

Korean hand therapy for tonsillectomy pain in children



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ARTICLE INFO

Article history:

Received 10 March 2015
Received in revised form 6 May 2015
Accepted 20 May 2015
Available online 28 May 2015

Keywords:

Tonsillectomy
Pain
Children
Korean hand therapy
Acupuncture
Codeine

ABSTRACT

Objectives: Severe throat pain can result from tonsillectomy and last up to 10 days in children. Codeine has recently been banned by the FDA in light of a recently recognized risk of death in these patients. Acupuncture has previously been associated with decreased pain in children after tonsillectomy. However, about 1 in 5 patients will refuse traditional acupuncture because of fear of needles. We explored Korean Hand Therapy (KHT), an acupuncture technique which does not involve needles, to see if this would also be associated with pain relief and be more widely accepted by children.

Methods: This was a retrospective review of children who underwent tonsillectomy over a 4-month window. No narcotics were prescribed after surgery. Patients who wanted help with pain relief were offered KHT. Perceived pain level was assessed before and after the KHT treatment. Following the 10-day recovery for tonsillectomy, patients or their parents were queried as to how long the pain relief from the KHT intervention was perceived to last.

Results: Fifty-six children underwent tonsillectomy; 29 of these patients (1–14 years) presented for pain relief after tonsillectomy and received KHT. 100% of patients (29 of 29) who were offered KHT accepted the intervention. The mean reported pain level before KHT was 5.03 (SD = 2.69) out of 10. This fell to 3.06 (SD = 3.15) after KHT. Statistical analyses supported the general conclusion that pain reports decline after KHT in the sampled population. 15 patients who received KHT – or their parents – provided a post-recovery report for how long they believed the KHT intervention lasted. The mean duration of perceived KHT benefit was 78.20 h, though the standard deviation was large (64.38 h). With the exception of one child reporting a slight increase in pain, no adverse effects were associated with KHT.

Conclusions: The data tentatively suggest KHT is associated with decreases in perceived pain after tonsillectomy and is widely accepted by children. These data – combined with the cost effectiveness, safety and ease of administering KHT – suggest that further studies exploring the effectiveness of KHT for pain relief after tonsillectomy are merited.

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1. Background

Tonsillectomy is one of the most frequently performed surgeries done worldwide; at least half a million tonsillectomies are done every year in the United States alone [2]. This surgery often results in severe throat pain, which can last up to 10 days [3]. Codeine elixir has long been prescribed for pain relief. However, the Food and Drug Administration recently banned this because of a recently recognized risk of death [4]. Young children may become dehydrated if they suffer significant throat pain and require intravenous fluids in an emergency department.

Acupuncture in general has been shown to reduce pain [5], has a low risk of complications [6], can be done quickly, and has minimal cost (about 11 cents per needle, with many treatments requiring five or less needles). In our previous study, acupuncture was associated with decreased perceived pain in children after tonsillectomy [1]. However, a significant portion of these patients (9 of 42 or about 21%) who presented for pain relief after tonsillectomy refused acupuncture because of their fear of needles.

Acupuncture is thousands of years old, but Korean Hand Therapy (KHT) was developed in the 1970s [7]. KHT is an acupuncture technique based upon the principles of traditional Chinese acupuncture and can be performed without needles using small aluminum discs applied with tape on the hands (Fig. 1). KHT is also inexpensive (about 10 cents per disc, with the current treatment using six stickers per patient) and comes with the added benefit that patients do not need to disrobe—a possible requirement of

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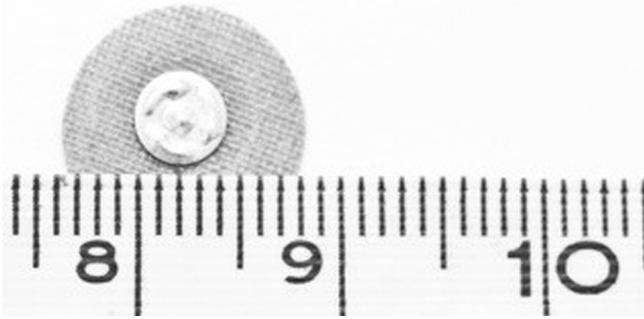


Fig. 1. Korean Hand Therapy can be done with small (4 mm diameter) aluminum discs on an adhesive backing.

traditional acupuncture and a distinct source of discomfort for most children in a medical setting.

