Latex Glove Allergy Among Dentists in Iasi, Romania

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Healthcare workers are subjected to a special risk of latex allergy as a result of the frequent exposures to latex and rubber products. The aim of this study was to evaluate the latex gloves allergy among 209 dentists aged between 25 and 61 years, in private dental offices in the city of Iasi, Romania. The 12 questions reffered to the use of protective gloves, the symptoms associated with latex contact, food allergies, allergy to drugs, dental materials or chemicals. Data were analyzed by gender, age and years of professional experience using SPSS 15.0 .18,8% of dentists reported latex glove allergies. The symptoms were manifested on the hands skin by redness (74.5%), itching (42.4%) and swelling (20.1%), suggesting an allergic dermatitis. Other symptoms include allergic rhinitis , allergic conjunctivitis , cough and wheezing .The age group between 37 and 48 years old was more affected in terms of the local symptoms, allergic rhinitis and allergic conjunctivitis associated with gloves latex. Women were affected more frequently by the allergic symptoms than men.

Keywords: latex allergy, protective gloves, dentists

Latex is a natural substance, a milky fluid that is produced by some types of trees or other plants, especially by Hevea Brasiliensis also known as "rubber tree". Latex is a stable dispersion (emulsion) of polymer (primarily *cis* - 1,4-polyisoprene) microparticles in an aqueous medium. Its complex composition consists of proteins, alkaloids, starches, sugars, oils, tannins, resins, and gums that coagulate on exposure to air[1]. In order to obtain the desired durability, strength and stretch properties various chemicals must be added to natural latex.

Latex is used in many products with different uses. It is a common component of many medical and dental supplies including disposable gloves, dental dams, syringes, intravenous tubing, catheters, stethoscopes, dressings and bandages. Latex surgical gloves were first used in 1890 by William Halstead. Since the late 1980s the use of latex gloves in healthcare institutions has become more common due to the integration of protective equipment in the concept of Universal Precautions in order to reduce occupational exposure of the medical staff to blood-borne pathogens..

Latex sensitization

A latex allergic reaction occurs when the body treats latex proteins as foreign substances. In response to this aggression (by antigens) the body creates proteins, called antibodies or immunoglobulins (IgE) targeted to destroy these harmful substances. As a result of the allergen contact with the IgE protein on the surface of the mast cells these cells explode releasing chemicals, one of which being histamine which causes the symptoms of allergy [2]. Approximately 250 different natural rubber latex polypeptides have been identified, of which 60 are able to bind human immunoglobulin E (IgE) antibody. [3] Latex proteins, major sources of allergy, can be absorbed through the skin or the powder containing the protein can be inhaled. However, besides latex, other chemicals associated with glove use may cause sensitivity including diethyldithiocarbamate(precursors to vulcanization reagents), anolin (used as a glove softener), polyoxy-propyleneglycol (a coagulant used in the glove manufacture process), organic or inorganic coloring pigments, quaternary ammonium compounds, anti-oxidants (used to prevent the degradation of the products) and preservatives[4]. Geier, in his study on occupational contact allergy caused by rubber gloves, demonstrated the frequency of contact sensitization to accelerators (thiurams, dithiocarbamates, mercaptobenzothiazole and/ or its derivatives)[5].

Types of reactions to latex

Latex can cause different reactions including irritant contact dermatitis (not an allergic reaction), allergic contact dermatitis (type IV hypersensitivity), and Type I IgE allergic reactions[6].

Irritant contact dermatitis is caused by latex but also by exposure to the starch added to the gloves to keep rubber products from sticking to each other and to make it easier to put on latex gloves. It is the most common reaction to latex products. This is not an allergic reaction and manifests as irritated, dry, itchy areas on the hand skin exposed to rubber gloves or other products or chemicals.

Allergic contact dermatitis (*delayed hypersensitivity or chemical sensitivity)* is caused by exposure to chemicals added to latex during manufacturing or processing. Symptoms usually begin 24 to 48 hours after the contact

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Nr.	Question
1.	Do you use latex gloves as protective equipment during dental treatment? - yes - no
2.	How many hours do you work a day? - under 2 hours - 2 - 4 hours - over 4 hours
3.	What kind of gloves do you use? - natural latex gloves - synthetic gloves - powder-free gloves
4.	How many hours do you wear gloves during medical activity/day? - under 2 hours - 2 - 4 hours - over 4 hours
5.	Are you allergic to latex? - yes - no - I do not know
6.	If "yes" identify the following symptoms: - itching - swelling - allergic rhinitis - allergic conjunctivitis - cough - wheezing
7.	Are you allergic to glove powder? - yes - no - I do not know
8.	Did you undergo latex allergy skin testing? - yes - no
9.	Do you suffer from food allergies? - fruits - vegetables - other
10.	Do you suffer from other kind of allergies? - dental materials - drugs - disinfectants - soap - cosmetics - other
11.	Did you have to stop working due to allergy to latex gloves? - yes - no
12.	What did you do to manage the latex glove allergy? - change natural latex gloves with synthetic gloves - use of powder-free gloves - quit wearing gloves - general medical treatment - other

Table 1
QUESTIONNAIRE FOR THE ASSESSMENT OF LATEX ALLERGIES

and consist in rash usually confined to the contact area which may be followed by skin blisters.

