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Critical Comparison of Autistic Treatment with Classic Chinese Medicine and Western Homeopathy

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Abstract

More people seek alternative medicine to treat autism. The effectiveness of Chinese and homeopathic medicine have been reported. This review included 36 studies investigated the treatment efficacy of Chinese and homeopathic medicine for children with autism. This study aimed at (1) summarizing findings about therapeutic effect of Chinese medicine and homeopathy; (2) examining methodological quality of these studies; and (3) recommending further investigation and providing direction for future work. This study evaluated treatment effect of acupuncture, herbal medicine, Qigong, Tuina and homeopathic medicine for children with autism. The study showed that there was a lack of randomized controlled trials with valid statistical evidence. To conclude, neither the therapeutic effect of Chinese medicine nor that of homeopathy could be confirmed.
Introduction

Autism spectrum disorders (ASD) was a neuro-developmental disorder (Frith, 2003). It was first named by Kanner (1943), as reported by Schopler and Mesibov (1988). Its etiology had not been determined, but different theories concerning the social environment, cognitive deficits and biological factors had been proposed (Frith, 2003). According to DSM-IV (American Psychiatric Association, 1994), the diagnostic criteria of autism included: (1) qualitative impairment in social interaction; (2) qualitative impairment in social, occupational, or other areas of functioning; (3) restricted repetitive and stereotyped patterns of behavior, interests and activities; and (4) onset during infancy or childhood. In Hong Kong, over 40% of children with ASD who were taking western medicine used at least one complementary and alternative medicine (V. C. Wong, 2009). Categorized by Hanson et al. (2007), homeopathy and Chinese medicine were under the alternative medicine system, because both of them were backed by a complete medical system.

Homeopathy was developed by Dr. Hahnemann S. (1755-1843), a German physician and chemist, approximately 200 years ago (De Schepper & Xue, 2005). He proposed that every individual possessed vital force, which could eliminate toxins brought by medications, vaccinations and energetic disturbances, commonly known as diseases, and initiate a self healing process (De Schepper & Xue, 2005).

There were three main principles concerning classical homeopathy. First, ‘law of
similar’ stated that substances that caused a particular pathology could be used to cure that pathology by taking in a small dose (Fontaine, 2005). Through serial dilutions and succussions, shaking the vial vigorously in each dilution, the substances would be diluted to an extent that none of the molecules was still present in the water (De Schepper & Xue, 2005). As the substance would leave an energetic imprint in the water, when the remedy entered the body, it could stimulate the vital force and provoked a self healing process (Smits & Owens, 2010). The assumption was that vital force or life energy, in Chinese known as ‘Qi’, did exist and was involved in the immune system (De Schepper & Xue, 2005). Smits and Owens (2010) regarded autism as an energetic disease instead of a permanent physical disease, and hypothesized that when the vital energy was disturbed, the immune system would not be strong enough to resist the next energy disturbance. A disturbing energetic imprint was left behind every time the patient came across an energetic disturbance (Smits & Owens, 2010). Disturbing energies increased oxidative stress in the brain, leading to hyper-functioning or blockage of some parts and resulted in autism (El-Ansary, Al-Daihan, Al-Dbass, & Al-Ayadhi, 2010). Therefore, children with ASD might be gifted in particular areas or suffer from language, emotional and social impairment when the parts of the brain responsible for these functions were blocked (Smits & Owens, 2010). Blocked brains had no physical lesion, but they had energetic imbalance (Smits & Owens, 2010). The second major principle of homeopathy was that the body was considered as a whole, so both mental states and physical
symptoms were recorded in the diagnosis (Chapman & Wilson, 1999). The third principle was that patients’ physical, emotional, spiritual and mental symptoms and their respective onset time would be assessed and the homoeopathist would prescribe a remedy that matched the maximum number of symptoms (Chapman & Wilson, 1999).

Dr. Smits cured 300 children with ASD by homeopathy through restoring their energetic balance, and recorded his clinical experiences in his book (Smits & Owens, 2010). In many cases, parents claimed that their children were completely cured, while in other cases, great improvement in socialization, language and behavior was noted. In addition, Robinson (2001) had reported improvement in social and language skills in children with autism treated with homeopathic Secretin, a duodenal enzyme. Their works would be reviewed in this paper.

