

Clinical Article

Estimated Number of Korean Adults with Back Pain and Population-Based Associated Factors of Back Pain : Data from the Fourth Korea National Health and Nutrition Examination Survey

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Objective : We estimated the number of Korean adults with back pain and evaluated population-based associated factors of back pain from a representative sample data from the Fourth Korea National Health and Nutrition Examination Survey.

Methods : The number of Korean adults who experienced back pain (experienced patients), those who experienced back pain lasting for three or more months during the past year (chronic patients), and those who were currently suffering from back pain (current patients) were estimated by analyzing the data from the fourth Korea National Health and Nutrition Examination Survey conducted in 2007 using surveyfreq procedure of the SAS statistical package. Population-based odds ratios for being experienced, chronic, and current patient according to demographic (age and gender), socioeconomic (education and occupation), and lifestyle factors (smoking, drinking, and exercise) were estimated using surveylogistic procedure.

Results : It was estimated that there were 5,554,256 (proportion, 15.4%; 95% CI, 4,809,466 - 6,299,046) experienced patients, 2,060,829 (5.7%; 1,557,413-2,564,246) chronic patients, and 3,084,188 (8.5%; 2,600,197 - 3,568,179) current patients among 36,107,225 Korean adults aged 20-89 years in 2007. Each of explanatory variables was significantly associated with at least one of the response variables for back pain.

Conclusion : Based on our study results, further efforts to investigate epidemiology of back pain, to evaluate associated factors, and to improve treatment outcomes are needed.

KEY WORDS : Back pain · Epidemiology · Population.

INTRODUCTION

Many studies attest to the high frequency of back complaints in any given society. It has been estimated that 70-85% of all people have back pain at some time in life¹⁾. Therefore, the economic and public health burden of back disorders and especially low back pain are enormous¹¹⁾. Moreover, as a result of the increasing number of older people throughout the world, the burden on the individual and society as a whole is expected to increase dramatically¹⁵⁾.

Dillon et al.²⁾ reported that the 12-month period prevalence of back pain episodes lasting for at least 1 month in the United States was 17.8% (95% CI 16.9%-18.6%) after analyzing the data from the third U.S. National Health and Nutrition Examination Survey conducted between October 1988 and October 1994. Low back pain claims are the most common category of workers' compensation losses in the United States, accounting for 15-25% of all claims and up to 40% of costs^{19,20)}.

Back pain is also becoming a large socioeconomic burden in Korea. Kim et al.⁶⁾ conducted a study to examine the association between duration of treatment and costs of occupational low back pain in Korea using 9,277 claims from a worker's compensation database. Duration and costs of claims were skewed, with the 51% of claims less than 6 months accounting for only 10% of costs and the 6% of

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claims longer than 2 years accounting for 29% of costs. After 50 months, 418 (4.5%) claims were still open. There have been studies to promote treatment outcomes of patients with back pain⁷ and evaluate the associated factors of back pain⁸. However, the exact number of Korean adults with back pain and population-based associated factors of back pain are not known. This study estimated the number of Korean adults with back pain and evaluated population-based associated factors of back pain from a representative sample of Korean adults.

MATERIALS AND METHODS

The Korea Center for Disease Control and Prevention has conducted the Korea National Health and Nutrition Examination Survey (K-NHANES) on randomly sampled general Korean population to assess health and nutritional statuses through interviews and health examinations. The fourth K-NHANES was scheduled to be conducted from 2007 to 2009 by rounding the whole nation every year without overlapping of survey areas and participants. A multistage stratified probability sampling was applied according to geographical area, gender, and age groups based on the Korea National Statistical Office registries. Individual weight indicating the probability of being sampled was assigned to each participant, enabling the results to represent the entire Korean population. A questionnaire was distributed to the participants to evaluate demographic, socioeconomic, lifestyle, and health status including back pain.

Of the 4,594 Koreans who participated in the fourth K-NHANES, 2,957 adults (aged ≥ 20 yr) responded to the questionnaire of the fourth K-NHANES. We excluded 4 adults aged ≥ 90 yr because of small number but wide age distribution and 24 adults who did not provide important information such as education or occupation. Finally, 2,929 adults remained for analysis.

We used three questions from the questionnaire to estimate the number of Korean adults with back pain as follows:

Q1. Have you ever experienced back pain?

1) Yes 2) No

Q2. Have you experienced back pain lasting for three or more months during the past year?

