Study of Occupational Exposure to Latex Glove among Health Care Professionals

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The paper aims to asses the prevalence of latex allergy and glove-related signs and symptoms reported by health care professionals. The lot study consisted of 140 medical, surgical, and laboratory workers in St. Spiridon Hospital of Iasi that after signing informed consent to participate in the study responded to a questionnaire contained questions about latex sensitivity. Data analysis was performed with the SPSS program for Windows, release 14.0 (SPSS Inc, Chicago, IL, USA). Participation rate was 87.5%. The mean age of the study participants was 37.5 years. There was a clear difference between the genders, females representing 72% of the investigated subjects. The most common clinical signs of latex allergy presented were itching, swelling and allergic rhinitis. Doctors presented an equal frequency of allergy symptoms such as itching and edema (18.51%,) while nurses showed more signs of allergy compared with physicians surveyed. Laboratory personnel presented the highest frequency of allergy symptoms. Laboratory personnel that wore gloves between 2-4 h/ day experienced more cases of latex allergy (80%) while physicians who wore gloves more than 4 h / day had only 50% of latex allergy cases reported. Latex allergy is an occupational pathology with increased frequency among health workers. Recognition of hypersensitivity and prompt management of reactions is paramount for the safety of dental patients and personnel.

Keywords: *latex, allergy, gloves hypersensitivity*

Over the past several decades, latex hypersensitivity has become an increasingly common phenomenon in the dental setting [1]. Exposure to latex via direct skin contactor inhalation of airborne allergens from powdered gloves poses the risk of sensitizing both clinicians and their patients. Adverse reactions to latex range from mild irritant contact dermatitis to potentially life-threatening hypersensitivity. The prevalence of these reactions is higher among medical and dental practitioners, those with prior allergies, patients with a history of multiple surgeries and those with spina bifida. The risk of developing latex hypersensitivity increases with prolonged and repeated exposure [2].

Natural rubber latex, which is an extract from the sap of *Hevea brasiliensis* trees, contains proteins and potential allergens [2, 3]. It is processed with as many as 200 chemicals and additives (4) and made into over 40,000 dental, medical and consumer products [1, 5]. Exposure to latex allergens occurs via mucous membranes, the vascular system, inhalation and direct skin contact [6-8].

Adverse reactions to latex include non-allergic contact dermatitis, delayed type V hypersensitivity and immediate type I hypersensitivity; most reactions are irritant contact dermatitis and type IV hypersensitivity [9] irritant contact dermatitis is an immediate response to chemicals and additives in latex products, presenting as skin erythema, chapping and the formation of vesicles in areas of direct contact [4, 8].

Type IV hypersensitivity, also a skin or mucous membrane contact reaction, occurs 24–96 h following exposure to chemicals in latex products and may or may not expand beyond the area of direct contact [4, 8]. Symptoms include erythema, pruritus, eczema, weeping, papules and vesicles. This hypersensitivity is diagnosed by patch testing [7, 8]. Although less prevalent, type I hypersensitivity is the most serious response. Immunoglobulin E (IgE) mediated type I responses to latex proteins result in adverse reactions within minutes to hours of exposure, ranging from mild irritation to life threat [7, 8].

The incidence of latex allergy may be reduced through such simple measures as using latex alternatives and low-protein powder-free gloves. For patients with confirmed latex allergy or those at risk of hypersensitivity, it is critical for medical personnel to be familiar with the range of possibilities for latex exposure and to employ appropriate preventive procedures [9, 10].

Health workers such dentist and surgeons represent specific group for studying the question of latex glove-related symptoms as they may wear gloves for 8-10 hdaily, 4-5 days a week, giving them a much greater degree of exposure to latex than most other health care workers.

The aim of the study was to assess the prevalence of latex allergy and glove-related signs and symptoms reported by health workers of St. Spiridon Hospital, Iasi, Romania.

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Experimental part

Materials and methods

The study population consisted of 140 medical, surgical, and laboratory workers in Saint Spiridon Hospital, who signed informed consent paper and responded to a questionnaire about latex hypersensitivity reactions.

The criteria for exclusion were either a severe asthma attack or a severe reaction to latex which had required medical intervention in the past year. The standardized questionnaire collected demographic data (age, gender, years of seniority), exposure data (task description, number of gloves used per day, hours of use, kind of gloves), as well as about symptoms related to glove use. All subjects filled-in the questionnaire and answers about unclear questions were obtained from a trained physician.

Each lesion or symptom was described and explained to the persons enrolled in the study accordingly to the level of knowledge of each participant.

