A research project submitted in partial fulfillment of the degree of Bachelor of Dental Surgery (BDS) of the University of Nairobi.

2013
Declaration

I, Marubu James Kamande declare that this is my original work and it has not been submitted to any other institution for award of any degree whatsoever.

Signed…………………………….      Date…………………………
Approval

This proposal has been submitted with approval of my supervisors.

SUPERVISORS:

Internal:

Dr. Regina Mutave. BDS (UON), M.Res (St. Andrews)

Department of Periodontology/ Community and Preventive Dentistry

School of Dental Sciences

University of Nairobi

Signed………………………………….Date…………………….

External:

Dr. Hudson Alumera. BDS (UON)

Department of Periodontology/ Community and Preventive Dentistry

School of Dental Sciences

University of Nairobi

Signed………………………………..Date………………………..
ACKNOWLEDGEMENTS

I wish to express my sincere gratitude to my supervisors, Dr. Mutave and Dr. Alumera for their guidance in enabling me to complete this project. I would also like to thank my colleagues and my family for their support. May God bless you all.
**TABLE OF CONTENTS**

Declaration ........................................................................................................................................... ii
Approval ................................................................................................................................................ iii
Abbreviations ....................................................................................................................................... viii
ABSTRACT .......................................................................................................................................... ix
Background .......................................................................................................................................... ix

Objective ............................................................................................................................................. ix
Study Design ...................................................................................................................................... ix
Study Setting ..................................................................................................................................... ix
Study Participants .......................................................................................................................... ix
Methods and Materials .................................................................................................................... ix

1.0 INTRODUCTION, RESEARCH PROBLEM, JUSTIFICATION, OBJECTIVES, HYPOTHESIS AND VARIABLES. ................................................................................................................................. 1

1.1 INTRODUCTION ..................................................................................................................................... 1

1.2 RESEARCH PROBLEM, JUSTIFICATION, OBJECTIVES, HYPOTHESIS AND VARIABLES. ................................................................................................................................. 4

1.2.1 Problem Statement .......................................................................................................................... 4
1.2.2 Justification .................................................................................................................................... 4
1.2.3 OBJECTIVES .............................................................................................................................. 4
1.2.4 HYPOTHESIS .............................................................................................................................. 4
1.2.5 VARIABLES ............................................................................................................................... 5

2.0 LITERATURE REVIEW .................................................................................................................. 6

3.0 MATERIALS AND METHODS ....................................................................................................... 10

3.1 Study area ..................................................................................................................................... 10
3.2 Study population .......................................................................................................................... 10
3.3 Study design .................................................................................................................................. 10
3.4 Sample size ................................................................................................................................... 10
3.5 Sampling method .......................................................................................................................... 11
3.6 Inclusion and Exclusion Criteria ................................................................................................. 11
3.8 Data Collection Instruments and Techniques .............................................................................. 11
3.9 Data Analysis and Presentation .................................................................................................... 12
3.10 Logistics .............................................................................................................. 12
3.11 Ethical Issues ...................................................................................................... 12
3.12 Perceived Benefits .............................................................................................. 12
4.1. Social demographic information ........................................................................ 13
4.2. Prevalence of periodontal disease ...................................................................... 14
4.3 Frequency and timing of teeth brushing .............................................................. 21
4.4 Pack years and the severity of periodontal disease ............................................ 23
5.0 DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS .............................. 26
  5.1 DISCUSSION ....................................................................................................... 26
  5.3 CONCLUSION ..................................................................................................... 28
  5.4 RECOMMENDATIONS ....................................................................................... 28
REFERENCES ............................................................................................................. 29
APPENDIX 1 ............................................................................................................... 31
  CLINICAL DATA COLLECTION FORM .................................................................. 31
TABLE OF FIGURES

