

Prevalence of hand dermatoses related to latex exposure amongst dentists in Queensland, Australia

Peter A. Leggat
Townsville, Australia

Derek R. Smith
Kawasaki, Japan

Objectives: To investigate the epidemiology of hand dermatoses symptoms and allergies, particularly those that suggested possible latex allergy. **Methods:** In 2004, a self-reporting questionnaire was mailed to a random sample of 400 dentists from the Queensland Branch of the Australian Dental Association. **Results:** A total of 285 questionnaires (73.1%) were completed and returned. Of the respondents, 73.3% were male and 26.7% female, with a mean age of 45.2 years (SD = 11.9 years) of whom 89.1% were general dentists, the remainder being specialists. Almost one third (29.1%) had experienced symptoms of hand dermatoses at some stage during the previous 12 months, with 15.1% experiencing symptoms during the previous three weeks. The most common symptom or sign was dry and cracked hands or fingers (22.5%). Only 2.1% of dentists had been medically diagnosed with latex allergy. The most common symptom or sign following the use of latex products was dermatitis (11.2%). **Conclusions:** Overall, this study showed that occupational dermatoses constitute a major occupational health problem among dentists in Queensland, Australia. Symptoms appear to be reported at a similar prevalence to other studies in developed countries. The identification of atopic dermatitis as a significant risk factor again stresses the importance of allergic disease and its relationship with occupational skin conditions. Although reducing exposure to potential allergens and irritants is an important minimisation strategy, further research is needed to identify occupational and non-occupational factors associated with occupational dermatoses in dental personnel.

Key words: Occupational dermatitis, dentists, Queensland, Australia, latex allergy, contact dermatitis, dental materials, dermatoses, irritants, allergens

Occupational hand dermatitis has been a particular problem for health professionals¹, with dental personnel being commonly affected². Dermatitis or eczematous dermatitis is an inflammatory response of the skin to various extrinsic and intrinsic agents. The two main forms of dermatitis are contact dermatitis and atopic dermatitis. Most are believed to result from contact with irritants, with the remainder arising from contact with allergens. Atopic dermatitis is thought to be mainly an inherited condition affecting a small proportion of the population, although the prevalence is not precisely known³. About 20% of sufferers will have their first onset of this disease in adulthood³. Atopic dermatitis

is associated in about 30-50% of cases with a family history of atopy, asthma or other allergic respiratory disease, such as hay fever³.

Allergy to latex gloves is the most frequently reported cause of dermatitis in dental personnel^{2,4,7}. More than one fifth of dentists (21.9%) reported occupational contact dermatitis in a study from Thailand⁶, while one third of dentists in New Zealand reported symptoms of hand dermatoses during the previous 12 months⁸. A previous American study found a 15% prevalence of adverse reactions to latex gloves in a major dental facility⁷. Occupational hand dermatoses are not exclusively related to latex allergy, with two recent studies suggesting that

only about 3.8% and 6.2% of dental personnel actually test positive to latex^{9,10}. Potential irritants and allergens used in dentistry have been described elsewhere¹¹.

In Australia, there have been few recent studies examining occupational dermatoses. A previous survey from Brisbane suggested that many dentists experienced skin problems related to glove useage⁵. Another survey from Sydney found that one third of dental staff at the Westmead Dental School reported symptoms related to wearing gloves⁴. Nevertheless, little is known about the current prevalence of occupational hand dermatoses (HD) among Australian dentists particularly those which suggested possible latex allergy. As such, this study was undertaken to investigate the epidemiology of hand dermatoses symptoms and allergies, particularly those that suggested possible latex allergy.

Methods

Ethical clearance for this study was given by the James Cook University Human Ethics Sub-Committee in 2004. A random sample of 400 dentists was then selected from the membership register of the Queensland Branch of the Australian Dental Association (ADAQ). A pre-emptive article describing our forthcoming survey was initially published in the *ADAQ Newsletter*. A single-page, A4-sized self-reporting hand dermatitis questionnaire was subsequently mailed to each dentist, including an information sheet and a reply paid envelope. One reminder was sent. Information on occupational hand dermatitis was sought, including allergic diseases, such as asthma and hay fever, as well as symptoms and signs related to the use of latex products. Specific dermal symptoms known to be indicative of hand dermatitis¹² were also requested, with further questions on symptoms and signs occurring more than once in the past 12 months, and symptoms and signs persisting for more than three weeks. Multiple choice and 'fill in the blank'-style questions were used. Information was also requested on age, sex, number of years since graduation, field of dental practice, number of hours worked per week and number of patients treated per day. The presence of HD was established according to criteria defined by Smit *et al.*¹². The criteria required two or more symptoms to appear in the preceding 12-months and to persist for more than three weeks or to have reoccurred during the 12-month recall time period. Data were analysed using the Statistical Package for the Social Sciences¹³.

