

Exercise for Postural Kyphosis in Individuals with Osteoporosis

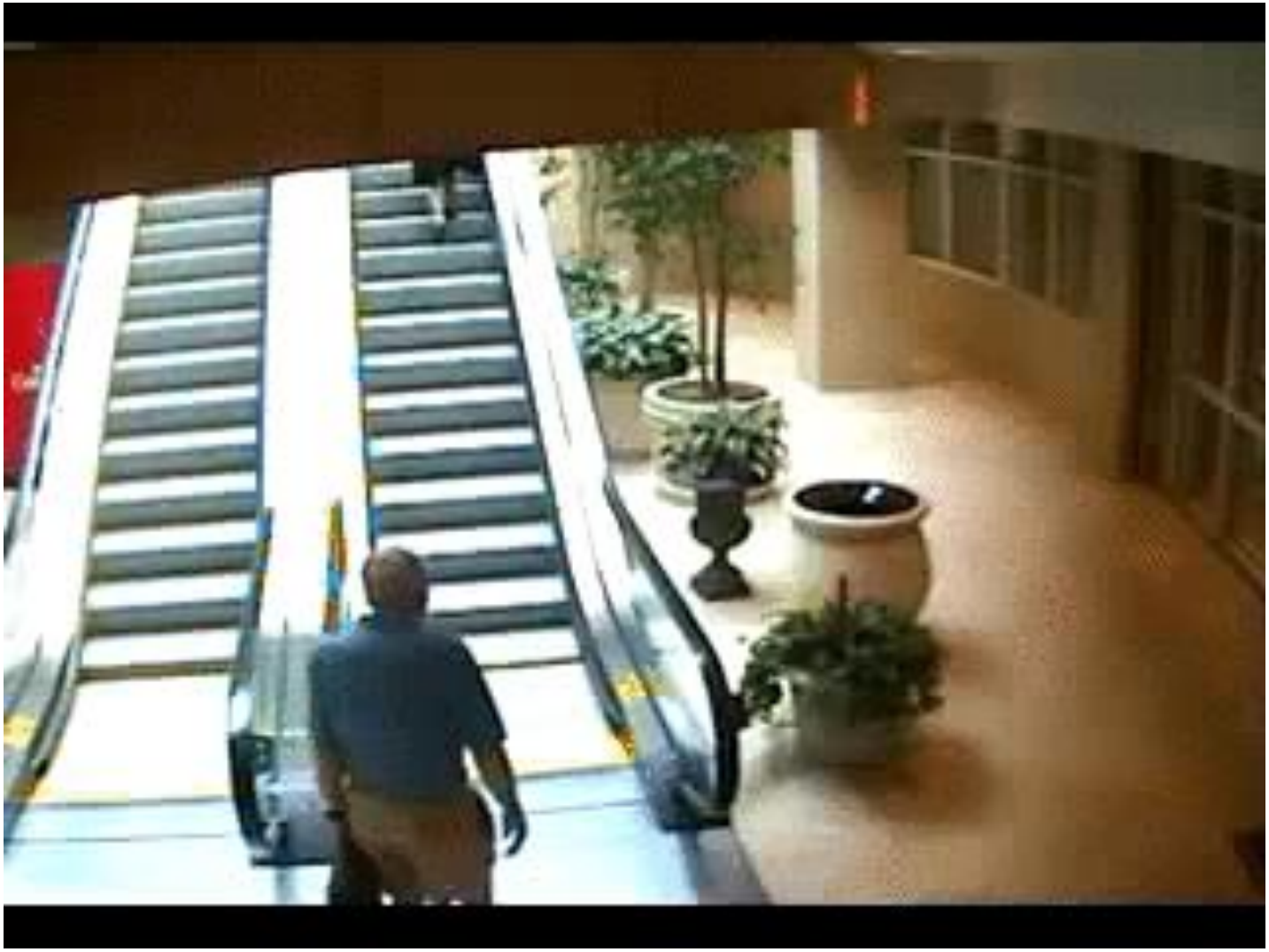
Wei-Li Hsu, PT, PhD

Associate Professor

