De qi: Chinese acupuncture patients’ experiences and beliefs regarding acupuncture needling sensation – an exploratory survey

Jun J Mao, John T Farrar, Katrina Armstrong, Alethea Donahue, Jessica Ngo, Marjorie A Bowman

Abstract

Introduction While de qi, the acupuncture needling sensation, has been considered as an important component of acupuncture, little is known of the acupuncture patient’s experience and beliefs about de qi in clinical settings. The aim of this study was to describe Chinese acupuncture patients’ perceived sensations of, and beliefs about, acupuncture needling.

Methods We developed a questionnaire and conducted a survey study at two time periods among 200 subjects at six outpatient acupuncture clinics in Beijing, China.

Results Respondents were 55% female and had a mean age of 41 years. The most common types of needling sensations reported by subjects were the terms ‘distended’ (94%), ‘sore’ (81%), ‘electric’ (81%) and ‘numb’ (78%). Eighty-nine percent of subjects reported that the needling sensation travelled away from the puncturing points or travelled among the needling points. Eighty-two percent of subjects believed that the needling sensation was very important for acupuncture treatment, and 68% further indicated that the stronger the needling sensation, the more effective the therapy. Eighty-one percent of subjects found the acupuncture process to be very comfortable and relaxing.

Conclusion Chinese acupuncture patients described the common characteristics of de qi and its migratory nature. The sensations were believed to be important in producing clinical efficacy by most patients. Measuring the sensations described as de qi in future prospective studies will help us understand the degree to which this phenomenon has an effect on the physiological outcome and clinical response to acupuncture. There appears to be a limit to the number of sensations that can be discriminated by each individual patient, and further development of the questionnaire is planned.

Keywords

Acupuncture, needle sensation, survey methods, treatment outcome.

Introduction

Acupuncture is a therapy that is widely used around the world. While several different but related styles of acupuncture exist, the Traditional Chinese Medicine (TCM) type is the most common one in the US. De qi, a set of sensations elicited as part of the acupuncture needling process, has been considered an important component of TCM acupuncture and referenced extensively in acupuncture literature.

The physiological mechanism that produces the effect of de qi has been explored in several studies, but is not well understood. Preliminary findings suggest that de qi may be an important phenomenon to measure in clinical studies of acupuncture so that its effects on clinical and biological outcomes can be further elucidated.

To support further acupuncture investigation, an appropriate method of measuring de qi needs to be developed. Vincent et al developed an Acupuncture Sensation Scale to measure the de qi sensation based on the acupuncturist’s impression of de qi by selecting items from the McGill Pain Scale. Park et al then used the translated scale among healthy Korean volunteers to demonstrate that the constellation of de qi sensation is more complex than the general pain dimension. However, both measures of de qi were driven by investigators rather than reflecting the patients’ own perspectives, which are critically important in developing psychometrically sound
instruments that accurately account for a patient’s experience with acupuncture needling.

To further develop a validated instrument that measures de qi, we performed a descriptive survey study with the following three specific aims: (1) to explore the different needling sensations patients report experiencing during acupuncture; (2) to determine whether patients describe the needling sensation as migratory rather than static; and (3) to understand patients’ attitudes toward and beliefs about acupuncture needling sensations. In order to generate appropriate hypotheses and learn to measure this important phenomenon for future acupuncture research, we wanted to explore individual patients’ experiences in an actual clinical setting, by observing a homogeneous population undergoing the same style of TCM.

**Methods**

**Survey development**

The study methods included a literature review, 4,11,12 structured interviews with acupuncture patients, and finally two surveys. To help develop an initial survey instrument, we first conducted structured interviews with five US acupuncture patients on a convenience basis to elicit their descriptions of their experiences and beliefs regarding acupuncture needling sensation. Draft items were then reviewed and modified using four additional US volunteer subjects who completed the questionnaire after acupuncture treatments. Finally, we administered the survey instrument to patients during two periods, Phases 1 and 2, making minor modifications after analysing the responses to Phase 1.

**Survey content**

Descriptions of eleven different types of needling sensation were included in the Phase 1 survey in China (see Tables 1 and 2), together with a final open-ended question asking about any additional de qi sensations. In the Phase 2 survey, we added the term ‘electric’ as an option because 14 of 120 subjects from the Phase 1 survey indicated ‘electric feeling’ as a response to the open-ended question. The only other new response to the open-ended questions was ‘ants crawling’ which was mentioned by only one subject and was not added to the Phase 2 survey. No further sensations were reported in time 2. We also altered the order of the list of sensations between Phase 1 and Phase 2 to reduce the order effects.