Results

Profile of respondents

Two hundred and eighty-five questionnaires (73.1%) were returned, fully or partially completed, with 10 questionnaires undeliverable and marked 'returned to sender'. Missing data were excluded from analysis.

Background data on age, number of years in clinical practice, weekly working hours, and number of patients treated per day are summarised by gender in *Table 1*. A total of 73.3% were male and 26.7% female, with a mean age of 45.2 years (SD = 11.9 years). Most were general dentists (89.1%), with the remainder being specialists (10.9%). Female dentists were significantly younger ($p < 0.001$), less experienced ($p < 0.001$), more likely to work fewer hours per week ($p < 0.001$), and see fewer patients per day ($p < 0.05$), than their male counterparts.

Prevalence of hand dermatoses

Almost one third (29.1%) had experienced symptoms of hand dermatoses at some stage during the previous 12 months, with 15.1% reporting symptoms during the past three weeks. Prevalence of symptoms occurring more than once during the previous 12 months was significantly higher among females ($p < 0.001$), younger dentists ($p < 0.001$), and more recent graduates ($p < 0.001$). The prevalence of symptoms persisting more than three weeks was significantly higher among those dentists who currently suffered or had previously suffered from allergic conditions, such as asthma and hay fever ($p < 0.01$).

The prevalence of various symptoms and signs of hand dermatoses experienced by the dentists in the previous 12 months has been summarised by gender in *Table 2*. The most common symptom or sign was dry and cracked hands or fingers (22.5%). Female dentists reported a significantly higher prevalence of dry and cracked hands or fingers ($p < 0.001$), scaling of hands or fingers ($p < 0.01$), and itchy hands or fingers ($p < 0.01$), when compared to their male counterparts.

Using the methodology described earlier¹², 13.7% of dentists appeared to meet the criteria for diagnosis of hand dermatitis, which was significantly higher amongst females ($p < 0.05$), younger dentists ($p < 0.001$), more recent graduates ($p < 0.001$), and those dentists who currently suffered or had previously suffered from allergic conditions, such as asthma and hay fever ($p < 0.01$).

Latex allergy

Only 2.1% of dentists had been medically diagnosed with latex allergy. The prevalence of various symptoms following the use of latex products is summarised by gender in *Table 3*. The most common symptom among them was dermatitis (11.2%). Dentists reporting present or past allergic conditions were significantly more likely to suffer from allergic rhinitis following the use of latex products ($p = 0.001$). Dermatitis following the use of latex products was significantly higher in younger dentists ($p < 0.05$) and more recent graduates ($p < 0.05$).

Table 1 Mean ($\pm$ SD) of age, experience, working hours per week, and patients per day by gender

Socio-demographic variables	Gender	
	Male	Female
Age (Years)	47.8 (11.6)	38.1 (9.5)
Experience (Years)	24.1 (11.6)	14.3 (9.1)
Working hours per week	37.1 (8.7)	31.6 (9.4)
Patients per day	15.4 (9.1)	13.0 (5.1)

Table 2 Prevalence (per cent) of various symptoms and signs of hand dermatitis related to latex products experienced in the previous 12 months by gender

Symptoms and signs of hand dermatitis*	Gender	
	Male (n=209)	Female (n=76)
Red and swollen hands or fingers	3.3% (7)	6.6% (5)
Dry and cracked hands or fingers	16.3% (34)	39.5% (30)
Blisters on hands or between fingers	1.9% (4)	2.6% (2)
Scaling of hands or fingers	7.2% (15)	19.7% (15)
Itchy hands or fingers	9.6% (20)	23.7% (18)
Other	7.2% (15)	4.0% (3)

* after Smit¹²**Table 3** Prevalence (per cent) of various symptoms following the use of latex products by gender

