

## Latex Allergy Prevalence among Egyptian Health Care Workers at a Tertiary Care Hospital in Cairo

Dina Sayed Sheha<sup>1</sup>, Nayera Samy Mostafa<sup>2</sup>, Fatema Elzahraa Abd El Kader<sup>1</sup>, Hossam Moustafa Elkady\*<sup>1</sup>

Departments of <sup>1</sup>Internal Medicine, Allergy and Clinical Immunology and <sup>2</sup>Community, Environmental and Occupational Medicine, Faculty of Medicine, Ain Shams University, Cairo, Egypt

\*Corresponding author: Hossam Moustafa Elkady, Mobile: (+20)01090751701, E-mail: hossamelkady86@ymail.com

### ABSTRACT

**Background:** Latex allergy is a common occupational problem among healthcare workers (HCWs). Although latex allergy prevalence has been researched in various countries, data in Egyptian hospitals is lacking.

**Objectives:** To determine the frequency of latex allergy among the HCWs in a tertiary hospital in Egypt.

**Patients and Methods:** One hundred and thirty healthcare workers at Ain Shams University Hospitals participated in the current cross-sectional study in the period from September 2020 to March 2021. All participants were evaluated for symptoms related to exposure of latex products, and skin prick test (SPT) for latex protein was done.

**Results:** Twenty-six (20%) of HCWs had positive SPT to latex. The most common allergic manifestations reported were skin allergy (53.84%), followed by allergic rhinitis (23.07%), allergic conjunctivitis (11.53%), bronchial asthma (7.69%), and angioedema (3.84%).

**Conclusion:** Latex allergy prevalence among HCWs was 20%. This rate is relatively higher than previous studies.

**Keyword:** Latex allergy, Skin prick test, Health care workers.

### INTRODUCTION

Latex allergy is an allergic response on exposure to latex proteins. It remains a widespread health risk for numerous occupations <sup>(1)</sup>.

As a result of frequent usage of latex gloves to prevent the spread of infectious diseases since the 1980s, healthcare professionals (such as doctors, nurses, dentists, laboratory workers) are the occupational group most impacted by latex allergy <sup>(2,3)</sup>.

The prevalence of latex hypersensitivity among healthcare workers (HCWs) varies according to the professional work, range from 25% to 50% among nurses, 30% among dentists, 50% for surgeons, and other healthcare practitioners show rates near 15% <sup>(4)</sup>.

Latex exposure occurs by contact of skin directly with latex containing products. Latex allergens in gloves can bond to powder particles and become airborne, which can be breathed in and induce respiratory allergy <sup>(5,6)</sup>.

Depending on the route of exposure (skin, mucosa or intravenous), allergen amount and sensitization level of patients, the manifestations induced by immunoglobulin E (IgE) hypersensitivity (type I) reaction occur within seconds to minutes of exposure to allergens. The patient may develop urticarial wheals, wheezy chest, allergic rhinitis, and conjunctivitis<sup>(7,8)</sup>. Additionally, patients may present with allergic contact dermatitis, a type IV delayed hypersensitivity reaction that occurs 24 – 48 hours after exposure to latex <sup>(8)</sup>.

Skin tests and specific IgE are the main diagnostic methods for latex allergy, positive results of either may be considered a sign of sensitization to latex <sup>(9)</sup>. Skin prick test is the first line investigation, when available, with specificity close to 100% and sensitivity up to 93% <sup>(10)</sup>.

Latex gloves usage has increased recently due to COVID-19 pandemic, Due to their greater durability,

latex and nitrile gloves were selected over vinyl and polyethylene gloves as part of biosafety procedures <sup>(11)</sup>. Since The epidemiological data of latex sensitivity is lacking in Egypt, the aim of the current study was to detect latex allergy prevalence among HCWs at Ain Shams University Hospitals (ASUHs).

### PATIENTS AND METHODS

One hundred and thirty healthcare workers at ASUHs (Ain shams university hospitals) participated in this cross-sectional study during the period from September 2020 to March 2021.

**Inclusion criteria:** Clinicians, nurses, laboratory technicians and allied health care professionals at Ain Shams University Hospitals.

**Exclusion criteria:** Participants with history of anaphylaxis, severe asthma, cardiovascular disease particularly on beta blocker medications, and pregnant and lactating females.