In order to capture the migratory as compared with static nature of the needling sensation, we asked patients to comment whether they felt the needling sensation travel from the acupuncture points to other parts of the body or travel between acupuncture points; furthermore, we asked them to quantify the duration and the strength of such sensation on categorical scales.

To capture the patients’ attitudes and beliefs about needling sensations, five items (see table 3) were specifically designed with response options ranged from ‘completely disagree’ to ‘completely agree’.

**Validation by translation and re-translation**

The survey was then translated into Chinese and translated back into English by a different individual to determine language equivalence. It was noticed that the Chinese term ‘Zhang’ had no direct English equivalent. Its meaning is similar to ‘stretch’ or ‘expand’ and we chose to translate it as ‘distended’ to be consistent with translation from a previous text.4 Prior to the survey distribution, the translated questionnaire was also reviewed one-on-one with seven Chinese patients in the acupuncture clinic waiting area at Chaoyang Traditional Chinese Medical (TCM) Hospital in Beijing to determine the clarity and appropriateness of the translated items. No changes were made based on their comments.

**Study Administration**

The survey was conducted in six outpatient acupuncture clinics affiliated with the China Beijing International Acupuncture Training Center (CBIATC) in Beijing, China between July-August 2004 (Phase 1) and April-May 2005 (Phase 2). The CBIATC, affiliated with the China Academy of Chinese Medical Science, serves as one of the three original training sites in China designated by the World Health Organisation to educate international health professionals about acupuncture and moxibustion. We conducted the survey at the outpatient acupuncture clinics in three TCM Hospitals (ie Beijing Institute of Acupuncture and Moxibustion, Chaoyang TCM hospital, and Jintai TCM hospital), and three comprehensive hospitals (ie Military
Table 1  Acupuncture needling sensations perceived by survey patients

<table>
<thead>
<tr>
<th>Sensation</th>
<th>Combined % (n=200)</th>
<th>Phase 1 % (n=120)</th>
<th>Phase 2 % (n=80)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Throbbing</td>
<td>69.0</td>
<td>60.8</td>
<td>81.3</td>
</tr>
<tr>
<td>Pulling</td>
<td>64.5</td>
<td>60.8</td>
<td>70.0</td>
</tr>
<tr>
<td>Sore</td>
<td>80.5</td>
<td>80.8</td>
<td>80.0</td>
</tr>
<tr>
<td>Numb</td>
<td>78.0</td>
<td>76.7</td>
<td>80.0</td>
</tr>
<tr>
<td>Tingling</td>
<td>70.0</td>
<td>67.5</td>
<td>73.8</td>
</tr>
<tr>
<td>Sharp</td>
<td>56.0</td>
<td>46.7</td>
<td>70.0</td>
</tr>
<tr>
<td>Electric*</td>
<td></td>
<td></td>
<td>81.3</td>
</tr>
<tr>
<td>Distended</td>
<td>93.5</td>
<td>94.2</td>
<td>92.5</td>
</tr>
<tr>
<td>Dull aching</td>
<td>57.5</td>
<td>55.0</td>
<td>61.3</td>
</tr>
<tr>
<td>Warm</td>
<td>51.0</td>
<td>52.5</td>
<td>48.8</td>
</tr>
<tr>
<td>Burning</td>
<td>40.0</td>
<td>41.7</td>
<td>37.5</td>
</tr>
<tr>
<td>Heavy</td>
<td>57.5</td>
<td>62.5</td>
<td>50.0</td>
</tr>
</tbody>
</table>

* Electric was only included in phase 2, as recommended in response to open-ended questions in phase 1.

Table 2  Acupuncture needling sensations perceived by men and women

<table>
<thead>
<tr>
<th>Sensation</th>
<th>Female % (n=109)</th>
<th>Male % (n=91)</th>
<th>P-value†</th>
</tr>
</thead>
<tbody>
<tr>
<td>Throbbing</td>
<td>54.1</td>
<td>86.8</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Pulling</td>
<td>53.2</td>
<td>78.0</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Sore</td>
<td>73.4</td>
<td>89.0</td>
<td>0.006</td>
</tr>
<tr>
<td>Numb</td>
<td>71.6</td>
<td>85.7</td>
<td>0.016</td>
</tr>
<tr>
<td>Tingling</td>
<td>61.5</td>
<td>80.2</td>
<td>0.004</td>
</tr>
<tr>
<td>Sharp</td>
<td>48.6</td>
<td>64.8</td>
<td>0.021</td>
</tr>
<tr>
<td>Electric*</td>
<td>73.2</td>
<td>90.0</td>
<td>0.085</td>
</tr>
<tr>
<td>Distended</td>
<td>90.8</td>
<td>96.7</td>
<td>0.093</td>
</tr>
<tr>
<td>Dull aching</td>
<td>48.6</td>
<td>68.1</td>
<td>0.005</td>
</tr>
<tr>
<td>Warm</td>
<td>39.5</td>
<td>64.8</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Burning</td>
<td>27.5</td>
<td>54.9</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Heavy</td>
<td>49.5</td>
<td>67.0</td>
<td>0.013</td>
</tr>
</tbody>
</table>