There is already some preliminary evidence that KHT is effective at treating common sources of post-operative discomfort. For instance, KHT compared favorably with traditional acupuncture at reducing post-operative nausea and vomiting in a randomized, controlled trial of patients undergoing abdominal hysterectomy [8]. This is especially striking given that the most recent Cochrane review on traditional acupuncture suggested that it could be as effective as medication in preventing postoperative nausea and vomiting in similar circumstances [9].

We wanted to see if KHT could be applied in a novel post-operative context – following tonsillectomy – to give young patients meaningful relief from another common source of post-operative discomfort: pain. At the same time, we wanted to see if KHT would be more widely accepted by young patients than traditional acupuncture was in our previous study [1].

2. Methods

2.1. Participants

The author performed all surgeries and KHT techniques. All surgeries were performed at Rady Children's Hospital San Diego. KHT was offered and performed – free of charge – at outpatient facilities in El Centro or Encinitas, CA during a standard post-operative visit.

The study is a retrospective review of pediatric tonsillectomy patients. The patient pool was drawn from the author's practice and included all patients less than 18 years of age who underwent tonsillectomy during a 4-month period beginning June 10, 2014 and ending September 30, 2014. The Institutional Review Boards of UC San Diego granted approval for this retrospective chart review.

Fifty-six children underwent tonsillectomy during the study period. In addition, all 56 patients also had adenoidectomy and 7 also had bilateral myringotomy and tube insertion.

There were no intra-operative complications and no patient had postoperative oropharyngeal bleeding.

Not all 56 patients were considered in the current review. Only patients who presented for pain relief within the traditional 10-day tonsillectomy recovery window are included in the final data analysis. It was not possible to collect pain data for patients who did not participate in the follow-up visit at all and “after” reports could not be collected for patients who participated in the visit but did not receive KHT.

Of the 56 patients who received surgery, 35 presented for pain relief during the first 10 days after surgery. Five rated their pain score as 0 and were not offered KHT. The rest, 30 patients, were all offered KHT. One of these patients turned 18 during the study and so exceeded the study age limit.

The final study sample consisted of 29 patients (12 females, 17 males) who agreed to have KHT. The mean age of this sample was 6.07 years (SD = 2.88 years, range = 1–14 years). Pain reports were collected from these patients or their parents immediately before and after the intervention.

Nineteen of these patients or their parents provided an additional report after the 10-day recovery window, estimating how long the benefits of the acupuncture intervention lasted. Interestingly, four of these patients reported no change in pain score at the time of the intervention but still provided the author with an estimate of benefit duration. When the author inquired further with these four patients, they stated that they experienced pain relief after returning home and believed it was due to the intervention. Although the possibility of delayed benefit is interesting, the reports of these patients were excluded on the chance that other interventions (e.g., parent administration of alternative pain relief) influenced the reports. The final subsample estimating benefit duration was 15 patients (6 females, 9 males) who reported a change in pain score at the time of the KHT intervention. The mean age of this subsample was 5.87 years (SD = 2.95 years, range = 1 to 11 years).

2.2. Tonsillectomy

Patients received a total of 2–3 cc of 1% lidocaine with 1:100,000 epinephrine injected into both tonsil beds before the start of surgery. An anesthetic technique using nitrous oxide and sevoflurane was used for all patients. Tonsillectomy was done using monopolar electrocautery set at 24 W and all patients were given intravenous dexamethasone 0.5 mg/kg up to a maximum of 12 mg. A monopolar suction cautery hand piece set at the same wattage was used for adenoid removals.

