

Low prevalence of clinical latex allergy in UK health care workers: a cross-sectional study

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The prevalence of natural rubber latex allergy amongst health care workers has been reported to vary between 1 and 40%. This is because different diagnostic criteria have been used on heterogeneous groups of subjects. We have undertaken a cross-sectional study of all 5600 employees in two National Health Service trusts served by one department of occupational health and one department of clinical immunology. The period prevalence (1999–2000) for Type I clinical latex allergy in the clinical health care workers was found to be 17/3500 (0.5%). Difficulties in diagnosis and factors which may have contributed to this low prevalence rate are discussed. No cases were forced to leave health care work as a consequence of their allergy.

Key words: Care workers; clinical health; latex allergy; prevalence.

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Introduction

The prevalence of IgE-mediated (Type I) sensitization to natural rubber latex (NRL) in health care workers (HCWs) has been reported to be as high as 40% [1,2] and as low as 1–2% [3–5]. Prevalence rates have varied according to whether calculations were based on self-reported symptoms on a questionnaire, which tend to overestimate prevalence as they are likely to include subjects with contact dermatitis and non-specific symptoms. Serological tests for specific immunoglobulin E (IgE) and skin prick tests (SPTs) may not correlate with clinical reactions to NRL, because >20 allergenic proteins have been identified in NRL. Not all of these allergens are contained within the commercial preparations that are currently used for diagnosis, resulting in false-negative results. False-positive results may occur in highly atopic individuals with very high concentrations of serum total IgE and by cross-reactivity between NRL allergens and other plant allergens.

Prevalence rates have also varied because studies have been carried out on different occupational groups, with varying degrees of exposure to NRL, and different sample sizes and periods of study. The prevalence rate of Type I clinical NRL allergy in the UK is unknown, so a cross-

sectional study was undertaken using all of the above methods, as well as normal clinical care, in all the HCWs in an English district comprising one acute and one community National Health Service (NHS) trust served by one department of occupational health and one department of clinical immunology.

Methods

All 5600 (3500 clinical) employees of two NHS trusts (4210 acute and 1390 community) were sent a confidential questionnaire in 1999 asking about symptoms suggestive of NRL allergy, including urticaria, rhinoconjunctivitis, angioedema, asthma and anaphylaxis. Questions were also asked about swelling of the lips after contact with balloons, and reactions to condoms and to fruit. Other allergies, such as hayfever and eczema, were also ascertained. A staff education programme using posters, newsletters and team briefings was simultaneously undertaken to raise awareness of NRL allergy in both trusts. Known cases were also identified from the normal clinical care of the authors.

Specific IgE to NRL was measured by the ELISA method to NRL extract with Hev b proteins (Hycor Biomedical, Penicuik, UK) and results graded on a scale from 0 to 6 by optical density. SPTs were performed using standardized NRL allergens (Soluprick; Alk-Abello,

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Hungerford, UK) in three dilutions (1, 10 or 100 Hep units) with positive (histamine) and negative (saline) controls. A positive result was defined as a wheal diameter 3 mm greater than the saline (negative) control. None of the subjects who had an SPT took anti-histamine medication during the week preceding the test.

Answers to questionnaires were scrutinized and subjects with symptoms suggestive of NRL allergy were offered specific IgE testing to NRL, house dust mite, cat dander and grass pollen. Subjects with symptoms and grade 0–2 specific IgE to NRL were offered a SPT. Subjects who refused a SPT were offered a 'use' test with a finger stall cut from a NRL glove, Derma plus powdered latex (Sempermed) containing 120 µg of NRL/g of rubber (Lowry method). A positive result was two or more papules on the skin under the stall within 15 min of contact.

Subjects were classified as NRL allergic if they had two or more symptoms suggestive of NRL allergy associated with either a grade 3–6 specific IgE to NRL, a positive SPT or a positive 'use' test. To ensure case ascertainment, all the positive specific IgE tests to NRL from 1995–2000 were identified from the laboratory database and cross-referenced with the occupational health records for the two trusts. The study was approved by the Dudley Health ethics committee.

Results

A total of 1440 (25%) questionnaires were returned; 115 of the respondents had symptoms suggestive of NRL allergy. Ninety-eight subjects underwent specific IgE testing, 31 had SPTs and 36 had a 'use' test. Five cases who did not reply to the questionnaire were already known to either the department of occupational health or the department of clinical immunology by way of normal patient care.