* Electric was only included in phase 2, as recommended in response to open-ended questions in phase 1.
† P<0.05 based on chi-2 tests

Table 3  Patients’ attitudes and beliefs toward acupuncture needling sensation (n=200)

<table>
<thead>
<tr>
<th>Attitudes and beliefs about acupuncture needling</th>
<th>Completely or mostly agree % (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acupuncture needling sensation is painful</td>
<td>16 (11-22)</td>
</tr>
<tr>
<td>The needling sensation made this treatment very uncomfortable</td>
<td>5 (3-10)</td>
</tr>
<tr>
<td>Experiencing needling sensation is very important for acupuncture treatment</td>
<td>82 (76-87)</td>
</tr>
<tr>
<td>The stronger the needling sensation is, the more effective the treatment is</td>
<td>68 (61-75)</td>
</tr>
<tr>
<td>Acupuncture is very comfortable and relaxing</td>
<td>81 (75-87)</td>
</tr>
</tbody>
</table>
We approached the study subjects about the survey before their acupuncture treatments and asked if they were willing to participate. Subjects who consented to provide the data were asked to return the completed survey before leaving the clinic. Most of the subjects filled out the survey on their own, but for those who had vision or literacy problems, the questions were read to the study subjects. The Chinese acupuncturists used needles with a variety of lengths and gauges depending on the locations of needling, patients’ body types, and the specific illnesses. The Chinese acupuncturists typically manipulated the needles to achieve de qi by noting patients’ verbal response or facial expression. After needle insertions and manipulations, some of the needles were further stimulated by moxibustion or electricity.

The sample size was the maximum achievable within the resources available. The study was approved by the Institutional Review Board at the University of Pennsylvania. Since we did not collect any personal identifiable information, voluntary provision of information was deemed to be consent.

Statistical Analysis

Descriptive statistics were performed for individual items to check for missing data as well as for distribution of response. For the five items that assessed the patients’ attitudes and beliefs about acupuncture needling, we dichotomised the responses with individuals responding ‘mostly agree’ and ‘completely agree’ as the endorsement of statements. Types of needling sensation, proportion of subjects reporting migratory needling sensation, and attitudes and beliefs regarding acupuncture needling were compared using chi-square analysis. Chi-square analysis and Fisher’s Exact Test (when appropriate) were then performed to explore the effect of age (younger than 50 vs 50 or older), sex, and previous experience with acupuncture (naïve vs experienced) on perception of sensation, migratory nature of sensation, and attitudes and beliefs regarding acupuncture needling. A level of P<0.05 was determined to be of statistical significance and all analyses were two sided. Statistic analysis was performed using Stata version 8.0 (StataCorp, College Station, Tex).

Results

Participants

A total of 200 subjects participated in this survey with 120 at Phase 1 and 80 at Phase 2. Fifty-five percent were women, and the mean age of the sample was 41. Twenty-one percent of respondents had no prior acupuncture experience, and 31% had more than nine acupuncture treatments for the current presenting conditions. The major reasons for the acupuncture visit were for musculoskeletal complaints such as back pain, neck pain, arthritis (41%), neurological complaints such as post-stroke rehabilitation, facial paralysis (23%) and weight loss (10%). Fifty-three percent of patients presented with pain related complaints.

We observed less than 5% missing data for items pertaining to the perception of migratory nature of needling sensation and items that measured patients’ attitudes and beliefs about acupuncture. However, we observed substantial missing data for questions pertaining to the types of sensation. The reason became clear during our field work when a number of subjects informed us about the difficulty in discriminating among various needling sensations beyond the few predominant sensations. Based on this, they elected to leave the questions unanswered even when the option of ‘uncertain’ was provided. This observation led us to dichotomise sensation items as definitively perceived for all positive responses and not definitively perceived for negative responses and missing data.

