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Prevalence and gender difference of lumbar disc space narrowing in elderly Chinese men and women: Mr. OS (Hong Kong) and Ms. OS (Hong Kong) studies

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Abstract

Objective—Mr. OS (Hong Kong) and Ms. OS (Hong Kong) represent the first large scale prospective population based studies conducted on bone health in elderly (≥65 yrs) Chinese men (n=2000) and women (n=2000). The current study investigated the prevalence of lumbar disc space narrowing (DSN) in these subjects, and identified the potential relationship between DSN and gender, bone mineral density (BMD), and other demographic and clinical data.

Methods—On lumbar lateral radiographs, L1/L2-L4/L5 disc space was classified to 4 categories: 0= normal; 1= mild narrowing; 2= moderate narrowing; 3= severe narrowing. Demographic and clinical data between subjects with and without sum of DSN score ≥ 3 were compared.

Results—DSN was more common in elderly women than in men. The average DSN score for the four discs was 2.71±2.21 for men, and 3.08±2.50 for women ($P<0.0001$). For the three age groups of 65~69, 70~79, ≥80 (yrs), average DSN score increased with increasing age in both men and women, and to a greater degree in women than men. Average DSN score difference between women and men was 0.12, 0.40, and 0.90 respectively in the three age groups. For both men and women, DSN ≥ 3 was associated with older age, higher spine and hip BMD, low back pain, and restricted leg mobility.

Conclusion—Prevalence and severity of DSN is higher in elderly women than elderly men. With increasing age, DSN progresses at a greater rate in females than males. DSN ≥ 3 is associated with higher spine and hip BMD.

Keywords

lumbar; disc; gender; elderly; bone mineral density

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Conflict of interest: None

Intervertebral disc degeneration is a common musculoskeletal condition. It can progress to disc herniation, spinal canal stenosis, and, in conjunction with facet joint arthrosis, degenerative spondylolisthesis. The factors initiating and influencing the progression of disc degeneration remain unclear. Nevertheless, there is a general agreement that spinal mechanical stress accelerates the progression of disc degeneration. Young men are more susceptible to disc degeneration than are young women, most likely due to increased mechanical stress and physical injury. Disc degeneration becomes apparent in men in the second decade of life, at almost a decade earlier than in women (1,2). The severity of age-matched disc degeneration is also generally greater in young and middle-aged men (1,2). In a recent MR imaging-based survey of young adults 20–22 years, lumbar disc degeneration was significantly more frequent in men (3). While young and middle-aged men are more likely to have lumbar disc degeneration than women, two recent population based studies indicated that this trend is reversed in elderly subjects, with women tending to have more severe lumbar disc degeneration than men. In a radiographic study of subjects 55 years and older, de Schepper *et al* (4) found that disc space narrowing (DSN) was more prevalent in women than men. Using an MR-based disc degeneration grading system, Wang *et al.* showed that elderly female subjects had more severe disc degeneration than elderly male subjects at all lumbar levels (5,6). It has been postulated that a decrease in estrogen level may be important with regard to accelerated disc degeneration in post-menopausal women (7).

Mr Os (Hong Kong) and Ms OS (Hong Kong) represent the first large scale prospective cohort studies ever conducted on bone health in Asian men and women. Two thousand Chinese elderly men and two thousand Chinese elderly women were studied to determine the relationship between anthropometric, lifestyle, medical and other factors with bone mineral density (BMD) at the hip and spine. The purpose of this current study is four-fold: 1) to determine the prevalence of radiographic lumbar DSN in elderly Chinese men and women; 2) to confirm whether DSN is more prevalent in elderly Chinese women than men and how this changes among different age groups; 3) to investigate the relationship between DSN and BMD; and 4) to identify potential risk factors for lumbar DSN in Chinese population. Radiographic DSN is a manifestation of late stage disc degeneration.

Materials and Methods

Two thousand Chinese men and two thousand Chinese women aged 65 or above were recruited from the local communities by advertisements placed in housing estates and community centers for the elderly people for a prospective cohort study from August 2001 to March 2003. The project was designed primarily to examine the BMD of older Chinese adults prospectively for 4 years. All subjects were community dwelling, able to walk without assistance, without bilateral hip replacement and have the potential to survive the duration of primary study as judged by their pre-existing medical status. Subjects were invited to the research center for interviews and physical examination. The study protocol was approved by the Chinese University of Hong Kong Ethics Committee. Written informed consent was obtained from all subjects. Data from the baseline evaluation were analyzed in the current report.

