



Original Article

Effects of Nonsurgical Spinal Decompression Treatment on the Level of Pain and Quality of Life in Patients with Cervical or Lumbar Disc Herniation: A Retrospective Observational Study



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ABSTRACT

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Background: This study aims to statistically analyze and compare the curative effect and satisfaction level between typical traditional Korean medicine treatment and nonsurgical spinal decompression treatment.

Methods: Of the patients who were diagnosed with the cervical or lumbar herniated intervertebral disc at the Department of Acupuncture and Moxibustion Medicine at the Daejeon Korean Medicine Hospital from April 14th to August 25th, 2019, this study retrospectively analyzed the medical records of 31 patients who underwent nonsurgical spinal decompression treatment and traditional Korean medicine (assigned to Group A) and another 31 patients who received typical traditional Korean medicine alone (assigned to Group B). The clinical data were analyzed using IBM SPSS Version 23.0.

Results: No statistically significant differences appeared in terms of sociodemographic, condition, and therapeutic characteristics, except whether the patient received Western medicine treatment, before or after a treatment with traditional Korean medicine. Group A exhibited higher variations in numeric rating scale, EuroQol- 5 dimension and EuroQol visual analogue scale scores compared to Group B as determined by independent sample *t* test and analysis of covariance. In addition, the satisfaction score of Group A was higher than that of Group B. The result of cross analysis revealed that desire for continued treatment in Group A was higher than that of Group B.

Conclusion: This retrospective observational study showed that the patients with nonsurgical spinal decompression treatment reported a greater reduction in pain, improved quality of life and satisfaction than patients receiving typical traditional Korean medicine.

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Introduction

Herniation of intervertebral discs is a condition that manifests symptoms by pressuring the nerve root or the dura mater with parts of or the whole nucleus pulposus, that may have herniated from a ruptured fibrous ring due to degenerative changes of the intervertebral disc, or damage from injury, vibration, or continuous micro stimulation. [1]. According to the ranking of the frequency of conditions treated at Korean medicine institutions listed in the 2017 National Health Insurance Statistical Yearbook [2] published by the Health Insurance Review and Assessment Service, a cervical herniated intervertebral disc (M50) ranked

37th, and other herniated intervertebral discs (M51) ranked 18th, showing that these are commonly experienced in the Korean population. Herniation of intervertebral discs can be diagnosed with radiological means such as X-ray, computed tomography (CT), and magnetic resonance imaging (MRI) [1]. The early signs of a cervical herniated intervertebral disc are pain and stiffness of the cervical area followed by shoulder joint pain, interscapular pain, precordial pain, pain and weakness of the upper limb, and hypoesthesia of the fingers, according to the affected nerve root [3]. The most common symptoms of lumbar herniated intervertebral discs are topical pain on the affected vertebrae, and hypoesthesia on the lower limb due to the herniated nucleus pulposus stimulating

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the nerve root. As symptoms get worse, they may progress into motor incoordination such as foot drop or cauda equine syndrome accompanying urination and defecation problems [4].

Nonsurgical spinal decompression treatment is a treatment method that applies traction force directly to the cervical or lumbar vertebrae and makes the internal pressure of the disc partially gravity-free, thereby relieving the nerve pressure and recovering the narrowed intervertebral space, thus inducing realignment and relaxation of the muscles and ligaments around the vertebrae. By continuously increasing traction force on the precise affected area, the internal pressure in the intervertebral disc decreases to negative pressure state, which may result in a therapeutic effect [5]. Published studies on decompression treatment include statistical analysis of the effect before and after treatment [6,7], a retrospective control study with Western medicine treatment [8], prospective controlled trials with Western medicine treatment [9,10], and a retrospective control study with Korean medicine [11]. However, a study that statistically compares the effect of decompression treatment with that of general Korean medicine treatment on both cervical and lumbar herniated intervertebral disc has not been reported yet.

Therefore, this study compares the statistical differences of the effect of treatment on satisfaction, degree of pain, and quality of life, accounting for differences in demographics, condition, and therapeutic characteristics, in 62 patients who received nonsurgical spinal decompression treatment or only Korean medicine treatment for cervical and lumbar disc herniation at the Department of Acupuncture and Moxibustion, Daejeon Korean Medicine Hospital of Daejeon University from April 14th, 2019 to August 25th, 2019.