Figure 1: Age distribution of participants
Figure 2: Prevalence of periodontal disease
Figure 3: Severity of gingivitis
Figure 4: Disease distribution of gingivitis
Figure 5: General prognosis of gingivitis
Figure 6: Specific prognosis of gingivitis
Figure 7: Severity of chronic periodontitis
Figure 8: Disease distribution of chronic periodontitis
Figure 9: General prognosis of chronic periodontitis
Figure 10: Specific prognosis of chronic periodontitis
Figure 11: Brushing frequency
Figure 12: Brushing timing
Figure 13: Disease severity in patients with 1-5 pack years
Figure 14: Disease severity in patients with 6-10 pack years
Figure 15: Disease severity in patients with 11-15 pack years
Figure 16: Disease severity in patients with 16-20 pack years
Abbreviations

ANUG  Acute Necrotizing Ulcerative Gingivitis.

SPSS  Statistical Package for Social Science.

UON   University of Nairobi.

UONDH University of Nairobi Dental Hospital.

WHO   World Health Organization.
ABSTRACT

Background
Studies carried out on smoking and its effect on the periodontal tissues have showed a correlation between smoking and periodontal disease. However further studies are necessary to establish the prevalence of periodontal disease associated with smoking.

Objective
To investigate the prevalence of periodontal disease among patients who are smokers visiting UONDH.

Study Design
This was a retrospective study.

Study Setting
The University of Nairobi Dental Hospital, Nairobi – Kenya.

Study Participants
Comprised of files of patients who had visited University of Nairobi Dental Hospital who were smokers aged between 18 and 65 years.

Methods and Materials
The study was an audit of the periodontal status extracted from clinical records made on patients who were smokers from January 2013 to August 2013. Information regarding the patients’ age, sex, periodontal status (probing depth and gingival index) and oral hygiene practices was sought. Data analysis was done using the statistical package for social science (SPSS version 17.0) for windows.

Results
Majority of the patients had chronic periodontitis. Prevalence and severity of periodontal disease increased with age and also pack years of the patients.
Conclusion
Within the limits of this study it has been concluded that there is a direct relationship between smoking and periodontal disease.

Recommendation
Advice on smoking cessation should be reinforced by the dentist when the patients who are smokers are undergoing periodontal therapy.
1.0 INTRODUCTION, RESEARCH PROBLEM, JUSTIFICATION, OBJECTIVES, HYPOTHESIS AND VARIABLES.

1.1 INTRODUCTION

Periodontal disease affects one or more of the periodontal tissues that include the gingival, alveolar bone, periodontal ligament and cementum. Traditionally periodontal disease was classified into gingivitis and periodontitis.

Treatment involves giving oral hygiene instructions and motivation to the patient and scaling and root planning aimed at removal of supragingival and subgingival calculus.

Cigarette smoking has for long been suspected to be associated with a variety of oral conditions including periodontal disease. Experimental evidence accumulated over the last two decades has indicated that cigarette smoking is a true risk factor for periodontitis. It has been associated with 2 to 3 fold increase in the odds of developing clinically detectable periodontitis.¹

Epidemiological studies have provided evidence that tobacco smokers have poorer oral hygiene than non-smokers, and also have increased quantities of dental calculus. Most of these differences can be attributed to less favorable tooth brushing habits, particularly evident in male smokers. However, smoking is associated with a decreased flow of saliva, which may explain the increased tendency to form dental calculus.²

Possible mechanisms through which smoking alters the expression of periodontal diseases include effects on the composition of plaque and effects on the host response. It has been hypothesized that smoking, through altering the oxidation-reduction potential in favor of anaerobic micro-organisms, would favor the formation of a more pathogenic plaque.³

Tobacco may alter the immune system’s capacity to maintain an ecological balance. Smoking diminishes oral cellular immunity by reducing the chemotactic response and phagocytic capacity of leukocytes.⁴ Smoking causes peripheral vasoconstriction, further limiting the ability of the tissues to effect an immune response.⁴

Acute necrotizing ulcerative gingivitis occurs more frequently in smokers. Possible mechanisms for this increased susceptibility include vasoconstriction of gingival blood vessels, reduced activity of leukocytes, and proliferation of anaerobic, fusospirochaetal
micro-organisms. These factors interact with the other factors implicated in the etiology of ANUG, namely poor oral hygiene and mental stress.