Latex related lower respiratory symptoms were defined as presence of attacks of cough, wheezing and dyspnea which appeared only at work or became significantly worse at work. Work related rhinitis was defined as the presence of sneezing and/or itchy, running nose during the work period. Contact urticaria related to latex use was defined as a self reported weal and flare reactions at the site of glove contact that appear within 10–15 min. of usage; generalized urticaria was defined as a self reported weal and flare reaction appearing in several skin sites. Contact dermatitis was defined as a self reported erythematous papulo-vesiculous persistent eruption observed on the skin after 2–3 days of contact with latex gloves.

Data analysis was performed with the SPSS program for Windows, release 14.0 (SPSS Inc, Chicago, IL, USA). Continuous data were summarized as means (SD). The difference between means was tested by *t* Student's test. Categorical data were analyzed by the likehood χ^2 techniques with Yates's correction as indicated by the data. Fisher's exact test was used if the expected number of observations in any cell was less than 5.

Results and discussions

A total of 140 health care workers returned the questionnaires and therefore participated in the baseline study, table 1.

The mean age of the study participants was 37.5 years (SD=5.7 years, range 20-60 years). There were more females (72%) than males. Most of those who responded to the questionnaire were nurses (50%) and almost 40% physicians, 40% of them working in surgery. Distribution of subjects related to the duration of work was approximately equal (table 1).

For those who have responded positively to the question of whether they had lesions on direct contact with latex most common clinical signs were itching, swelling and allergic rhinitis (table 2).

Physicians presented an equal frequency of allergy symptoms such as itching and swelling (18.51%), while nurses showed more signs of allergy compared with physicians surveyed: 21% allergic rhinitis, 22% swelling and 19% itching. Laboratory staff presented the highest frequency of allergy symptoms: allergic rhinitis 33, 20% wheezing and 20% itching).

Category	Features	Participants	%
Sex	• Female	101	72.1
	• Male	39	27.9
Age (years)	• under 29		
	• 30-39	3	2.1
	• 40-49	48	34.3
	• 50-59	59	42.1
	• > 60	26	18.6
		4	2.9
Resindency	• Urban	132	94.3
	• Rural	8	5.7
Work Department	• Medical	15	10.7
	• Surgical	57	40.7
	• Dental	52	37.1
	• Laboratory	16	11.4
Profession	• Physician	54	38.6
	• Nurse	71	50.7
	• Laboratory technician	15	10.7
Years in practice	• < 10	47	33.6
	• 10-20	51	36.4
	• >20	42	30.0

Table 1
DEMOGRAPHIC AND PROFESSIONAL CHARACTERISTICS

	Physician	Nurse	Laboratory technician
Itching	10 (18.51%)	14 (19.71%)	3 (20.00%)
Allergic rhinitis	6 (11.11%)	15 (21.12%)	5 (33.33%)
Allergic conjunctivitis	2 (3.70%)	8 (14.81%)	1 (6.66%)
Cough	3 (5.55%)	9 (16.66%)	1 (6.66%)
Wheezing	2 (3.70%)	4 (5.63%)	3 (20.00%)
Swelling	10 (18.5%)	12 (22.22%)	2 (13.33%)

Table 2
SUBJECT DISTRIBUTION ACCORDING ON THE SYMPTOMS REGARDING ALLERGIES AND PROFESSION

In the table 3 are presented the analysis on the types of allergy.

Results of the analysis on the distribution of the subject on the types of allergies reported showed that physicians have a raised prevalence for food allergies and drug induced reactions compared to nurses, but small compared to staff working in medical laboratories, the differences being statistically significant ($p < 0.005$). Female subjects were more sensitive on all kind of allergens comparing the male subjects (table.3).

In the table 4 are illustrated results of allergy simptoms function of wearing period.

Results indicate that laboratory personnel wearing gloves between 2-4 h / day experienced more cases of latex allergy (80%) while physicians who wore gloves more than 4 h / day had only 50% of latex allergy cases reported. For subjects who wore gloves 2-4 h a day cough was the most clinical evidence of allergy and those who reported wearing gloves 1-2 h daily had the most common itchy skin as a sign of allergy (table 4).

Regarding the relationship between latex allergy and years of practice, the results showedthat allergic rhinitis, cough and wheezing had a direct correlation with the duration of work in the same place. Persons who worked 10-20 years in the same working place reported mostly urticaria and allergic conjunctivitis (table 4).

Today, latex allergy is becoming a major occupational health issue and dentists and surgeons are clearly at risk from becoming sensitized to products containing latex. Occupational health physicians in the health service must be aware that latex sensitization is a potentially serious working condition and that appropriate precautions need to be employed in the management of affected individuals [11-12].

