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Daily Treatment with Traditional Korean Medicine and a Longer Hospitalization Period Aids Recovery in Patients with Lower Back Pain Sustained in Road Traffic Accidents

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ABSTRACT

Background: Length of hospitalization for patients with lower back pain sustained in road traffic accidents was assessed clinically.
Methods: In total, 170 patients with lower back pain injury sustained in road traffic accidents, were included in the study. They were divided into 2 groups: Group A with a shorter hospitalization period (1–7 days) and Group B with a longer hospitalization period (8–14 days). Each group was treated daily with traditional Korean medicine including: acupuncture, herbal acupuncture, herbal decoction medicine, and chuna treatment. To compare the treatment effects between the 2 groups, health-related quality of life, Oswestry disability index, and numeric rating scale were used. Statistical analysis between the 2 groups was assessed using Chi-square test, independent *t* test, and paired *t* test.
Results: After hospitalization, Group A and Group B both showed a significant increase in their health-related quality of life scores and significant decreases in Oswestry disability index and numeric rating scale scores. In addition, Group B, with a longer hospitalization period than Group A, showed a significant improvement over Group A in its health-related quality of life and numeric rating scale scores.
Conclusion: This study suggests that control of pain caused by lower back injury sustained in a road traffic accident, may be more effectively achieved in patients receiving 8-14 days of hospitalization and traditional Korean medicine treatment, compared to those receiving < 7 days of hospitalization treatment. In the future, more systematic and large-scale studies are needed to ascertain the effects of other variables.

Introduction

In 2016, 220,917 road traffic accidents (RTAs) occurred in Korea, resulting in 4,292 deaths and 331,720 injuries. According to the Traffic Accident Analysis System of the Road Traffic Corporation, lower back injury by RTAs in 2016 accounted for 26.9% of all injuries [1].

Lower back pain is a widespread pain that includes pain radiating bilaterally in the legs as well as neurological symptoms that appear between the lower ribs and the gluteal crest [2]. Lower back pain is a typical chronic pain condition and is caused by trauma, flexion–extension exercises exceeding the normal range, and poor posture. In some cases, pain continues to progress to chronic back pain even after treatment of the original injury [3].

Every year, more than 200,000 RTAs occur and more than 300,000 people are injured. As the number of patients suffering from lower back pain sustained in RTAs increases, administering treatment is becoming a challenge.

In traditional Korean medicine, the symptoms sustained in RTAs are treated according to the concept of qi stagnation and static blood [4]. In patients complaining of lower back pain due to traffic accidents, efficacy of traditional Korean medicine has

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been compared [5, 6, 7], however, there are few studies of clinical improvement according to length of stay in hospital for a patient with lower back pain sustained in RTA. This research is relevant to the making of healthcare policy as medical statistics become increasingly important.

In this study, 170 patients who were diagnosed as having "sprain and strain of the lumbar spine" with complaints of lower back pain received traditional Korean medicine treatments at the Daejeon Jaseng Hospital of Korean Medicine, Korea from October 1 to October 31, 2017. Patients were assigned into two groups according to the duration of hospitalization and the admission and discharge status of the two groups was compared.

Materials and Methods

Patients

From October 1 to October 31, 2017, patients diagnosed as having "sprain and strain of lumbar spine" at the Daejeon Jaseng Hospital of Korean Medicine, Korea were recruited. The patients' main symptoms were lower back pain with no fractures as visualized by X-rays, and visited the hospital within a week of the RTA occurrence. On this basis 170 patients were recruited and their charts retrospectively reviewed.

This study was approved by the Jaseng Hospital's institutional review board on January 31, 2018 (approval no. Jaseng 2018-01-005) as a retrospective study involving statistical analysis that did not record patients' individual identifying information. At the time of admission, patients consented to the use of their academic data in this study.

