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Pitout JDD, Church DL, Gregson DB, Chow BL, McCracken M, Mulvey M, Laupland KB (2007). Molecular epidemiology of CTXM-producing *Escherichia coli* in the Calgary Health Region: emergence of CTX-M-15-producing isolates. *Antimicrob. Agents Chemother.* 51: 1281-1286.

Pelczar JR, Harley JP, Klein DA (1993). *Microbiology: Concepts and Applications.* McGraw-Hill Inc., New York, pp. 591-603.

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Full Length Research Paper

Undergraduate dental curriculum of a Nigerian dental school and the behavioural science and management skills required for private dental practice

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The purpose of this study was to determine whether the undergraduate dental curriculum of the University of Lagos Dental School, adequately prepares the dental graduate with the behavioral science and business/management (practice management) skills required for private dental practice. A review of the current undergraduate dental curriculum of the University of Lagos Dental School was carried out to determine if there were any behavioral science and business/management course(s) designed to provide these skills. The curriculum was also reviewed to determine if there was any provision for clinical exposure to private dental clinics, for the dental students, prior to graduation. A review of the curriculum showed that there were behavioral science courses in medical sociology, medical psychology, clinical psychology and communication and interpersonal skills. However, there were no courses in the business/management skills required for private dental practice. There was also no provision for clinical exposure/attachments to private dental clinics. In comparison, the curriculum for penultimate year medical students in the same institution included a two-week clinical attachment/posting to private hospitals and medical facilities. The findings from this study show that the undergraduate dental curriculum of the University of Lagos Dental School adequately prepares the dental graduate with the behavioral science skills required for private dental practice. However, the curriculum is currently deficient in the business and management skills and knowledge required by dentists for private dental practice. Thus, there is an urgent need for the inclusion of practice management in the undergraduate dental curriculum of the University of Lagos and all other dental schools in the country.

Key words: Practice management, undergraduate dental curriculum, private dental practice.

INTRODUCTION

Undergraduate dental education in Nigeria started at the University of Lagos Dental School in September 1966. This was the first dental school to be established in Black Africa (Holist, 1985). The Nigerian undergraduate dental curriculum was modified from the British dental curriculum with many of the foundation faculty also

coming from the United Kingdom. Indeed, the Lagos Dental School was established as a single department under the Chairmanship of Professor N. W. Fox Taylor, a British national; with the first set of dental students graduating in 1971. It was later reorganized into three departments, namely, Oral Surgery and Oral Pathology,

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Restorative Dentistry and Preventive Dentistry (Jeboda, 1997). Since 1971, over 425 dentists have graduated from the University of Lagos Dental School. The University of Lagos Dental School currently has five departments, namely, Child Dental Health, Oral Pathology, Oral and Maxillofacial Surgery, Preventive Dentistry and Restorative Dentistry (CMUL, 2013). Currently, there are eight accredited dental schools in Nigeria, by the Medical and Dental Council of Nigerian (MDCN, 2013).

The National Universities Commission (NUC) and the MDCN are the two bodies responsible for regulating medical and dental education in Nigeria. The undergraduate dental course in Nigeria lasts a minimum of 6 years. As recommended by the MDCN, the curriculum is traditionally divided into four parts. The first part, which takes place in the first year of training, involves the study of the basic science subjects: physics, chemistry, biology and general studies. The second part comprises a basic medical and dental science phase that introduces students to the foundations of human structure and function including courses like anatomy, histology, biochemistry, physiology and oral biology. In the third part, clinical medical sciences that address the function and disorders of human organ systems are studied. The fourth and last part is the dentistry phase, which includes the clinical dental sciences. This dentistry phase can further be subdivided into basic dentistry (comprising basic, pediatric and advanced operative techniques and the science of dental materials) and clinical dentistry. The clinical dentistry phase, encompasses paedodontics, orthodontics, restorative dentistry, oral and maxillofacial surgery, oral pathology and oral medicine, periodontology, dental and maxillofacial radiology and community dentistry (MDCN, 2006).

After graduation and internship, career options open to dentists in Nigeria, include working in government owned health institutions, armed forces run institutions, as well as private dental practice, either as employees or in solo or joint ownership. In Nigeria, private dental practice is also growing. Modern dental practice started in Nigeria about 78 years ago, precisely between 1935 and 1937 with only two expatriate dentists (Holist, 1985). Since then, private dental practice has evolved and is currently a viable career option for dental graduates in Nigeria. As an emerging economy with a rapidly growing middle-class and the current National Health Insurance Scheme, it is projected that there would be an increased demand for private dental care, which would in turn lead to an increase in the number of private dental clinics set up in the country.

Dentists working in private practice are essentially small business owners and are required to direct and supervise a number of other health care professionals including other dentists, dental hygienists, dental assistants, laboratory technicians, and receptionists.

New dentists also find themselves focusing on a number of administrative tasks including bookkeeping,

financial forecasting, retirement planning, human resources, navigating insurance plans, buying equipment, maintaining inventories, and advertising. Each of these areas requires skill sets that must be mastered to lead and manage a successful business enterprise (Barber et al., 2011). Furthermore, excellent communication skills, self-discipline, and sound business backgrounds are essential for success in a private practice as well. However, development of these skills is frequently not a primary focus in the dental school setting (Barron et al., 1984; Van Blarcom, 1990; Chambers, 1992).

Undergraduate dental training at the University of Lagos essentially follows the curriculum as prescribed by the MDCN and discussed earlier. Indeed, the curriculum of dental schools in Nigeria are normally designed and produced by the Board of Studies (or an equivalent body) of that school, subject to the approval of the appropriate university organ, such as the university senate (MDCN, 2006). A broad overview of the University of Lagos dental curriculum shows that it extensively covers all aspects of dentistry required for clinical dental practice. However, as stated by Willis (2009), preparing dental graduates to operate a practice using sound business principles has become as important to their success as teaching them the scientific and technical bases of proper patient care, thus highlighting the importance of business management training as part of undergraduate dental curriculum.

