Psychological benefits of Tai chi exercise for breast cancer patients undergoing chemoradiotherapy

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Background

Breast cancer is the most common neoplasm diagnosed among women worldwide and is the leading cause of female cancer death [1]. The diagnosis and expenses for treatment thrust women on a journey that disorganizes their daily function and family roles with much fear and uncertainty [2].

Chemotherapy is widely used in the treatment of breast cancer and causes many adverse effects, such as hair loss, vomiting, nausea, anorexia, fatigue, anxiety, and sleep disturbance [3]. Fatigue is a common symptom among patients with cancer when undergoing radiotherapy and chemotherapy [4].

Background

- Tai Chi, a traditional oriental health-promoting exercise, is similar to aerobic exercise in several aspects[5].
- As a popular mind-body intervention, Tai Chi has been demonstrated to reduce cancer-related fatigue in breast cancer patients[6].
- Besides low- to moderate-intensity physical activity, Tai Chi also contains elements of meditation, body awareness and breathing[7].


Objectives & Methods

1. In the Tai Chi group, participants practiced simplified 24-Tai Chi style.
2. Each session was set for one hour, between approximately 9 and 10 AM, including a sequence of 10 minutes of warm-up and review of Tai Chi actions, 30 minutes of Tai Chi exercise, 10 minutes of breathing and meditation techniques, and 10 minutes of relaxation.

Methods

1. From January 2016 to December 2017
2. Participants were randomly allocated to the Tai Chi group and the control group with a ratio of 1:1 by computer-generated random number.

Eligibility criteria

1. Patients with breast cancer undergoing chemoradiotherapy;
2. 18 years ≤ age ≤ 70 years;
3. Willing to participate in this study;
4. Simultaneously suffered from other tumor diseases;
5. With concomitant diseases such as heart disease, diabetes, anemia, severe respiratory system diseases and movement disorders;
6. Participated in Tai Chi exercise before;
7. With contraindications of chemotherapy or radiotherapy.

Exclusion criteria

1. Patients with breast cancer undergoing chemoradiotherapy;
2. 18 years ≤ age ≤ 70 years;
3. Willing to participate in this study;
4. Simultaneously suffered from other tumor diseases;
5. With concomitant diseases such as heart disease, diabetes, anemia, severe respiratory system diseases and movement disorders;
6. Participated in Tai Chi exercise before;
7. With contraindications of chemotherapy or radiotherapy.
Objectives & Methods

Flow chart

Eligible patients (n=135)
- Excluded before randomization (n=18)
  1. With concomitant disease (n=9)
  2. Practiced Tai Chi before (n=5)
  3. With contraindications (n=4)

randomized (n=117)
- Tai Chi group (n=59)
  - Completed the trial (n=50)
  - Withdrawals (n=9)
    1. Treatment intolerance (n=6)
    2. Unwilling to insist on exercise (n=3)
- Control group (n=58)
  - Completed the trial (n=49)
  - Withdrawals (n=9)
    1. Treatment intolerance (n=9)
Objectives & Methods

Mood state was evaluated by Profile of Mood States-short form (POMS-SF) including six dimensions: Tension-anxiety; Depression-frustration; Tired-dull; Anger-hostility; Confused-chaotic; Energy-vigor.

Statistical analysis were performed by SPSS Statistics 21.0
Differences in categorical variables were compared by $X^2$ test
Differences in POMS-SF scores were compared by t test
## Results

Table 1: The baseline Demographic Characteristics of Participants in Two Groups

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Tai Chi</th>
<th>Control</th>
<th>(X^2)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;30</td>
<td>20</td>
<td>18</td>
<td>0.724</td>
<td>0.699</td>
</tr>
<tr>
<td>30-50</td>
<td>34</td>
<td>37</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;50</td>
<td>5</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary school</td>
<td>7</td>
<td>8</td>
<td>1.360</td>
<td>0.530</td>
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<tr>
<td>Middle school</td>
<td>39</td>
<td>42</td>
<td></td>
<td></td>
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<tr>
<td>University and above</td>
<td>13</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marital status</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>7</td>
<td>5</td>
<td>0.334</td>
<td>0.762</td>
</tr>
<tr>
<td>Not single</td>
<td>52</td>
<td>53</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Results

