

Original Article

Dental implant practice in French West Indies and French Guyana: a cross-sectional study among dental practitioners

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Abstract – Background: In 2016, 459 dentists were registered in French West Indies and French Guyana. They represent 10% of French clinicians but they work in an environment very different from continental France. The aim of this study was to describe dental implantology practices among dentists in Guadeloupe, Martinique, and French Guyana. **Materials and methods:** A cross-sectional study, with questionnaires sent by email, was conducted from November 2016 to January 2017. **Results:** 116 practitioners answered. Respondents were all general practitioners, except two dentists who practiced only surgical procedures (not specialists). Implant surgeries were provided by 50% respondents and soft-tissue or hard-tissue grafting were provided by 34.5% of the sample. Prosthodontic procedures were carried out by 62.9% respondents. At last, 34.5% of the sample were not involved in implant services. **Discussion:** The proportion of dentists who performed implant procedures was similar to that reported in other international studies and French survey. The percentage of dentists not involved in implant dentistry still significant and the most frequently reported barriers were the expense of treatment, patient's difficulties to afford the treatment and the lack of knowledge. **Conclusion:** The practice of implant dentistry is widespread in French West Indies and French Guyana. Dental implant use was not different between clinicians of Guadeloupe, Martinique, and French Guyana. The number of dentists who received local implant training was lower in French Guyana.

1 Introduction

Although implant dentistry has become an indispensable treatment in the rehabilitation of edentulous patients, dental implant treatments are not a common practice for all dentists. Apart from commercial information from implant suppliers or market research, there is little scientific data on implantology activity in France. A survey conducted in 2015 sought to define the profile of dentists involved in dental implantology in France [1]. Several international studies have shed light on the implantology practices of a population of dentists. They have also described their profiles or their preference when planning implant treatments and have quantified their activity in the implantology industry [2–8].

Dentists of French West Indies and French Guiana, among whom 459 were registered in 2016, represent 10% of dentists established in France. They work in very different social and health contexts compared to continental France: the unemployment rate exceeds 20% [9] and >25% population benefits from free universal health coverage [10]. The ratio of dentists

per capita is lower than the national average: 63 per 100 000 inhabitants versus 36 dentists per 100 000 inhabitants in Guadeloupe, 40–100 000 in Martinique and 23–100 000 inhabitants in French Guiana. To date, there is no data on the implantology activity of practitioners practicing in Guadeloupe, Martinique, and French Guiana [11]. The main objective of this study was to describe and quantify the implantology practices (from surgical to restorative phase) of private sector dentists in the overseas territories. The secondary objectives were to compare the results from these three territories and to assess their potential needs in implantology training.

2 Materials and methods

To meet these objectives, an evaluation survey of implantology practices was conducted among dentists who had private practices in Guadeloupe, Martinique, and French Guiana. This was a cross-sectional study. The survey successively addressed five major variables of interest:

- the profile of the practitioners surveyed
- the practice of implant surgery

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Table 1. Demographic data of dentists in Guadeloupe, Martinique and French Guyana.

	<i>N</i>	Total	Guadeloupe	Martinique	Guyane	<i>p</i>
Practice location	116	116	58 (50%)	41 (35.3%)	17 (14.7%)	>0.05
Sex: Male	116	69 (59.5%)	35 (60.3%)	23 (56.1%)	11 (64.7%)	>0.05
Age: Average (Median)	96	43.9 (40)	44.7 (43)	44.6 (45)	39.4 (37)	>0.05

- Pre-implant surgery
- the placement of implant prostheses
- follow-up training in implantology.

The study included dentists from the medical registers of Guadeloupe, Martinique, and French Guiana for the period October 2016 and included all those who worked partially or exclusively in private practices and who possessed a valid email address. The study excluded dentists registered as specialists in orthodontics, working in Saint-Martin or Saint-Barthelemy, not having valid email addresses, as well as exclusive endodontists, pedodontists, and orthodontists.

