Lumbar Disc Degeneration in Thai Elderly: A Population-Based Study

Dootchai Chaiwanichsiri MD*,
Araya Jiamworakul MD**, Sutthichai Jitapunkul MD***

* Department of Rehabilitation Medicine, Faculty of Medicine, Chulalongkorn University, Bangkok
** Thai Red Cross Rehabilitation Center, Thai Red Cross Society, Bangkok
*** Department of Medicine, Faculty of Medicine, Chulalongkorn University, Bangkok

Objective: Determine the prevalence and related factors of lumbar disc degeneration in the Thai elderly.
Material and Method: A population-based study was done at Rom Klao community, Bangkok. Seven hundred and ninety-two cases (306 males, and 486 females) out of 1,166 elderly people aged ≥ 50 (mean age of 61.07 $\pm$ 7.8 years) were assessed. The lateral spinal radiographs were interpreted as spondylosis grade 0-3 according to the degree of severity.
Results: Males had more prevalence of grade 2-3 spondylosis than females (58.8% vs. 52.9%), but females had higher prevalence of spinal listhesis (14.4% vs. 8.8%). Age was a strong predicting factor for disc degeneration (OR = 1.088, 95% CI = 1.065-1.111, p = 0.000). Females had more risk to develop spinal listhesis (OR = 1.84, 95% CI = 1.11-3.05, p = 0.020) and low back pain (OR = 1.82, 95% CI = 1.29-2.56, p = 0.001). BMI was a predicting factor for spondylosis (OR = 1.066, 95% CI = 1.02-1.10, p = 0.000). About 27% of the cases reported moderate-severe low back pain and had lower Barthel ADL index (p = 0.018).
Conclusion: Lumbar disc degeneration and low back pain were highly prevalent among the Thai elderly. Therefore, they need proper health care for disability prevention.

Keywords: Lumbar spine, Spondylosis, Spondylolisthesis, Low back pain, Elderly

Spondylosis or degenerative disc disease of the lumbar spine is a common musculoskeletal disorder in the elderly. The prevalence of lumbar spondylosis increases with age[1,2], also the occurrence of low back pain and disability[2,3]. Epidemiological study of lumbar disc degeneration resulted in different features among countries[4-6]. This is the first population-based study of lumbar spondylosis ever done in Thailand, as a part of the "Cohort study of problems, their risk factors and determinants of good health among the elderly living in Rom Klao community, Lat Krabang district, Bangkok" (CERB) project. The project was held by the Department of Medicine, Faculty of Medicine, Chulalongkorn University under the Thai Government budget in 1997. The objective of the present study was to identify the prevalence and related factors of lumbar spondylosis in this population. Therefore, proper health promotion programs should be implemented for the Thai elderly in order to improve their quality of life.

Material and Method

The project was approved by the Ethics Committee of the Faculty of Medicine, Chulalongkorn University. There were 1,166 people whose age ≥ 50 years living in the studied community. Nine hundred and forty-one people gave their informed consent and engaged in the CERB project. After being interviewed and assessed by the trained personnel, 800 people could have lateral spinal radiographs, which were all evaluated by a single observer.

Lumbar spondylosis identified from the radiographs was categorized into four grades: grade 0 = normal; grade 1 = mild narrowing disc space with subchondral bone sclerosis; grade 2 = moderate narrowing disc space with subchondral bone sclerosis and

Correspondence to : Chaiwanichsiri D, Department of Rehabilitation Medicine, Faculty of Medicine, Chulalongkorn University, Bangkok, Thailand. E-mail: dootchai@hotmail.com

osteophytes; grade 3 = marked narrowing disc space with osteophytes or listhesis. The levels of anterior listhesis and retrolisthesis were recorded.

All data were analyzed with SPSS program for Windows version 13. The prevalence was reported in percent. Mean, standard deviation (SD) were described by continuous data. Associated factors were compared between different ages, genders, and grades of spondylosis using unpaired t-test, and Pearson's Chi-square test. Logistic regression analysis was used to determine odds ratio and 95% confidence interval (95%) (CI) where appropriate, with significant level at $p < 0.05$.

