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# A literature review of *de qi* in clinical studies

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## ABSTRACT

**Objectives** *De qi* is a sensation experienced by a patient or an acupuncturist during acupuncture treatment. Although *de qi* is considered to be important in acupuncture treatment, there are not many studies about *de qi* and its character. The purpose of this study is to review *de qi* questionnaires and evaluate the relationship between *de qi* and acupuncture points, stimulation and treatment effects.

**Methods** A search was conducted using three English-language databases (PubMed, Cochrane and ScienceDirect) and seven Korean databases with the keywords '*de qi*' and 'needle sensation'. The included studies were then categorised as following: (1) *de qi* measurement tools, (2) the relationship between *de qi* and acupuncture points, (3) the relationship between *de qi* and stimulation, (4) the relationship between *de qi* and treatment effects and (5) attitudes and opinions toward *de qi*.

**Results** Several questionnaires have been developed to evaluate *de qi*, and the most frequent sensation in those questionnaires was 'heavy' and 'numb'. Although a few studies showed specificity to acupuncture points, information is still lacking to be able to draw a clear conclusion about the relationship between *de qi* and acupuncture points. Also, greater *de qi* was elicited in real acupuncture than placebo acupuncture in many studies. The relationship between *de qi* and treatment effects was controversial.

**Conclusions** It seems that real acupuncture induced greater *de qi* than sham acupuncture, and the relationship between *de qi*, acupuncture points and treatment effects was controversial. However, the current literature evaluating *de qi* is not sufficient to derive clear conclusions. Further studies with more objective indices and rigorous methodologies are needed.

## INTRODUCTION

Acupuncture is a treatment method that has been used in East Asia for thousands of years, and in recent years has been

increasingly adopted worldwide.<sup>1–2</sup> Acupuncture has proven to be effective for several diseases and symptoms, including osteoarthritis<sup>3</sup> and vomiting.<sup>4–5</sup> The mechanism of acupuncture may involve a form of 'energetic' phenomenon, such as the flow of energy through channels known as 'meridians'.

The term '*de qi*' means 'arrival of qi'. *De qi* is a sensation experienced by a patient or an acupuncturist during acupuncture treatment.<sup>6</sup> Typically, *de qi* is described as *suan* (aching or soreness), *ma* (numbness or tingling), *zhong* (heaviness) and *zhang* (fullness/distension or pressure).<sup>7</sup> However, many sensations have been used to describe *de qi* in previous questionnaires, and it is still difficult to describe *de qi* clearly. For example, sharp pain is sometimes viewed as an abnormal reaction to acupuncture treatment and sometimes as a part of *de qi*.

*De qi* is considered to be an important variable in acupuncture, because there is a belief that achieving *de qi* is associated with positive outcomes in acupuncture treatment.<sup>8–9</sup> However, a relationship between *de qi* and the positive effects of acupuncture treatment remains unproven in clinical trials,<sup>10–13</sup> and the mechanisms underlying this sensation are largely unknown. Additionally, there is a lack of adequate experimental data indicating *de qi* and related factors including acupuncture points, needling techniques and nerve fibre systems.<sup>14</sup>

In this study, we reviewed *de qi* related literature: (1) to investigate which sensations are used in *de qi* questionnaires, (2) to determine the relationship between *de qi* and acupuncture points, (3) to determine the relationship between *de qi* and stimulation, (4) to determine the relationship between *de qi* and treatment effects and (5) to learn the attitudes and opinions toward *de qi*.

## MATERIALS AND METHODS

A search was conducted using English-language (PubMed, Cochrane and ScienceDirect) and Korean (Research Information Sharing Service, Korean Studies Information Service System, Korean Medical Database, DBPIA, the Korean Oriental Medical Society, the Korean Acupuncture & Moxibustion Society, Society of Meridian & Acupoint) databases with the keywords 'de qi' and 'needle sensation'. Additional searches were performed on the references of the obtained studies. Only the human studies from the search results were included. The included studies were then categorised by the following criteria: (1) *de qi* measurement tools, (2) the relationship between *de qi* and acupuncture points, (3) the relationship between *de qi* and stimulation, (4) the relationship between *de qi* and treatment effects and (5) attitudes and opinions toward *de qi*.

