

Contact dermatitis in Korean dental technicians

JUN YOUNG LEE, JEONG MIN YOO, BAIK KEE CHO AND HYUNG OK KIM

Department of Dermatology, The Catholic University of Korea, Seoul, Korea

The high risk of occupational contact dermatitis in dental personnel are well accepted throughout the world. There are few reports concerning occupational skin disease in dental personnel in Korea. The purposes of this study were to investigate the frequency, characteristics and causative factors of contact dermatitis in Korean dental technicians. Recording of personal history, physical examination and patch tests with the Korean standard series and dental screening series were performed in 49 dental technicians. Most of the subjects were exposed to a variety of compounds, including acrylics, metals, plaster, alginate, etc. 22 (44.9%) subjects had contact dermatitis, present or past, and the site involved was the hand in all 22. The most common clinical feature of hand dermatitis was itching (77.3%); scaling, fissuring and erythema were other common clinical features. Metals, including potassium dichromate (24.5%), nickel sulfate (18.4%), mercury ammonium chloride (16.3%), cobalt chloride (12.2%) and palladium chloride (10.2%), showed high positive rates in patch test results of 49 dental technicians. 7 positive reactions to the various acrylics were found in 3 subjects. In our study, the frequency and clinical features of the contact dermatitis showed a similarity to other reports, though the patch test results were somewhat different; a higher patch-positive reaction to metals and a relatively lower patch-positive reaction to acrylics than the patch test results reported in Europe.

Key words: dental technician; occupational; allergic contact dermatitis; frequency; clinical features; hand dermatitis; metals; acrylics; patch test. © Munksgaard, 2001.

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Skin problems of dental personnel are common, with a frequency of 30–50% in various reports (1–5). Many allergens, including acrylics, metals, impression materials, antimicrobials, fragrances and rubber chemicals, etc., cause allergic contact dermatitis, and many work-related irritants exacerbate the condition (5–8). Some reports from Europe have indicated that the majority of skin lesions are allergic contact dermatitis (2, 8, 9), contrary to data reported in the USA (7), a difference attributed to different materials being used. Here we evaluate the clinical manifestations and causative factors of occupational contact dermatitis of dental technicians in Korea and compare the results with reports from other countries.

Materials and Methods

Study population

49 out of 1038 dental technicians visiting the Occupational & Environmental Center at St. Mary's Hospital for annual health examinations were voluntarily involved this study.

History taking and physical examination

History recorded personal and occupational history, working process, work-related contactants, and past and present skin problems. If the individual demonstrated any current skin lesion, or had any previous skin problems, we carefully examined for clinical characteristics and sites involved.

Patch testing

Patch tests were performed with a total 53 allergens: 23 allergens of the Korean standard series and 30 allergens of the dental screening series from Chemotechnique Diagnostics AB (Malmö, Sweden) in accordance with the recommendations of the ICDRG. The patches were applied to the back using Finn Chambers with Scanpor tape for 2 days and reading was done 1 day after removal of the patches. Reactions more than + (diffuse confluent erythema with palpable infiltration) were considered positive.

Table 1. Comparison of subject groups with contact dermatitis and without skin lesions

Good factors	Contact dermatitis	No skin lesion	Total
no. subjects	22	27	49
mean age (years)	36.2	38.3	37.4
mean occupational duration (years)	12.3	14.9	13.8
no. wearing protective gloves	4	1	5
no. using hand cream	11	11	22
no. with atopy history	1	2	3

Table 2. Clinical features and localization of contact dermatitis in 22 dental technicians

Clinical features	
itching	77.3%
scaling	59.1%
erythema	45.5%
fissure	36.4%
vesicle	27.3%
Localization	
hand	
dorsal	45.5%
ventral	22.7%
finger	
tip	18.2%
lateral	13.6%
dorsal	4.6%
face	9.1%
forearm	9.1%

Table 3. Patch test results with the dental screening series in 49 dental technicians

