Contents lists available at ScienceDirect

Respiratory Investigation

journal homepage: www.elsevier.com/locate/resinv

Original article

Physical activity in daily life in patients with idiopathic pulmonary fibrosis

*Osamu Nishiyama**, *Ryo Yamazaki*, *Hiroyuki Sano*, *Takashi Iwanaga*, *Yuji Higashimoto*, *Hiroaki Kume*, *Yuji Tohda*

Department of Respiratory Medicine and Allergology, Kindai University Faculty of Medicine, 377-2 Onohigashi, Osakasayama, Osaka 589-8511, Japan

ARTICLE INFO

Article history:
Received 15 December 2016
Received in revised form
21 June 2017
Accepted 21 September 2017
Available online 23 October 2017

Keywords:
Idiopathic pulmonary fibrosis
Physical activity
Sedentary; Survival

ABSTRACT

Background: Idiopathic pulmonary fibrosis (IPF) is characterized by progressive impairment of lung function and degradation of daily activity; however, this degradation has not been adequately elucidated. The objective of this study was to measure the physical activity of patients with IPF to determine its relationships with physiological parameters and survival rate.
Methods: In total, 31 patients with IPF and 20 age-matched healthy participants were enrolled in this study. Physical activity was assessed using a physical activity monitor. The relationships among physical activity, physiological data, questionnaire-based patient-centered data, and survival were examined.
Results: Physical activity, expressed as daily activity energy expenditure (AEE), was significantly lower, and the percentage of sedentary time was significantly longer in patients with IPF than in healthy participants. Moreover, AEE was moderately correlated with body-mass index, forced vital capacity, diffusing capacity of carbon monoxide, and partial arterial pressure of oxygen. Relatively strong correlation was also observed between AEE and the 6-min walk distance, but not with daily dyspnea, depression, and health-related quality of life scores. Prognostic analysis indicated that daily AEE was a significant predictor of survival.
Conclusions: Patients with IPF were significantly inactive compared with age-matched healthy participants. In patients with more impaired physiological functions, the lower the physical activity was, the more was the sedentary time increased. Furthermore, lower daily physical activity resulted in significantly worse survival.

© 2017 The Japanese Respiratory Society. Published by Elsevier B.V. All rights reserved.

Abbreviations: AEE, activity energy expenditure; BDI, Baseline Dyspnea Index; BMI, body mass index; COPD, chronic obstructive pulmonary disease; DLco, diffusing capacity of carbon monoxide; FEV_1, forced expiratory flow in 1 s; fIIP, fibrotic idiopathic interstitial pneumonia; FVC, forced vital capacity; HADS, Hospital Anxiety and Depression Scale; IPF, idiopathic pulmonary fibrosis; $PaCO_2$, partial arterial pressure of carbon dioxide; PaO_2, partial arterial pressure of oxygen; SD, standard deviation; SGRQ, St. George's Respiratory Questionnaire; SpO_2, transcutaneous oxygen saturation; 6MWD, 6-min walk distance; 6MWT, 6-min walk test

*Correspondence to: Department of Respiratory Medicine and Allergology, Kinki University Faculty of Medicine, Osaka-sayama, Osaka 589-8511, Japan. Fax: +81 72 367 7772.
E-mail addresses: nishiyama_o@yahoo.co.jp (O. Nishiyama), ryo-y@med.kindai.ac.jp (R. Yamazaki), hsano@med.kindai.ac.jp (H. Sano), iwanaga@med.kindai.ac.jp (T. Iwanaga), yhigashi@med.kindai.ac.jp (Y. Higashimoto), hkume@med.kindai.ac.jp (H. Kume), tohda@med.kindai.ac.jp (Y. Tohda).

http://dx.doi.org/10.1016/j.resinv.2017.09.004
2212-5345/© 2017 The Japanese Respiratory Society. Published by Elsevier B.V. All rights reserved.

1. Introduction

Idiopathic pulmonary fibrosis (IPF) is a debilitating disease that is characterized by progressive impairment in lung function and degradation of daily activity. Lung function, such as forced vital capacity (FVC), is now recognized as one of the important outcomes in clinical trials and cohort studies of IPF, because it significantly predicts survival [1]. Exercise capacity, such as a 6-min walk distance (6MWD) and maximal oxygen consumption measured by a cardiopulmonary exercise test, is decreased in IPF and is considered a significant predictor of survival [2–4]. However, the actual daily life physical activity in patients with IPF has not been adequately elucidated.