With regard to the tools for assessing needle sensations or *de qi*, only those studies in which the researchers developed a questionnaire using a qualitative or quantitative method were included. The studies that extracted the corresponding items from the existing literature or that did not describe the development method of the questionnaire were excluded.

The 'de qi and acupuncture points' category included studies evaluating the differences in *de qi* associated with acupuncture points and non-acupuncture points, and the 'de qi and stimulation' category included studies dealing with the differences in *de qi* originating from different types of stimulation, such as real needles and sham needles. The 'de qi and treatment effects' category included studies addressing the relationship between *de qi* and the treatment effects of acupuncture treatment, and the final category addressed the attitudes of the patient and the practitioner toward *de qi*.

## RESULTS

### Questionnaires on needle sensations or de qi

The first attempt to measure needle sensation was the Acupuncture Sensation Scale (ASS) developed by Vincent *et al.*<sup>15</sup> McGill developed a pain questionnaire<sup>16</sup> and Vincent subsequently developed the ASS based on McGill's questionnaire after consulting with 10 acupuncturists. The ASS included 20 items for acupuncture sensation: sharp, pulling, electric, tingling, heavy, pulsing, spreading, pricking, aching, hot, dull, radiating, numb, shocking, hurting, burning, stinging, penetrating, intense and throbbing.

The ASS was translated into Korean to compare the patients' expectations of needle sensation with their actual experience. According to this study, more than 60% of 38 patients expected painful, penetrating, sharp, tingling, pricking and stinging sensations but actually frequently experienced aching, spreading, radiating, pricking and stinging.<sup>17</sup> In a later study conducted by the same authors to examine whether the past treatment experience affected the expectation of needle sensation, the most common sensation that

subjects experienced were sharp, intense, radiating and heavy.<sup>18</sup>

As a part of an effort to develop a sham acupuncture device, Park *et al.*<sup>19</sup> assessed *de qi* using 25 questions derived from Vincent's survey. In addition to the 20 ASS items, this questionnaire included pressure, boring, pinching, tender and flickering sensations. Macpherson and Asghar<sup>20</sup> divided the 25 needle-sensation items in this questionnaire into *de qi*-related sensations and pain-related sensations using feedback from 20 experts. The seven sensations related to *de qi* were aching, dull, heavy, numb, radiating, spreading and tingling, and the nine sensations related to acute pain were burning, hot, hurting, pinching, pricking, sharp, shocking, stinging and tender.

To assess needle sensation, Kong *et al.*<sup>11</sup> developed the Subjective Acupuncture Sensation Scale (SASS). This scale consisted of nine items selected based on the literature and experience (tingling, heavy, aching, numb, burning, throbbing, stabbing, fullness and soreness), one freeform patient sensation item and another item measuring anxiety. This scale was later revised into the Massachusetts General Hospital Acupuncture Sensation Scale (MASS) for more scientific application.<sup>21</sup> The MASS consists of 12 *de qi*-related sensations (soreness, aching, deep pressure, heaviness, fullness/distension, tingling, numbness, sharp pain, dull pain, warmth, cold and throbbing) and a freeform patient sensation item. The degree of anxiety before, during and after the acupuncture treatment was also included via a mood scale. In addition, the extent of needle sensation spread, which had not appeared in previous scales, was included an accessory measure.

Qualitative methods, such as interviews or surveys, were also used to develop *de qi* questionnaires. Leung *et al.*<sup>22</sup> interviewed 15 subjects and investigated the 16 sensations most frequently felt by patients. Also, a Chinese study developed a *de qi* survey consisting of 12 items by survey of 200 subjects.<sup>23</sup> The most common needle sensations in this study were distension, soreness, electrical sensations and numbness.

White *et al.*<sup>24</sup> developed the Southampton Needling Sensation Questionnaire using patient interviews, expert consensus and a combination of clinical experience and knowledge of the literature. After this survey was developed, the data from 227 patient surveys were analysed. Of 17 items, 14 sensations were classified into 'aching *de qi*' and 'tingling *de qi*'. Deep ache, dull ache, discomfort, heaviness, pressure, bruising and stinging were classified as 'aching *de qi*', and tingling, warmth, spreading, fading, numbness, twinges and throbbing were classified as 'tingling *de qi*'. Whereas 'aching *de qi*' was significantly correlated with the overall pain of acupuncture, 'tingling *de qi*' was not. Of the other three items, 'sharp' is related solely to pain, and 'cold' and 'itchy' did not load into any factor.