The participants were interviewed using a structured standardized questionnaire. This questionnaire included demographic information, socioeconomic status, medical history related to osteoporosis, history of fracture, current medications (verified by direct inspection or medical record), alcohol and tobacco consumption. Dietary intake was recorded using a modified Block Food Frequency questionnaire based on the data from the Hong Kong Adult Dietary Survey in 1995 [8]. Physical activity was measured by the Physical Activity Scale for the Elderly Questionnaire (PASE) modified for use in the older Chinese at Hong Kong

[9]. Height and weight of the subjects were measured with indoor clothing without shoes. Height was measured by the Holtain Harpenden standiometer (Holtain Ltd., Crosswell, UK). Body weight was measured by the Physician Beam Balance Scale (Healthometer, Ill., USA). Both readings were recorded in one decimal. Grip strength on both hands was measured with a Preston Grip Dynamometer. Three tests on each hand were performed. The average of the second and third tests on each hand was used. Body mass index (BMI) was calculated using the formula of weight/height^2 (kilograms per square meter). BMD (g/cm^2) at the total hip and spine (L1–L4) was measured by Hologic QDR-4,500 W densitometers (Hologic, Inc., Waltham, Mass.). The *in vivo* coefficient of variation of the system was 0.9 and 0.7% at the lumbar spine and at the total hip, respectively.

Left lateral thoracic and lumbar spine radiographs were obtained by adjusting exposure parameters according to participants' body weight and height. Hard copies of lumbar spine radiographs were analyzed in this study. The readers were blinded to clinical characteristics of the participants. Intervertebral disc space height changes were classified to 4 categories: 0= normal; 1= mild narrowing (<30% reduction in disc height); 2= moderate narrowing (30%–60% reduction in disc height); 3= severe narrowing (>60% reduction in disc height) [4, 10–12]. Reader 1 is a senior radiologist with more than ten years experience in reading radiographs. Reader 2 is a junior radiologist with five years experience in reading radiographs. Before the formal grading started, one week was given to allow these two readers to familiarize themselves with the grading system, by comparing lateral lumbar spine radiographs from the Mr. OS (Hong Kong) and Ms. OS (Hong Kong) studies, as well as normal lumbar radiographs stored in our institution. Reader 1 read all 4000 lumbar spine radiographs; while reader 2 read 1000 lumbar spine radiographs selected sequentially such that one of every four radiographs (500 male and 500 females) was read. To minimize intra-reader bias (13), radiographs of male subjects and female subjects were mixed together, and the reading of all radiographs was completed in two months. Disc space narrowing at L5/S1 was not included as assessment of disc narrowing at this level is known to be less reliable (4). For discs L1/L2-L4/L5, the intra-reader reproducibility of reader 1 had a kappa value for grade 1 = 0.81, for grade 2 = 0.912, and grade 3=1 respectively, with an overall kappa value =0.872. The inter-reader reproducibility between reader 1 and reader 2 had a kappa value of 0.72 also indicating good agreement. In this study the results of reader 1 were further analyzed. The results of Reader 2, which were similar to reader 1 in trend, are presented in supplementary files.

Twenty five variables were analysed with regard to their relationship to DSN, including age, weight, height, BMI, spine BMD, hip BMD, PASE, average of left/right grip strength, dietary calcium intake, hypertension, diabetes, history of fracture after 50 years old, osteoarthritis, smoking history, fall in past 12 months, longest occupation involving physical laborer, number of children borne, low back pain, weakness of lower limbs, clumsiness in walking, difficulty bending forward, difficulty lifting up a 10 pounds object, difficulty putting on socks, difficulty getting in or out of the front seat of a car, difficulty in standing for two hours. DSN of the lumbar spine was defined as positive for this analysis when the sum of DSN score for discs L1/L2-L4/L5 was ≥ 3.

Statistical analyses were preformed using the statistical package SAS, version 9.1.3 (SAS Institute, Inc., Cary, NC, USA). Characteristics of participants with and without DSN≥ 3 were compared for both sexes. Two sample independent t-tests were used for continuous variables while Chi-square tests were used for categorical variables. Logistic regression analysis was performed for significant factors. All statistical tests were two-sided. An α level of 5% was used as the level of significance.