1) Yes 2) No 3) Unrelated (never experienced back pain)

Q3. Are you currently suffering from back pain?

1) Yes 2) No 3) Unrelated (never experienced back pain)

Those who responded 1) to Q1 were defined as experienced

patients, those who responded 1) to Q2 were defined as chronic patients, and those who responded 1) to Q3 were defined as current patients of back pain.

Information on demographic (age and gender), socioeconomic (education and occupation), and lifestyle factors (smoking, drinking, and exercise) was also obtained from the questionnaire. Regarding the smoking, individuals were classified into non-smoker, ex-smoker, and current smoker. Alcohol intake was divided into three groups according to drinking frequency: <1 times per month, 1–4 times per month, and ≥ 2 times per week. Regular exercise was defined as practicing high intensity physical activities (strenuous or gasping activities such as running, high speed cycling, swimming, etc) for at least 20 minutes at one session and at least 3 days a week; or practicing moderate intensity physical activities (slightly strenuous or gasping activities such as slow swimming, badminton, table tennis, etc) for at least 30 minutes at one session and at least 5 days a week; or walking for at least 30 minutes at one session and at least 5 days a week.

The number of experienced, chronic, and current patients in Korean adults were estimated using surveyfreq procedure of the SAS statistical package. Population-based adjusted odds ratio (OR) estimates for being experienced, chronic, and current patient according to demographic, socioeconomic, and lifestyle factors were calculated using surveylogistic procedure⁴.

RESULTS

After analyzing the data from the fourth K-NHANES, it was estimated that there were 5,554,256 (proportion, 15.4%; 95% CI, 4,809,466–6,299,046) experienced patients among 36,107,225 Korean adults aged 20–89 years in 2007. The proportion of experienced patients in females (18.4%) was significantly higher than that in males (12.2%) ($p < 0.01$). As age increased, the proportion of experienced patients increased ($p < 0.01$). As education level increased, the proportion of experienced patients reduced ($p < 0.01$). Regarding occupation, the proportion of experienced patients was highest in manual workers (19.6%) and lowest in clerks (6.9%). The proportion of experienced patients in non-smokers (16.4%) was higher than ex-smokers (16.2%) and current smokers (12.5%), but statistically insignificant. The proportion of experienced patients in those who never drank or drank less than one time per month (19.6%) was significantly higher than that in those who drank more frequently ($p < 0.01$). The proportion of experienced patients in those who did not practice regular exercise (16.3%) was higher than that in those who practiced regular exercise

(14.6%), but statistically insignificant (Table 1).

It was estimated that there were 2,060,829 (5.7%; 1,557,413 - 2,564,246) chronic patients among 36,107,225 Korean adults aged 20-89 years in 2007. The proportion of chronic patients in females (7.3%) was significantly higher than that in males (4.1%) ($p < 0.01$). As age increased, the proportion of chronic patients increased ($p < 0.01$). As education level increased, the proportion of chronic patients reduced ($p < 0.01$). Regarding occupation, the proportion

of chronic patients was highest in the unemployed (8.4%) and lowest in clerks (0.1%). The proportion of chronic patients in ex-smokers (6.7%) was higher than non-smokers (5.7%) and current smokers (4.9%), but statistically insignificant. The proportion of chronic patients in those who never drank or drank less than one time per month (7.7%) was significantly higher than that in those who drank more frequently ($p < 0.01$). The proportion of chronic patients in those who did not practice regular exercise (7.0%) was signi-

Table 1. Estimated number of Korean adults who experienced back pain based on the data from the fourth Korea National Health and Nutrition Examination Survey (K-NHANES IV)