Recently, a *de qi* questionnaire considering the phase of acupuncture treatment was developed.<sup>25</sup> The Acupuncture Sensation Questionnaire (ASQ) did not use the conventional method of a single time-independent assessment; instead, it assessed sensations experienced during needle insertion, manual stimulation and needle retention. The ASQ includes 19 items: 3 for needle insertion, 9 for manual stimulation and 7 for needle retention. The three needle-insertion items are refreshing or relieving, dullness and numbness. The manual stimulation items are spreading out, refreshing or relieving, warm, dull, activated digestion with bowel moving, relieving sensation of tense or tight muscles, heavy, numb and gentle touch. The needle-retention items are warm, refreshing or relieving, surging opening flow of stuffed or choked feeling, spreading out, heavy, activated blood circulation and compressing or pressuring.

As a result of reviewing *de qi* questionnaires, 8 questionnaires were included with 46 sensations. Among those sensations, heavy and numb were included in all eight questionnaires. Also, sharp, tingling, dull, throbbing sensations were included in more than five questionnaires (table 1).

#### The relationship between *de qi* and acupuncture points

In a study by Vincent *et al*,<sup>15</sup> patients assessed needle sensations after acupuncture needles were applied to acupuncture points and non-acupuncture points of the hands, feet and legs. In that study, there were no significant differences in needle sensations between acupuncture points and non-acupuncture points for any locations. However, Roth *et al*<sup>26</sup> reported that needle sensation was significantly stronger with traditional needling than sham acupuncture using a non-acupuncture point.

Park *et al*<sup>27</sup> applied needles at acupuncture and non-acupuncture points with four different depths (the epidermis, corium, fascia and muscle), and the needle sensations for each stimulation were assessed using the Southampton needle sensation questionnaire. The results showed that there were no statistically significant differences between acupuncture point and non-acupuncture point needle sensations at the epidermis, corium and fascia levels, although there were differences at the muscle level. Another recent study reported that soreness, numbness, distension and heaviness are felt when a needle is applied to the SJ5 acupuncture point, whereas a tingling sensation is mostly felt when a needle is applied to non-acupuncture points.<sup>28</sup>

As well as the difference between acupuncture points and non-acupuncture points, the peculiarity of each acupuncture point has also been studied. A Chinese study investigated needle sensations after needles were applied to pairs of acupuncture points with different meridians, nerves, or tissues. Although there was no significant difference in the prevalence

of needling sensations between the two paired acupuncture points, significant intensity differences were seen for soreness, fullness and heaviness. Also, the tingling sensation was stronger than heaviness and pressure at acupuncture points PC6, PC7 and ST36 compared to CV4 (table 2).<sup>29</sup>

#### The relationship between *de qi* and stimulation

Kong *et al*<sup>11</sup> compared needle sensations before and after manual acupuncture, electroacupuncture and sham acupuncture stimulations. The results showed that the *de qi* from manual acupuncture was not significantly different from that of electroacupuncture, but that the *de qi* from sham acupuncture was significantly lower than that of manual acupuncture or electroacupuncture. In another study of the effects of three different stimulation types (electrode, manual acupuncture and electroacupuncture), the *de qi* from electroacupuncture was greater than that of manual acupuncture or electrode acupuncture.<sup>22</sup> Additionally, whereas tingling was the most common sensation for electric stimulations resulting from electrodes or electroacupuncture, aching was the most common sensation for manual acupuncture. Chae *et al*<sup>30</sup> assessed and compared the *de qi* when using real acupuncture, blunted-tip sham acupuncture and round-tip sham acupuncture; the real acupuncture group exhibited significantly higher needle sensation index scores than did the blunted-tip and round-tip sham acupuncture groups. With deep penetration and needle rotation, real needles produced statistically significantly greater *de qi* than did sham acupuncture with no penetration<sup>13 31</sup> or sham acupuncture with superficial needling only.<sup>32</sup>