### Ethical Considerations:

The study design was approved by The Scientific Research Ethics Committee of Faculty of Medicine, Ain Shams University. Written informed consents were obtained from all participants. This work has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.

All the selected participants were subjected to the following:

Demographic data, history of co-morbidities (past history of medical diseases as diabetes, hypertension, heart disease or any other medical history), using gloves during patient encounter, changing gloves after contact with each patient, and the type of the used gloves. Personal and family history of allergic disorders and symptoms suggestive of latex

allergy including contact urticaria, allergic rhino conjunctivitis, bronchial asthma, contact dermatitis were documented.

**Full clinical examination:**

General examination of vital data (blood pressure, pulse), skin examination for any skin lesion (urticarial rash, erythema, dermatitis) and chest examination by auscultation of chest.

**Skin prick testing (SPT):**

After assessment of the vital data of each participant and explaining the test procedure, SPT was done for each participant who accepted and signed the informed consent. Disposable sterile lancets and crude latex allergen extracts were used, the histamine was used as a positive control and normal saline as a negative control. A drop of latex extract was applied on the volar forearm and lancet punctured into the skin. The test result was examined after 15 -20 minutes and the diameter of the wheal measured. In comparison to the negative control, a positive outcome was defined as an average diameter of 3 mm <sup>(12)</sup>.

**Statistical Analysis**

To evaluate the data, IBM SPSS Statistics for Windows, Version 21.0. Armonk, New York: IBM Corporation, Released 2012 was used, mean and standard deviation were used to present normally distributed continuous variables and compared between two groups using independent t-test. Also, categorical data were represented using numbers and percentages and compared between groups using Chi-square test and/or fisher exact test. Statistical significance was defined as p value of 0.05 or lower.

**RESULTS**

Table (1) shows the mean age of all participants was 29.54±7.94 years; 62.3% were females, 37.7% were males; 56.9% of the participants were physicians, 34.6% were nurses, 8.5% were laboratory workers.

**Table (1):** Demographic and personal data of the study participants (N=130):

		Min.	Max.	Mean	SD
<b>Age (in years)</b>		20	59	29.54	7.94
		N (130)		%	
<b>Gender</b>	Male	49		37.7%	
	Female	81		62.3%	
<b>Job</b>	Physician	74		56.9%	
	Nurse	45		34.6%	
	Laboratory Worker	11		8.5%	

Among 130 HCWs who were investigated for symptoms of latex allergy, 64 participants had symptoms or adverse reaction related to latex exposure (table 2).

Table (2) shows a statistically significant

difference in gender in patient with symptoms suggestive of latex allergy, being more prevalent among females (60.5%) than males (30.6%).

**Table (2):** Factors associated with latex allergy regarding demographic data of the study participants.

		Clinical symptoms related to latex exposure				t#	P value
		Yes (N=64)		No (N=66)			
		Mean	SD	Mean	SD		
<b>Age</b>		29	8	30	8	0.08	0.94
		N	%	N	%	X <sup>2</sup> ##	P value
<b>Gender</b>	Male	15	30.6%	34	69.4%	10.91	0.001
	Female	49	60.5%	32	39.5%		

#Student t test ##Chi square test or Fisher Exact

Among study participants who have symptoms related to latex exposure, 20% had positive skin prick test to latex extract (table 3).

**Table (3):** SPT results in subjects with clinical symptoms suggestive of latex allergy among study participants.

		Clinical symptoms related to Latex exposure				t#	P value
		Yes (N=64)		No (N=66)			
		N	%	N	%		
<b>SPT with Latex protein</b>	Negative	38	36.5%	66	63.5%	33.52	<0.001
	Positive	26	100%	0	0.0%		

The most common manifestation among patients with positive SPT to latex was skin allergy (53.84%), most of the study participants complains contact urticaria, dry, scaly skin or red blisters on latex exposure. The second most common symptom was allergic rhino conjunctivitis symptoms (runny nose, sneezing and red eye). Two study participants reported symptoms of bronchial asthma (wheezy chest, and dyspnea) and one participant reported history of angioedema on latex exposure (table 4).