Variable	K-NHANES IV		Population					p
	N ^a	n ^a	N ^b	n ^b	%	95% CI		
						Lower	Upper	
Total	2,929	484	36,107,225	5,554,256	15.4	4,809,466	6,299,046	
Gender								< .0001
Male	1,216	157	17,716,007	2,161,657	12.2	1,751,997	2,571,318	
Female	1,713	327	18,391,218	3,392,598	18.4	2,919,507	3,865,689	
Age (yr)								< .0001
20-29	310	27	7,258,092	669,718	9.2	395,965	943,472	
30-39	621	76	8,149,850	962,072	11.8	701,557	1,222,588	
40-49	562	80	8,272,765	1,201,538	14.5	900,459	1,502,616	
50-59	502	84	5,690,846	1,027,845	18.1	754,304	1,301,387	
60-69	489	110	3,725,278	916,124	24.6	710,359	1,121,889	
70-89	445	107	3,010,395	776,958	25.8	578,560	975,355	
Education (yr)								0.0004
≤ 6	883	179	7,160,500	1,544,011	21.6	1,219,507	1,868,515	
7-9	342	59	3,759,480	568,982	15.1	396,705	741,259	
10-12	836	133	11,553,889	1,735,369	15.0	1,336,752	2,133,986	
≥ 13	868	113	13,633,357	1,705,894	12.5	1,315,169	2,096,619	
Occupation								0.0002
Professional, manager, and administrator	332	33	4,913,419	511,582	10.4	275,736	747,429	
Clerk	172	10	2,646,937	183,189	6.9	47,150	319,228	
Sales and service Worker	311	50	4,683,306	748,763	16.0	485,387	1,012,140	
Agricultural and fishery worker	243	53	1,398,731	258,923	18.5	137,168	380,677	
Plant and machine operator	247	30	4,266,559	478,439	11.2	294,428	662,451	
Manual worker	218	39	2,652,057	519,246	19.6	302,897	735,596	
Unemployed	1,406	269	15,546,217	2,854,113	18.4	2,367,688	3,340,537	
Smoking								0.1269
Non-smoker	1,730	303	19,310,574	3,173,765	16.4	2,706,983	3,640,546	
Ex-smoker	604	101	7,574,347	1,224,644	16.2	915,025	1,534,264	
Current smoker	595	80	9,222,303	1,155,846	12.5	813,607	1,498,086	
Drinking frequency								< .0001
<1 time per month	1,471	296	15,684,921	3,081,306	19.6	2,590,294	3,572,317	
1-4 times per month	880	112	12,748,475	1,538,096	12.1	1,177,508	1,898,684	
≥ 2 times per week	578	76	7,673,829	934,854	12.2	657,683	1,212,024	
Regular exercise								0.3338
Yes	1,560	242	19,367,610	2,821,981	14.6	2,339,676	3,304,285	
No	1,369	242	16,739,615	2,732,275	16.3	2,174,067	3,290,483	

N^a: number of the K-NHANES IV participants per individual category, n^a: number of the Korean adults who experienced back pain among the K-NHANES IV participants per individual category, N^b: estimated number of the Korean adults per individual category, n^b: estimated number of the Korean adults per individual category who experienced back pain

ificantly higher than that in those who practiced regular exercise (4.6%) ($p < 0.01$) (Table 2).

It was estimated that there were 3,084,188 (8.5%; 2,600,197-3,568,179) current patients among 36,107,225 Korean adults aged 20-89 years in 2007. The proportion of current patients in females (11.2%) was significantly higher than that in males (5.7%) ($p < 0.01$). As age increased, the proportion of current patients increased ($p < 0.01$). As education level increased, the proportion of current patients

reduced ($p < 0.01$). Regarding occupation, the proportion of current patients was highest in agricultural and fishery workers (11.6%) and lowest in clerks (1.9%). The proportion of current patients in non-smokers (9.1%) was higher than ex-smokers (8.7%) and current smokers (7.1%), but statistically insignificant. The proportion of current patients in those who never drank or drank less than one time per month (11.6%) was significantly higher than that in those who drank more frequently ($p < 0.01$). The proportion of

Table 2. Estimated number of Korean adults who experienced back pain lasting for three or more months during the past year based on the data from the fourth Korea National Health and Nutrition Examination Survey (K-NHANES IV)