There are studies that show the difference in *de qi* aspect depends on the kind of acupuncture or stimulation. Comparing the needle sensations from pharmacopuncture and placebo acupuncture, the results showed that there were statistically significant differences between normal saline placebo acupuncture and Hwangryunhaedoktang herbal acupuncture in seven items: aching, pricking, stinging, heaviness, dullness, numbness and pulsing. There were also significant differences between normal saline acupuncture and Hominis Placenta herbal acupuncture in dullness and coolness.<sup>33</sup> In Hui *et al*'s<sup>14</sup> comparison of the *de qi* from tactile stimulation and acupuncture, acupuncture showed significantly higher frequency and intensity of sensation than did tactile stimulation in aching, soreness and pressure. Kou *et al*<sup>34</sup> also conducted acupuncture treatment with real needles or placebos and used five visual analogue scale items (numbness, pressure, heaviness, warmth and radiating paraesthesia) to evaluate *de qi*. The results showed that acupuncture produced significantly higher numbness, pressure, warmth and radiating paraesthesia sensations, but not heaviness, than the placebo needle did.

**Table 1** The sensations described in acupuncture sensation questionnaires

	Vincent <i>et al</i> <sup>15</sup>	Park <i>et al</i> <sup>19</sup>	Kong <i>et al</i> <sup>11</sup>	Kong <i>et al</i> <sup>21</sup>	Leung <i>et al</i> <sup>22</sup>	Mao <i>et al</i> <sup>23</sup>	White <i>et al</i> <sup>24</sup>	Kim <i>et al</i> <sup>25</sup>	N*
Sharp	X	X		X	X	X	X		6
Pulling	X	X				X			3
Electric	X	X				X	X		4
Tingling	X	X	X	X	X	X	X		7
Heavy	X	X	X	X	X	X	X	X	8
Pulsing	X	X			X				3
Spreading	X	X					X	X	4
Pricking	X	X					X		3
Aching	X	X	X	X	X				5
Hot	X	X							2
Dull	X	X		X	X	X	X	X	7
Radiating	X	X							2
Numb	X	X	X	X	X	X	X	X	8
Shocking	X	X							2
Painful	X	X							2
Burning	X	X	X		X	X			5
Stinging	X	X					X		3
Penetrating	X	X							2
Intense	X	X							2
Throbbing	X	X	X	X	X	X	X		7
Pressing		X		X	X		X		4
Boring		X							1
Pinching		X							1
Tender		X							1
Flickering		X							1
Cool/cold				X	X				2
Stabbing			X						1
Fullness/distension			X	X		X			3
Soreness			X	X		X			3
Warmth				X	X	X	X	X	5
Twitching					X				1
Muscle contraction					X				1
Tapping					X				1
Pecking					X				1
Bruising							X		1
Twinge							X		1
Uncomfortable							X		1
Fading							X		1
Deep ache							X		1
Refreshing or relieving/activated digestion with bowel movements/relieving sensation of tense or tight muscle/gentle touch/surging opening flow of stuffed or choked feeling/activated blood circulation/compressing or pressing								X	1

N\*, Number of being used in *de qi* questionnaire of each sensation

One recent study reported that superficial penetration produces prominent pricking and sharp sensations, whereas deep penetration produces a high degree of deep, dull, heavy, spreading and electric shock sensations.<sup>27</sup> Deep, dull and heavy sensations were more prominent when needle rotation was used than when simple needle insertion was employed.

In contrast to the studies discussed above, however, several studies have reported no difference between real needles and sham needles. Salih *et al*<sup>35</sup> conducted a study comparing *de qi* after real and sham-laser acu-punctures and found that spreading, radiating, tingling, tugging, pulsing, warm and dull were the sensations most frequently experienced by both

**Table 2** Characteristics of studies including the relationship between *de qi* and acupuncture point

Lead author (year)	Participants	Sample size	Intervention	Outcome	Results
Vincent <i>et al</i> (1989) <sup>15</sup>	Healthy volunteers	65	(A) Acupuncture points (B) Non-acupuncture points	Questionnaire including 20 sensations	<i>De qi</i> was not significantly different between (A) and (B)
Roth <i>et al</i> (1997) <sup>26</sup>	Healthy volunteers	20	(A) Acupuncture points (B) Non-acupuncture points	Questionnaire including more than four sensations	<i>De qi</i> was significantly stronger in (A) than (B)
Park <i>et al</i> (2011) <sup>27</sup>	Healthy volunteers	5	(A) Acupuncture points (B) Non-acupuncture points with four different depths (epidermis, corium, fascia, muscle)	Southampton needle sensation questionnaire (including 17 sensations and 1 pain VAS)	Groups (A) and (B) were not significantly different at epidermis, corium and fascia, although there was a significant difference at muscle level
Zhang <i>et al</i> (2011) <sup>28</sup>	Healthy volunteers	18	(A) Acupuncture point (SJ6) (B) Non-acupuncture point	Questionnaire including four sensations	Group (A) showed soreness, numbness, distension, heaviness Group (B) showed tingling sensation
Zhou <i>et al</i> (2011) <sup>29</sup>	Healthy volunteers	21	Electroacupuncture was applied at paired acupuncture points with different meridian, nerves, or tissues	Questionnaire including nine <i>de qi</i> sensations, sharp pain, and any other sensations	Two paired points were not significantly different in prevalence of needling sensation, but several paired acupuncture points showed significant intensity differences in soreness, fullness, heaviness

