

Exercising to help prevent osteoporotic fractures: exercises

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Osteoporosis is a condition in which bones become weak and brittle and more likely to break than normal bones. Physical activity helps reduce the rate of bone mineral loss that occurs as we age and which results in osteoporosis. It also helps avoid injury to bones by improving muscle strength and balance. The strength training and balance exercises described in this handout are relevant for healthy middle aged and older people and also for those with osteoporosis or other medical conditions. If you have osteoporosis or any other medical conditions, you should consult your general practitioner before beginning an exercise program as you are likely to need a program designed specifically for you.

Guidelines for strength training (also known as resistance training) using free weights are described in the *Medicine Today* patient handout entitled *Exercising to help prevent osteoporotic fractures: guidelines*, which you should read in conjunction with this handout. To improve strength, balance and bone density, it is important that each exercise you do feels 'hard' (scoring at least 15 on the scale of perceived exertion on the last page of this handout). Also, make sure you are doing each exercise properly – the large photos show the correct technique to use, and the smaller photos give examples of incorrect ways these exercises may be done.

Equipment

You will need the following equipment for the strength training exercises:

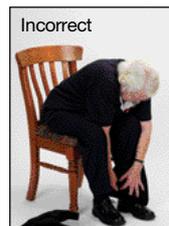
1. A set of ankle cuffs with removable 0.5 kg weights (a total of 10 kg per leg).
2. A set of adjustable dumbbells or fixed weight dumbbells ranging from 1 kg to about 20 kg.
3. A sturdy chair with a straight high back and no arms.

Putting on the ankle cuffs

(photo 1)

Sit on a chair and place each foot on a step so you can easily reach each ankle to fasten the cuff without having to bend forward.

Forward bending of the spine can cause compression fractures of the vertebrae in people at risk of osteoporosis.



This handout provides some exercises that, if performed regularly, will improve the health of your bones and help prevent osteoporotic fractures.

You should read the MedicineToday handout *Exercising to help prevent osteoporotic fractures: guidelines* for more information on strength training, balance training, aerobic exercise and high impact exercise.



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Strength training exercises

You should do two or three sets of eight repetitions of each exercise per session, and two or three sessions per week. In the rest period of at least a minute between each set, you should do one jump or heel drop – see photo 14. Each session should take 30 to 45 minutes.

Each of the exercise descriptions below counts as one repetition.

Calf raise (photos 2a, b and c)

Strengthens the ankle and the calf muscles.

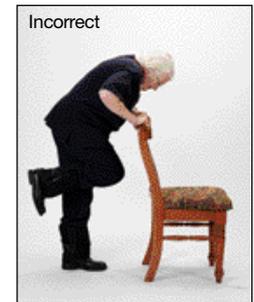
1. Wearing ankle weights, stand holding the back of a chair.
2. Lifting your heels, rise up on the toes of both feet, as high as possible.
3. Hold, then slowly lower your heels.
4. When this is too easy, use one leg at a time, alternately (photo 2c).



Knee flexion (photos 3a and b)

Strengthens the hamstring muscles, which bend the knee.

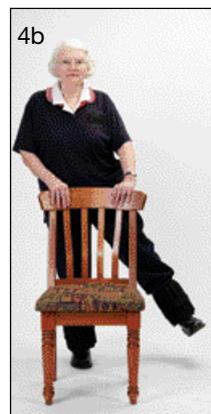
1. Wearing ankle weights, stand holding the back of a chair, close to it.
2. Bend one knee and slowly lift this foot backwards to as close to the back of your thigh as possible. Keep the upper part of your leg still, and your body upright.
3. Hold, then slowly lower your leg.
4. Repeat for the other leg.



Hip abduction (photos 4a and b)

Strengthens the muscles that pull the legs out to the side.

1. Wearing ankle weights, stand holding the back of a chair, close to it.
2. Without bending your knee or waist, move one leg straight out to the side, keeping your toes pointing forwards.
3. Hold, then slowly lower your leg.
4. Repeat for the other leg.