Traditional Chinese Medicine (TCM) was a system of diagnosis and health care approach originated from China approximately 3000 years ago (Williams, 2002). In the theory of TCM, Zangfu referred to the organ system in human body (Williams, 2002). Zang was composed of five solid (Yin) organs, which were the Spleen, Heart, Lungs, Liver and Kidneys, while Fu consisted of six other hollow (Yang) organs and extraordinary Fu was less important organs such as the brain and marrow (Williams, 2002). Illness in TCM was viewed as a disharmony of the patient’s energy system, so reestablishing the correct flow of Qi would restore the balance and ‘cure’ the illness (Williams, 2002). In Chinese medicine, the etiology of autism was related to the Heart, Kidney and Liver, so autism was classified into three
different types depending on which organ was the origin of impairment (Li & Liu, 2009).

The first type was caused by the congenital insufficiency of Kidney Jing, an essential component responsible for growth and development, promotion of Kidney Qi and production of Marrow (Li & Liu, 2009). Marrow was the elementary component of bone, bone marrow, the spinal cord and the brain, and Qi was regarded as ‘vital energy’ that facilitated the functioning of various organs, channels and tissues of the body (Williams, 2002). Thus, when Kidney Jing was deficient, retarded growth, low intelligence and learning difficulties could be resulted (吳暉，吴忠義，2006).

The second type was related to the impaired functioning of the Heart. Since Heart maintained joy and housed the Shen, which was a force that shaped the mental, psychological and spiritual condition of a person, malfunction of Heart would lead to a variety of mental disorders and difficulties in emotional control (Williams, 2002). This explained the emotional problems, restricted interest and stereotyped behaviors of children with ASD (Li & Liu, 2009). Moreover, Heart opened into the tongue, so impaired Heart function may result in speech and language disorders (Li & Liu, 2009).

The third type of ASD was linked to the impaired Liver function. Liver smoothed the flow of Qi, which harmonized emotions (Williams, 2002). It also regulated the blood supply to the body, which was essential in sustaining healthiness, strength and flexibility (Williams, 2002). Therefore, when there was liver stagnation, stiffness, rigidity in sudden changes and
emotional disharmony might ensue (Li & Liu, 2009). Treatment with TCM for autism commonly included different types of acupuncture such as needle and electro-acupuncture, herbal remedies, medical Qigong and Tuina, also known as massage (Li & Liu, 2009).

Chinese medicine identified the Meridian system composing of channels that carried Qi around the body (Williams, 2002). Along these channels, there were access points, known as acupuncture points, where the flow of Qi inside the body could be directly manipulated, either in or out of the body’s energy flow (Williams, 2002). Acupuncture involved inserting fine needles into the energy system at selected acu-points, in order to restore its harmony (Williams, 2002). Jin three-needle, a widely used and recognized acupuncture therapy, was first created by Jin (Yuan & Luo, 2005). Jin three-needle included three needles around each of the main acu-points in the brain, Baihui, Shenting, Naohu, and other acu-points in the body (Yuan & Luo, 2005). Liu and Li (2009), Wong and Sun (2010), Liu, Zhang, Zhang and Li (2009), Yuan, Ma and Jin (2005) and 馮勇 (2006) had treated children with autism with scalp acupuncture, tongue acupuncture, head acupuncture of nine needles of intelligence and five needles of forehead, Jin’s three-needle acupuncture and ear acupuncture. These studies and other studies related to TCM and autism would be reviewed in this paper.

Among acupuncture, herbal medicine and homeopathy, the most popular treatment was acupuncture and the least famous one was homeopathy in Hong Kong (V. C. Wong, 2009). There was 47.5% of parents with children with ASD had chosen acupuncture, 30% had
chosen Chinese herbal remedies and homeopathy occupied 5% (V. C. Wong, 2009). It was observed that there was a growing demand in complementary and alternative medicine (CAM). However, many studies that investigated the therapeutic effect of homeopathic and Chinese medicine for autism had not been summarized and critically reviewed. Therefore, the primary aim of this paper was to summarize and systematically review the autistic treatment with classic Chinese medicine and western homeopathy respectively, hoping to produce an objective estimate and appraisal of the treatment effect of them. The second aim of this paper would be providing direction and recommendation for future researches. All stages of the review would be reported, so that critical appraisal and replication could be administrated.

**Method**

Systematic review was a review that adopted a systematic approach to minimize biases and random errors which revealed in the method sessions (Egger, Smith, & Altman, 2001). In a systematic review, the heterogeneity across individual studies was examined, so that useful information could be obtained to guide rational and cost effective treatment decisions, to determine whether the available evidence was sufficient (Egger, Smith, & Altman, 2001). A systematic review in health care should go through the following stages: (1) formulation of review question, (2) defining inclusion and exclusion criteria, (3) identifying research evidence, (4) selection of studies, (5) data extraction, (6) quality assessment, (7) data synthesis, (8) interpreting the results (NHS Centre for Reviews and Dissemination, 2009).
Objective of the review

The objective of this review was to report the treatment effect of homeopathy and TCM for autism. By appraising the quality of related studies, it was hoped that a conclusive summary could be generated and areas that required further investigation could be specified.

