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Self-reported occupational health of general dental practitioners

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Background Limited information is available regarding the occupational health status of dentists (particularly in New Zealand), although previous research suggests that stress, hand dermatoses and musculoskeletal symptoms are common.

Aims To determine the occupational health status of New Zealand dentists.

Methods A nationwide postal survey of a representative sample of 750 dentists.

Results There was a response rate of 77%. Most dentists (71%) reported their general health as very good or excellent; 43% rated their physical fitness as excellent or very good and 64% were happy and interested in life. Workplace bullying had been experienced by 19% and was higher for female and employee dentists and 29% had experienced a violent or abusive incident at work. Almost half of the sample (47%) had experienced at least one dermatitis-type condition in the previous 12 months. The most commonly reported sites for musculoskeletal problems experienced in the previous year were the neck (59%), lower back (57%) and shoulders (45%). Women had a higher prevalence of several occupational health problems, but were more satisfied with their overall health than male dentists.

Conclusions The majority of dentists had good general health, but physical fitness levels were not ideal. The prevalence of hand dermatoses and musculoskeletal problems are high and impact significantly on dentists' daily lives. Interventions such as reducing weight and training in optimal working methods to reduce musculoskeletal problems and injuries (such as eye or needlestick incidents) might improve the health of this workforce but further research is required.

Key words Dentist; dermatoses; gender; musculoskeletal; obesity; occupational health.

Introduction

Dentistry is a stimulating and rewarding occupation but is physically and mentally demanding. The physical attributes required include good visual acuity, hearing, depth perception, psychomotor skills and manual dexterity and the ability to maintain occupational postures over long periods. Dentists also require mental alertness, sound judgement and good communication and managerial skills. Diminution of any of these may affect a practitioner's performance [1].

Failure to adapt to or contend with the working environment can predispose to illness or injury [2]. Dentists may be at risk of occupational diseases such as systemic infection (e.g. HIV, hepatitis B or C and tuberculosis), allergies (including dermatitis and respiratory disorders), toxicity, hearing loss, musculoskeletal disorders (particularly of the neck, back and shoulders), injuries (e.g. percutaneous or ocular) and psychological problems [1,3]. Musculoskeletal disorders, cardiovascular disease and neurotic symptoms contribute to premature retirement among dentists [4]. Although dentistry has seen significant technical advancements in recent years, occupational health problems remain [3].

There has been little discussion of the practising characteristics of dentists that may be associated with occupational disease. The aim of the present study was to determine the occupational health status of New Zealand (NZ) general dental practitioners (GDPs) and to identify associations with practising characteristics.

Methods

A nationwide postal survey of GDPs was undertaken in February to March 2008. Approval was gained from the University of Otago Ethics Committee. A sample

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of 750 GDPs was randomly selected from the 2007 Dental Register of the Dental Council of New Zealand. The questionnaire was developed following a literature review and was piloted with a sample of dental specialists. It was posted with a covering letter explaining the study's purpose and a reply paid envelope. Three weeks later, a second wave of forms was sent to dentists who had not responded. Participation incentives were offered in the form of a prize draw for each round.

The questionnaire sought data on respondents' sociodemographic and practising characteristics and information about their health behaviours and general health. For reporting purposes, respondents were grouped by gender, number of years working as a dentist (<10, 10–19, 20–29, 30–39 and 40+), country of dental training (NZ or other) and number of patients treated per day (up to 12, ≥13). The body mass index (BMI) was calculated for each dentist by using the formula: BMI = (weight in kg)/(height in m)^2.

Responses were analysed using the Statistical Package for the Social Sciences (SPSS; Version 16 for Mac OS X; www.spss.com). Associations between categorical variables were tested for statistical significance using the chi-square test, with the alpha level set at 0.05. Means were compared using the independent samples *t*-test.

Results

Thirteen questionnaires were returned because of incorrect address details and six because the dentists were not currently practising. Of the 567 questionnaires returned, one was excluded because fewer than half of the questions had been answered, giving a response rate of 77%. Approximately one-third (32%) of respondents were female and 68% were male. Comparison of characteristics of the responders with practising dentists in NZ (using the Dentist's Register) showed that there were no significant differences.