Smokers have increased prevalence and more severe extent of periodontal disease compared to non smokers. The noxious effect of smoking has been shown to be dose dependent and to be particularly marked in younger individuals; in these subjects, upto 51% of the observed risk of periodontitis was associated with cigarette smoking.

The topic is of public health importance because literature has indicated that smokers affected by periodontitis respond less favorably to non surgical, surgical and regenerative periodontal treatment. Also smoking has been associated with recurrence of periodontitis during periodontal maintenance. However the effects appeared to be dose dependent with heavy smokers (more than 10 cigarettes/day) presenting with higher levels of disease progression.

Solving the problem is beneficial because it has been shown that smoking cessation results in improved periodontal health. This is evidenced by the fact that previous smokers have lower level of risk for periodontitis compared to current smokers.

In spite of the awareness of the adverse effects of smoking on health, many of the patients will continue to be smokers. Many will not be aware of the effects that tobacco may have on their periodontal health. Literature from this research may be used in advising patients to reduce or stop their smoking as part of the periodontal management of the patients.

If the problem is not solved, the periodontal health of smokers will continually worsen as smoking worsens the oral hygiene status and depresses the host defense posture. It appears that smoking may affect vasculature, the humoral and cellular immune system and inflammatory system and have effect throughout the cytokine and adhesion molecule network.

Also if the problem is not solved there will be progression of periodontal disease among smokers. The pockets between their teeth and gums may grow deeper, allowing in more bacteria that destroy tissue and supporting bone. As a result, the gums may shrink away from the teeth making them look longer. Without treatment, your teeth may become loose, painful and even fall out.
The aim of this study is to consider the evidence for the association between smoking and periodontal disease. The study will also aim at establishing the prevalence of periodontal disease caused by cigarette smoking in my study area.
1.2 RESEARCH PROBLEM, JUSTIFICATION, OBJECTIVES, HYPOTHESIS AND VARIABLES.

1.2.1 Problem Statement
Cigarette smoking is a major risk factor for periodontal disease. On the contrary smoking cessation has been shown to reduce the risk of developing periodontal disease. Thus smokers need to be educated on the risks to health brought about by cigarette smoking and also know the benefits of smoking cessation.

1.2.2 Justification
This study aims at establishing the prevalence of periodontal disease among smokers and using the data obtained to educate smokers on the effects of smoking and also give them information on the benefits of smoking cessation. This study will be beneficial to smokers because once they decide to quit smoking they will have decreased susceptibility to periodontal disease and also other systemic conditions.

1.2.3 OBJECTIVES

General Objective

- To investigate the prevalence of periodontal diseases among patients visiting UONDH who are smokers.

Specific Objective

- To investigate the frequency and technique of brushing among smokers and its relationship to periodontal diseases.
- To find out the relationship between pack years and the severity of periodontal diseases.

1.2.4 HYPOTHESIS
There is a direct relationship between smoking and periodontal disease.
### 1.2.5 VARIABLES

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>MEASUREMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Social demographic variables</strong></td>
<td></td>
</tr>
<tr>
<td>1. Age</td>
<td>Years</td>
</tr>
<tr>
<td>2. Gender</td>
<td>Male or Female</td>
</tr>
<tr>
<td><strong>Independent variable</strong></td>
<td></td>
</tr>
<tr>
<td>1. Smoking</td>
<td>Number of sticks per day</td>
</tr>
<tr>
<td></td>
<td>Age of starting smoking</td>
</tr>
<tr>
<td></td>
<td>Pack years</td>
</tr>
<tr>
<td>2. Oral hygiene practices</td>
<td></td>
</tr>
<tr>
<td>3. Family social history</td>
<td>Level of income</td>
</tr>
<tr>
<td><strong>Dependent variable</strong></td>
<td></td>
</tr>
<tr>
<td>1. Periodontal status</td>
<td></td>
</tr>
</tbody>
</table>
2.0 LITERATURE REVIEW