Methods

Group A comprised of 95 patients (54 men and 41 women) who stayed in hospital for up to a week (1–7 days), and Group B comprised 75 patients (30 men and 45 women) who stayed in hospital between 1 to 2 weeks (8–14 days). Their medical records were collated and analyzed for:

1) Gender and age
2) Hospitalization period (days)
3) The number of days taken from RTA to first hospital visit
4) Symptoms excluding lower back pain
5) X-ray, computed tomography (CT), and magnetic resonance imaging (MRI) scans
6) Herbal acupuncture and herbal decoction treatment
7) EQ-5D scores at admission and discharge
8) Oswestry Disability Index (ODI) at admission and discharge
9) Numerical Rating Scale (NRS) at admission and discharge

Treatments

Acupuncture treatment

The needles used for acupuncture were disposable stainless-steel needles (0.25 × 40 mm; Dong Bang Medical Co. Ltd., Daecheon, Korea) that were inserted bilaterally at the BL 23 (Shinsu) and BL 40 (Wijung) points and Ashi points of the lumbar, pelvis, and lower limbs for 15 minutes twice a day. The needle insertion depth was about 20–30 mm. Acupuncture treatment was performed with transcutaneous infrared irradiation by Korean medicine doctors, who administered the acupuncture treatment daily, every morning and afternoon. Details of the acupuncture treatment were summarized according to the STRICTA [8] format (Table 1).

Herbal acupuncture and herbal decoction treatment

Each patient was either, injected with 1 mL of Shinbaro 1, Shinbaro 2, or bee venom, or was treated with Jungsongouhyul or muscle relaxation herbal acupuncture, at the interspinous ligament of L4, L5, and S1 and bilaterally at BL 24 (Kihaesu). Herbal acupuncture needles were inserted directly into the skin to a depth of 0.5–1 cm, and a disposable syringe (1 mL, 26G × 1.5 syringe; CPL Co. Ltd., Gyeonggi-do, Korea) was used. In addition, each patient took the prescribed herbal decoction, such as Danggwisusan and Danggwihwajoeum, twice daily, 30 min after a meal. Distribution of herbal acupuncture and herbal decoction is listed in Table 2.

Chuna treatment

Chuna treatment such as the Flexion Distraction technique, lumbar extension technique, lateral extension rotation technique, and lateral lumbar correction technique was performed 5 to 7 times a week from the day of admission.

Assessment Methods

EQ-5D

EQ-5D is a health questionnaire that has been standardized to enable patient assessment of their state of health with questions on physical and mental well-being, and normal mobility [12]. The higher the total score, the higher the quality of life. EQ-5D values were collected at admission and discharge. EQ-5D scores acquired at admission (EQ5D Ⅰ) were compared to those acquired at discharge (EQ5D Ⅱ), and changes (EQ5D Ⅱ – Ⅰ) were compared between Group A and Group B.

Oswestry disability index

ODI is a multiple-choice questionnaire answered by the patient and used to evaluate the functional status associated with lower back pain by describing the disabilities faced whilst carrying out day to day activities; it is measured on a 6-point scale (0 to 5 points) [13]. The higher the total score, the higher the degree of disability. ODI values were collected at admission (ODI Ⅰ) and discharge (ODI Ⅱ) and the change (ODI Ⅱ – Ⅰ) was compared between Group A and Group B.

Numeric rating scale

NRS is mainly used to assess the overall intensity of pain, and it is a method where patients select a number along a scale of 0 – 10 (0, no pain; 10, excruciating pain) [14]. NRS values were collected at admission and discharge. NRS scores at admission (NRS Ⅰ) and discharge (NRS Ⅱ) and the change (NRS Ⅱ – Ⅰ) was compared between groups A and B.

Statistical Methods

In this study, all statistical analyses were performed using Microsoft Excel 2010 for Windows, and the data were expressed as mean ± SD. To compare the homogeneity between groups, Chi-square was used for gender distribution. To compare ages, time taken from accident to hospital visit (days), and variations in EQ-5D, ODI, and NRS between the 2 groups, an Independent t test was used. A paired t test was used to compare variations in EQ-5D, ODI, and NRS before and after hospitalization for each group. Statistical significance was reached when $p < 0.05$.

Table 1. Therapy by the STRICTA Recommendation.