Almost three-quarters of respondents worked in group practices (73%), with 26% working solo. Most were self-employed (65%), while 21% were employees on commission and 14% worked on salary. Respondents had been practising for a mean of 22 years (SD 12) and had patient contact for a mean of 31 h/week (SD 9, range 0–60). Gender differences existed, with men treating patients for a mean 33 h/week (SD 9), while women treated patients for 28 h/week (SD 10, $P < 0.001$). The mean number of patients seen per day was 13 (SD 6). Self-employed dentists worked more contact hours than employee dentists (32, SD 8 and 30, SD 10, respectively; $P < 0.05$) and treated more patients per day (14, SD 7 and 12, SD 4, respectively ($P < 0.001$).

Only 3% of dentists were regular smokers and 5% smoked occasionally. Most reported using alcohol (79%), with usual consumption ranging from 0 to 70 units/week (mean 7; SD 8). The mean BMI was 25 (SD 4, range 15–55).

On average, dentists had taken 2.9 days off work due to illness in the previous year (SD 12, range 0–200), but had worked a mean 5 days (SD 12, range 0–200) when they had felt unwell. A higher proportion of dentists with a high BMI (≥26) had taken ≥4 days off due to illness than those with a lower BMI (≤25; 41, 21% and 37, 13%, respectively, $P < 0.05$). A greater proportion of women than men had taken ≥4 days off due to sickness in the previous year (39, 22% and 50, 13%, respectively, $P < 0.01$) or reported working ≥6 days when they felt unwell ($P > 0.05$).

Characteristics of respondents' self-reported general health are presented in Table 1.

Dentists who drank moderately (1–7 units/week) reported being more satisfied with their health; 33% of non-drinkers, 51% of moderate drinkers and 41% of heavier drinkers reported being very satisfied with their health ($P < 0.05$). Three-quarters of dentists had taken at least one form of medication in the preceding 4 weeks; the mean number taken was 1 (SD 1, range 0–7). The most commonly taken drugs were analgesics (39%), cardiac or antihypertensive medications (14%) and allergy medications such as antihistamines (14%). One-quarter (25%) had taken vitamin supplements and 4% had taken homoeopathic medicines. Eight (1%) had taken recreational drugs. There were no differences by gender, age or smoking status. A larger proportion of dentists with a high BMI had taken medications in the last year than those with a lower BMI (72 and 61%, respectively, $P < 0.05$).

Data relating to the ocular health of the respondents and their experience of work-related adverse health events are presented in Tables 2 and 3, respectively. Individuals who had taken ≥4 days off work due to illness in the last year were more likely to have reported experiencing workplace bullying (29 and 18%, respectively, $P < 0.05$). Respondents who drank more heavily were least likely to report that they had; 14% of dentists who reported consuming >7 units of alcohol per week had experienced workplace bullying, compared to 23% of those who drank 1–7 units/week and 26% of teetotallers ($P < 0.05$). Although more NZ-trained than overseas-trained dentists drank ≥7 units/week (41 and 27%, respectively, $P < 0.001$), there were no significant differences between the two groups with respect to workplace bullying experience. A greater proportion of dentists working in solo practice had experienced a violent or abusive incident than in group practice (37 and 26%, respectively, $P < 0.05$). Conversely, more of those in group practice had experienced an eye injury (15 and 8%, respectively, $P < 0.05$).

Data on dermatitis-type conditions are presented in Table 4. Females and younger dentists reported a higher experience of most symptoms (data not shown). Dentists who treated fewer patients per day had a higher prevalence of dermatitis-type symptoms than those who treated more (47 and 37%, respectively, $P < 0.05$).

