AUDIT

Use of acupuncture for pain management in an academic Korean medicine hospital: a retrospective review of electronic medical records

Kun Hyung Kim, Yu Ri Kim, Seung Hee Noh, Kyung Won Kang, Jae Kyu Kim, Gi Young Yang, Byung Ryul Lee

ABSTRACT

Objective This study aimed to identify the descriptive characteristics of patients with pain conditions who visited an academic medical centre for traditional Korean medicine (TKM).

Methods This work was a retrospective review of the electronic medical records of patients who received at least one session of acupuncture for pain management from March 2010 to February 2012 in the Korean medical hospital of Pusan National University. Demographic characteristics and data on patient conditions, treatment interventions received and costs associated with acupuncture treatments were analysed.

Results We identified a total of 2167 patients, including 2105 outpatients and 237 inpatients. The mean age (SD) of the patients was 52.0 (15.3) years, and approximately two-thirds of the patients were women (64.0%). The average number of acupuncture treatment sessions was 8.0 (6.6 for outpatients and 14.5 for inpatients). The most treated conditions were low back pain (47.4%), stimulation, herbal medicine (44.2%), neck pain (23.9%) and shoulder pain (17.5%). Interventions included needle acupuncture with manual (52.6%) or electrical (47.4%) stimulation, herbal medicine (44.2%), cupping (21.2%) and moxibustion (3.5%). Over one-third of outpatients (33.5%) received at least six sessions of acupuncture. The median total cost of each outpatient and inpatient care per person was 169 604 and 1 001 707 Korean Won (approximately £98 and £577), respectively.

Conclusions Acupuncture was primarily used for the treatment of low back, neck and shoulder pain with a wide range of related interventions at an academic medical centre for traditional Korean medicine. These data reflect real clinical practice and should inform the design of future prospective clinical research of acupuncture.

BACKGROUND

Acupuncture is practised worldwide for the treatment of various health conditions, including chronic pain, psychological conditions and cancer care. In 2001, it was estimated that 7% of the adult population in the UK had visited an acupuncture practitioner within their lifetime, which had increased by 11.2% in a national survey in 2005. Acupuncture is now formally recommended for management of persistent non-specific low back pain and prophylactic treatment of chronic tension-type headache by the National Institute for Health and Clinical Excellence (NICE) in the UK. Previous research revealed that in countries with diverse sociocultural backgrounds, a significant proportion of acupuncture consultation was for pain management. A recent survey of practitioners in European countries and China showed that pain was the most frequently reported and commonly treated condition by EU acupuncturists, whereas this was neurological conditions (mainly stroke) for Chinese practitioners, possibly reflecting different patterns and research interests in different contexts of the practice. Although acupuncture is also regularly employed in Korea, little is known about the current pattern of clinical practice in the Korean population. According to National Health Insurance data from Korea, pain was the major reason for annual acupuncture consultation. We therefore focused on the use of acupuncture for pain management and aimed to provide information on the characteristics of patients who sought acupuncture.
treatment for their pain conditions in an academic hospital dedicated to the practice of traditional Korean medicine (TKM).

**METHODS**

**Study design**

This study was a retrospective review of the electronic medical records (EMRs) of patients who had received at least one session of acupuncture for pain management, regardless of its origin or severity, in the Department of Acupuncture and Moxibustion Medicine (a major department of pain management at the TKM hospital of Pusan National University) from March 2010 to February 2012. The hospital is situated in Yangsan, which had a population of 260,000 people in 2012. It was established by the Korean Government, and the provision of TKM practices has been in place since 2010. Facilities include 7 TKM departments, 21 outpatient clinics and 2 inpatient wards, with a total of 250 inpatient beds. Dedicated personnel in 2011 were 35 TKM doctors, 23 nurses, 2 TKM pharmacists and 24 administrative staff members. In the observation periods of this study, the total numbers of outpatients, outpatient visits and inpatient admissions were 9013, 63,785 and 1474, respectively.

