J Clin Periodontol 2007; 34: 952–956 doi: 10.1111/j.1600-051X.2007.01147.x

Journal of Clinical Periodontology

Gradients in periodontal status in Japanese employed males

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Morita I, Nakagaki H, Yoshii S, Tsuboi S, Hayashizaki J, Igo J, Mizuno K, Sheiham A. Gradients in periodontal status in Japanese employed males. J Clin Periodontol 2007; 34: 952–956. doi: 10.1111/j.1600-051X.2007.01147.x.

Abstract

Aim: The objective was to assess whether there was a social gradient in periodontal status by job classification in Japanese male workers.

Material and Methods: Study participants were 15,803 Japanese male workers aged 20–69 years. There were seven groups classified by jobs. Oral examinations were conducted using community periodontal index (CPI).

Results: The percentages of sextants with a CPI score of 3 or 4 of professionals were significantly lower than for other job classes. The gradient also existed for the percentage of sextants with CPI score 4. After adjusting for age, a history of diabetes mellitus and smoking status, those lower on the gradient, namely, drivers, service occupations, salespersons and managers were 2.0, 1.5, 1.4 and 1.4, times, respectively more likely to have one or more sextants with CPI score 3 or 4 compared with professionals. Odds ratios of having more than one or more sextants with CPI score 4 after adjusting for age, clinical history of diabetes mellitus and smoking status for drivers, service occupations, salespersons and managers were 2.1, 1.5, 1.5 and 1.2, respectively, compared with professionals.

Conclusions: There was a gradient in periodontal status by job classification. Professional and office workers had better periodontal status than salespersons, service occupations and drivers.

Key words: inequality; job classification; periodontal status; social gradient

Accepted for publication 7 August 2007

Numerous chronic medical conditions are correlated with social status (Marmot & Shipley 1996, Marmot 1999, 2003, 2005, The Ministry of Health, Labour and Welfare 2000, Fuhrer et al. 2002). People higher up the socioeconomic hierarchy have lower levels of chronic diseases than those lower in the hierarchy, a phenomenon known as the social gradient in health, whereby those at the top of the social ladder are healthier than those immediately below them and they in turn are healthier than the next level on the gradient (Marmot 1999, 2003, 2005). Social gradients exist for general health (Marmot 1999, 2003, 2005) and for dental caries (Morita et al. 2007). People in the higher employment grades had lower levels of caries experience than those in the grades just below them, who in turn had lower levels of caries than lower grades (Morita et al. 2007). Chen (1995) reviewed differences in oral health based on socioeconomic position in industrialized, middle-income and low-income countries. Chen found that there was generally a social gradient in periodontal diseases and tooth loss in different countries. For example, Morris et al. (2001), Thomson et al. (2004) and Lopez et al. (2006) reported that periodontal status was better in people with a higher socioeconomic status than in those lower down the socioeconomic scale. In a recent study that addressed social gradients among adolescents, Lopez et al. (2006) found that there were gradients in the periodontal health of Chilean high school students based on family income and parents' education. Others have suggested that periodontal disease was not so strongly affected by socioeconomic status (Unell 1999, Treasure et al. 2001, Green et al. 2003). Periodontal diseases are related to several psychosocial factors such as work-related mental demand, stress and cigarette smoking (Sheiham & Nicolau 2005). These psychosocial factors are affected by socioeconomic status.

Because of the uncertainty about whether a social gradient in health exists in Japan (Cockerham et al. 2000) and because little is known about the association of periodontal status and occupational status in Japan, a study was planned with the objective of assessing whether there was a social gradient in periodontal health status by job classification in Japanese male workers.

Conflict of interest and source of funding statement

The authors declare that they have no conflict of interests.
This study was funded by the authors and their academic institution.

Material and Methods

Participants

In Japan, most employed people have statutory annual medical checks recommended by the Ministry of Health, Labour and Welfare. The participants in this study were all males coming for their statutory annual health checks between April 2005 and March 2006. They worked for companies in and around Nagoya in the centre of Japan. The participants were given a complete medical checkup and an oral examination by calibrated dentists.

The study was reviewed and approved by the Ethical Committee of Aichi-Gakuin University.

