PATTERN OF CARIES ON SPECIFIC TEETH AND SURFACES AMONG ADULT PATIENTS VISITING UNIVERSITY OF NAIROBI DENTAL HOSPITAL

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YEAR OF STUDY: 2014

A research proposal submitted in partial fulfillment for the award of Bachelor of Dental surgery degree of the University of Nairobi
DECLARATION

I, WATEKA DANIEL, hereby declare that this is my original work and has not been submitted anywhere by any person for research purposes or a degree in any institution.

Signature ..................................................

Date ....................................................

23/05/2014
I, Daniel Waterka, hereby submit my proposal for approval. This research has been carried out under guidance and supervision.

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LIST OF ABBREVIATION

BDS; Bachelor of Dental Surgery

DT; Decayed Teeth

DMFT; Decayed Missing Filled Teeth

KNH; Kenyatta National Hospital

SDS; School of Dental Sciences

SSPS; Statistical package for social sciences

UON; University of Nairobi

WHO; World Health Organization
SUMMARY

**Background:** several studies have shown that dental caries is the most common dental disease affecting both children and adults. According to the WHO the prevalence of dental caries is 50%

**Objective:** To describe the pattern of caries on specific teeth and surfaces in adult patients who attended and were treated at the university of Nairobi dental hospital

**Study design:** Descriptive cross-sectional study.

**Data collection tools and techniques:** The data will comprise all the radiographs and history of patients from the files retrieved from the records office. The radiographs will be studied, evaluated and results recorded.

**Sample and sampling:** patients will be selected using simple random sampling method.

**Setting:** The study will be conducted in the university of Nairobi dental hospital at the oral diagnosis clinic.

**Study population:** the study will be conducted in Kenyan African adult patients aged 18 years and above attending oral diagnosis clinic.

**Perceived benefits:** The results obtained from this study will help dentists and dental practitioners in the proper management of dental caries through proper diagnosis and oral hygiene instructions and motivation.
Chapter 1

1.0 Introduction

Dental carries is a progressive but initially localized demineralization of dental hard tissues after invasion by bacteria mainly strep mutans and lactobacillus. For dental caries to occur four interconnected factors play a major role in their aetiology; these are the presence of bacterial microorganize, substrates mainly carbohydrate products, presence of a susceptible tooth surface and time. The prevalence of dental caries varies from 34% to 90% in child population and is increasing at an alarming rate. According to WHO Global Oral Data Bank in 1997 the point prevalence was 81.5% (mean dmft 4.86) among 5-6 year old and 59.6% (mean DMFT 1.87) among 12-13 year old.

Various descriptive epidemiological studies of dental caries in adults have been undertaken in Kenyan population and no multivariate models were included to ascertain the relative role of identified caries risk indicators, along with this, information on caries prevalence and severity forms the basis for the magnitude and quality of caries prevention programs and treatment needs in a population. Therefore, a continuous need remains to field caries prevalence and severity information. Thus the present study is designed to assess the prevalence of dental caries (Percentage with caries), caries experience permanent dentition (dmft and DMFT) of adults treated at the university of Nairobi dental hospital, in the city of Nairobi, Kenya, to assess the surface distribution of dental caries, and to assess the contributing roles of the likely risk indicators like gender, parental education, oral hygiene habits, sugar consumption, socio-economic status, enamel defects, plaque score and dental visits on dental caries prevalence in permanent dentition.
Various reasons for the differing caries susceptibilities have been proposed, such as different tooth surface morphology or different post-eruptive enamel maturation of the surfaces. The caries susceptibility of a tooth surface also varies over time. It was found that susceptibility to caries is low during the first post-eruptive year, but rises rapidly to the maximum rate approximately two to three years post-eruption. Information on surface-specific dental caries patterns is a useful source of reference for dental administrators in deciding which preventive strategies to use.

Different age groups and populations exhibit distinct caries prevalence rates, observations of which could provide a useful descriptive measure of caries susceptibility in tooth surfaces. Older adults have considerably more factors that place tooth surfaces at risk for caries than do younger adults, due to the many health conditions faced by this population during the later phases of life, which can last as long as 40 years. During that period, the elderly face a wide spectrum of oral and general health problems.

A technical report by the Federation Dentaire Internationale also attributed the higher prevalence of caries in women to their earlier eruption of permanent teeth. The observation of significant rates of caries among women, even after adjusting for their greater number of teeth, was attributed to the fact that women’s teeth are exposed for longer periods of time to the risk of decay.