Materials and Methods

Participants

There were 415 patients who received treatment for cervical

and lumbar herniated intervertebral discs at the Department of Acupuncture and Moxibustion, Daejeon Korean Medicine Hospital of Daejeon University from April 14th, 2019 to August 25th, 2019. From 415 patients, those who had radiological records ($n = 36$) such as MRI or CT were classified as patients assigned to the decompression treatment group, who received nonsurgical spinal decompression treatment using the DRX9000 (Axiom Worldwide, Tampa, FL, USA) in parallel with acupuncture and moxibustion. There were 163 patients in the non-decompression treatment group, who received Korean medicine treatment using only acupuncture and moxibustion.

Of these, patients whose initial pain level was under 5 points on numerical rating scale (NRS), and patients who were unable to answer the telephone survey (such as rejected telephone call or a changed telephone number) were excluded from the study.

There were 31 patients in the decompression treatment group (Group A) and 31 patients in the non-decompression treatment group (Group B) finally included in the study (Fig. 1).

Methods

The data for this study were collected by retrieving the relevant patient medical records and performing telephone surveys (Appendices A-C). The investigation items of the medical records and the content of the telephone surveys were based on the study of Kim et al [12], and the collected research data included evidence of the symptoms, demographics, and therapeutic characteristics, as well as the treatment effects, quality of life scores, and satisfaction scores. The analysis was performed in consultation with Professors of Korean Medicine and Professors of Statistics at Daejeon University. This study was approved by the Institutional Review Board of the Daejeon Korean Medicine Hospital of Daejeon University (approval no.: DJDSKH-19-E-17-1).

Demographic characteristics

Demographic characteristics included sex (male and female),

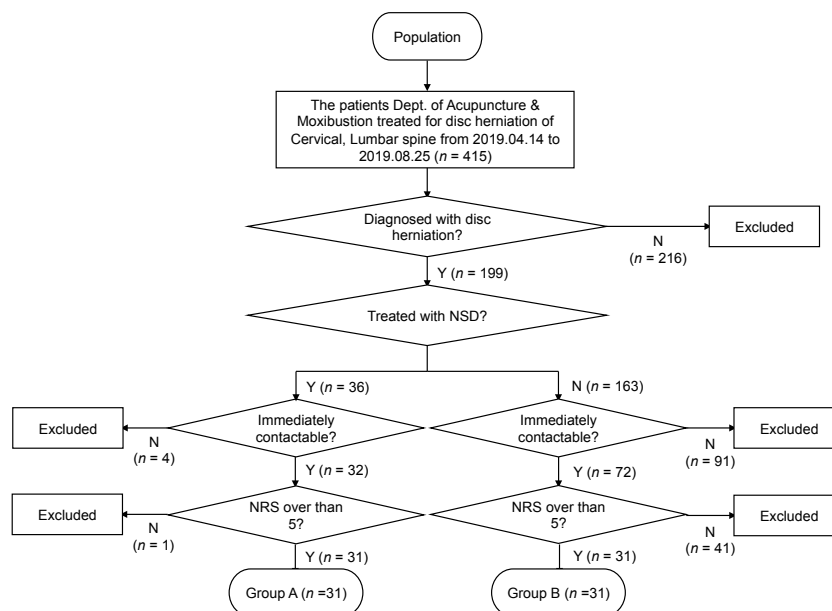


Fig. 1. Study flow chart.
NSD, nonsurgical spinal decompression treatment.

age (< 30s, in their 40s, in their 50s, in their 60s, and over 70), occupation (unemployed, office job, self-employed business, professional practice, and part time job), history of drinking, and history of smoking.

Symptom characteristics

The site of the symptoms was categorized as cervical or lumbar vertebrae, and the stage of disc herniation (4 stages: bulging, protrusion, extrusion, and sequestration) was recorded as observed in CT or MRI scans. Radiating pain to the upper or lower limb was investigated, and the duration of the symptoms was classified into acute stage (< 4 weeks to start the first treatment from the onset of the symptoms), subacute stage (4 to 12 weeks from the onset to the initiation of treatment), and chronic stage (> 12 weeks after the onset of the condition) [13].

Therapeutic characteristics

Patients were grouped into admitted patients and outpatients. The patients were also classified as the non-Western medicine treatment group, and the group that received Western medicine treatment (drug, injection and/or surgery) whether that was before Korean medicine treatment, after Korean medicine treatment, and before and after Korean medicine treatment.

Evaluation of therapeutic effect of treatment

The NRS was used to evaluate the level of pain a patient was suffering. The degree of pain was expressed as a number between 0 and 10 when 10 was the worst imaginable pain and 0 was no pain [14].