Results

The study subjects comprised two thousand Chinese men (mean age:72.4 years, range: 65–92 years) and two thousand Chinese women (mean age:72.6 years, range: 65–98). There was no age difference between men and women (p=0.254). Seven lumbar radiographs in men and two radiographs in women were judged as suboptimal quality and disc space assessment was not performed for these subjects. In addition, three discs in men and four discs in women were judged to have been sites of prior infection and were excluded from analysis. For discs L1/L2-L4/L5, 48.0% had ≥ grade 1 DSN and 15.9% had ≥ grade 2 DSN for men; 51.0% discs had ≥ grade 1 DSN and 20.9% had ≥ grade 2 DSN for women. The prevalence of grade 1 DSN was slightly more common in men (32.2% vs 30.0%, P<0.005), while the prevalence of ≥ grade 2 DSN was more common in women (15.9% vs 20.9%, P<0.0001). The overall ≥ grade 1 DSN was more common in women (48.0% vs 51.0%, P<0.0001). The average DSN score for L1/L2 to L4/L5 discs was 2.71±2.21 for men, and 3.08±2.50 for women (P<0.0001). Details of DSN prevalence at each level for men and women are shown in Table 1 (those of reader 2, which showed a similar trend to reader 1, are shown in supplementary table 1).

DSN score for the three age groups 65~69, 70~79, and ≥80 (yrs) is shown in Table 2. DSN severity throughout the lumbar spine increased with increasing age in both men and women (P<0.001). The difference in DSN score between men and women also increased with increasing age, being 0.12, 0.40, and 0.90 respectively in the three different age groups (This same trend was also shown by the results of reader 2, supplementary table 2). Further analysis demonstrated there were more grade ≥ 2 DSN as age increased, while grade 1 DSN remained similar across the three age groups (Table 3 and supplement table 3a–c).

Potential risk factors and their relationship with DSN (sum score ≥ 3) are shown in Table 4. For both males and females, DSN score ≥ 3 was associated with older age, higher spine and hip BMD, low back pain, and restricted leg mobility including difficulty in lifting up 10 pounds object, and difficulty in standing for two hours. For males DSN score ≥ 3 was also associated with lower PASE score; and for females DSN score ≥ 3 was also associated with lower grip strength and higher BMI. This study did not show a significant association between DSN score ≥ 3 and weight, height, dietary calcium intake, hypertension, diabetes, history of fracture, osteoarthritis, smoking history, longest occupation involving physical labor (table 4). Further logistic analysis showed that older age, high spine and hip BMD, low back pain, and difficulty standing two hours are significant predictors of DSN score ≥3 in both genders. BMI, grip strength, and number of children borne are not significant predictors for DSN score ≥3 (table 5).

Discussion

The current study represents the largest study on radiographic DSN in community dwelling elderly men and women in China. A particular strength of this study is that both men and women from the same community based population were investigated with lateral lumbar spine radiographs being obtained thereby enabling men and women to be directly compared. Similar to recent reports, our data showed a high prevalence of DSN in elderly subjects with its severity being higher in women than men (4, 6). Also similar to previous reports, DSN was most common at the L4/L5 level (4). However, our results show that mild DSN (grade =1) is more common in males (32.2%) than in female (30.0%). Though grade =1 DSN is more subjective, independent scoring by reader 2 showed a similar trend indicating that this result is likely to be reliable (supplementary Table 1).

One interesting finding from this current study is that the male female difference in DSN severity increased as age increased (Table 2). Recent evidence suggests that estrogen, through a variety of potential biologic effects, also seems to effect disc degeneration (7). It has been suggested that relative estrogen deficiency may be contributing to the accelerated disc degeneration seen in postmenopausal women, through either a direct effect on disc cells or indirectly through an effect on blood perfusion of the spine. Hormone replacement treatment seems to have a beneficial effect on lumbar intervertebral disc height in postmenopausal women (14). There is estrogen-receptor b gene expression in human intervertebral disc cells such that estrogen can enhance cell proliferation in annulus cell cultures (15). Impaired disc nutrition is also considered a major factor in disc degeneration (16–18). Vertebral marrow perfusion decreases after ovariectomy in animal studies (19). Estrogen has a positive effect on vascular smooth muscle and endothelial cells. Estrogen promotes vasodilatation, is known to prevent neointimal thickening after catheter balloon injury, and also ameliorates artheriosclerotic lesions (20). Since the disc nucleus obtains a considerable supply of nutrients via diffusion from the endplate, it is feasible that decreased vertebral perfusion in postmenopausal women contributes to the decreased diffusion and nutrient supply of the intervertebral disc nucleus (21). Intra-disc diffusion of an MR imaging-based contrast agent also decreases after ovariectomy in female rats (22). The observation that, as age increases, disc space narrowing progresses more rapidly in females than males, would support the notion that sex hormones do influence disc degeneration. Other potential factors such as thoracic scoliosis tends to be more common in women, weak postural muscle, more heavy lifting (relative to their strength) including shopping, should be further explored.

