

Quality of life in patients with latex allergy

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Background	Exposure to natural rubber latex (NRL) may lead to a variety of allergic clinical manifestations that may affect the quality of life (QOL).
Aim	To assess QOL of patients with different clinical effects of NRL allergy including rhino-conjunctivitis, asthma, anaphylaxis and skin manifestations.
Method	A questionnaire to assess QOL was mailed to 56 patients who had been assessed and managed for various clinical manifestations of latex allergy at a university affiliated hospital in Toronto, Canada.
Results	Thirty-one questionnaires were completed and returned. Thirty of the respondents were health care workers. Forty-one percent of the respondents had changed their jobs to reduce exposure to latex and 13% had stopped working. However the respondents did not report a great effect on the QOL related to latex allergy.
Conclusion	The results of this study indicate that the various clinical manifestations of latex allergy can be managed so that there is no significant interference with QOL.
Key words	Allergy; natural rubber latex; quality of life.

Introduction

Many workers are exposed to natural rubber latex (NRL), in particular those in the health care sector, where there is frequent glove use to reduce exposure to various infectious agents [1–4]. Recent estimates suggest that the prevalence of NRL allergy among health care workers including physicians, nurses, dentists, laboratory technicians and hospital housekeepers ranges from 2.8 to 17%. This variation in the reported prevalence is related to different study methodologies and exposures to latex [5–16]. Occupational sensitization and allergic manifestations have also been reported in 5–10% of the workers making NRL gloves or toys [17,18] and have also occurred in other occupations with latex glove exposure such as greenhouse workers [19] and hair dressers [20]. Exposure to NRL products can lead to: (1) allergic contact dermatitis (usually due to rubber additives) [21–23]

and (2) immunoglobulin (IgE) mediated allergic responses to NRL proteins, manifested as contact urticaria [24], rhino-conjunctivitis [25], occupational asthma [17], and anaphylaxis [26]. Atopic individuals, especially those with food allergies, are most likely to become sensitized [27] to NRL proteins. Furthermore, patients with conditions requiring frequent NRL exposure during surgery or catheterization, such as those with spina bifida, are at a high risk for NRL protein allergy [28–30].

Although latex allergy has been studied from the clinical, diagnostic and therapeutic points of view, there has been little investigation of the impact of latex allergy on the quality of life (QOL) in those sensitized. The objective of this study was to determine whether patients with various clinical manifestations of latex allergy have their QOL affected, and if so, to evaluate the extent of this.

Methods

This study was approved by the University of Toronto Research Ethics Committee. All patients with clinical latex allergy attending the allergy clinic at the Toronto Western Hospital were eligible to participate, following a chart review to ensure that the diagnosis of IgE

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mediated NRL allergy had been objectively confirmed on the basis of a positive skin prick test response (a mean wheal diameter of at least 3 mm after subtraction of the diameter of the response to phosphate-buffered saline) using a solution of low-ammoniated NRL latex (Bencard, Mississauga). All subjects had a history relating latex exposure with the development of an adverse clinical finding.

The diagnoses of contact dermatitis, contact urticaria, angioedema, rhino-conjunctivitis, and anaphylaxis were based on the history and the physical findings when present. The diagnosis of NRL-induced asthma was confirmed according to the Canadian Thoracic Society Guidelines for Occupational Asthma [31].

Each individual satisfying the criteria for entry into the study was contacted by telephone, told about the study and asked to participate. Those who agreed were mailed a consent form and a questionnaire along with a stamped return envelope. Patients were subsequently contacted by telephone up to three times to encourage completion and return of the questionnaire.

Published questionnaires by Juniper *et al.* that addressed the QOL associated with the diagnosis of eye and nose complaints [32] and occupational asthma [33] were used. A QOL questionnaire designed by Finlay and Kelly [34] for patients with psoriasis was used for patients with skin manifestations induced by latex, and questions were added regarding the impact of a history of anaphylaxis on QOL. These were completed, as appropriate, for the latex-induced clinical manifestations in each patient in the study. The questionnaire included questions focusing on: the symptoms of latex allergy, the impact of latex allergy on the aspects of home life, recreation and work, and the psychosocial and emotional effects attributable to latex allergy.