Type of allergic symptom	Gender	
	Male (n=209)	Female (n=76)
Asthma	1.0% (2)	1.3% (1)
Rhinitis	3.8% (8)	2.6% (2)
Dermatitis	9.7% (20)	15.8% (12)
Hives	0.5% (1)	1.3% (1)
Other	3.8% (8)	1.3% (1)

Discussion

This cross-sectional study examined the prevalence of self-reported occupational hand dermatoses and related symptoms and signs. The response rate was encouragingly high, perhaps due to measures designed to improve response rate, such as an advance ADAQ Newsletter announcement of the survey, the short questionnaire itself, and the follow-up reminder. Nevertheless, it has also been shown that advance telephone prompts may further improve response rates for dental surveys¹⁴. One of the major limitations of this type of investigation is that what people report may differ from their actual situation. In addition, this study did not seek to compare responses of dentists in their use of latex or alternate gloves. In addition, asking about the use of alternative gloves might be seen as a marker of potential latex glove allergy; however dentists may simply use alternate gloves as their first option or to avoid any potential latex allergy. Although a relatively limited geographical area was sampled, the State of Queensland, the comprehensive

database of a professional dental organisation was used. In this regard, ADAQ membership currently covers more than 90% of Queensland dentists, both generalist and specialist¹⁵.

Prevalence of hand dermatoses

In this study, nearly one third of dentists reported experiencing symptoms of occupational dermatoses more than once in the previous 12 months. This is similar to the rate documented among dentists in New Zealand⁸ and the United Kingdom¹⁶, as well as a previous survey of dental hygienists in Norway¹⁷. Alternatively, it is higher than a previous investigation from Thailand, where just over one fifth of dentists (21.9%) reported occupational contact dermatitis⁶, and also a Swedish survey, where 14.9% of dentists reported hand eczema¹⁸. It was interesting that the prevalence of occupational dermatoses symptoms which occurred more than once over the previous 12 months was higher

in females, as well as younger and less experienced dentists. This is consistent with the findings of a recent New Zealand study⁸. Dentists with a history of allergic conditions had a higher prevalence of hand dermatitis, as defined by the diagnostic criteria described by Smit *et al.*¹². Again, this is consistent with the aforementioned New Zealand dentists' study. Sinclair *et al.*⁸ also found that New Zealand dentists who had hobbies involving the use of solvents, were 11 times more likely to have experienced symptoms. Solvents are known irritants in the investigation of occupational dermatoses in dentists¹¹.

Latex allergy

Latex allergy probably contributes only part of the occupational hand dermatoses problem among dentists. Nevertheless, dermatitis was the most frequent symptom or sign of allergy following use of latex products in this study, which is similar to previous research conducted among dentists in Southern Thailand⁶, and dental personnel in Sydney, Australia.⁴ A similar study from the United States found a 15% prevalence of adverse reactions to latex gloves in a major dental facility⁷. True latex allergy had been medically diagnosed in only 2.1% of dentists in the current study, which is lower than other investigations documenting between 3.8% and 10% of dental personnel and senior dental students whom tested positive to latex allergy^{9,10,19}. Nevertheless, clinical testing of all dentists in this study would probably have yielded a much higher prevalence of latex allergy.

A study of adverse glove reactions among dentists in the United Kingdom indicated that most could be managed by self-medication, prescribed medication and / or changing to a different type of glove²⁰. Successful preventive programmes have also been instituted to reduce the incidence of allergy to latex and dental materials, such as acrylates, in dental personnel²¹. Nevertheless, it is important to accurately diagnose occupational latex allergy, and as such, any dentists with a provisional diagnosis of this condition should be promptly referred for allergy testing.

Conclusions

Overall, this study has shown that occupational dermatoses constitute a major occupational health problem among dentists in Queensland, Australia. Symptoms appear to be reported at a similar prevalence to other studies in developed countries. The identification of atopic dermatitis as a significant risk factor, again stresses the importance of allergic disease and its relationship with occupational skin conditions. Although reducing exposure to potential allergens and irritants is an important minimisation strategy, further research is needed to identify occupational and non-occupational factors associated with occupational dermatoses in dental personnel.

Acknowledgments

We are grateful to all the dentists who completed our questionnaire and to the ADAQ for their organisational assistance. This project was partially funded by a Merit Research Grant from James Cook University in Australia. We also acknowledge the assistance of Dr Frances W. Leggat in data management.