Variable	K-NHANES IV				Population			p
	N ^a		n ^b		%	95% CI		
	N ^a	n ^a	N ^b	n ^b		Lower	Upper	
Total	2,929	196	36,107,225	2,060,829	5.7	1,557,413	2,564,246	
Gender								0.0005
Male	1,216	58	17,716,007	726,482	4.1	482,592	970,373	
Female	1,713	138	18,391,218	1,334,347	7.3	982,085	1,686,609	
Age (yr)								< .0001
20 - 29	310	8	7,258,092	175,971	2.4	48,935	303,006	
30-39	621	27	8,149,850	360,090	4.4	181,325	538,855	
40-49	562	29	8,272,765	424,461	5.1	230,935	617,988	
50-59	502	30	5,690,846	336,253	5.9	189,519	482,987	
60-69	489	50	3,725,278	384,741	10.3	252,020	517,462	
70-89	445	52	3,010,395	379,314	12.6	244,678	513,949	
Education (yr)								0.0002
≤ 6	883	89	7,160,500	724,376	10.1	501,686	947,066	
7-9	342	22	3,759,480	203,488	5.4	95,996	310,980	
10-12	836	45	11,553,889	556,871	4.8	318,169	795,573	
≥ 13	868	40	13,633,357	576,094	4.2	364,309	787,879	
Occupation								< .0001
Professional, manager, and administrator	332	9	4,913,419	154,719	3.1	39,985	269,453	
Clerk	172	1	2,646,937	2,843	0.1	0	8,514	
Sales and service Worker	311	17	4,683,306	223,308	4.8	117,589	329,027	
Agricultural and fishery worker	243	21	1,398,731	81,174	5.8	23,557	138,791	
Plant and machine operator	247	12	4,266,559	174,680	4.1	34,854	314,507	
Manual worker	218	9	2,652,057	110,992	4.2	22,119	199,866	
Unemployed	1,406	127	15,546,217	1,313,112	8.4	962,897	1,663,328	
Smoking								0.4746
Non-smoker	1,730	121	19,310,574	1,104,833	5.7	800,495	1,409,170	
Ex-smoker	604	41	7,574,347	503,818	6.7	302,306	705,330	
Current smoker	595	34	9,222,303	452,178	4.9	258,030	646,327	
Drinking frequency								0.0008
< 1 time per month	1,471	125	15,684,921	1,208,963	7.7	879,264	1,538,662	
1-4 times per month	880	42	12,748,475	509,779	4.0	298,183	721,375	
≥ 2 times per week	578	29	7,673,829	342,087	4.5	182,203	501,971	
Regular exercise								0.0071
Yes	1,560	87	19,367,610	884,886	4.6	644,799	1,124,972	
No	1,369	109	16,739,615	1,175,944	7.0	804,298	1,547,589	

N^a: number of the K-NHANES IV participants per individual category, n^a: number of the Korean adults who experienced back pain lasting for three or more months during the past year among the K-NHANES IV participants per individual category, N^b: estimated number of the Korean adults per individual category, n^b: estimated number of the Korean adults per individual category who experienced back pain lasting for three or more months during the past year

current patients in those who did not practice regular exercise (10.1%) was significantly higher than that in those who practiced regular exercise (7.2%) ($p < 0.05$) (Table 3).

Table 4 shows population-based adjusted OR estimates for experiencing back pain (i.e., the risk for being experienced patient) according to demographic, socioeconomic, and lifestyle factors among Korean adults. Women had a 1.82 (95% CI, 1.35-2.46) times higher risk of being experienced patient than men. Adults aged ≥ 40 had a higher

risk of being experienced patient than those in their 20s; the OR estimates for those in their 40s, 50s, 60s, or ≥ 70 s were 1.87 (1.09-3.20), 2.62 (1.53-4.49), 3.77 (2.19-6.51), and 3.94 (2.09-7.42), respectively. Adults with ≤ 9 yr of education had a lower risk of being experienced patient than those with ≥ 13 yr of education; the OR estimates for those with ≤ 6 or 7-9 yr of education were 0.56 (0.38-0.82) and 0.55 (0.36-0.83), respectively. Manual workers had a 1.92 (1.00-3.68) times higher risk of being experienced

Table 3. Estimated number of Korean adults who were currently suffering from back pain based on the data from the fourth Korea National Health and Nutrition Examination Survey (K-NHANES IV)