Allergen	n (%)
potassium dichromate	12 (24.5)
nickel sulfate	9 (18.4)
mercury ammonium chloride	8 (16.3)
cobalt chloride	6 (12.2)
palladium chloride	5 (10.2)
copper sulfate	3 (6.1)
colophony	3 (6.1)
methyl methacrylate	2 (4.1)
eugenol	2 (4.1)
N-ethyl-toluenesulfonamide	2 (4.1)
2 benzotriazole	2 (4.1)
urethane dimethacrylate	1 (2.0)
N,N-dimethyl-4-toluidine	1 (2.0)
2-hydroxy-4-methoxy-benzophenone	1 (2.0)
1,4-butanediol dimethacrylate	1 (2.0)
BIS-MA	1 (2.0)
2-hydroxyethyl methacrylate	1 (2.0)
formaldehyde	1 (2.0)
4-tolydiethanolamine	1 (2.0)
aluminium chloride hexahydrate	1 (2.0)
camphoroquinone	1 (2.0)
tetrahydrofurfuryl methacrylate	1 (2.0)

Allergen with a positive reaction in at least 1 case are listed.

Results

Subjects

All 49 subjects were Korean and 46 of them were male. The mean age was 37.4 (range 21–61), and mean work duration in this occupation was 13.8 years. 3 subjects had a history of atopy. Only 5 subjects (10.2%) wore protective gloves and 22 (44.9%) used hand cream regularly. There were no differences between the group having contact dermatitis and the group without skin lesion with regard to mean age (36.2 versus 38.3), mean work duration (12.3 versus 14.9), use of protective gloves and cream, or history of atopy (Table 1). They were exposed to many materials used in various work procedures; crown and bridging (98%), impression (88%) and filling (84%), etc.

Frequency

22 of 49 subjects (44.9%) had developed contact dermatitis and the onset of skin lesions after becoming a dental technician ranged from immediate to over 20 years (Fig. 1).

Clinical features

17 of 22 subjects who had contact dermatitis (77%) complained of itching. Other common clinical features were scaling (59.1%), erythema (45.5%), fissuring (36.4%) and vesiculation (27.3%). The hands were involved in all 22 subjects with contact dermatitis. 2 patients had concomitant contact dermatitis lesions on the face and forearm, respectively. Commonly-involved areas of the hand were the dorsal side (45.5%), palmar side (22.7%) and finger-tip (18.2%) (Table 2).

Patch testing

Metals frequently gave positive reactions: cobalt chloride (22.5%), potassium dichromate (18.4%), etc. Balsam of Peru (Myroxylon Pereirae) (8.2%) and PPD (6.1%) were other allergens showing frequent positive reactions in the Korean standard series. The patch test reactions to the dental

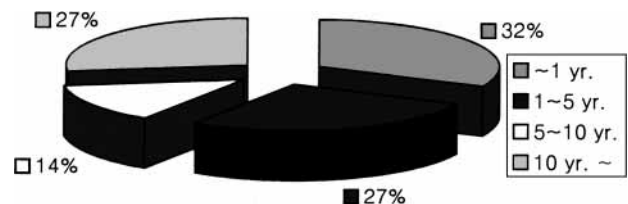


Fig. 1. Onset of skin lesion after entering the occupation of 49 dental technicians.

Table 4. Acrylics causing positive reactions in dental series

Patient no.	Acrylics
1	urethane dimethacrylate, tetrahydrofurfuryl methacrylate 1,4-butanediol dimethacrylate, BIS-MA
2	methyl methacrylate, 2-hydroxyethyl methacrylate
3	methyl methacrylate

Table 5. Comparison of positive reaction to allergens of dental series between the group with contact dermatitis and the group without skin lesions

Group	Contact dermatitis	No skin lesion	Total
no. of positive reactions	14	10	24
no. of negative reactions	8	17	25
total	22	27	49

screening series are shown in Table 3. The highest reaction frequency was to potassium dichromate (24.5%). Positive reactions to nickel sulfate (18.4%), mercury ammonium chloride (16.3%), cobalt chloride (12.2%) and palladium chloride (10.2%) were also observed frequently. 7 positive patch test reactions to acrylic compounds were elicited in 3 patients (Table 4); patient no. 1 showed multiple reactions to 4 acrylates: urethane dimethacrylate, tetrahydrofurfuryl methacrylate, 1,4-butanediol dimethacrylate and BIS-MA. Patient nos. 2 and 3 had positive reactions to methyl methacrylate. 14 of the 22 subjects (63.6%) who had contact dermatitis showed a positive patch test reaction to more than 1 allergen, but 10 subjects (37%) showed positivity to more than 1 allergen in the dental series among 27 subjects who did not have a skin lesion (Table 5). Both copper sulfate and eugenol elicited a positive reaction in 3 patients, respectively.