Seventeen of 3500 (0.5%) clinical health care workers were identified with Type I clinical NRL allergy between 1999 and 2000 (Table 1). Eleven were nurses or nursing assistants, four were technicians, one was a doctor and one a chiropodist. Seven were lost to follow-up or declined to take part in the investigations. No additional cases were identified by cross-referencing the laboratory database for grade 3–6 specific IgE to NRL with the occupational health records.

Symptoms were dermatological in 71/102 (70%) of the non-NRL-allergic and 15/17 (88%) of the NRL-allergic subjects, and rhino-conjunctival in 52/102 (62%) and 11/17 (64%), respectively. Of those with NRL allergy, three had had occupational asthma and two had had acute anaphylaxis.

Of those subjects who were tested, specific IgE was positive to one or more common UK inhalant allergens (house dust mite, cat dander, grass pollen) or other

Table 1. Cases of Type I clinical NRL allergy identified in an NHS acute and community trust, 1999–2000

	<i>Number</i>
Clinical staff	3500
Questionnaires returned	1400
Symptoms + grade 3–6 specific IgE	5
Symptoms + positive SPT	6
Symptoms + positive 'use' test	1
Identified by normal clinical care	5
Total	17

suspect allergens (dog, horse) in 33/80 (41%) who were non-NRL allergic and 13/15 (87%) who were NRL allergic.

Discussion

The prevalence rate of Type I clinical NRL allergy in this study of HCWs is much lower than in most published studies. There may be several reasons for this. First, asymptomatic subjects who may have demonstrated sensitization to NRL if subjected to specific IgE testing or SPTs were not included in this study. Secondly, we included only subjects with symptoms suggestive of NRL allergy and not subjects with non-specific symptoms, such as itching of the hands or rashes, which may have been due to Type IV sensitivity (contact allergic dermatitis). Thirdly, we used a combination of a questionnaire, specific IgEs, SPTs, the 'use' test and clinical consultation to diagnose NRL allergy, unlike many other studies that have used only one or two of these methods [6,7].

Individuals with allergic features due to other environmental allergens, such as grass pollen, house dust mite or animal dander, were identified so that symptoms were not inappropriately attributed to NRL. This was particularly important for symptoms such as rhino-conjunctivitis and wheeze. Our sample size was large and included all clinical HCWs in both an acute and a community trust. A response rate of 25% to a questionnaire may seem low at first sight, but the questionnaire was designed to identify only individuals with symptoms suggestive of NRL allergy.

Three cases of occupational asthma is greater than the estimated annual incidence rate for this condition for the whole of the UK of ~40 cases per year, as reported to the National Epidemiological Surveillance scheme [8]. Rates for the UK peaked in 1999 at 77, but fell to 18 cases in 2000. Although most chest and occupational physicians take part in the scheme, it is unlikely to capture all cases of occupational asthma attributed to NRL. There are 385 NHS trusts in the UK, from which the ~40 cases of occupational asthma are reported annually. This equates

to 0.1 cases per trust per year. We have identified three cases in two trusts. This is, however, a period prevalence of cases identified between 1999 and 2000, but includes cases diagnosed in previous years. Nevertheless, it would appear from this study that the National Epidemiological Surveillance scheme is underestimating the annual incidence rate for asthma due to NRL.

Since 1999, our trusts have gradually stopped buying gloves with donning powder and with a NRL protein concentration >100 µg/g, which may have contributed to the small number of cases that were identified by the study. Prior to 1999, powdered gloves with NRL protein concentrations >400 µg/g were being purchased by the trusts. Latex gloves have been shown to be associated with very high concentrations of NRL aeroallergens (>3500 particles/m³ of air) [9], which can be reduced by using powder-free NRL gloves.

The trend towards coating NRL with a polymer rather than with powder will have contributed to a reduction in NRL aeroallergens. A staff education programme that encouraged the use of NRL gloves only whilst handling blood or body fluids (rather than for any patient contact) may also have contributed to the low prevalence rate in this study.

We may have failed to identify cases of clinical NRL allergy who did not reply to the questionnaire, but we think that these cases would have come to our attention in the course of normal clinical care. That is, either by referral from another doctor or from a request for specific IgE to NRL to the laboratory which provides a sub-regional service for the assay.

It should be noted that all of the cases of clinical NRL allergy that we have identified have been kept at work by a combination of hazard reduction and job relocation. That is, either by removing NRL gloves from the individual's working environment or, where that was not practicable, relocating that person to an environment where NRL gloves were not used, e.g. to an admissions

ward. No one was forced to leave either trust as a consequence of NRL allergy.

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