Item	Detail
1. Acupuncture rationale	1a) Style of acupuncture: We based the acupuncture point selections on traditional Korean medicine (TKM) meridian theory to treat lower back pain and administered herbal acupuncture treatment based on pharmacopuncturology [9]. 1b) Reasoning for treatment provided, based on historical context, literature sources, and/or consensus methods, with references where appropriate: Acupoints were chosen for individual patients as in routine clinical practice based on "Donguibogam [10]" and "The acupuncture and Moxibustion Medicine [11])". 1c) Extent to which treatment was varied: Each patient received individualized acupuncture treatments that focused on specific needs and symptoms that the individual was experiencing at the discretion of the doctor.
2. Details of needling	2a) Number of needle insertions per subject per session (mean and range where relevant): There was no intervention of number of needle insertions per subject per session. Totally 1 mL of herbal acupuncture was injected. 2b) Names (or location if no standard name) of points used (uni/bilateral): Acupoints used were bilateral BL 23 (Shinsu) and BL 40 (Wijung) points and Ashi points of the lumbar, pelvis, and lower limbs. Herbal acupuncture needles were inserted nearly at the interspinous ligament of L4, L5, and S1 and bilaterally at BL 24 (Kihaesu). 2c) Depth of insertion, based on a specified unit of measurement, or on a particular tissue level: In acupuncture treatment, the depth of needle insertion was about 20-30 mm. In herbal acupuncture treatment, the depth of needle insertion was about 0.5-1 cm. 2d) Response sought: We did not employ vigorous manipulation in order to elicit a strong de qi sensation. 2e) Needle stimulation: Acupuncture treatment was performed with transcutaneous infrared irradiation and electrically stimulation for 15 minutes (1 Hz, within tolerable strength) using electro-stimulator (STN-111; StraTek Inc. Korea). 2f) Needle retention time: In a session of acupuncture treatment, needles were inserted for 15 minutes. Herbal acupuncture treatment needles were withdrawn immediately after injection. 2g) Needle type: The needles used for acupuncture were disposable stainless-steel needles (0.25 × 40 mm; Dong Bang Medical Co. Ltd., Daecheon, Korea). A disposable syringe (1 mL, 26G × 1.5 syringe; CPL Co. Ltd., Gyeonggi-do, Korea) for herbal acupuncture treatment was used. Injections for herbal acupuncture product were made from Jaseng Wonoe Tangjunwon, Namyangju, Korea.
3. Treatment regimen	3a) Number of treatment sessions: In Group A, acupuncture treatment was performed an average of 7.2 sessions (median 8, range 2-12), and herbal acupuncture treatment an average of 4.6 sessions (median 5, range 2-7) for <7 days. In Group B, acupuncture treatment was performed an average of 19.28 sessions (median 20, range 14-26), and herbal acupuncture treatment an average of 10.6 sessions (median 11, range 8-14) for 8-14 days. 3b) Frequency and duration of treatment sessions: Patients had received two sessions of acupuncture treatment and one session of herbal acupuncture treatment daily. In a session of acupuncture treatment, needles were inserted for 15 minutes. It took less than 5 minutes for a session of herbal acupuncture treatment.
4. Other components of treatment	4a) Details of other interventions administered to the acupuncture group: Each patient took the prescribed herbal decoction, such as Danggwisusan and Danggwihwajoeum, twice daily, 30 min after the meal. Table 2 shows the distribution of herbal acupuncture and herbal decoction. Also, they received chuna treatment, such as the Flexion Distraction technique, lumbar extension technique, lateral extension rotation technique, and lateral lumbar correction technique, five to seven times a week from the day of admission. 4b) Setting and context of treatment, including instructions to practitioners, and information and explanations to patients: Each of 10 traditional Korean medical specialists made individual diagnosis to patients in accordance with the principles of TKM and the radiologist's readings, and explained patients the treatment plan. They had met and treated them once daily from the day of admission. Each of 5 resident-1-year doctors also had treated patients once a day and collected EQ5D, ODI, and NRS data at admission and discharge.
5. Practitioner background	5) Description of participating acupuncturists (qualification or professional affiliation, years in acupuncture practice, other relevant experience): All 10 traditional Korean medical specialists, qualified through additional 4 years of training, administered the acupuncture treatment and herbal acupuncture treatment once a day. They obtained license of traditional Korean Medicine and had used acupuncture in their practices for an average of 11 years (median 12, range 5-19). All 5 resident-1-Year doctors, who finished 1year internship training and obtained license of traditional Korean Medicine and finished, also administered the acupuncture treatment once a day.
6. Control or comparator interventions	6a) Rationale for the control or comparator in the context of the research question, with sources that justify this choice: In a previous study of traffic accidents (TA) [24], patients treated for 8-14 days showed greater improvement than those treated for 1-7 days. Therefore, in this study, we divided TA patients into two groups and wanted to see the difference in the quality of life, disability, and pain between < 7 days inpatients and 8-14 days inpatients of TA. 6b) Precise description of the control or comparator. If sham acupuncture or any other type of acupuncture-like control is used, provide details as for Items 1 to 3 above: Group A and Group B received the same treatment.