**Data collection**

Information that existed in automatically extractable form (eg, age, gender, total number of outpatients and inpatients, total number of outpatient visits and admission days for inpatients, the name and frequency of primary diagnosis, frequencies of received acupuncture techniques and other ancillary interventions) in EMRs was collected in a predefined Excel spreadsheet (Microsoft; Redmond, Washington, USA). Information that had to be extracted manually by checking doctors’ full descriptions (eg, symptom duration, comorbid disease, current medication, treatment response and occurrence of adverse events) was not collected because of limited research resources.

Patient records were selected based on the International Statistical Classification of Diseases and Related Health Problems, 10th revision (ICD-10). The TKM doctors made primary diagnoses based on the patient’s history, clinical examination and tracking of previously diagnosed diseases. Only the primary diagnosis that was most related to the patient’s primary condition for acupuncture consultation was selected for analysis in patients who received more than one diagnosis. Primary diagnoses were operationally classified into 14 categories of major issues based on the site of pain symptoms to enable a more clinically relevant analysis and interpretation of the data.

The total costs of outpatient and inpatient management per patient were also measured. Separate data management staff who were not involved in this study extracted all of the data from the EMRs database. All extracted data were provided to the investigator in an anonymous format.

**Context of clinical practice**

TKM doctors could independently treat patients, although consultation with Western medicine doctors for further assessments (eg, radiological imaging or blood tests) or collaborative care of the patient (eg, prescription of analgesics) was also available. Patients who could self-ambulate were considered suitable for outpatient management. Examples of eligibility criteria for inpatient management are presented in box 1. Inpatient management consisted of the intensive application of diverse TKM interventions, which were often not available because of the time constraints of outpatient care settings or interventions that needed careful observation to avoid adverse events, such as moxibustion. The government-paid costs were reimbursed for inpatient TKM management, except for some non-covered interventions (eg, herbal decoctions and bee venom acupuncture), for up to 2 weeks in most cases of pain symptoms by the Health Insurance Review and Assessment Service (an official government agency that evaluates the appropriateness of healthcare practices). Hence, duration of hospital admission was 2 weeks or less in most inpatients. Details of acupuncture treatments are presented in accordance with the ‘Standards for Reporting Interventions in Clinical Trials of Acupuncture’ (STRICTA) 2010 checklist, given in online supplementary appendix 1.

**Cost analysis**

Various types of acupuncture and related interventions (eg, needle acupuncture, electroacupuncture, auricular

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**Box 1: Examples of inclusion criteria for inpatient care**

**Eligible:**
1. Worsening symptoms that significantly interfere with daily function.
2. Symptoms resistant to a period of outpatient management (usually 4–6 weeks).
3. Willingness to receive intensive inpatient care.

**Ineligible:**
1. Progressive neurological symptoms that needed immediate transfer to a medical practitioner of Western medicine.
2. Unstable vital signs.
3. Acute injuries suspected as being fractures of skeletal systems.
4. Poorly controlled psychiatric disorders (eg, schizophrenia, severe depressive disorder or alcohol/drug addiction) that may need specialist care in a closed ward.
acupuncture, cupping and moxibustion) and a limited number of herbal extracts were reimbursed by government-paid insurance in Korea.\textsuperscript{16} The total costs in our study included government-paid insurance reimbursements and patient-paid expenses for outpatient and inpatient care per patient, and these data were collected from the EMRs.

**Subgroup analysis**

Subgroup analyses identified differences in patient characteristics between patients who had received at least six sessions of acupuncture and patients who received fewer than six sessions in outpatient clinics. Six sessions was used as a cut-off value for the subgroup analysis, based on a systematic review that identified more favourable clinical outcomes in patients who received at least six sessions of acupuncture compared to patients with less than six sessions in four large clinical trials of acupuncture for chronic pain conditions.\textsuperscript{17}

**Ethical considerations**

An institutional review board at the Pusan National University Korean Medicine Hospital approved this study (no. 14-2012-001). This study did not require the informed consent of individual patients for the analysis because the electronic records in this study were used anonymously.