Application of inclusion and exclusion criteria

Studies assessing the therapeutic effect of homeopathy and TCM for children with autism would be included. Trials were eligible for inclusion if all of the participants were 16 years old or below and if the studies were published or unpublished but available for public access in the years 1996-2010. This would reduce publication bias (Egger, Smith, & Altman, 2001). To decrease language bias, studies written in English and Chinese would also be included (Egger, Smith, & Altman, 2001). If the treatment effect of same patients were reported in different papers, those papers will be included unless their objectives, methods, discussions and conclusions were exactly the same. The exclusion criteria were (1) studies which reported the therapeutic effect without providing empirical data or statistically analysis, and (2) studies published in more than one journal, in such cases, only the one published prior would be taken into consideration so as to eliminate duplicate publication bias.

The search

In order to search for as many studies as possible, the literature searching process included many search engines, in English, simplified and traditional Chinese. These engines
were used because many studies related to TCM were written in Chinese, but some studies were written in English and published overseas. Procedures of the searching process were shown by the flowchart described by Khan, Kunz, Kleijnen and Antes (2003) in Figure 1.

**Figure 1.** Procedures of the searching process.

Electronic Searches

Hand Searches

**Keywords (in English, simplified and traditional Chinese):**

Autism + Chinese medicine/ homeopathy/ complementary and alternative medicine/ acupuncture/ Jin three needle/ Qigong/ Tuina/ massage

English Search Engines:
1. Hong Kong University Theses Online
2. HKU Scholars Hub
3. Hong Kong Library Science Database
4. Hong Kong Academic Library Link
5. PsycINFO
6. Cochrane Library
7. Cochrane Reviews
8. Ovid Medline
9. Embase
10. Proquest

Chinese Search Engines:
1. China National Knowledge Infrastructure
2. Shouxi
3. Taiwan Electronic Periodical Services
4. Docin
5. Baidu Wen Ku
6. Chinese Scientific Journals Fulltext Database

(45 references)

The search results were combined. (50 references in total)

Inclusion criteria applied. 14 references were excluded.

Resulted in 36 relevant studies.
Development of the data extraction sheet

To review the literatures systematically, a data extraction sheet was developed to categorize data extracted from all of the relevant studies. The data extraction process considered the following aspects: (1) the primary focus of the studies (Subcategories included therapeutic effect of homeopathy, acupuncture, herbal medicine, Qigong or a combination of acupuncture, Tuina and other western therapies for ASD); (2) the research method (for example, research design, matching of age and severity of participants); (3) the treatment method (for example, homeopathic Secretin, acupuncture, herbal medicine, Qigong); (4) patient attrition; (5) the assessment tools used to reveal the treatment effect (standardized test, non-standardized test, or both); (6) reliability measures; and (7) the statistical analysis (for example, t test, Wilcoxon sign ranked test, Mann-Whitney U test, MANCOVA).

Results

Distribution by year

Table 1 showed the distribution of studies across the past 15 years. There was a remarkable increase in the number of studies investigating the therapeutic effect of Chinese medicine and homeopathy for ASD since 2001. It was found that the 36 studies reviewed were published in the last decade.

Table 1. Distribution of studies from 1996-2010

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of studies</th>
<th>% (n=36)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996-2000</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
Primary focus of the study

Table 2 categorized and summarized the primary focus of the studies. Most of the studies reviewed (23, 63.89%) focused on the therapeutic effect of acupuncture for ASD, while five studies (13.89%) focused on the therapeutic effect of combining acupuncture with other western ASD therapies, and two (5.56%) focused on that of combining acupuncture and Tuina for ASD. There were two papers focusing on the therapeutic effect of herbal medicine for ASD (5.56%) and another two focusing on that of Qigong for ASD (5.56%) respectively. Two studies (5.56%) focused on the therapeutic effect of homeopathy for ASD.