Table 2. Herbal Acupuncture and Herbal Decoction Treatment.

Herbal acupuncture	Patients (*n*)	%	Herbal decoction	Patients (*n*)	%
Shinbaro 1	82	48.2	Danggwisusan	115	67.6
Shinbaro 2	51	30.0	Danggwihwajoeum	43	25.3
Muscle relaxation	18	10.6	Gamisekyungtang	4	2.4
Jungsongouhyul pharmacopuncture	14	8.2	Gamisayuktang	3	1.8
Essential bee venom	1	0.6	Hwalhyultang	1	0.6
Nothing administered	4	2.4	Woongeoyeongshin	1	0.6
			None	3	1.8
Total	170	100	Total	170	100

Table 3. Characteristics of Subjects.

	Age (y)†	Gender‡		The time taken from accident to first visit (d)†	Days of hospitalization period
		Male	Female		
Group A	39.0 ± 12.91	54	41	1.6 ± 1.44	4.6 ± 1.55
Group B	37.4 ± 13.14	30	45	1.8 ± 1.68	10.6 ± 2.12
p	0.420	0.029*		0.482	

Date are presented as mean ± SD.
* $p < 0.05$.
† They were calculated by independent-sample t-test.
‡ They were calculated by Chi-square test.

Results

General characteristics of patients

Group A was comprised of 54 men and 41 women (average age, 39.0 ± 12.91 years). Group B comprised 30 men and 45 women (average age, 37.4 ± 13.14). The mean hospitalization period in Group A was 4.6 ± 1.55 days, and the mean time taken from accident to first visit was 1.6 ± 1.44 days. The mean hospitalization period in Group B was 10.6 ± 2.12 days, and the mean time taken from accident to first visit was 1.8 ± 1.68. Although Group B had a significantly higher proportion of women than Group A, there was no significant difference between groups in for age and time taken from accident to the first visit (Table 3).

All 170 patients had 1 or more additional complaint of pain, with the exception of lower back pain the most common complaint experience by 159 (93.5%) patients was neck pain (Table 4). The number of additional complaints of pain was 1.5 ± 0.8 in Group A and significantly higher p 0.037 in 1.8 ± 0.9 in Group B (Table 5).

Distribution of radiological findings

X-ray and CT scans of the lumbar spine were summarized for 168/170 patients by a radiologist (2 patients were pregnant therefore it was not safe to have the scans). Abnormal findings were found in 110 patients' scans and 58 patients' scans were within the normal range. Disc space narrowing of the lumbar spine was the most common (84.4%) finding. Degenerative spondylosis (35.9%), bulging disc (14.7%), and protrusion (10.6%) were also attributed to abnormal scans (Table 6).

Lumbar spine MRI scans were taken for 14 patients in Group A and 34 patients in Group B. Amongst them, 6 patients (42.9%) in Group A and 16 patients (47.1%) in Group B were found to have protrusion ~ sequestration abnormalities (Table 7).