Table 1. Self-reported general health (percentages in brackets)[a]

	Gender		Age group			All combined, *n* (%)
	Male, *n* (%)	Female, *n* (%)	0–39 years, *n* (%)	40–49 years, *n* (%)	50+ years, *n* (%)	
How do you rate your general health?						
Excellent/very good	268 (70)	131 (72)	137 (72)	113 (71)	148 (69)	399 (71)
Good/fair/poor	117 (30)	50 (28)	53 (28)	46 (29)	68 (32)	167 (30)
How do you rate your physical fitness?						
Excellent/very good	174 (45)	69 (38)	77 (41)	69 (43)	97 (45)	243 (43)
Good/fair/poor	211 (55)	112 (70)	113 (60)	90 (57)	119 (55)	323 (57)
What is your usual feeling?						
Happy and interested in life	238 (62)	119 (67)	116 (62)	99 (63)	142 (66)	357 (64)
Somewhat happy	130 (34)	52 (29)	67 (36)	49 (31)	65 (30)	182 (32)
Unhappy	15 (4)	7 (4)	5 (3)	9 (6)	8 (4)	22 (4)
How would you describe your life?						
Very/fairly stressful	254 (67)	138 (78)**	132 (71)	120 (76)	139 (65)*	392 (70)
Not very/not at all stressful	128 (34)	40 (23)	55 (29)	37 (24)	76 (35)	168 (30)
To what degree do you experience pain and discomfort?						
Free from pain/discomfort	154 (40)	71 (40)	85 (45)	60 (39)	80 (37)	225 (40)
Not free from pain/discomfort	229 (60)	106 (60)	103 (55)	96 (62)	135 (63)	335 (60)
Overall, how satisfied are you with your health?						
Very satisfied	161 (42)	91 (51)*	86 (46)	76 (48)	90 (42)	252 (45)
Somewhat or not satisfied	223 (58)	87 (49)	102 (54)	81 (52)	126 (58)	310 (55)

[a]Some respondents did not answer all questions.

*$P < 0.05$, **$P < 0.01$.

Table 2. Factors relating to dentists' ocular health

	Uses magnification regularly, *n* (%)	Wears prescription glasses or lenses regularly, *n* (%)	Uses eye protection regularly, *n* (%)	Had eye examination in previous 2 years, *n* (%)	Ever had eye injury at work, *n* (%)
Sex					
Male	173 (45)***	229 (60)	212 (56)***	300 (78)	56 (15)
Female	40 (22)	102 (57)	131 (73)	140 (78)	18 (10)
Age group (years)					
<40	33 (17)***	93 (49)***	138 (73)***	121 (64)***	19 (10)
40–49	63 (40)	72 (46)	111 (70)	124 (79)	23 (15)
≥50	116 (54)	166 (78)	93 (45)	194 (91)	31 (14)
Number of patients per day					
Up to 12	115 (38)	166 (55)*	200 (67)**	228 (76)	37 (12)
≥13	93 (38)	155 (64)	128 (54)	198 (82)	36 (15)
Employment status					
Employee	51 (26)***	108 (56)	122 (64)	141 (73)*	26 (13)
Self-employed	158 (44)	220 (60)	218 (61)	296 (81)	47 (13)
Days worked when not well					
≤5	175 (40)	250 (58)	266 (62)	346 (80)*	45 (10)***
≥6	32 (31)	61 (59)	61 (60)	72 (70)	24 (23)
All combined	213 (38)	331 (59)	343 (62)	440 (78)	74 (13)

*$P < 0.05$, **$P < 0.01$, ***$P < 0.001$.

Table 3. Dentists' experience of work-related adverse health events

	Needlestick injury in previous year, *n* (%)	Work injury excluding eyes, *n* (%)	Violent or abusive incident, *n* (%)	Workplace bullying, *n* (%)
Sex				
Male	53 (14)**	83 (22)	113 (30)	57 (15)***
Female	42 (23)	48 (27)	48 (27)	51 (28)
Age group (years)				
≤40	39 (21)	37 (20)	48 (25)	37 (20)**
40–49	21 (13)	38 (25)	50 (32)	41 (26)
≥50	34 (16)	55 (26)	62 (29)	29 (14)
BMI				
Up to 25	60 (20)*	71 (25)	77 (26)*	60 (20)
≥26	23 (12)	46 (24)	70 (36)	39 (20)
Employment status				
Employee	48 (25)***	40 (21)	53 (27)	48 (25)*
Self-employed	47 (13)	90 (25)	105 (29)	59 (16)
Days worked when not well				
≤5	67 (15)*	94 (22)*	114 (26)	78 (18)
≥6	25 (24)	33 (32)	37 (36)	26 (25)
All combined	95 (24)	131 (24)	161 (29)	108 (19)

*$P < 0.05$, **$P < 0.01$, ***$P < 0.001$.