Variable	K-NHANES IV		Population					p
	N ^a	n ^a	N ^b	n ^b	%	95% CI		
						Lower	Upper	
Total	2,929	291	36,107,225	3,084,188	8.5	2,600,197	3,568,179	
Gender								<.0001
Male	1,216	82	17,716,007	1,018,301	5.7	762,975	1,273,627	
Female	1,713	209	18,391,218	2,065,887	11.2	1,729,418	2,402,356	
Age (yr)								<.0001
20-29	310	11	7,258,092	236,917	3.3	95,317	378,517	
30-39	621	43	8,149,850	546,069	6.7	346,318	745,821	
40-49	562	43	8,272,765	637,195	7.7	409,474	864,915	
50-59	502	48	5,690,846	540,806	9.5	357,054	724,558	
60-69	489	75	3,725,278	604,322	16.2	442,634	766,011	
70-89	445	71	3,010,395	518,879	17.2	373,516	664,242	
Education (yr)								<.0001
≤ 6	883	124	7,160,500	1,051,737	14.7	794,648	1,308,826	
7-9	342	38	3,759,480	351,664	9.4	216,847	486,480	
10-12	836	66	11,553,889	778,720	6.7	532,961	1,024,479	
≥ 13	868	63	13,633,357	902,067	6.6	642,098	1,162,035	
Occupation								<.0001
Professional, manager, and administrator	332	13	4,913,419	205,371	4.2	49,711	361,032	
Clerk	172	3	2,646,937	49,660	1.9	0	109,563	
Sales and service Worker	311 ⁵ ₀	31	4,683,306	423,453	9.0	276,457	570,449	
Agricultural and fishery worker	243	33	1,398,731	161,574	11.6	79,845	243,302	
Plant and machine operator	247	16	4,266,559	247,096	5.8	86,882	407,310	
Manual worker	218	18	2,652,057	209,001	7.9	96,916	321,086	
Unemployed	1,406	177	15,546,217	1,788,033	11.5	1,440,775	2,135,291	
Smoking								0.3424
Non-smoker	1,730	184	19,310,574	1,765,017	9.1	1,465,038	2,064,995	
Ex-smoker	604	60	7,574,347	660,858	8.7	462,939	858,778	
Current smoker	595	47	9,222,303	658,312	7.1	423,287	893,338	
Drinking frequency								<.0001
<1 time per month	1,471	188	15,684,921	1,818,867	11.6	1,501,516	2,136,217	
1-4 times per month	880	60	12,748,475	699,731	5.5	471,453	928,009	
≥ 2 times per week	578	43	7,673,829	565,591	7.4	365,471	765,710	
Regular exercise								0.0120
Yes	1,560	135	19,367,610	1,389,990	7.2	1,123,295	1,656,685	
No	1,369	156	16,739,615	1,694,198	10.1	1,299,404	2,088,992	

N^a: number of the K-NHANES IV participants per individual category, n^a: number of the Korean adults who were currently suffering from back pain among the K-NHANES IV participants per individual category, N^b: estimated number of the Korean adults per individual category, n^b: estimated number of the Korean adults per individual category who were currently suffering from low back pain

patient than professionals, managers, and administrators. Those who drank 1-4 times per month had a 0.74 (0.57-0.96) times lower risk of being experienced patient than those who never drank or drank less than one time per month.

Table 5 shows population-based adjusted OR estimates for experiencing back pain lasting for three or more months during the past year (i.e., the risk for being chronic patient) according to demographic, socioeconomic, and lifestyle factors among Korean adults. Women had a 2.37 (95% CI, 1.34-4.11) times higher risk of being chronic patient than men. Adults aged ≥ 40 had a higher risk of being chronic patient than those in their 20s; the OR estimates for those in their 40s, 50s, 60s, or ≥ 70s were 2.72 (1.25-5.90), 2.99

(1.30-6.92), 4.58 (2.08-10.08), and 4.46 (1.65-12.02), respectively. Clerks had a 0.03 (0.00-0.32) times lower risk of being chronic patient than professionals, managers, and administrators. Ex-smokers and current smokers had a higher risk of being chronic patient than non-smokers; OR estimates for ex-smokers or current smokers were 2.39 (1.33-4.31) and 2.18 (1.15-4.12), respectively. Those who did not involve regular exercise had a 1.52 (1.0-2.18) times higher risk of being chronic patient than those who practiced regular exercise.

Table 6 shows population-based adjusted OR estimates for current suffering from back pain (i.e., the risk for being current patient) according to demographic, socioeconomic, and lifestyle factors among Korean adults. Women had a

Table 4. Population-based adjusted odds ratio estimates for experiencing back pain derived from multiple logistic regression analysis of the data from the fourth Korea National Health and Nutrition Examination Survey

