

# PREVALENCE OF LATEX ALLERGY AMONG HEALTHCARE WORKERS

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## Abstract

**Objectives:** The use of latex gloves has increased by several folds in the recent past due to concerns about blood-borne infections. Data from Asian countries with regard to latex allergy is scarce. The objective of this study was to determine the prevalence and risk factors of latex allergy among healthcare workers in a tertiary hospital in Sri Lanka. **Material and Methods:** A cross-sectional survey was carried out among different categories of employees in the hospital. A self-administered questionnaire was used to collect data related to latex allergy. **Results:** A total of 524 employees was recruited and 62% responded to the questionnaire. Among them 49.2% wore gloves for more than 1 hour a day. Symptoms suggestive of latex allergy were reported by 53 (16.3%) subjects. A considerable proportion (11.4%) of workers had been suffering from latex allergy for more than 5 years. Nurses accounted for the highest prevalence for any job category, while the unit with the highest rate was the surgical ward. Duration in the service (OR = 1.006, P = 0.048) and wearing gloves for more than one hour a day (OR = 3.292, P = 0.004) were significant risk factors for latex allergy, but not atopy or family history of atopy. Seven employees noticed that they developed food allergy after assuming duties as healthcare personnel. **Conclusions:** Prevalence of latex allergy is high among healthcare workers in this study population. Environmental factors rather than genetic predisposition play the major role in the development of this condition.

## Key words:

Healthcare workers, Natural rubber latex, Occupational allergy

## INTRODUCTION

Latex is the milky sap from the *Hevea brasiliensis* tree and is widely used in medical appliances and consumables. The use of latex products, especially latex gloves by healthcare workers, has increased, largely due to concerns about blood-borne infections. This has been paralleled by a growth of symptoms suggestive of latex allergy [1,2]. Even though the symptoms experienced by some individuals are mild and not life-threatening, the impact of this condition on their quality of life causes concern [3,4]. It is reported that affected individuals tend to change their working place, sometimes to the extent of changing the profession completely [4,5].

It seems that the emphasis made on this occupational hazard in developing countries, especially in the Asian

region, is inadequate, albeit the rise in prevalence of the symptoms [6]. It is postulated that in general, allergy is an emerging epidemic in Asia, but asthma and a few other atopic diseases have been the focus for research [7,8]. The total cost of workers' compensation claims for diseases caused by latex allergy at the workplace has become a major problem in some countries [1,9,10]. A few studies have addressed the risk factors for the development of latex allergy, but the results are inconclusive. Some authors postulate that genetic constitution poses the highest risk for this occupational allergy [5,11–13], but others have demonstrated a considerable effect of environmental factors [14]. A standard tool for mass screening for latex allergy is yet to be identified. However, a simple self-administered questionnaire has been shown to claim

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a good sensitivity [12]. This cross-sectional study was carried out to determine the prevalence and associated factors of latex allergy among healthcare workers in a tertiary hospital in Sri Lanka. Sri Lanka is a South Asian country with a comparably higher prevalence of allergic diseases in the recent past than other countries in the region [15].

## MATERIAL AND METHODS

This study was conducted at a university hospital in Sri Lanka, which provides tertiary care to patients. All the units with staff who wear gloves at work were selected and all the employees of the selected units were invited to the study. The study population consisted of doctors, nurses, laborers and laboratory technicians. Each subject was given an anonymous questionnaire (either in English or in Sinhala according to their preference) which asked about their job history, use of latex gloves and other latex products at work, and symptoms associated with the use of latex products. Enquiries were also made about pre-existing atopic diseases and family history of allergies.

The reaction was considered immediate (Type I hypersensitivity), if symptoms occurred within 60 minutes of exposure to latex-containing products: wearing latex gloves or exposure to latex when another person is wearing them. Symptoms involving skin, respiratory tract and face were recorded. Subjects, who reported burning sensation, itching, vesicular formation, or cracking, scaling or blistering of skin, were considered to have contact dermatitis regardless of the nature of the reaction; whether it was irritant or allergic.

Statistical analysis was performed using the Statistical Package for the Social Sciences (SPSS) for Windows (Version 13.0; SPSS Inc, Chicago, IL, USA). Categorical variables were assessed with the Chi-square test (Pearson). Odds Ratios (OR) and 95% Confidence Intervals (95% CI) for symptoms were calculated with multiple logistic regression.

## Ethics

Ethical clearance for this study was granted by the Ethics Review Committee of the Faculty of Medicine, University of Kelaniya, Sri Lanka. Informed verbal consent was taken from the participants before carrying out the study.