Results

After exclusion of the cases with history and evidences of spinal traumatic fracture, and tumor, 792 cases were brought for analysis. There were 306 males (38.6%), and 486 females (61.4%) with a mean age $\pm$ SD of 61.07 ± 7.8 years and a range of 50 to 88 years. The demographic data are shown in Table 1.

The numbers of the studied population in each decade are shown, with the gender ratio male:female $\approx$ 2:3. The female subjects had higher body mass index (BMI) with the mean value of ≥ 25 kg/m^2. About 54.8% of the subjects reported low back pain within 6 months, and 27% were moderate to severe pain. The mean Barthel ADL Index (BAI) scores are not significantly different between the two genders.
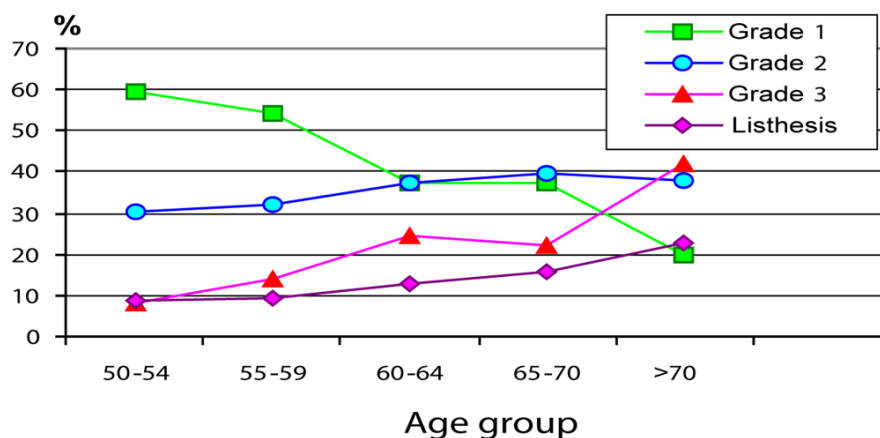
The prevalence of L-spondylosis and listhesis are shown in Fig. 1. Spondylosis grade 2-3 increased with age, from 42% to 62% up to the age of 70 and to 80% in later decades. The prevalence of lumbar listhesis increased from 8.5% to 12.9% up to the age of 70 and to 22.6% in later decades. The males had higher prevalence of grade 2-3 spondylosis (58.8% vs. 52.9%), but the females had more prevalence of spinal listhesis (14.4% vs. 8.8%).

Table 2 displays the distribution of spinal instability detected from lateral view radiograph. The most frequent level developing listhesis was L5 over

Table 1. Demographic data of the subjects (n = 792)

Data	Males n = 306	Females n = 486
Mean age (year)	61.39 ± 7.7	60.88 ± 7.9
50-59 year (n = 375)	136 (44.4%)	238 (48.9%)
60-69 year (n = 302)	126 (41.2%)	177 (36.4%)
≥ 70 year (n = 115)	44 (14.4%)	71 (14.6%)
BMI (kg/m^2)	23.63 ± 3.9	26.03 ± 4.8
LBP within 6 mo.	140/263 (53.2%)	249/447 (55.7%)
BAI Score (of 20)	18.2 ± 1.46	18.1 ± 1.09

Data were presented with mean $\pm$ SD or number

Fig. 1 Prevalence of grade 1-3 spondylosis, and spinal listhesis

Table 2. Distribution of lumbar listhesis in each gender

Level of listhesis	Male n = 27			Female n = 70		
	Anterior	Retro	Total	Anterior	Retro	Total
L1 over L2	0	0	0	0	1	1 (1.4%)
L2 over L3	0	0	0	0	2	2 (2.7%)
L3 over L4	0	4	4 (13.3%)	5	1	6 (8.1%)
L4 over L5	3	2	5 (16.7%)	29	1	30 (40.5%)
L5 over S1	17	2	19 (63.3%)	31	0	31 (41.9%)
Other	2	0	2 (6.7%)	4	0	4 (5.4%)
Prevalence	27/306 = 8.82%			70/486 = 14.4%		