A study done by the University of Minnesota Division of Periodontology showed that smoking is a major risk factor for periodontal disease. Both current and former smokers have an increased prevalence and severity of periodontal diseases. There is a significant positive association between the amount smoked and the severity of periodontitis. There is a linear and direct correlation between smoking and attachment loss with effects even at a low level of smoking. The periodontal status of former smokers ranks between current smokers and those who have never smoked. It has also shown that 86-90% of refractory periodontitis cases are smokers.\textsuperscript{7,8,9}

The study has also shown that smoking has local and systemic effects which include; Locally the cytotoxic and vasoactive substances from tobacco smoke can inhibit tissue perfusion and cell proliferation and metabolism. Systemic effects are immuno-suppression and impairment of soft tissue and bone cell function. The systemic effects occur due to several factors which include; Impairing serum antibody response to some periodontal pathogens, altering polymorphonuclear leukocyte function, increasing Tumor Necrosis Factor- alpha, Prostaglandin E2, Neutrophil collagenase and Elastase in gingival crevicular fluid (GCF) and it may also interfere with fibroblast attachment.\textsuperscript{7,8,9}

According to the study cigarette smoking also delays wound healing and results in poorer clinical results following both surgical and non surgical periodontal therapy among smokers as compared to non smokers. The study has found that smokers have less success with open flap debridement, osseous resection, soft tissue and bone graft procedures, and guided tissue regeneration procedures. The implant failure rate has also been showed to be higher among smokers as compared to non smokers. Factors that result in delayed wound healing include; Smoking impairs revascularization of bone and soft tissue, its also alters antibody function and polymorphonuclear(PMN) altered chemotaxis, phagocytosis, and adherence.\textsuperscript{7,8,9}

However this study has not given the correlation between cigarette smoking and microflora and also its effect on other pathogenic micro organisms that may be associated with periodontal diseases.

Another study done by Delta Dental showed that current smokers were about four times more likely than people who have never smoked to have periodontitis, but ex-smokers who had
abstained for 11 years faced no increased risk. This according to the findings published in the Journal of Periodontology. Overall nearly 53% of periodontal diseases in the study was attributed to current and former smoking. The study by Delta Dental also found out that 55% of the study’s subjects with periodontitis were current smokers and nearly 22% were former smokers. Also current smokers of more than one and a half packs of cigarettes a day were nearly six times more likely than non-smokers to have periodontitis and those who smoked less than half a pack daily were almost three times more likely to have the disease.10

Another study done by the University of Adelaide (Dental Practice Education Research Unit) also showed a correlation between cigarette smoking and periodontal disease. Preber and Bergstrom (1985, 1990), have found that smoking has a detrimental effect on the response of the tissues to both surgical and non-surgical periodontal treatments. Smokers exhibit significantly less reductions in probing depths than that observed among non-smokers.11

It has also showed that heavy smokers often present with a thickened, fibrotic appearance of their gingival tissues. Studies following the protocol of the experimental gingivitis in man studies (Theilade et al, 1965), in which all oral hygiene is withdrawn over a period of up to four weeks and the development of gingivitis is observed, have found that the development of gingivitis is delayed among smokers. The rate of plaque accumulation is similar in smokers and non-smokers; however, smokers show less gingival inflammatory change, with less gingival bleeding, gingival redness and gingival fluid flow. (Bergstrom and Preber, 1986). Hence, it appears that smoking may suppress the normal immune response to the accumulation of plaque. The major clinical implication of these findings is that the masking of gingival bleeding in smokers may lead to a failure to recognise the presence of periodontal diseases.12,13

