OP1-3-5

Epidemiology and effect on physical function of osteosarcopenia in patients with knee osteoarthritis

So Young Lee[1*], Bo Ryun Kim[1†], Sang Rim Kim[2], Kwang Woo Nam[2], Yong-Geun Park[2], Min Ji Suh[1], Won Bin Kim[1], Youn Ji Kim[1]

Jeju National University School of Medicine, Regional Rheumatoid and Degenerative Arthritis Center, Jeju National University Hospital, Jeju, Republic of Korea, Department of Rehabilitation Medicine[1], Jeju National University School of Medicine, Regional Rheumatoid and Degenerative Arthritis Center, Jeju National University Hospital, Jeju, Republic of Korea, Department of Orthopedic Surgery[2]

Objective
This study was undertaken to investigate the prevalence of osteosarcopenia and its impact on physical function, quality of life and pain in patients with end-stage knee osteoarthritis.

Methods
In this cross-sectional study, we assessed a total of 578 patients (77 males and 501 females; average age 71.47±5.72 years) who were diagnosed with end-stage knee osteoarthritis (OA). We divided patient into four groups according to the presence of osteoporosis and sarcopenia(defined as a loss of skeletal muscle mass by Bioelectrical Impedance Analysis). The concept of osteosarcopenia is defined as patients with osteoporosis and sarcopenia. All patients completed performance-based physical function tests including stair climbing test (SCT), 6-minute walk test (6MWT), timed up and go test (TUG), instrumental gait analysis for spatio-temporal parameters. Self-reported physical function and pain were measured using the Western Ontario McMaster Universities Osteoarthritis Index (WOMAC) and Visual Analog Scale (VAS), and self-reported quality of life was measured using the EuroQOL five dimensions (EQ-5D) questionnaire.

Results
Osteoporosis alone was diagnosed in 191 subjects (33%), sarcopenia alone in 23 (4%), and osteosarcopenia in 13 (2.2%). Among 13 patients with osteosarcopenia, 11(84.6) were females and 2(15.4) were males. In the analysis of variance (ANOVA), osteosarcopenia group exhibited significantly higher scores in SCT-ascent, SCT-descent, TUG, and lower scores in 6MWT, gait speed, cadence and EQ-5D in other groups (P<0.05). After adjusting for age, sex, BMI by the logistic regression, SCT-descent (β=0.158, p<0.001, R2=0.13), SCT-descent (β=0.169, p<0.001, R2=0.118), 6MWT (β=0.091, p=0.027, R2=0.027), TUG (β=0.14, p=0.001, R2=0.128), EQ-5D (β=-0.14, p=0.001, R2=0.033), WOMAC pain(β=0.158, p<0.001, R2=0.13), gait speed (β=-0.138, p=0.001, R2=0.085) and cadence (β=-0.131, p=0.002,

R2=0.039) were significantly associated with patients with osteosarcopenia (OR=1.040, 95% CI 1.010-1.071, p=0.010).

Conclusions

This study confirmed the prevalence of osteosarcopenia could be associated with the performance-based and self-reported physical function, and quality of life in patients with end-stage knee OA.

Table 1. Demographic characteristics of the subjects (N=578)

	Total	Male	Female	
Number	578	77	501	
Age (years)	71.47±5.72	72.32±5.83	71.34±5.70	0.16
BMI (kg/m^2)	26.63±3.47	26.28±3.21	26.68±3.51	0.34
aSMI (kg/m^2)	6.64±0.94	7.73±1.04	6.47±0.81	<0.001
K-L grade				0.42
Grade 3	122(21.1)	15(19.5)	107(21.4)	
Grade 4	456(78.9)	62(80.5)	394(78.6)	
Comorbidities				
Hypertension	382(65.1)	58(75.3)	324(64.7)	0.04
Diabetes mellitus	105(18.2)	12(15.6)	93(18.6)	0.33
Degenerative spine disease	89(15.4)	8(10.4)	81(16.2)	0.13
Sarcopenia	36(6.2)	14(18.2)	22(4.4)	<0.001
Osteoporosis	204(35.3)	13(16.9)	191(38.1)	<0.001

Values represent mean ± standard deviation or number (%) of cases

Abbreviations: aSMI, appendicular skeletal muscle index; BMI, Body Mass Index; K-L, Kellgren-Lawrence

Table 2. Demographic data and performance-based physical function, self-reported physical function, quality of life and pain in patients with end-stage knee osteoarthritis according to groups (n=578).