*Latex Allergy(immediate hypersensitivity)*can be caused by exposures at even very low levels of allergen. Within minutes of exposure to latex a mild allergic reaction can produce such symptoms as skin redness, itching and hives. In case of severe reactions the symptoms may include sneezing, runny nose, itchy eyes, scratchy throat, and asthma. A life-threatening anaphylactic reaction can occur in rare cases.

Control strategies to reduce exposure to latex and superior modern manufacturing processes have reduced the incidence of latex reactions[7]

The aim of this study was to evaluate the allergic reactions to latex gloves among dentists in Iasi, Romania.

Experimental part

Methods

In order to assess the allergic reactions to latex gloves among dentists a questionnaire-based study was initiated. Data were collected from 209 dentists aged 25 to 61 years, working in private dental offices in Iasi, Romania. The study was conducted between December 2014 and April 2015.

The *self-administered* questionnaire included 12 questions regarding compliance with glove use, types of used protective gloves , daily glove use, and the symptoms associated with latex contact. Dentists' personal history of vegetables and fruits or other food allergy , allergy to drugs, dental materials , disinfectants or other chemicals were also recorded (table 1).

Data were analyzed by gender, age and years of professional experience. The Microsoft Excel and SPSS for Windows 15.0 (Statistical Package for the Social Sciences, Chicago, IL) were used for data analysis. Fisher's exact test was used for testing the relationships between variables.

Results and discussions

The participation rate of the dentists to the study was 85%. Of the investigated dentists 44.3% were men and

55.7% women. According to age, the study group was divided into three groups as follows: 25-36 years, 37-48 years and 49-61 years. The number of years of professional activity ranged from 3 to 34 ; 18.9% had less than 10 years of professional activity, 48.4% between 10 and 20 years, and 32.7% more than 20 years .

In our study 90.9% of the dentists use latex gloves for hand protection, this percentage being close to the values reported in Canada (McCarthy, 2000 – 95%) and United Kingdom (Gibson, 2003 - 95%) [8]. Of these, 34.6% prefer non-sterile gloves, 11.3 % use only surgical sterile gloves and 54.1% use both glove types depending on the clinical procedure.

Allergy to latex gloves is a major occupational problem among healthcare workers, especially among those who often use this protective equipment following the aplication of the concept of Universal Precautions in 1987. In our study,18.8% of the investigated dentists reported latex glove allergies. In the literature, depending on the reference source, the prevalence of latex allergy among healthcare workers ranges from 0.6 to 17%, while in the general population it is estimated to be even lower than 1%.[9,10].Two studies on large cohorts of subjects skin tested to latex in Europe reported a prevalence of positive skin test of approximately 1% [3]**.**In a population study in France the prevalence in the general population was estimated at 0.7%, but this is higher in healthcare workers (up to 17%) [11].

In the present study, more women than men experienced allergic symptoms (60.5% *vs.* 39.5%),unlike the literature reviews which found no gender differences in the incidence of latex allergy [12].Of the latex-sensitive dentists, 32.5% experienced symptoms after the first use of gloves while 67.5% developed an allergic reaction to latex gradually.

The reported symptoms affected the hand skin in direct contact with the latex, and included: redness (74.5%), itching (42.4%) and swelling (20.1%), suggesting an allergic dermatitis. Other symptoms included such systemic reactions as allergic rhinitis (18.2%), allergic conjunctivitis (8.4%), cough (10.8%) and wheezing (2.7%) (fig.1).No dentist reported severe reactions to latex, such as anaphylactic shock.

Local symptoms were significantly more common among female than male dentists: itching (63.3%*vs*. 38.8%), swelling (5.2% vs. 34.8%) and allergic conjunctivitis (64.6 vs. 45.4%).

The results showed that the age group 37-48 years is most commonly affected by symptoms associated with latex glove allergy : itching (71.9%), swelling (74.1)%, allergic rhinitis (51.9)%, allergic conjunctivitis (61.5%), cough (64.3%), and wheezing (60.0%) . The lowest values were recorded in the dentists aged 25-36 years (itching 9.4%, swelling 11.1%, allergic rhinitis 3.7%) and 49-61 years (itching 18.8%, swelling 14.8%, allergic rhinitis 3.7%, allergic conjunctivitis 23.1%) (fig.2).

As expected, the dentists having 10-20 years of professional experience were most affected by symptoms: itching (65.6%), swelling (66.7%) and allergic conjunctivitis (69.2%). A possible explanation may be that the younger age group has not yet been frequently exposed to latex and older dentists were not familiar with the use of the protective gloves at the beginning of their professional activity. In the group with over 20 years of professional experience the main symptoms were the respiratory ones : allergic rhinitis (44.4%) and cough (50.0%). Here were no reports of major complications associated to latex or starch [13,14].

