Mouth and Teeth

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An oral health promotion intervention in French pregnant women; highlights at risk subgroups for dental diseases

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Abstract

Objectives: To describe an oral health promotion intervention in a population of French pregnant women. In order to estimate oral health awareness in pregnancy.

Material and Methods: A cross-sectional study was conducted in a population of pregnant women through the health coverage insurance system for railway workers (CPRP SNCF). Medical and dental informations were analysed through a specifically designed scheme of information retrieval.

Results: Pregnant women (n=443) exhibited a carious prevalence of 34%, with a mean DMFT at 5.11(95% CI [4.68;5.54]). Gingival disease was the most prevalent dental disorder and the main dental treatment need for 54.18% women in the population; conservative treatment for carious lesions came as the second need for 32.73%. A specific subgroup at a high risk for oral diseases was delineated. Ten percent of the studied population concentrate 33% of carious lesions.

Conclusions: This study identifies the need for promoting oral health awareness in French pregnant women. A high risk subgroup for oral diseases requires additional intervention and dental treatment needs for periodontal and conservative care. The single model appointment oral health intervention must be completed by increased information to all health professionals involved in pregnancy care and beforehand.

Abbreviations

CPRP SNCF: Caisse de Prévoyance et de Retraite du Personnel de la Société Nationale des Chemins de Fer Français

Introduction

While oral health is a recognised component of overall health and well-being at all ages, it is of paramount importance at some specific times [1]. Recently, there has been an increased awareness of the role of maternal oral health and its potential impact on the future child. Pregnancy is a key moment in a life-time, when oral health is often neglected by women, particularly among women of low socioeconomic status [2].

Physiological changes and effects of oral diseases –tooth decay and periodontal diseases - are recognized as possible risk factors leading to adverse obstetrical outcomes [3]. Physiological changes in saliva following gastroesophageal reflux, multiplication of food intakes and decreased oral hygiene during pregnancy may explain increased carious lesions often observed [4,5]. Except for infectious or painful complications, decay does not in itself, demonstrate possible adverse obstetrical outcomes, but affects the quality of life of pregnant women [6]. In addition, lower oral health in mothers significantly results in high risk children for caries diseases and later poorer oral health; multiple cavities or active caries in mothers are a high predictor for early childhood caries (ECC) [7].

Periodontal diseases are a better documented risk for prematurity, pre-eclampsia and low birth weight rates [8,9]. However, recent meta-analyses and literature reviews suggest a multifactorial cause and have not shown any benefit of periodontal therapy during pregnancy towards the reduction of preterm birth rates [10,11]. Also, conflicting results exist regarding the causal link of periodontal disease in obstetric risk [12].

Assuming that rates of dental diseases are high during pregnancy, with significant implications for the mother and the child across the life course, the importance of health promotion during the prenatal period is endorsed by many professional associations and other related national priorities [13]. International and national guidelines include key recommendations towards increasing education and awareness, and in some instances preventive professional oral examination.

In France, since 2010, the High Authority of Health recommends prevention strategies for pregnant women and parents before birth. A systematic preventive oral hygiene examination, carried out by a dentist, is recommended as of the 4th month.

In the follow-up of pregnancy, care-giving in France, mostly relies on the single medical appointment model in the field of specialized medicine; this includes a monthly medical appointment (with a midwife or a general practitioner or an ob-gyn). In regards to dental care, in addition to the recommended 4th month preventive examination,

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dental care is provided as needed to the mother either upon request for emergency or for routine examination.

Although most guidelines call for oral health promotion during pregnancy, few oral health promotion interventions during this critical period have been reported.

French workers in the national railways network (SNCF) benefit a corporate specific medical insurance coverage, for them and their related direct family members; they have a long tradition of health promotion intervention in various medical or dental fields [14].

In 2012 and 2013, the beneficiaries of this health insurance scheme represented respectively 0.8% and 0.77% of the total French population protected by a social security scheme.

As part of the medical-risk management, the dental service of the CPRP SNCF initiated, as of 2012, an oral prevention campaign for pregnant women. Here we report the results and analysis of the information gathered during the 2012-2013 campaigns. The aim of the study was to assess the existence of high risk individuals and to question the relevance of the single appointment model for prevention.

Material and methods

In order to benefit from a medical follow-up, pregnant mothers have to register their pregnancy. The design of the study was based on a single appointment evaluation by a dental professional to the choice of the patient following a third party paid intervention by the social security insurance system. The aim of this individualized prevention campaign was to raise oral health awareness of pregnant women by inviting them by mail to seek a free dental appointment with their treating dentist, with direct third-party payment and without out advance payment.