## RESULTS

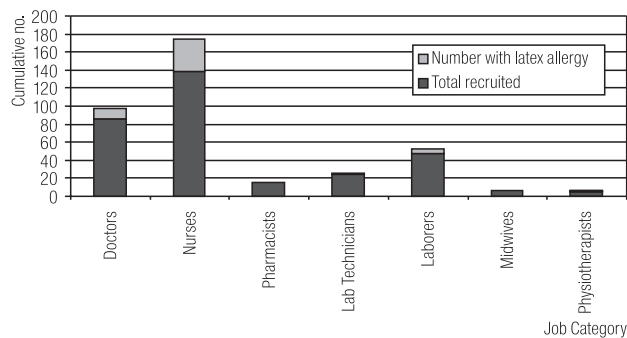
A total of 524 workers were recruited to the study and 325 (62%) replied to the questionnaire. The ages of the respondents ranged from 19 to 59 years (mean 37 years) and 73.5% of them were females. The total comprised 86 doctors, 139 nurses, 16 pharmacists, 25 laboratory technicians, 48 laborers, 6 midwives and 5 physiotherapists. Altogether 160 (49.2%) individuals stated that they regularly wore gloves for more than 1 hour in total over a working day. Healthcare workers in surgical wards and theatres were the most frequent and prolonged users of latex gloves. On average, workers donned 6 pairs of gloves per working day. Apart from latex gloves, 44.2% of the staff indicated that they handle other rubber products (elastic bandages, rubber bands, etc.) during work.

Fifty-three (16.3%) of the employees experienced symptoms strongly suggestive of latex allergy. Of the 53 who reported them, 16 had immediate reactions (type I hypersensitivity), 26 had contact dermatitis, and 11 reported to have both types of hypersensitivity reactions. Table 1 shows the prevalence of symptoms reported by the employees. None reported to have anaphylactic shock due to latex. Their hands were most commonly affected by latex glove allergy. Among those who reported to have latex allergy, 88.7% were regularly wearing powdered-latex gloves, while the rest used powder-free gloves at work. Symptoms were transient in 43 subjects, while 10 staff members had virtually persistent symptoms. Nine workers claimed that they developed symptoms when they had contact with other workers wearing gloves. Among them, only 4 had evidence of allergy when they themselves wore latex gloves.

The prevalence of symptoms according to the working unit (Table 2) and job category (Figure 1) is summarized. The surgical ward seems to be the unit with highest prevalence of latex allergy, while nurses, regardless of the working unit, account for the highest prevalence for any job category. Approximately 43% of the staff members who have latex allergy, suffered from the symptoms for less than a year, while 11.4% and 45.7% had problems for more than 5 years and 1–5 years respectively. A total of 18 subjects complained that they developed reactions

**Table 1.** Frequency of symptoms related to latex glove use

Affected site / system	Symptom	N (%)
Hands	hives	10 (18.9)
	itching, vesicular formation, cracking, scaling or blistering of skin	37 (69.8)
Face	itchy eyes	10 (18.9)
	puffiness around eyes	3 (5.7)
Respiratory tract	sneezing	8 (15.1)
	chest tightness	3 (5.7)
	difficulty in breathing	2 (3.8)
	cough	7 (13.2)
	wheezing	0
General	hives/itching of the whole body	2 (3.8)
	anaphylactic shock	0

**Fig. 1.** Prevalence of symptoms of latex allergy according to the job category.**Table 3.** Odds Ratios of possible risk factors for latex allergy

Risk factor	aOR	P value (95% CI)
Duration in the service	1.006	0.048 (1.00–1.012)
Handling other rubber products	1.558	0.187 (0.806–3.012)
Wearing gloves > 1 hour	3.292	0.004 (1.471–7.37)
Working with others wearing gloves	5.985	0.083 (0.791–45.263)
Number of gloves donned/day	1.029	0.394 (0.964–1.097)
Undergone frequent surgeries / invasive procedures in the past	1.173	0.701 (0.518–2.655)
Atopy	1.508	0.218 (0.784–2.902)
Family history of atopy	1.368	0.616 (0.402–4.65)
History of food allergy	1.060	0.876 (0.511–2.196)

aOR — adjusted Odds Ratio for age and sex.

**Table 2.** Prevalence of symptoms according to the working department

Ward/Unit	N	%
OPD	2	3.8
ICU	3	5.7
Medical ward	7	13.2
Surgical ward	24	45.3
Operation theatre	4	7.5
Radiology unit	1	1.9
Laboratory	2	3.8
Preliminary Care Unit	3	5.7
Outpatient Clinics	5	9.4
Blood Bank	2	3.8

when handling other rubber products such as elastic bandages, erases, rubber bands etc. Those who have an allergy to latex gloves appear to have a higher rate of reactions against other rubber products than those who do not have latex glove allergy (Chi-Square = 15.52,  $p < 0.001$ ).