The following scale was used to determine the effect of latex allergy on various activities important in QOL: 0, not affected; 1, hardly troubled; 2, somewhat troubled; 3, moderately troubled; 4, quite a bit troubled; 5, very troubled; 6, extremely troubled.

The scale used to determine the frequency and severity of the symptoms and the extent of their effect on factors related to the QOL was the following: 0, none of the time; 1, hardly any of the time; 2, a small part of the time; 3, some of the time; 4, a good part of the time; 5, most of the time; 6, all of the time.

The answers to the various questions using these two general formats were used to construct domains of general QOL factors. These QOL domains were all scored from 0 to 6.

Analysis of the data was carried out using the Statistical Analysis System (SAS), version 8. The various QOL domains were scored using an ordinal scale of measurement and therefore non-parametric tests

(Spearman rank correlations) were used in the analysis to calculate *P* values.

Results

Chart review indicated that 68 patients had positive NRL protein skin prick tests. Six patients were excluded because they had a positive latex prick test but no history of latex-induced allergic symptoms. A further five patients had changed their address and could not be located, and one patient declined participation. A total of 56 questionnaires were mailed to the subjects. Only 31 questionnaires were eventually completed and returned, despite up to three reminder calls to the non-respondents, giving a response rate of 55%.

Among the 31 participants, the mean age was 37.0 years with a standard deviation of 10.9 years and a range from 21 to 59 years. Thirty of the 31 participants were female. The distribution of NRL related clinical manifestations was as follows: rhino-conjunctivitis (19 patients), occupational asthma (10 patients), contact urticaria or angioedema (23 patients), anaphylaxis (14 patients). Many of these patients exhibited more than one manifestation of latex allergy.

Latex prick testing indicated that the majority of latex allergy cases (77%) had a wheal diameter of 8 mm or more in excess of the negative control response. In seven cases (22.6%), a positive latex skin test response was recorded to a latex dilution of 1:1000, three cases (9.7%) responded to a dilution of 1:100, 13 cases (42%) responded to a dilution of 1:10 and in eight subjects (34%) the skin test response was to undiluted latex.

The duration of time between the diagnosis of latex allergy and the completion of the questionnaire ranged from 9.6 to 42.4 months with a mean of 24.4 months and a standard deviation of 11.1 months.

Most of the 31 subjects were employed in a medically related activity at the time of diagnosis. They included 15 nurses, three individuals employed in office jobs in a hospital, three dental assistants, two physicians, two respiratory therapists, two laboratory technicians, two X-ray technicians, one pharmacist and one homemaker. Thirteen subjects (42%) had changed their jobs at some time after the diagnosis to reduce exposure to latex. The percentages of subjects who changed jobs according to the type of allergic manifestation were as follows: asthma (60%), anaphylaxis (50%), rhino-conjunctivitis (58%), skin manifestations (35%). Also, four subjects (12.9) had quit their jobs because of latex allergy and were not currently employed. Among the 27 subjects currently employed, 16% worked in a different area of the same building without exposure to latex while the remainder of the subjects still worked in the same area, although several had been given a different job. Six of the 27

subjects currently working, avoided wearing gloves at work (these subjects had previous contact rashes related to latex glove usage), while the rest currently wore either vinyl or other types of non-latex gloves. Of the 31 respondents, 17 (55%) reported that their co-workers without latex allergy avoided using powdered latex gloves to minimize the risk of latex allergic reactions in sensitized workers.