**Statistical analysis**

A descriptive statistical analysis was conducted. Continuous data are presented as the means and SDs, and categorical data are presented as a percentage and frequency. Continuous data with an asymmetrical distribution are presented as the medians and a percentile range (25th and 75th percentiles). SAS V9.1.2 software (SAS Institute, Cary, North Carolina, USA) was used for all statistical analyses. A separate biomedical statistician who was not involved in the clinical practice performed all statistical analyses.

**RESULTS**

A total of 2167 patients, including 2105 outpatients and 237 inpatients (23% of total outpatient and 16% of total inpatient admissions, respectively) (175 patients received outpatient and inpatient management during the analysis period), with bodily pain as a major issue received acupuncture and related traditional treatments. The mean patient age was 52.0 years, and 64% of the patients were women. The average number of acupuncture treatments per patient was 8.0 sessions. A total of 10.2% of the patients, primarily inpatients, were covered by private insurance for TKM (table 1). More than half of the patients were treated for low back and neck pain (34.5%). Shoulder pain (17.5%) and hip/knee pain (7.3%) were the next most common reasons for acupuncture treatments (table 2). The ICD-10 codes of the primary diagnoses are provided in online supplementary appendix 2.

Various acupuncture techniques and related interventions were used. A total of 16 965 acupuncture treatment sessions were provided in 2167 patients. A total of 47.4% of the patients received electroacupuncture, and the other patients received manual acupuncture. Herbal medicine was used in approximately half of the total patients (44.2%) and in the majority of inpatients (88.6%). Dry cupping (ie, cupping treatment without bloodletting) and wet cupping (ie, cupping treatment with bloodletting) were the second and third most frequently delivered acupuncture-related non-pharmacological interventions. Indirect moxibustion was used in 25% of inpatients, but this treatment was only used in a small number of outpatients. Inpatients generally received more intensive ancillary treatments. Treatment details are provided in table 3. Results of the subgroup analysis, showing considerable variance in terms of treatment sessions between two outpatient subgroups (patients who have received at least six sessions or not), are provided in online supplementary appendix 3.

The median total cost for outpatient and inpatient care per patient was 169 604 and 1 001 707 Korean Won (approximately £98 and £577), respectively.

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Demographic characteristics of patients treated with acupuncture</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total</strong></td>
<td><strong>Outpatients</strong></td>
</tr>
<tr>
<td>No. of patients</td>
<td>2167</td>
</tr>
<tr>
<td>Age</td>
<td>52.0 (15.4)</td>
</tr>
<tr>
<td>No. of women</td>
<td>1387 (64.0%)</td>
</tr>
<tr>
<td>Average no. of treatments per patient</td>
<td>8.0 (12.0)</td>
</tr>
<tr>
<td>No. covered by private insurance</td>
<td>222 (10.2%)</td>
</tr>
</tbody>
</table>

Values are provided as the mean (SD) or n (%) where appropriate. A total of 175 patients received outpatient and inpatient care and, therefore, the total number of patients may not match with the sum of the number of outpatients and inpatients.

* More than one daily session of acupuncture treatment was often provided for inpatients in our hospital for intensive pain management. Nevertheless, the number of admission days was used as the number of provided treatment sessions for inpatients since the actual session of acupuncture was not automatically extractable from the electronic medical records (EMRs).
DISCUSSION
This study is the first descriptive report using EMRs from an actual clinical practice in an academic medical hospital for TKM in South Korea. This study demonstrated that middle-aged women were the primary population in our hospital in the most recent 2-year period. Most of the treated symptoms were low back and neck pain, which is consistent with previous studies that revealed a high use of acupuncture for the management of these conditions. 

Herbal medicine prescriptions and dry cupping were the two most frequently delivered ancillary interventions. Approximately one-third of the total expenditure for outpatient or inpatient care was reimbursed by the government, which suggests a lower economic barrier to the access of acupuncture treatment than other countries that do not provide government reimbursement.

