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ORIGINAL ARTICLE

Occupational Contact Dermatitis in the Wind Energy Industry[☆]

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KEYWORDS

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PALABRAS CLAVE

Dermatitis de
contacto;
Profesional;
Industria eólica;
Resinas epoxi;

Abstract

Background and objectives: In 2010, wind energy coverage in Spain increased by 16%, making the country the world's fourth largest producer in a fast-developing industry that is also a source of employment. Occupational skin diseases in this field have received little attention. The present study aims to describe the main characteristics of skin diseases affecting workers in the wind energy industry and the allergens involved.

Material and methods: We performed a descriptive, observational study of workers from the wind energy industry with suspected contact dermatitis who were referred to the occupational dermatology clinic of the National School of Occupational Medicine (Escuela Nacional de Medicina del Trabajo) between 2009 and 2011. We took both a clinical history and an occupational history, and patients underwent a physical examination and patch testing with the materials used in their work.

Results: We studied 10 workers (8 men, 2 women), with a mean age of 33.7 years. The main finding was dermatitis, which affected the face, eyelids, forearms, and hands. Sensitization to epoxy resins was detected in 4 workers, 1 of whom was also sensitized to epoxy curing agents. One worker was sensitized to bisphenol F resin but had a negative result with epoxy resin from the standard series. In the 5 remaining cases, the final diagnosis was irritant contact dermatitis due to fiberglass.

Conclusions: Occupational skin diseases are increasingly common in the wind energy industry. The main allergens are epoxy resins. Fiberglass tends to produce irritation.

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Dermatitis de contacto profesional en la industria eólica

Resumen

Introducción y objetivos: En el año 2010 la energía eólica en España incrementó su capacidad de cobertura un 16%, lo que posiciona al país en el cuarto lugar del mundo en este sector industrial, de gran desarrollo económico y fuente de empleo. Las dermatosis profesionales en este campo han sido poco estudiadas. Con el presente estudio se pretende describir las principales características de la afectación cutánea en sus trabajadores y los alérgenos implicados.

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Fibra de vidrio;
Bisfenol F;
Molinos de viento

Material y método: Se realiza un estudio descriptivo y observacional de trabajadores de la industria eólica con sospecha de dermatitis de contacto remitidos a consulta de Dermatología Laboral de la Escuela Nacional de Medicina del Trabajo entre 2009 y 2011. Se realizó historia clínica, historia laboral, exploración física y pruebas epicutáneas según los materiales manipulados por estos trabajadores.

Resultados: Se estudiaron 10 trabajadores (8 hombres, 2 mujeres) pertenecientes a esta industria. La media de edad fue de 33,7 años. El cuadro principal fue eccema que afectaba a la cara, a los párpados, a los antebrazos y a las manos. En 4 trabajadores se encontró una sensibilización a resinas epoxi, uno de ellos presentó, además, sensibilización a sus endurecedores. Un paciente se encontraba sensibilizado a la resina de bisfenol F, con negatividad de la resina epoxi de la batería estándar. En los 5 casos restantes el diagnóstico final fue el de dermatitis de contacto irritativa por fibra de vidrio.

Conclusiones: Las dermatosis ocupacionales en la industria eólica son cada vez más frecuentes. Las resinas epoxi son sus principales alérgenos, mientras que la fibra de vidrio suele producir cuadros irritativos.

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Introduction

Wind has been used as an energy source since ancient times, when people began to apply it to pump water, propel boats, and grind grains. The modern wind industry came into being in 1979 with the mass production of turbines moved by large blades, which have increased in diameter over time from 20-30 m to the 90 m currently used by the highest-output turbines (Fig. 1). During the last 10 years, world wind energy production has increased considerably, with the result that production now stands at 196 630 MW.¹ In 2010, China was the world's leading wind energy producer, with Spain in fourth place after the United States and Germany.² Spain has 889 wind farms with 18 933 turbines distributed throughout the country; the farms are located mainly in Castile and Leon, Castile-La Mancha, Galicia, and Andalusia. The highest installed capacity is in Castile and Leon.³

The advantages of wind energy are that it is renewable, nonpolluting, and easily obtained if the turbines are installed in a suitable location. Its main disadvantages, however, are the high cost of the aerogenerators, in which production of energy is intermittent, and the fact that the energy cannot be stored.⁴ Aerogenerators are manufactured

mainly in Denmark, Portugal, Spain, and Germany. The materials used in their construction include carbon fiber and synthetic fiber (aramids), as well as epoxy resin and curing agents. The manufacturing process varies according to needs, and fiberglass is now replacing carbon fiber.⁵ An aerogenerator costs €2-3 million and has a half-life of 20 years.

People who work in the manufacture of wind turbines must use special protective clothing, gloves, and goggles to prevent exposure to these substances, which are irritants and sensitizing agents. Few studies have examined skin diseases in the wind turbine industry. Rasmussen et al.⁶ reported a prevalence of 10.9% for occupational allergic contact dermatitis; the allergen was epoxy resin in 60.6% of cases and epoxy curing agents in 37.9%. Our study aimed to describe the skin symptoms presented by these workers and the allergens causing occupational contact dermatitis in this industry.

Material and Methods

We performed a descriptive observational study of patients working for companies that produced aerogenerators with suspected occupational contact dermatitis who were referred to the dermatology clinic of the National School of Occupational Medicine (Escuela Nacional de Medicina del Trabajo) in Madrid, Spain between 2009 and 2011. We took a general clinical history and occupational history, and patients underwent a physical examination. We studied the products to which the workers were exposed in their jobs by analyzing the product safety data sheets and conducting interviews with representatives of the company.

The patch tests applied were the standard series of the Spanish Contact Dermatitis and Skin Allergy Research Group (GEIDAC) and the epoxy resin series of Chemotechnique Diagnostics (Table 1). Other specific panels were used in some cases depending on the allergens specified on the product safety data sheet and in the clinical history. The patches were placed on the patient's back, where they remained under occlusion for 48 hours. The results were read at 2, 3, and 6 days and reported according to the criteria of the



Figure 1 Modern aerogenerator.

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