Director of Movement Science Lab

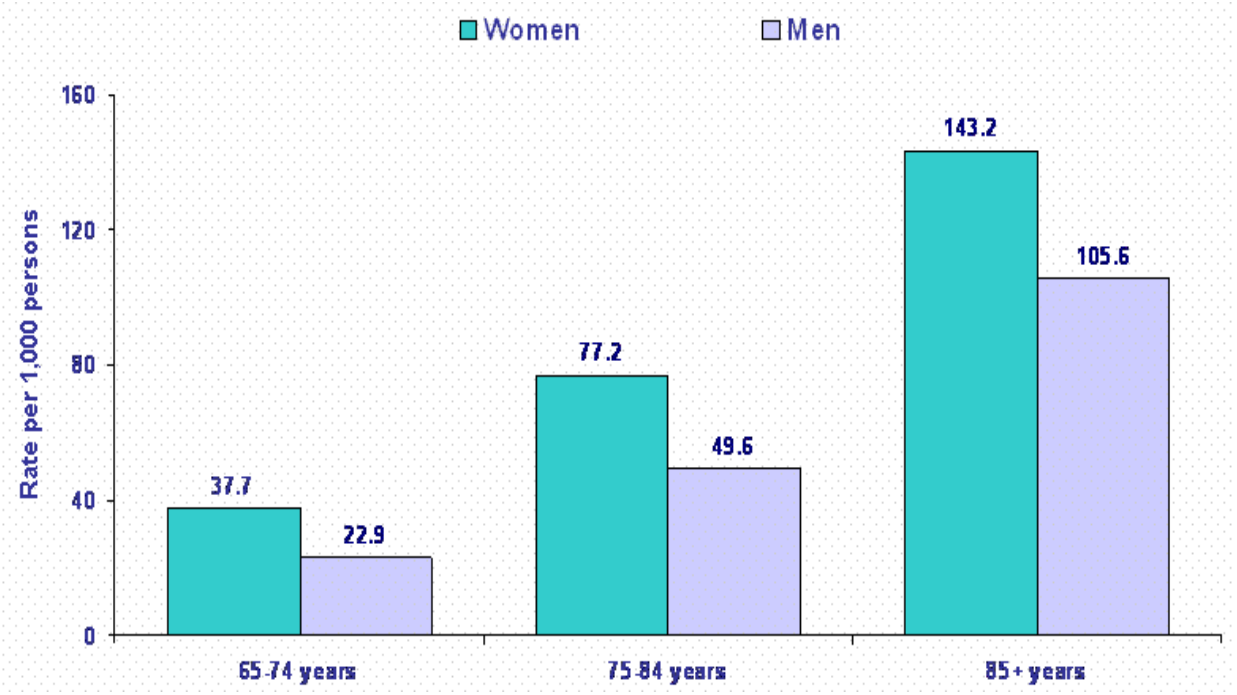
School and Graduate Institute of Physical Therapy
National Taiwan University