The traditional curricular path in which business and management skills are emphasized in dental schools, all over the world, is in practice management courses. These skills are also learned in the clinical setting, ethics and professionalism curriculum, and behavioral sciences courses. Unfortunately, undergraduate dental education very often does not provide these skills. In a recent study to determine respondents' perception of preparedness for dental practice management upon graduation from dental school, an overwhelming number of dentists (85%) reported that they had felt uncomfortable with their practice management education at the time of graduation (Barber et al., 2011). Indeed, it is sad to note that many dentists in private practice often have to learn and acquire management skills while on the job; sometimes after making costly mistakes which could have been avoided if they had received adequate training in this important aspect of dentistry.

Thus, the aim of this study was to determine if the undergraduate dental curriculum of the University of Lagos Dental School, adequately prepares the dental graduate with the behavioral science and the business/management (practice management) skills required for private dental practice.

METHODOLOGY

This study was essentially a curriculum review. The authors carried out an extensive review of the current undergraduate dental curriculum of the University of Lagos Dental School (CMUL, 2011).

This review was done using a methodology described by Dunning et al. (2011) in a closely related study, to determine if there was/were any course(s) designed to provide the behavioral science and business/management skills required for the practice of dentistry, particularly private dental practice.

Thus, for the purpose of this study, 'behavioral science' was defined very liberally to include courses in the disciplines of psychology, sociology, communication and speech. While, 'business/management skills' were defined very broadly to include courses in any of the following areas including accounting, marketing, human resource management, small business set-up, equipment procurement and inventory control, entrepreneurship, organizational behavior, leadership and ethics. The different behavioral science and business/management areas listed earlier were selected, because they had previously been cited in literature, as important components of the behavioral science and business/management skills required for private dental practice (Barber et al., 2011; Dunning et al., 2011; American Dental Education Association (ADEA), 2011; Willis, 2009; Houlberg, 2008).

In addition, the clinical curriculum was reviewed by assessing the contents of each course to determine if there was/were any course(s) or elective(s), with the objective(s) of exposing the dental students to private dental practice, prior to graduation.

Comparisons were made with the medical curriculum of the same institution and with the undergraduate dental curricula for European and North American dental education. For European undergraduate dental education, comparisons were made with the Association for Dental Education in Europe (ADEE) document on curriculum structure, content, learning and assessment in European undergraduate dental education (ADEE, 2010). On the other hand, for North American dental education, comparisons were made with the 'competencies for the new general dentist' as prescribed by the ADEA (2011). In making these comparisons, the method utilized for assessing courses in 'behavioural sciences' and 'business/management skills' earlier mentioned was used.

RESULTS

A review of the undergraduate dental curriculum of the Lagos Dental School revealed the following. There were behavioral science topics in medical sociology and medical psychology, which were scheduled for total cumulative periods of 56 (0.91%) and 26 h (0.42%), respectively of the total duration of the undergraduate dental curriculum and were undertaken in the second year of training. In addition, there was a course in clinical psychology, scheduled for 36 h (0.59%), which was undertaken in the third year of training. A course in health management and planning, which included lectures in communication and interpersonal skills, was also included in the curriculum for the 5th year of training. The 5th year medical and dental students jointly undertook this course. However, a review of the course outline for this course showed that it was designed primarily for the management and execution of primary health care programs and was not as a management course for dental practice.

There were no courses in the business/management skills required for private dental practice as previously highlighted in the methodology. In addition, there were no provisions for clinical exposure/attachment to private dental clinics prior to graduation. In comparison, the

undergraduate medical curriculum of the same school (University of Lagos Medical School) also included the same courses in behavioural sciences as outlined for the dental students. However, in addition, it included a course in General Medical Practice (GMP), in which the basic business/management principles required for running a private medical facility were taught to the 5th year medical students. This course included a provision for a two-week clinical attachment with private hospitals as part of the course. Thus, unlike the medical students, the dental students are only exposed to dental care delivery in a tertiary health facility with no exposure to private dental practice prior to graduation.

A comparison with undergraduate dental education in Europe (ADEE, 2010) and North America (ADEA, 2011) showed that behavioural science and practice management courses were included in the dental curriculum in both climes, unlike in Nigeria. ADEE recommends that "behavioural and social sciences are included in the curriculum to ensure that dentists communicate effectively with their patients, team members and other health professionals". It also recommended that practice management should be included in the curriculum (ADEE, 2010). In a similar vein, ADEA (2011) also identified 'communication and interpersonal skills' and 'practice management and informatics' as two of the six major competencies which general dentists should have acquired on graduation from dental school. Under 'practice management and informatics', article 5.4 of this document, further states that the new graduate dentist should 'demonstrate effective business, financial management and human resource skills' (ADEA, 2011).

DISCUSSION

Behavioral science and business skills are vital to the success of any practicing dentist (Dunning et al., 2011). According to the MDCN, the competencies and skills, which the Nigerian trained dentist should have on graduation, include, among others, entrepreneurship as applied to clinical practice and the communication and interpersonal skills relating to the ability to interact with patients, other health professionals and to engage in teamwork. Thus, it recommends that dental practice, administration and management studies should be part of the curriculum for final year undergraduate dental students in Nigeria. However, it is the responsibility of the individual university to arrange its courses to suit its aspiration and learning (MDCN, 2006).

Indeed, the MDCN's outline for the Nigerian undergraduate medical curriculum is even more detailed, with respect to its expectation of practice management training for medical doctors. It recommends a course in Economics and Administration in GMP. It goes on to state that this course should cover such areas as requirements for setting up and managing small-scale

practices; sources of funds and optimal fund utilization; basic principles of budgeting and budget control; costing and cost structures services pricing; medical records keeping; inventory and inventory control; basic principles of personnel management and staffing of private clinics and hospitals (MDCN, 2006). It can be rightly argued that these topics cover the core areas of practice management required not just for medical practice, but for dental practice as well.

A review of the undergraduate curriculum of the University of Lagos Dental School showed that behavioral science courses such as medical sociology, medical psychology and clinical psychology were present. In addition, there were also courses in communication and interpersonal skills. However, the core courses required for business and management skills, that is, practice management, as outlined earlier were absent. It is interesting to note that the medical curriculum for the same school follows strictly the recommendations of the MDCN in this regard. Thus, the fifth year medical students undergo a course in GMP, which covers different aspects of medical practice management as discussed earlier.

