

Latex allergy

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Several review articles on latex allergy were published during these last years on of the last being publisher by Turjanmaa K. et al [1] in 1996.

Our purpose is not to make a general overview of the problem but indeed to stress some particular points based on recent data in the literature.

I would like to talk :

I - On the prevalence of latex sensitization in a general population

II - On the increased rate of sensitization in health care workers and workers from industry

III - On the increased rate of sensitization in children with spina bifida or multiple surgeries

IV - On main allergens and cross allergy, especially with foods.

However, before starting, I would like to point out a particularly historical fact. Each general report on latex allergy recalls that the first descriptions appeared in 1979-80 in the European literature with the report by Nutter [2] in 1979 and by Forstrom [3] in 1980, both describing contact urticaria to rubber.

In fact, the first description comes from Stern in 1927 [4], relating the case of a chronic general urticaria appearing after dental care. The role of a dental prosthesis made with latex was suspected and proved by exclusion and reintroduction of the prosthesis, and then by a contact provocation test with a piece of latex introduced in the mouth.

PREVALENCE OF LATEX SENSITIZATION IN A GENERAL POPULATION

The occurrence of natural rubber latex (NRL) allergy has not been systematically surveyed among the general population. NRL allergy was found in only one (0.12 %) of 804 unselected Finnish adult prick-tested before surgery [5]. A low prevalence rate of 0.4 % was also found in nonatopic French subjects prick-tested in an allergology clinic [6]. A few small studies of relatively unselected children provide prevalence figure up to 10 % [7, 8]. A study [9] using the AlaSTAT assay system in 1000 volunteer American blood donors, with health care workers excluded, reported 6.4 % with latex sensitization and 2.3 % with RAST grade 2 or more. The 3.9 % value was found for those who were positive according to both AlasTAT and CAP assays. The 6.4 % prevalence of detectable antilatelx IgE antibodies may appear to be unreasonably high but this prevalence is low compared with the prevalence of anti-hymenoptera venom IgE found in population surveys.

Recently [10], we conducted a survey including 747 subjects aged from 20 to 40 year visiting a health care center for a check-up. Two hundred and fifty-eight completed the study, answering a questionnaire concerning occupational symptoms, atopy, occupational use of latex, surgical procedures, were skin prick-tested and had a blood test for latex sensitization (RAST method, Pharmacia, Sweden). 6.6 % of the study group had

either a positive skin test or a positive RAST to latex. In a systematic preoperative screening for muscle relaxant and latex allergy, we found 4 cases of confirmed sensitization to latex out of 72 patients [11]. Atopy is a high risk factor for latex sensitization. In our study, the prevalence of latex sensitization was 11.2 % in atopic subjects compared to 2.8 % among nonatopic subjects, atopy significantly increasing the risk of latex sensitivity (OR = 4.2, 95 % CI 1.4 - 14.0, $p = 0.016$). In agreement with this, NRL allergic health care workers are atopic 2.2 - 4.2 times more often than their coworkers without NRL allergy [12-16].

In spite of discrepancies between the results in the literature about latex sensitization in a general population, it seems reasonable to accept a mean value near 1-3 %.

More data are needed about the prevalence of clinically significant latex sensitivity. Ownby et al. [17] reported six general reactions due to latex out of 5554 barium enema examinations, i.e., an estimate of one severe latex-induced reaction per 1000 population.

During general anesthesia the rate of anaphylaxis is estimated to be 1/4500, and latex allergy accounted for 19 % of the accidents in a recent French survey [18]. At this time, it is not possible to know the exact prevalence of the any clinical symptoms due to confirmed latex sensitization in the general population. In our study [10], 4 out of 258 reported clinical manifestations when wearing gloves and had proven latex sensitization.

What we can say is that latex sensitization alone does not mean that a clinical allergic reaction will occur. Hadjiliadis et al. [19] recently suggested that there was a relationship between the skin test response size and the severity of the clinical symptoms. It seems to me that the prevalence of latex sensitization, i.e., a positive skin or blood test, is relatively high compared to the prevalence of severe clinical reactions in an unselected population, for instance, pre-operatively, leading to a very low positive predictive value and a very high negative predictive value. Thus we must have much more information about risk factors for latex allergy before recommending a systematic preoperative screening.

INCREASED RATE IN HEALTH CARE WORKERS AND WORKERS FROM INDUSTRY

In European health care workers screened with SPT (skin prick tests), the prevalence of NRL allergy has ranged from 2.8 % to 10.7 % (see ref. [1] for general review). In Canada and the USA, high prevalence rates have also been found in physicians and operating room nurses [14, 20]. The

prevalence of latex sensitization has been estimated to be around 10 % in occupationally exposed workers such as doll manufacturers, hairdressers, glove manufacturers [21, 22, 23]. The most frequently reported manifestation is contact urticaria, followed by rhinoconjunctivitis [1], these manifestations frequently occur during professional exposure. Recent studies have also indicated that asthma is a frequent manifestation of NRL allergy among workers manufacturing NRL products and among health-care providers using NRL gloves [24].

