

A description of oral health in three French jails

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Prisoners display many features suggestive of a higher risk of poorer oral health than the general population. They have many risk factors: disadvantaged social background, consumption of psychoactive substances and a high proportion of persons with mental illness. The oral health of prisoners is handled by different care providers, such as hospital doctors together with some students, interns, and some dedicated dental practitioners. There are few data describing the outcomes of this activity. **Objective:** The objective of this descriptive study was to determine the oral health of prisoners in the current care system as observed in three French jails. **Participants:** 84 male prisoners were allocated to two subgroups according to the duration of incarceration: a short term group (≤ 2 years; 31 subjects, mean age: 31 (sd 13) years) and a long term group (> 2 years; 53 subjects, mean age: 43 (sd 11) years). One investigator performed a semi-guided interview and a dental examination. **Main outcome measures:** The DMFT index, the Global Oral Health Assessment Index, the number of dental functional units and some specific indicators on mastication were collected. **Results:** Duration of incarceration explained more variability than age for numbers of missing teeth (26%; $p < 0.001$) and functional units (24%; $p < 0.001$). Long-term prisoners had greater chewing difficulties than short term prisoners. **Conclusions:** This study suggested that, in the French jails studied, a stable level of oral infection including untreated caries was obtained at the cost of a degraded masticatory function.

Key words: dental caries, DMFT index, prisoners, jail, France

Introduction

On January 1st, 2007, 58,402 persons, including 2,152 (3.7%) women and 727 (1.2%) minors were imprisoned in France (Rande, 2007) in 3 types of institution: remand home, detention centre and prison. A remand home is a penitentiary establishment housing pre-trial remand prisoners and prisoners whose outstanding sentence is less than one year. A detention centre is a penitentiary establishment primarily orientated towards the rehabilitation of prisoners. It receives prisoners who are considered to present the best prospects for rehabilitation. A prison is an establishment for the hardest convicts in which the detention regime is mainly focused on security. In accordance with a law passed in 1994, the inmates are supported by social security and have access to public hospital care. Dental care is available to inmates of all three types of institutions from 1 to 5 days per week.

Prisoners display many features suggestive of a higher risk of poorer oral health than the general population. They are mostly men aged 18 to 44, generally from a disadvantaged social background. A national survey in 1997 indicated that a fifth of those going to prison claimed to have no fixed abode and 17.5% reported having no social or health coverage (Mouquet, 2005). This low social background makes them particularly susceptible to the marked social inequalities in oral health that exist in France. A study conducted by phone and published in 2000 showed that 45% of unskilled workers and 29% of executives had lost a tooth that had not been replaced. This study also showed that the number of decayed missing and filled teeth (DMFT) varies with social category

(Azogui-Lévy and Boy-Lefèvre, 2005). In addition, the consumption of addictive substances is an important risk factor for oral health. People entering French prison in 1997 and 2003 had a higher consumption of psychoactive substances (alcohol, tobacco, illicit drugs and psychotropic drugs) than the general population (Mouquet, 2005). The tobacco and alcohol users exhibited more carious lesions and periodontal disease than the general population. In addition, illicit drug users have poorer oral health due to the effect of xerostomia induced by these substances, increased consumption of sugar and due to neglect of personal care and oral hygiene during periods of abuse. Cannabis, another drug frequently used by this population, shows adverse effects on oral health similar to those of other illicit drugs and, as do alcohol and tobacco, it increases the risk of cancer (Cho *et al.*, 2005).

The French prison population includes many people with mental illness. In June 2001, the French Research Directorate of Studies of the Evaluation and Statistics (DREES) conducted a study in the Medico-Psychological Regional Services (Prieto and Faure, 2004). It showed that 55% of those entering prison had one or more psychiatric disorder (55% prevalence of anxiety disorders, 54% addictive disorders, and 42% psychosomatic disorders). Twenty per cent had been in some sort of psychiatric care. In another study, 27.4% of French male prisoners present a clinical psychiatric disorder (Falissard *et al.*, 2006). These results are similar to those from other industrialised countries (Fazel and Danesh, 2002). In these individuals, deterioration in oral health was attributed to the xerostomia induced by psychotropic drugs. The indifference of most of these patients to appearance-mediated

social interaction does not predispose them to hygiene or aesthetic concerns. Because of the combination of these risk factors, the prison population is particularly at risk of having a bad state of oral health.