Aging and Falls



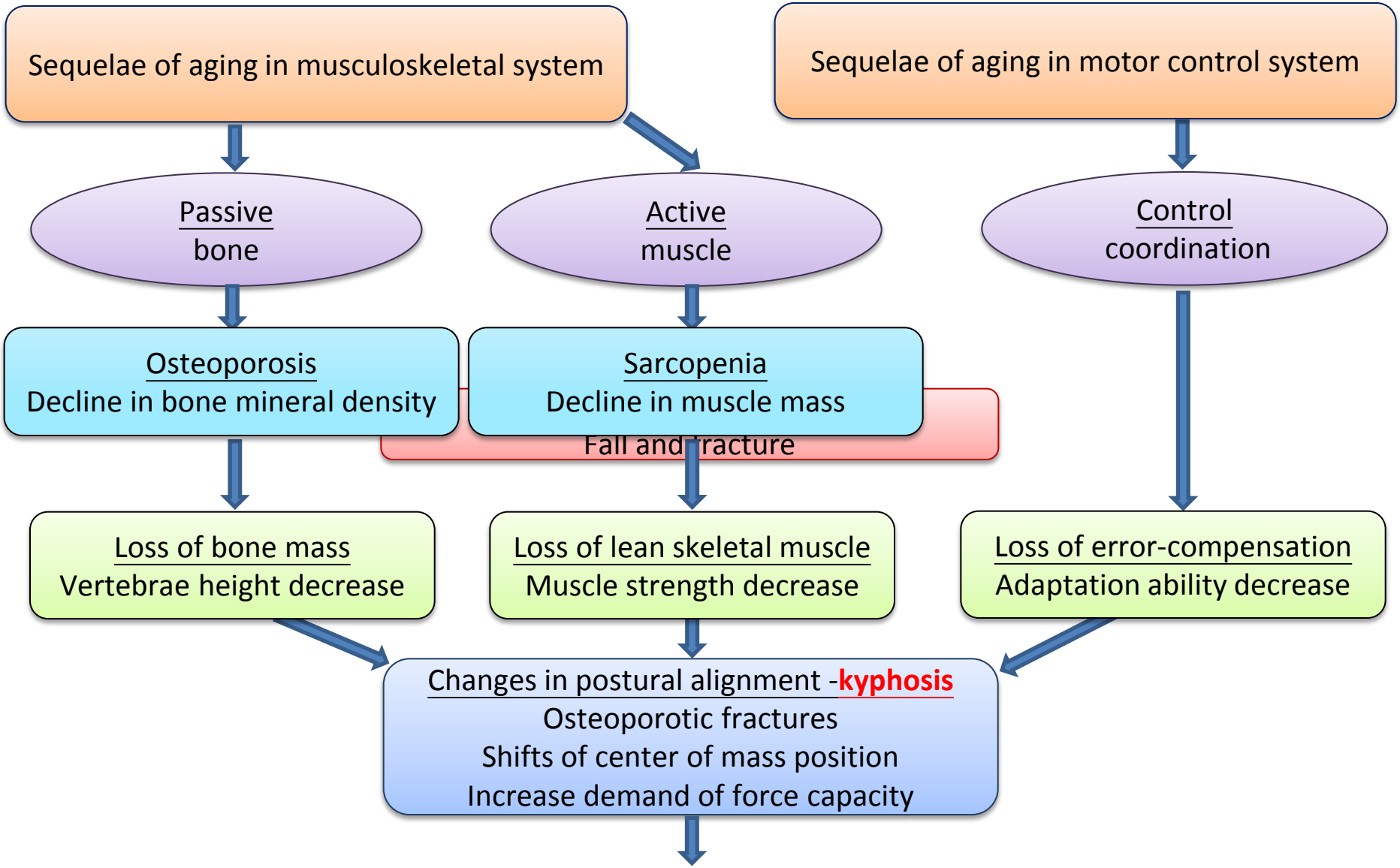
Falls and Injuries

- Falls represent a significant health risk in the elderly with osteoporosis
  - result in injuries that require medical attention



Rates of ER visits for injurious falls among elderly people.
(*Population Division, U.S. Census Bureau*, 2006)

Hypothetical Model for Effects of Aging on Upright Balance



(Hsu* et al, *J Formos Med Assoc,* 2014)