One of the reasons why the undergraduate medical curriculum in Nigeria is more detailed in its requirements for practice management training may be the fact that dental education in Nigeria is relatively much younger. Dental education in Nigeria commenced 18 years after the first medical school was established at the University College Hospital, Ibadan in 1948. Thus, while the medical curriculum has undergone major revisions over time, it can be said that undergraduate dental education and its curriculum in Nigeria are still evolving. In particular, the same may be said for the University of Lagos, where the medical school was established in 1962, four years before the establishment of the dental school (CMUL, 2013). Current anecdotal evidence shows that practice management training is also absent from the undergraduate curriculum of all other dental schools in Nigeria.

As reported by Willis (2009), the study and teaching of the discipline of dental practice management are becoming more important as the dental practice business environment becomes increasingly complex. Changes in the external environment of dental practice require that practice owners have more of a business orientation in managing their practices than ever before. However, even in environments where practice management forms a part of the undergraduate dental curriculum, graduating dental students often identify practice administration and patient management among the least emphasized topics in their programs, and the majority feels underprepared to lead and manage the business of a practice (Barber et al., 2011). Thus, the need for its inclusion in the undergraduate dental curriculum of the Lagos Dental School cannot be overemphasized.

Training in practice management provides the business

and ethical context for care delivery and prepares dentists for the economic realities of the world (Corner et al., 2001; Frohna et al., 2004). Nigeria, with a population of over 160 million people and a rapidly growing economy provides a huge opportunity for entrepreneurship. Current reforms in the health sector, particularly in the area of managed care and health insurance, have a tendency to increase the access to healthcare of a large proportion of the population, particularly the middle class. Anecdotal evidence shows that this has affected positively the number of people seeking private dental care and in turn has led to an increase in the number of dental clinics, particularly in the cities and urban areas. It is therefore very important, that the Nigerian dental graduate is adequately prepared, not just with the clinical skills required for practice, but also the management skills required to effectively run and manage a dental practice.

In this study, it is also acknowledged that not all dental graduates would be interested in private dental practice on graduation from the dental school. Indeed, some will aspire to work in the public sector; in either Local, State or Federal Government owned dental institutions or even with the military. However, practice management training would still be of great benefit to these dental graduates, because the management and leadership skills acquired from a well-designed practice management course can be effectively utilized in any dental establishment.

Conclusion

The undergraduate dental curriculum of the University of Lagos Dental School adequately prepares the dental graduate with the behavioral science skills required for private dental practice. However, the curriculum is currently deficient in the business and management skills and knowledge, required to prepare the dental graduate for private dental practice. Thus, there is an urgent need to include practice management in the undergraduate dental curriculum of the University of Lagos and all other dental schools in Nigeria.

Study limitations

While this study suggests that there is a need to include practice management in the undergraduate dental curriculum of the University of Lagos, it has a number of limitations. An assessment of the knowledge and perception of the University of Lagos dental students and graduates themselves, on the practice management skills required for dental practice, would have been of value to this study. Furthermore, an assessment of the current undergraduate dental curriculum by recent dental graduates of the school, on its adequacy or otherwise, in helping them to cope with the management demands of dental practice, would also have been of great value.

Thus, there is a need for further studies to address these issues.

RECOMMENDATIONS

Inclusion of practice management in the undergraduate dental curriculum of the University of Lagos and that of all other dental schools in Nigeria is strongly recommended. The practice management training should include courses in accounting, marketing, human resource management, health insurance, small business set-up, equipment procurement and inventory control, entrepreneurship, organizational behavior and leadership.

There is also a need for exposure of the dental students to the private dental practice environment, prior to graduation from the dental school. Dental students in their final year of training could undergo externships to selected private practices of alumni of the Lagos Dental School. Owners of these practices could also serve as mentors to graduating dental students interested in going into private dental practice. A similar model could also be adopted in the other dental schools in the country. All these would adequately prepare the Nigerian dental school graduate to function effectively in either the public or private sector, as dentists with the pre-requisite management skills and knowledge to excel in both areas.

Furthermore, there is a need for the Medical and Dental Council of Nigeria, to clearly spell out in detail, the practice management competencies that Nigerian dentists are expected to have on graduation as has been done with the medical curriculum. They should also ensure that these are included and implemented in the undergraduate dental curricula of all dental schools in Nigeria.

It is important to note that the inclusion of practice management in the curriculum does not automatically translate into the acquisition of these skills by dental graduates. There is still a need to ensure that the courses are designed and taught in a way that would be of great value to the dental student upon graduation as a dentist. Thus, even when introduced into the curriculum, there is a need for continuous research to ensure that these courses are achieving the purpose for which they were included in the first place.