Variable	Estimate	95% CI
Gender		
Male	1.00	
Female	1.82	(1.35, 2.46)
Age (yr)		
20-29	1.00	
30-39	1.33	(0.81, 2.17)
40-49	1.87	(1.09, 3.20)
50-59	2.62	(1.53, 4.49)
60-69	3.77	(2.19, 6.51)
70-89	3.94	(2.09, 7.42)
Education (yr)		
≤ 6	0.56	(0.38, 0.82)
7-9	0.55	(0.36, 0.83)
10-12	0.81	(0.58, 1.11)
≥ 13	1.00	
Occupation		
Professional, manager, and administrator	1.00	
Clerk	0.70	(0.30, 1.64)
Sales and service worker	1.71	(0.91, 3.20)
Agricultural and fishery worker	1.66	(0.92, 2.99)
Plant and machine operator	1.39	(0.73, 2.64)
Manual worker	1.92	(1.00, 3.68)
Unemployed	1.51	(0.93, 2.44)
Smoking		
Non-smoker	1.00	
Ex-smoker	1.50	(0.99, 2.27)
Current smoker	1.37	(0.88, 2.13)
Drinking frequency		
<1 time per month	1.00	
1-4 times per month	0.74	(0.57, 0.96)
≥ 2 times per week	0.71	(0.49, 1.04)
Regular exercise		
Yes	1.00	
No	1.14	(0.85, 1.52)

Table 5. Population-based adjusted odds ratio estimates for experiencing back pain lasting for three or more months during the past year derived from multiple logistic regression analysis of the data from the fourth Korea National Health and Nutrition Examination Survey

Variable	Estimate	95% CI
Gender		
Male	1.00	
Female	2.37	(1.37, 4.11)
Age (yr)		
20-29	1.00	
30-39	2.00	(0.91, 4.40)
40-49	2.72	(1.25, 5.90)
50-59	2.99	(1.30, 6.92)
60-69	4.58	(2.08, 10.08)
70-89	4.46	(1.65, 12.02)
Education (yr)		
≤ 6	0.75	(0.41, 1.39)
7-9	0.57	(0.28, 1.17)
10-12	0.71	(0.45, 1.11)
≥ 13	1.00	
Occupation		
Professional, manager, and administrator	1.00	
Clerk	0.03	(0.00, 0.32)
Sales and service worker	1.51	(0.62, 3.72)
Agricultural and fishery worker	1.53	(0.58, 4.08)
Plant and machine operator	1.53	(0.50, 4.69)
Manual worker	1.18	(0.34, 4.02)
Unemployed	2.14	(0.99, 4.60)
Smoking		
Non-smoker	1.00	
Ex-smoker	2.39	(1.33, 4.31)
Current smoker	2.18	(1.15, 4.12)
Drinking frequency		
<1 time per month	1.00	
1-4 times per month	0.78	(0.50, 1.21)
≥ 2 times per week	0.79	(0.51, 1.22)
Regular exercise		
Yes	1.00	
No	1.52	(1.07, 2.18)

2.94 (95% CI, 1.89-4.57) times higher risk of being current patient than men. Adults aged ≥ 30 had a higher risk of being current patient than those in their 20s; the OR estimates for those in their 30s, 40s, 50s, 60s, or ≥ 70 s were 2.24 (1.12-4.49), 2.94 (1.37-6.31), 3.86 (1.95-7.67), 6.44 (3.28-12.65), and 5.79 (2.57-13.02), respectively. Adults with less than 13 year of education had a lower risk of being current patient than those with greater or equal to 13 year of education; the OR estimates for those with ≤ 6 , 7-9, or 10-12 yr of education were 0.57 (0.34-0.98), 0.54 (0.32-0.92), and 0.57 (0.37-0.88), respectively. Ex-smokers and current smokers had a higher risk of being current patient than non-smokers; OR estimates for ex-smokers or current smokers were 2.01 (1.31-3.09) and 2.03 (1.21-3.41), res-

pectively. Those who did not involve regular exercise had a 1.43 (1.04-1.96) times higher risk of being current patient than those who practiced regular exercise.

DISCUSSION

This study revealed useful information on epidemiology of back pain in Korean adults in 2007; over 5 million Korean adults have ever experienced back pain. Of them, over 2 million (37.1%) experienced their back pain progressed to chronic and over 3 million (55.5%) were suffering from back pain at a certain time period.