As of January 1st, 2012, all concerned individuals were mailed with an invitation letter for the dental appointment, a dental chart to be completed by their practitioner. The chart was mailed back to the dental department of CPRP-SNCF, by the dental practitioner, thus ensuring the third-party payment for the appointment.

During the appointment, the dentist had to complete the chart based on collected data upon clinical examination.

Statistical analysis of the data was performed by the medical and dental department of the CPRP-SNCF.

Study population

The target population comprised every pregnant woman affiliated with the CPRP SNCF scheme, who had registered their pregnancy before the fourteenth week of pregnancy, in accordance with the provisions of the French Public Health Code. The sample size of the population was 2083 women in 2012, 1747 in 2013.

Data collection

Data were collected through a specifically designed -chart created by all authors of this study. The chart contained self-reported data by the pregnant mother regarding her civil status, medical and dental personal history and dental examination data were reported by the dental practitioner in the course of the appointment.

The following items were noted:

Self-reported information

- Personal information:

- Age,

- Parity (first pregnancy or >1 pregnancy),

- Term for the pregnancy,

- Employment status (1-executing staff, 2- control staff, 3-managerial staff, 4-senior position)

- Medical and dental information

- Medical status during pregnancy

Fair (no medical conditions), diabetes, high blood pressure, other medical conditions .

- Smoking status:

Yes / no.

- Last dental appointment with a scaling session:

Less than a year, between 1 and 2 years, more than 2 years, date unknown.

Data from upon clinical examination assessed by the dentist

– Dental status with Decayed, Missing and Filled teeth (DMFT), dental charting to be completed.

– Gingival Condition Scale: qualitative rating 1 (good gingival condition) to 5 (poor gingival condition).

– Dental treatment needs for the following item: dental extractions, conservative dentistry and endodontics,prosthetics (all types), periodontal care with 2 distinct items: scaling session or root-scaling

Data collection and analysis

Overall data were collected and analysed by the insurance medical and dental department of the CPRP SNCF. The collection and processing of the data for this study were approved by the national French data protection authority (National Committee for Processed Data and Freedom-CNIL).

Data were transcribed anonymously, and the following indices were calculated: DMFT index, Significant Caries Index.

The SiC Index is the mean DMFT of the one third of the study group with the highest caries score [15].

Gingival conditions scales values were averaged. Mean (m) and SD (standard deviation) were calculated.

Statistical analysis of the data was performed using the Pearson Chi Square (χ^2) distribution comparison tests, the Kolmogorov-Smirnov normality test (KS), Student's (t) average comparisons, analysis of Fisher variance (F), and Pearson bi-varied correlation analysis(R) . The 95% confidence intervals use the normal law and the binomial law for small numbers. The significance level is set at $p = 0.05$. Statistical analyses were performed using the PSPPIRE © 2007 software.

Results

The baseline characteristics of the population based on self-reported data in the questionnaires and insurance identification are shown in Table 1. In 2012 and 2013, 3 830 women reported their pregnancy to the CPRP-SNCF, were eligible and offered with the prevention dental appointment.

Participation data were as follows: the overall response rate is at 15.35%; 443 pregnant women (11.57%) had a dental appointment; 145

(3.79%) informed CPRP SNCF that they declined the possibility which they felt unnecessary, as a result of an already existing dental follow-up. The abstention rate was at 84.65%, (3 242 women).

Pregnancy information showed that most women answered during the 2nd term of their pregnancy (n = 254, 57.34%). Whereas 45.82% (n = 203) of the participants were first pregnancies, 34.76% were multiparous (n = 154), however 19.4% (n = 86) of the patients did not answer the item. Their difference was not statistically significant between the ranks of the pregnancies in the population (p = 0.07).

Regarding the age at pregnancy, the mean age of the population is at 31.16 years with a normal distribution (KS Z = 1.17, p = 0.11). First pregnancy women are on average younger at 29.54 years (n = 203, SD = 4.82), whereas multiparous women have an average age at 32.97 years (n = 154, SD = 4.19), this difference is statistically significant (p <0.01). When looking at the employment status, executing staff women are significantly younger than those belonging to other categories (p = 0.03).

Self-reported medical and smoking status of the patients is presented in Table 2. Self- reported smoking showed a high proportion of 358 women (80.81%) were non-smoking. Smokers represented a smaller proportion of 42 subjects (9.48%); however, a similar number of women (43 subjects, 9.71%) did not answer this item. Medical conditions during pregnancy showed that 386 women (87.13%) reported no medical problems in the course of their pregnancy. Medical conditions including diabetes and high blood pressure were present in 4.51% of the population (20 patients), (Table 2).