Also the same study showed that acute necrotizing ulcerative gingivitis occurs more frequently in smokers. Possible mechanisms for this increased susceptibility include vasoconstriction of gingival blood vessels, reduced activity of leukocytes, and proliferation of anaerobic, fusospirochaetal micro-organisms. These factors interact with the other factors implicated in the aetiology of acute necrotizing ulcerative gingivitis which include poor oral hygiene and mental stress.14
A study by Bergström *et al.,* 1989 showed that smokers had a significantly greater frequency of diseased sites and a significantly greater reduction of periodontal bone height than non-smokers. The periodontal condition of former smokers was between that of current smokers and non-smokers. Heavy exposure to smoking was consistently associated with more severe disease than light exposure, suggesting that the relationship is dose-dependent. In another recent investigation by Haffajee and Socransky smokers had evidence of more severe periodontal disease than past or never-smokers, indicated by higher mean loss of attachment.\(^{15}\)

Smoking extends a favorable habitat for bacteria such as *P. gingivalis, P. intermedia,* and *A. actinomycetemcomitans* to shallow sites. Molecular byproducts of smoking interfere with mechanisms that normally contain growth of damaging bacteria at the surface of the oral mucosa in gingival crevices. In this way, smoking can promote early development of periodontal lesions.

Studies have shown that the effect of smoking on periodontal tissues may involve both of these processes. For example, smokers tend to have depressed numbers of T-helper lymphocytes, which are important cells of the immune system to regulate cell-mediated immunity and the activity of B lymphocytes.\(^9,10\) In addition, the host requires functional neutrophils to deal effectively with bacterial infections. Tobacco smoke has been shown by several studies to have a deleterious effect on various neutrophil functions. For example, smoking has been shown to impair the chemotaxis and phagocytosis of both oral and peripheral neutrophils.\(^11,12\) Neutrophils are found in inflammatory lesions, particularly acute lesions, where they concentrate at the site of injury. They are chemically attracted to the site by a process called chemotaxis. Once at the site of injury, neutrophils then engulf (phagocytosis) and kill most microorganisms and neutralize other noxious substances. It has been shown that impaired neutrophil function can contribute to more severe periodontal destruction.\(^13\)

Disease masking is a term that has been applied to describe the appearance of the gingiva associated with chronic smokers.\(^13\) Typically, the diseased tissues of smokers tend to have a firmer appearance and less bleeding compared to that of nonsmokers. The term disease masking is used because the vasoconstrictive properties of tobacco smoke hide the inflammatory and destructive changes occurring within the periodontium. The periodontal tissues are compromised by the initial vasoconstriction, resulting in decreased blood flow to the gingiva. This masks the
normal early signs of periodontal problems by decreasing gingival inflammation, erythema, and bleeding despite the presence of the disease.

According to a study done by Johnson et al (2001), passive smoking has also been mildly associated with development of periodontal disease. The same study also showed that in dentally aware subjects with high standards of oral hygiene, the amount of crestal bone loss among smokers was approximately three times that of nonsmokers over a 10-year period.
3.0 MATERIALS AND METHODS

3.1 Study area
The study was conducted at the University of Nairobi Dental Hospital. It is located on ArgwingsKodhek Road, Nairobi. It is a teaching and referral hospital and offers a degree course (Bachelor of Dental Surgery) and post graduate programs in dentistry.

3.2 Study population
Comprised files of patients visiting University of Nairobi Dental Hospital who were smokers aged between 18 and 65 years and had a valid file number and periodontal form.

3.3 Study design
This was a retrospective study using hospital based files and records.

3.4 Sample size
For a population less than 10000 and assuming a confidence level of 95% and a prevalence of 53%, from a similar study, sample size was calculated as follows: Using Fischers formula.

\[ N = \frac{Z^2 P(1-P)}{C^2} \]

Where Z= Z Value (1.960), C= 1- confidence level (95%)

P= Prevalence of the problem under investigation (53%)

\[ N = \frac{1.960^2 \times 0.53(1 - 0.53)}{(1 - 0.95)^2} \]

\[ N = 384 \]

As the population was less than 10000 the formula used was:
\[ nf = \frac{n}{1+\left(\frac{n}{N}\right)} \]

Where \( nf \) was the desired sample size for population less than 10000

\( n = \) sample size derived for a population more than 10000

\( N = \) estimated size of the population with the characteristic of interest under investigation (1500)

\[ nf = \frac{384}{1+\left(\frac{384}{100}\right)} \]

\[ nf = 79 \]

3.5 Sampling method
Simple random sampling method was used. Files of patients who visited the hospital were examined at random as long as they were smokers and aged between 18 to 65 years.