To evaluate the patients' quality of life, the EuroQol-5 dimension (EQ-5D) questionnaire and the EuroQol visual analogue scale (EQ-VAS) were used. The EQ-5D is a survey consisting of 5 multiple choice questions. The questions evaluate mobility (M), self-care (SC), usual activities (UA), pain/discomfort (PD), and anxiety/depression (AD). The responses to the questions were "No problem at all," "Quite problematic," or "Seriously problematic." The measurements of each question were calculated by applying the weight and this produced the EQ-5D index. The measurements of the EQ-5D questionnaire were calculated into points in the -0.171-1 range, and the calculated number was considered to be proportional to the quality of life. The equation of the EQ-5D index is as follows.

$$\text{EQ-5D index} = 1 - (0.050 + 0.096 \times M2 + 0.418 \times M3 + 0.046 \times SC2 + 0.136 \times SC3 + 0.051 \times UA2 + 0.208 \times UA3 + 0.037 \times PD2 + 0.151 \times PD3 + 0.043 \times AD2 + 0.158 \times AD3 + 0.050 \times N3);$$

If LQ_1EQL=1 & LQ_2EQL=1 & LQ_3EQL=1 & LQ_4EQL & LQ_5EQL=1 then EQ5D=1;

In the equation, the number 2 means "quite problematic" and the number 3 means "seriously problematic." In this case, 1 was substituted, and in other cases 0 was substituted. In the case of N3, if "seriously problematic" was selected once or more, 1 was substituted [15]. In addition, the EQ-5D questionnaire before and after treatment was investigated separately to identify the change.

EQ-VAS is the tool for evaluating quality of life in linear visual analogue scale. It quantifies the patient's subjective health state over 100 points where 100 is the best possible perceived state of health and 0 is the worst imaginable state [16]. EQ-VAS was measured before and after treatment to identify the change of scores.

Satisfaction for treatment was evaluated using the 5-point Likert scale. The satisfaction level after treatment was measured as 1 point (very unsatisfactory), 2 points (unsatisfactory), 3 points

(mediocre), 4 points (satisfactory), and 5 points (very satisfactory). Desire for continuous treatment was answered as "yes" or "no" [17].

Statistical analysis

The collected data were analyzed using IBM SPSS Version 23.0. The differences in demographic characteristics, symptoms of the condition, and therapeutic characteristics in each group were identified by using frequency analysis and crossover analysis (Chi-square test). To identify the difference in treatment effect and satisfaction between the groups, NRS, EQ-5D, change of EQ-VAS, and satisfaction scores were analyzed using the independent sample *t* test and analysis of covariance (ANCOVA). To identify the difference between the groups in the intention to have the treatment again, crossover analysis by Chi-square test was used. The level of significance for all statistical analyses in this study was reached when $p \leq 0.05$.

Results

Descriptive statistics and crossover analysis

Demographic characteristics

There were no statistically significant differences in sex, age, occupation, drinking and smoking history between the 2 groups in this study (Table 1).

Symptom characteristics

There were no statistical differences in the site of the symptom, stage of disc herniation, presence of radiating pain, and duration of the condition between the 2 groups (Table 2).

Therapeutic characteristics

Analysis of admission rates in each group showed no statistical differences between the 2 groups.

By crossover analyzing the ratio of patients receiving Western medicine treatment (before and/or after Korean medicine treatment) in each group, there was a difference in the ratio of patients receiving Western medicine treatment (before or after Korean medicine treatment) between the 2 groups according to the accompaniment of decompression treatment ($p < 0.05$; Table 3).

Independent t test and ANCOVA

NRS

The NRS score before treatment in each group was measured to be 6.52 ± 0.890 and 6.35 ± 0.798 in Group A and Group B, respectively. There was no statistical difference between the 2 groups ($p = 0.455$). This showed that the severity of pain before treatment was similar in the 2 groups.

The change in NRS score before and after treatment in each group showed a larger decrease in Group A, and this difference was statistically significant ($p < 0.001$; Table 4).

The results of the NRS score showed that the average difference of NRS scores measured before and after treatments that either accompanied decompression treatment or not (excluding the influence of sex, age, occupation, site of the condition, stage of disc herniation, duration of the condition), significantly influenced a change in NRS scores before treatment when accompanied by Western medicine treatment, and smoking history ($p < 0.01$; Table 5).

EQ-5D

The EQ-5D index before treatment in each group were 0.814 ± 0.099 and 0.853 ± 0.072 in Group A and Group B respectively,

Table 1. Frequency Analysis and Descriptive Statistics of Demographic Characteristics.