In Korea, a high proportion of TKM doctors use electroacupuncture (78.2%),18 wet cupping (90.8%),19–20 auricular acupuncture (66.0%)21 and moxibustion (66.9%).22 One survey demonstrated that 1817 (96.1%) of 2001 TKM doctors used dry-cupping treatments in their practice.23 Our study complements the results of previous practitioner surveys that support the prevalence of electrostimulation and other non-needling additional interventions in Korea. The differences between our analysis and previous studies may be responsible for the specific study context and methodology (ie, practitioner survey vs review of medical records) and sample variation.

Additional treatment related to acupuncture was one of the recommended reporting items in a Consolidated Standards of Reporting Trials (CONSORT) extension version for acupuncture (ie, STRICTA).24 The observed complexity of treatments in our study supports the importance of the identification and reporting of ancillary interventions in the context of pragmatic acupuncture research, and these results may help inform the design of future pragmatic clinical studies that may require measurements of concomitant treatments based on TKM theory.

About half of the inpatients had private medical insurance that mostly covered their costs for inpatient admission, whereas less than 5% of outpatients were covered by private insurance. This might have affected patients’ attitudes to the selection of a different type of treatment (eg, outpatient or inpatient care) and their responses to treatments received, although no data on such differences are available in this study.

Some interventions, such as herbal medicine, dry cupping and indirect moxibustion, were more frequently used in inpatient management. A high use of herbal medicine was observed in inpatient care, which suggests that herbal medicine may be regarded as an essential element of treatment in inpatient management. Another possible reason for the higher use of herbal medicine is that most herbal medicine is not covered by government insurance; thus, it was more affordable for inpatients that had private medical insurance, which does cover the cost of herbal medicine. Dry cupping for back-Shu points or local pain areas as well as indirect moxibustion on the CV meridian (especially at CV4) were also commonly added in routine management of inpatient care. These interventions were fully covered by government insurance, but still had higher proportion of use in inpatient care. These ancillary interventions were practised by senior TKM doctors in outpatient settings, and by trainee TKM doctors in inpatient settings. Limited resources (eg, lack of additional practitioners and time constraints for concomitant TKM

Table 2 Number of patients in 14 symptom classifications

<table>
<thead>
<tr>
<th>Symptom classification</th>
<th>Total (N=2167)</th>
<th>Outpatients (N=2105)</th>
<th>Inpatients (N=237)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spinal pain (lumbar)</td>
<td>661 (30.5%)</td>
<td>626 (29.7%)</td>
<td>110 (46.4%)</td>
</tr>
<tr>
<td>Spinal pain (neck)</td>
<td>520 (24.0%)</td>
<td>513 (24.4%)</td>
<td>45 (19.0%)</td>
</tr>
<tr>
<td>Shoulder pain</td>
<td>360 (17.5%)</td>
<td>374 (17.6%)</td>
<td>36 (15.6%)</td>
</tr>
<tr>
<td>Hip/knee pain</td>
<td>315 (14.6%)</td>
<td>313 (15.0%)</td>
<td>2 (0.8%)</td>
</tr>
<tr>
<td>Spinal pain (thoracic/upper back)</td>
<td>36 (1.7%)</td>
<td>35 (1.7%)</td>
<td>1 (0.4%)</td>
</tr>
<tr>
<td>Ankle/foot pain</td>
<td>23 (1.1%)</td>
<td>23 (1.1%)</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>Upper extremity pain (excluding shoulder)</td>
<td>27 (1.3%)</td>
<td>27 (1.3%)</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>Non-joint lower extremity pain</td>
<td>23 (1.1%)</td>
<td>23 (1.1%)</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>Multiple site pain</td>
<td>30 (1.4%)</td>
<td>29 (1.4%)</td>
<td>1 (0.4%)</td>
</tr>
<tr>
<td>Non-joint upper extremity pain</td>
<td>20 (0.9%)</td>
<td>20 (0.9%)</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>Pelvic pain</td>
<td>12 (0.6%)</td>
<td>12 (0.6%)</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>Headache</td>
<td>7 (0.3%)</td>
<td>7 (0.3%)</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>Neuropathic pain</td>
<td>7 (0.3%)</td>
<td>7 (0.3%)</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>27 (1.3%)</td>
<td>27 (1.3%)</td>
<td>3 (1.3%)</td>
</tr>
</tbody>
</table>