Outpatient dental appointments results are presented in Table 3 and Figure 1. The DFMT index was calculated for the whole population. The average DMFT of the population is at 5.11 (95%CI [4.68;5.54]). The proportion of caries –free women (DMFT = 0) is 18.06% (n = 80). Caries prevalence in the study population was estimated at 34.09 % (n= 151) through the D component of the DFMT index with at least one untreated carious lesion. The mean DMFT is composed in decreasing order of importance by the component F (m = 3.94), then the component D (m = 0.77) and M (m = 0.40) (Table 3). The differences observed between the averages of these three components are statistically significant (p <0.01). As expected, the average DMFT index increases significantly with age (p <0.01) as does the number of missing teeth overall with age (R = 0.3, p <0.01). Conversely, the analysis of variance shows no statistically significant difference between the DMFT index and the employment status, whereas the number of missing teeth that are not replaced is inversely correlated with the employment status (R = 0.3, p <0.01).

Further analysis of the carious status was carried on by calculating the Significant Caries index (SiC index).The SiC index refers to the one-third of the population (n = 148) with the highest DMFT scores. Here, the average SiC is at 10.49; it is twice the average of the total population of the study (Figure 1). Women in this high-risk subgroup

Table 1. Baseline characteristics of the population

		Subjects (N)	% of sample	95% Confidence Interval
Responding rate		2012-2013		
	Total pregnant women / sent forms:	3830		
	- Non responding :	3242	84.65	[84.09; 85.20]
	- Responding:	588	15.35	[14.05; 16.66]
	Returned information	443	11.57	[10.60; 13.07]
	Declined appointment	145	3.79	[1.16 ; 6.42]
Pregnancy Term at responding time		443		
	1st trimester	12	2.71	[1.41 ; 4.68]
	2nd trimester	254	57.34	[51.5 ; 63.16]
	3rd trimester	104	23.48	[14.3 ; 32.60]
	Non responding	73	16.48	[5.59 ; 27.37]
Pregnancy rank			Mean Age	
	First pregnancy	203	29.54*	[28.88 ; 30.20]
	Multiparous	154	32.97*	[32.31 ; 33.63]
	Non reponding	86	31.72	[30.85 ; 32.59]
Employment status	Executing staff	247	30.43*	[29.82 ; 31.04]
	Control staff	110	31,88*	[31.10 ; 32.66]
	Managerial staff	73	32,26 *	[31.24 ; 33.28]
	Senior position	13	32,62	[29.69 ; 35.55]
	Total	443	31,16	[30.72 ; 31.60]

*statistically significant difference: p<0.01 for pregnancy ranking and employment status

Table 2. Self-reported medical conditions and smoking status (N=443)

		Subjects (N)	% of sample	95% Confidence Interval
Medical conditions	Fair medical condition	386	87.13	[82.41 ; 91.85]
	High blood pressure	8	1.81	[0.78 ; 3.53]
	Diabetes	6	1.35	[0.50 ; 2.92]
	Other medical conditions	5	1.13	[0.37 ; 2.61]
	Non responding	37	8.35	[5.95 ; 11.33]
Smoking status	Non smoking	358	80.81	[75.91 ; 85.71]
	Smokers	42	9.48	[6.92 ; 12.6]
	Non responding	43	9.71	[7.11 ; 12.85]