Variables	Group A		Group B		χ^2	
	<i>n</i>	%	<i>n</i>	%		
Sex	Male	16	51.6	14	45.2	0.258 (0.611)
	Female	15	48.4	17	54.8	
Age (y)	1-39	4	12.9	3	9.7	1.619 (0.805)
	40-49	8	25.8	6	19.4	
	50-59	11	35.5	10	32.3	
	60-69	5	16.1	9	29.0	
	≥70	3	9.7	3	9.7	
	Mean ± SD	53.29 ± 12.163		54.58 ± 11.386		
Occupation	Unemployed	9	29.0	10	32.3	7.157 (0.128)
	Office job	18	58.1	10	32.3	
	Self-employed	4	12.9	7	22.6	
	Professional	0	0	1	3.2	
	Part time job	0	0	3	9.7	
Drinking history	Yes	11	35.5	11	35.5	0.000 (1.000)
	No	20	64.5	20	64.5	
Smoking history	Yes	6	80.6	6	80.6	0.000 (1.000)
	No	25	19.4	25	19.4	

Table 2. Frequency Analysis and Descriptive Statistics of Symptom Characteristics.

Variables	Group A		Group B		χ^2		
	<i>n</i>	%	<i>n</i>	%			
Site of symptom	Cervical	9	29.0	11	35.5	0.295 (0.587)	
	Lumbar	22	71.0	20	64.5		
Stage of disc herniation	Bulging	10	32.3	8	25.8	1.476 (0.688)	
	Protrusion	17	65.8	19	61.3		
	Extrusion	4	12.9	3	9.7		
	Sequestration	0	0	1	3.2		
Radiating pain	Yes	Left	11	35.5	9	29.0	1.677 (0.642)
		Right	4	12.9	8	25.8	
		Both	6	19.4	5	16.1	
	No	10	32.3	9	29.0		
Duration of condition	Acute	7	22.6	2	6.5	3.265 (0.195)	
	Subacute	7	22.6	8	25.8		
	Chronic	17	54.8	21	67.7		

showing that the quality of life before treatment in both groups was similar ($p = 0.079$).

The differences of the EQ-5D index before and after treatment in the 2 groups showed a larger increase in Group A, which was statistically significant ($p < 0.01$; Table 6).

The results of the EQ-5D showed that the average difference of the EQ-5D index measured before and after treatments that either accompanied decompression treatment or not (excluding the influence of sex, occupation, site of the condition, stage of disc herniation, duration of symptoms, presence of radiating pain,

Table 3. Frequency Analysis and Descriptive Statistics of Therapeutic Characteristics.

Variables		Group A		Group B		χ^2
		<i>n</i>	%	<i>n</i>	%	
Admission	Yes	9	29.0	7	22.6	0.337 (0.562)
	No	22	71.0	24	77.4	
Western treatment	WTBA	7	22.6	16	51.6	7.948 (0.047*)
	WTB	14	45.2	12	38.7	
	WTA	2	6.5	0	0	
	WTN	8	25.8	3	9.7	

* $p < 0.05$.

WTBA, Western treatment both before and after; WTB, Western treatment only before; WTA, Western treatment only after; WTN, non-Western treatment.

Table 4. The Change of NRS Score Between Before and After Treatment.

		Before	After	Improvement	<i>p</i>
NRS score	Group A	6.52 ± 0.890	4.03 ±	2.48 ±	< 0.001***
	Group B	6.35 ±	5.10 ± 0.300	1.26 ± 1.125	

*** $p < 0.001$.

NRS, numerical rating scale.

Table 5. ANCOVA of the Change of NRS Scores for Before and After Treatment.

	Type III Sum of Squares	df	Mean Square	F (<i>p</i>)
Corrected model	40.027	10	4.003	3.716 (0.001)
Intercept	0.719	1	0.719	0.667 (0.418)
Sex	2.428	1	2.428	2.254 (0.139)
Age	0.638	1	0.638	0.593 (0.445)
Occupation	0.359	1	0.359	0.333 (0.566)
Site of symptom	2.580	1	2.580	2.395 (0.128)
Stage of disc herniation	0.031	1	0.031	0.029 (0.866)
Duration of condition	0.027	1	0.027	0.025 (0.875)
Western treatment	4.093	1	4.093	3.800 (0.057)
Smoking history	3.691	1	3.691	3.427 (0.070)
NRS score before treatment	0.561	1	0.561	0.521 (0.474)
NSD	9.919	1	9.919	9.208 (0.004**)