After the surgery, parents were advised that their children could eat or drink whatever they wanted, noting that fluid take should be encouraged to reduce the risk of dehydration. Additionally, children could be as active as they wished (e.g., bike rides, running, playing sports) and could swim, shower, or bathe immediately on going home.

None of the patients were prescribed narcotics for use at home. Parents were advised to respond to child requests for pain relief by administering the appropriate dose of acetaminophen or ibuprofen elixir, respecting child body weight and the time intervals given by the manufacturer.

2.3. Korean hand therapy intervention and pain reports

Patients were invited to return during the 10-day recovery if the family wanted help with pain relief. Upon arrival, the patient or parent (pending patient age and apparent maturity) was asked to use the Faces Pain Score – Revised Scale (Fig. 2) to assess current level of discomfort.

If the pain score was greater than zero, Korean Hand Therapy was offered free of charge for the patient. All patients had KHT done on the right middle finger. This measurement was repeated again after the treatment resulting in a “before” pain report and an “after” pain report.

The hand points for KHT can be identified using a hand-held battery-operated point location device (Pointer Plus, Lhasa OMS, Inc., Weymouth, MA). This instrument measures electrical conductivity along the skin surface. The point finder helps the practitioner identify active KHT points on the hands. The KHT

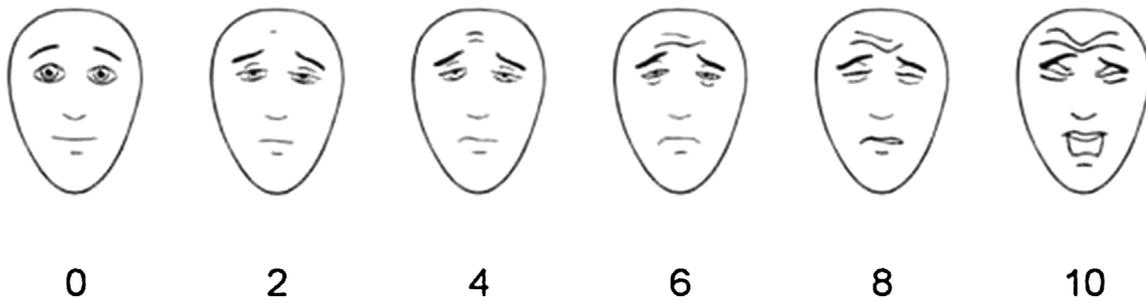


Fig. 2. FACES pain score – revised scale.

treatment used 6 sterile, single-use circular aluminum discs (Qi Mark Press Pellet, A Type, silver, small, Seoul, Korea) with a diameter of 4 mm on an adhesive backing placed on the right middle finger at points designated as M5, E4 and E8 (Fig. 3).

The mean duration of KHT treatment before the secondary pain assessment was 11.17 min (SD = 7.26 min; range = 5–40 min). Patients were sent home with the aluminum discs in place on the right middle finger. There were no complications or adverse events from the KHT intervention.

2.4. Measuring the duration of KHT benefit

Patients who had KHT were asked to return after the 10-day recovery period and the patient or parents were queried as to how long (in hours, days or weeks) the acupuncture treatment was of benefit. This time estimate was converted to hours if needed and recorded.

3. Results

All data analysis and data visualization was completed using the statistical programming language R [10] and the IDE RStudio [11]. Visualizations were built using the R package ggplot2 [12].

As noted, 29 patients (excluding one 18-year-old) presented for pain relief after tonsillectomy and reported some level of pain. These patients were offered KHT. One hundred percent of patients (29 of 29) who were offered KHT accepted the intervention – none were opposed to receiving the treatment. In these 29 patients, the mean reported pain level before KHT was 5.03 (SD = 2.69) out of 10. This fell to 3.06 (SD = 3.15) after KHT. See Figs. 4 and 5 for a visual summary of the change in reported pain level before and after KHT.