REFERENCES

- American Dental Education Association (2011). Competencies for the new general dentist (as approved by the 2008 ADEA House of Delegates). *J. Dent. Educ.* 75(7):932-935.
- Association for Dental Education in Europe, ADEE (2010). Curriculum Structure, Content, Learning and Assessment in European Undergraduate Dental Education. Available at: <http://www.adee.org>.
- Barber M, Wiesen R, Arnold S, Taichman RS, Taichman LS (2011). Perceptions of Business Skill Development by Graduates of the University of Michigan Dental School. *J. Dent. Educ.* 75(4):505-517.
- Barron EG, Shirley WL, Waldrep AC (1984). A realistic approach to locating dental practices. *J. Am. Dent. Assoc.* 109: 903-908.
- Chambers DW (1992). The continuing education business. *J. Dent. Educ.* 56(10):672-679.
- College of Medicine, University of Lagos (2011). College of Medicine, University of Lagos Prospectus 2011/2012. CMUI, pp. 45-49.
- College of Medicine, University of Lagos (2013). Faculty of Dental Sciences Curriculum. Available at: <http://www.cmui.edu.ng>.
- Dunning DG, Lange BM, Radden RD, Tacha KK (2011). Prerequisites in Behavioral Science and Business: Opportunities for Dental Education. *J. Dent. Educ.* 75(1):77-81.
- Frohna JG, Kalet A, Kachur E, Zabar S, Cox M, Halpern R, Hewson MG, Yedidia MJ, Williams BC (2004). Assessing residents' competency in care management: Report of a consensus conference. *Teach. Learn. Med.* 16(1):77-84.
- Holist NO (1985). Dentistry in developing countries (Africa): A case study. *Trop. Dent. J.* 8(1):23-28.
- Houlberg BJ (2008). Dental residents' perceptions of practice and patient management training during postgraduate education. *J. Dent. Educ.* 72(6):643-652.
- Jeboda SO (1997). Dental educational trends in Africa with special reference to Nigeria. *Int. Dent. J.* 47:21-25.
- Medical and Dental Council of Nigeria - MDCN (2006). The Red Book: Guidelines on Minimum standards of Medical and Dental Education in Nigeria. Available at: <http://www.mdcnigeria.org>.
- Medical and Dental Council of Nigeria (2013). Dental training institutions accredited by council. Available at: <http://www.mdcnigeria.org>.
- Otuyemi OD (2002). Orthodontics in Nigeria: Journey so far and the challenges ahead. *J. Orthod.* 28(1):90-92.
- Van Blarcom C (1990). Prosthodontics. Clinical practice-third-party relations. Review of the literature. *J. Prosthet. Dent.* 64:293-310.
- Willis DO (2009). Using competencies to improve dental practice management education. *J. Dent. Educ.* 73(10):1144-1152.

Full Length Research Paper

Assessment of periodontal treatment on lipid control in patients with cardiovascular disease

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Several studies have sought to explain the possible causal relationship between periodontal disease and cardiovascular disease. The aim of this study was to find evidence that periodontal treatment is associated with changes in lipid levels in patients with cardiovascular disease after a 12-month follow-up period. Eighty patients were selected and divided into 4 groups of 20 patients each, as follows: 2 groups of patients with cardiovascular disease and conventional periodontal treatment or full-mouth scaling and root planing; and 2 groups of patients without systemic involvement and conventional periodontal treatment or full-mouth scaling and root planing. The patients were evaluated by laboratory examinations and clinically evaluated for 12 months. Improvement in the clinical and lipid parameters in patients with cardiovascular disease was observed. The best results were obtained by mechanical control and full-mouth scaling and root planing. It may be concluded that periodontal treatment contributes to control the lipid levels, particularly in patients with cardiovascular disease.

Key words: Periodontal disease, cardiovascular disease, total cholesterol, triglycerides.

INTRODUCTION

There is emerging evidence that inflammation plays a key role in the development of cardiovascular disease from atheroma formation to its rupture and development of clinical events. Several epidemiological studies have investigated and support an association between high levels of inflammatory markers and increased risk and progression of Doença cardiovascular (Packard and Libby 2008; D'Aiuto et al., 2013). Some studies have shown direct evidence for the common relationship between systemic health and oral health, that is, the potential effects of periodontal disease in the much broader range of organic systems (Oz et al., 2007; Moura Foz et al., 2010). The field of periodontal medicine emphasizes important issues between the association of periodontal disease and cardiovascular diseases (D'Aiuto

et al., 2013). These authors in systematic search found 31 clinical trials investigating the impact of periodontal therapy on serum lipid levels of which 11 randomized controlled trials included seven trials of individuals with periodontitis alone and four trials involving individuals with periodontitis and other co-morbidities (that is, diabetes, metabolic syndrome, and hypercholesterolemia). Arterial hypertension, dyslipidemia, genetic predisposition, smoking, obesity, sedentary lifestyle, and diabetes mellitus are well-known classic risk factors for atherosclerosis and they can cause acute myocardial infarction or ischemic cerebral vascular accident (Suzuki et al., 2010). However, these risk factors do not justify the variation in the incidence of cardio-vascular diseases and cerebrovascular diseases. Within this context, periodontal

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disease has been studied as a risk factor for cardiovascular alterations (Bharti and Khurana, 2009).

The biological plausibility of the association between periodontal diseases and cardiovascular diseases is well studied and it includes some of the following possible mechanisms: high concentrations of cholesterol and the action of oral bacteria in the process of atherosclerosis or the participation of acute-phase proteins that may increase in chronic periodontitis (Izumi et al., 2009).

Recent studies showed that patients diagnosed with hyperlipidemia have significantly higher values of periodontal parameters than the control subjects with normal metabolic status (Fentoglu et al., 2009, 2010). The inter-relationship between periodontitis and hyperlipidemia provides an example of a systemic disease predisposing to oral infection, and once the oral infection establishes, it exacerbates the systemic disease (Fentoglu et al., 2010).

Possible mechanisms for the relationship among local infections, inflammation and systemic alterations, which might be related to chronic inflammation such as periodontitis, are capable of starting and maintaining the high systemic levels of several cytokines in the acute-phase response associated with inflammation (D'Aiuto et al., 2013). Periodontitis is associated with the increase in the level of C-reactive protein and fibrinogen, irrespective of coronary diseases (Balan, 2010). Furthermore, there is evidence that suggests that the increase in the levels of systemic markers of inflammation, such as the C-reactive protein and interleukin-6 (IL-6), is associated with cardiovascular diseases (Balan, 2010).

Conventional periodontal treatment (scaling and root planing procedures) can lead to a known clinical success and this is usually an effective therapeutic approach for the treatment of chronic periodontitis due to the reduction of periodontal pathogens followed by an increase in beneficial bacteria (Kalsi et al., 2011). With the purpose of preventing the transmission of pathogens from non-treated periodontal pockets to the recently debrided ones, the one-stage full-mouth disinfection protocol was proposed by a group of researchers coordinated by MQuirynen et al. (1995), which was later modified without the use of an antiseptic by Lang et al. (2008).

In view of this possible causal relationship between periodontal diseases and cardiovascular diseases, confirming the hypothesis that the periodontal diseases would be a risk factor for cardiovascular diseases, the aim of this study was to find evidence that periodontal treatment is associated with changes in lipid levels in patients with cardiovascular disease after a 12-month follow-up period through clinical parameters of periodontal disease and laboratory parameters.