Table 2: Comparisons of POMS-SF Between Two Groups

<table>
<thead>
<tr>
<th></th>
<th>Tai Chi group (n=59)</th>
<th>Control group (n=58)</th>
<th>Tai Chi group (n=59)</th>
<th>Control group (n=58)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Before intervention</td>
<td>After intervention</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tension-anxiety</td>
<td>4.21 ± 1.87</td>
<td>4.19 ± 1.76</td>
<td>4.12 ± 1.56&lt;sup&gt;A&lt;/sup&gt;</td>
<td>4.80 ± 1.91</td>
</tr>
<tr>
<td>Depression-frustration</td>
<td>3.62 ± 1.28</td>
<td>3.60 ± 1.35</td>
<td>4.71 ± 1.85&lt;sup&gt;+&lt;/sup&gt;</td>
<td>6.84 ± 2.72&lt;sup&gt;*&lt;/sup&gt;</td>
</tr>
<tr>
<td>Tired-dull</td>
<td>3.96 ± 1.73</td>
<td>4.02 ± 1.80</td>
<td>4.26 ± 1.77&lt;sup&gt;A&lt;/sup&gt;</td>
<td>6.73 ± 2.35&lt;sup&gt;*&lt;/sup&gt;</td>
</tr>
<tr>
<td>Anger-hostility</td>
<td>4.31 ± 1.54</td>
<td>4.29 ± 1.58</td>
<td>4.50 ± 1.83&lt;sup&gt;A&lt;/sup&gt;</td>
<td>5.29 ± 2.17&lt;sup&gt;*&lt;/sup&gt;</td>
</tr>
<tr>
<td>Confused-chaotic</td>
<td>5.08 ± 2.23</td>
<td>5.12 ± 2.16</td>
<td>5.63 ± 2.04&lt;sup&gt;A&lt;/sup&gt;</td>
<td>6.74 ± 2.45&lt;sup&gt;*&lt;/sup&gt;</td>
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<tr>
<td>Energy-vigor</td>
<td>8.24 ± 2.16</td>
<td>8.27 ± 2.05</td>
<td>8.21 ± 2.25&lt;sup&gt;A&lt;/sup&gt;</td>
<td>5.40 ± 2.41&lt;sup&gt;*&lt;/sup&gt;</td>
</tr>
<tr>
<td>Total sentiment</td>
<td>30.76 ± 9.45</td>
<td>31.07 ± 9.51</td>
<td>34.75 ± 9.92&lt;sup&gt;+&lt;/sup&gt;</td>
<td>45.87 ± 12.83&lt;sup&gt;*&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

Note: <sup>*</sup>P<0.05 compared with the same group before intervention;
<sup>+</sup>P<0.05 compared with the control group after intervention.
The negative dimension scores of the control group except the tension-anxiety dimension were significantly increased in the study, and the energy-vigor dimension score decreased. Accordingly, the patient's total sentiment score increased significantly, confirming that chemoradiotherapy can actually aggravate patients' negative emotions.

In Tai Chi group, all negative dimension scores and the total sentiment score were significantly lower, while energy-vigor dimension score was higher, than those in control group after intervention, which suggested that Tai Chi exercise ameliorated patients' negative emotion.

Through controlled breathing, moving of the body and meditation, one can reach “body relaxation and mind calm” and Tian Ren He Yi during Tai Chi exercise[8].
Discussion & Conclusion

- Tai Chi meditation can improve psychological health by promoting the general well-being, counteracting stress, and leading to a better vigor of spirit[9].
- Thickened cortex in some brain area after long-term Tai Chi practice uncovered a neural mechanism of Tai Chi practice connecting to the improved psychological health[10].
- Tai Chi exercise has been found to improve emotional function following cancer treatment[11].
- This study suggests that Tai Chi exercise can generate positive effects on psychology in multiple dimensions, thus help to improve the negative emotions of breast cancer patients undergoing chemoradiotherapy.