Percent
1 hour	118	49.8
2 hour	51	21.5
3 hour	54	22.8
4 hour	10	4.2
5 hour	1	.4

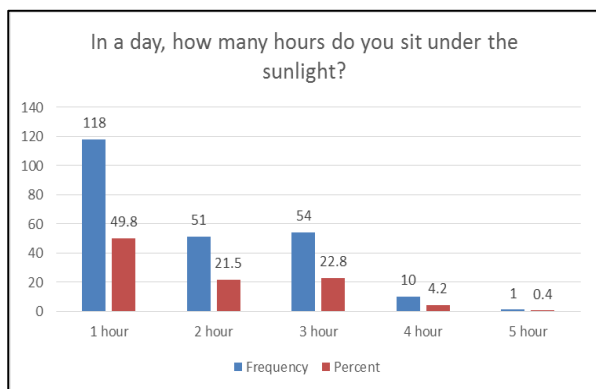


Figure-4 – Frequency and percentage distribution of hours spent under sunlight

According to Table-3 and Figure-3, out of 237 patients, 118 (49.8%) patients spent an hour or less in the sunlight daily while 51 (21.5%) patients spent 2 hours, 54 (22.8%) patients spent 3 hours, (10 (4.2%) patients spent 4 hours and 1 (0.4%) patients spent 5 hours in the sunlight in a day.

DISCUSSION

Osteosarcopenia is an alarming health complication especially among the elderly population. The prevalence is very high however, it is often overlooked. The risk factors of osteosarcopenia together with obesity if not controlled on time could result in consequences like increased morbidity and mortality.

Insufficient literature regarding osteosarcopenic obesity exists, therefore, the present study will be add beneficial literature regarding this syndrome. The present study was aimed to find out the association between osteosarcopenia and obesity. Some lifestyle adaptations like modified dietary patterns and exercise plays an important role in alleviating this condition. Thus, the present study also analyzed some of the lifestyle adaptations common among the osteosarcopenia patients.

A strong association was found between osteosarcopenia and obesity. As seen in Table-1 and Figure-1, 15 patients with osteopenia and sarcopenia were also obese and 149 patients with osteoporosis and sarcopenia were also obese. P value was 0.041 showing significant result and rejecting the null hypothesis. The present study was supported by previous studies regarding the presence of obesity along with osteoporosis and sarcopenia among the elderly. In a study involving ≥ 50 years of age females, osteosarcopenic obesity was found to be 19% (Szlejf, C. *et al.*, 2017). Another study showed the association between osteosarcopenia and obesity moreover comparing the functional capabilities. Results showed lowest functional performance in osteosarcopenic participants indicating an increased risk for bone fractures and immobility (Ilich, J. Z *et al.*, 2015).

The current study showed that only 71 (30%) participated in some kind of physical activity including a 20 minute walk while the rest 166 (70%) of the participants did not partake in any kind of activity (Table-2, Figure-2). Exercise plays a very significant role while dealing with OSO. Studies indicate that exercise, especially unconventional exercise, show promising results in improving the muscle quality and fat mass among the elderly thereby enhancing their quality of life. Exercises such as Pilates, tai chi and yoga have showed positive results on the elderly population who are incapable of performing the conventional exercise. (12) Studies have proved that exercise interventions have significantly improved the physical fitness, muscle mass and overall quality of life of the elderly (Chang, S. F. *et al.*, 2018).

Diet plays a key role in the proper functioning and maintenance of bone, muscle and fat mass. To obtain the required nutrients, variety of food must be consumed at least 3 times a day or in small quantities at frequent intervals. However, the present study showed that the older adults were frequently skipping meals as seen in Table-3 and Figure-3. This decreased their dietary intake quality and negatively impacted their health. A general weakness and fatigue was observed among the participants and they complained of overall bone and muscle pain. Previous study supported the effect of diet quality on osteosarcopenic obesity among middle aged and older males and females. The quality of the diet was evaluated through Diet Quality Index-

International (DQI-I). Results showed that consuming a healthy diet have lesser chances of developing body composition abnormalities (Kim, J. *et al.*, 2017). De Souza *et al.*, conducted a study to find out the effect of protein intake on muscle mass and bone health. It was seen that a sufficient protein intake in terms of quantity and quality, with no need of supplementation, could have a helpful effect on lean mass, bone mineral density, and skeletal muscle mass (Genaro, P. D. S. *et al.*, 2015). Sovianneter Borg and his colleagues conducted a study with the purpose of treating sarcopenia with nutrients. Their usual dietary practices were assessed using questionnaire. Results concluded that directed nutritional interventions improves the biochemical status and nutritional intake of the adults (ter Borg, S. *et al.*, 2016). Another study shows the positive impact of intake of omega-3 fatty acids on peak bone mass (Kuroda, T. *et al.*, 2017). A study conducted by E.S. Zoltick show the how decreased protein intake increases chances of falls and fractures (Mamerow, M. M. *et al.*, 2014). However, to obtain the optimum nutrients, a balanced diet is required. Skipping meals and reducing the intake of dairy and protein especially can be a leading cause for the health problems among the elders.

For the absorption of vitamin D, sunlight exposure is essential. However, as Table-4, Figure-4 shows, in the current study, 118 (49.8%) of the participants were getting inadequate exposure to sunlight i.e. they were exposed to sunlight for an hour or less per day. Hence, vitamin D deficiency was very common in participants. A previous study conducted with the objective to examine the association of 25hydroxy vitamin D (OHD) with osteoporosis, sarcopenia and physical activity, concluded that vitamin D 25OHD is vital for maintaining bones, muscles functions, skeletal muscle mass and maintaining physical activity (Scott, D. *et al.*, 2010). A study was conducted by Jinhee Kim to examine the association of the serum vitamin D and osteosarcopenic obesity. Results of study was that adults with higher serum vitamin D have reduced risk of adverse body composition and lower the risk of osteosarcopenic obesity in both male and female (Kim, J. *et al.*, 2017). Another cross sectional study was conducted to assess the level of calcium and vitamin D. To assess sunlight exposure of vitamin D the study was categorized on basis of sunlight exposure. Inadequate calcium intake and vitamin D deficiency are highly widespread and can lead to adverse bone composition and bad health (Quesada-Gómez, J. M. *et al.*, 2013). The deficiencies caused by the diet and lifestyle of people make the bones weak and more prone to fractures ultimately making a person less physically active resulting in muscle decline and an increased risk of obesity as well as other disorders.

CONCLUSION

Osteosarcopenia is among the significant health problems of the world in elderly patients and is associated with obesity at an alarming rate. Together, these conditions increase the complications of health especially among elderly people. By finding out the determinants of this condition, it will be helpful to prevent its incidence and reduce the complications through optimal diet and exercise.

Osteosarcopenic obesity is a highly prevalent syndrome among the elderly. Further research should be done especially focusing on lifestyle interventions and treating the syndrome through diet and exercise.

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Conflict of Interest

There is no conflict of interest.

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