Table 3. Factors associated to spondylosis, spinal instability and low back pain

Associated factors	L-spondylosis			Lumbar listhesis			Low back pain		
	Gr.0-1 (n = 355)	Gr.2-3 (n = 437)	p-value	No (n = 695)	Yes (n = 97)	p-value	No-mild (n = 578)	Mod-Sev (n = 214)	p-value
Age	58.8 ± 6.0	63.0 ± 8.0	0.000*	60.7 ± 7.0	63.5 ± 8.0	0.001*	60.9 ± 7.6	61.4 ± 8.3	0.519
Sex M:F (%)	35.5:64.5	41.2:58.8	0.118	40: 60	28:72	0.029*	42.6: 57.4	28:72	0.000*
Body mass index	24.8 ± 4.0	25.3 ± 4.0	0.194	25.0 ± 4	25.7 ± 4.0	0.185	25.1 ± 4.7	25.2 ± 4.5	0.843
Barthel ADL index	18.2 ± 1.0	18.1 ± 1.3	0.561	18.1 ± 1.2	18.2 ± 1.1	0.681	8.2 ± 1.0	17.9 ± 1.6	0.018*
Low back pain	53.7%	55.6%	0.671	53.5%	64.0%	0.0781	-	-	-
LDD %Mi:%Sev	-	-	-	-	-	-	47.1:52.9	38.8:61.2	0.046*
Lumbar listhesis	-	-	-	-	-	-	10.4%	17.3%	0.013*

LDD = Lumbar disc degeneration, Mi = mild degree, Mod = moderate degree, Sev = severe degree
* Statistically significant

S1 in the male subjects (63%), while in the female, the listhesis level of L4 over L5, and L5 over S1 were equally most commonly present (~ 40%).

Factors related to lumbar disc degeneration and low back pain are compared in Table 3. Age was a strong factor that influenced the severity of spondylosis and spinal listhesis (p = 0.00). The odds ratio (OR) predicted spondylosis was 1.088/ year (95% CI = 1.065-1.111, p = 0.000), and the OR predicted lumbar listhesis was 1.045/year (95% CI = 1.017-1.072, p = 0.001). Females had more risk to develop spinal listhesis (OR = 1.84, 95% CI = 1.11-3.05, p = 0.020) and low back pain (OR = 1.82, 95% CI = 1.29-2.56, p = 0.001) than males. BMI showed no significant difference in all groups, but with the logistic regression analysis had OR of 1.066 (95% CI = 1.02-1.10, p = 0.000) in predicting spondylosis with each increasing kg/m². Subjects with moderate to severe low back pain had a lower BAI score (p = 0.018), and were associated with severe degree spondylosis

(p = 0.046), spinal listhesis (p = 0.013), and female gender (p = 0.000).

Discussion

Despite the most frequently used Kellgren-Lawrence (K-L) score 0-4 in classifying the radiographic osteoarthritis (OA), recent studies showed that K-L score was not well correlated with the pathogenesis of OA in different sites[7]. So the authors preferred to use the presence of subchondral sclerosis, degree of joint space narrowing, osteophyte formation, and occurrence of spinal listhesis to determine severity of lumbar disc degeneration, and classify them into 0-3 grades (normal, mild, moderate and severe) as described.

The prevalence and severity of lumbar spondylosis and listhesis increased with age as expected from the physiologic degenerative process. More degree of degeneration found in males corresponded to the previous autopsy and radiographic

studies[2,5]. This may reflect the higher physical activities in this group.