Job classification

Job classification was based on the criteria of the Japanese Ministry of Health, Labour and Welfare (The Ministry of Health, Labour and Welfare 1999). There are nine major job groups: 1. Professional (professionals, specialists), 2. Managers, 3. Office workers (computer operators, clerks, secretaries), 4. Skilled workers (factory workers, construction workers), 5. Salespersons (shop assistants), 6. Service occupations (superintendents, cleaners or car park attendants), 7. Security (guards), 8. Farmers and fishermen, and 9. Transport and telecommunication workers (truck drivers). A question on job classification was included in the interview that was completed by all participants before the dental examination.

Oral examination and assessment of the clinical history of diabetes mellitus and smoking status

Seven calibrated dentists examined the participants under a reflected light using a mouth mirror and compressed air. The periodontal status was assessed using a CPI probe (YDM Co., Tokyo, Japan) and standard WHO (1997) criteria for the community periodontal index (CPI). The oral cavity was divided into six sextants and 10 teeth, two incisors and eight molars, were examined to obtain CPI scores. The CPI scores were: healthy (score 0), bleeding after probing (score 1), dental calculus detected by probing (score 2), 4–5 mm deep pockets (score 3) and >6 mm deep pockets (score 4) (WHO 1997). A clinical history of diabetes mellitus and smoking status were included in the questionnaire that was answered by all participants before the medical checks. The clinical history of diabetes mellitus was recorded as have or do not have a clinical history of diabetes mellitus. Smoking behaviour was recorded as never smoked, former smoker and current smoker.

Statistical analysis

Participants who had three or less sextants were excluded from the analysis

Analysis of differences in periodontal status by job classification was adjusted for age, clinical history of diabetes mellitus and smoking status and assessed using four-way analysis of variance and Tukey's honestly significant difference test. Periodontal status was calculated as percentage of sextants with CPI score 3 or 4 and CPI score 4. Multivariate logistic-regression analysis was performed to examine whether job classification was associated with periodontal status after adjusting for age, clinical history of diabetes mellitus and smoking status. Periodontal status for participants was grouped as: having one or more sextants with CPI score 3 or 4, and having one or more sextants with CPI score 4.

The analysis was undertaken using SPSS 14.0J for Windows (SPSS Inc., Chicago, IL, USA).

Results

Because there were very few security guards and farmers and fishermen, they were excluded from the analysis as were 6% of the participants with three or fewer sextants present, which left 15,803 male participants aged 20–69 years in the study (Table 1).

Smoking was very common in most categories of workers. Whereas 41% of those in professional occupations never smoked, only 13.9% of drivers had never smoked (Table 2).

There were significant differences in periodontal status by job classification (Table 3). Professionals had a significantly lower percentage of sextants with CPI score 3 or 4 than other job classes (compared with skilled workers $p<0.001$, other job classes $p<0.001$) (Table 4). The gradient in periodontal status by job classification also existed for the percentage of sextants with CPI score 4 (Table 3).

Drivers were 2.4 times, service occupations and salespersons 1.6 times and managers 1.5 times more likely to have one or more sextants with CPI score 3 or 4 compared with professionals, after adjusting

Table 1. Number of participants, by job classification and age: Japanese males

Job classification	Age (years)											
	20–29		30–39		40–49		50–59		60–69		Total	
	n	(%)	*n*	(%)	*n*	(%)	*n*	(%)	*n*	(%)	*n*	(%)
Professional	439	42.1	1525	39.1	1341	28.3	867	18.5	229	16.1	4401	27.8
Managers	4	0.4	190	4.9	962	20.3	1556	33.2	565	39.8	3277	20.7
Office worker	68	6.5	509	13.0	734	15.5	618	13.2	210	14.8	2139	13.5
Skilled worker	366	35.1	711	18.2	357	7.5	695	14.8	214	15.1	2343	14.8
Sales persons	85	8.2	546	14.0	863	18.2	509	10.8	88	6.2	2091	13.2
Service occupations	23	2.2	143	3.7	230	4.8	196	4.2	54	3.8	646	4.1
Drivers	57	5.5	280	7.2	256	5.4	252	5.4	61	4.3	906	5.7
Total	1042	100.0	3904	100.0	4743	100.0	4693	100.0	1421	100.0	15803	100.0

Table 2. Smoking status by job classification in employed Japanese males

	Never smoke		Former smokers		Current smokers		Total	
	n	(%)	*n*	(%)	*n*	(%)	*n*	(%)
Professional	1797	40.8	1024	23.3	1580	35.9	4401	100.0
Managers	639	19.5	1273	38.8	1365	41.7	3277	100.0
Office worker	680	31.8	634	29.6	825	38.6	2139	100.0
Skilled worker	663	28.3	481	20.5	1199	51.2	2343	100.0
Sales persons	438	20.9	585	28.0	1068	51.1	2091	100.0
Service occupations	154	23.8	184	28.5	308	47.7	646	100.0
Drivers	126	13.9	229	25.3	551	60.8	906	100.0