Table 5. Number of Additional Complaints in Addition to Lower Back Pain.

Number of additional chief complaints	Number of patients	
	Group A (n = 95)	Group B (n = 75)
0	0	0
1	60	35
2	23	24
3	9	12
4	3	4
Total	95	75
mean ± SD	1.5 ± 0.8	1.8 ± 0.9
$p^{\dagger}$	0.037*	

Date are presented as mean ± SD.
* $p < 0.05$
† They were calculated by independent-sample t-test.
Group A, hospitalization period 1–7 days; Group B, hospitalization period 8–14 days.

Table 4. Additional Chief Complaints of Patients Except for Lower Back Pain.

Additional chief complaint	Number of patients (%)		
	Group A (n = 95)	Group B (n = 75)	Total (n = 170)
Neck pain	90 (94.7)	69 (92.0)	159 (93.5)
Knee pain	11 (11.6)	15 (20.0)	26 (15.3)
Shoulder pain	10 (10.5)	7 (9.3)	17 (10.0)
Headache	5 (5.3)	10 (13.3)	15 (8.8)
Chest pain	6 (6.3)	9 (12.0)	15 (8.8)
Ankle pain	3 (3.2)	9 (12.0)	12 (7.1)
Wrist pain	1 (1.1)	6 (8.0)	7 (4.1)
Elbow pain	3 (3.2)	4 (5.3)	7 (4.1)
Hand pain	2 (2.1)	1 (0.01)	3 (1.8)
Back pain	1 (0.01)	1 (0.01)	2 (1.2)
Abdominal pain	1 (0.01)	0 (0)	1 (0.6)
Nasal pain	0 (0)	1 (0.01)	1 (0.6)
Tibial pain	0 (0)	1 (0.01)	1 (0.6)
Jaw pain	1 (0.01)	0 (0)	1 (0.6)
Ear pain	0 (0)	1 (0.01)	1 (0.6)
Dizziness	0 (0)	1 (0.01)	1 (0.6)

Multiple processing. Percentage is the ratio for the number of each patient.
Group A, hospitalization period 1–7 days; Group B, hospitalization period 8–14 days.

Table 6. Distribution of Radiological Findings.

	Number of patients (%)		
	Group A (n = 95)	Group B (n = 75)	Total (n = 170)
Within normal range	34 (35.8)	24 (32.0)	58 (34.1)
Abnormal findings	61 (64.2)	49 (65.3)	110 (64.7)
No radiographic image	0 (0.0)	2 (2.7)	2 (1.2)
Disc space narrowing	48 (50.5)	36 (48.0)	84 (49.4)
Degenerative spondylosis	38 (40.0)	23 (30.7)	61 (35.9)
Bulging disc	8 (8.4)	17 (22.7)	25 (14.7)
Protrusion disc	4 (4.2)	14 (18.7)	18 (10.6)
Spondylolisthesis	3 (3.2)	4 (5.3)	7 (4.1)
Schmorl nodes	4 (4.2)	1 (1.3)	5 (2.9)
Extrusion disc	3 (3.2)	1 (1.3)	4 (2.4)
Scoliosis	2 (2.1)	2 (2.7)	4 (2.4)
Operation performed in the past	2 (2.1)	1 (1.3)	3 (1.8)
6 lumbar type vertebrae	3 (3.2)	0 (0.0)	3 (1.8)
Modic changes	1 (1.1)	2 (2.7)	3 (1.8)
Sequestration disc	0 (0.0)	2 (2.7)	2 (1.2)
Stenosis	1 (1.1)	0 (0.0)	1 (0.6)

Multiple processing. Percentage is the ratio for the number of each patient.
Group A, hospitalization period 1–7 days; Group B, hospitalization period 8–14 days.