Dependent variable: The change of NRS

** $p < 0.01$.

ANCOVA, analysis of covariance; df, degree of freedom; NRS, numerical rating scale; NSD, With or without nonsurgical spinal decompression treatment.

accompaniment of Western treatment, and drinking and smoking history), were significantly different ($p < 0.05$; Table 7)

EQ-VAS

The EQ-VAS scores before treatment in each group were 44.68 ± 7.521 and 51.61 ± 7.680 in Group A and Group B, respectively, showing that the average of EQ-VAS before treatment in the 2 groups was statistically significantly different ($p \leq 0.001$). This showed that the subjective state of health was worse in Group A. The difference in EQ-VAS scores before and after treatment in the 2 groups showed a larger increase in Group A, which was statistically significant ($p < 0.001$; Table 8). The results showed that the average difference of EQ-VAS measured before and after treatments that either accompanied decompression treatment or not, (excluding the influence of sex, occupation, admission rate, site of the condition, stage of disc herniation, duration

of symptoms, presence of radiating pain, accompaniment of Western treatment, and drinking and smoking history) that could have altered the EQ-VAS score before treatment, were significantly different ($p < 0.001$; Table 9).

Satisfaction score: 5-point Likert scale

To identify the difference between the groups, satisfaction scores were analyzed using independent sample *t* test and ANCOVA.

The satisfaction score in each group was statistically significantly different between the 2 groups ($p < 0.001$), and showed a higher satisfaction in Group A (Table 10).

The results of satisfaction scores showed that the average of the satisfaction score after treatments that either accompanied decompression treatment or not (excluding the influence of sex, age, occupation, admission rate, site of the condition, stage of disc herniation, duration of symptoms, and presence of radiating pain),

Table 6. The Change of EQ-5D Index Between Before and After Treatment.

		Before	After	Improvement	<i>p</i>
EQ-5D	Group A	0.814 ±	0.895 ±	0.080 ±	0.004**
	Group B	0.853 ±	0.882 ±	0.029 ±	

** $p < 0.01$.

EQ-5D, EuroQol-5 dimension.

Table 7. ANCOVA of the Change of EQ-5D Between Before and After Treatment.

	Type III Sum of Squares	df	Mean Square	F (<i>p</i>)
Corrected Model	0.072	10	0.007	1.501 (0.166)
Intercept	0.005	1	0.005	1.038 (0.313)
Sex	0.001	1	0.001	0.116 (0.735)
Occupation	0.006	1	0.006	1.222 (0.274)
Site of symptom	0.001	1	0.001	0.232 (0.632)
Stage of disc herniation	0.003	1	0.003	0.556 (0.459)
Duration of condition	0.006	1	0.006	1.228 (0.273)
Radiating pain	0.004	1	0.004	0.808 (0.373)
Western treatment	< 0.001	1	< 0.001	0.039 (0.843)
Drinking history	0.001	1	0.001	0.163 (0.688)
Smoking history	0.002	1	0.002	0.408 (0.526)
NSD	0.033	1	0.033	6.819 (0.012*)

Dependent variable: The change of EQ-5D

* $p < 0.05$.

ANCOVA, analysis of covariance; df, degree of freedom; EQ-5D, EuroQol-5 dimension; NSD, with or without nonsurgical spinal decompression treatment.

Table 8. The Change of EQ-VAS Between Before and After Treatment.

		Before	After	Improvement	<i>p</i>
EQ-VAS	Group A	44.68 ±	60.32 ±	15.65 ±	< 0.001***
	Group B	51.61 ±	55.96 ±	4.35 ±	

*** *p* < 0.001.

EQ-VAS, EuroQol visual analogue scale.

Table 9. ANCOVA of the Change of EQ-VAS Between Before and After Treatment.

	Type III sum of squares	df	Mean square	F (<i>p</i>)
Corrected model	3157.853	12	263.154	3.151 (0.002)
Intercept	18.223	1	18.223	0.218 (0.642)
Sex	7.021	1	7.021	0.084 (0.773)
Occupation	81.819	1	81.819	0.980 (0.327)
Admission	102.048	1	102.048	1.222 (0.274)
Site of symptom	0.027	1	0.027	< 0.001 (0.986)
Stage of disc herniation	82.574	1	82.574	0.0989 (0.325)
Duration of condition	11.744	1	11.744	0.141 (0.709)
Radiating pain	48.619	1	48.619	0.582 (0.449)
Western treatment	139.382	1	139.382	1.669 (0.202)
Drinking history	15.865	1	15.865	0.190 (0.665)
Smoking history	20.351	1	20.351	0.244 (0.624)
EQ-VAS of before treatment	29.318	1	29.318	0.351 (0.556)
NSD	1240.309	1	1240.309	14.852 (< 0.001***)

Dependent variable: The change of EQ-VAS

*** *p* < 0.001.

ANCOVA, analysis of covariance; df, degree of freedom; EQ-VAS, EuroQol visual analogue scale; NSD, with or without nonsurgical spinal decompression treatment.

was significantly different ($p \leq 0.001$; Table 11).