Table 3. Differences in periodontal health status, by job classification

	20–29 years old		30–39 years old		40–49 years old		50–59 years old		60–69 years old	
	mean	SD	mean	SD	mean	SD	mean	SD	mean	SD
Percentage of sextants with CPI score 3 or 4										
Professional	2.5	11.3	9.6	21.7	20.2	29.6	31.4	33.3	37.2	33.6
Managers	16.7	33.3	18.4	26.9	23.4	29.4	35.8	33.1	41.4	31.9
Office worker	2.7	12.1	12.1	23.5	20.9	28.6	33.2	33.4	41.6	33.6
Skilled worker	1.8	8.8	10.1	23.4	27.7	34.6	32.8	34.8	36.9	36.5
Sales persons	3.7	13.2	13.5	24.1	25.4	31.4	39.0	33.9	48.1	33.1
Service occupations	9.4	23.5	14.5	26.6	29.7	32.9	41.1	36.2	42.4	33.6
Drivers	9.1	22.5	21.0	31.0	33.6	34.5	45.3	33.9	52.1	36.8
Percentage of sextants with CPI score 4										
Professional	0.1	1.6	0.8	6.8	2.8	11.3	6.5	17.0	7.0	18.0
Managers	0.0	0.0	1.9	7.9	3.5	12.0	7.0	16.9	8.8	17.3
Office worker	0.2	2.0	0.8	4.2	2.0	8.1	6.9	16.9	9.8	19.9
Skilled worker	0.0	0.0	0.5	5.5	5.0	15.7	7.9	18.6	8.3	17.8
Sales persons	0.0	0.0	1.3	8.0	4.3	13.3	10.1	20.7	10.9	21.6
Service occupations	0.0	0.0	0.9	6.2	5.5	15.5	8.5	19.5	9.0	16.6
Drivers	0.0	0.0	2.1	8.6	6.7	16.8	10.7	21.2	14.5	21.8

CPI, community periodontal index.

Table 4. Differences in periodontal status in Japanese males, by job classification

	Professional	Managers	Office worker	Skilled worker	Sales persons	Service occupations
Percentage of sextants with CPI score 3 or 4						
Managers	***					
Office worker	***	***				
Skilled worker	**	***	**			
Sales persons	***	***	NS	***		
Service occupations	***	NS	***	***	*	
Drivers	***	NS	***	***	***	NS
Percentage of sextants with CPI score 4						
Managers	***					
Office worker	NS	***				
Skilled worker	**	***	NS			
Sales persons	***	NS	NS	NS		
Service occupations	***	NS	NS	NS	NS	
Drivers	***	NS	***	***	NS	NS

Tukey's honestly significant difference test.
Adjusted for age, clinical history of diabetes mellitus and smoking status.
*$p<0.05$, **$p<0.001$, ***$p<0.01$.
NS, not significant; CPI, community periodontal index.

for age and clinical history of diabetes mellitus (Table 5, model (1). After adjusting for smoking status, drivers, service occupations, salespersons and managers were 2.0, 1.5, 1.4 and 1.4, times, respectively more likely to have one or more sextants with CPI score 3 or 4 compared with professionals (Table 5, model 2).

Odds ratios of having more than one or more sextants with CPI score 4 after adjusting for age and clinical history of diabetes mellitus for drivers, service occupations, salespersons and managers were 2.4, 1.6, 1.7 and 1.3, respectively, compared with professionals (Table 6, model 1). After adjusting for age, clinical history of diabetes mellitus and smoking status in model 2, the odds ratios of drivers, service occupations, salespersons and managers were 2.1, 1.5, 1.5 and 1.2, respectively, compared with professionals (Table 6).

Discussion

This study explored whether there was a social gradient in periodontal status among employed Japanese males in Nagoya. There was a significant social gradient by job classification in periodontal status. The main differences in the periodontal status were between skilled and unskilled workers. The extent of the differences varied by age. The differences were small or non-existent in the 20- to 29-year-old group but increased in those in the older age groups.