MATERIALS AND METHODS

One hundred and twenty-four patients attended the Dental Clinic of Unioeste (Cascavel, Parana, Brazil), Department of Periodontics, of which forty patients (ages between 30 and 54 years) who had cardiovascular diseases or did not show any type of systemic

compromise were selected. The other 40 patients selected could not present any type of systemic compromise. The inclusion criteria for all the groups were as follows: patients with chronic periodontitis with at least four sites with probing depth above 5 mm, clinical attachment level greater or equal to 4 mm, bleeding on probing, and clinical evaluation of gingival inflammation. The teeth had to be in normal position, with a minimum number of 20 teeth in dental arches and the clinical examination was performed on the buccal, lingual, palatal, mesial and distal tooth surfaces.

For the exclusion criteria, the non-cardiopathic patients could present any other systemic compromise. However, all patients must present a negative history of antibiotic therapy within the last six months; must not have used steroidal or non-steroidal anti-inflammatory drugs within three months prior to the study; must present a negative history of pregnancy, negative history of contraceptive use or any other type of hormone therapy; negative history of smoking or definite cessation at least five years prior to the study; negative history of periodontal treatment within the last 12 months. This study was approved by the Human Research Ethics Committee of Unioeste, report No 203/2010 – CEP, and all the patients signed and received a copy of the free and informed consent. With regard to the diet and medication of these patients, no observations were made because all the criteria and guidance of the doctor responsible for monitoring the cardiovascular disease had to be strictly followed. As for the groups of patients without any cardiovascular compromise, no changes were made in the diet or food habits.

Clinical examination

Clinical examinations were performed using a Williams-type periodontal probe No. 23 by a single, previously calibrated examiner to determine: (1) Silness and Løe plaque index (Silness and Loe, 1964); (2) LÖE and SILNESS gingival index (Loe and Silness, 1963); (3) Probing depth: distance from the bottom of the sulcus up to gingival margin at six points: mesio-buccal, buccal, disto-buccal, disto-lingual/palatal, lingual/palatal and mesio-lingual/palatal of each tooth assessed; (4) Clinical attachment level: also determined at the same points of probing depth.

Laboratory examination

Each patient participating in the study was required to take a blood test, at any time determined by the patient, but always at the same laboratory, following these parameters: (1) total cholesterol, (2) cholesterol fraction, and (3) triglycerides.

After the initial clinical and initial laboratory examinations, the patients were randomly divided into 4 groups of 20 patients each as shown in Table 1. All patients received periodontal therapy (conventional periodontal therapy or full-mouth scaling and root planing), oral hygiene instructions, and supra- and subgingival scaling, which were performed using Gracey curettes (Hu-Friedy, Chicago, IL, USA). Conventional periodontal therapy is to provide education/information, to motivate oral hygiene, and to perform scaling and root planing. Traditional scaling and root planing procedures were performed in quadrants or sextants at regular intervals of one or two weeks. All groups received instruction on how to perform correct control of dental plaque through mechanical removal and supportive periodontal therapy. The patients were assessed for 12 months and clinical examinations were performed throughout the months of the study. At all time intervals, the patients were instructed again in the study. With regard to the laboratory examinations, all patients were required to perform examinations (0 to 12 months) at the same time intervals.

After the data had been rigorously analyzed and was within the normality curve, the data of the groups were assessed

Table 1. Distribution of 80 patients according to the treatments proposed.

Group	Group 1: Patient with cardiovascular disease	Group 2: Patient with cardiovascular disease	Group 3: Patients with no systemic compromise	Group 4: Patients with no systemic compromise
Initial	-Clinical and laboratory exams. -Mechanical control (modified Bass technique + dental floss) -Conventional periodontal therapy	-Clinical and laboratory exams. -Mechanical control (modified Bass technique + dental floss) -Full-mouth scaling and root planning therapy	-Clinical and laboratory exams. -Mechanical control (modified Bass technique + dental floss) -Conventional periodontal therapy	- Clinical and laboratory exams. - Mechanical control (modified Bass technique + dental floss) - Full-mouth scaling and root planning therapy
12 months	-Clinical and laboratory exams. -Mechanical control (modified Bass technique + dental floss) -Supporting Periodontal Therapy	-Clinical and laboratory exams. -Mechanical control (modified Bass technique + dental floss) -Supporting Periodontal Therapy	-Clinical and laboratory exams. -Mechanical control (modified Bass technique + dental floss) -Supporting Periodontal Therapy	- Clinical and laboratory exams. - Supporting Periodontal Therapy - Mechanical control (modified Bass technique + dental floss)

using the analysis of variance (ANOVA) and Tukey's test ($P < 0.05$).

RESULTS

Table 2 shows the mean clinical periodontal parameters achieved in all groups treated and the time intervals according to Table 1. All groups showed a significant reduction in the plaque index at the end of treatment, confirming the effectiveness of periodontal treatment. The results for the gingival index indicate that all groups showed a statistically significant reduction, particularly groups 2 and 4 that showed a significant reduction after full-mouth scaling and root planing was used during treatment. A significant improvement was found in the probing depth after full-mouth scaling and root planing, although small differences in the reduction of probing depth were found, particularly in group 2 with a significant reduction of 1 mm, and this therapy was quite effective in this group of patients. As for the clinical attachment level, an improvement was observed in all the groups, particularly groups 1 and 2 that showed a significant improvement, and both therapies were

efficient in all groups.

Table 3 shows the mean values (mg/dl) of the lipid levels for all groups treated at the time intervals assessed, as shown in Table 1. Observing the levels of total cholesterol, a significant improvement in level of cholesterol was observed in groups 1, 3 and 4, especially after 12 months, despite an increase during the period, but a significant increase was only found in group 2, although this parameter was already high at the beginning of treatment. As for the high density lipoprotein (HDL) levels, a significant increase was found in all groups, which shows the effectiveness of periodontal treatment in this parameter, and it is important to demonstrate the relationship between the periodontal treatment and the lipid level. The results in the low density lipoprotein (LDL) levels showed a significant reduction in all groups within the 12-month period, particularly in groups 2 and 4, which shows the action of full-mouth scaling and root planing on the lipid parameter. A reduction in the triglyceride levels in all groups was observed, showing the effectiveness of periodontal treatment, again in groups 2 and 4, which showed a great reduction after full-mouth scaling and root planing.