The prevalence of natural rubber latex allergy in European healthcare workers has been reported at a rate of 2.8 to 10.7% [13,14]. Due to their frequent and prolonged exposure to latex gloves throughout their medical practice, the most exposed medical staff to allergy is represented by surgeons and dental practitioners.

In our study, 50% of participants reported specific allergy symptoms to latex. Wearing gloves for more than 4 hours per day proved to be in direct correlation with allergic reactions to latex.

In a similar study, without objective test, Berky et al. reported *symptoms of an allergic nature* in the case of 13.7% of 1043 US Army dental officers [15]. However, the figure included all persons who had delayed reactions, and they could not determine the diagnosis for those delayed symptoms as well as those located as contact urticaria or generalized urticaria reactions. Rankin has also led a study where he reported a 15% prevalence of adverse reactions to latex gloves (16). Other studies confirmed the relationship between various types of allergies (food, metals or drugs) and latex allergy [17-18].

Wearing gloves time is very important, our study results indicating that medical staff wearing gloves for more than 4 h per day is more prone to allergy to latex. In the study

Table 3

DISTRIBUTION OF TYPE OF ALLERGY TO PROFESSION AND SEX

	Physician	Nurse	Laboratory technician	P value	Female	Male
Animal allergy	1 (1.85%)	2 (2.81%)	3 (20.0%)	0.038	3 (2.97%)	0 0.00%)
Food allergy	3 (5.55%)	2 (2.81%)	5 (33.3%)	0.010	4 (3.96%)	1 (2.56%)
Disinfectant allergy	2 (3.70%)	2 (2.81%)	4 (26.6%)	0.020	4 (3.96%)	0 (0.00%)
Metal allergy	0 (0.0%)	2 (2.81%)	0 (0.0%)	0.031	2 (1.98%)	0 (0.00%)
Medication allergy	4 (7.40%)	4 (5.63%)	8 (53.3%)	0.027	7 (6.93%)	1 (2.56%)

Table 4

DISTRIBUTION OF SUBJECTS BY PROFESSION AND SYMPTOMS AND NUMBER OF HOURS OF WEARING LATEX GLOVES/ DAY

	Profession			Symptoms					
Hours of wearing gloves	**Physician**	**Nurse**	**Laboratory technician**	**Itching**	**Allergic rhinitis**	**Allergic conjunctivitis**	**Cough**	**wheezing**	**Swelling**
0-1 hour/day	6 11.1%	16 22.5%	1 6.7%	11 40.7%	2 7.7%	0 0%	2 15.4%	2 22.2%	8 33.3%
2-4 hours/day	21 38.9%	30 42.3%	12 80.0%	9 33.3%	15 57.7%	8 72.7%	8 61.5%	5 55.6%	8 33.3%
>4 hours/day	27 50.0%	25 35.2%	2 13.3%	7 25.9%	9 34.6%	3 27.3%	3 23.1%	2 22.2%	8 33.3%
Total	54	71	15	27	26	11	13	9	24
< 10 years	20 37.0%	24 33.8%	3 20.0%	5 18.5%	6 23.1%	0 0%	1 7.7%	1 11.1%	6 25.0%
10-20 years	17 31.5%	28 39.4%	6 40.0%	18 66.7%	8 30.8%	7 63.6%	5 38.5%	4 44.4%	15 62.5%
>20 years	17 31.5%	19 26.8%	6 40.0%	4 14.8%	12 46.2%	4 36.4%	7 53.8%	4 44.4%	3 12.5%
Total	54	71	15	27	26	11	13	9	24

conducted by Walsh et al., 84.6% of the subjects reported that they consistently use gloves at work, compared with 13.9% who said they don't do it [18, 19]. Reasons for not wearing gloves were: reduced sensations, reduced mobility, low risk of infection, allergic skin reactions, patient consent and low cost.

Natural rubber latex allergies have major implications for the health of subjects working in this field but also for patients who experience increased sensitivity to latex. For people who suffer from allergies, both medical staff and patients who are coming in contact with, alternative solutions can be offered, especially free of latex products such as nitrile gloves, mainly without talc. Individuals who have other types of allergies (metal, medicines, disinfectants) appear to have a higher risk of hypersensitivity by latex contact.

Because allergic reactions to latex range from mild to very severe and the severity of allergic reactions can worsen with repeated exposure to the substance, proper diagnosis of latex allergy is important. In case of allergy medical staff can use powder-free low-protein latex gloves as an alternative to powdered latex gloves, significantly reducing the incidence of latex allergy and latex-induced asthma, as well as the prevalence of latex-related symptoms.

Conclusions

Latex allergy is an occupational pathology with increased frequency among health care workers. Recognition of hypersensitivity and prompt management of reactions is paramount for the safety of health care and dental patients and personnel.

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