The aim of this study is to determine the pattern and distribution of dental caries on specific teeth and surfaces for the management of dental caries which is ranked as the most prevalent dental disease.
1.1) LITERATURE REVIEW

Dental caries is one of the main oral health problems in both industrialized and increasing in developing countries and it affects 60 to 90% of school aged children and adults. In a research done by Gladwell Gathecha, Anselimo Makokha, Peter Wanzala, Jared Omolo, Perry Smith, The prevalence of dental caries was found to be 37.5% (DMFT 0.76) in Nairobi West and 24.0% (DMFT 0.36) in Mathira West. These results indicate a decline in dental caries as compared to previous Kenyan studies that found a prevalence of 50% in 11 - 13 year olds ¹ and 64% in 3-5 year olds ². The decrease may be attributed to increased oral health awareness and number of available dental professionals. The results also showed that the prevalence of dental caries and the DMFT were significantly higher in Nairobi West District than in Mathira West District. Living in urban areas has implications for lifestyle, including dietary pattern and has been shown to be associated with an increased prevalence of dental caries. The prevalence of dental caries found here is slightly lower than other East African countries which have recorded a prevalence of 41% in urban areas and 29% in rural areas in Uganda, and 41.5% among urban children in Tanzania. These results were quite similar, however, to the findings in a study done in Burkina Faso where the urban area prevalence was 33.8%, while the rural area prevalence was 21.2% ³.

According to a research by the national institute of the dental and craniofacial research on dental carries, 92% of adults between 20 to 64 yrs have dental carries. According to the same research 23% of the studied subjects had untreated carries ².

In Another research done by Mustafa Demirci, Safa Tuncer, and Ahmet Ayhan Yuceokur on Prevalence of Caries on Individual Tooth Surfaces and its Distribution by Age and Gender in University Clinic Patients and published in European journal of dentistry July 2010 showed that Caries distribution was higher in the maxillary jaw (62.4%) than in the mandibular jaw (37.6%).
Except molars, approximal surfaces of all teeth demonstrated the highest caries rates, ranging from 58.5% to 77.5%. Occlusal fissures on the first and second molars contributed most significantly to caries frequency, from 52.7% to 66.3%. Females (59.1%) showed a higher incidence of caries than males (40.9%). Approximal surfaces of incisors, canines, premolars and occlusal fissure sites in molars showed the highest caries rates in both sexes. Caries were most common among individuals aged 17 to 25 years. Approximal surfaces of incisors, canines, premolars and occlusal surfaces in molars had the highest caries rates in all age groups, except for individuals older than 65 years of age.

Another research published in the African journal online by BO Popoola and OO Denloye on the pattern and surface prevalence of dental carries on the posterior teeth of children in a Nigerian teaching hospital showed that the colossal surfaces had the highest prevalence of dental caries at 77% with the a proximal surfaces trailing at 15%. The same research showed that the first permanent molars had the highest incidence of carries. In summary the paper recorded a dmft of 2.68±1.84 in primary dentition and 0.2±0.54 in the permanent dentition.

A research done by Sakeenabi Basha and Hire math S. Swamy and published in the journal of clinical and experimental dentistry on Dental caries experience, tooth surface distribution and associated factors the results showed that caries prevalence (overall) was 26.75% in primary dentition (dmft>0) and 25.25% in permanent dentition (DMFT > 0). There was no significant difference (p>0.05) in caries prevalence in relation to gender, type of school, tooth brushing frequency and mother’s occupation. However, there was significant difference (p<0.05) in caries prevalence in relation to age, SES, use of fluoridated dentifrice, sugar consumption, parental education, plaque score, enamel defects and dental visits. The mean dmft and DMFT score for 6-year-old was 3.20±4.25 and 0.23±0.7 respectively. In both the dentition mean dt (3.18±4.21) and
DT (0.23±0.7) scores predominated over filled component. In 13-year-old, mean DMFT score was 1.40±2.35 (DT = 1.32±2.30). No significant gender differences were observed (p>0.05) for caries indices.