Crossover analysis

Desire to continue treatment

Patients who received decompression treatment showed a significant desire to have further treatment compared with the patients who did not receive decompression treatment ($p < 0.05$; Table 12).

Discussion

Pain on the cervical and lumbar vertebra is common and most adults (50% to 80%) experience it at least once in our lifetime. This pain may impose a great social and economic burden. Factors that cause vertebral pain are not simple, but results from physical characteristics, socioeconomic state, psychological state, and occupational environmental characteristics [18]. Pain results from stimulation of the nerve root caused by herniation of intervertebral disc [19]. Around 80% of vertebral conditions/syndromes are

Table 10. Frequency Analysis and Descriptive Statistics of Satisfaction Characteristics.

		Group A		Group B		p
		n	%	n	%	
Satisfaction	Very dissatisfied (1)	0	0	2	6.5	< 0.001***
	Somewhat dissatisfied (2)	1	3.2	6	19.4	
	Neutral (3)	11	35.5	15	48.4	
	Somewhat satisfied (4)	8	25.8	6	19.4	
	Very satisfied (5)	11	35.5	2	6.5	

*** $p < 0.001$.

Table 11. ANCOVA of the Satisfaction.

	Type III sum of squares	df	Mean square	F (p)
Corrected model	25.190	9	2.799	3.445 (0.002)
Intercept	11.683	1	11.683	14.381 (< 0.001)
Sex	0.002	1	0.002	0.003 (0.957)
Age	0.198	1	0.198	0.243 (0.624)
Occupation	1.497	1	1.479	1.820 (0.183)
Admission	2.315	1	2.315	2.850 (0.097)
Site of symptom	0.038	1	0.038	0.047 (0.829)
Stage of disc herniation	0.511	1	0.511	0.629 (0.431)
Duration of condition	2.143	1	2.143	2.638 (0.110)
Radiating pain	1.593	1	1.593	1.961 (0.167)
NSD	10.493	1	10.493	12.915 (0.001***)
Dependent variable: Satisfaction				

*** $p \leq 0.001$.

ANCOVA, analysis of covariance; df, degree of freedom; NSD, with or without nonsurgical spinal decompression treatment.

Table 12. Frequency Analysis and Descriptive Statistics of Desire to Continue Treatment.

Variable		Group A		Group B		χ^2
		n	%	n	%	
Desire to continue treatment	Yes	26	83.9	17	54.8	6.147 (0.013*)
	No	5	16.1	14	45.2	

* $p < 0.05$.

related to herniation of intervertebral disc, and less than 20% are directly related to intervertebral structures like facet joints, ligaments, and fascia [20].

Surgical treatment for herniation of an intervertebral disc is considered when there is a neurological deficit, other neurological symptoms progress, or when other pathological states of the spinal column like spinal stenosis is present. Otherwise, conservative treatment has shown positive results [21]. Acupuncture, moxibustion, herbal medicine, pharmacopuncture, Chuna, acupotomy, Korean medicine physical therapy, and exercise therapy are provided as conservative treatment in Korean medicine for herniation of an intervertebral disc [22,23], and traction therapy is also offered to decrease the internal pressure of the disc. Although the traditional traction therapy has shown significant treatment effect for pain and symptoms by decreasing the pressure in the spine [24], there are some studies which report that traditional traction therapy increases internal pressure in the disc due to reflexive muscle spasms, and since traditional traction therapy cannot lower the internal pressure of the disc to reduce the pressure [25]. A recent study showed that nonsurgical spinal decompression treatment decreases the internal pressure of the disc to reduce the pressure [26].

Many studies today are performed in patients with herniation of intervertebral disc [6-11]. However, there are no studies that statistically analyze the treatment effects of general Korean medicine treatments like acupuncture, moxibustion, cupping, and nonsurgical spinal decompression treatment for herniation of cervical and lumbar intervertebral discs considering demographic characteristics, location of the symptoms, and its treatment. Therefore, this study aimed to understand the demographics, the condition, and its treatment of patients with herniated discs who received Korean medicine treatment and decompression treatment. Treatment effects and satisfaction for Korean medicine treatment and decompression treatment were compared statistically.

