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Work-related asthma in a sample of subjects with established asthma

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ABSTRACT

Objective: To assess the impact of occupational exposure to irritants or sensitizers on the occurrence, recrudescence and worsening of asthma and to identify unrecognized cases of work related asthma (WRA) including Work-Exacerbated Asthma (WEA) and Occupational Asthma (OA), in a general asthma clinic population sample.

Setting, design and participants: The study was a population-based cross sectional survey. 1289 asthmatic subjects (from 15 to 46 yrs old) living in a vast district of Tuscany (Italy) were identified from the Medical Reimbursement Register of the National Health System. 893 subjects agreed to take part in the study. Subjects who were currently working or had worked in past were classified in different categories of occupational risk exposure (No, Low or High) according to the italian standard classification for industries and job titles, associated with the judgment of occupational hygiene experts.

Results: 41% of subjects worked in industries and in job titles at risk for exposure to airway irritants and/or sensitizers, 48.6% reported an occupational exposure to gases, dust and fumes, more males than females. Prevalence of WEA and OA was higher in subjects who worked at higher risk exposure; these subjects reported a higher prevalence of markers of asthma severity (asthma control, level of treatment, FEV1) than subjects without WRA. Risk of WEA was significantly associated to female gender, older age, and self-reported exposure, while risk of OA was associated to job title with higher exposure risk to occupational asthmogens.

Conclusions: Our study shows a high prevalence of WRA (especially WEA) associated with employment in industries and job titles at risk for airways sensitizers and/or irritants; data also support a role for occupational exposure in determining a poor asthma control and a higher level of asthma severity.

1. Introduction

Asthma is common among adults in Europe, and its prevalence (about 7%) has markedly increased in recent decades [1], thus posing now a major public health problem and a frequent cause of disability at work. It is therefore of paramount importance to identify modifiable risk factors for this disorder. Epidemiologic evidence suggests that most variations in the prevalence of asthma are due to environmental more than to genetic factors. Approximately 5–20% of cases of adult asthma are attributable to occupational factors, which is consistent with a role for work in initiating asthma [2,3].

The associations between occupational exposure and asthma is probably underestimated because the prevalence of work related asthma (WRA) – which includes occupational asthma (OA) specifically caused by occupational sensitizers or irritants, and work-exacerbated asthma (WEA), in which pre-existing asthma is made worse by work – has not been well defined, due in part to variable definitions, diagnostic criteria, and work settings, as well as incomplete surveillance data. The awareness of magnitude and

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management of WRA nevertheless highlights a significant potential for the primary prevention of new cases and the secondary and tertiary prevention of disease progression and disability [4].

Large population-based studies could provide deeper insight into the extent and the characteristics of WRA. To date surveillance systems usually underestimate these features and only a few population-based studies have previously estimated occupation-specific risks of asthma [3,5–7], showing large discrepancies in the prevalence of work-related asthma.

The aim of this study was to assess the impact of occupational exposure on the occurrence, recrudescence and worsening of asthma, and to identify unrecognized cases of WRA in a general asthma population sample. As opposed to previous study protocols [8–10], we enrolled subjects with a clinically well-established diagnosis of asthma, as derived from the national health service record of patients with medication reimbursement for asthma. This record includes all patients with a diagnosis of asthma performed by a pulmonary specialist according to standard criteria (GINA report, update 2011), in order to have free access to asthma evaluation over time and treatment, as appropriate. For this purpose, we investigated in this group of young asthmatic subjects the potential influence of the work exposure on asthma symptoms and severity.

2. Subjects and methods

2.1. Study population

The study was a population-based cross sectional survey. During the year 2008, 1289 asthmatic subjects (from 15 to 46 yrs old) living in a vast district of Tuscany (Italy) of about 400.000 inhabitants, were contacted by telephone and invited to a medical examination. The cases were identified from the Medical Reimbursement Register of the National Health System and all those who had received the special reimbursement right for asthma investigations and medications at the end of 2007 and were alive were selected.

