Inspiratory muscle training and quality of life in patients with heart failure: Systematic review of randomized trials

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Patients with chronic heart failure (CHF) may present abnormalities in cardiovascular, musculoskeletal and respiratory systems [1–3], and these abnormalities may have important implications for quality of life as well as in their poor prognosis [4]. Thus, a primary objective in the management of these patients is to improve quality of life, and the assessment of this variable should be an important and useful outcome measure for evaluating benefits of medical and physical therapy interventions [5]. Randomized clinical trials (RCTs) have focused on the effects of inspiratory muscle training (IMT) on inspiratory muscle strength and endurance, which leads to improvement on quality of life in these patients [6–8]. However, the studies analysing these benefits are small and discordant. Therefore, we performed a systematic review comparing IMT to control groups [placebo-IMT (the same regimen as the IMT group, except that the treatment was performed with a lower inspiratory load or with no inspiratory load) or another intervention] on quality of life in patients with CHF.

We included RCTs assessing IMT compared to control groups in the treatment of CHF patients with the New York Heart Association (NYHA) functional class I, II or III, follow-up longer than 6 weeks which evaluated quality of life. We searched the following databases: MEDLINE, Physiotherapy Evidence Database, Cochrane Central Register of Controlled Trials and the bibliographies of published studies. The search was performed in July 2011 and comprised the following terms: “breathing exercises”, “inspiratory muscle training”, “respiratory muscle training”, “heart failure” combined with a high sensitivity combination of words used in the search for RCTs [9]. There was no language restriction. Titles and abstracts of all articles identified were independently evaluated by two investigators. All abstracts that did not provide sufficient information regarding the eligibility criteria were selected for full-text evaluation and disagreement were solved by consensus.

The search strategy yielded 119 abstracts, from which four studies were included (n = 150). The reasons for exclusion of the 115 studies were: 21 studies with duplicated citations, 84 studies excluded based on review of title and/or abstract (no CHF patients, no randomized trials, no IMT intervention) and 10 studies excluded on secondary review (5—no randomized trials, 2—no IMT intervention, 3—no outcome).

Three studies compared IMT to placebo-IMT [6,8,10] and one study [7] compared IMT plus aerobic exercise (AE) to AE alone. The characteristics of each trial are summarized in Table 1. Quality of life was assessed with the Minnesota Living With Heart Failure Questionnaire [6,7], Disease Specific Questionnaire [10] or Turkish version of the SF-36 [8].

Dall’Ago et al. [6] included only patients with inspiratory muscle weakness and observed an improvement in quality of life comparing before and after treatment measurements in the IMT group (27 ± 17 to

Table 1
Trial characteristics.

<table>
<thead>
<tr>
<th>Study</th>
<th>Characteristics of patients</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Johnson et al. [10]</td>
<td>Patients: 8/8</td>
<td>IMT: Threshold load 30% PImax adjusted for each increment of PImax.</td>
</tr>
<tr>
<td></td>
<td>Age: 70 ± 4.6/63.4 ± 4.5</td>
<td>P-IMT: Threshold load 15% PImax.</td>
</tr>
<tr>
<td></td>
<td>NYHA (I/II/III): 0/12/6</td>
<td>– Both groups: trainers for 15 min twice daily for at least 8 weeks.</td>
</tr>
<tr>
<td>Dall’Ago et al. [6]</td>
<td>Patients: 16/16</td>
<td>IMT: Threshold load 30% PImax; adjusted weekly to maintain 30% PImax.</td>
</tr>
<tr>
<td></td>
<td>Age: 54 ± 3/58 ± 2</td>
<td>P-IMT: Threshold no load.</td>
</tr>
<tr>
<td></td>
<td>NYHA (I/II/III): 4/6/6/4/5/7</td>
<td>– Both groups trained 30 min daily, 7 days per week, for 12 weeks.</td>
</tr>
<tr>
<td>Bosnak-Guclu et al. [8]</td>
<td>Patients: 16/14</td>
<td>IMT: Threshold load 40% PImax; training loads were adjusted weekly to maintain 40% of the PImax.</td>
</tr>
<tr>
<td></td>
<td>Age: 69.5 ± 7.9/65.7 ± 10.5</td>
<td>P-IMT: Threshold load 15% PImax.</td>
</tr>
<tr>
<td></td>
<td>NYHA (I/II/III): 1/2/1; 0/5/0/9/5</td>
<td>Training group: IMT (Threshold load 30% PImax; adjusted weekly to maintain 30% PImax—30 min daily, 7 days per week, for 12 weeks) plus aerobic exercise (supervised exercise program performed 3 times per week, for 12 weeks).</td>
</tr>
<tr>
<td>Winkelmann et al. [7]</td>
<td>Patients: 12/12</td>
<td>Control group: Aerobic exercise (supervised exercise program performed 3 times per week, for 12 weeks).</td>
</tr>
<tr>
<td></td>
<td>Age: 54 ± 12/59 ± 9</td>
<td>NYHA (I/II/III): not reported</td>
</tr>
</tbody>
</table>

IMT = inspiratory muscle training; P-IMT = placebo-inspiratory muscle training; PImax = maximal inspiratory pressure; NYHA = New York Heart Association.

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The presence of an atrial electromechanical delay in idiopathic atrial fibrillation as determined by tissue Doppler imaging

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Atrial fibrillation (AF) derives from a complex continuum of predisposing factors. However, the true ‘scene of calamity’ is the atrium. Increased left atrial (LA) size is associated with increased risk of AF onset and recurrence, other cardiovascular disease and mortality [1, 2]. Both atrial conduction slowing and atrial dilatation will favour AF as it results in increased total atrial conduction time, which is the time elapsed between the initiation of atrial depolarisation and the last depolarisation of the same activation front [3]. A prolonged total atrial conduction time may reflect the electro-anatomical substrate for AF since it is associated with underlying cardiovascular disease and age [4]. It can be easily and non-invasively determined by means of transthoracic echocardiography assessing the electromechanical PA interval with tissue Doppler imaging (PA-TDI) [5]. Idiopathic AF refers to AF in the absence of a cardiovascular or pulmonary disease generating the pathophysiological substrate for the arrhythmia. Herein, we study the electrophysiological properties of the atria in patients with idiopathic AF using tissue Doppler imaging.

We prospectively studied 41 consecutive idiopathic AF patients and 45 healthy sinus rhythm control patients who were referred to the outpatient clinic for a standard transthoracic echocardiographic examination. Informed consent of all patients was obtained and the authors of this manuscript have certified that they comply with the Principles of Ethical Publishing in the International Journal of Cardiology.

References