The demographic characteristics of this study are consistent with the 2017 National Health Insurance Statistical Yearbook [2]. The total medical benefit expenses for people in their 50s showed that 32.2% had a cervical herniated intervertebral disc (M50) and 24.8% had another herniated intervertebral disc (M51).

There were more patients with herniation of lumbar intervertebral disc than cervical disc. It is similar to the statistical result which showed other herniated intervertebral discs (M51) ranked 18th and cervical herniated intervertebral discs (M50) ranked 37th in the Status of benefits by frequency of disease in 2017 National Health Insurance Statistical Yearbook. It showed that there were more patients with lumbar herniated intervertebral discs than cervical herniated intervertebral discs visit Korean medicine hospitals.

As for the stage of disc herniation, radiating pain, duration of condition, when the duration of the symptoms is not long, pain is the main symptom rather than radiating pain in the herniation of intervertebral disc, and as the duration of illness is prolonged, it is possible to develop radiating pain along the upper or lower limbs [3]. Therefore, this study seems to have more chronic pain patients with a longer duration of illness, as is the characteristics of Korean medicine hospitals.

According to treatment, there were more outpatient than patients admitted to hospital. This may mean that decompression treatment is not a burden to have and is non-invasive as it may be administered via an outpatient clinic like any other Korean medicine treatment. Western medicine treatment (before or after Korean medicine treatment) in the decompression treatment group had less patients considered to have had relatively good effects compared with general Korean medicine or Western medicine

treatment.

The NRS [14], EQ-5D [15], EQ-VAS [16] and 5-point Likert scale [17] scores were used to compare the treatment effects and satisfaction of Group A and Group B. Cross-tabulation analysis identified that the average scores of NRS and EQ-5D before treatment were similar in the 2 groups. Cross-tabulation analysis revealed that the average EQ-VAS score before treatment was lower in Group A. This implied that a patient who perceives his or her health condition is in bad state tends to try decompression treatment. Change in scores of NRS, EQ-5D, and EQ-VAS before and after treatment was statistically greater in Group A than in Group B, and this could mean that relief of pain and improved quality of life was greater when decompression treatment was accompanied with general Korean medicine treatment. In addition, the satisfaction score was statistically higher in Group A and this implies that accompanying decompression treatment enhances satisfaction compared with receiving only Korean medicine treatment. However, since the change in scores of NRS, EQ-5D, EQ-VAS before and after treatment, and satisfaction score was affected not only by accompanying decompression treatment but also by demography, condition, treatment characteristics, ANCOVA was performed. As a result, the change in NRS, EQ-5D, EQ-VAS, and satisfaction scores showed a significant change according to whether they received decompression treatment or not (excluding effects from sex, age, occupation, admission, site of condition, stage of disc herniation, duration of condition, radiating pain, Western treatment before or after treatment, drinking or smoking history and NRS, EQ-5D, EQ-VAS scores before treatment). It showed that accompanying non-invasive decompression treatment in addition to Korean medicine treatment, helped to reduce pain in patients with cervical and lumbar herniated intervertebral disc. Decompression treatment may also help enhance quality of life, and have a positive effect on patient satisfaction compared with general Korean medicine treatment.

Patients who had accompanied decompression treatment were more likely to have the intention to try the treatment again compared with patients who only received Korean medicine treatment. This showed that patient satisfaction from decompression treatment was greater than general Korean medicine treatment. Further studies should follow.

This study is unique compared to previous studies in that it comprehensively includes patients with cervical and lumbar herniated intervertebral discs, and statistically analyzes the treatment effects and satisfaction of general Korean medicine treatment and decompression treatment retrospectively. It also analyzes demographic characteristics, the condition, and the treatment to achieve more accurate results. However, this study used data from a telephone survey or medical records, and the items used to evaluate the treatment effects or quality of life was subjective. In addition, the total number of patients in this study was only 62, and it is a retrospective study not a prospective study with experimental group and control group. There should be randomized controlled trials with enough patients and controls to compare the treatment effects with objective evaluation tools like radiographical results or visual analog scale in the future.

Conclusion

Among patients diagnosed with cervical and lumbar herniated intervertebral disc there were no significant differences in sociodemographic characteristics, the condition, and therapeutic characteristics, except for when the patient received Western medicine treatment before or after traditional Korean medicine treatment. Group A exhibited higher variations in the NRS, EQ-5D

and EQ-VAS scores compared with Group B, and the satisfaction score of Group A was higher than that of Group B. Significant mean changes in the NRS, EQ-5D, EQ-VAS and satisfaction scores were observed when patients received decompression treatment (excluding effects from demographics, condition, and treatment characteristics). Desire for continued treatment in Group A was higher than Group B.