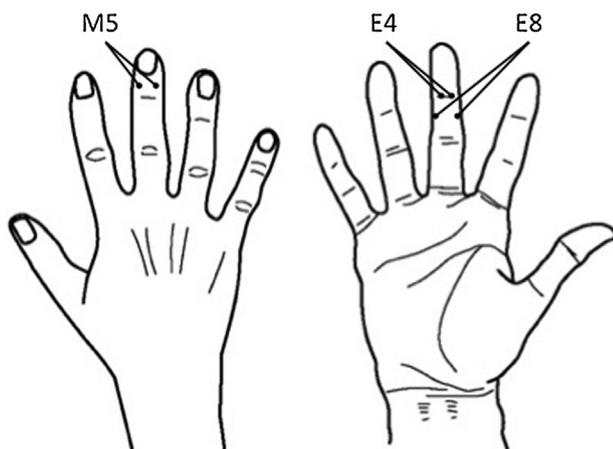


Fig. 3. Diagram showing KHT points used in this study. All patients had KHT done to their right middle finger only.

3.1. Preliminary analyses

Prior to conducting the primary statistical analysis, participant age, KHT duration, and the number of days between surgery and acupuncture intervention were explored as possible confounding factors. Each of these could reasonably have influenced pain report as measured in the current design. There were no statistically significant correlations or other observable associations between these factors and any changes in pain reports. These current findings though statistically inconclusive and based on a limited research design – at the very least did not support the hypothesis that these factors were influencing the change reports. These outcomes also complemented the results of the previous study by Ochi [1] using traditional acupuncture. That study, though similarly limited in size and design, also failed to support these factors as confounds. The factors were excluded from further analysis in the current report.

One additional concern was that patients who participated in the follow-up report – where we asked how long KHT benefit was observed – might have been a biased sample. As described above, only 19 of the 29 patients who received KHT participated in the

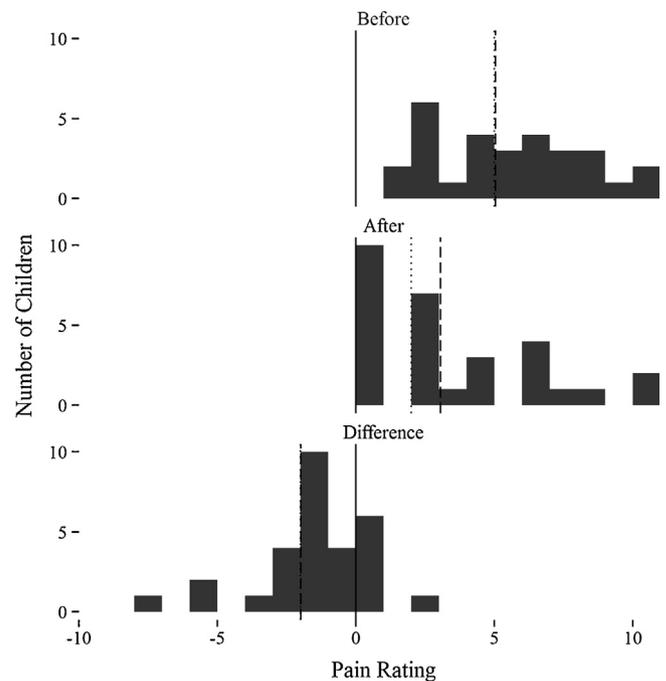


Fig. 4. Histograms showing the distribution of child pain ratings before and after KHT therapy, along with a histogram showing the distribution of changes in pain ratings from before to after KHT. The dotted line is the distribution median. The dashed line is the mean. Where it appears there is only one line, the two lines are overlapping.

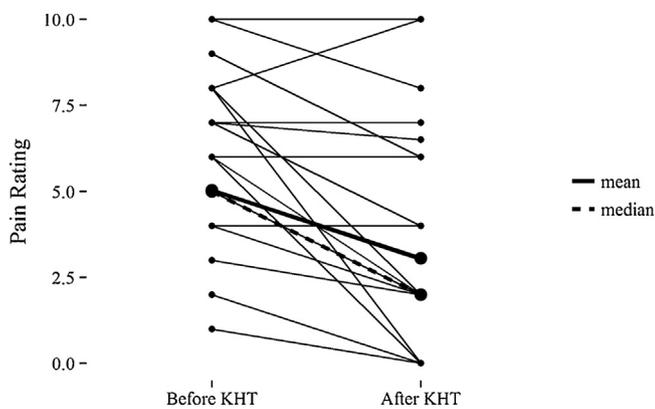


Fig. 5. Individual and group trends in reported level of pain before and after Korean Hand Therapy treatment. The mean and median trends have been given a distinct line compared to individual trends. There appear to be fewer lines than total KHT recipients because some patients had identical starting and ending pain values.