Table 3. Data from clinical examination

DMFT Index		**N**	**Mean**	**SD**	**Min**	**Max**	**95% CI**
		443	5.11	4.57	0	20	[4.68 ; 5.54]
- Decayed		151	0.77*	1.43	0	10	[0.64 ; 0.90]
- Missing		79	0.40*	1.28	0	12	[0.28 ; 0.52]
- Filled		312	3.94*	4.14	0	19	[3.55 ; 4.33]
* p<0,01							
DFMT with age		**N**	**Mean**	**SD**	**Min**	**Max**	**95% CI**
	0-19	2	2.5	3.54	0	5	[0.00 ;7.41]
	20-24	31	3.42	4.07	0	19	[1.99 ;4.85]
	25-29	130	4.58	4.15	0	20	[3.87 ;5.29]
	30-34	174	5.06	4.56	0	18	[4.38 ;5.74]
	35-39	90	6.1	4.89	0	20	[5.09 ;7.11]
	40 et +	16	7.94	5.2	0	17	[5.39 ;10.49]
DFMT with employment status		**N**	**Mean**	**SD**	**Min**	**Max**	**95% CI**
	Executing staff	247	5.24	4.63	0	20	[4.66 ;5.82]
	Control staff	110	5.05	4.65	0	20	[4.18 ;5.92]
	Managerial staff	73	5.12	4.43	0	17	[4.1 ;6.14]
	Senior position	13	3.15	3.13	0	9	[1.45 ;4.85]
Missing teeth not replaced with employment status		**N**	**Mean**	**SD**	**Min**	**Max**	**95% CI**
	Executing staff	247	0.4	1.04	0	9	[0.27 ;0.53]
	Control staff	110	0.22	0.9	0	8	[0.05 ;0.39]
	Managerial staff	73	0.05	0.28	0	2	[0 ;0.11]
	Senior position	13	0	0	0	0	[0]
Gingival condition Rating scale index [1 – 5]		**N**	**Mean rating scale index**	**SD**	**Min**	**Max**	**95%CI**
		402	1.66	0.98	1	5	[1.56 ;1.76]
Gingival condition Rating scale index according to previous gingival care (N=402)		**Previous scaling session**	**Mean rating scale index**	**SD**	**Min**	**Max**	**95%CI**
	Scaling session <1 year ago	122	1.57*	0.92	1	5	[1.41 ; 1.73]
	Scaling session between 1 et 2 years ago	122	1.58 *	0.91	1	5	[1.42 ; 1.74]
	Scaling session> 2 years	111	1.94*	1.15	1	5	[1.73 ; 2.15]
	Non dated scaling session	35	1.4	0.81	1	4	[1.13 ; 1.67]
	Non responding	12					

* p=0,01 between scaling sessions<2 years ago end scaling sessions>2years ago

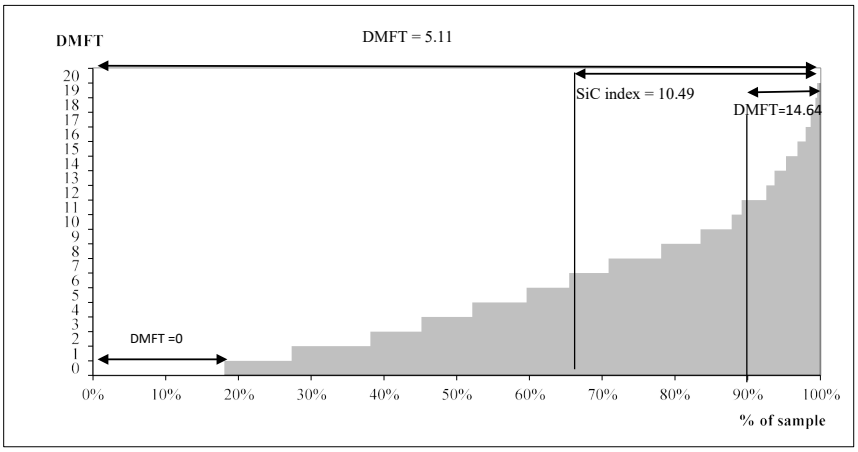

Figure 1. DMFT and Significant Caries index (SiC index)

were significantly older (m = 32.12 years, SD = 4.73) than the other two-thirds (m = 30.67 years, SD= 4.67, n = 295) p<0.01. There were more reported smokers in this subgroup (n = 19, 12.84%) than in the rest of the population (n = 23, 7.8%) and this difference was statistically significant (x^2 (2ddl) = 6.9, p = 0.03). Hence, ten percent of all pregnant women in the study concentrate 33% of the carious problems with an average DMFT of 14.64, which is almost three times the average DMFT score (5.11) of pregnant women in the study (Figure 1).

Gingival condition was evaluated from the results of the qualitative rating scale used in this study, as noted by the dental practitioner upon the clinical examination. On a 1 to 5 scale ranging from 1 (no clinical sign of marginal inflammation), to 5 (severe gingival inflammation) the average calculated rating was at 1.66 in the study population (n=402). For 55.08% (n = 244) the pregnant women examined, practitioners assigned a score of 1 (good) - the item was not completed in 9.26% (n = 41) cases.

In order to test the relative accuracy of the semi quantitative scale, we looked at the distribution according to the previous scaling sessions over 2 years. The distribution of the scale scores shows that women who had a scaling session more than 2 years ago have a significantly-higher scoring than those who had a previous session earlier than 2 years (m = 1.94 vs m=1.58, p = 0.01). (Table 3).