Variables	Osteoporosis(-) Sarcopenia(-)	Osteoporosis(+) Sarcopenia(-)	Osteoporosis(-) Sarcopenia(+)	Osteoporosis(+) Sarcopenia(+)	
Number	351(60.7)	191(33.0)	23(4.0)	13(2.2)	
Age (years)	70.87±5.74	72.06±5.57	74.74±3.67	73.23±7.38	0.002
BMI (kg/m2)	27.14±3.53	26.17±3.23	24.36±2.71	23.45±2.82	<0.001
SCT-ascent (sec)	13.18±5.26[a]	14.25±5.39[b]	14.59±6.26	19.82±8.77[ab]	0.001
SCT-descent (sec)	15.64±5.93[ad]	17.32±6.34[d]	17.09±6.99	22.04±12.03[a]	0.001
6MWT (m)	324.48±104.91[e]	303.78±102.65	261.43±107.86[e]	267.69±111.65	0.004
TUG (sec)	11.59±3.27[a]	12.57±5.32	12.46±3.01	15.44±9.16[a]	0.002
Gait analysis					
Gait speed (m/sec)	0.91±0.17[a]	0.88±0.17[b]	0.89±0.15	0.73±0.23[ab]	0.001
Cadence (steps/min)	105.37±14.20[a]	103.15±15.34[b]	104.58±14.24[c]	86.02±23.38[abc]	<0.001
WOMAC-pain	9.16±3.04	9.74±3.13	9.57±2.71	10.15±3.36	0.15
WOMAC-stiffness	2.80±1.29	2.83±1.20	2.57±1.47	2.92±1.71	0.81
WOMAC-function	28.89±8.84	29.25±8.96	30.35±9.54	34.00±10.69	0.21
EQ-5D	0.59±0.16[a]	0.58±0.16	0.53±0.20	0.46±0.23[a]	0.01
VAS	6.86±1.77	7.02±1.55	7.26±1.29	7.31±1.32	0.441

Values represent mean ± standard deviation or number (%) of cases

Abbreviations: BMI, Body Mass Index; SCT, Stair Climbing Test; 6MWT, 6-minute walk test; TUG, Timed up and go; WOMAC, Western Ontario McMaster Universities Osteoarthritis Index; EQ-5D, EuroQOL five dimensions; VAS, Visual analog scale

[a]Significant difference between Osteoporosos(-)Sarcopenia(-) and Osteoporosos(+)Sarcopenia(+) (p<0.05)

[b]Significant difference between Osteoporosos(+)Sarcopenia(-) and Osteoporosos(+)Sarcopenia(+) (p<0.05)

[c]Significant difference between Osteoporosos(-)Sarcopenia(+) and Osteoporosos(+)Sarcopenia(+) (p<0.05)

[d]Significant difference between Osteoporosos(-)Sarcopenia(-) and Osteoporosos(+)Sarcopenia(-) (p<0.05)

[e]Significant difference between Osteoporosos(-)Sarcopenia(-) and Osteoporosos(-)Sarcopenia(+) (p<0.05)

Table 3. Factors of performance-based physical function, self-reported physical function, quality of and pain associated with osteosarcopenia in patients with end-stage knee osteoarthritis by lo regression analyses adjusting for age, sex, BMI

Outcome/Independent predictor	Standardized β	p-value	Adjusted R2
WOMAC pain	0.091	0.027	0.027
SCT-ascent	0.158	<0.001	0.13
SCT-descent	0.169	<0.001	0.118
6MWT	-0.144	<0.001	0.11
TUG	0.14	0.001	0.128
EQ5D	-0.14	0.001	0.033
gait speed	-0.138	0.001	0.085
cadence	-0.131	0.002	0.039

Values represent mean ± standard deviation or number (%) of cases

Abbreviations: SCT, Stair Climbing Test; 6MWT, 6-minute walk test; TUG, Timed up and go; EQ-5D, EuroQOL five dimensions