Such poor oral health is in itself a risk factor for general health and the induced negative image does not favour a return to society in good condition. It is therefore of interest to assess the needs of this population with a view to improving management of their health care. Imprisonment can be used to reach a population virtually excluded from any normal and regular system of care and prevention. These persons are more receptive to dental care during their imprisonment (Hancocks, 2010). They are supposed to have limited access to illegal substances and have a lot of free time while in jail. In addition, the visit to the dentist is sometimes felt like a “window” on the outside. The oral health of prisoners is handled by different care providers such as hospital doctors together with some students, interns, and some dedicated dental practitioners. Almost no information is available about the outcomes of this activity. In previous studies, the detainees were classified into three categories: persons with good oral health status, persons with a care plan and persons in need of urgent care (Mouquet, 2005). No detailed information about oral health was provided. The specific treatment needs such as prosthetic requirements were not specified. The evaluation was not conducted by a dentist.

The objective of this study was to observe the oral health of prisoners in the current care system existing in three French jails.

Materials and Method

This observational study was conducted from December 2006 to January 2007. Authorisations were obtained from the three jail directorates. Information on the study was given to all the prisoners making a dental visit and informed consent collected from those agreeing to participate. Caries experience was measured using the DMFT index. The French validated version of the Global Oral Health Assessment Index (GOHAI) (Tubert-Jeannin *et al.*, 2003) recorded overall oral health and some specific indicators after different incarceration times in a sample of prisoners of a French department (Puy-de-Dôme, Auvergne).

There are three jails for male prisoners in the department of Puy-de-Dôme: a remand home in each of the cities of Riom and Clermont-Ferrand and one detention centre (Riom). At the date of the study, there were 163 detainees in the detention centre and 99 and 115 in the two remand homes. These prisoners were normally treated by a private dentist in Riom and by a dentist employed at the University dental school in Clermont-Ferrand, each working one day a week.

Due to a lack of availability of prison guards, the recruitment procedure could not encompass all prisoners. Instead, in the remand home and the detention centre in Riom, all male inmates presenting at the infirmary during the two months of the study were invited to participate. In Clermont-Ferrand, all new male prisoners and all those waiting for a dental consultation during the same time period were proposed for inclusion. The study

participants were divided into two groups: those with an accumulated total incarceration so far of 2 years or less and those over 2 years.

Interviews were conducted by a sole investigator, a dentist (ND), who collected all the data. After having read an information sheet, each detainee signed an informed consent form. The questions were administered in a semi-guided interview under the following headings: i) demographic characteristics such as age, incarceration duration, height and weight; ii) risk factors for dental diseases such as general health problems, smoking habits, dietary habits (e.g. intake of soft drinks, snacks), ongoing pharmacological treatment; iii) oral health self-evaluation such as subjective feeling of need for dental care, and subjective feeling of the effects of incarceration. More particularly, the participants answered questions about their perception of any changes in their oral health status, their oral hygiene habits, and the dental care they had received following incarceration. Finally, the oral health quality of life was assessed using the French version of the GOHAI.

A clinical dental examination was undertaken at which the following data were collected: number of functional dental units (defined as the number of antagonist pairs of premolars and molars), number of decayed, missing and filled teeth (DMFT), the presence of non-restored anterior edentulous spaces, the number of mobile teeth, gingival inflammation, plaque and calculus presence and the presence of an acute and clinically visible infectious focus (e.g. residual root, periodontal abscess, fistula, cellulitis). Functional dental units were registered when articulating paper (200µm) left marks on previously dried teeth. The number of functional units was given by the number of mandibular teeth showing at least one coloured mark. Contacts between implants, bridge and crowns and natural teeth were included. Teeth on dentures were counted only if the denture had been worn during the last two meals. The following variables were dichotomised (yes or no): anterior edentulous spaces were noted by the examiner during speaking or/and smiling; tooth mobility was considered to be present when a tooth could be displaced at least 2mm when pressed with an instrument; dental plaque and calculus were evaluated visually and were considered to be present if the score was 1 or more according to the index of Greene and Vermillion (1960); gingival inflammation was also evaluated visually, without a periodontal probe and inflammation was considered to be present if the score was greater than zero according to the gingival index of Löe and Silness (1963).

A test re-test control was performed to assess the reliability of the examiner for these dichotomised variables. For calibration purposes, 144 slides showing different cases with dental plaque, calculus, gingival inflammation, dental fractures and infection foci were scored on two occasions, a week apart. Two scoring sessions were similar (MacNemar test, $p>0.05$).