Dental treatment needs were analysed from the clinical recommendations assessed by the dentist during the preventive consultation. They are presented in Table 4. Overall 69.30% (n = 307) of the population requires at least some form of dental care. The main item was scaling prophylaxis session advised for 54.18% (n = 240) of the study population. Carious lesions conservative treatment came as the second most frequently needed care for almost one-third of women (n = 145, 32.73%). Of these, primary caries treatment care was needed in 63.45% (n = 92) of them, 22.07% (n = 32) of the lesions were secondary caries and 14.5 % (n = 21) of women in the population requested treatment for both primary and secondary caries. Prosthetic dentistry was advised for 16.25% of women, mostly (94.5%) for fixed single crown. The needs for endodontic or surgical procedures (involving tooth extractions) were noted sporadically, in than 5% of the study population.

Discussion

This study reports the results of an oral health promotion intervention in a population of French pregnant women. While direct data on the study population are reported, the design of the health intervention gives some informations in regard to oral health literacy among the patients and care givers.

The oral health campaign was designed and based on the single-appointment model with a dental professional based on a voluntary response to a personalized reminder letter. The answer rate was at 15.35% reflecting the self-reported compliance of the population. This demonstrates the low knowledge of the importance of oral health during the pregnancy, both to the mothers and the health professional involved in pregnancy care in France.

Table 4. Dental treatment needs (N=443).

	N	% of sample	95% CI
Dental treatment needs overall	307	69.30	[64.14;74.46]
Scaling prophylaxis session	240	54.18	[47.88;60.48]
Conservative dentistry overall	145	32.73	[25.09;40.37]
primary caries only	92	63.45	[53.61;73.29]
secondary caries only	32	22.07	[7.70;36.44]
Primary and secondary caries	21	14.48	[0 ; 29.53]

Response rates to promotion interventions, with similar designs, are usually low; for other medical conditions, such as diabetes or obesity responses rates were reported around 40% [16,17]. A single solicitation by postal mail was used in this study and it is likely that multiple solicitations by internet or direct phone contact may have enhanced the response rate.

While integration of oral health promotion in general care has been highly recommended by the World Health Organization, physicians' knowledge of and adherence to improving oral health remains low [18-20].

In the study population, most of the women responding to the dental appointment were in the second term of the pregnancy, in accordance with the recommendation of the French High Authority for Health (HAS), which advises a dental visit during the second semester. Despite European guidelines, no specific professional guidelines exist through other professional organisations in France, thus reflecting the low perception of screening and early dental care in pregnancy. Owing to the design of the study, it can be assumed that the responding participants perceived a need for dental follow-up. Thus, this study identified a subset of patients with a higher awareness for health promotion interventions.

The sample characteristics of the study population compared to previously reported studies in the French population in regard to age [21], employment status [21] and medical overall conditions [22]. Caries prevalence is similar on the lower side, to previously describe international studies [23,24,25]. In addition, the importance of medico-economic organisation of dental care accounts for the result of oral health intervention [26]. Here, the benefits of widespread social protection, the stability for employment at the railway corporation (CPRP SNCF) likely account for the low caries incidence in the overall study population.

Among the participants, 69.3% of the women were in need for dental care. Gingival conditions (54.2%) were the most needed care; caries treatment was diagnosed in 32.8% of the patients. Moreover, the data identified a subset of pregnant women in the population that concentrate 33% of oral diseases and treatment needs. This subset of high risk patients for oral diseases was older women, primiparous, more likely with an executing staff employment status and smoking patients. Gingival condition accounts for most of the dental treatment needs in pregnant women; while this has been widely recognized in previous literature [27,9,10], the effect of periodontal treatment on a decreased obstetrical risk, is more controversial [28,29]. However, the study identifies strong inequalities in oral health since 1/10 of the study population concentrates 1/3 of caries lesions. Since the mother's oral health is a key factor for the oral health of the child [30], these women likely combine several risk factors in pregnancy and the single appointment intervention model proved adequate here in providing information and care. These patients would likely benefit from specifically-designed programs towards increasing their oral health literacy [31]. Caries risk assessment models have been recently reviewed and no specific multivariate model could be identified for any specific population such as pregnant women; baseline caries prevalence was the most accurate single predictor in all age groups [32].

In order to initiate significant behavioral changes in oral health behaviour, outcome of promotion interventions should be appreciated. Lack of understanding of the relationship between oral health and pregnancy by health professional, noted in several studies [33,34] could

be overcome by emphasizing multidisciplinary guidelines for non-dental and dental professional involved in managed care pregnancy surveillance [35]. Here, the evaluation of the dental status and treatment need was adequately retrieved through the practising dentist of the patient, though it has been reported that dentists express discomfort with treatment modalities during pregnancy [13]. Further evaluation might indicate whether a single-appointment intervention can yield to effective treatment in high risk populations, thus translating knowledge into prevention and care.

Disclosure statement

The authors report no conflicts of interest.

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