Table 2. Primary focus of studies

<table>
<thead>
<tr>
<th>Primary Focus</th>
<th>No. of studies</th>
<th>% (n=36)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Therapeutic effect of homeopathy for ASD</td>
<td>2</td>
<td>5.56</td>
</tr>
<tr>
<td>Therapeutic effect of acupuncture for ASD</td>
<td>23</td>
<td>63.89</td>
</tr>
<tr>
<td>Therapeutic effect of acupuncture and Tuina for ASD</td>
<td>2</td>
<td>5.56</td>
</tr>
<tr>
<td>Therapeutic effect of acupuncture with other treatments for ASD (music therapy, behavior therapy)</td>
<td>5</td>
<td>13.89</td>
</tr>
<tr>
<td>Therapeutic effect of herbal medicine for ASD</td>
<td>2</td>
<td>5.56</td>
</tr>
<tr>
<td>Therapeutic effect of Qigong for ASD</td>
<td>2</td>
<td>5.56</td>
</tr>
</tbody>
</table>

Research method

Table 3 displayed the research method of the studies reviewed. The majority included an experimental and a control group in their research (21, 58.33%). There were eight studies adopting a single group design (22.22%), and six studying a single case or a series of cases (16.67%). Smits & Owens (2010) reported a number of cases treated with homeopathy based
on clinical experiences. One study utilized a multiple group design with three groups. Among the studies which had two or more groups, ten studies, nearly half of them, were randomized controlled trials. Furthermore, among these ten randomized controlled trials, only five had matched the age and severity of the participants, which were possible factors affecting the treatment outcome (Xie, 2007). Two out of these five studies were double-blinded trials.

Table 3. Research design of studies

<table>
<thead>
<tr>
<th>Research Design</th>
<th>No. of studies</th>
<th>% (n=36)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case study (single case and case series)</td>
<td>6</td>
<td>16.67</td>
</tr>
<tr>
<td>Single group</td>
<td>8</td>
<td>22.22</td>
</tr>
<tr>
<td>Two groups</td>
<td>21</td>
<td>58.33</td>
</tr>
<tr>
<td>Three groups</td>
<td>1</td>
<td>2.78</td>
</tr>
</tbody>
</table>

Treatment methods

As shown in Table 4, most studies (23, 63.89%) used acupuncture as the treatment method, and Jin three-needle (13, 36.11%) and classic acupuncture (4, 11.11%) were the most common treatment approach among them. There were three studies (8.33%) utilizing scalp acupuncture. Tongue acupuncture was applied in one study (2.78%), while electro-acupuncture was applied in two studies (5.56%). Two studies (5.56%) combined acupuncture and Tuina as treatment, and another five studies (13.89%) combined acupuncture and other therapies, including music therapy, behavioral therapy and speech therapy. Homeopathic medicine, herbal medicine and Qigong each appeared in two studies (5.56%).

Table 4. Treatment methods used in studies

<table>
<thead>
<tr>
<th>Treatment Methods</th>
<th>No. of studies</th>
<th>% (n=36)</th>
</tr>
</thead>
</table>
Homeopathic medicine 2 5.56
Acupuncture
- classic acupuncture 4 11.11
- scalp acupuncture 3 8.33
- Jin three-needle 13 36.11
- tongue acupuncture 1 2.78
- electro-acupuncture 2 5.56
(total=23) (total=63.89)
Herbal medicine 2 5.56
Qigong 2 5.56
Combination of acupuncture and Tuina 2 5.56
Combination of acupuncture with other treatments 5 13.89

Patient attrition

Among the studies reviewed, seventeen of them (47.22%) had reported that they had excluded attrite patients from their studies, while nineteen of them (52.78%) did not mention whether there was patient attrition. Six of them (16.67%) had stated the proportion of attrite patients. However, none of them had discussed on the possible reasons of patient attrition.

Assessment tools

Table 5 listed the number of studies that used standardized and non-standardized assessment tools for measuring the treatment outcome. Eleven studies used only standardized tests (11, 30.56%), and twelve (33.33%) used only non-standardized tests. Also, 12 studies (33.33%) used both standardized and non-standardized tests. One study did not report how the treatment outcome was measured. Examples of standardized tests were Childhood Autism Rating Scale (CARS), Aberrant Behavior Checklist and Functional Independence Measure for Children (WeeFIM®). Moreover, examples of non-standardized tests included Autism
Behavior Checklist (ABC), Chinese version of Children Psychoeducational Profile (C-CEP), Autism Treatment Evaluation Checklist (ATEC), etc. Among the studies reviewed, CARS (16, 44.44%) and ABC (12, 33.33%) were the most frequently used.

Table 5. Assessment tools used in studies

<table>
<thead>
<tr>
<th>Assessment Tools</th>
<th>No. of studies</th>
<th>% (n=36)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standardized tests</td>
<td>11</td>
<td>30.56</td>
</tr>
<tr>
<td>Non-standardized tests</td>
<td>12</td>
<td>33.33</td>
</tr>
<tr>
<td>Both Standardized and Non-standardized Tests</td>
<td>12</td>
<td>33.33</td>
</tr>
<tr>
<td>Not Mentioned</td>
<td>1</td>
<td>2.78</td>
</tr>
</tbody>
</table>

Reliability measures

The treatment outcome of 32 studies (88.89%) was measured by different scales such as CARS, Clancy Autism Behavior Scale, Ritvo-Freeman Real Life Scale and Clinical Global Impression-Improvement Scale, in which the rating was based on the assessor’s observation. Thus, reliability depended on the degree of inter- or intra-observer agreement (Shaughnessy, Zechmeister, & Zechmeister, 2000). No study had reported the reliability of measurement.