The medical history of the dentists revealed the presence other types of allergies, such as food allergies (26.6%), allergies to animal hair (18.3%), allergies to different drugs (21.5%) or allergic asthma (12%). It was demonstrated that individuals who have allergies to certain foods (like kiwi, banana, avocado, chestnuts and papaya) are also at a greater risk for allergic reactions to latex (cross-reactivity) because these foods contain a protein similar to hevein [15,16]

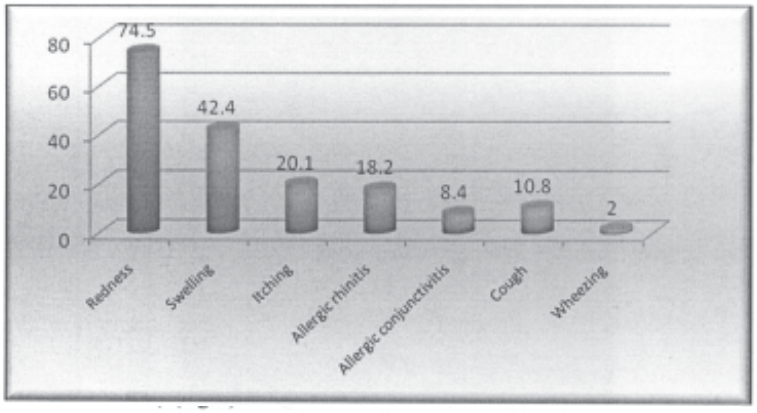

Fig. 1. Symptoms of allergies to latex gloves

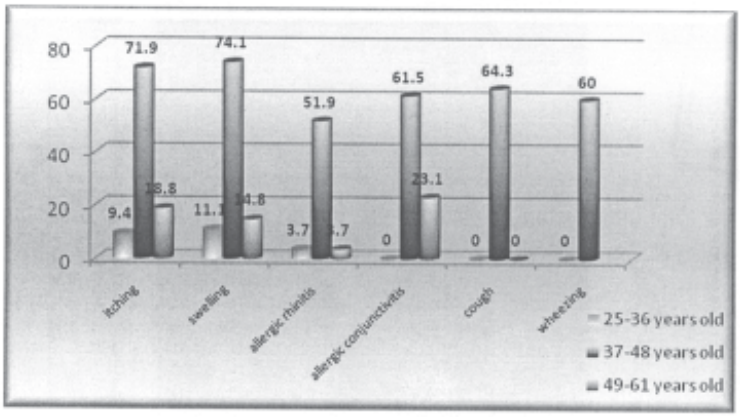

Fig. 2. Latex allergy symptoms by age group

Dentists allergic to latex also reported to be sensitive to such dental materials as impression materials (8.5%), dental filling materials (4.7%) and endodontic disinfectants (6.6%).

Most dentists wore protective gloves for over 4 hours per day (55.9%), 41.2% - 2 to 4 h, and 2.9% less than 2 h**.** Female dentists seemed to be more concerned with hand protection, a significantly greater proportion of female than male dentists wearing latex gloves for over 4 h per day (63.6% *vs*. 36.4%). As to the relationship with *hours* of daily glove *use,* the results showed, as expected, an increased frequency of latex glove allergies among dentists wearing gloves for more than 4 h per day ($p < 0.005$).

Only 9 dentists in our study received a skin test aimed at identifying the individual risk and the specific allergens. The diagnosis of latex allergy is made using the results of *medical history, physical examination* and laboratory tests(e.g. serum lgE blood test, skin test and challenge test) [3].These tests should be performed under the direction and supervision of a qualified allergist. The questionnaire designed for screening latex allergy is reliable for identifying those at low risk while skin testing offers the opportunity to objectively identify true latex allergy [17, 18].

The attitude of the latex-sensitive dentists towards allergic reaction consisted in avoiding contact with natural latex by replacing the natural latex gloves with non-latex (e.g., nitrile or vinyl) powder-free gloves (92.9%). Saary demonstrated that a change in glove use from high-protein/ powdered to low-protein/powder-free latex gloves at a previously surveyed dental school reduces the prevalence of natural latex sensitivity among students and staff members [19]. A percentage of 64.6% of the sensitive dentists took general anti-allergy medication also avoiding direct contact with other latex-containing devices (rubber dams, prophylaxis cups, orthodontic elastics, and medication vials).Even healthcare workers using hypoallergenic latex gloves were found to develop allergic symptoms, but the prevalence of this sensitization is much lower compared to that caused by natural latex gloves [20,21].No dentist reported the need for hospitalization or emergency care for serious forms of allergy. Nevertheless, in order to manage those situations the health care personnel should know how to recognize, evaluate, and manage emergencies related to latex allergies and to identify those at risk of latex allergies.

In a previous paper was studied the occupational exposure of dentists to chemicals during hands hygiene [22].

Conclusions

Allergy to latex gloves is relatively frequent among dental healthcare professionals in Iasi, Romania. Skin tests are relevant in assessing latex allergies frequency and identification of allergy agent. Dentists should be aware of the potential risk of the latex exposure to induce allergy reactions and adopt the prevention strategies to minimize exposure.

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