

UTILISING A SKIN PRICK TEST FOR THE DETERMINATION OF THE PRESENCE OF ALLERGIC RHINITIS IN DIVERS

Romuald Olszański¹⁾, Zbigniew Dąbrowiecki¹⁾, Dorota Niewiedział²⁾, Krzysztof Gadomski³⁾, Ewa Zieliński⁴⁾

¹⁾ Department of Maritime and Hyperbaric Medicine, Military Medical Institute of Gdynia, Poland

²⁾ Department of Human Development Psychology, University of Zielona Góra, Poland

³⁾ Military Preventive Medicine Centre, Gdynia, Poland

⁴⁾ Department of Emergency Medicine and Disaster Collegium Medicum Ludwika Rydygiera in Bydgoszcz, Nicolaus Copernicus University, Toruń, Poland

ABSTRACT

Allergic rhinitis occurs in various regions of the world and affects from 10 to 40% of the population. The skin prick test is the "gold standard" for the detection of type I allergic diseases according to the Gella and Coombs classification, which is mediated by IgE. For our experiment, skin prick tests were performed on 60 divers aged between 30 and 40 years of age. The following tests for airborne allergens were used: tests for pollen from trees, grasses, cereals, weeds, proteins from house dust mites, animal hair and epidermis, and moulds. On the basis of an interview and a positive skin prick test allergic rhinitis was diagnosed in 17 divers.

Conclusions:

1. Allergic rhinitis can cause health problems in divers and be the cause of diving accidents.

2. The application of the skin prick test during the health qualification in the Military Maritime Health Commission, would allow the exclusion of diver candidates suffering from allergies.

Keywords: scuba diving, Skin Prick Test, allergic rhinitis, divers.

ARTICLE INFO

PolHypRes 2018 Vol. 65 Issue 4 pp. 49 - 54

ISSN: 1734-7009 eISSN: 2084-0535

DOI: 10.2478/phr-2018-0023

Pages: 6, figures: 0, tables: 1

page **www** of the periodical: www.phr.net.pl

Original article

Submission date: 19.09.2018 r.

Acceptance for print: 25.11.2018 r.

Publisher

Polish Hyperbaric Medicine and Technology Society



INTRODUCTION

Depending on the immunological mechanism, hypersensitivity reactions are divided according to the classification of Gell and Coombs into: type I - immediate reaction, type II - cytotoxic reaction, type III - reaction of immunological complexes, type IV - delayed reaction [1]. Allergic rhinitis belongs to type I, in which the allergen binds with specific IgE antibodies on the surface of the mast cell and inflammatory mediators are released. Type I reactions, apart from allergic rhinitis, include asthma, urticaria and anaphylactic shock.

IgE is the main immunological antibody of immediate reactions that was discovered in 1968 by Bennich and Johansson from Sweden and a Japanese Ishizaki couple living in the United States [2].

Allergic rhinitis occurs in various regions of the world and affects from 10 to 40% of the population [3]. Skin Prick Tests are the "gold standard" for the detection of allergic diseases mediated by IgE due to their low cost and safety [2].

Allergic rhinitis is caused by airborne allergens, including seasonal allergens: pollen from trees, grasses, cereals, weeds and year-round allergens: proteins from house dust mites, animal hair and epidermis, and moulds.

In recent years there has been an increase in the incidence of allergic diseases. In the case of inhalatory allergies, symptoms are caused by allergies to: pollen from plants (grasses, trees and weeds), house dust mites (*Dermatophagoides*, etc.), animal allergens (dog, cat), moulds (*Cladosporium herbarum*, *Aspergillus Alternaria*, etc.). Skin Prick Tests are reliable in confirming the contribution of these allergens to the development of clinical symptoms [5].

RESEARCH OBJECTIVE

- Diagnosis of allergic rhinitis in professional divers using the Skin Prick Test.
- Preventive actions - Skin Prick Tests as an additional examination during diving

qualification tests by the Military Maritime Health Commission.

MATERIAL AND METHOD

Skin Prick tests were performed on 60 divers aged between 30 and 40 years of age. The following tests for airborne allergens were used: pollen from trees, grasses, cereals, weeds, proteins from house dust mites, animal hair and epidermis, and moulds.

The tests were applied to healthy forearm skin on the flexor side and with the use of a 1 millimetre blade, allergens were introduced to the epidermis to a depth of 0.4 mm. After 15-30 minutes, a bubble surrounded by erythema appeared, which was an exponent of an immediate reaction in relation to a negative sample with saline solution and a positive control with histamine solution. A bubble size greater than 3 mm in diameter, which is equal to or greater than the positive control, was adopted as a positive result [4].

RESULTS

On the basis of medical history and skin prick tests, the allergic rhinitis was diagnosed in 17 divers. In 11 divers' allergic rhinitis caused by seasonal allergens were found. Two divers were found to be allergic to tree pollen (i.e. a problem during tree pollination in the spring), 2 divers had symptoms related to the grass pollen which occurs in the summer, and 2 divers were found to be allergic to weed pollens found in August and September. In 5 divers allergies to various seasonal pollens and symptoms of allergic rhinitis were observed for a longer time when exposed to spring-summer pollens (pollen from trees and grass - 2 divers, pollen from grass and weeds - 2 divers and from trees and weeds - 1 diver).