Statistical analysis

Table 6 showed the statistical analysis among the studies. Thirty-one studies (86.11%) offered statistical evidence to support their conclusions. Three studies (8.33%) provided the p-value without specifying the tests used for their statistical analysis. Two studies (5.56%) only reported clinical observation without any data manipulation. The majority utilized t test. Wilcoxon sign ranked test and the Mann-Whitney U test were also often used and applied in five studies respectively. Three studies only gave descriptive statistics stating the percentage
of effective cases. One study employed MANCOVA, two employed ANOVA and three employed chi square test.

Table 6. Studies with conclusion drawn from statistical evidence

<table>
<thead>
<tr>
<th>Statistical Analysis</th>
<th>Included in no. of studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>t test</td>
<td>18</td>
</tr>
<tr>
<td>Wilcoxon sign ranked test</td>
<td>5</td>
</tr>
<tr>
<td>Mann-Whitney U test</td>
<td>5</td>
</tr>
<tr>
<td>Chi square test</td>
<td>3</td>
</tr>
<tr>
<td>ANOVA</td>
<td>2</td>
</tr>
<tr>
<td>MANCOVA</td>
<td>1</td>
</tr>
<tr>
<td>Descriptive statistics only</td>
<td>3</td>
</tr>
</tbody>
</table>

Treatment effect in children with ASD

Homeopathic medicine and TCM practitioners viewed ASD as a result of ‘energetic imbalance’ (Williams, 2002). Hence, they developed methods like detoxification and stimulation of the energetic system, in an attempt to restore the natural internal homeostasis. The effectiveness of homeopathy and Chinese medicine for ASD was summarized as follows.

(1) Therapeutic effect of homeopathy for ASD

The efficacy of homeopathy for children with autism had been studied by two authors. Robinson (2001) prescribed homeopathic Secretin to 12 children with autism. Although care workers had reported improvement in social and language skills, statistical analysis revealed a worsening of symptoms in the participants. The therapeutic effect was also recorded by Smits & Owens (2010). Dr. Smits, a homeopathic practitioner, prescribed homeopathic medicine to children with autism based on the principle of detoxification. In his book, he
illustrated the procedures he followed for treating more than 300 children with ASD, and he
cited several cases in his clinic as examples. He also detected a worsening of autistic
symptoms after a short course, but he observed improvement in various aspects after the
deterioration upon continuous homeopathic medication and adjustment in the potency.
However, the positive treatment effect he claimed was not supported by statistical evidence,
only clinical observation and parent’s comments were provided.

(2) Therapeutic effect of acupuncture for ASD

The therapeutic effect of acupuncture for ASD was reported in 23 (63.89%) studies. A
number of authors concluded that acupuncture was an effective treatment for autism. All
studies (n=13) which had investigated the treatment effect of Jin’s three needle therapy
concluded that the therapy was effective in treating ASD. Liu and Yuan (2007) applied Jin’s
three needle therapy to 33 children with autism as the treatment group and sensory integration
therapy to 34 children with autism as the control group. They revealed that Jin’s three needle
therapy could significantly improve social skills, sensory, language and motor ability of
children with autism. Also, they reported that the improvement brought by Jin’s three needle
therapy was significantly larger than that brought by sensory integration therapy.

All studies (n=4) which had investigated the efficacy of classic acupuncture reported
that the therapy could induce positive treatment effect in children with autism, but only two
of them provided statistical evidence to support their findings. Yan, Wei, Chen and Chen
(2007) concluded that acupuncture combined with rehabilitation training resulted in a better therapeutic effect than that of simple rehabilitation training for children with autism. In addition, C. L. Wong (2009) reported that acupuncture could improve irritability, stereotypy and language ability of children with ASD. She also observed no sign of regression within the follow-up period or serious side effects during the experimental period.

All studies (n=3) which had studied the therapeutic effect of scalp acupuncture concluded that it was effective for treating ASD. Liu, Zhang, Zhang and Li (2009) treated 38 patients with scalp acupuncture therapy, followed by a two-year follow up period. Their result showed that scalp acupuncture had significant treatment effect for autism, particularly in solitary behaviors and communicative functions, and the treatment had no side effects.