Logistic regression showed that wearing gloves for more than for 1 hour at work and the duration in the service are the most significant risk factors for latex allergy. Working in the environment with others wearing gloves appears to add to the risk of latex allergy with statistically marginal significance (Table 3). Atopy was defined by the presence of wheeze, asthma, rhinitis or eczema in the past. Atopy, food allergy or family history of atopy did not confer a risk

factor for latex allergy. Interestingly, 7 subjects reported that they developed food allergy after the assumption of duties in the present job, but only one of them noticed latex allergy at work.

On the subjects' days off from work, the symptoms get improved in 47 (88.7%) individuals. 24.5% of the affected individuals took medications for the symptoms. Two employees had to get time off from work due to the occurring symptoms, and 2 had to change their work place due to unbearable symptoms.

## DISCUSSION

This survey found that the prevalence of latex allergy among healthcare workers is considerably high and those who develop allergic reactions to latex gloves have a higher tendency to develop allergy to other rubber products.

The prevalence of 5–17% for latex allergy among healthcare workers has been reported all around the world [12,16,17]. Unfortunately, this is the only study conducted up to date to ascertain the prevalence of latex allergy in the country, thus neither comparisons nor time trends could be identified for the country. The outcome measures were assessed only by a questionnaire, which is a drawback of this study, but the results reiterate the importance of carrying out further studies in this population with a high prevalence of latex allergy.

Allergic reactions to latex could be a type I hypersensitivity reaction, which develops immediately after the exposure. These are caused by circulating IgE antibodies to proteins in natural latex. Out of the manifestations of type I hypersensitivity reactions, urticaria is the most frequent symptom reported [5,12]. We found that respiratory symptoms were as common as urticaria in the study group. A major drawback of a questionnaire study is the lack of definite criteria to distinguish between the two categories of contact dermatitis: irritant contact dermatitis and allergic contact dermatitis. Irritant contact dermatitis is often induced by multiple irritants such as cleansing agents, moisture trapped inside gloves, glove-donning powder and especially chemicals added during the manufacturing process of latex. Shifting to powder-

free gloves may alleviate symptoms in affected individuals [1]. Contact dermatitis which is allergic in origin (so-called allergic contact dermatitis) is mediated by  $T_{HI}$  cells and is a delayed-type hypersensitivity reaction. Most of the time proteins in latex products are responsible for these reactions and switching to non-latex gloves relieves the symptoms. A definite diagnosis of the nature of the problem (irritant versus allergic) can only be made by a skin patch test. A significant proportion of individuals who reported latex allergy (11/53), indeed had both contact dermatitis and type I reactions. This concurs with the results of other studies, and supports the fact that subjects with contact dermatitis to latex have a higher risk of developing type I hypersensitivity [6,14].

Staff of surgical wards showed the highest prevalence of latex allergy according to the working unit in this study. This is in contrast to the findings of other studies, in which operational theatre staff and staff of the intensive care units reported to have the highest prevalence [5,14]. Being in the service for longer periods (in total 48 members were in the service for more than 5 years) and some of their habits (frequent hand washing, higher rate of changing gloves) could be some of the possible contributing factors for this higher rates in surgical ward staff.

The use of powdered gloves adds to the risk of allergy not only concerning the individual wearing them, but also any susceptible worker in the same room. Airborne powder particles, carrying attached proteins in latex, readily get dispersed in the air and induce symptoms upon contact with the skin, mucosa, or by inhalation, in a susceptible individual albeit the source of allergen is from the gloves on another individual [18]. Indeed 9 individuals complained that they develop symptoms of latex allergy when they are working with others wearing gloves. This highlights the possibility of being sensitized to latex exclusively at the workplace. The risk of becoming sensitized to latex during a hospital stay in patients has not been evaluated up to date. The danger behind this sensitization is that patients may go into anaphylactic shock with intermittent exposure they experience every time getting admitted to hospital. A major impact

on the quality of life of the patients would be when they develop food allergy when sensitized to latex, due to cross reactivity between latex and food allergens. Future studies should address this issue to appreciate the gravity of this problem among in-ward patients. Indeed, this study has shown that individuals who did not have food allergy in the past developed reactions to food after taking up work at the hospital. This indirectly indicates the possibility of developing food allergy by patients who frequently get admitted to hospital and who undergo multiple invasive/surgical procedures.