Statistical analysis was performed using SPSS v1.5 (Chicago, IL). Multivariate linear regression analysis was used to determine which factor (duration of incarceration or prisoner age) contributed the most to the DFMT, tooth loss, decay and filled teeth and then to determine which factor (DFMT, duration of incarceration and prisoner age) contributed the most to the number of functional units.

Logistic regression was used to analyse the GOHAI which was dichotomised (below and above 50). The explicative factors were duration of incarceration, prisoner age and number of functional units. χ^2 was used for the qualitative variables. Values were given as mean, standard deviation and a 5% risk was set.

Results

Recruitments corresponded to participation rates of 20% in the Riom remand home, 48% in Clermont-Ferrand and 32% in the detention centre. The average time of incarceration was 68 (sd 70) months among the 84 prisoners who were 39 (sd 13) years old on average. For prisoners that had been incarcerated for two years or less ($n=31$), the mean duration of incarceration was 10 (sd 9) months and mean age was 30 (sd 13) years. The second group was those men who had been in jail for more than two years, 101 (sd 68) months on average. They were older (43 (sd 11) years; $n=53$).

Several differences were noticed between short and long term prisoners (Table 1). Many more missing teeth were recorded in long duration prisoners. The multivariate linear regression analysis applied to the DMFT indicated that 12.5% of the variance was explained ($p<0.05$) by the incarceration duration (7.4%) and prisoners' age (5.1%). The same analysis applied to the missing teeth indicated an explained variance of 25.6% ($p<0.001$) by the incarceration duration (17.9%) and prisoners' age (7.7%). No significant difference was noticed for the decayed or the filled components of DMFT. The multivariate linear regression analysis applied to the number

of functional units indicated that 24.2% of the variance was explained ($p<0.001$) by the DMFT (14.1%) and by incarceration duration (9.6%). Prisoners' age (0.5%) was not significant. Logistic regression applied to the GOHAI did not show any significant factor.

The results of the clinical examinations are shown in Table 2. They indicate little difference between the two groups. Dental plaque, calculus, gingival inflammation and the number of clinically visible dental foci of infection were similar in the two groups. Despite prostheses, a visible edentulous space was more prevalent in subjects who had been sentenced to a long period of incarceration. Long-term incarcerated subjects had fewer functional units than short-term prisoners (4.3, sd 2.8 vs. 6.0, sd 2.0).

Responding to the questionnaire, the prisoners incarcerated for more than two years reported that their oral health had deteriorated (Table 3). From these answers, it is difficult to know whether incarceration had modified their hygiene habits or the frequency of dental visits because there were no differences in these responses by length of incarceration. Interestingly, there was a highly significant difference between the two groups when describing possible chewing difficulties. Many more long term prisoners declared that they had difficulty chewing (Table 3).

Discussion

This study suggested strongly that, for these jails, a stable level of untreated caries and other forms of oral infection was maintained at the cost of degraded masticatory function. The stability of oral infection, independent of

Table 1. Comparisons of mean decayed, missing, filled teeth and DMFT in the two groups of prisoners. The proportion of variance explained by the model and the corresponding significant differences are given following a multivariate linear regression analysis

	<i>All prisoners (n=84)</i>		<i>Time of incarceration ≤ 2 years (n=31)</i>		<i>Time of incarceration > 2 years (n=53)</i>		<i>Proportion of variance explained (R²)</i>	<i>Statistical significance p</i>
	<i>mean</i>	<i>(sd)</i>	<i>mean</i>	<i>(sd)</i>	<i>mean</i>	<i>(sd)</i>		
Decayed (D)	2.4	(3.4)	3.2	(4.1)	1.9	(2.8)	17.9	non-significant
Missing (M)	6.3	(7.1)	2.4	(3.4)	8.6	(7.7)		p<0.001
Filled (F)	4.1	(4.2)	4.4	(5.0)	4.0	(3.8)		non-significant
DMFT	12.8	(7.8)	10.1	(7.6)	14.5	(7.5)	7.4	p<0.05

Table 2. Comparisons of distributions of subjects in the two groups of prisoners for items characterising the presence of oral infectious diseases

	<i>Time of incarceration ≤ 2 years (n=30)*</i>		<i>Time of incarceration > 2 years (n=52)*</i>		<i>Statistical significance χ^2 test, p</i>
	<i>Yes</i>	<i>No</i>	<i>Yes</i>	<i>No</i>	
Dental plaque	14	16	21	31	non-significant
Calculus	23	7	32	20	non-significant
	(n=31)		(n=53)		
Gingival inflammation	19	12	32	21	non-significant
Presence of a visible edentulous space	4	27	18	35	p<0.05
Dental focus of infection clinically visible	13	18	13	40	non-significant

* Two subjects, one in each group, had no teeth and were excluded from dental plaque and calculus evaluation.