The relationship between osteoporosis and degenerative changes has been studied, mainly in the hip joint and the wrist, where high BMD is usually associated with increased degenerative change (23). The correlation between osteoporosis and intervertebral disc degeneration in the spine is less clear. Some studies suggested disc degeneration was associated with higher lumbar spine BMD (23–28). On the other hand, a few studies reported that many osteoporotic patients have severe disc degeneration (29, 30). It has been proposed that osteoporosis may be an etiological factor in the development of lumbar disc degeneration with osteoporosis inducing loss of vertebral height, leading to instability, facet arthrosis and disc degeneration (30). This study confirmed our previous report that disc degeneration was associated with higher lumbar spine BMD (6). Reduced BMD leads to endplate weakening and loss of vertebral body height, a process that allows the disc to push into the endplates and expand. This possibly facilitates dissipation of forces applied to the disc and thus helps reduce disc damage. The increased contact surface area may also decrease pressure (31). In a previous smaller cohort MRI based study (32), it was shown that no significant relationship was observed between total hip T-score status and severity of disc degeneration. This current study demonstrated that hip BMD is a significant predictor of DSN, both for males and females (table 4). However, the spine BMD difference in the subjects with and without disc space narrowing (0.068 for male, 0.072 for female) was larger than that of hip BMD difference (0.021 for male and 0.020 for males, derived from table 4). Disc space narrowing, marginal osteophytosis, facet joint arthrosis and age-related loss of vertebral height are all known to result in DXA-measured BMD being artificially higher (33). To solve this confounding effect of degenerative disease leading to increased BMD measurement by DXA, quantitative CT is a better technique. With a small cohort of subjects with spine BMD measured with quantitative CT, it was shown lumbar disc spaces were more likely to be narrowed when spine BMD was higher (6).

In this study we defined sum DSN score ≥ 3 at the L1/L2-L4/L5 levels as DSN positive. This is broadly similar to the method of De Schepper *et al* (4). De Schepper *et al* defined DSN as positive when there is a grade≥1 narrowing at 2 or more levels, and DSN positive is related to chronic low back pain, and the associations were strengthened by excluding level L5/S1 (4). Our study also confirmed that DSN can be associated with low back pain and a restricted lower limb activity (Table 4). DSN≥3 is associated with older age for both males and female; lower physical activity for males; lower grip strength and higher BMI for females. Dietary calcium intake, hypertension, diabetes, and smoking did not show significant association with DSN≥3 in this study. Although increased DSN is associated with reduced concurrent physical activity level (PASE) in males, it was not found to be associated prior occupational physical activity.

A limitation of the current study was that only relatively healthy subjects without any hip replacement and with the likelihood of surviving the study duration were enrolled. There could have led to a selection bias in favor of relatively healthy participants. However, this may be inevitable feature of medium to long-term prospective cohort studies. There is also a possibility that a single-sided disc space narrowing may be overlooked as a frontal lumbar radiograph was not obtained. However, this circumstance is very unusual and would apply equally to males and females. The study questionnaire was designed with view to determining risk factors for osteoporosis and not specifically designed to characterize risk factors for DSN. Therefore the variables associated with DSN could not be explored in greater depth.

In conclusion, this large scale population based study shows that the prevalence and severity of disc space narrowing is higher in elderly women than elderly men. As age increases, disc space narrowing progresses more rapidly in females than males. More severe disc space narrowing is associated with higher spine and hip BMD, back pain and restricted leg mobility.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table 1

Prevalence of disc space narrowing in each disc level for men and women.