The treatment effect of tongue and electro-acupuncture for children with ASD in a short course was found to be positive. Wong and Sun (2010) found that a short course of tongue acupuncture could improve behavioral and developmental features of children with ASD in their randomized controlled trial. Chen, Liu and Wong (2008) and Wong, Chen and Liu (2010) studied treatment effect of electro-acupuncture, and both pointed out that a short, intensive course of electro-acupuncture could improve particular features of autism.

However, a conclusion about the therapeutic effect of acupuncture for autism could yet be drawn. It was because eight studies (34.78%) used a single subject design, and 15 studies (65.22%) used a two-group design. The authors of the studies which used a two-group design
had chosen different acupuncture points. Two studies on classic acupuncture shared only two common acu-points, Sishencong and Shenting. Two studies on electro-acupuncture also shared only two common acu-points, Sishencong and Yintang. The authors investigated the effect of tongue acupuncture in ASD used the acu-points in the tongue only. Although there were ten studies with a two-group design used the acu-points proposed by Jin (Yuan & Luo, 2005), eight studies analyzed their data with $t$ test, which was inappropriate because of two independent variables in their studies (Liu & Yuan, 2007; Yuan, Ma, & Jin, 2005).

(3) Therapeutic effect of acupuncture and Tuina for ASD

Two studies investigated the therapeutic effect of acupuncture and Tuina for ASD. 馮勇 (2006) combined auricular acupuncture and Tuina to cure a ten-year-old girl. He clinically observed that she was able to follow simple contextual commands and respond to her name after receiving the treatment for half a year. 琦瑋、封玉 (2009) combined acupuncture with other therapies, mainly Tuina, to heal 13 children with autism. They concluded that using TCM as the predominant treatment approach could lead to improvement in symptoms of children with autism. Since the two studies were either a single subject or single group design, the therapeutic effect of acupuncture and Tuina for ASD could not be concluded.

(4) Therapeutic effect of acupuncture with other treatments for ASD

Common western therapies like applied behavior analysis (ABA), sensory integration, speech therapy and music therapy had been combined with acupuncture to treat autism in five
studies (13.89%). For instance, Ma, Yuan and Jin (2006) integrated acupuncture and behavior therapy to treat children with autism. They concluded that integrating acupuncture with behavior intervention created a better therapeutic effect for children with autism.

(5) Therapeutic effect of herbal medicine for ASD

Therapeutic effect of herbal medicine for children with autism was reported in two studies. One study was a case study which observed the improvement of an eight-year-old boy after taking herbal medicine for half a year (Liou & Wu, 2008). The prescription had been changed for four times during treatment period according to his symptoms. In the other study, the authors randomly divided 25 participants into the experimental and control group (嚴愉芬, 雷法清, 2007). However, among the experimental group, the prescription individual participants received varied from each other according to their symptoms. Thus, a conclusive statement of effectiveness of herbal medicine for children with ASD could not be obtained.

(6) Therapeutic effect of Qigong for ASD

The treatment effectiveness of medical Qigong had been investigated in two studies. Silva & Cignolini (2005) measured the treatment effect of medical Qigong in language ability, behaviors and motor skills of eight children with autism with standardized tests, and they found significant positive effect. Another study was a randomized controlled trial evaluating the treatment effectiveness of a five-month Qigong Sensory Training (QST) in sensory ability, digestion and sleep (Silva, Schalock, Ayres, Bunse, & Budden, 2009). The result showed that
QST led to significant classroom improvement of social and language skills and reduction in autistic behavior. As there was only one study with a two-group design, a conclusion on whether Qigong was effective in treating children with autism could not be drawn.

Summary

The above showed the representative findings of the studies about treatment effect of homeopathy and TCM. As stated, a conclusion could not be generated due to a lack of randomized controlled trials and statistical evidence. The therapeutic effect of homeopathy was more affected by the limited number of studies and statistical evidence, because no studies investigating this topic had used a two-group or multiple group design. Meanwhile, many studies evaluating the treatment effect of TCM had used a single subject or group design. Also, many studies that had a two-group or multiple group design did not randomize the participants, blind them and the assessors, and use appropriate statistical tests to analyze the data collected. The issues addressed would be further discussed and elaborated.

Discussion

In order to review and summarize the treatment effect of homeopathy and Chinese medicine for children with autism, it was necessary to consider the methodological quality, including validity and reliability, of studies in both fields. The research design, treatment method used, treatment outcome assessment and data processing should be evaluated with extra care to ensure a minimum of biases and an accurate conclusion.
Internal validity was referred to as the degree of correctness of the result of a study under circumstances being investigated, while external validity was described as the degree of correctness of the result of a study being generalized to different circumstances (Shaughnessy, Zechmeister, & Zechmeister, 2000). Therefore, randomization, blinding, patient attrition, treatment regimens, statistical analysis and side effects all contributed to the validity (Khan, Kunz, Kleijnen, & Antes, 2003).

