Osteoporosis and sarcopenia are two conditions that are associated with ageing. Older people with osteoporosis and sarcopenia are at a higher risk of falls, fractures, disability and frailty. When people suffer from both osteoporosis and sarcopenia, the risk of falling and subsequent fracture is higher. Early diagnosis of osteosarcopenia and effective therapeutic interventions are important for maintaining quality of life in older people.

Osteoporosis

Osteoporosis is a common disease affecting about 1.2 million people. A further 6.3 million people have low bone density (osteopenia). Approximately 6% of men and 23% of women over 50 years have osteoporosis, increasing to 13% of men and 43% of women aged over 70 years.

Osteoporosis is a disease in which the density and quality of bone are reduced, leading to weakness of the skeleton and increased risk of fracture, particularly at the hip, spine and wrist. The World Health Organisation (WHO) defines osteoporosis as a T-score at the hip and/or lumbar spine at or below 2.5 standard deviations below the average values of a young healthy adult. Osteopenia is categorised as a T-score between -1 and -2.5.

Fracture risk associated with osteoporosis increases dramatically with advancing age. Older people living in residential aged care facilities are at a considerably higher risk of suffering fractures than older people living in the community.

Medications used for the prevention and treatment of osteoporosis include:

- Alendronate (Fosamax)
- Denosumab (Prolia)
- Raloxifene (Evista)
- Risedronate (Actonel)
- Teriparatide (Forteo)
- Zoledronic acid (Aclasta)

These therapies reduce fragility fracture risk by approximately 50%.

Sarcopenia

Sarcopenia is described as a degenerative loss of skeletal muscle mass and strength associated with ageing. Older people tend to be less active, contributing to sarcopenia. Sarcopenia is one of the most important causes of functional decline and loss of independence in older adults. Up to 50% of muscle mass is lost by 80 years of age. Muscle mass loss plays a key role in fracture risk. This loss of muscle mass and strength affects balance, gait and overall ability to perform tasks of daily living.

It is estimated that up to 6.4% of men and 9.3% of women in Australia have sarcopenia. People with sarcopenia are at least three times more likely to have a fall in the next two years, compared with people with normal muscle mass and strength.

Risk factors for sarcopenia include low albumin, stroke, hyperlipidaemia.

Sarcopenia is also associated with numerous acute and chronic disease states, increased insulin resistance, fatigue, falls and mortality. Obesity plays an important role in sarcopenia.

Osteosarcopenia

The combined effect of osteoporosis and sarcopenia is a serious threat to older people, especially when they are frail. Musculoskeletal decline is associated with excess mortality due to a decline in bone and low muscle mass. Muscle weakness is a contributor to age-related fracture risk. The loss of muscle mass contributes to reduction in mechanical loading by gravitational forces, which usually stimulate bone formation.

Older people with osteosarcopenia are more likely experience impaired mobility and have the highest prevalence of atraumatic fractures.

Women are more likely to experience osteosarcopenia, as they usually have lower lean muscle mean and strength, and lower bone mineral density (BMD) compared to men of the same age.

Low haemoglobin, low serum folate, low BMI and depression are associated with osteosarcopenia in older people.

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In summary, risk factors for osteosarcopenia include:

- Older age
- Female gender
- High alcohol intake
- Oral corticosteroids (prednisone, prednisolone)
- Menopause (in women)
- Low protein intake
- Low BMI
- Current smoking
- Low dietary calcium
- Low serum vitamin D
- Hypogonadism (in men)
- Hyperparathyroidism
- Obesity
- Rheumatoid arthritis
- Chronic kidney disease
- Low mobility and function

Management of osteosarcopenia

Interventions for osteosarcopenia can be broadly described as:

- Healthy lifestyle
- Physical activity
- Vitamin D and calcium supplementation
- Pharmacological treatment for osteoporosis
- Adequate protein intake

Adequate nutrition and targeted exercise are the most effective interventions for osteosarcopenia. Even the oldest and frailest nursing home residents may benefit from a combination of nutrition and resistance exercise. Activities to reduce falls risk and enhance muscle strength should be encouraged. Smoking cessation and alcohol restriction should be encouraged.

Nutritional evaluation and correction of deficiencies, including optimisation of vitamin D status, physical therapy, strength and balance training, and gait-assistive devices should be offered. Early intervention to optimise nutritional status is essential to minimise poor outcomes such as falls and fractures.

There is good evidence that vitamin D supplementation is effective in reducing the rate of falls in aged care homes. Australian guidelines recommend vitamin D supplements for all residents in aged care facilities as vitamin D deficiency is common. The target vitamin D level is above 75nmol/L.

Dietary calcium intake should be optimised (1200–1500 mg per day is recommended) and supplementation offered to those with inadequate intake to achieve this recommended daily intake. A dose of 1500mg calcium carbonate (600mg elemental calcium) or calcium citrate (315 mg elemental calcium) is usually sufficient to supplement dietary intake.

First-line treatments for osteoporosis include bisphosphonates (alendronate, risendronate and zolendronic acid) and denosumab.

Residential Medication Management Reviews (RMMRs) can identify medications associated with increased falls risk, vitamin D deficiency and osteoporosis. Deprescribing of these medicines may be possible in the context of the resident’s life expectancy, clinical status and preferences.

In addition to dietary protein, protein supplementation may be beneficial, especially combined with exercise. Protein supplementation improves muscle strength and function.

Summary

Residents with osteosarcopenia are at an increased risk of falls and fractures, and poorer quality of life. They are likely to be at an even higher risk of falls and fractures than those with osteopenia/osteoporosis or sarcopenia alone. Muscle mass loss or sarcopenia plays a key role in fracture risk in people with reduced bone density (osteoporosis or osteopenia) due to reduction in strength, functional impairment, and falls. A healthy lifestyle and strength and balance activities are first-line prevention and treatment choices. Adequate protein and calcium dietary intake, with supplements if necessary, and maintaining appropriate levels of vitamin D have a positive effect on both bone and muscle.

References