Men	**L1/L2 (n=1996)**	**L2/L3 (n=1998)**	**L3/L4 (n=1997)**	**L4/L5 (n=1998)**	**∑L1-L4 (n=7989)**
G=1	476	614	718	764	2572 *(32.2%)*
G=2	94	156	187	520	957 *(12.0%)*
G=3	19	52	71	166	308 *(3.9%)*
∑G1-G3	589	822	976	1450	3837 (48.0%)
∑G2-G3	113	208	258	686	1265 (15.9%)
Women	L1/L2 (n=1992)	L2/L3 (n=1992)	L3/L4 (n=1992)	L4/L5 (n=1992)	∑L1-L4 (n=7968)
G=1	447	612	673	655	2387 (30.0%)
G=2	118	252	281	589	1240 (15.6%)
G=3	50	88	96	192	426 (5.3%)
∑G1–G3	615	952	1050	1436	4053 (51.0%)
∑G2–G3	168	340	377	781	1666 (20.9%)

G=1, 2, 3: grade 1 grade 2 and grade 3 disc space narrowing respectively. ∑L1–L4: sum of the four disc levels L1/L2 to L4/L5.

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Table 2

Disc space narrowing score in three age groups (mean±SD of discs L1/L2–L4/L5)

	65~69 (yrs)	70~79 (yrs)	≥80 (yrs)	P-value for trend
Male:	2.358±2.028 (n=662)	2.787±2.214 (n=1151)	3.516±2.543 (n=184)	P<0.001
Female:	2.478±2.052 (n=668)	3.188±2.531 (n=1112)	4.417±2.990 (n=216)	P<0.001
Male Female difference	0.12 (P=0.286)	0.401 (P<0.001)	0.901 (P<0.001)	

Table 3

Prevalence of disc space narrowing in three age groups for men and women *.

Men	**age 65–69 (n=2648)**	**age 70–79 (n=4607)**	**Age>80 (n=736)**
G=1	832 (31.4%)	1488 (32.3%)	252 (34.2%)
G=2	270 (10.2%)	573 (12.4%)	115 (15.6%)
G=3	63 (2.4%)	192 (4.2%)	55 (7.5%)
∑G1–G3	1165 (44.0%)	2253 (48.9%)	422 (57.3%)
∑G2–G3	333 (12.6%)	765 (16.6%)	170 (23.1%)
Women	(n=2672)	(n=4451)	(n=864)
G=1	798 (29.9%)	1320 (29.7%)	269 (31.1%)
G=2	331 (12.4%)	733 (16.5%)	176 (20.4%)
G=3	65 (2.4%)	254 (5.7%)	111 (12.8%)
∑G1–G3	1194 (44.7%)	2307 (51.8%)	556 (64.4%)
∑G2–G3	396 (14.8%)	987 (22.2%)	287 (33.2%)

*all are the sum of discs L1/L2–L4/L5

Table 4

Demographic and clinical data between subjects with and without disc space narrowing.