The results for the QOL questions for the various clinical manifestations of latex allergy were as follows:

Rhino-conjunctivitis (19 patients)

The mean scores for the various QOL domains for latex sensitized patients with rhino-conjunctivitis using the method described by Juniper and Guyatt [32] are given in Table 1(A). These scores ranged from 1.11 for sleep interference to 2.00 for practical problems such as the need to rub the nose or eyes, blow the nose repeatedly and the inconvenience of having to carry a tissue or handkerchief. Therefore these results are consistent with only mild interference with QOL related to rhino-conjunctivitis. The Spearman rank correlations between the symptoms score and the other QOL domain scores ranged from 0.77 to 0.98 and were all statistically significant ($P < 0.05$).

There were no statistically significant Spearman rank correlations between any of the QOL domain scores and age, diameter of the wheal on prick testing or dilution of a positive prick test. Interference with activity was negatively correlated with time since diagnosis and the result was statistically significant ($r = -0.46$; $P = 0.05$). None of the other QOL domain scores had statistically significant Spearman rank correlations with duration of latex symptoms or time since diagnosis of latex allergy.

Asthma (10 patients)

The scores for the various QOL domains for latex sensitized patients with asthma using the method described by Juniper *et al.* [33] are given in Table 1(B). Only the activity limitation domain (mean of 2.04) had an overall mean score above 2, a relatively low score on the scale of 2–6. These results do not suggest a large effect on QOL related to latex induced asthma.

The Spearman rank correlations between the combined symptom score and each of the functional domains—activity interference, emotional effects and being bothered by environmental stimuli—ranged from 0.80 to 0.87 and all were statistically significant ($P < 0.05$).

There were no statistically significant Spearman rank correlations between any QOL domain in patients with asthma and age, diameter of the wheal on prick testing,

Table 1. Quality of life domain scores according to clinical category

(A) Rhinoconjunctivitis		
Domain	Mean (standard deviation)	Median
Sleep interference	1.11 (1.29)	0.67
Practical problems	2.00 (1.86)	2.00
Activity limitation	1.61 (1.70)	0.67
Emotional	1.64 (1.78)	1.50
Symptoms (combined)	1.58 (1.47)	1.20
Overall	1.59 (1.45)	1.43
(B) Asthma		
Domain	Mean (standard deviation)	Median
Activity limitation	2.04 (1.15)	2.23
Emotional	1.40 (1.06)	1.80
Environmental	1.65 (1.03)	1.38
Symptoms (combined)	1.68 (1.28)	1.58
(C) Skin manifestations		
Domain	Mean (standard deviation)	Median
Activity limitation	0.79 (1.16)	0.40
Work interference	0.65 (1.67)	0.00
Leisure interference	0.22 (0.56)	0.00
Treatment effect	0.57 (1.41)	0.00
Overall	0.58 (0.91)	0.20
(D) Anaphylaxis		
Domain	Mean (standard deviation)	Median
Activity limitation	2.71 (2.27)	3.50
Anxiety	2.21 (2.20)	1.50

dilution of a positive prick test, duration of latex symptoms or time since diagnosis of latex allergy.

Skin manifestations (23 patients)

The questions posed to these individuals based on the method of Finlay and Kelly [34] dealt exclusively with problems related to the QOL and did not address their symptoms. The mean scores for the various QOL domains for latex sensitive patients with skin problems were very low for all the domains and ranged from 0.22 to 0.79 (Table 1C).

There were no statistically significant Spearman rank correlations between any QOL domain and age, diameter of the wheal on prick testing, dilution of a positive test, duration of latex symptoms or time since diagnosis of latex allergy.

Anaphylaxis (14 patients)

Domains for overall activity limitation in the proceeding 2 weeks and anxiety related to fear of anaphylaxis were obtained from the questionnaire responses for the patients with anaphylaxis. The results given in Table 1(D) indicate that the scores for both of these domains were in the moderate range (2–4) and were higher than

the scores given for any of the domains for the other categories of latex allergy. A total of 12 out of the 14 patients reported some limitation of activity related to their latex allergy. A total of 43% of these patients reported a score of 3 or more for a 'feeling of anxiety or distress' because of their fear of anaphylaxis.