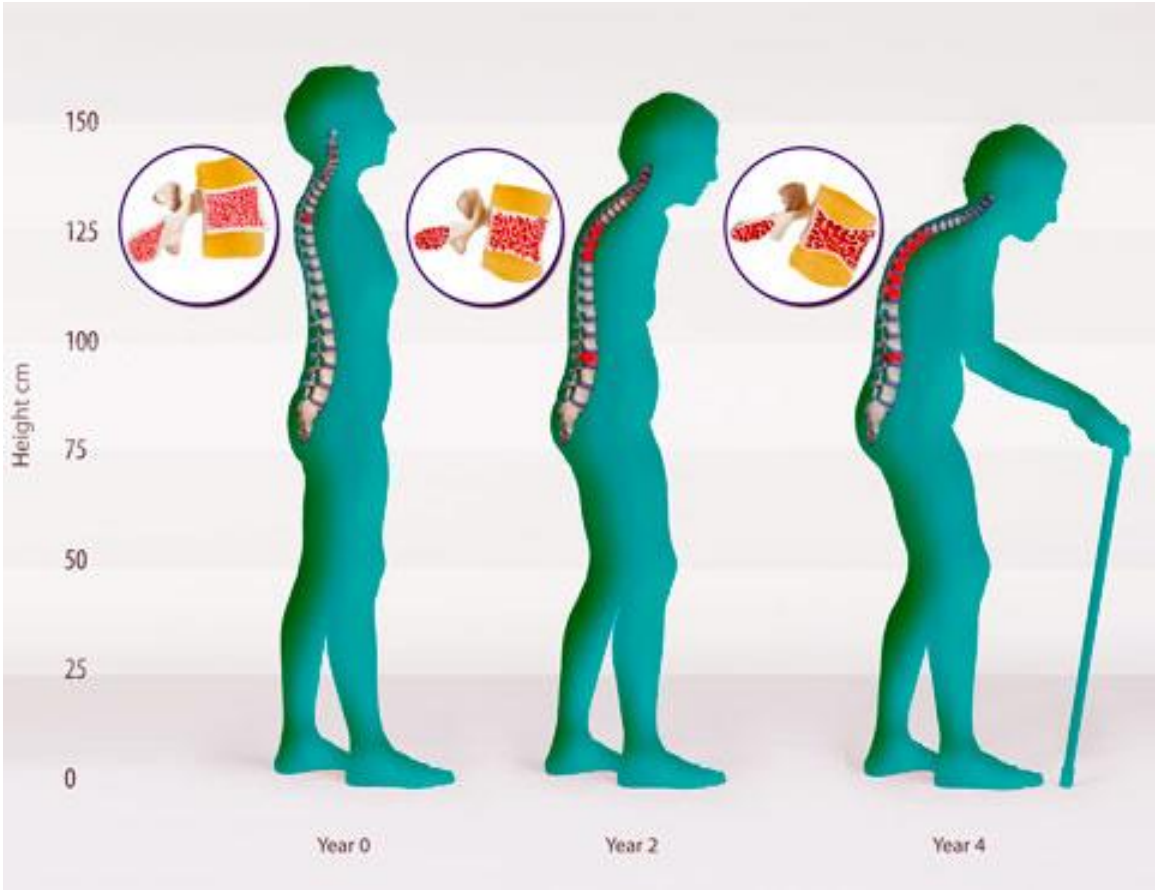
Upright Balance

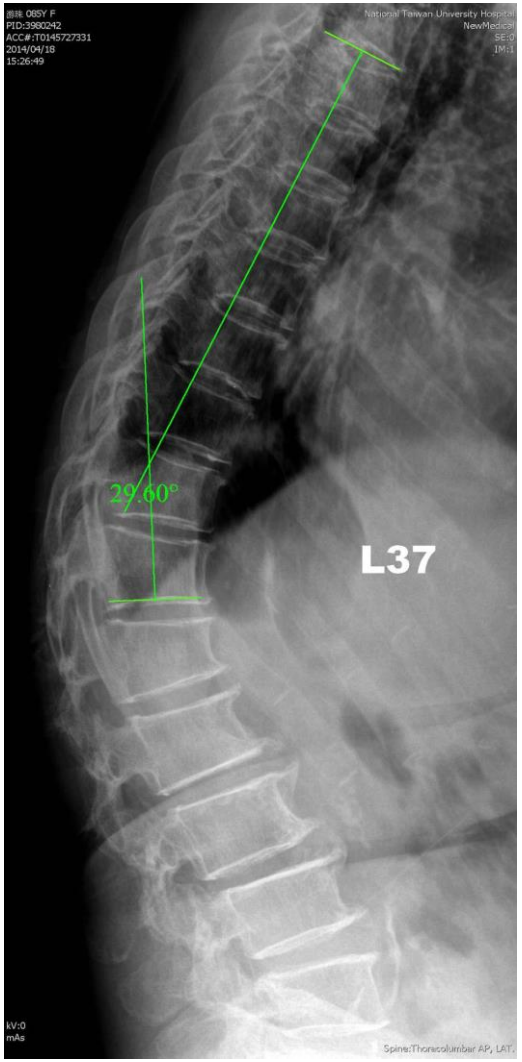
- Stability in upright position
  - keeping the vertical projection of the whole body center of mass within the base of support



