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Original Research

Stroke and periodontal disease in Senegal: case–control study

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ABSTRACT

Objective: To determine the periodontal factors associated with stroke in melanodermic subjects in Senegal.

Study design: Case–control study.

Methods: One hundred and twenty cases and 120 controls were included in this study. Cases had been diagnosed with stroke by a neurologist, with the diagnosis confirmed by scanner. Controls had never had any type of stroke. Data were collected regarding sociodemographic characteristics, lifestyle behaviours, general history, type of stroke (ischaemic or haemorrhagic) and periodontal parameters [plaque index, papillary bleeding index, pocket depth, clinical attachment loss, Community Periodontal Index of Treatment Needs and periodontitis (defined by clinical attachment loss >2 mm and pocket depth >3 mm)]. Logistic regression analysis was performed using R software to isolate a final model after adjustment for the 5% threshold.

Results: All periodontal characteristics were more common among cases than among controls. Periodontitis (odds ratio 1.58, 95% confidence interval 1.1–3.022) and periodontal parameters were significantly associated with stroke, adjusted for hypertension, sedentary lifestyle, and the interaction between periodontitis and age.

Conclusions: Periodontal disease is associated with stroke in the Senegalese population. Prospective longitudinal studies should be undertaken to improve understanding.

Introduction

In its World Health Statistics 2008 report, the World Health Organization stated that stroke was the second most important cause of death around the world, accounting for 9.7% of all recorded deaths. It is projected that this will increase to 12% by 2030.[1] Stroke is a cosmopolitan condition with annual incidence of 145 new cases per 100,000 population in France, and prevalence of 250 cases per 100,000 population in Vietnam.[2] The condition also constitutes a major public health challenge in developing countries, accounting for 45% of all

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deaths at the Department of Neurology of Cocody University Hospital, Abidjan in Ivory Coast, and is the principal condition and cause of death at the Neurology Clinic of Fann University Hospital, Dakar, Senegal.[3]

The extent and severity of stroke have resulted in much interest in its risk factors. A study involving 6000 subjects found that approximately 90% of cases of stroke can be attributed to 10 risk factors, including high blood pressure, physical inactivity and alcohol.[4]

Periodontal disease is polymicrobial, primarily inflammatory in nature and involves frequent formation of periodontal pockets. The prevalence of both stroke and periodontal disease is high in Africa,[5] and the relationship between these two diseases has been reported previously.[6] In Korea, Kim et al. found that periodontitis was an independent risk factor for stroke in men, non-diabetics and obese subjects.[7] In Europe, particularly in Germany, Grau et al. found that patients with severe periodontitis (clinical attachment level >6 mm) had a 4.3-fold higher risk of ischaemic stroke compared with patients without periodontitis or with mild periodontitis (clinical attachment level ≤3 mm).[8] A meta-analysis including eight cohort studies concluded that the risk of stroke was 19% higher in patients with periodontal disease.[9]

In Africa, studies focussing on the relationship between periodontal disease and stroke are very rare despite the magnitude and severity of this problem. For some diseases, being of Black ethnicity is a protective factor or 'masks' the association in melanodermic subjects. In Senegal, this relationship has not yet been documented. As such, it was hypothesized that there is an association between periodontal disease and stroke, and a case–control study was conducted to test this hypothesis. The objective was to determine the periodontal factors associated with stroke in melanodermic subjects.

Methods

This case–control study took place in the neurological clinic of Fann National University Hospital. This is the only neurological clinic in Senegal. The clinic also receives patients from other countries.

Population and inclusion criteria

The study population consisted of outpatients and inpatients attending the neurological clinic of Fann National University Hospital.

Case definition

Cases were defined as patients who had been diagnosed with stroke by a neurologist, with the diagnosis confirmed by scanner.

Control definition
Controls were defined as patients in the clinic who had not had any type of stroke.

Exclusion criteria

Patients whose general condition did not allow a periodontal clinical examination (comatose patients), patients who were taking immunosuppressants or had received periodontal treatment within the last 6 months, and patients who had lost more than 75% of their teeth were excluded from the study.

Sample size and matching

The sample size was calculated using EpiInfo 2000 (Centers for Disease Control and Prevention, Atlanta, GA, USA). With risk of 5% and power of 80%, and with reference to Diallo et al.,[10] theoretical exposure to periodontal diseases of 32% was assumed among the controls. The risk of stroke for patients with periodontitis was fixed at 2. Thus, the sample size was 120 cases and 120 controls. The groups were matched in terms of age and sex in order to minimize the influence of these factors.

Collection procedure and variables

Data were collected using a questionnaire that had been validated and used previously for the same purpose. This questionnaire was pretested on 10 patients attending the neurosurgery clinic in the hospital, to enable the authors to observe respondents' reactions to the survey and to estimate the time spent on various sections of the questionnaire. Data collection took place every day, and included all patients who came into the clinic who met the selection criteria. Data collection took place from April to July 2011.

The information collected by questionnaire included sociodemographic characteristics (age, occupation, income, weight, size, body mass index) and lifestyle behaviours [smoking (active: ≥5 cigarettes/day; passive: <5 cigarettes/day), drinking coffee (>3 cups/day), drinking alcohol (>3 glasses/day), chewing cola seeds and activity (sedentary or physical)]. Medical history covered diabetes, depression, infection and hypertension. Information on periodontal factors included plaque, papillary bleeding index, pocket depth, attachment loss and Community Periodontal Index of Treatment Needs (CPITN).

One week after the stroke, the patient or their relative/friend was interviewed, and data collection was completed by a periodontal clinical examination of the patient.

Clinical observation and evaluation of periodontal data

Evaluation of the level of hygiene of the gingival condition, extent of bleeding, clinical attachment loss and pocket depth was performed according to the recommendations of Martin and Bercy.[11] Average values were calculated, first for individuals, by calculating the average value per tooth in the individual, adding the numbers together and dividing by the number of teeth scored (individual score). The average for the sample was calculated as the average value of all individual scores for the members of the sample.

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