A 45 questions questionnaire, divided into six sections, was administered to three dentists who worked in private practices in Guadeloupe. After the questionnaire was revised on the basis of the responses of the dentists, it was posted on the Google Form platform, and was disseminated via email from November 2016. A reminder email was sent after 2 weeks. Data collection was completed in January 2017.

The statistical processing was done on www.openepi.com and with the Epi info software. We calculated the means and medians of the quantitative variables as well as the frequencies and percentages of the qualitative variables. The chi-square and Fisher's exact tests were used to compare the distributions of the qualitative variables according to the territories, and the Kruskal-Wallis test was used to measure quantitative variables. A difference was deemed to be statistically significant if $p < 0.05$.

3 Results

3.1 Practitioner profile

The target population consisted of 425 dentists not specialized in orthodontics, listed on the medical registers of the departmental counsels of Guadeloupe, Martinique, and French Guiana. The questionnaire survey was sent to 304 individual email addresses, with these practitioners making up the source population. We received 122 responses, out of which six questionnaires had to be excluded because they were either erroneous or incomplete. There were therefore only 116 usable questionnaires, which represents a response rate of 38%. Half the respondents practiced in Guadeloupe, and the least represented territory was French Guiana. Approximately 60% respondents were male, with women accounting for 40.5%. The ages of the respondents ranged between 25 and 66 years, with

an average age of 43.9 years (Tab. 1). Regardless of the territory, the respondents were predominantly licensed practitioners, with staff or replacements representing <20% of the sample. Those practicing in groups were in the majority in French Guiana. This subpopulation represented 88% French Guianese respondents compared to 66% dentists established in Martinique and 52% Guadeloupeans ($p < 0.05$). Those having one or more assistants were in the majority, with >90% in Martinique and French Guiana as opposed to 76% in Guadeloupe ($p < 0.05$). For the variables "working in groups" and "employing at least one dental assistant," there was a statistically significant difference in the distributions among the territories ($p < 0.05$).

3.2 Implant surgery

In each territory, >30% practitioners reported no implant activity (restorative or surgical). The main reasons given were the lack of desire, the substantial financial investment in technical facilities, or even the limited budgets of their clients. Only three oral surgeons affirmed that they only performed procedures in the surgical phase (Fig. 1).

Fifty-eight (50%) oral surgeons practiced implant surgery (Tab. 2). Regardless of the territory, women performing implant surgery were significantly less than men—they accounted for <20%. Those practitioners with <5 years of experience in implantology were in the majority. They accounted for 55% respondents. Every dentist involved in implant surgery reported having at least one assistant. In addition, 62% respondents had a cone beam X-ray machine in their dental office, whereas 58.6% respondents had set up a room dedicated solely to surgery (Tab. 3).

Of the 58 practitioners performing implant surgeries, two did not perform multiple implant placements. Their experience in implant surgery was <1 year. All the practitioners who performed such surgeries placed their implants in two stages.

Immediate implant placement following an extraction was done by 60% dentists. Twenty-three respondents were aided by computer guided surgery or piezo surgery. A total of 16 respondents performed implant placement flapless.

The most popular implant system among practitioners in this sample was Biotech® with 63.8% practitioners performing implant surgeries using it. The systems by Straumann®, Ankylos®, Global D®, Zimmer® have also been mentioned but were not as strongly favored.