Healthy man | **Multisensory deficits** | **Multisensory deficits**

Postural Kyphosis in Osteoporosis





Purpose

Myofascial release technique (Baldwin et al 2013)

- To relieve pain
- To increase joint mobility
- To improve posture

Aim of this study

- To investigate the immediate effects of **stretching exercise** and **myofascial release** on kyphotic posture in individuals with osteoporosis and osteopenia

Participants

• Inclusion Criteria	• Exclusion Criteria
• aged > 40 years old • had a DXA scan within the last year with a T-score (spine or hip) < -1 • were able to stand and walk independently for 5 min	• neurological disorders • sensory impairments • cancer, severe back pain with Faces Pain Scale (FPS) > 7 • any known pain, pathology or surgery of the shoulder joints

Thirty-three osteoporotic and osteopenic women were recruited

Interventions

Stretching Exercise-
Trunk Muscle

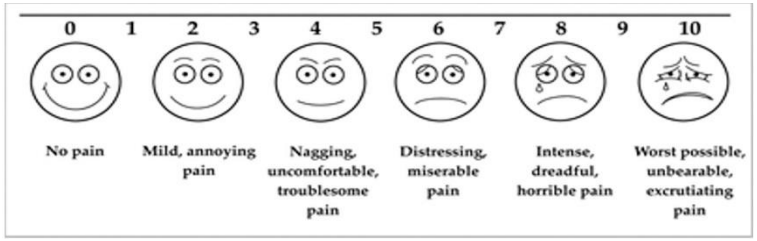


Myofascial Release-
Pectoralis Minor



Outcome Measures

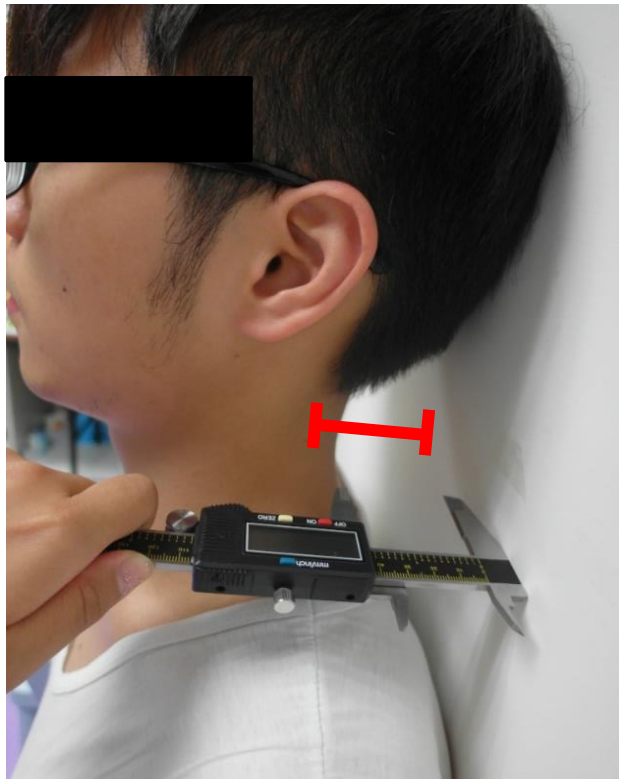
Faces Pain Scale for back pain



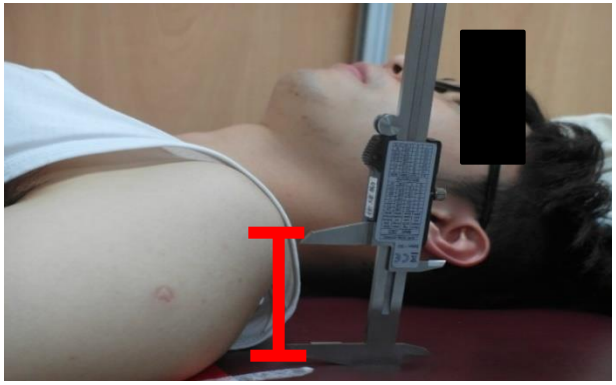
Trunk flexion & extension



Occiput-wall distance



Pectoralis Minor Length



Statistical Analysis

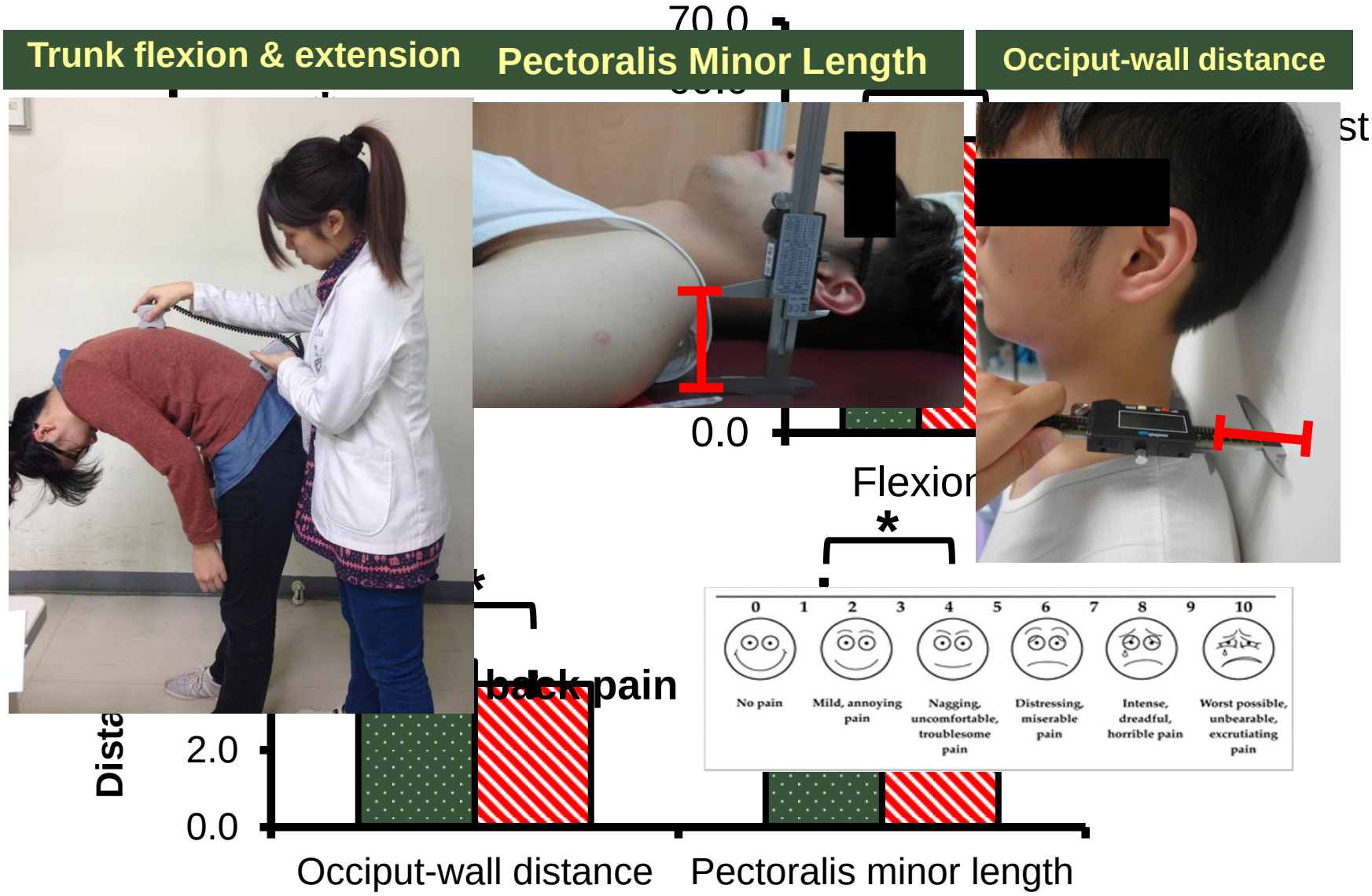
- Paired-t test was used to compare pre- and post-intervention for all outcome measurements
- Significance level was set at $p < 0.05$
- SPSS v18.0 was used for all statistical analysisData are presented as mean ± D