VAS, visual analogue scale.

**Table 3** Characteristics of studies including the relationship between *de qi* and stimulation

Lead author (year)	Participants	Sample size	Intervention	Outcome	Results
<i>De qi</i> intensity					
Kong <i>et al</i> (2005) <sup>11</sup>	Healthy subjects	31	(A) Manual acupuncture (B) Electroacupuncture (C) Sham manual	SASS (nine sensation and one freeform, anxiety measure)	Groups (A) and (B) were not significantly different  Group (C) was lower than (A) or (B)
Leung <i>et al</i> (2006) <sup>22</sup>	Healthy subjects	15	(A) Electrode (B) Manual acupuncture (C) Electroacupuncture	Questionnaire including 16 sensations	Group (C) was greater than (A) or (B) In (B), aching was the most common sensation In (A) and (C), tingling was the most common sensation
Chae <i>et al</i> (2006) <sup>30</sup>	Healthy volunteers	94	(A) Real acupuncture (B) Blunted-tip sham acupuncture (C) Round-tip sham acupuncture	ASS (including 20 sensations)	Group (A) was higher than (B) and (C)
White <i>et al</i> (2010) <sup>13</sup>	Patients with osteoarthritis	147	(A) Real acupuncture with deep penetration and needle rotation (B) Sham acupuncture with no penetration	Questionnaire including 25 sensations	Group (A) produced significantly greater <i>de qi</i> than (B)
Benham <i>et al</i> (2010) <sup>32</sup>	Healthy volunteers	15	(A) Real acupuncture with deep penetration and needle rotation (B) Sham acupuncture with superficial needling	Needle sensation VAS and SASS (nine sensation and one freeform, anxiety measure)	Group (A) was significantly greater than (B)
Chen <i>et al</i> (2012) <sup>31</sup>	Healthy volunteers	24	(A) Acupuncture at acupuncture points (B) Acupuncture at sham acupuncture points (C) Sham acupuncture at acupuncture points (D) Sham acupuncture at sham acupuncture points	Questionnaire including six sensations	Group (A) produced <i>de qi</i> , (B) produced <i>de qi</i> or sharp pain. Group (C) showed sharp pain and (D) showed nothing.
<i>De qi</i> aspect					
Yoon <i>et al</i> (2004) <sup>33</sup>	Healthy volunteers	63	(A) Hwangryunhaedoktang herbal acupuncture (B) Hominis placental herbal acupuncture (C) Normal saline placebo acupuncture	Questionnaire including 21 acupuncture sensations	Groups (A) and (C) were significantly different for seven sensations (aching, pricking, stinging, heaviness, dullness, numbness, pulsing) Groups (B) and (C) were significantly different for two sensations (dullness and coolness)
Hui <i>et al</i> (2007) <sup>14</sup>	Healthy volunteers	42	(A) Acupuncture (B) Tactile stimulation	Questionnaire including 10 sensations and sharp pain	Group (A) showed significantly higher frequency and intensity of sensation than (B) in aching, soreness and pressure