3.6 Inclusion and Exclusion Criteria
Inclusion Criteria: All files of patients who had visited UONDH and had a valid file number and periodontal form aged between 18 and 65 years from January 2013 to August 2013.

Exclusion Criteria: File of patients who were non smokers.

3.7 Participant Recruitment

\begin{center}
\begin{tabular}{|c|}
\hline
Files selected = 200  \\
\hline
Files excluded = 121  \\
\hline
Files analysed = 79  \\
\hline
\end{tabular}
\end{center}

3.8 Data Collection Instruments and Techniques
The study was an audit of the periodontal status register and reports to extract all relevant entries made on patients who were smokers from January 2013 to August 2013 using patients files.
Information regarding the patients’ age, sex, periodontal status (probing depth and gingival index) and oral hygiene practices was sought.

3.9 Data Analysis and Presentation
Data was analysed using the SPSS 17.0 software while the results obtained were presented in form of tables and bar graphs. The analysed data established the prevalence of periodontal disease among patients who were smokers thus established whether there was a direct relationship between smoking and periodontal disease.

3.10 Logistics
Financial constraints may result in inadequate data collection.

Limited time because of exams and clinical work.

3.11 Ethical Issues
This project was approved by the University of Nairobi/ Kenyatta National Hospital Ethical and Research Committee.

Permission was sought from the Dean of the School of Dental Sciences to carry out the study.

All information was treated with utmost confidentiality.

3.12 Perceived Benefits
Information obtained from this research gave a clear picture of the prevalence of periodontal disease among smokers and this data was used in educating smokers which may subsequently result in smoking cessation.
CHAPTER 4

4.0 RESULTS

4.1. Social demographic information
A total of 79 files were audited whereby all the files belonged to male patients. The age ranged from 20 to 64 years with the mean age being 39 years. The maximum age of the patients’ files analysed was 64 years and the minimum age was 20 years. Among the patients, 39% were aged between 20-33, 41% were aged between 34-49 and 20% were aged between 50-64.

Fig 1: Age distribution of participants
4.2. Prevalence of periodontal disease

Fig 2: Prevalence of periodontal disease

30.4% of the patients had gingivitis while 69.6% of the patients had chronic periodontitis. Of the patients with gingivitis, 29.2% had mild disease, 62.5% had moderate disease and 8.3% had severe disease. The disease distribution of gingivitis was 4.2% localised form of gingivitis and 95.8% had generalised form of gingivitis. 91.7% of the patients had a fair general prognosis and 8.3% had a poor general prognosis. 70.8% of the patients had a fair specific prognosis, 12.5% had a poor specific prognosis, 12.5% had a questionable prognosis and 4.2% had a hopeless specific prognosis.
**Fig 3: Severity of gingivitis**

**Fig 4: Disease distribution of gingivitis**
Fig 5: General prognosis of gingivitis
Fig 6: Specific prognosis of gingivitis

Of the patients with chronic periodontitis, 29.1% had mild form of chronic periodontitis, 36.4% had moderate form of chronic periodontitis and 34.5% had severe form of chronic periodontitis. 56.4% had localised form of chronic periodontitis while 43.6% had generalised form of the disease. 80% of the patients had a fair general prognosis, 18.2% had a poor general prognosis and 1.8% had a hopeless general prognosis. 45.5% had a fair specific prognosis, 30.9% had a poor specific prognosis, 9.1% had a questionable specific prognosis and 14.5% had a hopeless specific prognosis.
**Fig 7: Severity of chronic periodontitis**

**Fig 8: Disease distribution of chronic periodontitis**
Fig 9: General prognosis of chronic periodontitis

Fig 10: Specific prognosis of chronic periodontitis
Age and prevalence of periodontal disease

Of the patients aged between 20-33 years, 51.6% had gingivitis and 48.4% had chronic periodontitis. 35.5% had mild form of periodontal disease, 54.8% had moderate disease and 9.7% had severe form of periodontal disease.