Table 4. Prevalence of dentists' dermatitis-type conditions

	During the previous 12 months, *n* (%)	During practising life, *n* (%)
Red swollen hands	25 (4)	30 (5)
Red hands or fingers	33 (6)	53 (9)
Dry cracked hands	118 (21)	156 (28)
Vesicles on hands or fingers	29 (5)	47 (8)
Scaling hands or fingers	43 (8)	55 (10)
Itching hands or fingers	116 (21)	158 (28)
Irritation of eyes, airway or nose	160 (28)	180 (32)
Any symptom	267 (47)	317 (56)

Data on respondents' experience of headaches and temporomandibular joint (TMJ) pain are presented in Table 5 and experience of musculoskeletal problems in Table 6.

Overweight dentists were more likely than those with a lower BMI to have experienced elbow (13 and 8%, respectively, $P < 0.05$), knee (27 and 19%, respectively, $P < 0.05$) or ankle or foot pain (20 and 11%, respectively, $P < 0.01$) in the previous 12 months. Females had a higher prevalence of pain than males for shoulder (58 and 42%, respectively, $P < 0.01$), neck (72 and 55%, respectively, $P < 0.001$), wrist/hand (36 and 22%, respectively, $P < 0.001$) and upper back regions (36 and 22%, respectively, $P < 0.001$). Conversely, males had a higher prevalence of elbow pain (13 and 6%, respectively, $P < 0.05$). Dentists who treated fewer patients per day had higher prevalence of shoulder (51 and 42%, respectively, $P < 0.05$), neck (65 and 55%, respectively, $P < 0.05$) and wrist/hand pain (29 and 22%, respectively, $P < 0.05$) than their colleagues who treated more patients.

Discussion

In this survey of NZ general dentists, most reported good health, but hand dermatoses and musculoskeletal problems were common. Workplace bullying was reported by one-fifth, and over one-quarter had experienced a violent or abusive incident.

Turning to the study's weaknesses and strengths, we were unable to survey non-practising dentists, who may have retired for occupational health reasons. Some respondents chose not to answer all questions, introducing some item non-response. Finally, the cross-sectional design meant that causation could not be demonstrated. A satisfactory response rate [5] resulted from two mailings. Comparison of responders with practising dentists in NZ showed that the two groups did not differ by gender, age or country of qualification, suggesting that the findings are generalizable.

Overall, most dentists had very good general health. The 1% using recreational drugs is considerably fewer than USA [6] or UK [7] estimates. Only 3% were smokers; less than recently reported for dentists elsewhere [6–8]. Although almost four-fifths reported drinking alcohol regularly, the mean weekly consumption (seven standard drinks) is within recommended maxima for women (14) and men (21) (Alcohol Advisory Council www.alac.org.nz). Moderate drinkers were more satisfied with their health.

Most dentists had taken very few days off due to illness, but, on average, respondents had worked 5 days when they