Demographic Data of the Participants

$n = 33$	Mean ± SD	Range
Age (years old)	72.4 ± 10.5	44 – 89
Height (cm)	152.8 ± 4.8	142 – 167
Weight (kg)	58.6 ± 10.6	42 – 74
BMI (kg/m^2)	25.1 ± 4.7	18.0 – 31.6
DXA T-score of the spine	-2.7 ± 1.0	-4.3 – -0.7
DXA T-score of the right hip joint	-1.9 ± 0.2	-3.0 – -1.2
Kyphosis angle in X-ray (degree)	33.6 ± 12.4	15.9 – 49.7
FPS of the back pain	3.1 ± 2.5	0 – 7

	Number of participants
History of vertebral compression fractures	15
History of falls	10

Results


Trunk flexion & extension
Pectoralis Minor Length
Occiput-wall distance
70.0
0.0
Flexion
*
back pain
2.0
0.0
Occiput-wall distance
Pectoralis minor length
0 1 2 3 4 5 6 7 8 9 10
No pain
Mild, annoying pain
Nagging, uncomfortable, troublesome pain
Distressing, miserable pain
Intense, dreadful, horrible pain
Worst possible, unbearable, excrutiating pain

Conclusions

Single session of myofascial release and stretching exercise on postural correction may have immediate beneficial effects

- back pain
- kyphosis
- trunk mobility

Future studies should investigate the long-term effects of this intervention technique

Ongoing and Future Studies

Sequelae of aging in musculoskeletal system

Sequelae of aging in motor control system

Passive
bone

Active
muscle

Control
coordination

Osteoporosis
Decline in bone mineral density

Sarcopenia
Decline in muscle mass

Loss of bone mass
Vertebrae height decrease

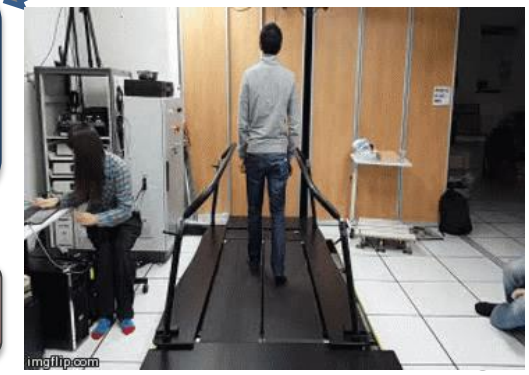
Loss of lean skeletal muscle
Muscle strength decrease

Exercise Training Using Perturbation Treadmill



Changes in postural alignment (kyphosis)
Osteoporotic fractures
Shifts of center of mass position
Increase demand of force capacity

Poor upright balance
Fall and fracture



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Thanks for your attention!



National Taiwan University, Taipei, Taiwan

Wei-Li Hsu, PT, PhD