Continued

Table 3 Continued

Lead author (year)	Participants	Sample size	Intervention	Outcome	Results
Kou <i>et al</i> (2007) <sup>34</sup>	Healthy volunteers	11	(A) Real acupuncture (B) Placebo acupuncture (superficial, non-acupuncture points without manipulation)	Questionnaire including five sensations	Group (A) showed higher VAS values for numbness, pressure and warmth, radiating paraesthesia than (B)
Park <i>et al</i> (2011) <sup>27</sup>	Healthy volunteers	5	(A) Superficial penetration (B) Deep penetration	Southampton needle sensation questionnaire (including 17 sensations and one pain VAS)	Group (A) produced greater sensation in pricking and sharp sensation, and (B) showed greater sensation in deep, dull, heavy, spreading and electric shock sensation Needle rotation in (B) increased deep, dull and heavy sensations
Salih <i>et al</i> (2010) <sup>35</sup>	Healthy volunteers	34	(A) Real laser acupuncture (B) Sham laser acupuncture	Questionnaire including 17 sensations	Groups (A) and (B) resulted in similar <i>de qi</i> sensations with regard to frequency, intensity and quality.

ASS, acupuncture sensation scale, SASS, subjective acupuncture sensation scale, VAS, visual analogue scale.

groups. The results also indicated that real acupuncture and sham-laser acupuncture produced *de qi* that was similar in terms of frequency, intensity and quality. The study found that *de qi* can be felt even with no tactile skin stimulation, which suggests that such *de qi* results from the overall treatment process and not necessarily from a particular aspect of it (table 3).

#### The relationship between *de qi* and treatment effects

Kong *et al*<sup>11</sup> compared the degree of pain and needle sensations before and after acupuncture. The results showed statistically significant correlations between the pain-relieving effect and two of the nine SASS items (soreness and numbness). Chae *et al*<sup>10</sup> also investigated the degree of acupuncture analgesia before and after acupuncture treatment and compared that with the ASS. Significant correlations between the analgesic effect of real acupuncture and the degree of acupuncture sensation were found with respect to burning, intense, pulsating and stinging sensations.

A Japanese study treated osteoarthritis with real and sham needles and found that patients who felt *de qi* experienced better treatment results than those who did not.<sup>12</sup> However, another two clinical studies comparing the *de qi* and pain relief of patients with osteoarthritis found no significant difference in pain relief between those who felt *de qi* and those who did not (table 4).<sup>13 36</sup>

#### Attitudes and opinions toward *de qi*

In a Chinese study that investigated the sensations and faith of patients in acupuncture, 89% of the patients reported that the needle sensations spread from the applied acupuncture points, and 82% considered the needle sensation to be an important element of acupuncture treatment.<sup>24</sup> In addition, 68% of the patients thought that stronger needle sensations led to better treatment results, and 81% felt comfortable during the acupuncture treatment process.

In a survey of acupuncture practitioners in China and the USA, 47 of 86 practitioners agreed that dull pain was *de qi*, and over half agreed that *de qi* was beneficial, but sharp pain was harmful.<sup>37</sup> Of them, 73% believed that there was a correlation between *de qi* and treatment results. The patient attitudes toward *de qi* in China and the USA were found to follow different patterns; only 2 of the 17 practitioners who responded that patients approved of *de qi* were from the USA, and the remainder were from China.

#### DISCUSSION

Most clinical studies of *de qi* assessed patient *de qi* by asking patients to record the sensations they feel or by making practitioners assess patient *de qi* based on patients' reactions.<sup>19</sup> However, many acupuncturists thought that the *de qi* felt by the practitioner was as

**Table 4** Characteristics of studies including the relationship between *de qi* and treatment effects

Lead author (year)	Participants	Sample size	Condition	Intervention	Outcome	Results
Kong <i>et al</i> (2005) <sup>11</sup>	Healthy participants +experimental pain	31	Pain (heat stimuli)	Acupuncture	SASS (nine sensations and one freeform, anxiety measure)	Significant correlations of analgesia with the two sensations (soreness and numbness)
Chae <i>et al</i> (2007) <sup>10</sup>	Healthy volunteers +experimental pain	92	Pain	(A) Real acupuncture (B) Sham acupuncture (non-penetrating needle)	Questionnaire including 20 sensations	In (A), there was a correlation between the analgesic effect of real acupuncture and the sensation (burning, intense, pulsating, stinging)
Takeda and Wessel (1994) <sup>12</sup>	Patients with osteoarthritis	40	Pain	(A) Real acupuncture (B) Sham acupuncture	McGill pain questionnaire including 75 sensations	Patients who felt <i>de qi</i> experienced better treatment results than those who did not
White <i>et al</i> (2010) <sup>13</sup>	Patients with osteoarthritis	147	Pain	(A) Real acupuncture (B) Sham acupuncture (Streitberger needle)	Questionnaire including 25 sensations	No significant correlation between the strength of <i>de qi</i> and improvement in pain
Foster <i>et al</i> (2007) <sup>36</sup>	Patients with osteoarthritis	352	Pain and function	(A) Advice and exercise (B) Advice and exercise plus true acupuncture (C) Advice and exercise plus non-penetrating acupuncture	Therapists recorded the sensations that participants reported	No significant differences in change scores for pain or function between participants reporting <i>de qi</i> during more than 50% of treatment sessions compared with those who reported <i>de qi</i> less often

