

Work-Aggravated Asthma in the Workplace Due to Environmental Exposure: A Case Report

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ABSTRACT

Work-aggravated asthma is an important and common subtype of work-related asthma. Air pollutants in the workplace are important risk factors for triggering asthma symptoms. Air pollutants can be caused by the operating conditions of the work process, as well as by indoor and outdoor air pollution. In this study, a case of work-aggravated asthma is discussed. An office worker, who had been following up with a diagnosis of asthma for 6 years, was diagnosed with work-aggravated asthma. The reason underlying this diagnosis was the smoke and dust from nearby factories as well as the antiseptic substances used in the workplace. Following the diagnosis, the patient's workplace was changed by the management. After such change, the patient's symptoms have relieved and she needed less inhaler therapy than before. In summary, work-aggravated asthma can be exacerbated by factors in the workplace environment. Hence, the workplace environment should also be carefully questioned while assessing the risk factors at work.

Keywords: work aggravated asthma, occupational, environment.

INTRODUCTION

Workplace conditions have a significant impact on the health of employees [1]. Asthma is one of the most common work-related diseases caused by dust exposure. Asthma is also the second most common chronic respiratory disease worldwide [2]. It is a condition characterized by varying degrees of airflow restriction and/or bronchial hypersensitivity. Typically, symptoms such as dyspnea and cough begin when the employee presents at the work environment and stop or decrease when the employee leaves this environment [3]. Work-aggravated asthma is a type of asthma that exists before work or develops concurrently with work and worsens under workplace conditions [4].

Work history, respiratory function tests (RFT), pefmeter monitoring, non-specific and specific bronchial provocation test (BPT), skin tests, and serological tests (specific and total Ig E) are all important to diagnose work-related asthma. Specific BPT is widely regarded as the gold standard in the diagnosis of occupational asthma. However, it is not always possible to apply all of these to all workplace risk factors. Therefore, pefmeter monitoring is also considered crucial in diagnosis [5]. The minimum and maximum values of PEF measurements are compared while working and on weekends. Low PEF values and daily high variability values during working periods are more likely to be associated with occupational asthma than values

during resting periods [6]. Air pollutants in the workplace are frequently caused by job execution conditions or indoor/outdoor air pollution [7]. This study presents a case of work-aggravated asthma caused by exposure to indoor and outdoor air pollution, ambient dust, and antiseptic substances commonly used during the pandemic period.

CASE

A 39 years-old female patient had been diagnosed with asthma for six years and she was taking bronchodilator therapy when she applied to our outpatient clinic. She had complaints of cough, shortness of breath, and watery eyes for 8 years. Her complaints had increased in the last four months at the workplace where she recently started working. She applied to the chest diseases outpatient clinic and was referred to our occupational disease outpatient clinic with the suspicion of occupational asthma.

She was working as a secretary in the office of a public institution in 2002-2003 and she had no active complaints in this time-period. She did not work anywhere between 2003-2007. From 2007- to December 2017, she had worked as an office worker in a different building of the same public institution for about 10 years. She was working in a room with windows and no central ventilation and she was exposed to dust especially during archive editing works. She stated that her complaints of sneezing, runny nose and tearing in the eyes began in that period. Between July 2018 and March 2020, she worked as a secretary in a different building of the same institution for about 1.5 years. It was a windowed building without any central ventilation, and her complaints regressed during such period. Her last workplace was in an industrial market with factories, and she was working in a windowed room with no central ventilation. Air pollutants such as smoke and soot from nearby factories polluted the air inside the room. At the same time, she had to work in the archive for about 4 hours 2 to 3 days a week at this workplace and was exposed to the dust accumulated on the files there. Due to the pandemic, disinfectant products and cologne were frequently used in the workplace. She stated that her symptoms increased due to these exposures. Her mother also had a history of asthma. She also had a history of food allergy (to some spicy foods)

and penicillin allergy. Physical examination was normal. The lung radiography taken in June 2020 was normal. New spirometric examination could not be performed due to pandemic.