In primary dentition, most affected teeth were mandibular second molars (23.51%), followed by maxillary second molars (16.46%), mandibular first molars (15.91%), maxillary first molars (13.74%), and maxillary anteriors (11.93%). Mandibular anteriors were least affected (3.98%). In permanent dentition mandibular first molars (35.58%) were most frequently affected with decay followed by maxillary first molars (25.96%), mandibular second molars (18.91%), and maxillary second molars (13.78%).

In both the dentition, it was frequent to find decay on occlusal surfaces and rare in lingual /palatal surfaces. Caries experience was associated with sugar consumption (OR= 2.31; 95% CI = 1.72-3.10), dental visits (OR= 2.10; 95% CI = 1.32-2.90), presence of enamel defects (OR= 2.69; 95% CI = 1.28-3.10), and plaque score (OR= 1.38; 95% CI = 1.01-1.98). Children from low SES had an OR 1.33 times higher likelihood of having caries than children from medium and upper SES (95% CI = 1.02-1.89).

Children with caries in their primary teeth had a strong association (OR= 4.87; 95% CI = 2.33-6.87) with caries experience. The children with fair plaque score had an OR 2.45 times higher likelihood of having caries than children with good plaque score (95% CI = 1.12-4.32). The presence of enamel defects (OR= 3.92; 95% CI = 2.13-4.89) was also positively associated with caries⁵.
A research carried out by Ferro R, Besostri A and Olivieri A on Caries prevalence and tooth surface distribution in a group of 5-year-old Italian children, the results indicated that the most commonly affected teeth were primary molars, (78% of the overall sample), especially in the mandible. The surfaces of molars most often affected were the occlusal (52%). Proximal surfaces were affected more in first than in second primary molars. Dental caries occurred most often in the maxilla. The frequency of caries in anterior teeth was low (12%).
CHAPTER 2

2.0) STATEMENT OF THE RESEARCH PROBLEM AND JUSTIFICATION OF OBJECTIVES

2.1 STATEMENT OF RESEARCH OF PROBLEM
Dental caries is the leading dental disease in Kenya and the whole world in both children and adult’s. The clinical features of dental caries guide in the management of dental caries. If not properly managed dental caries can lead to hard tissue destruction, pain and eventually tooth loss which negatively affects the overall aesthetics of an individual. Proper dental hygiene however reduces the susceptibility of teeth to dental caries.

2.2) Justification of the study
Many studies in Kenya have emphasized on the prevalence of dental caries in different age groups and regions and have overlooked the individual teeth and surface distribution of caries. This study aims at establishing the prevalence of specific teeth and surfaces in the adults. The results of this project could be useful in oral health instructions and hygiene and manufacture of dentifrices suitable for areas most susceptible to caries.

Objectives

2.3 Main objective
To describe the pattern of caries on specific teeth and surfaces in adult patients who attend and are treated at the university of Nairobi dental hospital.
2.3.1 Specific objectives
1. To determine the pattern of dental caries among adult patients
2. To determine the distribution of dental caries on specific teeth
3. To establish the pattern and distribution of dental caries on various surfaces of teeth

2.4 HYPOTHESIS
*Alternative:* The distribution and pattern of dental caries varies with tooth type and surface

*Null:* The distribution and pattern of dental caries does not vary with tooth type and surface

2.5.1 VARIABLES

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<th>Independent variables</th>
<th>Tooth type</th>
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| Dependent variables         | Caries exposure measured using DMFS |
CHAPTER 3

3.0 METHODOLOGY

3.1 Study design
This will be a descriptive cross-sectional study

3.2 Study area
The study will be conducted in the university of Nairobi dental hospital at the oral diagnosis clinic. The hospital is located in Nairobi the capital city of Kenya in upper hill along argwins kodhek road. The hospital is at the school of dental sciences in the college of health sciences of the University of Nairobi. Oral diagnosis is under the department of oral maxillofacial oral pathology and oral medicine which is one of the departments at the hospital. The school trains both undergraduates and post graduates

3.3 study population
Kenyan African adult patients aged 18 years and above attending oral diagnosis clinic

3.3.1 Inclusion criteria
1. Adults of Kenyan African origin.
2. Have erupted permanent incisors, canines, premolars, first molars and second molars and third molars.
3. Adults who consent

3.3.2 Exclusion criteria
1. Adults who are Kenyan but not of African origin
2. Adults who have missing teeth
3. Adults with impacted teeth
4. Adults who do not consent

3.4 Sample size determination

The formula to be used shall be

\[ N = \frac{Z^2(PQ)}{C^2} \]

Where:

\( N \) = Desired sample size

\( P \) = the proportion of the target population who have oral conditions.