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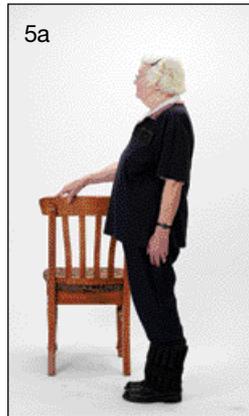
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Hip flexion (photos 5a and b)

Strengthens the muscles that bring the knee towards the chest.

1. Wearing ankle weights, stand side on to the back of a chair, resting one hand on the chair back.
2. Without bending at the waist or letting go of the chair, bring one knee at a time as close to your chest as possible.
3. Hold, then slowly lower your leg.
4. Repeat for the other leg.



Hip extension (photos 6a and b)

Strengthens the muscles in the buttocks and lower back.

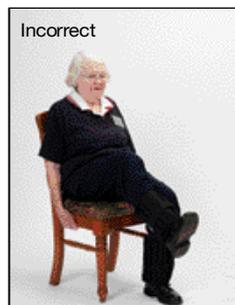
1. Wearing ankle weights, stand holding on to the back of a chair, and bend forward about 45 degrees at the waist.
2. Slowly lift one leg straight out behind you as high as possible. Keep your knee straight and foot pointing downwards, and don't move your upper body.
3. Hold, then slowly lower your leg.
4. Repeat for the other leg.



Knee extension (photos 7a and b)

Strengthens the quadriceps muscle, which straightens the knee.

1. Wearing ankle weights, sit in a chair with a good upright posture and the back of your knees resting against the chair seat.
2. Raise one foot in front of you until your knee is as straight as possible, keeping your thigh on the chair and your toes pointing up. Pull your toes towards your head as far as possible.
3. Hold, then slowly lower your leg.
4. Repeat for the other leg.



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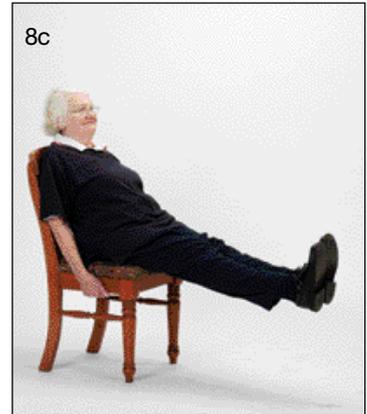
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Leg lifts (photos 8a, b and c)

Strengthens the abdominal muscles to improve posture.

1. Wearing ankle weights, sit in a chair and slide forwards so your buttocks are near the front edge and your back is resting against the chair back. Hold on to the sides of the seat for balance.
2. Slowly lift both feet 5 to 10 cm off the ground, then straighten your legs out in front of you.
3. Hold, then slowly lower your feet to the ground.
4. If this is too difficult, remove the weights or lift one leg at a time.



Seated row (photos 9a and b)

Strengthens the muscles of the upper torso for control of balance and posture.

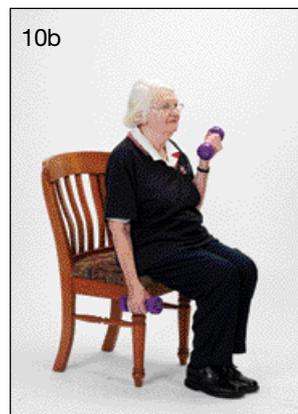
1. Holding dumbbells, sit forward in a chair with a good upright posture.
2. Hold the dumbbells perpendicular to the ground with elbows bent, so that the dumbbells are touching each other about 10 cm in front of your chest.
3. Slowly bring your arms out to the side as though you are drawing a circle around your body. Try to squeeze your shoulder blades together.
4. Bring your arms back directly in front of your chest.



Biceps curl (photos 10a and b)

Strengthens the upper arm muscles that flex the elbow.

