

Latex allergy in health care workers in Taiwan: prevalence, clinical features

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Abstract

Background Latex allergy is becoming a major health concern among healthcare workers, of whom approximately 2.8 to 18% are reportedly sensitized.

Objective The purpose of this study was to analyze the results of a natural rubber latex (NRL) allergy screening program to identify sensitized hospital employees.

Methods Nurses ($n = 130$) assigned to operating theaters and intensive care units were evaluated using a written questionnaire for symptoms of atopy (asthma, rhinoconjunctivitis, and atopic eczema), possible reactions to latex gloves, other medical devices and previous surgery. Serological testing for total immunoglobulin E (IgE), latex-specific IgE, and specific-IgE to melon, banana, kiwi, tomato, and chestnut were performed using Pharmacia CAP radioallergosorbent tests. Skin pick test (SPT) for latex allergen was also performed.

Results Elevated serum total IgE was found in 22(16.9%) of the 130 nurses, 3(16.7%) of whom had increased latex-specific IgE further confirmed by SPT. The overall prevalence of latex allergy was 2.3% (3/130). No cross reactive fruit-allergy was found among the latex-sensitized nurses.

Conclusion This study supports the existence of other forms of atopy are related to an increased risk of latex sensitization. The NRL screening program used in this study is feasible for use in identifying latex-sensitized employees

Keywords Natural rubber latex · Health care workers · Fruit allergy

Introduction

The prevalence of latex allergy is progressively increasing due to the widespread use of protective disposable ware, especially latex gloves, among health care workers (HCW) in the past decade (Alessio et al. 2001). The estimated prevalence of latex allergy among HCW varied from 2.8 to 18%, and studies do not always distinguish between those who are positive in an assay for latex-specific immunoglobulin E (IgE) and those with clinical allergy (asthma, rhinoconjunctivitis, and atopic dermatitis) (Pridgeon et al. 2000). Although the prevalence of latex allergy in the general population is estimated at less than 1%, it appears to be far higher among HCW and in patients with spina bifida, approaching almost 65% (Agarwal and Gawkrödger 2002). The clinical features of latex allergy can range from mild skin erythema to life-threatening anaphylaxis, which is usually a type I, immediate hypersensitivity reaction mediated by IgE, although some people may have type IV delayed-type hypersensitivity reactions (Nettis et al. 2002). Disposable medical gloves are the major reservoir of latex allergens, particularly powdered gloves. They are also the greatest source of latex aeroallergens in the surgical setting (Elliott 2002).

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HCW have high exposure to latex allergens, which occurs via both direct skin contact and inhalation of latex particles from powdered gloves. In Taiwan, natural rubber latex (NRL) gloves are predominantly used, and the prevalence of latex allergy among HCW is not clear. Thus primary prevention and screening programs in hospitals are urgently needed. In addition, the existence of other forms of atopy may be related to an increased risk of latex sensitization.

Materials and methods

A total of 130 nurses, who worked in the intensive care units and operating theaters of the Min-Sheng General Hospital, a regional general hospital in Tao Yuan City, were included. The nurses used both sterile and non-sterile disposable latex examination gloves, were depending on availability and setting. A questionnaire concerning personal atopy history (respiratory allergy and atopic dermatitis) including sensitization to vegetables such as potato, tomato, chestnut, banana, and kiwi fruit, previous surgical history, latex product allergy and symptoms like dermatitis, dry/cracked hands or fingers following the use of latex products such as medical devices and other commonly used devices in the health care setting was sent to each nurse. The Pharmacia CAP radioallergosorbent test (Uppsala, Sweden) was used to detect the presence of serum total IgE, latex-specific IgE, and fruit IgE antibodies that might cross react with latex IgE antibodies. Skin prick tests (SPTs) for latex allergen and common environmental allergens including *D. pteronyssinus*, *D. farinae*, Blomia, cockroach, *Aspergillus*, *Candida* and *Alternaria* were performed in each participant.

Statistical analysis

The Microsoft Excel and the Statistical Package for the Social Sciences (SPSS) software programs were used for the processing and analysis of study data.