follow-up (with four being excluded due reporting a duration when they did not report an initial benefit). This is a reasonable concern that the current design cannot rule out entirely. However, it is worth noting that there was no correlation ($r = 0.36$, $p = 0.83$) observed between amount of benefit and reported duration. In other words, the patients who did participate did not seem biased to report longer durations if they experienced more pain relief. It also seems unlikely that patients would be more likely to participate if they had a positive experience versus a negative experience. In other words, systematic attrition cannot be ruled out but there are no strong reasons to believe that this attrition would favor the study hypotheses.

3.2. Primary analyses

Changes in pain reports were examined using a dependent samples *t*-test and reached statistical significance, $t(28) = 5.13$, $p < 0.01$. Statistical significance suggests that the current sample is unlikely to be observed under the null hypothesis (i.e., that the reported pain level did not change). Under these circumstances it seems appropriate to treat this statistical evidence as an indication that the trend of a decline in pain scores observed in our sample is likely to generalize to our sample population.

The mean change in reported pain level was a decrease of 1.98 units ($SD = 2.08$). Though the sample mean is a commonly reported estimate of effect magnitude, it can easily mislead the reader for two reasons: (1) it fails to capture the uncertainty associated with estimate; and (2) it is not scaled to be easy to compare with other effect sizes. Three additional estimates of effect size were selected to counter these shortcomings. First we determined the confidence interval for the mean change in pain report: 95% CI $[-1.19, -2.77]$. Second we examined the breakdown of pain score differences: One child (about 3% of the sample) reported an increase in pain, six (about 21%) reported no change, eighteen (about 62%) reported at least two units of pain reduction, and eight (about 28%) reported three or more units of pain reduction. Finally we calculated the standard measure of effect size for a dependent samples *t*-test: $r^2 = 0.48$. The collection of estimates suggests that, at least based on the available sample, KHT had a meaningful impact on pain reports.

Also of interest is how long the effect of KHT lasted for those patients whose pain scores changed after the KHT intervention. As noted above, 15 estimates of KHT benefit duration were obtained. All patient estimates were converted to hours and “capped” by the tonsillectomy recovery window. The natural recovery window for tonsillectomy is 10 days [3]. So, for example, if a patient received

KHT on day 8, they could have a maximum of 48 h of benefit (the full day 9 and 10). This restriction on estimates was implemented to minimize the extent to which patients conflated acupuncture pain relief with the relief expected to occur during the natural healing process.

The mean duration of perceived KHT benefit was 78.20 h (a little over 3 days), though the standard deviation was large (64.38 h or just over 2.5 days). The average reported duration of benefit was significantly different from a duration of 0 (single sample $t = 4.70$, $df = 14$, $p < 0.01$) with the 95% confidence interval for the average duration going from 42.55 h to 113.85 h. Three of fifteen (20%) participating KHT recipients reported 12 h benefit or less, three of fifteen (20%) reported between 12 and 48 h, and nine of fifteen (60%) reported more than 48 h of benefit.

4. Discussion

This retrospective chart review suggests that the application of Korean Hand Therapy after tonsillectomy is associated with decreased pain in children. These results expand on our previous research [1] in two ways. First, the results suggest that KHT and traditional acupuncture may be both associated with pain relief when treating young patients post-tonsillectomy. Our previous study estimated that traditional acupuncture was associated with decrease in reported pain level of 2.70–4.49 pain units (95% confidence interval) whereas the current study estimates that KHT was associated with a decrease of 1.19–2.77 units (95% confidence interval). Second, the results suggest that KHT may be more widely accepted by young patients than traditional acupuncture: roughly 21% of patients refused traditional acupuncture in the previous study but no patients refused KHT in the current study. Combined, these points support the hypothesis that KHT is a viable alternative for reducing pain relief in children post-tonsillectomy.

