

Original Article

Fan Therapy Is Effective in Relieving Dyspnea in Patients With Terminally Ill Cancer: A Parallel-Arm, Randomized Controlled Trial

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Abstract

Context. Dyspnea is a common distressing symptom among patients with advanced cancer.

Objective. The objective of this study was to determine the effect of fan therapy on dyspnea in patients with terminally ill cancer.

Methods. This parallel-arm, randomized controlled trial included 40 patients with advanced cancer from a palliative care unit at the National Cancer Center Hospital in Japan. All patients experienced dyspnea at rest with a score of at least three points on a subjective 0- to 10-point Numerical Rating Scale (NRS), showed peripheral oxygen saturation levels of $\geq 90\%$, had an Eastern Cooperative Oncology Group grade of 3 or 4, and were aged 20 years or more. In one group, a fan was directed to blow air on the patient's face for five minutes. This group was compared to a control group wherein air was blown to the patient's legs. Patients were randomly assigned to each group. The main outcome measure was the difference in dyspnea NRS scores between fan-to-face and fan-to-legs groups.

Results. No significant differences were seen in baseline dyspnea NRS between groups (mean score, 5.3 vs. 5.1, $P = 0.665$). Mean dyspnea changed by -1.35 points (95% CI, -1.86 to -0.84) in patients assigned to receive fan-to-face and by -0.1 points (-0.53 to 0.33) in patients assigned to receive fan-to-legs ($P < 0.001$). The proportion of patients with a one-point reduction in dyspnea NRS was significantly higher in the fan-to-face arm than in the fan-to-legs arm (80% [$n = 16$] vs. 25% [$n = 5$], $P = 0.001$).

Conclusion. Fan-to-face is effective in alleviating dyspnea in patients with terminally ill cancer. J Pain Symptom Manage 2018;■:■-■. © 2018 American Academy of Hospice and Palliative Medicine. Published by Elsevier Inc. All rights reserved.

Key Words

Dyspnea, neoplasms, palliative care, randomized controlled trial, nursing

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Introduction

Dyspnea, a common and distressing symptom among patients with advanced cancer, is defined as an unpleasant or uncomfortable sensation during breathing.^{1,2} This symptom has negative physical, emotional, and psychosocial effects. The prevalence of dyspnea increases as patients approach death,^{3,4} and its alleviation is, therefore, critically important to improve the quality of life in such patients. Management of dyspnea includes treatment of the underlying causes with various combinations of pharmacological therapy and nonpharmacological approaches.⁵⁻⁷

Fan therapy, often used to palliate dyspnea, uses a fan to blow air in the direction of the patient's face. The mechanism by which fan therapy provides relief from symptoms of dyspnea is not yet clear; however, direct stimulation of the face, nasal mucosa, or pharynx, as well as changes in facial temperature by cooling due to the airflow, may affect the ventilation patterns.⁸⁻¹⁰

Although fan therapy is recommended by various clinical guidelines,¹¹⁻¹³ there is limited empirical evidence to support its effectiveness.^{14,15} A randomized trial conducted by Galbraith et al. reported that fan therapy was effective in reducing dyspnea, but the subjects studied were patients with different primary advanced diseases, and included 11 patients with primary or secondary lung cancer.¹⁶ Galbraith et al. conducted a second single-arm study targeting a similar population ($n = 31$) and reported that half of the participants showed reduced intensity of dyspnea with fan therapy.¹⁷ Other randomized controlled trials targeting patients with cancer have involved small sample sizes ($n = 21$) with varying performance status.¹⁸ Wong et al.¹⁹ in a randomized controlled trial (RCT) of patients with terminally ill cancer reported on the effectiveness of fan therapy. However, this study had neither an adequate sample power analysis nor a clear definition of the target population. Alleviating dyspnea in patients with terminally ill cancer is a crucial issue; therefore, it is important to evaluate the effectiveness of fan therapy in these patients. However, adequately powered RCTs have not been conducted to examine the efficacy of fan therapy for dyspnea in such patients. Given the minimal potential side effects, low cost, practical convenience, and immediate responses, a well-designed clinical trial evaluating the effectiveness of fan therapy will be of great value.

The primary aim of this study was, therefore, to evaluate the effectiveness of fan therapy for dyspnea in patients with terminally ill cancer. In addition, we aimed to investigate the changes in patients' facial surface temperature and physiological parameters, after fan therapy.

Methods

Study Design

We conducted a parallel-arm RCT (Japanese Clinical Trials Register UMIN000023345; https://upload.umin.ac.jp/cgi-open-bin/ctr_e/ctr_view.cgi?recptno=R000026902) and recruited patients between September 28, 2016, and August 25, 2017. We adopted a parallel control design because in our pilot study, the washout period for fan therapy that may affect the study outcome needed to be more than one hour, which indicated that a crossover design was inappropriate.^{17,20} Fig. 1 shows the CONSORT flowchart for patient selection.

Participants and Settings

Participants were recruited from a palliative care unit of the National Cancer Center Hospital East, Chiba, Japan. Patients were required to meet the following inclusion criteria: 1) metastatic or locally advanced cancer, 2) not undergoing current or further anticancer treatment, 3) dyspnea while sitting or lying at rest with a score of at least three points on a 0- to 10-point Numerical Rating Scale (NRS) (0 = no breathlessness; 10 = worst possible breathlessness); 4) peripheral oxygen saturation levels $\geq 90\%$; 5) Eastern Cooperative Oncology Group grade of 3 or 4; 6) aged ≥ 20 years; and 7) no cognitive impairment and able to communicate in Japanese. Owing to the lack of an established definition, we defined our target population (patients with terminally ill cancer) using the criteria of disease (metastatic or locally advanced), treatment (no anticancer treatment), and performance status. The exclusion criteria were fever $> 38^\circ\text{C}$ in the preceding 24 hours, a hemoglobin level ≤ 6 g/dL, and diseases or treatments affecting the trigeminal nerve.

Interventions and Procedures

Fan therapy constituted of directing a fan to blow air for five minutes across the region innervated by the second/third trigeminal nerve branches. The fan (model PJ-B3CLL [SHARP, Sakai-ku, Sakai, Japan]; five blades; size, $37 \times 35.6 \times 84$ cm) was directed toward one side of the face. The rationale for using five minutes of directed airflow was based on previous findings that this protocol achieved symptom palliation.^{16,17,20} As in previous studies,¹⁶ the distance, location, side of the face, strength, and swing of the fan were determined as per the patient's preferences.^{16,18,20} A standing fan placed on the floor was applied at the lowest speed initially and was gradually adjusted to increase the speed and strength of the fan breeze. In the control arm, airflow was directed onto the legs with the patient's skin exposed for five minutes using the same model of fan as that

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