References

1. Smith DR, Leggat PA. Occupational hand dermatitis among health care workers. *J Environ Dermatol* 2005 **12**: 29-39.
2. Messite J. Ch. 1. Occupational safety and health in the dental workplace. In: Goldman HS, Hartman KS, Messite J. *Occupational Hazards in Dentistry*. pp 1-19. Chicago: Year Book Medical Publishers, 1984.
3. Larsen FS, Hanifin JM. Epidemiology of atopic dermatitis. *Immunol Allergy Clinics N Amer* 2002 **22**: 1-25.
4. Katelaris C H, Widmer R P, Lazarus R M. Prevalence of latex allergy in a dental school. *Med J Aust* 1996 **164**: 711-714.
5. Walsh LJ, Lange P, Savage NW. Factors influencing the wearing of protective gloves in general dental practice. *Quintessence Int* 1995 **26**: 203-209.
6. Chowanadisai S, Leggat PA, Kukiattrakoon B *et al.* Occupational health problems of dentists in southern Thailand. *Int Dent J* 2000 **50**: 36-40.
7. Rankin KV, Jones DL, Rees TD. Latex glove reactions found in a dental school. *J Am Dent Assoc* 1993 **124**: 67-71.
8. Sinclair NA, Thomson WM. Prevalence of self-reported hand dermatoses in New Zealand dentists. *N Z Dent J* 2004 **100**: 38-41.
9. Hamann CP, Turjanmaa K, Rietschel R *et al.* Natural rubber latex hypersensitivity: incidence and prevalence of type 1 allergy in the dental profession. *J Am Dent Assoc* 1998 **129**: 43-54.
10. Hill JG, Grimwood RE, Hermes CB *et al.* Prevalence of occupationally related hand dermatitis in dental workers. *J Am Dent Assoc* 1998 **129**: 212-217.
11. Scully C, Cawson R A, Griffiths M. Ch. 2. Hazards to particular body systems. In: *Occupational Hazards to Dental Staff*. pp 22-54. London: British Medical Journal, 1990.
12. Smit HA, Coenraads PJ, Lavrijsen APM *et al.* Evaluation of a self-administered questionnaire on hand dermatitis. *Contact Dermatitis* 1992 **26**: 11-16.
13. SPSS Inc. Statistical Package for the Social Sciences, SPSS version 12.0.1 for Windows, 2003.
14. Rikard-Bell G, Ward J. Maximizing response rates to a survey of dentists: a randomized trial. *Aust Dent J* 2000 **45**: 46-48.
15. Australian Dental Association, Queensland Branch. Homepage: About ADA(Qld). Available at: http://www.ada.org.au/branches/qld/_home.asp (accessed 1 April 2005)
16. Burke FJ, Wilson NH, Cheung SW. Factors associated with skin irritation of the hands experienced by general dental practitioners. *Contact Dermatitis* 1995 **32**: 35-38.
17. Jacobsen N, Hensten-Pettersen A. Occupational health problems among dental hygienists. *Community Dent Oral Epidemiol* 1995 **23**: 177-181.
18. Wallenhammar LM, Ortengren U, Andreasson H *et al.* Contact allergy and hand eczema in Swedish dentists. *Contact Dermatitis* 2000 **43**: 192-199.
19. Tarlo SM, Sussman GL, Holness DL. Latex sensitivity in dental students and staff: A cross-sectional study. *J Allergy Clin Immunol* 1997 **99**: 396-401.

20. Scott A, Gawkrödger DJ, Yeoman C *et al.* Adverse reactions to protective gloves used in the dental profession: experience of the UK Adverse Reaction Reporting Project. *Br Dent J* 2003 **195**: 686-690.
21. Ohlson CG, Svensson L. Prevention of allergy to acrylates and latex in dental personnel. *Swed Dent J* 2002 **26**: 141-147.

Correspondence to: Associate Professor Peter A. Leggat, Deputy Director, Anton Breinl Centre for Public Health and Tropical Medicine, James Cook University, Townsville, Queensland 4811, Australia. Email: Peter.Leggat@jcu.edu.au

Dr Derek R. Smith, Researcher, Department of Hazard Assessment, National Institute of Industrial Health, 6-21-1 Nagao, Tama-Ku, Kawasaki 214-8585, Japan, and Adjunct Senior Research Fellow, Anton Breinl Centre for Public Health and Tropical Medicine, James Cook University, Townsville, Queensland 4811, Australia