Pefmeter monitoring was performed to evaluate the case in terms of occupational asthma. She worked in flexible shifts due to the pandemic conditions. For this reason, pefmeter monitoring could not be done during 2 weeks of working and 2 weeks of rest, but the working and non-working periods were evaluated during the follow-up. In order to show PEF variability, the follow-up period was extended, and 40-day PEF monitoring was performed. Measurements were made on daily basis in the morning, noon, evening, and night (Three measurements were made each time, the highest value was taken). It was observed that the basal PEF values during the working periods were lower than the basal PEF values during the rest period. However, it was found that the daily PEF variability during the working periods was about %12 (Figure 1).

The patient was diagnosed with work-aggravated asthma after a thorough examination of the patient's the current work history, clinical, radiological, spirometric findings, PEF meter monitoring results, and defined occupational and environmental risk factors. Following the diagnosis, the workplace of the case was changed by the management and she was assigned to another building of the same company in another district. There was no air pollution here. After that, a significant improvement was observed in the patient's clinic and need for bronchodilator treatment was reduced. Figure 1 depicts the change in pefmeter monitoring following a workplace change. Basal PEF values increased from 320 to 360 while working.

DISCUSSION

The onset or exacerbation of asthma-related symptoms after contact with substances used in the workplace is the main factor that leads to the diagnosis of occupational asthma. Occupational asthma is quite common in the chemical and agricultural industries. However, it may occur depending on the specific job tasks and materials used in each profession [8,9]. Although our patient was a secretary working in an office,

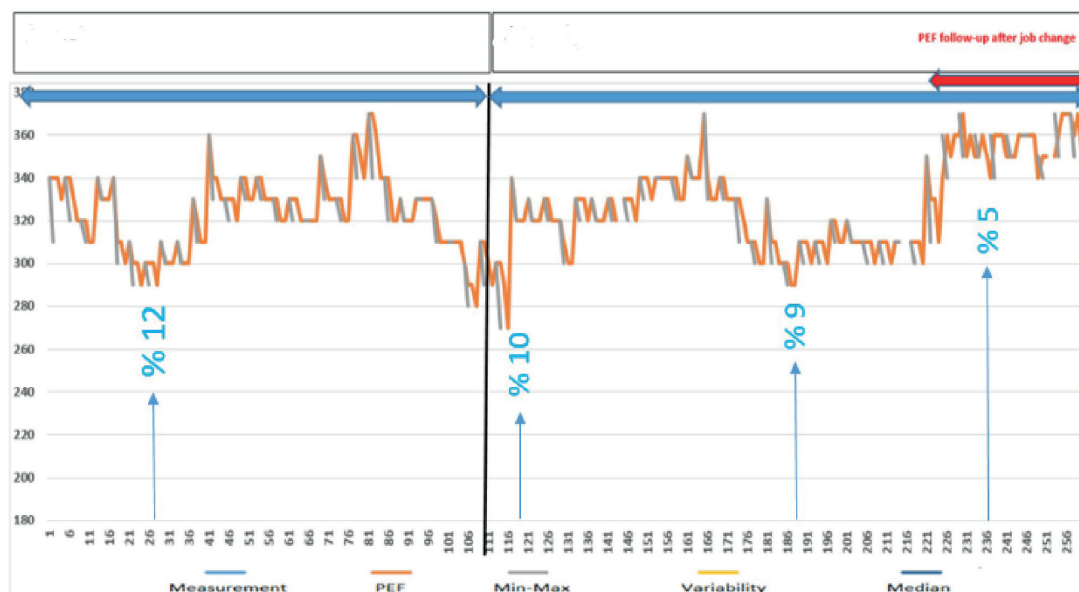


Figure 1. Daily PEF change during working and resting periods and after job change (Blue arrows show PEF variability's highest amplitudes of working periods).