\( C \) = confidence interval of 95%

\[ N = 1.96^2 (0.072) (1-0.072) (1-0.95)^2 \]

For a population that is less than 10,000, the following formula is used:

\[ N_f = \frac{n}{1 + n/N} \]

Where:

\( N_f \) = desired sample size for a population less than 10,000.

\( n \) = sample size derived for a population greater than 10,000.

\( N \) = estimated size of the population with the characteristic of interest under investigation.

\[ N_f = 102 \]
3.5 **sampling procedure**
Consenting patients visiting the university of Nairobi dental hospital will be sampled using simple random sampling method.

3.6 **Minimizing errors and bias**
- By taking only individuals who meet the inclusion criteria
- By the correct calibration and reliability

3.7 **Data collection instruments, technique and procedures**

3.7.1 **Data collection tools**
A clinical examination form (modified world oral health assessment form 1997-appendix) will be used to record data on various oral hygiene status and the pattern of dmfts.

3.7.2 **Calibration**
prior to commencement of the study, calibration will be done by one of the supervisors at the department of oral and maxillofacial surgery, oral pathology and oral medicine, school of dental sciences and repeated also in the field. Calibration will be done for caries examination
3.7.3 Actual data collection  
The socio-demographic variable such as age, gender, residence, level of education from participants through an interview by the researcher. The pattern of dmft will then be recorded in WHO 1997 clinical examination form.

3.7.4 Clinical examination  
The examination of recruited participants will be carried out at the oral diagnosis clinic with the patients sitting on a dental chair and the head slightly bend backwards. It will be done under natural light using dental probes and mouth mirrors. The clinical findings will be confirmed with the radiographs analysed and recorded in the WHO 1997 clinical examination form.

3.8 Data analysis  
The data collected will be coded and entered into a computer and analyzed using the statistical package for social sciences (SPSS) version 11.5 and Microsoft office excel 2007. Data cleaning will be done by running frequencies. Data analysis will include descriptive and analytical statistics. The confidence level in this study will be 95% and the p-value for statistical significance will be set at less than 0.05.

3.9 Ethical consideration  
The proposal will be submitted to the Kenyatta national hospital and university of Nairobi ethics, research and standards committee for approval. Permission to carry out the investigations will be sort from the relevant authorities from the school of dental sciences. The purpose of the study will be clearly explained to the participant and only participants who will give an informed written consent will be recruited. Voluntary participation, confidentiality and withdrawal privilege will be observed at all times.
# Schedule of Activities

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<td>Data collection</td>
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## Budget

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4. Sakeenbi Basha and Hire math S. Swamy. Dental caries experience, tooth surface

5. Ferro R, Besostri A, Olivieri A. Caries prevalence and tooth surface distribution in a
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   1996; 104: 436-443.


10. Ng'ang'a P M and Valderhaug J. Dental caries in primary school children in Nairobi,


THE PURPOSE OF THE STUDY

I, Daniel Wateka from the university of Nairobi would like to seek your consent to participate in a study aimed at determining the pattern of caries in Kenyan of African origin. The information I get is part of my research for a project as a partial fulfillment for the degree of bachelor of dental surgery.

HOW DO YOU PARTICIPATE

I will ask you questions about your past and present oral hygiene practices and dental treatment. I shall look into your mouth and record some observations. The examinations will be carried out using clean (sterile) instruments and no invasive procedures will be performed.

ANTICIPATED RISK

No risk is anticipated for participating in the study.

CONFIDENTIALITY

The information given to the researcher will be kept in strict confidence. No confidence information will be revealed, released or published.

If you are satisfied with my explanation and you are willing to participate please sign the consent form.
CONSENT FORM

I..........................having understood the nature of the study as explained by DANIEL WATEKA of the university of Nairobi, is willing to participate in the study

Name

......................................................Signed......................................................

...Date........................................

I confirm that I have explained the nature of the study to the patient

Name ..................................................Signed

......................................................Date........................................
### APPENDIX 1: DATA COLLECTION FORM

**Name** ................................................. **Age** ..........................................................

**Gender** .............................................. **Residence** ..................................................

**Clinical summary** ......................................

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**DMFS SCORE**

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Dmft...............................Researchers
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