These results align well with other studies of KHT as an intervention for post-operative relief. A double-blind, randomized, placebo-controlled study showed significantly less postoperative vomiting in children undergoing strabismus surgery; no mention is made of any patients refusing KHT during this study [13]. In another randomized, double-blind placebo-controlled trial patients undergoing KHT experienced significantly less throat pain from intubation compared to controls [14].

If the results of present study are corroborated, KHT may also carry additional benefits over and above its association with pain relief. Traditional acupuncture in the hands of a well-trained practitioner is very safe with a risk profile comparable to prescribing penicillin [15]. Korean Hand Therapy is an even safer procedure because it can be done quickly, effectively and efficiently and does not require needles. The author has not been able to identify any complications or adverse side effects from KHT in the medical literature.

KHT also compares extremely favorably to new technology-assisted surgical instruments developed to reduce tissue trauma and subsequent pain. The harmonic scalpel [16] and coblator [17] each increase the cost per patient by about \$150.00 but do not result in less pain [18]. In comparison, each of the KHT stickers used in this study cost about 10 cents. Furthermore, since there are no needles involved with KHT, patients could even be given a supply of replacement stickers to be applied at home to hopefully extend the duration of benefit.

The barrier to introducing KHT into practice is also not unreasonable. Most states allow allopathic and osteopathic physicians to practice acupuncture under the authority of their medical licenses. Physicians who are interested in traditional acupuncture, which is the foundation upon which KHT is based, should choose from courses endorsed by the American Academy of Medical Acupuncture [19].

It is also worth noting that KHT is but one of many acupuncture techniques. The patients in this study had only KHT done to avoid mixing the results of various acupuncture methods. However, the author has anecdotally observed in his own practice that KHT can be easily combined with traditional acupuncture if desired to further reduce throat pain and relieve nasal congestion or headache. In other words, the author hypothesizes that the magnitudes of pain relief observed in the current study of KHT and previous study of traditional acupuncture [1] may be increased by combinations of techniques.

Our study was limited to children undergoing KHT for pain relief but many adults also undergo tonsillectomy and often endure pain for a much longer time postoperatively. The recovery period is about 10 days in children. Over half of adults however in one study had pain up to 3 weeks postoperatively [20], suggesting that they are also viable candidates for pain relief using KHT.

Having done our best to build a case for KHT, it is important that we revisit the many limitations of the current design. Indeed, we feel these limitations extensive enough that the results and conclusions presented in it should be treated as an encouraging initial trial that needs to be corroborated. Current limitations include: a sample of convenience, a lack of random assignment and control conditions, non-blind experimenter and patients, and a high variability in patient characteristics. Though the current study of KHT, especially coupled with the previous study of traditional acupuncture, is promising, future work will be necessary to confirm effect magnitude, mechanism, and generalization across a wide range of practitioners and patients.

5. Conclusions

The data tentatively suggest KHT decreases perceived pain in children after tonsillectomy and is widely accepted by these patients. Though randomized, controlled research needs to be done to confirm the trends observed in the current study, the combination of these preliminary results with the low cost and safety of KHT support the hypothesis that it is a promising way to relieve tonsillectomy pain in children.

Conflict of interest

The author declares he has no competing interests.

Sources of funding

The author paid for all expenses related to this study.

Author's contributions

JWO performed all surgical and KHT techniques. He conceived, designed and executed the study and wrote the manuscript.

Authors' information

Dr. James Ochi is a fellowship-trained pediatric otolaryngologist board-certified in both Otolaryngology and Medical Acupuncture. He is a Voluntary Assistant Clinical Professor of Surgery at UC San Diego School of Medicine in San Diego, CA.

