VIA MEDICA

CASE REPORT

Int Marit Health
2022; 73, 3: 112–114
10.5603/IMH.2022.0021
www.intmarhealth.pl

ISSN 1641-9251
eISSN 2081-3252

Occupational asthma, rhinitis and contact urticaria in a salmon-processing worker

David Lucas[1, 2, 3], Greta Gourier[2, 3], Richard Pougnet[2, 3, 4], Jean-Dominique Dewitte[2, 3, 4], Brice Loddé[1, 2, 3]

[1]ORPHY Laboratory, University Brest, France
[2]Occupational and Environmental Diseases Centre, Teaching Hospital, Brest, France
[3]French Society of Maritime Medicine, Brest, France
[4]Laboratoire d'Etude et de Recherche en Sociologie (EA 3149), Université de Brest, France

ABSTRACT

We report a case of occupational allergy to salmon combining allergic asthma, allergic rhinitis and allergic contact urticaria in a 59-year-old salmon-processing worker. Parvalbumin is the most common allergen, but indeed sensitisation to tropomyosin, preservatives and spices could occur.

(Int Marit Health 2022; 73, 3: 112–114)

Key words: occupational diseases, occupational asthma, contact urticaria, case report, salmon

INTRODUCTION

Various seafood and fishes are known to cause occupational asthma (OA), contact urticaria (CU) and protein contact dermatitis. In the majority of published clinical cases, allergic occupational diseases are separately diagnosed [1, 2]. We report a case of occupational allergy to salmon combining allergic asthma, allergic rhinitis and allergic CU.

CASE REPORT

The patient was a 59-year-old smoking man working in a salmon-processing plant in Brittany for 11 years. He was referred to our department to investigate a 3-years history of cough exacerbated at the workplace. He was assigned to a fresh salmon-filleting line in a plant of smoked salmon production in Brittany. He was only in contact with fresh salmon. He reported daily symptoms of rhinitis followed by dry cough without sputum occurring minutes to hour after starting work tasks. He also described itchy wheals on his hands about 30 minutes after contact with water from salmon preservatives tanks. Intensity and frequency of symptoms increased during last 3 years. He had to left workplace after few hours at work and was out of work for 6 months before medical consultation. In January 2020, he recalled a severe episode of dyspnoea with wheezing necessiting monitoring at an emergency department. His symptoms improved when he was out of work. He was wearing gloves and mask at work but medical examination revealed the unsuitable wearing of the devices.

In February 2020, the patient underwent spirometry. Functional respiratory tests showed minimal airway obstruction with a forced expiratory volume in the first second (FEV1) of 2.2 l (66% of predictive value), forced vital capacity (FVC) of 3.2 l below the fifth percentile and FEV1/vital capacity of 0.69. He began a controller asthma treatment with a fixed combination of formoterol/fluticasone 20/500 µg/d. Two months later new functional spirometry tests showed an FEV1 of 3.63 l (108% of predictive value), FVC of 4.83 l (114% of predictive value), FEV1/vital capacity of 73% and total lung capacity of 7.96 L (115%).

Skin prick tests (SPT) to common aeroallergens, latex and professional cleaning products on a normal reactive skin (negative control, 0 mm; positive control, 5 mm) were negative. Skin prick tests in prick to prick with different

Dr. David Lucas, Occupational and Environmental Diseases Centre, Teaching Hospital, 4 Av Foch F-29200, Brest, France, tel: +33298223509, e-mail: david.lucas@chu-brest.fr

Received: 12.08.2022 Accepted: 30.09.2022

Figure 1. Prick tests to common allergens and salmon occupationally handled (near elbow)

types of fresh salmon (Norwegian, Scottish, organic) from her plant were all extremely positive, (respectively, 19 mm, 15 mm, 20 mm) with pseudopods (Fig. 1). Specific IgE were 10.5 kUA/L for salmon and 1.14 kUA/L for parvalbumin.