Values are provided as n (%).
interventions in busy outpatient clinics) might be a possible explanation of the lower use of concomitant treatments in outpatient settings. The preference of patients and practitioners for particular TKM interventions should not be excluded as possible explanation of this observed result although the lack of data does not permit this inference. Whether and to what degree the medical insurance system covers TKM, available resources for treatments, preferences for certain treatments can contribute to clinical heterogeneity all warrant further investigation to understand and explain current diverse patterns in clinical practice.

Two recent systematic reviews highlighted the cost effectiveness of acupuncture treatment for common chronic pain conditions and demonstrated that the cost per quality-adjusted life year was below typical thresholds for the willingness to pay.\textsuperscript{25,26} However, most randomised controlled trials (RCTs) included in these systematic reviews were performed in European countries and focused on the additional use of acupuncture for general care rather than the combined use of acupuncture with other traditional treatments, similar to our observations. No information is available on the cost effectiveness of acupuncture in combination with various traditional interventions, which is practiced in real clinical situations in Korea, for any pain condition. Our observations of the average costs for outpatient and inpatient care provide an example of the gross expenditures for the treatment of pain conditions per patient in an academic TKM hospital (eg, £98 for an average of eight sessions of acupuncture). Acceptable cost utility (approximately €35 per each acupuncture session) was identified in the German healthcare context, although societal perspective adopted in German economic analyses does not permit direct application of those results into different countries.\textsuperscript{27} Lack of comparison of costs of acupuncture with those of conventional cares for pain management, no information on indirect costs for acupuncture consultation and on treatment results as well as bias related to the retrospective nature of this study are major obstacles to the meaningful interpretation of cost results in our study, and should be tackled in any future cost analysis.

This study has a number of limitations. First, only primary diagnoses were extracted regardless of the existence of other diagnoses that may have interacted with a patient’s pain conditions. Moreover, the number of patients who reported pain at more than one site may have been underestimated during the symptom classification process. Multiple comorbidities and multiple site pains were not uncommon in patients with pain conditions.\textsuperscript{28} However, only the primary diagnosis was extracted, which may have biased the results. Second, a range of different diagnoses was merged into the most likely symptom classification. Therefore, our analysis produced an overall

<table>
<thead>
<tr>
<th>Total (N=2167)</th>
<th>Outpatients (N=2105)</th>
<th>Inpatients (N=237)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total sessions</td>
<td>Mean sessions per patient</td>
<td>No. of patients</td>
</tr>
<tr>
<td>Manual acupuncture</td>
<td>8920</td>
<td>1140 (52.6%)</td>
</tr>
<tr>
<td>Electroacupuncture</td>
<td>8045</td>
<td>1027 (47.4%)</td>
</tr>
<tr>
<td>Herbal medicine</td>
<td>1030</td>
<td>958 (44.2%)</td>
</tr>
<tr>
<td>Dry cupping</td>
<td>2170</td>
<td>330 (15.2%)</td>
</tr>
<tr>
<td>Wet cupping</td>
<td>656</td>
<td>150 (6.9%)</td>
</tr>
<tr>
<td>Indirect moxibustion</td>
<td>258</td>
<td>94 (4.4%)</td>
</tr>
<tr>
<td>Direct moxibustion</td>
<td>134</td>
<td>15 (0.7%)</td>
</tr>
<tr>
<td>Ear acupuncture</td>
<td>15</td>
<td>2 (0.1%)</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>37</td>
<td>11 (0.8%)</td>
</tr>
</tbody>
</table>

Values are presented as n (%) or mean (SD). Patients may have received multiple treatment interventions during each session. Therefore, the total number of patients is not equal to the total number of patients who received each treatment.