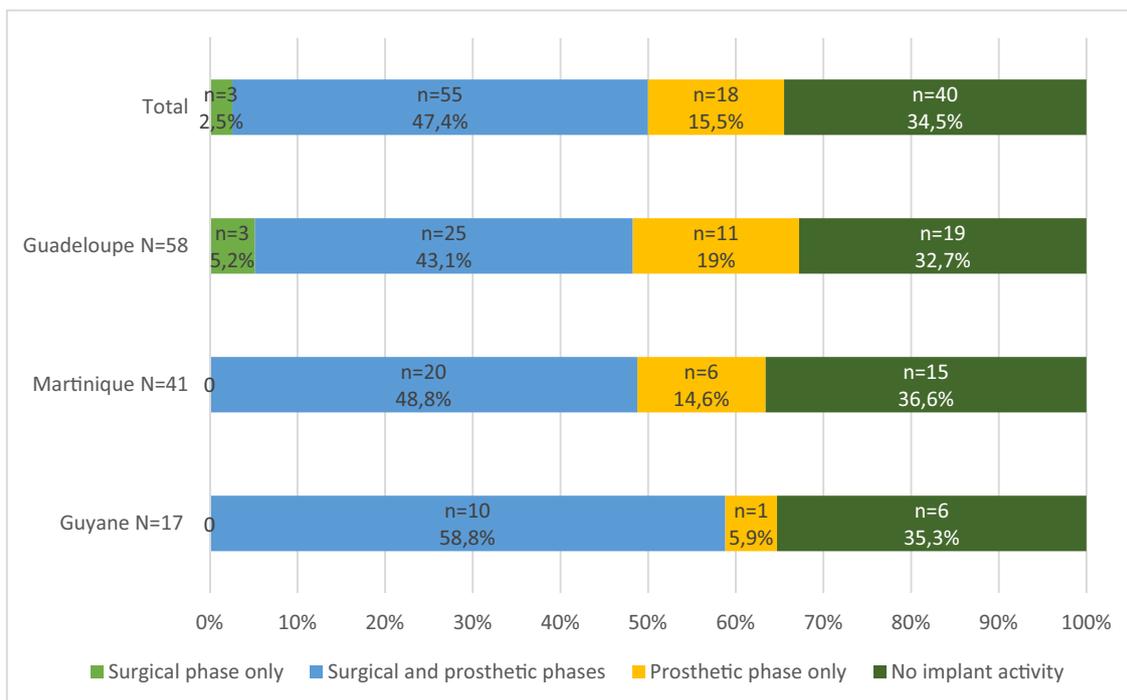


Fig. 1. Dental implant practices of dentists of Guadeloupe, Martinique and French Guyana N = 116.

Table 2. Dental implant practices and training of dentists in Guadeloupe, Martinique and French Guyana.

	N	Total n = (%)	Guadeloupe n = 58 n (%)	Martinique n = 41 n (%)	Guyane n = 17 n (%)	p
Implant surgery	116	58 (50%)	28 (48.3%)	20 (48.8%)	10 (58.8%)	>0.05
Pre-implant surgery	116	40 (34.5%)	15 (25.9%)	17 (41.5%)	8 (47.1%)	>0.05
Implant Prostodontics	116	73 (62.9%)	36 (62.1%)	26 (63.4%)	11 (64.7%)	>0.05
Trained for implant procedures	116	91 (78.4%)	47 (81%)	31 (76%)	13 (76%)	>0.05
Trained for implant procedures in French West-Indies	116	66 (56.9%)	34 (58.6%)	27 (65.9%)	5 (29.4%)	0.036

Table 3. Surgical procedures of dentists who provide dental implant surgery in Guadeloupe, Martinique and French Guyana.

	N	Total n = (%)	Guadeloupe n = 28 n (%)	Martinique n = 20 n (%)	Guyane n = 10 n (%)	p
Cone Beam	58	36 (62.1)	16 (57.1)	14 (70)	6 (60)	>0.05
Room dedicated to surgery	58	34 (58.6)	15 (53.6)	15 (75)	4 (40)	>0.05
Implant surgery for full arch fixed bridge	58	32 (55.2%)	13 (46.4%)	13 (65%)	6 (60%)	>0.05
Implant surgery in 1 stage	58	45 (77.6%)	21(75%)	17 (85%)	7 (70%)	>0.05
Flapless surgery	58	16 (27.5%)	7 (25%)	5 (25%)	4 (40%)	>0.05
Immediate implant placement	58	35 (60.3%)	16 (57.1%)	14 (70%)	5 (50%)	>0.05
Computer Guided Surgery	58	20 (34.5%)	9 (32.1%)	8 (40%)	3 (30%)	>0.05
Piezo surgery	58	23 (39.7%)	10 (35.7%)	10 (50%)	3 (30%)	>0.05

Table 4. Grafting procedures of dentists in Guadeloupe, Martinique and French Guyana.