she was most likely affected by smoke and dust exposure from nearby. In addition, disinfectants that started to be used during the pandemic period may have exacerbated her symptoms. Air pollution is associated with harmful odors, and odors can exacerbate asthma symptoms. Air pollution is one of the factors responsible for the increase in asthma incidence in most industrialized countries. Clinicians should be aware of common air pollutants that can affect asthmatic patients [10]. In addition, susceptibility to house dust mites is a major risk factor for asthma exacerbations and the development of asthma. Dust mites thrive in fabric-covered objects at warm temperatures and humidity levels above 50% [10]. Hence, it is difficult to distinguish asthma caused by work or non-work-related factors. For this reason, the use of daily pefmeter monitoring and showing the causal relationship between the suspected agent and asthma symptoms also have high diagnostic value [11]. Examining PEF records at work and at rest (Figure 1), daily PEF variability, weekly PEF variability, average PEF values at work and at rest were obtained and used as diagnostic criteria.

In conclusion, our patient's complaints have been present since 2012 and symptoms have worsened after exposure to dust and fumes from the workplace environment. PEF variability

was found to be higher while working, and the patient was diagnosed with work-aggravated asthma. Occupational hygiene applications and measurements in the workplace make significant contributions to physicians' patient evaluation and management. On the other hand, however, the inability to measure air pollutants in or around the workplace was an important limitation. Thus, we aimed to demonstrate that work-aggravated asthma can occur not only as a result of workplace exposures but also as a result of exposures around the workplace, also in addition to the effect of disinfectant substances on asthma symptoms.

Author contribution

Study conception and design: NA, CS, and AD; data collection: NA; analysis and interpretation of results: NA and CS; draft manuscript preparation: NA, CS, and AD. All authors reviewed the results and approved the final version of the manuscript.

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Conflict of interest

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REFERENCES

- [1] Çolak Ş. Fiziksel Risk Faktörleri. Yıldız AN, Sandal A, editors. İş Sağlığı ve Güvenliği Meslek Hastalıkları. Ankara: Hacettepe Üniversitesi; 2020. p. 289.
- [2] GBD Chronic Respiratory Disease Collaborators. Prevalence and attributable health burden of chronic respiratory diseases, 1990-2017: a systematic analysis for the Global Burden of Disease Study 2017. *Lancet Respir Med.* 2020;8(6):585-596. doi:10.1016/S2213-2600(20)30105-3
- [3] Cartier A. Definition and diagnosis of occupational asthma. *Eur Respir J.* 1994;7(1):153-160. doi:10.1183/09031936.94.07010153
- [4] Henneberger PK, Redlich CA, Callahan DB, et al. An official american thoracic society statement: work-exacerbated asthma. *Am J Respir Crit Care Med.* 2011;184(3):368-378. doi:10.1164/rccm.812011ST
- [5] Akkurt İ. Mesleki astım. *Solunum Hastalıkları. Güneş Tıp Kitapevi;* 2004. p. 256-273.
- [6] Arkan Erdoğan G. Mesleki astım. *Güncel Göğüs Hastalıkları Serisi.* 2019;7(2):141-149.
- [7] Türk Toraks Derneği. Astım Tanı ve Tedavi Rehberi 2016 Güncellemesi. Official Journal of the Turkish Thoracic Society, 2016;(Supplement 17).
- [8] Gannon PF, Bright P, Campbell M, O'Hickey SP, Burge PS. Occupational asthma due to glutaraldehyde and formaldehyde in endoscopy and x ray departments. *Thorax.* 1995;50(2):156-159. doi:10.1136/thx.50.2.156
- [9] Pisati G, Baruffini A, Bernabeo F, Stanizzi R. Bronchial provocation testing in the diagnosis of occupational asthma due to latex surgical gloves. *Eur Respir J.* 1994;7(2):332-336. doi:10.1183/09031936.94.07020332
- [10] Pinheiro GA. ATSDR Case Studies in Environmental Triggers of Asthma: November 28, 2014. Available from: <https://www.atsdr.cdc.gov/csem/asthma/docs/asthma.pdf>
- [11] Côté J, Kennedy S, Chan-Yeung M. Quantitative versus qualitative analysis of peak expiratory flow in occupational asthma. *Thorax.* 1993;48(1):48-51. doi:10.1136/thx.48.1.48