Discussion

Dentists, dental nurses and dental technicians have a high risk of occupational skin disease. The cumulative frequency of skin problems on the hands was 53% in Danish dental technicians (3). Estlander et al. (1) and Rustemeyer & Frosch (2) reported the frequency of hand dermatitis among dental technicians in their countries as 28.9% and 36%, respectively, and the 37.6% frequency of hand dermatitis among American dental personnel is consistent with those in European reports (7). Although the frequency on both continents was similar, the characteristics of the hand dermatitis were different. Rustemeyer & Frosch (2) reported that 63.5% of hand dermatitis among 55 dental technicians was allergic contact dermatitis, but the frequency of allergic contact dermatitis in American

dental personnel was only 0.67% (7). Kanerva et al. (8) explained this difference as being related to materials used in dental work; the use of plastics in restorative dentistry is not common in military dental practice in the United State, where dental amalgam is still the main restorative in posterior teeth, and where dental composite resin and glass ionomers may not be used as extensively as in Finland and other Nordic countries. This suggests that the clinical features and causative allergens may differ from country to country and between past and present. The frequency of contact dermatitis in our study, 44.9%, is consistent with other reports (1–5). Dental technicians are exposed to various compounds: metals, acrylics, impression compounds, porcelain and filling materials. Metals, acrylics, plaster and alginate were common contactants in our subjects and our patch test results suggest that these common contactants were related to their hand dermatitis. 14 out of 22 patients displaying contact dermatitis demonstrated a positive reaction to more than 1 allergen among acrylics and metals. This positive patch test reaction ratio among subjects who had hand dermatitis was clearly higher than that among subjects who did not have hand dermatitis. Although the numbers of subjects in both groups were small, we can interpret this result as showing that allergens showing positive reactions had some responsibility for their dermatitis. Positive patch test reactions to metals, including potassium dichromate, mercury chloride, cobalt chloride and palladium chloride, were more frequent in our study than in a European report (2). However, positivities to acrylics were low; 2 positive reactions to methyl methacrylate and 1 positive reaction each to 5 other acrylates were observed in our dental screening series. Although the reason for this difference is not clearly explained, it is related to not only to the materials used in the workplace but also to the procedures used. Contact dermatitis developed on the hand in all 22 subjects. The most commonly affected sites were the dorsum and palm. Only 2 patients showed concomitant contact dermatitis lesions on the face or forearm. Although most of the hand dermatitis was diagnosed as contact dermatitis, we were unable to discriminate clearly between allergic contact dermatitis and irritant contact dermatitis, because most of patients had no skin lesions at the time of examination. However, we estimate that more than 1/2 of the hand dermatitis was irritant contact dermatitis, for 3 reasons. 1st, many cases of hand dermatitis did not last long, with the exception of a few cases, in spite of working on the same procedure. 2nd, the most commonly affected skin sites were the dorsum and palm of the hand in our study, suggesting the

possibility of the irritant contact dermatitis, because the more usual site for allergic contact dermatitis in dental workers is the finger tip (2, 10). Finally, the 3rd reason is the patch test results. Acrylics, the most common allergen in dental workers, did not cause allergic reactions frequently in our patch test results; only 3 subjects had a positive reaction to acrylics. And, although the positive patch test reactions to metals were more frequent than in European reports, it was not significantly higher than that of the general Korean population visiting patch test clinics (11), and metals are not known to be a frequent allergen in dental workers (2).

In conclusion, the frequency of occupational contact dermatitis in dental technicians in Korea was 44.9%, and this was consistent with other reports. The site involved was the hand, as in other reports, although irritant contact dermatitis was more common than allergic contact dermatitis. The patch positivity to metals was higher, but the positivity to acrylics was lower than that of European reports (2, 10, 12, 13).

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Address:

Hyung Ok Kim
Department of Dermatology
Kangnam St. Mary's Hospital
The Catholic University of Korea
505 Banpo-dong, Seocho-ku
Seoul, Korea, 137-040