DISCUSSION

Cardiovascular diseases are the main causes of death in contemporary society, despite the declining tendency of incidence and mortality, thus encouraging the development of a large number of studies and research with the purpose of improving prevention, diagnostic and treatment methods (Moura Foz et al., 2010). Periodontal disease has also been the object of several studies and research in the last decades as it represents one of the major public health problems due to its relatively high prevalence, even in developed countries, being considered the most prevalent chronic disease that affects human dentition. In this connection, this study was conducted with the purpose of finding evidence that suggest the association between periodontal and cardiovascular diseases through the behavior of lipid parameters that may influence the development of cardiovascular disease.

Most recently, a comprehensive review was performed by an American Heart Association (AHA) working group (Lockhart et al., 2012), which concluded that "periodontal disease is associated with atherosclerotic vascular disease

Table 2. Measurements (means \pm standard deviations) of the clinical periodontal parameters achieved in all groups treated and the periods respective.

Group	Period	Plaque index (%)	Gingival index (%)	Probing depth (mm)	Clinical attachment level (mm)	P value
Group 1	Initial	60.75 \pm 1.61 ^A	26.53 \pm 1.61 ^A	1.66 \pm 0.11 ^A	2.63 \pm 0.15 ^A	P<0.05
	12 months	35.84 \pm 1.50 ^B	4.91 \pm 1.30 ^B	1.65 \pm 0.32 ^A	2.18 \pm 0.16 ^B	
Group 2	Initial	77.20 \pm 0.87 ^C	28.34 \pm 1.87 ^C	2.49 \pm 0.42 ^B	2.73 \pm 0.12 ^C	P<0.05
	12 months	36.30 \pm 1.42 ^D	5.00 \pm 1.65 ^B	1.41 \pm 0.36 ^C	2.56 \pm 0.11 ^D	
Group 3	Initial	33.75 \pm 0.95 ^E	0.445 \pm 0.01 ^D	1.40 \pm 0.31 ^D	2.65 \pm 0.10 ^A	P<0.05
	12 months	27.67 \pm 0.68 ^F	0.90 \pm 0.08 ^E	1.52 \pm 0.42 ^E	2.58 \pm 0.11 ^D	
Group 4	Initial	44.47 \pm 0.62 ^G	2.23 \pm 0.62 ^F	1.32 \pm 0.25 ^F	2.71 \pm 0.12 ^C	P<0.05
	12 months	32.12 \pm 0.94 ^H	0.00 \pm 0.00 ^G	1.06 \pm 0.32 ^G	2.54 \pm 0.10 ^D	

*Different letters represent statistically significant difference among means in the same parameters and periods respective.

Table 3. Measurements (means \pm standard deviations) of the lipid serum level achieved in all groups treated and the periods respective.

Group	Period	Total cholesterol (mg/dl)	HDL cholesterol (mg/dl)	LDL cholesterol (mg/dl)	Triglyceride (mg/dl)	P value
Group 1	Initial	202.28 \pm 4.51 ^A	46.28 \pm 1.51 ^A	112.70 \pm 4.07 ^A	149.76 \pm 6.45 ^A	P<0.05
	12 months	153.45 \pm 5.14 ^B	79.57 \pm 1.41 ^B	105.50 \pm 3.33 ^B	124.10 \pm 5.14 ^B	
Group 2	Initial	194.00 \pm 4.00 ^C	44.00 \pm 2.00 ^C	139.00 \pm 5.26 ^C	118.60 \pm 5.96 ^C	P<0.05
	12 months	199.22 \pm 8.12 ^D	78.44 \pm 2.22 ^D	126.80 \pm 4.56 ^D	82.00 \pm 2.68 ^D	
Group 3	Initial	147.85 \pm 5.21 ^E	56.56 \pm 1.65 ^E	75.60 \pm 3.54 ^E	83.27 \pm 5.32 ^E	P<0.05
	12 months	109.90 \pm 7.12 ^F	60.70 \pm 2.12 ^F	61.50 \pm 2.22 ^F	38.10 \pm 6.36 ^F	
Group 4	Initial	163.00 \pm 6.32 ^G	45.46 \pm 3.31 ^A	99.46 \pm 3.89 ^G	112.42 \pm 4.32 ^G	P<0.05
	12 months	130.43 \pm 5.13 ^H	58.90 \pm 1.31 ^G	59.30 \pm 1.31 ^F	74.50 \pm 4.51 ^H	

**Different letters represent statistically significant difference among means in the same parameters and periods respective to total cholesterol, HDL, LDL and triglyceride.

independent of known confounders". AHA further concluded that there was no evidence for a causal link and that, therefore, "statements that imply a causative association between periodontal disease and specific atherosclerotic vascular disease events [...] are unwarranted" (Dietrich et al., 2013).

One of the hypotheses of this mechanism linking between periodontitis and atherosclerosis would be predicted based on inflammatory mechanisms initiated by bacteria associated with periodontal lesions, locally or systemically, that then influence the initiation or propagation of the atherosclerotic lesion. Such lesions may be initiated by inflammatory stimuli including systemic and locally produced inflammatory cytokines and chemotactic agents that cause changes in the endothelium such

as up-regulation of adhesion molecules. These changes promote interactions with leucocytes, such as monocytes, that promote leucocyte migration into the intimal layer of the artery. Lipid streaks, comprised of modified LDL within macrophages and dendritic cells in the intimal layer, can initiate and propagate this inflammatory response. Up-regulation of the endothelium additionally leads to release of chemotactic cytokines such as monocyte chemoattractant protein-1 that further attract monocytes or other cells that can transport migration by degradation of the extracellular matrix (Schenkein and Loos, 2013).