In another recent study, Vandenplas et al. [25] found 13 out of 273 subjects in contact with latex sensitized to the allergen and 7 out of the 12 who underwent specific inhalation challenges with latex gloves had a positive bronchial provocation test. Ho et al. [26] confirmed occupational asthma using a soluble extract rather than by exposing the subjects to latex glove powder [24, 27]. It is now well demonstrated that allergenic latex proteins are adsorbed on cornstarch powder which thus serves as an allergen carrier [28-30]. One of the practical consequence of this finding is to use non-powdered gloves to reduce the load of allergens present in the occupational environment [30, 31].

INCREASED RATE OF SENSITIZATION IN CHILDREN WITH SPINA BIFIDA (SB) OR MULTIPLE SURGERIES

Children with spina bifida are known to be at increased risk for latex and ethylene oxide sensitization [32-41]. The prevalence rates of latex sensitization ranges from 34 % up to 64 %. Konz et al. [42] suggested that the SB population is unique in demonstrating IgE response to latex contact since the SB group had a much higher latex sensitivity prevalence than a spinal cord injury (SCI) group who had had comparable latex contact. However, the SCI group is clearly not clinically identical to the SB group (age and sex, for instance).

Michael et al. [43] pointed out that the number of operations (more than 5) is a risk factor. Nieto et al. [44] made a multivariate study of associated factors in 100 consecutive SB patients. Their conclusion was that allergy to latex was mainly related to the number of operations and to the atopic diathesis of the patients [44]. This finding was supported by our study [45] investigating 29 children with spina bifida, 31 with multiple surgeries for another disease and 20 as a control group with less than 1 anesthetic experience. The three groups did not differ significantly with respect to age, sex and atopic status. The mean number of anesthetics was comparable in the spina bifida and the multiple surgeries groups. Latex sensi-

zation was the same in the spina bifida group (59 %) and in the multiple surgeries group (55 %), but not in the control group (0 % – $p \leq 0.05$). These results suggest that it is the number of surgical procedures rather than spina bifida per se which is related to sensitization to latex. Since the number of perioperative anaphylactic reactions was 5 out of the 17 latex-sensitized SB children and 4 out of the 17 multiple surgeries children, we recommended systematic preoperative screening for latex allergy in all children with a history of multiple surgeries.

MAIN ALLERGENS AND CROSS ALLERGY WITH FOODS

Numerous studies have described a large variety of NRL proteins binding IgE from sera of NRL allergic patients. Hevein (4.72 kDa), hevein C domain (14 kDa), rubber elongation factor (14.6 kDa), profilin (14-15 kDa) and prohevein (20 kDa) were found to be important sensitizing proteins [46, 47]. Other latex proteins such as a 27 kDa protein (found as a major protein in sensitized SB children) or hevamins (37-30 kDa) and β glucosidases (36 kDa) were also described as being allergenic (1). The majority of the sensitizing proteins seems to be localized in the "bottom fraction" of centrifuged latex, the extraction which contains the lutoids [48, 49]. In the lutoid fraction

we found a protein of 29 kDa, possibly heveamine, that react with the sera of all the patients studied [49].

Since our first report suggesting allergen cross-reactivity between NRL and banana [50], a number of studies have confirmed possible cross-reactivity with various foods (kiwi, avocado, chestnut, pineapple, peach, papaya, potatoes) [51]. Alenius et al. [52] detected 14 different proteins in banana extracts reacting with IgE from latex-sensitized patients. Hevamines, which have lysozyme functions and are considered to be stress proteins (29-30 kDa), are present in several plants and fruits and could be one of the major crossreacting allergens [51]. Furthermore, the 14 kDa domain of hevein has homology with the potato stress proteins WIN1 and WIN 2 and thus potentially represents a cross reactive allergen [53]. Beezhhold et al. [54] have further characterized a 46 kDa latex protein as a new latex protein allergen having some homology with patatin storage proteins found in several plant families. These cross reacting proteins may explain the high association between allergy to latex and allergy to foods. In 47 latex allergic patients, 100 out of 376 (27 %) food skin prick tests were positive. 27/100 positive food skin prick tests were associated with clinical symptoms including 11 associated with food anaphylaxis [54]. However, at this time, there is no prospective study evaluating the risk of clinical allergy to foods in latex allergic patients with no history of allergy to foods at the time of the latex allergy evaluation.

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