Recently, physical activity has been of focal interest in chronic obstructive pulmonary disease (COPD) [5]. Patients with COPD have reduced physical activity, which is not completely reflected by the disease severity when determined via the lung function [6,7]. More importantly, physical activity is reportedly a stronger predictor of survival than is forced expiratory volume in 1 sec (FEV_1) and exercise capacity assessed by a 6-min walk test (6MWT) [8].

The question remains as to whether the reduction in physical activity due to IPF is similar to that in COPD and is associated with the survival rate. To address this, patients with IPF and age-matched healthy participants were prospectively recruited, and physical activity was measured to determine its relationship with physiological parameters and survival rate.

2. Patients and methods

2.1. Study population and design

This study was a prospective, controlled, observational study. A total of 31 patients with a diagnosis of IPF were prospectively recruited from outpatient settings in our university hospital (Kindai University Hospital, Osakasayama, Osaka, Japan) and represented the IPF group. The diagnosis of IPF was in accordance with the criteria set forth by the American Thoracic Society (ATS), European Respiratory Society, Japanese Respiratory Society, and Latin American Thoracic Association [9]. Patients were excluded if an infection or acute worsening of the disease had occurred within 3 months or if they had unstable comorbid illnesses. Further excluded were patients who could not undertake a pulmonary function test and a 6MWT, patients who were on any anti-inflammatory or antifibrotic therapy, and patients who were receiving long-term oxygen therapy. Eligible patients were evaluated for their physical activity and were followed-up to record mortality.

In addition, 20 age-matched healthy participants without lung disease were included in the control group. Their physical activities were also evaluated to enable a comparison with the eligible patients with IPF.

Written informed consent was obtained from all study participants. The study protocol was approved by the ethics committee of Kindai University, Faculty of Medicine on December 13, 2010 (No. 22–49).

2.2. Measurement of physical activity

Patients and study participants were equipped with an Actical® physical activity monitor (Mini Mitter Co., Inc., Respironics, Inc, OR, USA). The Actical activity monitor is an accelerometer that senses motion in all directions. It is water resistant, lightweight (17 g), small ($2.8 \times 2.7 \times 1.0\ cm^3$), and has a data storage capacity of 64,800 data points that will saturate after 44 days of measurement using 1-min recording intervals. The monitors are initialized and downloaded using a serial port computer interface. The device measures the activity energy expenditure (AEE), which is defined as the relative energy expenditure to perform a task above resting metabolism and includes steps taken per day. Caloric expenditure was approximated for the time spent at four physical activity intensities: sedentary; light, ~0.031 kcal/min/kg; moderate, ~0.083 kcal/min/kg; and vigorous, ~0.083 kcal/min/kg. The accuracy of the Actical monitor for predicting AEE and the time spent at each activity intensity has been validated [10]. Participants were instructed to wear the monitoring device on their hip, using a strap, continuously for 7 consecutive days, except while bathing and sleeping. The AEE and time spent at each activity intensity were calculated based on the average daily value.

2.3. Pulmonary function tests

All study participants underwent spirometry (CHEST AC-55V; Chest, Tokyo, Japan), according to the method described in the guidelines of the ATS [11]. Single-breath diffusing capacity of the lung for carbon monoxide (DL_{CO}) was also measured (CHEST AC-55V; Chest, Tokyo, Japan) [12]. The values of the forced vital capacity (FVC) and DL_{CO} were related to the percentage of the predicted values [13,14].

2.4. The 6-min walk test

The 6MWT was conducted in all participants according to the ATS statement [15]. Briefly, all patients were tested under standardized conditions by trained physicians. After the baseline blood pressure, heart rate, and oxygen saturation were measured, patients were asked to walk as far as possible in 6 min. The total distance walked, as well as their heart rate and oxygen saturation immediately after the test, were recorded. Patients were also asked to rate their dyspnea at the end of the test using the modified Borg scale. Briefly, patients selected a number from 0 to 10, with 0 representing no dyspnea and 10 representing the maximal sustainable dyspnea [16].

2.5. Assessments of dyspnea in daily living, anxiety, depression, and health-related quality of life

The severity of dyspnea in daily living was assessed using the Baseline Dyspnea Index (BDI) [17], which recognizes three grades for each of the following categories: functional impairment, magnitude of the task, and magnitude of the effort.

Download English Version:

https://daneshyari.com/en/article/8750748

Download Persian Version:

https://daneshyari.com/article/8750748

Daneshyari.com