Spinal listhesis (anteriorlisthesis and retrolisthesis) had been reported with varied prevalence depending on race. White women had a prevalence of 43%[8], African-American women had 58%[9], while a report on the Japanese showed 8.9%[10], which was similar to the present study. Every report shows a higher prevalence of listhesis in the females, which is most likely due to hormonal effects on soft tissue laxity. However, the difference in distribution of the listhesis levels of the presented population from Western reports (most were L4 over L5 in both sexes)[11,12] indicated that there were other factors such as genetics, cultural ergonomic ADL, or different anatomical structure that have influence upon spinal stability. Further researches are needed to explain these findings.

The prevalence of 54.8% self reported low back pain is quite high compared to previous studies[13-16]. The elderly with moderate to severe pain had a slightly higher mean age than the mild pain group, but without statistical significance. Recent systematic review showed that only the severe pain group that had back pain prevalence increasing with age[17]. Females had more severe pain, which may be related to the more occurrences of spinal listhesis and their higher BMI.

Conclusion

In the Thai elderly, lumbar disc degeneration was highly prevalent and increased with age. Advanced age and female gender had more tendencies to develop spinal listhesis and low back pain. Education on weight control and life style modifications should be implemented for health promotion and primary prevention.

Acknowledgement

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ภาวะกระดูกหลังส่วนเอวเสื่อมในผู้สูงอายุชาวไทย: การศึกษาระดับชุมชน

ดุจใจ ชัยวานิชศิริ, อารยา เจียมวรกุล, สุทธิชัย จิตะพันธ์กุล

วัตถุประสงค์: เพื่อศึกษาอุบัติการณ์ภาวะกระดูกสันหลังส่วนเอวเสื่อมในผู้สูงอายุชาวไทย

วัสดุและวิธีการ: สำรวจผู้ที่มีอายุมากกว่า 50 ปีที่อาศัยในชุมชนร่มเกล้า เขตลาดกระบัง กรุงเทพมหานคร 792 คน จากทั้งหมดจำนวน 1,166 คน โดยการสัมภาษณ์และถ่ายเอกซ์เรย์ด้านข้างของกระดูกสันหลัง ภาพถ่ายรังสี จะถูกอ่านผลเป็นภาวะหลังเสื่อม สามระดับตามความรุนแรง

ผลการศึกษา: มีอาสาสมัครชาย 306 คน หญิง 486 คน อายุเฉลี่ย 61.07 ± 7.8 ปี พบภาวะกระดูกสันหลังเสื่อมระดับปานกลางถึงรุนแรงในผู้ชายมากกว่าผู้หญิง (ร้อยละ 58.8 ต่อ 52.9) ส่วนอุบัติการณ์กระดูกสันหลังเลื่อน พบในผู้หญิงมากกว่า (ร้อยละ14.4 ต่อ 8.8) อุบัติการณ์กระดูกสันหลังเสื่อมเพิ่มขึ้นตามอายุ (OR = 1.088, 95% CI = 1.065-1.111, p = 0.000) เพศหญิงมีความเสี่ยงต่อการเกิดกระดูกสันหลังเลื่อนมากกว่า (OR = 1.84, 95% CI = 1.11-3.05, p = 0.020) และ มีโอกาสปวดหลังมากกว่า (OR = 1.82, 95% CI = 1.29-2.56, p = 0.001) ดัชนีมวลกายเป็นปัจจัยเสี่ยงต่อการเกิดภาวะกระดูกสันหลังส่วนเอวเสื่อม (OR = 1.066, 95% CI = 1.02-1.10, p = 0.000) ผู้สูงอายุร้อยละ 27 มีอาการปวดหลังปานกลางถึงปวดรุนแรง ร่วมกับมีค่าเฉลี่ย Barthel ADL index ต่ำกว่า (p = 0.018)

สรุป: ภาวะกระดูกหลังเสื่อมและอาการปวดหลังมีอุบัติการณ์สูงในผู้สูงอายุชาวไทย ส่งผลให้ช่วยเหลือตนเองได้น้อยลง จำเป็นต้องมีมาตรการส่งเสริมสุขภาพให้เหมาะสม