Table 3. Comparisons of subjective responses of both groups of prisoners to qualitative questions

	Time of incarceration ≤2 years (n=31)			Time of incarceration >2 years (n=53)			Statistical significance
	No	Yes,better	Yes,worse	No	Yes,better	Yes,worse	
Incarceration modified your oral health	20	3	8	17	5	30	p<0.02
Incarceration modified your hygiene habits	16	13	2	27	20	6	non-significant
Incarceration modified your frequency of dental visits	13	12	6	17	19	17	non-significant
	No	Yes		No	Yes		
Chewing difficulties	26	5		26	27		p<0.01

the duration of incarceration, is revealed by the similarity in the decay component of DMFT and in the presence of gingival inflammation. No change was seen in oral hygiene, as indicated by the similar levels of dental plaque and calculus and number of foci of infection in the two groups. The presence of a degraded masticatory function is indicated by the increased M component of DMFT in long term prisoners and by the report of a significant increase in chewing difficulty. Reduced masticatory function is probably explained by the significant decrease in the number of functional units and may account for the significant increase in the subjective reports of worse oral health. The stable level of infection, consequent to extractions, led to chewing difficulties and was probably due to the conditions of incarceration. Older age in long term prisoners was probably not the main cause of the results described in the study since age had a minor role in the missing teeth variability and no significant role in the functional unit variability.

The effect of incarceration should be distinguished from the expected differences between prisoners and the general population, though there is little recent information about the oral status in the French general adult population. Comparing our results with those of Hescot *et al.* (1997) exploring DMFT in 35-44 years old adults of the general population, it appears that our sample in the corresponding age, has fewer filled teeth (4.1 vs 10.4), more missing teeth (6.3 vs. 3.0) and more decayed teeth (2.4 vs. 1.2). Several studies carried out in the UK, South Africa, Australia and US (Jones *et al.*, 2005; Naidoo *et al.*, 2005; Osborn *et al.*, 2003; Salive *et al.*, 1989) showed prisoners having more missing and decayed teeth than the general population. Heavy use of extraction was found in British and US studies (Jones *et al.*, 2005; Salive *et al.*, 1989). The greater use of extraction has been explained as a management strategy but also by frequent occurrence of traumatic events (Salive *et al.*, 1989). None of these studies pointed to the chewing difficulties as a result of the frequent use of extraction in the dental care provided to prisoners. The elimination of dental problems (caries and periodontal diseases) by dental extraction leaves the individual with fewer teeth and masticatory problems (Feldman *et al.*, 1980). Numerous studies have shown an association between loss of teeth and inferior diet (Moynihan *et al.*, 2009). Teeth are important contributors to social acceptability and could play a role in prisoner rehabilitation. Unrestored edentulous spaces

are a negative factor. Some authors suggest that providing oral health care to prisoners benefits their families, their communities and the nation as a whole (Treadwell and Formicola, 2008). The frequent use of extraction in prison may reflect a special strategy used by dental care providers. Poor availability of dentists leads prisoners to choose dental treatment that is unlikely to lead to urgent situations between visits. A more frequent availability of dentists for prisoners would help retain teeth and could improve the social acceptability after jail.

The study has some limitations. First of all, no strict inference can be drawn from this study regarding the relation between dependant and explicative variables because of the observational character of the study design. In particular, the impact of the duration of incarceration on oral health evoked above must be considered with caution. In addition, the study was conducted in just one French department (Puy de Dome) and the sample cannot be considered representative of prisoners in the whole country nor perhaps of the sampled jails' prisoners given the sampling rates. Further, the prisoners are allocated to different institutions depending on their crime, their age and the risk they represent. The sample was not selected at random across all the jails' prisoners because of the additional work this would have entailed for guards and the impact of this is difficult to assess though no prisoner refused to participate. Those included were mainly prisoners seeking care at the infirmary, motivated often either by pain or functional discomfort but some of them could have been concerned by their health. The group was exclusively male; women make up only 3.7% of the French prison population (Rande, 2007) and there were none in the prisons we studied. Some variables (presence of plaque, calculus) were recorded dichotomously. This information could have been collected using more complex indices but for simplicity, in the prison environment, we chose not to quantify plaque and calculus. The risk of a bias arising from a single operator was lessened by the absence of technical judgements in the study and by the calibration carried out before collecting the data.

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