Conflicts of Interest

The authors have no conflicts of interest to declare.


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Appendix A.

 <p>대전한방병원 DAEJEON UNIVERSITY</p>	Questionnaire	2019. 09.
<p>Script for telephone survey after hospital discharge Hello? This is Department of Acupuncture and Moxibustion at Daejeon Korean Medicine Hospital of Daejeon University. Are you OO who received MSN for OO disease OO (month), OO (year)? We are doing a telephone survey for check-up and symptom managements of patients who received MSN. Listen to my question and please answer according to your current status. Let me begin now.</p> <ol style="list-style-type: none"> 1. Have you ever been to a hospital or clinic of orthopedics, neurosurgery, or pain medicine after discharge? (Yes / No) 2. Are you still having pain or radiating pain? Yes (→2-1), No (→3). 2-1. If 0 means no pain, 5 means moderate pain, and 10 means very severe pain, my current pain is about 2-2. Have you ever had back pain or lower back pain in the last month and have been treated more than twice a week? (Yes / No) 3. I'm going to ask you two questions to assess the quality of life before and after treatment. 4. How satisfied were you with the MSN treatment? ① very dissatisfied ② somewhat dissatisfied ③ neutral ④ somewhat satisfied ⑤ very satisfied 5. Are you willing to receive MSN treatment again at the time of the pain recurrence? (Yes / No) <p>Thank you very much. The telephone survey has finished. Once a pain occurred, recurrence is very often, so steady management is necessary. You also visit us for treatment again. Thank you again for answering to our survey.</p> <p style="text-align: right;">[2019 . 09 . .]</p>		

Appendix B.

 <p>대전한방병원 DAEJEON UNIVERSITY</p>	<p>EQ-5D</p>	<p>2019. 09.</p>
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□UK □ND □NA

The following questions are about your general health status. Please listen to the questions and answer the ones closest to your health before and after treatment.

<p>1. motor capacity</p> <ul style="list-style-type: none"> <input type="checkbox"/> (1) I have no trouble walking. <input type="checkbox"/> (2) I have some difficulty in walking. <input type="checkbox"/> (3) I have to lie down all day. <p>2. Self-management</p> <ul style="list-style-type: none"> <input type="checkbox"/> (1) I have no problem taking a bath or dressing up. <input type="checkbox"/> (2) I have some trouble taking a bath or dressing myself. <input type="checkbox"/> (3) I can't bathe or dress alone. <p>3. Daily activities (work, study, housework, family, or leisure activities)</p> <ul style="list-style-type: none"> <input type="checkbox"/> (1) I have no problem doing my daily activities. <input type="checkbox"/> (2) I have some difficulties in doing my daily activities. <input type="checkbox"/> (3) I can't do my daily activities. 	<p>4. Pain / discomfort</p> <ul style="list-style-type: none"> <input type="checkbox"/> (1) I have no pain or discomfort. <input type="checkbox"/> (2) I have some pain or discomfort. <input type="checkbox"/> (3) I have a very severe pain or discomfort. <p>5. Anxiety / Depression</p> <ul style="list-style-type: none"> <input type="checkbox"/> (1) I am not anxious or depressed. <input type="checkbox"/> (2) I'm somewhat anxious or depressed. <input type="checkbox"/> (3) I am very anxious or depressed.
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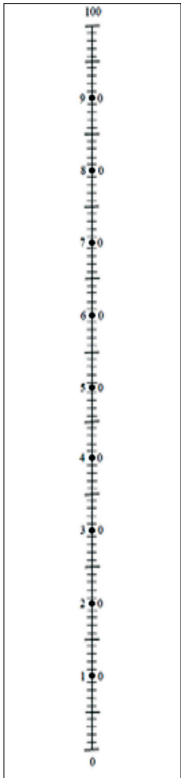
[2019 . 09 . .]

Appendix C.

 <p>대전한방병원 DAEJEON UNIVERSITY</p>	<p>EQ-VAS</p>	<p>2019. 09.</p>
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To help you express how good and bad your health is, we have drawn a ruler (similar to a thermometer) that marks the best possible state as 100 and the lowest state you can imagine as zero.

Tell us how good and bad your health is before and after treatment.



[2019 . 09 . .]