Surprisingly, we have found that factors considered to confer a great risk for the development of latex allergy at the workplace, such as atopy and family history of atopy, do not play a role in subjects enrolled to this study. Wearing gloves for long hours and being in the service for a long period were the most significant risk factors for latex allergy in healthcare workers of this study. This implies that environmental factors, rather than genetic predisposition, determine the development of this occupational hazard.

The results of this study demonstrate that latex allergy continues to be a major occupational hazard and emphasize the need of implementing policies related to glove use at the workplace in order to promote safe environment at the hospital. The use of non-powdered latex gloves by all healthcare workers, and the use of non-latex gloves by sensitized subjects will definitely decrease the burden of latex allergy among healthcare workers. Increased awareness of this occupational problem will decrease the incidence of serious and persisting manifestations among them. The impact of exposure to latex on in-ward patients should be investigated.

## REFERENCES

1. Liss GM, Tario SM. *Natural rubber latex-related occupational asthma: association with interventions and glove changes over time*. Am J Ind Med 2001;40(4):347-53.
2. Bousquet J, Flahault A, Vandenplas O, Ameille J, Duron JJ, Pecquet C, et al. *Natural rubber latex allergy among health care workers: a systematic review of the evidence*. J Allergy Clin Immunol 2006;118(2):447-54.
3. Power S, Gallagher J, Meaney S. *Quality of life in health care workers with latex allergy*. Occup Med (London) 2010;60(1):62-5.
4. Nienhaus A, Kromak K, Raulf-Heimsoth M, van Kampen V, Merget R. *Outcome of occupational latex allergy-work ability and quality of life*. PLoS One 2008;3(10):e3459.
5. Smedley J, Jury A, Bendall H, Frew A, Coggon D. *Prevalence and risk factors for latex allergy: a cross-sectional study in a United Kingdom hospital*. Occup Environ Med 1999;56:833-6.
6. Deval R, Ramesh V, Prasad GBKS, Jain AK. *Natural rubber latex allergy*. Indian J Dermatol Venereol Leprol 2008;74:304-10.
7. Pawankar R, Bunnag C, Chen Y, Fukuda T, Kim YY, Le LT, et al. *Allergic rhinitis and its impact on asthma update (ARIA 2008)-Western and Asian-Pacific perspective*. Asian Pac J Allergy Immunol 2009;27(4):237-43.
8. Gerez IF, Lee BW, van Bever HP, Shek LP. *Allergies in Asia: differences in prevalence and management compared with western populations*. Expert Rev Clin Immunol 2010;6(2):279-89.
9. Latza U, Haamann F, Baur X. *Effectiveness of a nationwide interdisciplinary preventive programme for latex allergy*. Int Arch Occup Environ Health 2005;78(5):394-402.
10. Edlich RF, Masson SS, Swainston E, Dahlstrom JJ, Gubler K, Long WB 3rd. *Reducing workers' compensation costs for latex allergy and litigation against glove manufacturing companies*. Environ Pathol Toxicol Oncol 2009;28(4):265-8.
11. Sinha A, Harrison PV. *Latex glove allergy among hospital employees: a study in north-west of England*. Occup Med 1998;48(6):405-10.
12. Kujala V. *A review of current literature on epidemiology of immediate glove irritation and latex allergy*. Occup Med 1999;49(1):3-9.
13. Filon FL, Radman G. *Latex allergy: a follow up study of 1040 healthcare workers*. Occup Environ Med 2006;63:121-5.
14. Lin C, Hung D, Chen D, Wu HJ, Lan JL, Chen YH. *A hospital-based screening study of latex allergy and latex sensitization among medical workers in Taiwan*. J Microbiol Immunol Infect 2008;41:499-506.
15. Amarasekera NDDM, Gunawardena NK, de Silva NR, Weerasinghe A. *Prevalence of childhood atopic diseases in Western Province of Sri Lanka*. Ceylon Med J 2010;55(1):5-8.

16. Turrjanmaa K. *Incidence of immediate allergy to latex gloves in hospital personnel*. Contact Dermatitis 1987;17:270–5.
17. Lagier F, Vervloet D, Lhermet I, Poyen D, Charpin D. *Prevalence of latex allergy in operating room nurses*. J Allergy Clin Immunol 1992;90(3 Pt 1):319–22.
18. Edlich RF, Long WB 3rd, Gubler DK, Rodeheaver GT, Thacker JG, Borel L, et al. *Dangers of cornstarch powder on medical gloves: seeking a solution*. Ann Plas Surg 2009;63(1):11–5.