Results

Five hundred nurses were working in Min-Sheng General Hospital at the time of recruitment for this study. All of the 130 nurses who participated in the survey completed the required information. Among them, 57(44%) reported having atopy and 22(16.9%) of these subjects had high serum IgE concentration greater than 200 kU/l. Among the subjects who reported having atopy, 18 had elevated serum total IgE

concentration (>200 kU/l). However, four subjects with high IgE levels that did not report any allergic condition. Thus, 18 of 57 (31.6%) nurses with elevated IgE concentrations had atopic disease, and three of them (16.7%) had elevated latex-specific total IgE (>0.35 kU/l, the cutoff level) (Tables 1, 2). Sensitization to latex was further confirmed by SPT in three nurses. All three of these nurses had atopy history associated with elevated serum IgE concentration. Elevated serum IgE levels were thus found in 16.9% (22/130) of the investigated HCW had, and 2.3% (3/130) of HCW were NRL-specific-IgE antibody positive using the CAP radioallergosorbent test. In addition, of the 15 nurses who had undergone previous surgery, only one had elevated IgE.

Discussion

The latex allergens Hev b1, Hev b3, Hev b5, Hev b6, and Hev b7 are proteins involved in the biosynthesis of rubber or the coagulation of latex (Niggemann and Breiteneder 2000). These allergens can sensitize HCW by direct contact and/or aerosolization resulting in either a type I or type IV immune reaction. Moreover, vegetables including potato, tomato, chestnut, banana, and kiwi fruit can cross react with latex (Laresse Filon et al. 2001). The clinical manifestations of latex allergy range from local reactions (edema, itching, erythematous, and papulae), rhinoconjunctivitis, asthma, and pharyngeal edema, to anaphylactic shock (Patriarca et al. 2002).

Table 1 The relationship of atopy related to serum total IgE concentration

| Study subjects | Self-report atopy <i>n</i> = 57 | Non-atopy <i>n</i> = 73 | Total number <i>n</i> = 130 |
|----------------------------|------------------------------------|----------------------------|--------------------------------|
| Serum total IgE > 200 kU/l | 18(31.6%) | 4(5.5%) | 22(16.9%) |
| Serum total IgE < 200 kU/l | 39(68.4%) | 69(94.5%) | 108(83.1%) |

Table 2 The association of atopy related to an increase risk of latex sensitized nurses

| Study subjects | IgE > 200 kU/l with self-report atopy <i>n</i> = 18 | IgE > 200 kU/l without atopy <i>n</i> = 4 | Total number <i>n</i> = 22 |
|--------------------------------|--|--|-------------------------------|
| Latex-specific IgE > 0.35 kU/l | 3(16.7%) | 0(0%) | 3(13.6%) |
| Latex-specific IgE < 0.35 kU/l | 15(83.3%) | 4(100%) | 19(86.4%) |

There is growing evidence that primary prevention of occupational NRL allergies can be achieved if education and practical interventions are properly performed and maintained. Hospital surveys in England, Scotland, and Wales of more than 90 operating theaters showed that none had a latex allergy protocol, and less than one-third of theaters in the UK had latex-free products set aside for use by those with latex allergies (Keh et al. 2000). Another survey of 269 departments of anesthesia in England revealed that 87% had a store of latex-free equipment. Among them, 54% had a named nurse and 28% had a named consultant responsible for updating of latex allergy provisions (Yuill et al. 2003). These findings indicate the need for increasing awareness of the importance of primary prevention, pre-employment education and continued education about NRL allergy. Taiwanese hospitals currently have no latex allergy interventions or protocols, no store of latex-free equipment, no named physician or nurse responsible for latex allergy provisions, and disposable latex examination gloves are still being used almost exclusively.

In our study, 3 (13.6%) of the 22 intensive care nurses with elevated total IgE concentrations had latex-specific IgE antibody (Table 2), resulting in an overall latex allergy prevalence of only 2.3% (3/130). All three of these nurses also had rhinoconjunctivitis and contact dermatitis. These findings suggest that the 44% of the nurses who reported atopy and had high serum total IgE were at increased risk for latex allergy, in agreement with the findings of a recent study by Suli et al. (2004). HCW are at increased risk of NRL allergy, and latex-free gloves of vinyl or nitrile are an appropriate alternative to NRL gloves for these HCW. Moreover, a latex allergy screening program that

includes education is the most practical way of addressing this problem in hospitals.

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