In order to confirm the effectiveness of a treatment, randomized group designs must be employed (Egger, Smith, & Altman, 2001). An ABAB design, multiple baselines or post-treatment long term follow-up were necessary to show the treatment efficacy of a single case or group study (Shaughnessy, Zechmeister, & Zechmeister, 2000). Among the studies reviewed, there was no randomized controlled group trial in the field of homeopathy, and only ten studies (27.78%) in the field of TCM utilized randomized controlled group design. Among these studies with randomized controlled groups, solely five of them matched the age and severity of participants in different groups. It had been recommended that children with ASD in different groups should be matched for their chronological age and severity, as these were main factors influencing the treatment outcome (Xie, 2007). This ensured homogeneity before treatment, so that improvement in children with ASD could be attributed to the treatment. For the studies without randomized controlled groups (14, 38.89%), only one study investigating homeopathy demonstrated multiple baseline in data collection (Robinson, 2001),
while one study investigating TCM could report long-term efficient percentage (Liu, Zhang, Zhang, & Li, 2009). Therefore, treatment effect could not be concluded from the studies without a good research design and without ensuring the homogeneity between groups.

An account for the lack of double-blinded randomized controlled trials may be the unique characteristics of homeopathy and TCM. The treatment of them for each patient should be individualized, so that even for the same disorder, the treatment could vary. As a result, it was difficult to divide participants into just the experimental and control group.

Another concern about research design was whether practitioners, outcome assessors, participants and their caregivers were blinded. Blinding these people could avoid detection bias (Egger, Smith, & Altman, 2001). There were three double-blinded, randomized controlled trials in all studies reviewed, but one of them did not match the groups for their age and severity before treatment. Therefore, there were only two double-blinded, randomized controlled trials.

Patient attrition was one of the main aspects in assessing the quality of a study. Patient attrition appeared in 17 studies (47.22%). It may be attributed to the unwillingness to participate further, a clinical decision of ceasing the intervention, side effects of the treatment or the impossibility of contacting the patients (Egger, Smith, & Altman, 2001). Patients not adhering to treatments often implied some kind of relation with the prognosis, so the outcome assessment result of all participants should be recorded (Egger, Smith, & Altman, 2001).
However, only six studies (16.67%) had reported the proportion of attrite patients, and none of them had discussed about the implications of patient attrition. When patient attrition was not well reported and discussed, validity of the studies may be adversely influenced.

Treatment regimens were also an important aspect of validity. Though ten studies included two randomized groups, two of them had administrated acupuncture therapy to both the experimental and control groups (劉剛, 2006; Yuan, Ma, & Jin, 2005). As a result, the treatment effect of acupuncture alone could only be observed in the rest eight studies.

Another issue affecting the validity of a study was the statistical analysis of the trial (Egger, Smith, & Altman, 2001). Statistical analysis was applied in 86.11% of the studies (n=31). Statistical evidence was required in order to examine the treatment effect of a therapy, so it was suggested that statistical analysis should be used before concluding that a therapy was effective. Among the studies which had employed statistical analysis, five studies provided the p-value, but the authors did not state what statistical tests were conducted for their analysis. This threatened the external validity (Egger, Smith, & Altman, 2001).

$t$ test was the most common statistical test applied among the studies reviewed (58.06%). In 18 studies using the $t$ test, thirteen of them adopted a two or multiple group design. In six of them, the pre-treatment baseline was homogenous between different groups, while seven studies had not ensured homogeneity before treatment. Although six studies had ensured homogeneity before treatment, two of them had investigated two independent
variables, age and group. Consider that $t$ test was used to identify if there was any significant difference between two sample means, ANOVA should be applied to analyze those studies with two independent variables (Munro, 1997). Therefore, these two studies did not analyze the data appropriately. Moreover, one of the six studies involved three groups, and the difference among group means were identified and compared by $t$ test and ANOVA, but the authors did not specify the type of ANOVA used. For the seven studies without measuring homogeneity before treatment, factorial ANOVA instead of $t$ test should be applied because time and group were considered as two independent variables (Munro, 1997). Only one of these seven studies had applied ANOVA, but the type of ANOVA used was not specified. Hence, these seven studies could not provide statistical evidence to support their conclusions.