Caution must be exercised when comparing our results with those of the studies on epidemiology of back pain or back disorders in other countries. Lack of agreement on a clear and potentially acceptable definition of back pain should be considered. In addition, intercultural differences in perceiving or reporting back pain should also be considered. For example, Raspe et al. conducted a survey on national differences in back pain between the United Kingdom and Germany. Past and current back pain was more frequent among German participants and different between East and West Germany. The differences in back pain prevalence could not be explained by less favorable risk profiles among German participants. They concluded that intercultural differences in perceiving or reporting back pain can be hypothesized as the most likely explanation of the markedly different prevalence of the disorder in the United Kingdom and East and West Germany¹².

Back pain is typically classified as being specific or nonspecific according to the presence of red flags such as spinal fracture, cancer, infection, and cauda equina syndrome. However, the probability that a particular case of back pain has a specific cause identified on back radiographs is known to be less than 1%¹⁸. Approximately, 90% cases of back pain have no radiologically identifiable cause and are designated as nonspecific.

Literatures witness that demographic, occupational, and lifestyle factors are associated with nonspecific back pain¹¹. The occurrence of back pain is associated with several demographic factors such as sex, age, and education level¹⁶. Studies have shown the association between occupational factors and back pain. Workplace physical loads such as heavy physical work, lifting, bending, twisting, pulling, and pushing have often been associated with back pain³. In addition, psychosocial factors at work (perceived high pressure on time and workload, low job control, job dissatisfaction, monotonous work, and low support from coworkers and management) appear to independently increase the risk of back disorders⁵. Skillgate et al.¹⁴ suggested that smoking

Table 6. Population-based adjusted odds ratio estimates for current suffering from back pain derived from multiple logistic regression analysis of the data from the fourth Korea National Health and Nutrition Examination Survey

Variable	Estimate	95% CI
Gender		
Male	1.00	
Female	2.94	(1.89, 4.57)
Age (yr)		
20-29	1.00	
30-39	2.24	(1.12, 4.49)
40-49	2.94	(1.37, 6.31)
50-59	3.86	(1.95, 7.67)
60-69	6.44	(3.28, 12.65)
70-89	5.79	(2.57, 13.02)
Education (yr)		
≤ 6	0.57	(0.34, 0.98)
7-9	0.54	(0.32, 0.92)
10-12	0.57	(0.37, 0.88)
≥ 13	1.00	
Occupation		
Professional, manager, and administrator	1.00	
Clerk	0.49	(0.11, 2.16)
Sales and service worker	2.34	(0.95, 5.75)
Agricultural and fishery worker	2.42	(0.99, 5.89)
Plant and machine operator	1.90	(0.69, 5.26)
Manual worker	1.70	(0.66, 4.38)
Unemployed	2.14	(0.94, 4.88)
Smoking		
Non-smoker	1.00	
Ex-smoker	2.01	(1.31, 3.09)
Current smoker	2.03	(1.21, 3.41)
Drinking frequency		
<1 time per month	1.00	
1-4 times per month	0.70	(0.48, 1.01)
≥ 2 times per week	0.89	(0.60, 1.32)
Regular exercise		
Yes	1.00	
No	1.43	(1.04, 1.96)

is a risk factor for long-term sick leave due to nonspecific back or neck pain and moderate alcohol consumption tends to have a protective effect. Regular exercise may prevent back pain : 1) it strengthens the back muscles and increase trunk flexibility; 2) increases blood supply to the spine muscles and joints and intervertebral discs; and 3) improves mood and thereby alter the perception of pain^{10,17}.

Results of this study for the association of demographic, occupational, and lifestyle factors with back pain were generally consistent to those of the previous studies. In this study, however, adults with short duration of education showed a lower risk of being experienced or current patient than those with ≥ 13 yr of education. It has been reported that subjects with a low educational level reported substantially more disabling back pain¹³. However, inconsistencies remain in the literatures over the relative contributions of risk factors to the occurrence of back pain and the causal processes linking education and health are not well known. Occupational exposure and lifestyle factors may intermediate for the causal pathways from education to back pain⁹.

CONCLUSION

Investigation of the number of patients with concerned disease or illness enables to know the potential medical need in population. It also gives medical providers useful information such as medical facilities, fund, and manpower corresponding to the need. Therefore, further efforts to investigate epidemiology of back pain, to evaluate associated factors, and to improve treatment outcomes are needed.