Eight hundred ninety three subjects agreed to take part in the study. Six hundred eighty four respondents (76.6%) were currently in full time employment, 82 (9.1%) had retired and 127 (14.2%) were unemployed. The analyses of this paper were restricted to the 684 subjects who were currently in full-time employment.

The data reported are related to the investigations performed in the medical examination in the Occupational Health Clinic. This included a detailed questionnaire exploring asthma and work characteristics, spirometry, level of pharmacologic treatment and asthma control.

2.2. Questionnaire

A trained survey investigator administered to all subjects a standardized computer assisted questionnaire, which collected informations on the demographic characteristics, smoking history, global health status, asthma severity, pharmacologic therapy, work history and current work status [11,12]. The questionnaire was specifically developed for this study and was based on existing instruments [13–15]. The questionnaire required 15–20 min to complete.

Specific sections addressed asthma management, symptoms timing and severity, career choice and history, and demographic and socioeconomic data. Asthma history and management-related variables included identification of asthma care providers, allergies, rhinitis and/or eczema, asthma triggers, smoking history, medication use and the perceived impact of asthma on daily life. Asthma control assessment was based on GINA criteria [16], and included frequency of weekly nocturnal awakening due to asthma, day-time asthma symptoms, activity limitation related to asthma, short-acting bronchodilator use, and number of exacerbations in the previous 12 months.

Respondents were asked about the occurrence and the frequency of asthma symptoms caused or worsened by work, whether in the current job or in the past. Occupational specific variables included knowledge of occupational factors that may aggravate asthma and the impact of asthma in occupational career. Current and past occupations of the respondents was coded in two different ways: 1) according to the 2007 “ATECO” statistical classification (Nomenclatore “ATtività ECOnomiche”) of the Italian National Institute of Statistic (ISTAT), national version of european statistical classification of economic activities “Nace Rev. 2”, to categorize economic sectors; 2) according to 2001 Italian ISFOL (Istituto per lo Sviluppo della Formazione Occupazionale dei Lavoratori, which means Institute for the Development of Vocational Training of Workers) classification, based on the International Standard Classification of Occupations (ISCO) used by the European Community, to categorize job titles. In addition, a subjective assessment of the type and severity of current occupational exposure to gas, fumes and dusts (GFD) was asked.

Using national classifications of industry and job titles, occupational exposure to possible asthma triggers/sensitizers (asthmogens) of each referred industry and job titles was thereafter classified as None, Low or High, according to the opinion of 3 experts familiar with both local and national exposures at work (Appendix 1). Self reported exposure to dusts, gases, and fumes in the current occupation was estimated by the response to the following question:” Are you exposed to dusts, gases, or chemical fumes ?” (presence/absence).

2.3. Assessment of work-related asthma (WRA), work exacerbated asthma (WEA) and occupational asthma (OA)

According to the American College of Chest Physicians Consensus Statement (4), Work-related asthma (WRA) includes occupational asthma (OA) and Work-exacerbated asthma (WEA). OA refers to asthma caused by occupational exposure to specific sensitizers or irritants. WEA, unlike OA, is not initially brought about by occupational exposures, and is defined as pre-existing or concurrent asthma that is worsened by workplace conditions [15].

Subjects answering “Yes” to al least one of the 7 questions in Appendix 2 were categorized as having WRA. Subjects with suspected OA (according to age of onset of asthma symptoms, occupational exposure to well-known sensitizers, and positive response to item questions no. 4 and/or no. 5 of Appendix 2) underwent further investigations (full history collection, methacholine challenge test, specific challenge test when available, PEF monitoring in and out of work), and defined as affected by OA on the basis of the final judgment of a panel of experts (new diagnoses of OA). In addition, subjects with a previous diagnosis of OA already accepted by the Italian National Work Insurance Institute on the basis of specific examinations performed in a specialized asthma clinic, and subjects with a history suggestive of OA in relation to an earlier work and who have lost their previous job due to asthma (question no. 6 of the Appendix) were also placed in OA category (established diagnoses of OA).

2.4. Pulmonary function tests

Spirometry with assessment of forced expiratory volume in 1 s