Acknowledgments

The author is very grateful for the expertise contributed by Yue-Pang Mok MD in selecting the Korean Hand Therapy points used in this study. The author is also indebted to Brian Waismeyer MA and Fraser Cocks PhD for their time and expertise.

References

- [1] J.W. Ochi, Acupuncture instead of codeine for tonsillectomy pain in children, *Int. J. Pediatr. Otorhinolaryngol.* 77 (2013) 2058–2062.
- [2] K.A. Cullen, M.J. Hall, A. Golosinskiy, Ambulatory surgery in the United States, 2006, *Natl. Health Stat. Rep.* 11 (2009) 1–25.
- [3] D.W. Stewart, P.G. Ragg, S. Sheppard, G.A. Chalkiadis, The severity and duration of postoperative pain and analgesia requirements in children after tonsillectomy, orchidopexy, or inguinal hernia repair, *Paediatr. Anaesth.* 22 (2012) 136–143.
- [4] U.S. Food and Drug Administration. (<http://www.fda.gov/Drugs/DrugSafety/ucm339112.htm>).
- [5] National Center for Complementary and Alternative Medicine. (<http://nccam.nih.gov/health/acupuncture/acupuncture-for-pain.htm>).
- [6] K.J. Kemper, R. Sarah, E. Silver-Highfield, E. Xiarhos, L. Barnes, C. Berde, On pins and needles? Pediatric pain patients' experience with acupuncture, *Pediatrics* 105 (2000) 941–947.
- [7] T.W. Yoo, in: C.J.E. Murphy (Ed.), 2nd ed., *Koryo Hand Therapy*, 1, Eum Yang Mek Jin, Seoul, 2001.
- [8] K.S. Kim, M.S. Koo, J.W. Jeon, H.S. Park, I.S. Seung, Capsicum plaster at the Korean hand acupuncture point reduces postoperative nausea and vomiting after abdominal hysterectomy, *Anesth. Analg.* 95 (2002) 1103–1107.
- [9] A. Lee, L.T. Fan, Stimulation of the wrist acupuncture point P6 for preventing postoperative nausea and vomiting, *Cochrane Database Syst. Rev.* 2 (2009) CD003281, <http://dx.doi.org/10.1002/14651858.CD003281.pub3>.
- [10] R Core Team, R: A Language and Environment for Statistical Computing, R Foundation for Statistical Computing, Vienna, Austria, 2015, <http://www.R-project.org/>.
- [11] RStudio, RStudio: integrated development environment for R. Boston, MA. (<http://www.rstudio.com/>), 2012.
- [12] H. Wickham, *Ggplot2: Elegant Graphics for Data Analysis*, Springer, New York, 2009.
- [13] A. Schlager, M. Moehler, F. Purhinger, Korean hand acupressure reduces postoperative vomiting in children after strabismus surgery, *Br. J. Anaesth.* 85 (2000) 267–270.
- [14] H.S. Park, K.S. Kim, H.K. Min, D.W. Kim, Prevention of postoperative sore throat using capsicum plaster applied at the Korean hand acupuncture point, *Anaesthesia* 59 (2004) 647–651.
- [15] V. Jindal, A. Ge, P.J. Mansky, Safety and efficacy of acupuncture in children: a review of the evidence, *J. Pediatr. Hematol. Oncol.* 30 (2008) 431–442.
- [16] Ethicon Endo-Surgery. (<http://www.ees.com/Clinician/Specialty/ent/tonsillectomy#Overview>).
- [17] ArthroCare ENT. (<http://www.arthrocareent.com/procedures/view/1-tonsillectomy>).
- [18] K.P. Oomen, V.K. Modi, M.G. Stewart, Evidence-based practice: pediatric tonsillectomy, *Otolaryngol. Clin. N. Am.* 45 (2012) 1071–1081.
- [19] American Academy of Medical Acupuncture. (<http://www.medicalacupuncture.org/index.html>).
- [20] A. Salonen, H. Kokki, J. Nuutinen, Recovery after tonsillectomy in adults: a three-week follow-up study, *Laryngoscope* 112 (2002) 94–98.