



HYPERSENSITIVITY TO NATURAL RUBBER LATEX GLOVES AMONG ALBANIAN DENTAL STUDENTS: THE ROLE OF EXPOSURE DURATION

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ABSTRACT

Article History

Received: 15 February 2017

Revised: 17 March 2017

Accepted: 4 April 2017

Published: 20 April 2017

Keywords

Latex glove allergy

Questionnaire

Diagnostic tests

Dental students

Latex exposure duration

Allergy symptoms.

Latex allergy is a common occupational disease among healthcare workers who use latex gloves. The aim of the present study was to determine the prevalence of allergy to latex gloves among dental students and the role of exposure duration in latex allergy. In this prospective study, a total of 240 students completed a self-administered questionnaire aiming at providing information about glove, working habits, signs and symptoms related to glove use, precautions taken to minimize it, etc. The challenge and patch tests were performed through latex gloves, and skin prick test with commercial extracts. The questionnaire items and diagnostic tests revealed that one-fourth of subjects were suspicious for latex gloves hypersensitivity. Their mean value for skin reactions like contact urticaria, irritant or allergic dermatitis was between 10% and 14%, while for non-cutaneous symptoms the mean value was under 5%. The average latex exposure (in hours) is estimated to be about 214 ± 71 (SE), with a maximum of 11500 hours. The correlation between studied variables and the time exposure to latex gloves revealed weak to moderate relations with respect to reported latex allergy, eczematous reactions, hand erythema after glove wearing, irritant reactions during wash/washout procedures, concentration oscillations during usage of latex gloves, or dyspnea attack during latex exposure. Due to the relationship between allergic reactions to latex gloves and some medical histories during school practice, it seems to be necessary to undergo pre-matriculation evaluation and periodic health surveillance of dental students.

Contribution/Originality: AB designed the questionnaire, assisted students to complete them, conducted diagnostic tests and collected the data; DK and SS coordinated and helped with the study design and conduction; DM assisted on students' enrollment in the study and helped with the study design from the stomatological perspective; EP assisted on statistical analysis of the data; ÇM coordinated the students' enrollment in the study; AR assisted on manuscript copyediting, EÇM drafted the manuscript.

1. INTRODUCTION

Natural rubber latex (NRL) allergy is a common occupational disease among healthcare workers who use latex gloves [1-3]. Diagnosis of latex allergy is based on personal history, physical examination, skin prick, patch and challenge tests, or specific IgE determination, while self-administrated questionnaires are largely used to assess data about natural history, risk factors, etc [4-7].

The role of exposure duration to NRL gloves is demonstrated in a few studies, but there is lack of data with concern to this factor among the dental care students in Albania [8, 9]. The aim of the present study was to determine the allergy prevalence to NRL gloves among dental students in the Albanian University of Tirana, and the correlation between questionnaire and diagnostic items to latex exposure duration.

2. METHOD

A total of 240 students (mean age 22.8 ± 3.4 years) were prospectively surveyed using a self-administered questionnaire that gave information about the participants in regards to working habits, glove use, concentration on work, signs and symptoms related to NRL glove usage, any other type of allergy, familiar atopy, precautions taken to minimize the latex allergy, etc. The calculation of the exposure time to latex gloves was estimated based on practice program according to study semesters in addition to student's statement about the dental work or assistance outside school practice. Beside questionnaire items, prevalence of latex-related symptoms and sensitization was determined in a randomized students' sample by commercial skin prick tests (Stallergenes, France), patch tests with NRL, as well as through challenge test with dermal and airborne NRL exposure. Similarly to questionnaire, the challenge test was performed on all students.

The suspected cases for adverse reactions during latex exposure were further classified as irritant or allergic skin reactions, and internal organs allergic reactions. Correlation between exposure time to latex and other variables is conducted according to Kendall's tau correlation coefficient and logistic regression analysis. Statistical significance was considered when $p < 0.05$.

3. RESULTS

A NRL allergy or hand erythema during work procedures was reported in 10% of subjects. About 14% of subjects reported irritant dermatitis after hand wash or washout procedures and about 10% of subjects complained of irritant symptoms after application of disinfectants. Hand eczema, within two days after NRL gloves use, was reported by 14% of subjects. Immediate facial allergic symptoms, rhino-conjunctival symptoms, lower respiratory symptoms, and visit to the emergency room after latex exposure were reported by 5%, 5.4%, 2.5% and 7.1% of subjects, respectively. The frequency of the rest of admitted questionnaire items is shown in table 1. Additional allergic pathologies and familiar history for such diseases were reported in 17% and 26% of subjects respectively. In addition, 15% of subjects reported food allergies.

With regards to diagnostic procedures, the patch test to latex resulted positive in about 15% of subjects. Skin prick test revealed a latex sensitization on 20% and airborne challenge with NRL gloves confirmed the allergic sensitization on 7.5% of subjects. In total, 25% of subjects were suspected for adverse reactions during NRL exposure, 19.2% were diagnosed with irritant contact dermatitis, 14.6% with allergic skin reactions, and 3.8% with internal allergic symptoms (for more information, see Table 1).