Of the patients aged between 34-49 years, 21.9% had gingivitis and 78.1% had chronic periodontitis. 28.1% had mild form of periodontal disease, 40.6% had moderate disease and 31.2% had severe form of periodontal disease.

Of the patients aged between 50-64 years, 6.2% had gingivitis and 93.8% had chronic periodontitis. 18.8% had mild disease, 31.2% had moderate disease and 50% had severe form of periodontal disease.
4.3 Frequency and timing of teeth brushing

Of the 79 patients’ files analysed, 49.4% of the patients brush once daily, 45.6% of the patients brush twice daily and 5.1% of the patients brushed irregularly. Of the 39 patients who brushed once daily, 5.1% had mild gingivitis, 23.1% had moderate gingivitis, 25.6% had mild chronic periodontitis, 30.8% had moderate chronic periodontitis and 15.4% had severe chronic periodontitis. Of the 36 patients who brushed twice daily, 13.9% had mild gingivitis, 16.7% had moderate gingivitis, 2.8% had severe gingivitis, 16.7% had mild chronic periodontitis, 19.4% had moderate chronic periodontitis and 30.6% had severe chronic periodontitis. Among the four patients who brushed irregularly, 25% had severe gingivitis, 25% had moderate chronic periodontitis and 50% had severe chronic periodontitis.

Fig 11: Brushing frequency
35.4% of the patients brush in the morning after breakfast, 17.7% brush in the morning before breakfast, 1.3% brush in the evening after dinner and 45.6% brush both in the morning and evening.
4.4 Pack years and the severity of periodontal disease.
Of the 79 files analysed, 37.2% of the patients with pack years ranging from 1-5 had mild periodontal disease, 53.5% of the patients had moderate disease and 9.3% of the patients had severe periodontal disease.

Fig 13: Disease severity in patients with 1-5 pack years

In patients with 6-10 pack years, 27.8% had mild periodontal disease, 22.2% had moderate periodontal disease and 50% of the patients had severe periodontal disease.
Fig 14: Disease severity in patients with 6-10 pack years

In patients with 11-15 pack years, 9.1% had mild periodontal disease, 54.5% had moderate periodontal disease and 36.4% had severe periodontal disease.

Fig 15: Disease severity in patients with 11-15 pack years
In patients with 16-20 pack years, 25% had mild periodontal disease, 50% had moderate periodontal disease and 25% had severe periodontal disease.

**Fig 16: Disease severity in patients with 16-20 pack years**

In patients with 21-25 pack years, 100% of the patients had severe periodontal disease. In patients with more than 25 pack years, 100% of the patients had severe periodontal disease.
CHAPTER 5.0

5.0 DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.1 DISCUSSION

Information pertaining to this study was obtained from a total of 79 files of patients visiting UONDH periodontology clinic. The study population consisted 100% males. The age ranged from 20-64 years. The mean age was 39 years. The maximum age of the patients was 64 years and the minimum age was 20 years.

Prevalence of periodontal disease

Of the files analysed, 30.4% of the patients had gingivitis while 69.6% of the patients had chronic periodontitis. The percentage of patients with chronic periodontitis is relatively high compared to a study done by Delta Dental that found out that 55% of the study’s subjects with periodontitis were current smokers.\(^\text{10}\) This may be attributed to other factors such as oral hygiene practices, frequency of visits to the dentist and socio-economic status.

Of the patients with gingivitis, majority had moderate disease which was generalized. Most of these patients had a fair general and specific prognosis.

Of the patients with chronic periodontitis, majority had moderate form of chronic periodontitis which was localized. Most of these patients had a fair general and specific prognosis.