1. Holding dumbbells, sit in a chair with a good upright posture.
2. Bend one elbow to lift the dumbbell towards your shoulder. Don't move the upper arm or shoulder during the lift.
3. Hold, then slowly lower the dumbbell.
4. Repeat for the other arm.



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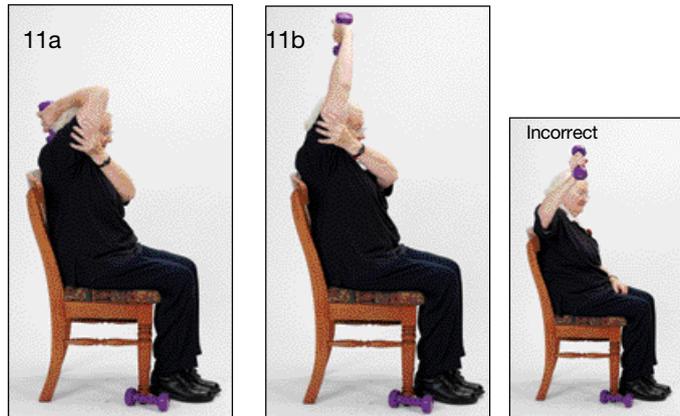
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Triceps lift (photos 11a and b)

Strengthens the muscles at the back of the upper arm that straighten the elbow.

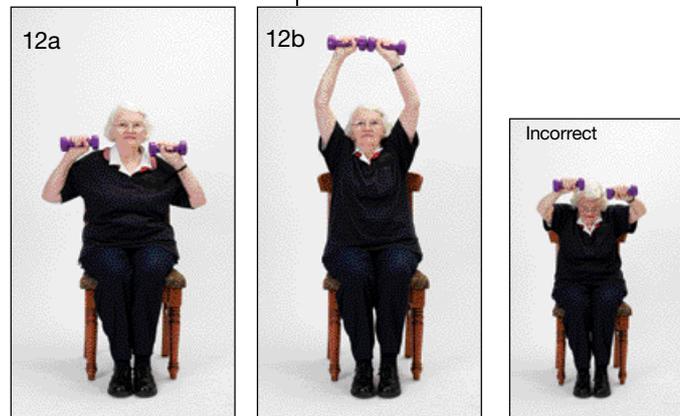
1. Sit in a chair with a good upright posture, arms by your side.
2. Holding a dumbbell in one hand, raise that arm over your head. Using your other arm to hold your elbow close to your head, slowly bend the elbow so the dumbbell moves down to behind your neck.
3. Slowly raise your arm straight above your head.
4. Hold, then slowly bend your elbow to lower the dumbbell back behind your neck.
5. For this exercise, do all the repetitions for a set with one arm before changing to the other arm (i.e. eight times with one arm, then eight times with the other arm).



Overhead press (photos 12a and b)

Strengthens the shoulder and upper arm muscles.

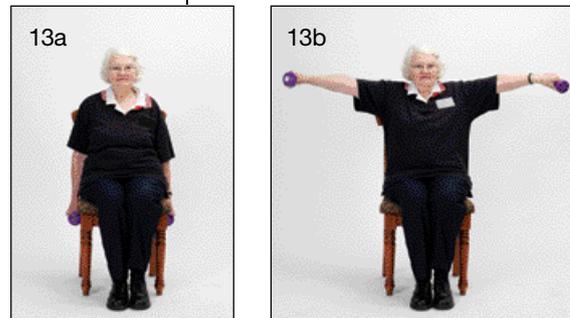
1. Holding dumbbells, sit in a chair with a good upright posture, arms by your side.
2. Raise both arms, bending the elbows so the dumbbells are held level with your ears.
3. Slowly raise both arms straight above your head.
4. Hold, then slowly lower your arms to level with your ears.



Side arm raise (photos 13a and b)

Strengthens the deltoid muscles that lift the arms out to the side.

1. Holding dumbbells, sit in a chair with a good upright posture, arms by your side.
2. Raise your arms out to the side as high as your shoulders, keeping the elbows straight.
3. Slowly lower your arms to the chair.