At the medical examination, the patient did not have any urticaria or angioedema. Testing for dermographism gave negative results. He described a dry cough and dyspnoea. Pulmonary examination did not find wheezing. The patient was counselled regarding avoidance of contact with salmon. Following this diagnosis, his management redirected him to an administrative work. Since starting this new job, symptoms have completely disappeared.

In February 2021, 1 year after allergen exposure avoidance, the patient underwent another spirometry. The functional parameters showed her asthma to be stable with FCV of 5.2 l, FEV1 of 3.1 l and FEV1/FCV of 60%.

History of work-related rhinitis and asthma symptoms, confirmation of bronchial asthma with improvement of airway obstruction (increase of FEV1), the clear positivity of skin prick tests and specific IgE, resolution of pulmonary and dermatological symptoms after exposure eviction allows us to conclude to an OA caused by salmon [3].

DISCUSSION

Occupational exposure to seafood and fish allergens occurs mainly in the food and fishing industry [1, 4]. Reactions can occur through inhalation of aerosols generated during cutting, scrubbing, cleaning, or through the skin as a result of direct handling of the seafood and fish itself [1, 4]. Wiszniewska et al. [5] reported a clinical case of a seafood production worker with severe asthma, rhinitis, conjunctivitis and CU caused by exposure to squid. For salmon-processing workers, most cases reported are IgE mediated OA. Occupational asthmatic reactions to salmon have been demonstrated with prevalence at 8% among automated salmon processing workers [6]. In a study including 70 workers of a Norwegian salmon-processing company, wheezing was noted for 5.7% on Mondays, and 7.1% of workers have been diagnosed with asthma [7]. In another study, 3 cases of OA to salmon were found in a population of 26 salmon-processing workers [8]. Exposure assessment in this salmon-processing plant showed elevated concentrations of salmon allergen at the filleting machine and table. Most OA related to fish are case-reports of sensitisation secondary to inhalation of wet aerosols in fish processing workers and fishmongers, but no case has been described in fishermen [9].

In a recent paper published by Mason et al. [10] on data from the Surveillance of Work-related and Occupational Respiratory Disease, authors found 58 cases of OA in seafood processors in period 1992–2017. They estimated the annual average incidence rate of OA in the United Kingdom seafood processing sector as 70/100 000 (95% confidence interval: 49–91) employees over the period 1992–2017. Prawns, salmon and trout are the most implicated agents and they found high airborne levels of tropomyosin and parvalbumin in occupational monitoring data.

Fish processors are also exposed to endotoxins with levels of airborne concentrations in the range between 6.8 and 136 EU/m^3 [11]. Shiryaeva et al. [7] found levels of endotoxin at 29 EU/m^3 in salmon-processing plants and more specifically a very high level of airborne endotoxin found in water from the transport tank (779 EU/mL) was

described [8]. Recent studies underlined high levels of endotoxin in several plants and for a salmon-processing plant high atmospheric levels of mould spores (*penicillium notatum*, *aspergillus aspergillus* and *cladosporium herbarum*) when filleting fresh salmon [8].

Parvalbumin is the most common allergen in salmon allergic reaction. However, sensitisation to other protein as tropomyosin, preservatives as sodium metabisulphite, formaldehyde and spices could occur [2, 12].

Most occupational skin diseases described in salmon-processing workers are CU and contact dermatitis from protein [1, 13]. In 8 cases of contact dermatitis from protein from a national network, majority was chief cook and linked to salmon [14]. The penetration of allergens is facilitated by irritant contact dermatitis or atopic skin. In our case, description of symptoms is more probably for a diagnosis of contact urticaria.

CONCLUSIONS

Occupational allergic diseases in salmon-processing workers could occur, as in our case, including asthma, rhinitis and dermatological diseases as contact urticaria or dermatitis from protein. Collective and individual prevention are needed to reduce atmospheric concentration of aeroallergen, contact with skin and damaged skin. Detection of early stage of diseases by occupational physicians is also important.