Types of acupuncture needling sensation

The most common acupuncture needling sensations reported as definitively experienced by patients were ‘distended’ (94%), ‘sore’ (81%), ‘electric’ (81%, but only used in Phase 2) and ‘numb’ (78%), as shown in Table 1. More respondents at Phase 2 reported throbbing than at Phase 1 (81% vs 61%). A difference was also seen for sharp sensation between Phase 1 and Phase 2 (47% vs 70%). Estimates for other sensations were very similar between Phase 1 and Phase 2.

Male patients reported a greater number of acupuncture needling sensations than female patients, eight vs six, P<0.001 by rank sum test. For each individual sensation, a greater proportion of male patients than female patients reported experiencing definitive sensation, except for...
distension (see Table 2). In addition, patients younger than 50 years were more likely to report dull ache than those aged 50 or older (61% vs 42%), P=0.021. Furthermore, 82% of acupuncture experienced vs 64% of acupuncture naïve patients reported experience of numbness as part of acupuncture needling sensation (P=0.019).

Migratory nature of acupuncture needling sensation
Eighty nine percent of respondents reported feeling the acupuncture needling sensation travel away from needling points or travel between the acupuncture points. However, the duration of the migratory sensation was substantially different among patients, with 8% of subjects experiencing it throughout the acupuncture treatment, 16% rarely, and 31% (the largest group) experiencing the migratory sensation only occasionally during the acupuncture treatment (see Figure 1). Most individuals described the migratory sensation as moderate (43%) or strong (22%), while a small number of subjects reported it as very strong (2%) or very weak (6%), see Figure 2. Although the perception of migratory sensation was unrelated to age or sex, patients with previous experience of acupuncture were more likely to report the needling sensation as migratory compared to acupuncture-naïve patients (92% vs. 76%), P=0.003.

Attitudes and beliefs about acupuncture needling
Eighty two percent of respondents endorsed the statement that acupuncture needling sensation is very important for their acupuncture treatment, and 68% believed that the stronger the needling sensation, the more effective the treatment. Sixteen percent of respondents described the acupuncture needling sensation as painful; however, only 5% stated that the needling sensation made the acupuncture treatment very uncomfortable. In contrast, most people (81%) agreed that acupuncture was very comfortable and relaxing. All ten subjects who reported acupuncture needling as uncomfortable were younger than age 50 years. In addition, individuals who were aged 50 or older were more likely to endorse the importance of experiencing needling sensation than those younger than 50 (93% vs 77%), P=0.026.

Discussion
In contrast to previous studies investigating de qi that used volunteers or experimental models,11-14 our study provides evidence of what patients experience and believe about de qi in real world clinical settings. In this study, patients in Chinese acupuncture clinics described de qi, the acupuncture needling sensations as ‘distended’, ‘sore’, ‘electric’, ‘numb’, and ‘migratory’. The majority of patients endorsed the importance of de qi in acupuncture therapy and 68% further believed that the stronger the de qi sensation, the more effective the acupuncture treatment. While a small proportion of patients found acupuncture painful, most individuals reported the process of acupuncture as very comfortable and relaxing. Nevertheless, the types, duration and strength of acupuncture needling sensations were different and highly individualised, and some of the sensation
characteristics may be influenced by sex, age, and previous acupuncture experience.

Our study supports the concept that the constellation of sensations experienced by the Chinese patients in actual clinical settings is distinct from what they would consider general pain, and is very similar to what has been described in the Chinese texts. Despite conducting the survey in two time frames and changing the listed order of sensations, we were able to produce very similar estimates among most sensations with the exception of throbbing and sharp sensations. Differences in the latter may be due to their changed positions in the list, or to type I error. Future studies should confirm whether the ordering of items may change the frequency of recording of these sensations.

Vincent et al found that the component of pulling, numb, heavy, dull and aching reported among English patients may support the traditional concept of de qi. Park later showed that the Korean acupuncture-naive subjects expected more pain and local tissue stimulation (penetrating, tingling, pricking and burning) than they actually experienced. On the other hand, they experienced the sensations commonly used to describe de qi (ie aching, pulling, heavy, dull and electric) more than they expected. A recent study using experimental thermal pain model among a small cohort of healthy US volunteers suggested that subject ratings of numbness and soreness, but not ratings of stabbing, throbbing, tingling, burning, heaviness, fullness, or aching, were correlated with effective analgesia. These studies together with ours suggest that, while patients may feel a wide range of sensations with the needle puncturing process for acupuncture as well as in other conventional medical therapies, a limited set of sensations may be unique to the acupuncture experience, not perceived as pain and important to the efficacy of acupuncture. This strongly supports the need to appropriately measure these sensations in future clinical studies of acupuncture.