References

1. Andersson GB : Epidemiological features of chronic low-back pain. *Lancet* 354 : 581-585, 1999
2. Dillon C, Paulose-Ram R, Hirsch R, Gu Q : Skeletal muscle relaxant use in the United States : data from the Third National Health and Nutrition Examination Survey (NHANES III). *Spine (Phila Pa 1976)* 29 : 892-896, 2004
3. Eriksen W, Bruusgaard D, Knardahl S : Work factors as predictors of intense or disabling low back pain; a prospective study of nurses' aides. *Occup Environ Med* 61 : 398-404, 2004
4. Fatmi Z, Hadden WC, Razzak JA, Qureshi HI, Hyder AA, Pappas G : Incidence, patterns and severity of reported unintentional injuries in Pakistan for persons five years and older : results of the National Health Survey of Pakistan 1990-94. *BMC Public Health* 7 : 152, 2007
5. Kaila-Kangas L, Kivimäki M, Riihimäki H, Luukkonen R, Kirjonen J, Leino-Arjas P : Psychosocial factors at work as predictors of hospitalization for back disorders : a 28-year follow-up of industrial employees. *Spine (Phila Pa 1976)* 29 : 1823-1830, 2004
6. Kim HS, Choi JW, Chang SH, Lee KS, Oh JY : Treatment duration and cost of work-related low back pain in Korea. *J Korean Med Sci* 20 : 127-131, 2005
7. Kim SW, Ju CI, Kim CG, Lee SM, Shin H : Efficacy of spinal implant removal after thoracolumbar junction fusion. *J Korean Neurosurg Soc* 43 : 139-142, 2008
8. Kwon MA, Shim WS, Kim MH, Gwak MS, Hahm TS, Kim GS, et al. : A correlation between low back pain and associated factors : a study involving 772 patients who had undergone general physical examination. *J Korean Med Sci* 21 : 1086-1091, 2006
9. Leclerc A, Gourmelen J, Chastang JF, Plouvier S, Niedhammer I, Lanoë JL : Level of education and back pain in France : the role of demographic, lifestyle and physical work factors. *Int Arch Occup Environ Health* 82 : 643-652, 2009
10. Linton SJ, van Tulder MW : Preventive interventions for back and neck pain problems : what is the evidence? *Spine (Phila Pa 1976)* 26 : 778-787, 2001
11. Manek NJ, MacGregor AJ : Epidemiology of back disorders : prevalence, risk factors, and prognosis. *Curr Opin Rheumatol* 17 : 134-140, 2005
12. Raspe H, Matthis C, Croft P, O'Neill T; European Vertebral Osteoporosis Study Group : Variation in back pain between countries : the example of Britain and Germany. *Spine (Phila Pa 1976)* 29 : 1017-1021; discussion 1021, 2004
13. Schmidt CO, Raspe H, Pflugsten M, Hasenbring M, Basler HD, Eich W, Kohlmann T : Back pain in the German adult population : prevalence, severity, and sociodemographic correlates in a multiregional survey. *Spine (Phila Pa 1976)* 32 : 2005-2011, 2007
14. Skillgate E, Vingård E, Josephson M, Holm LW, Alfredsson L : Is smoking and alcohol consumption associated with long-term sick leave due to unspecific back or neck pain among employees in the public sector? Results of a three-year follow-up cohort study. *J Rehabil Med* 41 : 550-556, 2009
15. Stewart WF, Ricci JA, Chee E, Morganstein D, Lipton R : Lost productive time and cost due to common pain conditions in the US workforce. *JAMA* 290 : 2443-2454, 2003
16. Stranjalis G, Tsamandouraki K, Sakas DE, Alamanos Y : Low back pain in a representative sample of Greek population : analysis according to personal and socioeconomic characteristics. *Spine (Phila Pa 1976)* 29 : 1355-1360; discussion 1361, 2004
17. Tveito TH, Hysing M, Eriksen HR : Low back pain interventions at the workplace : a systematic literature review. *Occup Med (Lond)* 54 : 3-13, 2004
18. van den Bosch MA, Hollingworth W, Kinmonth AL, Dixon AK : Evidence against the use of lumbar spine radiography for low back pain. *Clin Radiol* 59 : 69-76, 2004
19. Volinn E, Van Koeveering D, Loeser JD : Back sprain in industry. The role of socioeconomic factors in chronicity. *Spine (Phila Pa 1976)* 16 : 542-548, 1991
20. Webster BS, Snook SH : The cost of 1989 workers' compensation low back pain claims. *Spine (Phila Pa 1976)* 19 : 1111-1115; discussion 1116, 1994