Table 5. Dentists' experience of headaches and TMJ pain

	Headaches in last 12 months, *n* (%)	Length of time with headaches in last 12 months, *n* (%)		TMJ pain in last 12 months, *n* (%)	Length of time with TMJ pain in last 12 months, *n* (%)	
		Up to 1 week	≥8 days		Up to 1 week	≥8 days
Male	208 (55)***	340 (88)	45 (12)***	51 (13)***	337 (98)	8 (2)*
Female	145 (81)	135 (75)	46 (25)	50 (28)	171 (95)	10 (6)
Trained in NZ	257 (60)**	369 (85)	63 (15)	78 (18)	420 (97)	12 (3)
Trained overseas	96 (73)	106 (79)	28 (21)	23 (17)	128 (96)	6 (5)
Employee	135 (70)*	162 (83)	33 (17)	45 (23)*	187 (96)	8 (4)
Self-employed	216 (60)	308 (84)	58 (16)	56 (15)	356 (97)	10 (3)
0–39 years	145 (76)***	148 (78)	42 (22)***	49 (26)***	179 (94)	11 (6)*
40–49 years	106 (67)	130 (82)	29 (18)	36 (23)	154 (97)	5 (3)
50+ years	101 (47)	179 (91)	19 (9)	16 (8)	214 (99)	2 (1)
Up to 12 patients per day	200 (66)	247 (81)	58 (19)	64 (21)*	291 (95)	14 (5)*
≥13 pts per day	140 (58)	212 (87)	31 (13)	33 (14)	240 (99)	3 (1)
All combined	353 (63)	475 (84)	91 (16)	101 (18)	548 (97)	18 (3)

*$P < 0.05$, **$P < 0.01$, ***$P < 0.001$.

Table 6. Musculoskeletal symptoms experienced by dentists

	Symptoms in last 12 months, *n* (%)	Symptoms preventing normal tasks, *n* (%)	Symptoms last 7 days, *n* (%)	Days off work due to symptoms in last year, *n* (range of days)	Seen health professional due to these symptoms in last 12 months, *n* (%)
Neck	332 (59)	65 (12)	112 (20)	17 (1–7)	129 (23)
Shoulders	257 (45)	52 (9)	95 (17)	12 (1–7)	115 (20)
Elbows	57 (10)	15 (3)	23 (4)	2 (1–7)	22 (4)
Wrists/hands	141 (25)	49 (9)	56 (10)	4 (1–88)	43 (8)
Upper back	169 (30)	41 (7)	70 (12)	7 (1–3)	79 (14)
Lower back	325 (57)	86 (15)	120 (21)	16 (1–48)	128 (23)
Hips/thighs	84 (15)	19 (3)	30 (5)	2 (1–8)	40 (7)
Knees	118 (21)	26 (5)	54 (10)	5 (1–32)	47 (8)
Ankles/feet	74 (13)	21 (4)	34 (6)	3 (1–4)	34 (6)

had felt unwell. Furthermore, work-related injuries were more common among dentists who had worked at least 6 days in the previous year when they felt unwell (which, in turn, was more common among those reporting workplace bullying, violence or abuse), suggesting that working when unwell predisposes to such events. More women than men had taken ≥4 days off work due to illness in the preceding year and reported working ≥6 days when they felt unwell. It is not clear whether female dentists are more prone to illness than males or whether some of the 'sick' days taken were to mind unwell dependants.

Fewer than half rated their physical fitness highly, suggesting that many dentists do not find as much time as they would like for exercise, a key strategy for reducing dentists' musculoskeletal symptoms [9]. While only a few dentists were generally unhappy with little interest in life, many dentists reported stressful lives; it is unclear whether they perceived this positively or negatively. Dentists suffer high rates of stress [10–13]; this can lead to premature retirement [4]. Contributing factors include time pressure (and limited personal time), procedural intimacy, staff and patient relationships, job satisfaction and financial concerns [3,10]. In this study, women and those aged 40–49 rated their lives as more stressful, with the least among those aged >50. The former are more likely to be juggling work, family life and financial pressures. High levels of stress can lead to 'burnout' and contribute to musculoskeletal problems [14].

Almost 60% experienced pain or discomfort, with close to 40% requiring analgesics at least once in the previous 4 weeks. Overweight dentists appeared to have inferior health, as they were more likely to report experiencing pain or discomfort, having more days off work due to sickness, poor general health and physical fitness and lower satisfaction with their health. Enabling overweight practitioners to lose weight should be a key occupational health goal.