We also found that most Chinese acupuncture patients described de qi as migratory rather than static, which may suggest a physiologic role for at least temporary changes in underlying neurovascular or connective tissue structures in response to the needling. Kuo demonstrated that acupuncture needle puncture may result in local vasodilatory effects in humans. A recent study also showed that needle manipulation during acupuncture causes a significant displacement of connective tissues distant from the needling point. In addition, a functional MRI study demonstrated substantial differences in signal intensity within subcortical structures between those individuals who reported migratory needling sensation and those who reported pain instead of de qi sensation. The above studies suggest that acupuncture needling can initiate physiological change at local tissue level, as well as mediate an effect distant from the needle site. Furthermore, the perception of migratory sensation may reinforce patients’ belief in the traditional theory that acupuncture is meant to ‘mobilise the stagnated energy’. It is possible that the interaction between heightened psychological state and the perceived physiological changes helps produce a positive clinical response. If the neurophysiological changes were to persist after the stimulation has stopped, through a mechanism similar to the development of long term memory or learned motor movements, it is possible that these changes could explain a sustained effect of acupuncture.

Most patients in our study endorsed the importance of the de qi sensation in acupuncture. We do not know of other studies in different cultural settings or languages that measured patient perceived importance in acupuncture needling sensation. If these beliefs are culturally based rather than universal, it would be interesting to learn the effect of these culturally based beliefs on actual outcomes of therapeutic intervention. Several authors have suggested that the meaning of therapy and the therapeutic context may exert important effects on patient preference for a particular therapy as well as the outcome of that therapy. In future studies with appropriate measures, these components of the therapeutic intervention may help to determine the relative contribution of these factors in healing therapies such as acupuncture as they relate to the culture in which they are used. If these beliefs are shared beyond the cultural boundaries, the individual variations in such beliefs may be examined to determine their influences on individual response to acupuncture therapy.

While this study is descriptive, certain limitations should be acknowledged. The surveys were conducted in an acupuncture population in a clinical setting in China. Native Chinese have a great deal...
of cultural familiarity with acupuncture and their reported beliefs and sensations may not apply to other cultures. Clearly, studies are needed in other populations to determine if different culture has an effect on these results. Demographic differences such as age, sex, and prior experience appeared to relate differently to the perception and beliefs of de qi; these findings may be subject to type I errors and should be used for hypothesis generation only. Future studies should seek to validate these findings and determine their relevance to the clinical practice of acupuncture.

Another limitation of the study was the considerable missing data observed among the types of needling sensation. However, the explanation provided by the patients helped us understand that they were using the questions as a list of symptoms from which to choose. By altering our interpretation of these data to match how patients used the scale, we were able to make sense out of the results by observing the number and types of sensations selected. The mean number of sensations the subjects endorsed was seven, with 25% of subjects rating only four or fewer sensations. In future use of this scale, we will alter the structure of the questions to allow patients to select the sensation and intensity without forcing a decision on all of them. An advantage of this change in question format is that it is possible that in a relaxing process like acupuncture, hypervigilance about individual needling sensation may actually have negative consequences for the therapy. The process by which our patients used the questions pointed out an important issue in methodology of measuring sensations of acupuncture needling and other types of manipulative therapies. That is, individuals in clinical settings may most easily discriminate a limited set of sensations at best. Thus, having a lengthy forced answer questionnaire that measures many sensations probably produces data that are less reliable and difficult to interpret, and may even reduce the efficacy of the clinical response in unknown ways.

Despite these limitations, our study was based on a carefully designed questionnaire and conducted in the actual setting of acupuncture clinics. This offers a different and potentially important perspective to the field of acupuncture research. As we become aware of the experience about and attitudes towards de qi that Chinese acupuncture patients have, we can further develop an appropriate measure to capture this phenomenon in more diverse clinical populations and in other languages. Our research also exposed some unique challenges in methods relevant to the measurement of de qi, which will enhance the future rigour of research in this area. We believe that developing clinically meaningful and valid measures of de qi is an important step to uncover the bio-behavioural mechanism of acupuncture.

Acknowledgements

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Conflicts of interest

Dr Mao was supported by a training grant 5T32AT000600 from NIH/NCCAM. Dr Ng was supported by a Stanford Medical School Medical Student Scholarship. The funding agency had no role in the design and conduct of the study.

Reference list


Summary points

- Measuring de qi with needling is critical for understanding whether it correlates with physiological changes or clinical response.
- Chinese acupuncture patients commonly described de qi as ‘distended’, ‘sore’, ‘electric’ and ‘numb’.
- Most patients perceived de qi as migratory.
- A majority of patients believed that the stronger the needling sensation, the more effective the treatment.

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