SASS, subjective acupuncture sensation scale, VAS, visual analogue scale.



important as the *de qi* felt by the patient.<sup>37</sup> Kim<sup>38</sup> also reported that the practitioner's needle sensations are more objective than those of patients and are necessary for obtaining treatment results. Even though there have been many attempts to assess the needle sensations experienced by the practitioner,<sup>19 39</sup> a validated *de qi* questionnaire has not been confirmed. Further studies to develop tools assessing *de qi* based on the practitioner's feeling or senses should be conducted, and for that, various approaches considering the interaction between practitioners and patients and the historical meaning of *de qi* should be used.

A recent Austrian study used ultrasonic waves to measure the distance to nerve tissue when a needle was inserted at an acupuncture point and assessed whether *de qi* was felt when nerve tissue was contacted.<sup>40</sup> Similarly, studies to investigate the reactions to acupuncture points are currently being conducted using fMRI. A Chinese study has found that fMRI results were different when the HT7 or SI6 acupuncture point was stimulated.<sup>41</sup> Another recent study found that acupuncture at different acupuncture points could induce neural responses in different brain areas.<sup>42</sup> Fang *et al*<sup>43</sup> reported that rotating the needle strengthened the effect of acupuncture on cortical neuronal activity using fMRI. When objective indexes and *de qi* are assessed together, the relationships among tissue, activated brain areas and *de qi* will be clarified. These results could help to find out how *de qi* is elicited and the role of *de qi* in acupuncture treatment.

Even in situations of similar acupuncture or similar stimulation, the degree of *de qi* that the patients felt differed by individual.<sup>30 34 44</sup> A study verifying the effects of acupuncture on emotions and cognition reported that soreness, a major element of *de qi*, was correlated with the degree of deactivation of the angular gyrus in women but not in men.<sup>45</sup> Thus, *de qi* is not uniformly manifested in all patients but can differ by individual or gender. The reason that patients feel different *de qi* even with similar acupuncture treatments might be related to why people show different treatment effects or which factors elicit *de qi*. Therefore, it is important to investigate why the magnitude and the type of *de qi* that people feel is different. An assessment of *de qi* that considers individual characteristics and circumstances is also a future research goal.

Current *de qi* assessment tools confound all kinds of sensations related to needle. Just as the early ASS versions were based on the McGill pain survey, many early studies quantitatively assessed the sensation. However, one study reported that the acupuncture needle sensations of *de qi* and sharp pain are associated with different patterns of activations and deactivations in the brain.<sup>31</sup> Also, in the previous studies, the analgesic effect of acupuncture showed correlation with several sensations including soreness,

numbness,<sup>11</sup> burning, intense, pulsating and stinging.<sup>10</sup> Even though there was an attempt to classify needle sensations into *de qi* cluster and acute pain cluster,<sup>20</sup> the sensation related to acupuncture effect is still not clear. In the future, additional studies should be conducted to elucidate which sensation is related to the therapeutic effect of acupuncture.

## CONCLUSIONS

Several questionnaires have been developed to assess *de qi*, and most of those are based on patients' experience. Also, the most frequent sensations in those questionnaires were 'heavy' and 'numb'. Even though a clear relationship between *de qi* and acupuncture point was not shown, the level of *de qi* is usually greater in real acupuncture compared to sham acupuncture according to previous studies. The relationship between *de qi* and treatment effects is controversial. It is difficult to form a clear conclusion because of the lack of research on *de qi*. Further studies using more objective indexes and considering individual characteristics should be conducted.

## Summary points

- ▶ We explored the literature on *de qi*.
- ▶ It is largely inconclusive on many aspects.
- ▶ *De qi* may be more easily elicited by EA than manual, and at some acupuncture points than non-points.

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