The greater use of spectacles, contact lenses and magnification with age is to be expected, as visual acuity, accommodation and yellow hue discrimination decrease with age, while glare and contrast sensitivity increase [15]. Younger

dentists wore more eye protection, probably because they did not have prescription glasses or loupes (which serve to protect the eyes as well as aiding vision). The more than one-fifth of dentists who had not undergone a recent eye examination is higher than reported from the UK [15]. In contrast to previous findings [16], there were no sex differences in eye injury prevalence in this study. Overall prevalence was similar to a UK estimate [17].

Fewer dentists had received needlestick injuries than in other studies [17–20], although some of these included all sharps injuries. Women reported a higher prevalence than men, despite working fewer hours. The reasons for this are unclear. Given the potential for transfer of viruses, measures to further prevent needlestick and other sharps injuries should be encouraged.

Violence and aggression towards dental personnel are increasing, but are less than for other health care workers. Eighty per cent of a sample of UK dental personnel [21] had experienced aggression at work (some having experienced physical violence). In our study, over one-quarter of dentists had done so. The prevalence of workplace bullying is also concerning, especially as it was associated with sick days taken and it appeared to be a particular concern for female and employee dentists and those aged between 40 and 49. Further investigation of workplace bullying and aggression would be useful.

Over half of the dentists in the current study had experienced at least one dermatitis-type symptom during their practising life. The prevalence was higher than previously reported for NZ dentists, where 33% had symptoms during the previous year and 42% during their practising life [22]. However, 'dry cracked hands' were not counted in that study; removing those from our data gave 12-month and lifetime prevalences of 42% [95% confidence interval (CI) 38–46%] and 50% (95% CI 45–54%), respectively, still higher than the earlier estimates. Consistent with previous studies [22,23], dermatitis symptoms were more common among females. Dentists treating fewer patients had a higher 12-month prevalence of dermatoses; perhaps they were working fewer clinical hours because of this problem. Hand dermatoses can be managed by self-medication, use of non-powdered, non-latex gloves and avoidance of other allergens (such as methacrylates) [3,22].

While the 12-month prevalence of headaches was high, they occurred during only a few days per year for most. However, one-quarter of females experienced headaches for at least 8 days, consistent with previous reports [24]. The reasons for this (and its workforce impact) are unclear. As in previous studies [9,14,24–27, 28], musculoskeletal symptom prevalence was high, most commonly in the neck, shoulder, back and wrists/hands. Their daily impact was considerable, with many reporting that symptoms prevented normal tasks and necessitated days off work and visits to health professionals. Symptom prevalence in our study did not significantly differ from that among NZ dental therapists [29] (despite the two samples' gender differences) for neck, shoulder, upper back, lower back or knee symptoms, although fewer dentists than dental therapists had elbow or wrist/hand symptoms. As has previously been reported [24,30], female dentists had more musculoskeletal pain than males, but the previously reported negative association between musculoskeletal pain and years since graduation [19,25] was not seen (except for neck pain). Part-time dentists reported more musculoskeletal problems than their full-time counterparts in this and other studies [19].

Dentists with significant occupational health problems may reduce their clinical practice; those treating fewer patients per day had a higher prevalence of shoulder, neck and hand/wrist pain and dermatoses over the previous 12 months. Alternatively, those treating fewer patients may perform more intricate and complex procedures, meaning that they wear gloves for a greater proportion of the day and spend more time in a working position that predisposes to problems. Women have been reported to suffer more occupation-related health complaints than men [24]; women in the current study reported higher stress levels and more needlestick injuries, workplace bullying, dermatitis, headaches, TMJ pain and musculoskeletal pain. Despite this, women were more satisfied with their health overall than male dentists.

Further research is required to determine the impact of occupational health disorders on the productivity of the dentist workforce. The causes of occupational health problems affecting dentists (particularly musculoskeletal disorders) need to be determined with greater accuracy, along with occupational safety measures to help reduce their prevalence and impact.

Key points

- The majority of dentists had good general health overall, but physical fitness was not ideal for most.
- The prevalence of musculoskeletal problems and dermatoses was high and impacted significantly on the daily lives of dentists.
- Women had a higher prevalence of several occupational health problems than their male counterparts.

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Conflicts of interest

None declared.

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