In total, ten studies with a multiple groups design had used $t$ test inappropriately to manage their data, so the validity of their results was seriously affected. In the five studies using $t$ test in a single group design, three of them had a small sample size (n<30). Their statistical analysis was inappropriate because $t$ test was a parametric test (Munro, 1997). It was recommended that if the sample size was small and the sample was not a normal distribution, Wilcoxon sign ranked test should be used, as it did not require the assumption of a normal distribution and could be applied for repeated measures (Munro, 1997). In the other two studies with a larger sample size, none of them indicated whether the $t$ test they used was a repeated measure $t$ test, a parametric test for within group design researches (Shaughnessy,
In brief, none of the five single group design studies provided valid statistical evidence to support the positive treatment effect they reported.

In addition to validity, reliability of the studies was also an important issue in this review. The treatment outcomes of 32 studies (88.89%) were measured by different scales, while the other studies (n=4, 11.11%) reported their treatment outcome basing on clinical observations only. The degree of inter-observer or intra-observer agreement reflected the reliability of the conclusion of the studies (Shaughnessy, Zechmeister, & Zechmeister, 2000). It was found that none of the studies had reported reliability for their rating of the scales. The reliability of the treatment outcome may have been ignored and it was low in these studies.

To sum up, only two studies reviewed was of higher quality that enabled a concrete conclusion (C. L. Wong, 2009; Wong, Chen, & Liu, 2010). The authors employed blinding, involved two randomized groups and utilized appropriate statistical tests to analyze their data. Wong, Chen, & Liu (2010) assessed the treatment effect of electro-acupuncture, while C. L. Wong (2009) examined that of classic acupuncture, and they had chosen different acu-points. Since the number of studies with comparable results was small and therapies of the two studies differed, it was not likely to proceed to meta-analysis in the meantime (Egger, Smith, & Altman, 2001). More high quality studies examining the treatment effect of homeopathy and TCM for autism should be generated, so that meta-analysis could be conducted.

**Limitation**
The major limitation of this review may be the language use of the researches of homeopathy. Since it was originated from Germany, many researches may have been conducted by Germans and written in German. However, those papers were excluded from this review. For this reason, the number of studies on homeopathy may have been limited.

**Recommendation**

As the only two studies related to homeopathy either employed a single group design or did not provide statistical evidence, it was recommended that more investigation on the treatment effect of homeopathy for ASD should be conducted. Furthermore, more researches on treatment effect of TCM for ASD should also be administrated, because only two studies related to TCM were of higher quality that a reliable and valid conclusion could be made. Therefore, it was recommended that investigators should design a randomized controlled trial, recruit a more homogeneous group of autism and examine the treatment effect in different subgroups. The researchers should also blind the practitioners, assessors and participants, report and explain patient attrition, ensure that the treatment duration was long enough, use appropriate assessment tools to measure treatment outcome and apply valid statistical tests. It was also recommended that the acu-points for autism should be more universal, so that the results among different studies could be more homogeneous and comparable.

Due to individualized prescription of homeopathic and Chinese medicine, it may be difficult to recruit a homogeneous group of participants, and a single group design may be
inevitable. Under such circumstance, it was suggested that the treatment regimen for each individual should be clearly reported. Also, an ABAB design, multiple pre-treatment baseline and post-treatment long-term follow up should be employed. With a long-term follow up period, the long term effect and maintenance effect could be documented.

CARS was used in 16 studies (44.44%) to measure treatment outcome, but it was developed for diagnosis and was inappropriate for evaluating treatment outcomes (Robinson, 2001). Autism Treatment Evaluation Checklist (ATEC) was recommended for measuring the treatment effect, because it included more specific autistic symptoms (Robinson, 2001). Moreover, more objective assessment could be used, for example, neuro-imaging techniques could be utilized to study the therapeutic mechanism of acupuncture for ASD.

In addition, future researches should be written in English. Studies written in Chinese and German were also recommended to be translated into English, so that the studies could be repeated and published in international journals, and further investigation could be done in the English-speaking western countries.

**Conclusion**

To conclude, treatment effect of homeopathy and TCM for ASD could not be confirmed due to insufficient number of high quality studies. A lack of blinding, randomization, addressing of attrition, reporting of reliability and valid statistical evidence were common problems among studies reviewed. These should be improved in future studies.
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烯瑋、封玉 (2009)。針刺、推拿為主治療兒童孤獨症語言障礙 13 例。中醫研究，22(4)，54-55。
Appendix

The following were studies included in this review paper.


劉振寰、張宏雁、張春濤、李諾 (2009)。益智頭針治療小兒孤獨症的臨床研究。第二屆國際神經修復學會年會論文匯編。

袁青、吳至鳳、汪睿超、趙妍、郎建英 (2009)。靳三針療法對自閉症不同臨床症狀療效觀察。新中醫，41(3)，83-85。

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汪睿超 (2008)。靳三針治療重度兒童自閉症臨床療效研究。檢索自

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