	Men				Women			
	total disc score≥ 3 (n=937)	**total disc score <3 (n=1061)**	**χ2 or t**	**p**	**total disc score≥ 3 (n=962)**	**total disc score <3 (n=1035)**	**χ2 or t**	**p**
Age(years)	73.19±5.12	71.69±4.80	−6.74	<.0001	73.43±5.60	71.66±4.92	−7.51	<.0001
Weight (kg)	62.65±9.57	62.27±9.21	−0.89	0.3732	54.84±8.62	54.20±8.36	−1.68	0.0926
Height (m)	1.63±0.06	1.63±0.05	−0.69	0.4927	1.51±0.05	1.51±0.05	1.28	0.2021
BMI (kg/m2)	23.50±3.20	23.41±3.07	−0.65	0.5170	24.11±3.48	23.74±3.40	−2.40	0.0163
Spine BMD (g/cm^2)	0.987±0.179	0.919±0.176	−8.51	<.0001	0.788±0.150	0.716±0.137	−10.99	<.0001
Hip BMD (g/cm^2)	0.875±0.131	0.854±0.125	−3.56	0.0004	0.719±0.117	0.699±0.116	−3.99	<.0001
PASE	93.88±47.73	100.21±52.30	2.82	0.0048	84.26±32.03	86.61±34.32	1.58	0.1154
Average of left/right grip strength (kg)	30.91±6.64	31.46±6.28	1.90	0.0572	19.95±4.21	20.56±4.17	3.25	0.0012
Dietary calcium intake (mg/day)	632.14±296.14	625.19±299.16	−0.52	0.6029	571.30±269.63	568.70±264.44	−0.22	0.8283
Hypertension	397 (42.4%)	438 (41.3%)	0.24	0.6228	468 (45.2%)	402 (41.8%)	2.39	0.1225
Diabetes	138 (14.7%)	155 (14.6%)	0.01	0.9402	143 (13.8%)	142 (14.8%)	0.36	0.5466
History of fracture after 50 years old	61 (6.5%)	71 (6.7%)	0.03	0.8704	171 (16.5%)	163 (16.9%)	0.06	0.8006
Osteoarthritis	67 (7.2%)	56 (5.3%)	3.02	0.0823	110 (10.6%)	98 (10.2%)	0.10	0.7472
smoking	112 (12.0%)	126 (11.9%)	0.00	0.9575	18 (1.7%)	19 (2.0%)	0.15	0.6961
Fall in past 12 months	138 (14.7%)	169 (15.9%)	0.55	0.4577	252 (24.4%)	230 (23.9%)	0.05	0.8187
Longest occupation involving physical labor	77 (8.2%)	100 (9.4%)	0.91	0.3399	35 (3.5%)	26 (2.8%)	0.71	0.3988
No of children borne	--	--	--	--	3.44±2.15	3.65±2.11	2.16	0.0308
Low back pain	316 (33.7%)	296 (27.9%)	7.95	0.0048	578 (55.9%)	485 (50.4%)	5.90	0.0151
weakness of lower limbs	55 (5.9%)	33 (3.1%)	9.00	0.0027	84 (8.1%)	72 (7.5%)	0.28	0.5993
Clumsiness in walking	208 (22.2%)	185 (17.4%)	7.14	0.0075	347 (33.5%)	288 (29.9%)	2.96	0.0853
Difficulty bending forward	85 (9.1%)	63 (5.9%)	7.12	0.0076	111 (10.7%)	95 (9.9%)	0.39	0.5329
Difficulty lifting up 10 pounds object	87 (9.3%)	73 (6.9%)	3.91	0.0481	283 (27.3%)	222 (23.1%)	4.80	0.0284
Difficulty putting socks on foot	49 (5.2%)	55 (5.2%)	0.00	0.9634	50 (4.8%)	24 (2.5%)	7.63	0.0058
Difficulty getting in/out of the front car seat	67 (7.2%)	50 (4.7%)	5.36	0.0206	143 (13.8%)	108 (11.2%)	3.04	0.0811
Difficulty standing for two hours	292 (31.2%)	272 (25.6%)	7.50	0.0062	627 (60.6%)	530 (55.1%)	6.16	0.0131

PASE= Physical Activity Scale for the Elderly

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Table 5

Logistic regression of total disc space narrowing score ≥ 3

	Men(n=2000)			Women(n=2000)		
		OR (95 % CI)			OR (95 % CI)	
	Unit	**Model 1: hip BMD**	**Model 2: Spine BMD**	**Unit**	**Model 1: hip BMD**	**Model 2: Spine BMD**
Age(years)	5.0	1.38 (1.26, 1.52)	1.32 (1.20, 1.45)	5.0	1.47 (1.34, 1.62)	1.40 (1.27, 1.54)
BMI(kg/m2)	--	--	--	3.45	1.03 (0.93, 1.15)	0.94 (0.85, 1.05)
BMD	0.13	1.26 (1.14, 1.38)	1.33 (1.24, 1.42)	0.12	1.39 (1.24, 1.55)	1.64 (1.50, 1.80)
PASE	−50.3	1.08 (0.99, 1.19)	1.07 (0.98, 1.18)	--	--	--
Average of left/right grip strength (kg)	--	--	--	−4.2	1.09 (0.99, 1.20)	1.12 (1.01, 1.24)
Women bear children no.	--	--	--	1	0.95 (0.91, 0.99)	0.95 (0.91, 0.99)
Low back pain	Yes/No	1.30 (1.07, 1.58)	1.31 (1.07, 1.60)	Yes/No	1.19 (0.99, 1.44)	1.23 (1.02, 1.50)
Difficulty standing 2 hours	Yes/No	1.17 (0.95, 1.43)	1.13 (0.92, 1.40)	Yes/No	1.15 (0.95, 1.39)	1.15 (0.95, 1.41)
AUC		0.615	0.646		0.634	0.681

PASE= Physical Activity Scale for the Elderly, *AUC*=area under the curve