Jump (photo 14)

High impact exercise stimulates bone cells, increasing bone density.

Perform one jump in the rest period between each set of each strength training exercise – so you do about 15 to 30 jumps per session. Land with your knees straight and on both feet.

If you have previous injuries or more than mild knee or hip osteoarthritis then heel drops are more suitable. For heel drops, stand on a step with your heels overhanging the edge. Rapidly drop your heels, with a sudden stop. Then slowly raise them.



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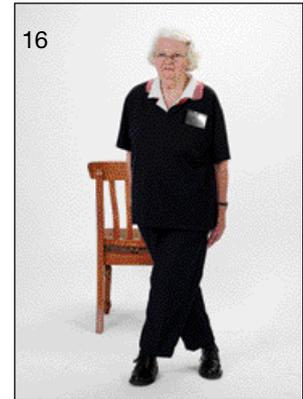
Balance exercises

Balance exercises are best done before strength training exercises to minimise fatigue and the risk of falling. You should do one set of five repetitions of each exercise per session.

Tandem walking (photo 15)

Also known as heel-to-toe walking.

1. Walk for 3 to 4 metres placing the heel of one foot directly in front of the toe of the other, just touching.
2. Have a chair, rail or another person close by in case of overbalancing.

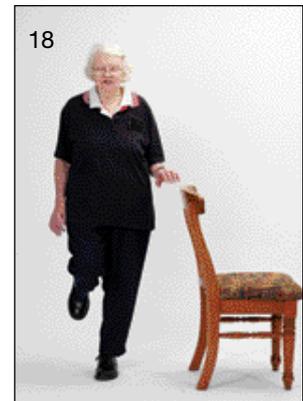
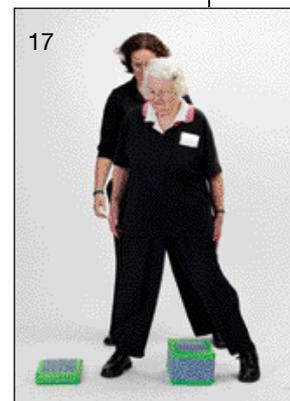


Crossover walking (photo 16)

1. Walk sideways for 3 to 4 metres crossing one leg in front of the other, placing your feet parallel to each other with the toes level.
2. Have a chair, rail or another person close by in case of overbalancing.

Sideways stepping over object (photo 17)

1. Walk sideways over three or four objects of differing heights, placing your feet parallel to each other with the toes level.
2. Have a chair, rail or another person close by in case of overbalancing.



Standing on one leg, eyes closed (photo 18)

1. With your eyes closed and one hand resting on the back of a chair for support, stand on one leg for 30 seconds.
2. Repeat for the other leg.
3. To increase difficulty, add a mental task such as naming animals or subtracting 7's from 200.
4. To further increase the difficulty, reduce the hand support from one hand to one finger to one fingertip to no hands.

Exercise intensity scale

At each exercise session, rate the difficulty of the first time you do each exercise on this scale.

When your rating for an exercise falls below a score of 15, increase the difficulty by moving up to the next higher weight, decreasing the hand support (from two hands to one hand, to one finger, to one fingertip to no hands), standing on one leg or jumping higher, depending on the exercise.

Exercise Intensity Scale		
6		
7	Very, Very Light	
8		
9	Very Light	
10		
11	Fairly Light	
12		
13	Somewhat Hard	
14		
15	Hard	
16		
17	Very Hard	
18		
19	Very, Very Hard	
20		

More information

Further information can be obtained from the websites of the following organisations:

- Osteoporosis Australia – www.osteoporosis.org.au
- Fit For Your Life Foundation – www.fitforyourlife.org
- Centre for Strong Medicine, Balmain Hospital, Sydney – www.strongmedicine.md
- COTA (Council on the Ageing): Living Longer Living Stronger program – www.cota.org.au



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