In 6 divers allergic rhinitis was caused by year-round allergens, i.e. dust mite protein (3 divers), cat hair and dust mite protein (1 diver). The symptoms occurred all year round and disappeared after the use of antihistamines and locally applied steroids.

Tab. 1

List of allergens inducing allergic rhinitis in divers.

Allergens	Number of divers
Pollen from trees	2
Grass pollen	2
Weed pollen	2
Pollen from trees and grasses	2
Pollen from trees and weeds	1
Grass and weed pollen	2
Grass pollen and cat hair	1
Pollen from trees and mites	2
Mite proteins	3
Total	17

DISCUSSION

Skin Prick Tests are a diagnostic method used to detect type I allergies of immediate reaction, IgE-dependent. Skin tests, i.e. standardised tests of skin reactivity to allergens, are the basis of modern allergological diagnostics. A positive test result is proof of the existence of a specific skin allergy to a given allergen. Skin prick tests are a reference test in the detection of IgE-dependent allergies, which is essential in the diagnosis of allergic seasonal and all-year-round rhinitis [5]. The result of a skin prick test excludes or confirms allergy to a specific allergen and is important for determining the diagnosis and prognosis. It also decides on the individual prevention of allergic rhinitis by reducing exposure to an allergen [5].

Allergic diseases, particularly respiratory diseases, are an important and growing problem in the Polish population, e.g. allergic rhinitis occurs in over 22% of the Polish population [6].

House dust mites are the most common allergen in: China, Thailand, Singapore and Vietnam [7]. Mites cause cross-reactions with shrimps, which are a very common food in the Far East [7]. Cross allergies also

occur between an allergy to tree pollen (birch, hazel) and raw vegetables and fruits [8].

Allergic rhinitis, both year-round and seasonal, can cause health problems in divers and lead to diving accidents due to the problem with ventilation. Allergic rhinitis is treated with antihistamines, which cause side effects (drowsiness or reduced concentration), which may cause health risks when working underwater.

CONCLUSIONS

- Skin Prick Tests were positive for 17 divers. Based on the interview and tests, seasonal or year-round allergic rhinitis was confirmed in divers.
- Allergic rhinitis can cause health problems in divers and lead to diving accidents.
- The use of the Skin Prick Test during the health qualification by the Military Maritime Health Commission, would allow for the exclusion of diver candidates suffering from allergies.

REFERENCES

1. Gadomski K, Siermontowski P, Dąbrowiecki Z, Olszański R. The risk of developing a contact allergy to materials present in diving suits and diving equipment, *Polish Hyperbaric Research* 2(59), 57-61, 2017
2. Silny W, Czarnecka-Operacz M, Jenerowicz D, Olek-Hrab K, Zmudzńska M, Teresiak-Matusiak E. Lexicon of allergic skin diseases and drug-related reactions, 2009 pp.;
3. Saleem N, Waqar S, Shafi A. Skin Prick Test Reactivity to Common Aeroallergens among Allergic Rhinitis Patients. *Journal of the College of Physicians and Surgeons Pakistan*. 28 (10): 766-771, 2018;
4. Christopher DJ, BSc, Ashok N, Ravivarma A, Shankar D, Peterson E, Dinh PT, Vedanthan PK. Low Potency of Indian Dust Mite Allergen Skin Prick Test Extracts Compared to FDA-Approved Extracts: A Double-Blinded Randomized Control Trial. *Allergy & Rhinology* 9: 1-6, 2018;
5. Kruszewski J, Silny W, Mazurek H, Czarnecka-Operacz M. The standards in allergology. Part 1. Skin tests. *Przegląd alergologiczny* 51-59, 2003;
6. Samoliński B, Raciborski F, Lipiec A, Tomaszewska A, Krzych-Fałta E, Samel-Kowalik P, Walkiewicz A, Lusawa A, Borowicz J, Komorowski J Samolińska-Zawisza U, Sybilski AJ, Barbara Piekarska B, Nowicka A. Epidemiology of Allergic Diseases in Poland. *Alergologia Polska* 1,1 0 – 18, 2014;
7. Chu HT, Godin I, Phuong NT, Nguyen LH, Hiep TTM, Xuan NM, Corazza F, Michel O. Evaluation of skin prick test to screen dust mite sensitization in chronic respiratory diseases in Southern Vietnam *Asia Pac Allergy*. 8(4):e39, 2018;
8. Hegde VL, Mahesh PA, Venkatesh YP. Skin prick test analysis reveals cross-sensitization to tomato profilin and grass pollen in nasobronchial allergic patients with history of tomato food allergy. *Eur Ann Allergy Clin Immunol* 50, N 1, 10-18, 2018.

prof. dr hab. med. Romuald Olszański

Zakład Medycyny Morskiej i Hiperbarycznej
Wojсковy Instytut Medyczny
ul. kmdr. Grudzińskiego 4
81-103 Gdynia 3
romuald.olszanski@wp.pl