Table 3. Total number and distribution of treatments received

\textsuperscript{5} View the complete reference list online.

picture of symptom distribution in pain conditions rather than an exact medical diagnosis. Third, our analyses were based on retrospective medical records at an academic medical hospital for TKM in southeastern Korea. Therefore, the results of this study have limited generalisability and may not fully represent the current status of the clinical practice of TKM. Fourth, a small number of practitioners provided treatments, which limits the representativeness of our results on the use of various techniques. Other practitioners may prefer different treatments that were not observed in our study. We also could not extract the exact acupuncture points and techniques or the use of other ancillary treatments because these data were not extractable from the EMRs and the investigation of individual medical records by hand was too exhaustive. Therefore, we do not know the detailed clinical context of treatment delivery, and this lack of data is a significant limitation of our study. Finally, other information related to patient characteristics, such as pain duration or symptom severity, could not be collected due to time constraints and limited resources. Therefore, only descriptive data were available.

IMPLICATIONS FOR FUTURE RESEARCH
The use of multiple TKM interventions was identified for pain management in a TKM-dedicated hospital in South Korea. A range of interventions should be considered as possible ancillary treatments when designing pragmatic clinical trials or collecting the treatment histories of patients who have previously experienced TKM intervention in research settings. For preparing future audit or prospective observational studies using patients’ electronic records, the development of predefined data extraction sheets to extract automatically as much relevant clinical information as possible is needed. More clinical characteristics of patients, such as patients’ history, beliefs, expectations and preferences for acupuncture and other TKM interventions, as well as responses to treatments should be collected to understand and identify any potentially influencing factors in the current status of acupuncture practice in Korea. Sets of clinical outcomes for pain conditions (mainly in the lower back, neck, shoulder and knee) have been routinely collected in our department. Thus, we expect that future observational studies at Pusan National University could overcome some limitations of this study.

CONCLUSIONS
The majority of patients received acupuncture for their low back and neck pain. Acupuncture and ancillary treatments were frequently used in clinical settings. The clinical characteristics observed in this study may inform future clinical studies about the current status of practice and be reflected into the design of future pragmatic acupuncture trials.

Summary points
- We audited 2167 patients treated with acupuncture or related techniques in a Korean hospital.
- 70% were treated for back, neck or shoulder pain.
- Manual and electrical stimulation were used equally often.
- Patients paid about two thirds of the cost.

Contributors
KHK conceived and designed the study. KHK, YRK and SHN transformed the data from electronic medical records. KWK conducted the statistical analysis as a separate biostatistician. All authors participated in the discussion and the critical revisions of the initial article. KHK drafted the report and wrote the final manuscript.

Funding
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Competing interests
None.

Ethics approval
Institutional review board in Korean Medicine Hospital, Pusan National University.

Provenance and review
Not commissioned; externally peer reviewed.

Data sharing statement
The anonymised descriptive data spreadsheet (as an excel file) is available to the reviewers with no conflict of interest for academic purpose only. The data can be requested from the contact author.

<table>
<thead>
<tr>
<th>Table 4</th>
<th>Costs for the entire period of outpatient and inpatient care per patient</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Median costs per patient</strong></td>
<td><strong>Outpatients</strong></td>
</tr>
<tr>
<td>Total expenditure</td>
<td>169604 KRW (56926, 407993) (£98, IQR 33, 235)</td>
</tr>
<tr>
<td>Government-paid cost</td>
<td>43149 KRW (19741, 95269) (£25, IQR 12, 55)</td>
</tr>
<tr>
<td>Patient-paid cost</td>
<td>88800 KRW (27700, 313116) (£50, IQR 16, 180)</td>
</tr>
</tbody>
</table>

Data are presented as the means and percentile ranges (the 25th and 75th percentiles). Exchange rate assumes that £1 is worth 1,737 KRW. KRW, Korean Won.
REFERENCES


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