	<i>N</i>	Total <i>n</i> = (%)	Guadeloupe <i>n</i> = (%)	Martinique <i>n</i> = (%)	Guyane <i>n</i> = (%)	<i>p</i>
Subepithelial connective tissue grafting	40	24 (60%)	7 (46.7%)	11 (64.7%)	6 (75%)	>0.05
Connective tissue grafting	40	28 (70%)	11 (73.3%)	10 (58.8%)	7 (87.5%)	>0.05
Guided Bone regeneration	40	36 (90%)	12 (80%)	16 (94.1%)	8 (100%)	>0.05
Block Grafting	40	20 (50%)	6 (40%)	9 (64.7%)	5 (62.5%)	>0.05
Sinus elevation with lateral window	40	23 (57.5%)	8 (53.3%)	11 (64.7%)	4 (50%)	>0.05

Table 5. Dental implant prosthetic procedures of dentists in Guadeloupe, Martinique and French Guyana.

	<i>N</i>	Total <i>n</i> (%)	Guadeloupe <i>n</i> = 36 <i>n</i> (%)	Martinique <i>n</i> = 26 <i>n</i> (%)	Guyane <i>n</i> = 11 <i>n</i> (%)	<i>p</i>
Implant fixed crown	73	67 (91.8%)	32 (88.9%)	25 (96.2%)	10 (90.9%)	>0.05
Implant fixed bridge	73	69 (94.5%)	34 (94.4%)	24 (92.3%)	11 (100%)	>0.05
Full arch implant fixed bridge	73	35 (47.9%)	17 (47.2%)	11 (42.3%)	7 (63.6%)	>0.05
Temporary Fixed Implant restorations	73	46 (63%)	22 (61.1%)	15 (57.7%)	9 (81.8%)	>0.05
Zirconium Abutment	73	47 (64.4%)	25 (69.4%)	15 (57.7%)	7 (63.6%)	>0.05
Implant supported Full Overdentures	73	58 (79.5%)	27 (75%)	23 (88.5%)	8 (72.7%)	>0.05
Implant supported Partial dentures	73	37 (50.7%)	17 (47.2%)	13 (50%)	7 (63.3%)	>0.05

3.3 Pre-implant surgery

Only 34.5% oral surgeons in this sample perform pre-implant surgical procedures such as soft-tissue or bone grafts (Tab. 2). Guided bone regeneration was the most common procedure performed by oral surgeons practicing implantology, with 57.5% performing lateral window sinus elevations and apposition grafts, which are the two least common implant procedures (see Tab. 4).

3.4 Implant prosthetics

Practitioners doing implant supported overdentures were found to be in the majority in all three territories ($n=73$; Tab. 2). A very large majority of these practitioners stated that they place fixed, custom prostheses, which can be either single (92%) or multiple (95%).

In contrast, practitioners performing full arch implant fixed bridges were in the minority, 47.2% oral surgeons performing implant prosthesis in Guadeloupe, 42.3% in Martinique, except in French Guiana where they were 63.6% ($p > 0.05$; Tab. 5).

Oral surgeons working with complete implant stabilized overdentures represented 79.5% practitioners who partake in prosthetic implant activity. They were greater in number than those who use partial, implant-supported prosthetics (Tab. 5).

Two practitioners said that they use optical impressions to make implant-supported prosthetics and those using computer-aided design and manufacture (CAD/CAM) were in the minority 37% in the French West Indies. In Guadeloupe 41.7% ($n = 15$) of the practitioners use implant-supported prosthetics versus 34.6% ($n = 9$) in Martinique and 27.3% ($n = 3$) in French Guiana ($n = 73$; $p > 0.05$).

3.5 Follow-up training in implantology

Ninety-one practitioners in our sample have been professionally trained in implant prosthetics or implant surgery (Tab. 2). The majority had university degrees as well as private training, and this was the same in all three territories. The respondents were mainly trained in metropolitan France, the French West Indies, the Dominican Republic, or Europe.