Conflict of interest: None declared

REFERENCES

1. Jeebhay MF, Lopata AL. Occupational allergies in seafood-processing workers. Adv Food Nutr Res. 2012; 66: 47–73, doi: 10.1016/B978-0-12-394597-6.00002-1, indexed in Pubmed: 22909978.
2. Lucas D, Lodde B, Jepsen JR, et al. Occupational asthma in maritime environments: an update. Int Marit Health. 2016; 67(3): 144–152, doi: 10.5603/IMH.2016.0027, indexed in Pubmed: 27681213.
3. Jolly AT, Klees JE, Pacheco KA, et al. Work-Related Asthma. J Occup Environ Med. 2015; 57(10): e121–e129, doi: 10.1097/JOM.0000000000000572, indexed in Pubmed: 26461873.
4. Jeebhay MF, Robins TG, Lehrer SB, et al. Occupational seafood allergy: a review. Occup Environ Med. 2001; 58(9): 553–562, doi: 10.1136/oem.58.9.553, indexed in Pubmed: 11511741.
5. Wiszniewska M, Tymoszuk D, Pas-Wyroślak A, et al. Occupational allergy to squid (Loligo vulgaris). Occup Med (Lond). 2013; 63(4): 298–300, doi: 10.1093/occmed/kqt025, indexed in Pubmed: 23535711.
6. Fidias E, Leon S. Salmon, ventilation, and mycotoxin inhalation. Lancet. 1995; 346(8991-8992): 1707, doi: 10.1016/s0140-6736(95)92873-1.
7. Shiryaeva O, Aasmoe L, Straume B, et al. Respiratory effects of bioaerosols: exposure-response study among salmon-processing workers. Am J Ind Med. 2014; 57(3): 276–285, doi: 10.1002/ajim.22281, indexed in Pubmed: 24310925.
8. Dahlman-Höglund A, Renström A, Larsson PH, et al. Salmon allergen exposure, occupational asthma, and respiratory symptoms among salmon processing workers. Am J Ind Med. 2012; 55(7): 624–630, doi: 10.1002/ajim.22067, indexed in Pubmed: 22576678.
9. Droszcz W, Kowalski J, Piotrowska B, et al. Allergy to fish in fish meal factory workers. Int Arch Occup Environ Health. 1981; 49(1): 13–19, doi: 10.1007/BF00380804, indexed in Pubmed: 7298210.
10. Mason HJ, Carder M, Money A, et al. Occupational asthma and its causation in the UK seafood processing industry. Ann Work Expo Health. 2020; 64(8): 817–825, doi: 10.1093/annweh/wxaa055, indexed in Pubmed: 32491156.
11. Jeebhay MF, Cartier A. Seafood workers and respiratory disease: an update. Curr Opin Allergy Clin Immunol. 2010; 10(2): 104–113, doi: 10.1097/ACI.0b013e3283373bd0, indexed in Pubmed: 20179585.
12. Lucas D, Gourier G, Pougnet R, et al. Letter to the Editor, 'Occupational Asthma and Its Causation in the UK Seafood Processing Industry'. Do Not Forget Preservatives and Endotoxins. Ann Work Expo Health. 2021; 65(6): 738–739, doi: 10.1093/annweh/wxaa137, indexed in Pubmed: 33616174.
13. Hajeb P, Selamat J. A contemporary review of seafood allergy. Clin Rev Allergy Immunol. 2012; 42(3): 365–385, doi: 10.1007/s12016-011-8284-9, indexed in Pubmed: 22045217.
14. Loddé B, Cros P, Roguedas-Contios AM, et al. Occupational contact dermatitis from protein in sea products: who is the most affected, the fisherman or the chef? J Occup Med Toxicol. 2017; 12: 4, doi: 10.1186/s12995-017-0150-0, indexed in Pubmed: 28203266.