Although a number of the studies have investigated the effect of periodontal treatment on the lipid profile (Oz et al., 2007; Taylor et al., 2010), there are no studies in the literature that have moderate evidence that does not

support a positive effect of non-surgical periodontal therapy on lipid parameters and the impact of periodontal treatment on systemically compromised patients regarding the lipid parameters, since these patients may have a different response when compared with healthy patients, because of their disease or even the medication they use (D'Aiuto et al., 2013).

The results of the present study show that there was an improvement in the clinical periodontal levels in individuals who do not present alterations in these levels and in patients with cardiovascular diseases in which periodontal treatment showed a significant improvement on these results, as shown in Table 2. Periodontal treatment was effective in all groups, particularly for the groups that received full-mouth scaling and root planing, showing that the control of periodontal disease can be performed, irrespective of the systemic condition of the patient, but with greater success when the patient cooperates during treatment.

D'Aiuto et al. (2005) analyzed the short-term effects of intensive periodontal therapy in the inflammatory markers and cholesterol and found alterations in inflammation irrespective of age, gender, body mass, and ethnicity, but a significant interaction among smokers and therapeutic regimes was found. This study showed a decrease in total cholesterol and LDL after two months of periodontal therapy concluding that periodontitis causes moderate systemic inflammation in systemically healthy individuals and that periodontal treatment may be an adjuvant therapy to control the cholesterol levels in individuals, corroborating our results (Table 3), particularly of patients in groups 1 and 2 who already presented lipid disorders.

Although the role of periodontitis associated with diet and behavior may not be excluded, periodontal treatment alone has only shown to be effective in improving the lipid profile. One possible explanation for this finding could be that the cytokines IL-1 β and TNF- α present during periodontal disease also have an effect on the lipid metabolism by influencing the production of other cytokines, altering hemodynamic, using amino acids from several tissues involved in lipid metabolism, or by modifying the hypothalamic-pituitary-adrenal axis and increasing the concentrations of adrenocorticotropic hormones, cortisol, adrenaline, noradrenaline and glucagon in the plasma. It is believed that the elevation of serum lipids result from the increase in hepatic lipogenesis, lipolysis in adipose tissues, blood circulation and increased synthesis or reduced elimination of triglycerides and LDL due to the reduction in the activity of the lipoprotein lipase (Moeintaghavi et al., 2005).

With regard to the results in Table 3, the improvement in the HDL levels showed the positive action of periodontal therapy, corroborating the study of Oz et al. (2007) and Taylor et al. (2010), who showed the beneficial effect of periodontal treatment on lipid metabolism, since the levels of LDL and cholesterol reduced after periodontal treatment, particularly in groups 1 and 2. On the other

hand, the study of Sridhar et al. (2009) showed that periodontitis did not influence the alteration of the serum lipid levels and that there would be no correlation between these levels and periodontal attachment loss, corroborating a systematic review of D'Aiuto et al. (2013) which demonstrated there is however limited evidence that these acute and chronic changes will either increase or reduce cardiovascular disease burden of individuals suffering from periodontitis in the long term.

Conclusion

Within the limitations of this study, it may be concluded that periodontal treatment contributes to control the lipid levels, particularly in patients with cardiovascular disease. In addition, the control of the development of periodontal disease may also be achieved in patients with cardiovascular diseases.

REFERENCES

- Balan H (2010). Do cardio-vascular and periodontal diseases have a close, causal relationship? *Rom. J. Inter. Med.* 48(2):121-129.
- Bharti V, Khurana P (2009). Metabolic syndrome and periodontal disease. *J. Indian Soc. Periodontol.* 13(3):172-174.
- D'Aiuto F, Nibali L, Parkar M, Suvan J, Tonetti MS (2005). Short-term effects of intensive periodontal therapy on serum inflammatory markers and cholesterol. *J. Dent. Res.* 84(3):269-273.
- D'Aiuto F, Orlandi M, Gunsolley JC (2013). Evidence that periodontal treatment improves biomarkers and CVD outcomes. *J. Clin. Periodontol.* 40(Suppl. 14):S85-S105.
- Dietrich T, Sharma P, Walter C, Weston P, Beck J (2013). The epidemiological evidence behind the association between periodontitis and incident atherosclerotic cardiovascular disease. *J. Clin. Periodontol.* 40(Suppl. 14):S70-S84.
- Fentoglu O, Oz G, Tasdelen P, Uskun E, Aykac Y, Bozkurt FY (2009). Periodontal status in subjects with hyperlipidemia. *J. Periodontol.* 80:267-273.
- Fentoglu O, Sözen T, Oz SG, Kale B, Sönmez Y, Tonguç MO, Gürkan CA, Aykaç Y, Kirzioğlu FY (2010). Short-term effects of periodontal therapy as an adjunct to anti-lipemic treatment. *Oral Dis.* 16(7):648-54.
- Izumi A, Yoshihara A, Hiroto T, Miyazaki H (2009). The relationship between serum lipids and periodontitis in elderly non-smokers. *J. Periodontol.* 80(5):740-748.
- Kalsi R, Vandana KL, Prakash S (2011). Effect of local drug delivery in chronic periodontitis patients: A meta-analysis. *J. Indian Soc. Periodontol.* 15(4):304-309.
- Lang NP, Tan WC, Krähenmann MA, Zwahlen M (2008). A systematic review of the effects of full-mouth debridement with and without anti-septics in patients with chronic periodontitis. *J. Clin. Periodontol.* 35(8 Suppl):8-21.
- Lockhart PB, Bolger AF, Papananou PN, Osinbowale O, Trevisan M, Levison ME, Taubert KA, Newburger JW, Gornik HL, Gewitz MH, Wilson WR, Smith SC Jr., Baddour LM (2012). Periodontal disease and atherosclerotic vascular disease: does the evidence support an independent association? A scientific statement from the American Heart Association. *Circulation* 125:2520-2544.
- Loe H, Silness J (1963). Periodontal disease in pregnancy. I - Prevalence and severity. *Acta Odontol. Scand.* 21:533-551.
- Moeintaghavi A, Haerian-Ardakani A, Talebi-Ardakani M, Tabatabaie I (2005). Hyperlipidemia in patients with periodontitis. *J. Contemp. Dent. Pract.* 6(3):78-85.
- Moura Foz A, Alexandre Romito G, Manoel Bispo C, Luciancencov Petrillo C, Patel K, Suvan J, D'Aiuto F (2010). Periodontal therapy