Of the patients aged between 20-33 years, majority had gingivitis. Of the patients aged between 34-49 years, majority had chronic periodontitis. Of the patients aged between 50-64 years, majority had chronic periodontitis. There is a change in disease from gingivitis to chronic periodontitis as age increases and this may be attributed to the cumulative exposure to predisposing factors that cause periodontal disease.
**Frequency and timing of teeth brushing**

49.4% of the patients brush once daily, 45.6% of the patients brush twice daily and 5.1% of the patients brushed irregularly. Of the 39 patients who brushed once daily, majority had moderate chronic periodontitis. Of the 36 patients who brushed twice daily, majority had severe chronic periodontitis. This may be attributed to brushing technique which may be wrong and also the brushing timing e.g. brushing before meals. Among the 4 patients who brushed irregularly, majority had severe chronic periodontitis. This is consistent with a study done by Johnson *et al* (2001) which showed that in dentally aware subjects with high standards of oral hygiene, the amount of crestal bone loss among smokers was approximately three times that of nonsmokers over a 10-year period.\(^{13}\)

**Pack years and the severity of periodontal disease.**

Of the 79 files analysed, majority of the patients with pack years ranging from 1-5 had moderate periodontal disease. In patients with 6-10 pack years, majority had severe periodontal disease. In patients with 11-15 pack years, majority had moderate periodontal disease. In patients with 16-20 pack years, majority had moderate periodontal disease. In patients with 21-25 pack years, all the patients had severe periodontal disease. In patients with more than 25 pack years, all the patients had severe periodontal disease. This is consistent with a study done by the University of Minnesota Division of Periodontology which showed that there is a significant positive association between the amount of cigarettes smoked and the severity of periodontal disease.\(^{7,8,9}\)

Also a study by Bergström *et al*, 1989 showed that heavy exposure to smoking was consistently associated with more severe disease than light exposure, suggesting that the relationship is dose-dependent.\(^{15}\)

**5.2 LIMITATIONS**

Insufficient information in the files of the patients thus some variables could not be analysed as they would not give a clear picture of the periodontal status.
5.3 CONCLUSION

Based on the study it has been concluded that:

- There is a direct relationship between smoking and the occurrence of periodontal disease.
- There is a linear and direct correlation between the amount of cigarettes smoked in terms of pack years and the severity of periodontal disease.
- Oral hygiene practices affect the occurrence and severity of periodontal disease whereby those who brush irregularly have more severe forms of disease as compared to those who brush regularly.

5.4 RECOMMENDATIONS

- Advise on smoking cessation should be reinforced by the dentist when the patients who are smokers are undergoing periodontal therapy.
- Also education on the effects of smoking on the periodontium should be given to the general population through workshops, mass media and other forms to discourage non-smokers from starting the habit and also to encourage the current smokers to quit smoking.
REFERENCES


3) Bergstrom J. Tobacco smoking and chronic destructive periodontal disease. Odontology 2004 Sep; 92(1): 1-8


APPENDIX 1

CLINICAL DATA COLLECTION FORM

Name......................................................... Age....... File No..............

Chief complaint.................................................................................................................

Diagnosis 1..............................................................................................................................

2........................................................................................................................................

3........................................................................................................................................

4........................................................................................................................................

Gingiva: Colour..................................

Size..........................................

Shape..........................................

Consistency..................................

Texture..........................................

Prognosis: General ...................... Specific.................................................................

Radiographic findings...........................................................................................................

........................................................................................................................................

Gingival index (First visit)......... Plaque score............................................................

Age of starting smoking.......................................................... .........................................

Cigarettes smoked per day.......................................................... .........................................

Number of years the patient has smoked.......................................................... ....................
Brushing frequency………………………………………………………………………………

Brushing timing………………………………………………………………………………

Interdental cleaning…………………………………………………………………………

Past Dental History…………………………………………………………………………
………………………………………………………………………………………………

“Relevant” medical history…………………………………………………………………
………………………………………………………………………………………………

Frequency of visits to the dentist…………………………………………………………
………………………………………………………………………………………………

Relevant family social history……………………………………………………………
………………………………………………………………………………………………
………………………………………………………………………………………………