Comparison of EQ5D, ODI and NRS

Between-group comparisons of EQ5D, ODI, and NRS

The change in Group A between EQ5D Ⅰ scores 0.79 ± 0.12 and EQ5D Ⅱ scores 0.82 ± 0.10 showed a significant increase (p = 0.008). The same trend was observed in Group B, the change between EQ5D Ⅰ score 0.72 ± 0.17 and EQ5D Ⅱ score 0.80 ± 0.11 significantly increased (p < 0.0001). Scores of EQ5D Ⅰ in Group A were statistically significantly higher than those in Group B (p = 0.005). There was no statistically significant difference in the scores of EQ5D Ⅱ between Groups A and B (p = 0.380).

ODI scores indicated a significant (p < 0.0001) decrease in Group A between ODI Ⅰ 32.78 ± 16.29 and ODI Ⅱ 25.30 ± 14.37. The same trend was observed in Group B, between ODI Ⅰ scores 38.86 ± 16.89 and ODI Ⅱ scores 28.40 ± 15.16 (p < 0.0001). ODI Ⅰ scores in Group A were statistically significantly (p = 0.018) lower than those in Group B. There was no statistically significant difference in ODI Ⅱ scores between Group A and Group B (p = 0.175).

NRS scores indicated a significant decrease (p <0.0001) in Group A, between NRS Ⅰ scores 4.89 ± 0.69 and NRS Ⅱ scores 4.20 ± 0.95. The same trend was also observed in Group B, between NRS Ⅰ scores 4.92 ± 0.69 and NRS Ⅱ scores 3.71 ± 0.96 (p < 0.0001). There was no statistically significant difference in the scores of NRS Ⅰ between Group A and Group B (p = 0.813). NRS Ⅱ scores in Group B were statistically (p = 0.001) significantly lower than those in Group A (Table 8).

Between-group comparisons of the variations in EQ5D, ODI, and NRS scores

Variations between EQ5D Ⅰ and EQ5D Ⅱ, ODI Ⅰ and ODI Ⅱ, NRS Ⅰ and NRS Ⅱ were calculated and compared to the variations between groups A and B. The values of EQ5D Ⅱ − Ⅰ were 0.029 ± 0.10 for Group A and 0.081 ± 0.16 for Group B. There was a significant difference (p = 0.018) between the groups, indicating a better clinical outcome in Group B than in Group A.

The values of ODI Ⅱ − Ⅰ were − 7.48 ± 12.84 for Group A and − 10.47 ± 11.93 for Group B. Group B with a longer hospitalization period showed a higher, albeit insignificant, decrease compared to Group A (p = 0.122).

The values of NRS Ⅱ − Ⅰ were − 0.69 ± 0.74 for Group A and − 1.21 ± 0.70 for Group B. Group B showed significantly increased (p < 0.0001) clinical improvement compared with Group A (Table 9).

Table 7. Distribution of Lumbar Intervertebral Disc Herniation Types.

Disc herniation type	Number of patients (%)	
	Group A	Group B
Normal	5 (35.7)	10 (29.4)
≥ Bulging disc ~ < Protrusion	3 (21.4)	8 (23.5)
≥ Protrusion ~ < Extrusion	4 (28.6)	14 (41.2)
≥ Extrusion ~ < Sequestration	2 (14.3)	0 (0.0)
≥ Sequestration	0 (0.0)	2 (5.9)
Total	14	34

Group A, hospitalization period 1–7 days; Group B, hospitalization period 8–14 days.

Table 8. EQ5D, ODI, and NRS Scores of the Groups.

	Group A (n = 95)	Group B (n = 75)	$p^{\ddagger}$
EQ5D Ⅰ	0.79 ± 0.12	0.72 ± 0.17	0.005*
EQ5D Ⅱ	0.82 ± 0.10	0.80 ± 0.11	0.380
$p^{\dagger}$	0.008*	< 0.0001*	
ODI Ⅰ	32.78 ± 16.29	38.86 ± 16.89	0.018*
ODI Ⅱ	25.30 ± 14.37	28.40 ± 15.16	0.175
$p^{\dagger}$	< 0.0001*	< 0.0001*	
NRS Ⅰ	4.89 ± 0.69	4.92 ± 0.69	0.813
NRS Ⅱ	4.20 ± 0.95	3.71 ± 0.96	0.001*
$p^{\dagger}$	< 0.0001*	< 0.0001*	