In Guadeloupe and Martinique most of the practitioners were locally trained in implant surgery and/or implant prosthetics, they accounted for 59% and 66% respectively, in French Guiana they only accounted for 29.4% respondents ($p < 0.05$; Tab. 2).

In responses to the question "What do you think about the implantology training offered in the implantology and implant prosthetics in the French West Indies?" The majority of Guianese respondents (65%) stated that it was insufficient, compared to 48% Guadeloupean respondents, and 29% of those practicing in Martinique ($p < 0.05$).

4 Discussion

The response rate of our study (38%) is comparable to that of the Canadian study by Esfandiari *et al.*, but is still lower than the majority of similar international studies [2,3,5,6]. The most represented territory based on its responses was Guadeloupe, followed by Martinique, and then French Guiana. The data provided by the national dentists' board corroborates the results, considering that Guadeloupe is the territory in the French West Indies with the greatest number of registered practitioners, whereas French Guiana is the territory having the least [12].

The respondents were mostly male practitioners working with a group and their average age was 43.9 years. This sample is therefore younger than the population practicing in France. Nonetheless, the male-to-female ratio, with a female population of 39.5% in France in 2012, as well as the distribution of the dentists who practice alone or as a group/team, were similar [13].

The proportion of practitioners who do not offer these implant services in our study (34.5%) is equivalent to figures noted in the study conducted by Murray *et al.* in New Zealand in 2014 (32%) [5], and to those from Ng *et al.*'s study, (39%) which was done in Hong Kong in 2008 [3]. The percentage of practitioners who do not practice implant dentistry in the French West Indies was larger than that in the study done by Lambrecht *et al.* in 2006. In that study, a group of Swiss oral surgeons accounted for 17.6% practitioners who did neither implant surgery nor implant-supported prosthetics [6].

In our study, the reasons given to justify the lack of implant dentistry practices were mainly the lack of desire, the financial investment required to procure technical facilities being deemed too substantial, and the clients' limited budgets.

In previous studies, the expense of treatment was the most cited barrier in New Zealand, whereas it was insufficient knowledge and training in Hong-Kong. Moreover, some practitioners in our study stated that patients mostly consisted of persons who received free universal health coverage, and thus could probably not afford implant rehabilitation. Indeed, over a quarter of the population in the French West Indies, receives this kind of coverage and up to 37% of the Guianese population [10].

Among the oral surgeons involved in implantology in France, the survey done by online magazine *le Fil dentaire* found that more than half the practitioners performed the surgical and prosthetic phases whereas about one-third of the practitioners limited themselves to the prosthetic phase [1]. In our study, the results are similar; 72.4% practitioners involved in implantology in the French West Indies perform surgery and implant prosthesis and 23.7% only perform prosthetic rehabilitation.

Practitioners performing implant surgery all performed single implants. Only two practitioners said that they did not do multiple implants because they had <1 years of experience in implant surgery. Practitioners inserting implants for complete rehabilitation were lower in percentage, accounting

for 55% respondents. There is no epidemiological study that could explain these figures given that the number of completely edentulous patients is lower in the French West Indies than elsewhere.

However, in the Cheung *et al.*, study when asked about cases they would treat with implant, full arch retained bridges was chosen by only 20% of Australian dentists [8]. It can therefore be assumed that some dentists would prefer to rehabilitate these patients by other techniques, such as the conventional complete removable prosthesis.

It is interesting to compare this figure with the number of practitioners using computer-guided surgery in the French West Indies; they accounted for 34.5% of those performing implant surgery, i.e., 20 practitioners. Dr. Cohen's investigation revealed that <20% French dentists used computer-guided surgery. The most cited reason for not using it was the high cost [1]. The use of computer-guided surgery may allow them to more easily address cases of complete-mouth implant rehabilitation.

The implant system most used by dental surgeons in the sample was Biotech®, followed by Dentsply®, and Nobel Biocare®. Most practitioners only cited one implant system although the question allowed for multiple answers. Of the French practitioners surveyed by the online dental magazine *le Fil dentaire*, 49% said they only installed one implant brand. However, the most cited brands in descending order were Nobel Biocare®, Zimmer®, Straumann®, Dentsply, and Global D® [1].