The Spearman rank correlation between the anxiety and activity limitation domains for patients with anaphylaxis was 0.748 which was statistically significant ($P = 0.002$). Neither of these domains had statistically significant Spearman rank correlations with age, diameter of the wheal on prick testing, dilution of a positive test, duration of the latex symptoms or time since a diagnosis of latex allergy.

Discussion

Most of the subjects in our study were health care workers. These workers have an increased risk of NRL allergy because of their occupational use of latex gloves. Also, the high proportion of health care workers in our study may be influenced by their greater awareness of the problem of NRL allergy and knowledge of clinical assessment and treatment facilities in comparison to the other workers. These factors might have influenced their interest in seeking referral to an allergy clinic.

The scores for interference with the various QOL domains for the different clinical manifestations of latex allergy tended to be in the lower end of the scale of 0–6. The ranges of mean scores for the domains given in Table 1 were: rhino-conjunctivitis, 1.11–2.00; asthma, 1.40–2.04; skin manifestations, 0.22–0.79; anaphylaxis, 2.21–2.71.

Different questionnaires were used for the various clinical manifestations of NRL allergy because it was assumed that the degree of interference with the QOL would depend on the type of clinical problem. However, this leads to the development of different QOL domains for the various clinical effects. Therefore statistical analysis of the differences in the domain scores between the various clinical categories would not be appropriate. However, all the domains were scored on the same scale from 0 to 6 and some relative comparisons could be made, although it was recognized that this was not a 'like versus like' comparison. In general, the results for the functional domains for individuals with anaphylaxis were higher than the other categories of latex allergy, indicating greater interference with the QOL. A total of 43% of the patients with anaphylaxis reported a score of 3 or more for a 'feeling of anxiety or distress' because of their fear of anaphylaxis and there was a high and statistically significant Spearman rank correlation between anxiety and activity limitation. The QOL interference scores for skin manifestations tended to be

lower than the QOL interference scores for the other categories of latex allergy.

We think that the participation rate of just 55% of the eligible patients is unlikely to account for the low QOL interference scores. We feel that individuals with greater QOL interference would be more eager to report such problems but there was no comparison between the respondents and the non-respondents in the study. Consequently, we would have greater confidence in our findings if the response rate had been higher.

These generally low QOL interference scores may be related to the fact that individuals were not interviewed at the time of their initial clinical manifestations or clinical assessment, when their concern and anxiety might have been higher. This may also have contributed to the lower than anticipated response rate among those surveyed. All the participants had been treated at a university affiliated hospital and had received appropriate management at the time they received their questionnaire.

A total of 17 QOL domains were evaluated for the four combined clinical manifestations of latex allergy and 15 of these were negatively correlated with time since diagnosis and duration of the symptoms, although only one of these negative correlations reached statistical significance—that between activity limitation in patients with rhino-conjunctivitis and the time since diagnosis. This analysis was limited by the small sample size and consequent low power, but the results suggest that there is less interference in the QOL with the passage of time since the initial diagnosis of latex allergy.

In each of the clinical categories of latex allergy, none of the functional domains was found to be statistically significantly associated with potential risk factors including age, diameter of the wheal on prick testing or dilution of a positive prick test.

Management of patients with latex allergy often involves job change or other workplace accommodation. In our sample of 31 patients, 13 (42%) had changed jobs to avoid further exposure to latex. Among those who were currently employed, further contact with latex had been minimized by switching to non-latex gloves. Also, 17 respondents (55%) reported that their co-workers without latex allergy avoided using powdered latex gloves to minimize the risk of latex reactions in sensitized workers.

Overall, the results of this study should be considered encouraging because they indicate that the various manifestations of latex allergy can be managed so that there is not significant interference with the QOL. This information may be helpful to clinicians in the management of such patients. In particular when patients are newly diagnosed, the knowledge that there should be no great interference with long-term QOL should be reassuring.

This study considered the effect of each individual clinical manifestation of NRL allergy on the QOL.

Further research might evaluate the effects of combinations of clinical manifestations on the overall QOL.

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