Data are presented as mean ± SD.
* p < 0.05.
† They were calculated by a paired t test.
‡ They were calculated by independent sample t test.
Group A, hospitalization period 1–7 days; Group B, hospitalization period 8–14 days; EQ5D Ⅰ, quality of life at admission; EQ5D Ⅱ, quality of life at discharge; ODI Ⅰ, Oswestry disability index at admission; ODI Ⅱ, Oswestry disability index at discharge; NRS Ⅰ, numerical rating scale at admission; NRS Ⅱ, numerical rating scale at discharge.

Table 9. The Between-group Variations in EQ5D, ODI, and NRS Scores.

	Group A (n = 95)	Group B (n = 75)	$p^{\dagger}$
EQ5D Ⅱ − Ⅰ	0.029 ± 0.10	0.081 ± 0.16	0.018*
ODI Ⅱ − Ⅰ	−7.48 ± 12.84	−10.47 ± 11.93	0.122
NRS Ⅱ − Ⅰ	−0.69 ± 0.74	−1.21 ± 0.70	< 0.0001*

Data are presented as mean ± SD.
* p < 0.05.
† They were calculated by independent-sample t-test.
Group A, hospitalization period 1–7 days; Group B, hospitalization period 8–14 days; EQ5D Ⅱ − Ⅰ, the change of quality of life between at admission and discharge; ODI Ⅱ − Ⅰ, the change of Oswestry disability index between at admission and discharge; NRS Ⅱ − Ⅰ, the change of numerical rating scale between at admission and discharge.

Discussion

Compared to other vertebrae, the load-bearing position of the lumbar vertebrae at the base of the spinal column, predisposes these vertebrae to a higher tension and pressure, but nevertheless, they have the capacity for a wide range of motion and muscle development. Damage or degeneration in the lumbar vertebrae results in lower back pain, a common, painful condition [15]. The complexity of lower back pain, and the variety of causes and symptoms, leaves us without a definitive solution to this problem.

In a study by Park et al [16], local pain was present in 93% of the individuals who suffered a RTA, with neck pain (68.52%) and lower back pain (49.63%) the most frequently reported areas of pain.

According to statistical analysis of RTAs, the percentage of minor injuries at the waist is high, second only to the neck, thus, management of these injuries is important [1]. It has been reported that traditional Korean medicine has been beneficial in these patients with lower back pain [17]; 62.9% of patients opted for this therapy after being treated with western medicine because the therapeutic effect had been minimal [18]. The number of patients opting for traditional Korean medicine as their primary care is gradually increasing [18].

Traditional Korean medicine treatment includes acupuncture, herbal medicine, chuna, and other therapies. In recent years, herbal acupuncture has been developed for a more effective treatment. For the sequelae caused by a RTA, Kim et al [19] performed bee

venom acupuncture twice a week for 4 weeks on patients who had received 3 months of conservative orthopedic treatment with minimal effect. They reported significant beneficial changes in VAS and SF-36 scores. Park et al [20] reported that chuna treatment was effective at increasing cervical ROM (range of motion) and pain relief. Also, Park et al [21] reported that chuna treatment was effective in pain reduction in patients who had suffered whiplash injuries.

A greater decrease in VAS scores was reported by Lee et al [22] in patients treated with "Eo-Hyeol Bang" acupuncture than in those treated with general acupuncture for lower back pain due to RTAs. Kim et al [5] reported that both herbal acupuncture and chuna treatment were effective on patients suffering with lower back pain sustained in RTAs and that herbal acupuncture was more effective than chuna treatment in the initial 2 weeks, whereas chuna treatment was more effective than herbal acupuncture after 4 weeks of treatment. Kim et al [6] reported that both Shinbaro herbal acupuncture and Jakyakgamcho decoction herbal acupuncture had a significant effect on resolving the pain and disability associated with lower back pain sustained in RTAs.