**Table (4):** Clinical symptoms of patients with latex positive SPT (N= 26).

Clinical symptoms of patients with positive SPT for latex	N	%
<b>Skin allergy</b>	14	53.84%
<b>Allergic rhinitis</b>	6	23.07%
<b>Allergic conjunctivitis</b>	3	11.53%
<b>Bronchial asthma</b>	2	7.69%
<b>Angioedema</b>	1	3.84%

**DISCUSSION**

The prevalence of latex allergy among HCWs has been reported in several literature to range from 7% to 17%<sup>(13, 14)</sup>. **Wu et al.**<sup>(1)</sup> suggested that the use of latex-free gloves in developed countries may be the cause of this wide range of variability.

To our knowledge, the current study is the first to investigate latex allergy among health care professionals in Egyptian hospitals.

The age of participants was (20-59) years; most of them were females (62.3%), and the majority were physicians (56.9%).

Among the 130 participant, 64 participants had symptoms suggestive of latex allergy, and 26 HCWs (20%) tested positive for latex allergen by SPT.

Latex allergy prevalence in the study population was 20%. The findings are compatible with a study in Brazil in 2012 using specific IgE for latex, the latex sensitivity was 22.4%<sup>(15)</sup>, but higher than the rate documented by previous studies. The prevalence was 17.9% in a study conducted at Shiraz in 2008<sup>(16)</sup>, 18% among 899 nurses in Thailand in 2013<sup>(17)</sup>, 16.3% at a university hospital in Sri Lanka 2010<sup>(18)</sup>, 16% in India on 163 dentists in 2010<sup>(19)</sup>, and 8.3% in hospital in South Africa in 2013<sup>(20)</sup>. A possible explanation for the higher prevalence rate reported by the current study was that it was conducted during the era of COVID-19 pandemic. Because of the high infectious rate of COVID-19; HCWs were required to wear personal protective equipment such as gloves more frequently than any other time, hence an increase in the risk of developing latex allergy.

In the current study, 60.5% of participants who had symptoms related to latex exposure were females. This is in accordance with other studies where female gender was reported as a risk factor for latex allergy in several trials as reported by **Agrawal et al.**<sup>(19)</sup> in India and **Köse et al.**<sup>(21)</sup> in Turkey.

The present study reports the most common allergic symptom was skin allergy 53.84%, followed by symptoms of allergic rhinitis 23.07% and allergic conjunctivitis 11.53%, meanwhile two participants reported symptoms of bronchial asthma 7.69% and only one reported having angioedema 3.84% which is consistent with a study by **Köse et al.**<sup>(21)</sup> in Turkey determined contact dermatitis as the most common hypersensitivity reaction 61.7%, allergic rhinitis in 27.7%, allergic conjunctivitis in 6.4%, and bronchial asthma in 4.2%. **Sakkaravarth et al.**<sup>(22)</sup> conducted a study on 1088 healthcare professionals in south India, the common symptom was irritant contact dermatitis 68.6% followed by rhinitis 40.4%, allergic contact dermatitis 17.1%, contact urticaria 11.1%, allergic conjunctivitis 6.06%, and bronchial asthma 3.03%. A study conducted in South Africa, the symptoms experienced were allergic rhinitis in 100.0%, asthma in 50.0%, dermatitis in 25.0%, and urticaria in 8.3%<sup>(20)</sup>.

The strengths of the current study include; the prevalence determined data using allergic history and clinical examination was confirmed by latex specific

SPT, which is the gold standard for the diagnosis of latex allergy. SPT was carried out by skilled allergist.

Currently, the only successful management for latex hypersensitivity is prevention<sup>(23)</sup>. Powdered latex should be avoided as possible to create a "latex-safe environment". Health care workers should be able to identify latex allergy as early as possible to reduce associated morbidity.

## LIMITATION OF THE STUDY

The cross-sectional study methodology of this research has certain limitations because it estimated the prevalence of latex sensitization at a single point in time, and the study was conducted at a period of heavy usage of gloves and latex products to avoid infection with COVID-19. The study's findings cannot be generalized to all Egyptian HCWs, So more studies in different times with large sample size and randomization are recommended.

## CONCLUSION

The prevalence of latex allergy was 20% in a single tertiary care hospital in Egypt. Skin allergy was the most common manifestation of latex allergy among the studied population of HCWs. Non latex products usage among health care professionals is recommended.

**Conflict of interest:** The authors declare no conflict of interest.

**Sources of funding:** This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

**Author contribution:** Authors contributed equally in the study.

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