The periodontal status of drivers and service occupations was similar to that of professionals who were 10 years older. The percentages of sextants with CPI scores 3 or 4 in drivers and service occupations at 20–29 years of age were similar to professionals at 30–39 years of age. This gradient was repeated for other ages (Table 3).

One group, the 20–29-year-old managers, had higher than expected levels of periodontal disease for their job classification position in the hierarchy. In Japan, young managers do not have a healthy lifestyle for their status. They are heavy smokers and have long working hours and high levels of stress. Middle managers in Japanese companies have the most stressful position of all job classifications as they are responsible for achieving output targets. As this study was not related to causation of the gradient, stress levels were not assessed.

Drivers had the highest levels of periodontal disease of all job classifications. Drivers do considerable overtime work. They have the highest mortality of all job classifications in Japan (Kagamimori et al. 2006). These patterns may be explained by the effects of lack of flexibility of daily lives on oral hygiene practices. People who had more routinized and less flexible lives had lower toothcleaning frequencies and cleaned their teeth less effectively than those who had a more flexible and less routinized day (Abegg et al. 2000).

The results of the present study agree with those from UK, New Zealand and Chile. In the Adult Dental Health Survey in England, there were marked social gradients in periodontal status. The likelihood of an adult having pocketing greater than 3.5 mm was higher in manual workers than non-manual groups in social classes I, II and IIINM (Kelly et al. 2000). In New Zealand, the percentage with periodontitis in the high socioeconomic status group was lower than in the low socioeconomic status group (Thomson et al. 2004), and in Chile, the lowest income group was 1.7 times more likely to have at least one site with clinical attachment level 3 mm or more than the highest income group (Lopez et al. 2006).

The participants in this study were employed people who came to one health check-up centre. They were from many large-, middle- and small-sized

Table 5. Odds ratio of having one or more sextants with CPI = 3 or 4, by job classification

	OR (95% CI)	
	model 1*	model 2†
Professional	1	1
Managers	1.47 (1.33–1.63)	1.36 (1.22–1.51)
Office worker	1.18 (1.05–1.32)	1.14 (1.02–1.28)
Skilled worker	0.96 (0.85–1.08)	0.85 (0.76–0.95)
Salespersons	1.58 (1.42–1.77)	1.40 (1.25–1.57)
Service occupations	1.60 (1.34–1.91)	1.46 (1.22–1.75)
Drivers	2.39 (2.04–2.80)	1.97 (1.68–2.31)

*Model 1: adjusted for age and clinical history of diabetes mellitus.
†Model 2: adjusted for age, clinical history of diabetes mellitus and smoking status.
CPI, community periodontal index; OR, odds ratio; CI, confidence interval.

Table 6. Odds ratio of having one or more sextants with CPI = 4, by job classification

	OR (95% CI)	
	model 1*	model 2†
Professional	1	1
Managers	1.32 (1.14–1.53)	1.23 (1.06–1.43)
Office worker	1.14 (0.96–1.37)	1.10 (0.92–1.32)
Skilled worker	1.25 (1.05–1.50)	1.16 (0.97–1.39)
Salespersons	1.65 (1.39–1.96)	1.49 (1.26–1.78)
Service occupations	1.63 (1.27–2.08)	1.53 (1.19–1.96)
Drivers	2.36 (1.91–2.92)	2.05 (1.66–2.54)

*Model 1: adjusted for age and clinical history of diabetes mellitus.
†Model 2: adjusted for age, clinical history of diabetes mellitus and smoking status.
CPI, community periodontal index; OR, odds ratio; CI, confidence interval.

companies and can be considered to be representative of Japanese male workers.

A possible shortcoming of this study is the use of the CPI to assess periodontal status. It may underestimate periodontal status. However, despite its shortcomings, the fact remained that there was a gradient in periodontal status by job classification.

Conclusions

There was a gradient in periodontal status by job classification in Japanese male workers. The gradient in the percentage of sextants with CPI with score 3 or 4 existed for all decade age groups. Differences in the percentage of sextants with CPI score 4 by job classification were apparent in those 40 years or older and were greater in the older age groups. Professional and office workers had a better periodontal status than salespersons, service occupations and drivers.

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Clinical Relevance

Scientific rationale for the study: There is evidence of a social gradient in general health. If there is a similar social gradient for periodontal diseases that would suggest common causal pathways for periodontal and other common chronic diseases.
Principal findings: Professional and office workers had a better periodontal status than salespersons, service occupations and drivers.
Practical implications: There appear to be common risk factors for periodontal disease and some major chronic medical diseases.