The effectiveness of acupuncture, herbal acupuncture, and chuna treatment, for patients with lower back pain sustained in RTAs has been reported [5, 6, 7, 22]. However, little is known about the effect of length of treatment in hospital on a patient's outcome.

In this study, the length of hospitalization period was examined to determine whether this was a factor in aiding recovery in patients with lower back pain sustained in RTAs. The EQ5D, ODI, and NRS scores were measured at admission and discharge.

The proportion of women in Group B, which had a longer hospitalization period, was higher than that in Group A. It might be considered that women are more susceptible to trauma and the aftereffects of RTAs than men [23] however, this needs further investigation.

All 170 patients complained of 1 or more symptoms with the exception of lower back pain; 159 patients complained of neck pain, suggesting that lower back pain and neck pain are highly related to each other in RTAs. In addition, Group B patients with a relatively long hospital stay had statistically significantly higher number of additional symptoms, suggesting that the higher the number of pain sites, the longer the length of hospitalization.

In this study, 110 patients (64.7%) had radiographic abnormalities in the lumbar spine, and 22 of 48 patients had protrusion~sequestration abnormalities in the lumbar intervertebral disc as detected by MRI. Disc space narrowing, degenerative spondylosis, disc herniation, and other conditions complicate treatment of lower back pain in RTAs. Future systematic and large scale studies should focus on the relationship between treatment duration and radiological findings in patients with lower back pain sustained in RTAs.

EQ5D values of groups A and B were both significantly increased, and ODI and NRS were significantly decreased in both groups ($p < 0.0001$) following treatment. Taken together, it was found that treatment with traditional Korean medicine for lower back pain sustained in RTAs, improved the quality of life and reduced pain regardless of the length of hospital stay.

Scores of EQ5D Ⅰ were statistically significantly lower in Group B than in Group A, and scores of ODI Ⅰ was statistically higher in Group B than in Group A. But there was no significant difference in scores of NRS Ⅰ between the 2 groups. This suggests that even if the degree of pain is similar at admission, the lower the quality of life and the greater the disability caused by lower back pain, the more likely it is that patients are hospitalized for longer periods in RTAs.

There was no statistical difference between Group A and Group B EQ5D Ⅱ and ODI Ⅱ scores. In contrast, there was a statistical difference between groups A and B for NRS Ⅱ scores. This shows that longer (8-14 days) hospitalization may be more effective in reducing pain than a shorter period (< 7 days) of hospitalization. However, since it is not the result of comparison under the same conditions, it is necessary to compare the results at the time when the same period elapses in another study later.

Comparing the EQ5D Ⅱ − Ⅰ, ODI Ⅱ − Ⅰ, and NRS Ⅱ − Ⅰ scores between Groups A and B, Group B showed significantly increased of EQ5D and decreased NRS scores compared with Group A ($p < 0.05$). Group B also showed decreased ODI score than Group A; however, the difference was not statistically significant. It might be considered that additional length of hospitalization has a more positive effect on improving quality of life and reducing pain rather than improving patients' actual functioning and disability. Patients hospitalized for 8-14 days showed greater resolution of clinical symptoms at discharge than those who received short hospitalization treatments lasting <7 days. In a study of Lee et al [24], patients treated for 8–14 days showed greater improvement than those treated for 1–7 days. This shows the possibility that a longer inpatient treatment lasting 8-14 days might be more effective. However, more systematic and large-scale studies are needed to ascertain the effects of other variables.

This study has several limitations. The data on the outcome of outpatient treatment and outpatient follow-up after discharge were not available, and there was no consistent treatment intervention, and all patients did not receive the same treatment. In the future, more objective research will be needed to study traditional Korean medicine treatment of the sequelae of RTA, and this may enable the establishment of more robust data to enable the expansion of automobile insurance coverages.

Conclusion

This study suggests that pain control in lower back injury that was sustained in a RTA, may be more effectively achieved in patients who receive 8-14 days of hospitalization compared with those who receive < 7 days of hospitalization. In the future, more systematic and large-scale studies are needed to ascertain the effects of other variables.

Conflicts of Interest

All authors declare to have no conflicts of interest.

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