- and biomarkers related to cardiovascular risk. *Minerva Stomatol.* 59(5):271-283.
- Oz SG, Fentoglu O, Kilicarslan A, Guven GS, Tanrtover MD, Aykac Y, Sozen T (2007). Beneficial effects of periodontal treatment on metabolic control of hypercholesterolemia. *South Med. J.* 100(7):663-664.
- Packard RR, Libby P (2008). Inflammation in atherosclerosis: From vascular biology to biomarker discovery and risk prediction. *Clin. Chem.* 54:24–38.
- Quirynen M, Bollen CML, Vandekerckhove BNA, Dekeyser C, Papaioannou W, Eysen H (1995). Full- vs. Partial-mouth Disinfection in the Treatment of Periodontal Infections: Short-term Clinical and Microbiological Observations. *J. Dent. Res.* 74(8):1459-1467.
- Schenkein HA, Loos BG (2013). Inflammatory mechanisms linking periodontal diseases to cardiovascular diseases. *J. Clin. Periodontol.* 40 (Suppl. 14):S51–S69.
- Silness J, Loe H (1964). Periodontal disease in pregnancy. II – Correlation between oral hygiene and periodontal condition. *Acta Odontol. Scand.* 22:121-135.
- Suzuki J, Aoyama N, Ogawa M, Hirata Y, Izumi Y, Nagai R, Isobe M (2010). Periodontitis and cardiovascular disease. *Exp. Opin. Ther. Targets* 14(10):1023-1027.
- Taylor B, Tofler G, Morel-Kopp MC, Carey H, Carter T, Elliott M, Dailey C, Villata L, Ward C, Woodward M, Schenck K (2010). The effect of initial treatment of periodontitis on systemic markers of inflammation and cardiovascular risk: a randomized controlled trial. *Eur. J. Oral Sci.* 118:350–356.

UPCOMING CONFERENCES

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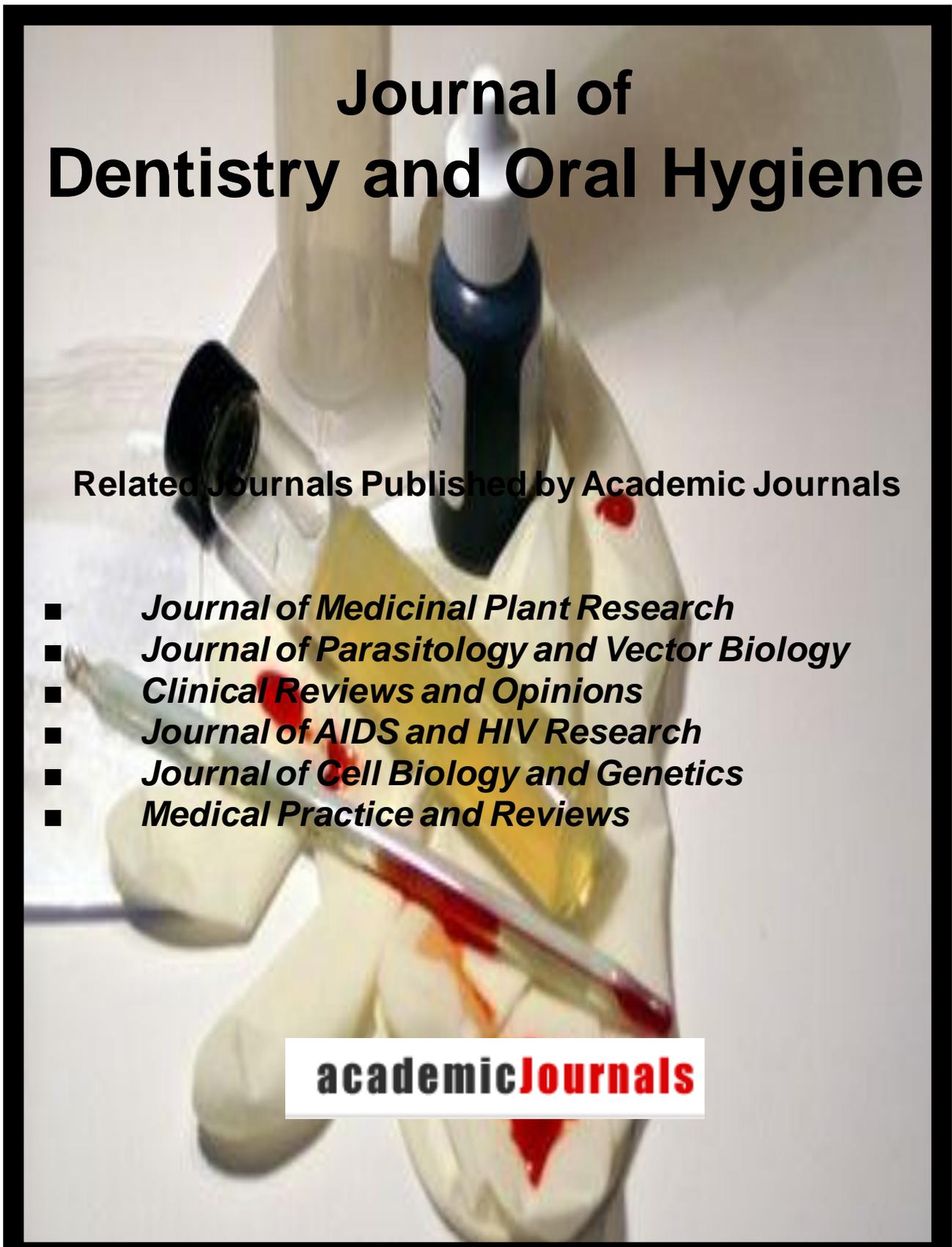
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