Average latex exposure (in hours) is estimated to be about 214 ± 71 (SE), with a maximum of 11500 hours. The correlation between studied variables and the time exposure to NRL gloves revealed weak to moderate links with respect to reported latex allergy, eczematous reactions, hand erythema after glove wearing, irritant reactions during wash/washout procedures, concentration oscillations during usage of latex gloves, or dyspnea attack during latex exposure. Both suspected and confirmed diagnoses of latex hypersensitivity showed also a weak correlation to time of latex exposure (see Table 1).

Table-1. Correlation between latex exposure duration and study variables

Correlation between latex exposure duration and other variables				
Variables	Frequency (%)	r	R²	p
Previous reports for latex allergy	24 (10.0)	.196	0.104	<0.001
Regular use of latex gloves	227 (94.6)	.320	0.002	<0.001
Assisting colleagues that use latex gloves	195 (81.3)	.361	0.007	<0.001
Hand erythema during work	23 (9.6)	.132	0.133	.018
Previous surgical interventions	57 (23.8)	-.027	-	.625
Irritant dermatitis after hand wash / washout procedures	33 (13.8)	.104	-	.063
Irritant disorders after hand disinfection procedures	26 (10.8)	.114	0.005	.040
History for additional allergic pathologies	42 (17.5)	.118	-	.034
Familiar history for allergic diseases	63 (26.3)	-.003	-	.956
Tobacco smoking	65 (27.1)	-.065	-	.243
Immediate erythema after use of latex gloves	31 (12.9)	.145	0.078	.009
Eczema or cracked skin within 2 days after use of latex gloves	34 (14.2)	.217	0.071	<0.001
Concentration disorders after use of latex gloves	46 (19.2)	.085	-	.125
Variations in the concentration level after use of latex gloves	27 (11.3)	.134	0.026	.016
Regular use of latex-free gloves	146 (60.8)	.055	-	.321
Adverse reactions after use of latex-free gloves	2 (0.4)	-.093	-	.095
Attenuation of adverse symptoms after use of latex-free gloves	102 (42.5)	.067	-	.229
Sneezing, eye itching, nasal congestion after latex exposure	13 (5.4)	.033	-	.550
Breathlessness attack after latex exposure	6 (2.5)	.159	0.070	.004
Facial itching, angioedema, or erythema after latex exposure	12 (5.0)	.074	-	.186
Breathlessness attack after toy balloon blowing	5 (2.1)	.104	-	.061
Additional allergic reactions non-related to latex	28 (11.7)	-.047	-	.401
Visit in emergency services after latex exposure	17 (7.1)	-.067	-	.230
Previous positive allergy tests	13 (5.4)	.048	-	.384
Previous food allergies	37 (15.4)	.043	-	.422
Latex wheal	5/18 (27.8)	.130	-	.295
Latex flare	6/18 (33.3)	.126	-	.302
Suspected adverse reactions	60 (25%)	.179	0.033	.001
Irritant skin reactions	46 (19.2%)	.163	0.001	.003
Allergic skin reactions	35 (14.6%)	.171	0.007	.002
Internal organ allergic reactions	9 (3.8%)	.140	0.046	.012

4. DISCUSSION

The obtained data by self-reported questionnaires and diagnostic procedures agree with literature reports, which emphasize the role of latex allergy as major occupational health problem in health care workers, affecting 0.5 to 18% of subgroups at risk [1, 2, 9-13]. Additionally, our study revealed concentration changes during the work practice. A skin allergy is confirmed on about 15% and non-cutaneous allergy in about 4% of subjects, indicating that, apart from contact to the skin, the respiratory exposure plays an important role on the latex sensitization [5, 14, 15].

Average latex exposure in our students is estimated to be about 215 hours, with a maximum of 11500 hours. The moderate correlation between some study items and exposure duration puts forth the argument that latex concentration, frequency and duration of glove use are important factors associated to latex sensitization, and to occurrence of different allergic symptoms [8, 9, 14, 16, 17]. It is estimated that duration of glove use more than 18

hours per week, more than 3 pairs of gloves used per day, NRL glove exposure, during medical practice longer than 3 years with a total exposure time of 9000 hours should be considered additional risk factors on the increased prevalence for latex-related allergic diseases [2, 16-18]. Additional surveys demonstrated that high prevalence of symptoms is much strongly related to the use of latex gloves as compared to years of exposure or number of surgical procedures [19, 20]. These findings demonstrate that latex allergy is an important health problem for health care workers, especially for those working in places where more NRL gloves are used [2, 18]. The determination of latex glove exposure as risk factor for latex sensitization after a lower exposure duration among Albanian students may lead to the conclusion that gloves quality (stratified according to the protection level against biological materials, and concentration level for the NRL), plays a decisive role [6, 11, 21, 22].

This study reinforces the conclusion that it is essential to recognize which professionals are sensitized to latex in order to provide appropriate treatment and to establish adequate prevention. Due to the relationship between allergic reactions to latex gloves and development of some medical histories during school practice, it seems necessary to undergo pre-matriculation and pre-employment evaluation, as well as periodic health surveillance of dental students.

Funding: This study received no specific financial support.

Competing Interests: The authors declare that they have no competing interests.

Contributors/Acknowledgement: All authors contributed equally to the conception and design of the study.

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