Just over one-third of the dental surgeons in the sample (34.5%) reported performing pre-implant soft-tissue or hard tissue surgeries. The most common practice performed by these respondents was guided bone regeneration, followed by mucogingival surgery, and finally lateral window sinus elevations. The apposition graft was the least-performed procedure. The Australian study by Cheung *et al.* done in 2015, had similar results. The most common hard-tissue grafting technique was guided bone regeneration, whereas block grafting the least performed procedure [8].

In the sample, 62.9% participants reported performing supra-implant prosthesis. Cheung suggests that the many similarities between the implant prosthesis and conventional prosthesis would explain the large number of oral surgeons practicing implant prosthesis [8]. These practitioners were predominantly male, but the proportion of women was higher compared to practitioners inserting implants or performing pre-implant surgery. A similar sex ratio was described in the Canadian study by Esfandiari *et al.* [7].

In the French West Indies, among oral surgeons carrying out implant prosthesis placements, 79.5% performed implant-stabilized full dentures whereas 50.7% performed implant-stabilized partial dentures. The rehabilitation of complete mandibular edentulism by implant-stabilized complete removable dentures has been a consensus since the McGill conference in 2002 [14]. In contrast, implant-stabilized partial removable dentures are more controversial and not the subject of consensus [15].

Very few practitioners had an optical impression system in the French West Indies. In fact, only two dentists were able to

use them for implant prosthetics. The high cost of the systems and the lack of training for the staff at local laboratories were reasons mentioned in the remarks section of our questionnaire. This could also explain the nonacquisition of optical impression systems and the low number of practitioners using computer-aided manufacturing design in the French West Indies.

More than 78% practitioners in our sample were trained in implant surgery or implant prosthesis, and they had mainly obtained university degrees or attended private postgraduate training. If all types of professional training were combined, most had been pursued in metropolitan France, the Caribbean, or the Dominican Republic. In the Dominican Republic, there are both theoretical and practical training courses in implantology, which are particularly suitable for practitioners in the French West Indies because of their geographical proximity.

The training caters specifically to them such that information leaflets are printed in French and the institutions collaborate with French-speaking trainers.

On this topic of training, there was a statistically significant difference among the three territories. The proportion of practitioners in French Guiana who had received training in implantology locally was much lower than that in overseas territories. In addition, the number of Guianese oral surgeons in whose estimation the local supply of implantology training was inadequate is much higher than that of respondents in other territories. According to our research, it seems that French Guiana has less training options than the other territories in the French West Indies.

The response rate does not allow us to generalize our results to the entire population of dentists practicing in Guadeloupe, Martinique, and French Guiana. In addition, we performed many statistical tests, which tends to increase the alpha risk. We can only discuss trends that are observed among oral surgeons in the French West Indies.

Similar to any other study, this one is not free from bias. Distributing the questionnaire by email incurs a selection bias. We were at risk of having a sample with a lower average age than the actual population of oral surgeons practicing in the French West Indies. In addition, there was a possible information bias as they subjectively described their professional practices.

We have also noted that there are a few recent studies on the population of overseas territories, their state of oral health, as well as health professionals and their practices. We also regret the lack of information available on implantology activity in neighboring Caribbean countries, with which we would have liked to compare our results.

5 Conclusion

The independent dentists of Guadeloupe, Martinique, French Guiana practice implantology in proportions comparable to those observed in metropolitan France or abroad.

The comparison between territories revealed few statistically significant differences. It would be interesting to conduct a similar study, in about 10 years, using the same protocol, for analyzing changes in the practice of implantology in the French West Indies, as other researchers have done in New Zealand or Hong Kong. Since implantology is part of the initial dentistry curriculum, it can be assumed that a larger proportion of general practitioners will begin to practice it.

Conflicts of interest: The authors declare that they have no conflicts of interest in relation to this article.

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