ASSOCIATION OF TOBACCO SMOKING WITH PERIODONTAL HEALTH AND EARLY LOSS OF TEETH IN ADULT POPULATION OF LUCKNOW

Dissertation

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In the specialty of

Public Health Dentistry

By

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BABU BANARASI DAS COLLEGE OF DENTAL SCIENCES, LUCKNOW

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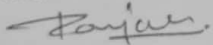
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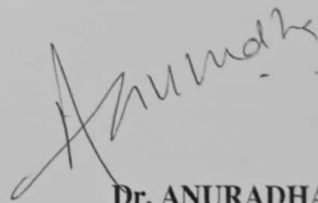
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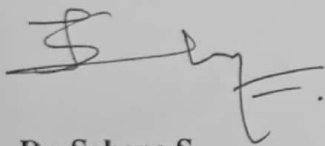
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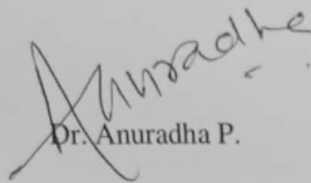
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LIST OF ABBREVIATIONS

S.no.	Abbreviations	Full Forms
1.	DMFT/dmft	Decayed, Missing, Filled Teeth
2.	WHO	World Health Organization
3.	N	Number of subjects
4.	SD	Standard Deviations
5.	P	Spearman coefficient (rho)
6.	DMFS/dmfs	Decayed, Missing, Filled Surface
7.	pH	Power of Hydrogen
8.	DF	Degree of Freedom
9.	±	Plus-Minus
10.	GI	Gingival Index
11.	PI	Periodontal Index
12.	LOA	Loss Of Attachment
13. P	TCP	Tobacco Control Policy
14.	SES	Socio Economic Status
15.	CP	Chronic Periodontitis
16.	AP	Aggressive Periodontitis
17. C	CAL	Clinical Attachment Loss
18.	≥	Greater than or equal to

19.	%	Percentage
20.	x^2	Chi- Square
21.	CPI	Community Periodontal Index
22.	NS	Not Significant
23.	S	Significant

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Abstract

Aim and objectives: The aim of this study was to evaluate association of tobacco smoking with periodontal health and early loss of teeth in Adult population of Lucknow.

Material and Methods: A cross sectional study was conducted on 994 adults (495 non smokers and 499 tobacco smokers) aged 22-55 years. Lucknow was divided into four zones, East, West, North, South, approximately 22 wards came under each of these geographic zones. Then areas were selected from each ward by multistage sampling. A total of 994 adults were examined and interviewed, i.e. 248 adults were selected from each zone. Community periodontal index (CPI) score was recorded for each and a questionnaire was completed by each participant.

Results: Periodontal condition as assessed by CPI (community periodontal index) score showed that there was statistically significant difference in the findings between smokers and non-smokers.

Statistical Analysis: Chi- square test was used to test whether the variables had normal or non- normal distribution. SPSS version 18.0 was used for analysis.

Conclusions: Within the limits of this study, positive association was observed between periodontal disease and cigarette smoking. It was found that cigarette smoking was associated with lesser gingival bleeding and more deeper pockets as compared to non-smokers.

Introduction

Periodontal diseases are one of the common oral diseases of mankind. No area of world is free from it. Approximately half of the child population and almost entire adult population have some periodontal disease[1]. Many factors play a major role in the degree of response. Cross-sectional studies have shown that smokers are two to seven times more likely to have periodontitis, compared to nonsmokers. The high prevalence of smokers in any population makes smoking a feasible target for intervention in public health.[2]

Smoking is one of the major risk factor for periodontal diseases and early loss of teeth[3, 4]. Smoking affects the oral hygiene, the gingival status, the periodontal status, impairing wound healing, diminished implant stability and increased bone loss compared with non-smokers.[5,6] Clinical findings related to smoking and periodontal disease have been well documented. Alveolar bone loss, tooth mobility, increased probing depth and tooth loss have been reported to be more severe in smokers than in non- smokers[7].

Periodontal breakdown has been shown to be more severe among current smokers compared to former smokers. Those who have never smoked have been observed to have the lowest risk of periodontitis. With respect to surgical or non-surgical periodontal therapy, several studies have shown that smokers have a worse response to treatment when compared to nonsmokers.

It has been reported by a study [8] that cigarette smokers usually have more dental calculus and less gingival bleeding than non-smokers[8-10], although there is little information about the prevalence of dental calculus and gingival inflammation in tobacco smokers. Smoking produces an adverse effect on clinical periodontal variables and alveolar bone

height and density, acting as a potential risk factor for alveolar bone loss, even at an early age with low tobacco consumption. It is very important to inform young smokers about the risk of this habit in relation to periodontal health.[11]

Despite great achievements in the oral health of populations globally, problems still remain in many communities around the world particularly among underprivileged groups in developed and developing countries. Dental caries and periodontal diseases have historically been considered the most important global oral health burdens. At present, the distribution and severity of oral diseases vary in different parts of the world and within the same country or region. The significant role of socio-behavioral and environmental factors in oral disease and health is demonstrated in a large number of epidemiological surveys. In many developing countries, access to oral health services is limited and teeth are often left untreated or are extracted because of pain or discomfort. Throughout the world, losing teeth is still seen by many people as a natural consequence of ageing. While in some industrialized countries there has been a positive trend of reduction in tooth loss among adults in recent years, the proportion of edentulous adults aged 65 years and older is still high in some countries. Globally, most children have signs of gingivitis and, among adults; the initial stages of periodontal diseases are prevalent. A survey was held by WHO using the so-called Community Periodontal Index severe found periodontitis in 15% population of 35-44 years old.[12]

In industrialized countries, studies show that smoking is a major risk factor for adult periodontal disease, responsible for more than half of the periodontitis cases in this age group.[13] Smoking tobacco has become a common social habit in India and is arising alarmingly in Northern India.

Smoking tobacco has got deleterious effects on oral health. Studies conducted over years show that both smoking tobacco have harmful effects on periodontal health. The prevalence of early loss of teeth was also high in tobacco smokers compared to non smokers in India .[14] Studies of this kind has not been conducted in this region of the country before so data of the study will be helpful in determining the need for a tobacco smoking cessation and counseling cell in the dental hospitals and institutions of the Lucknow city.

Aim and Objectives

AIM

To evaluate the association of tobacco smoking with periodontal health status and early loss of teeth in adult population of Lucknow.

OBJECTIVES

❖ To evaluate periodontal health status in tobacco smokers and non tobacco smokers.

❖ To evaluate early loss of teeth in tobacco smokers and non tobacco smokers.

❖ To assess co-relation between tobacco smoking and early loss of teeth in adult population of Lucknow.

Review of Literature

Feldman RS, Bravacos JS, Rose CL(1983)[15] , conducted a study to determine Association between smoking different tobacco products and periodontal disease indexes. Six indexes of periodontal health were recorded in cigarette smokers, pipe/cigar smokers and nonsmokers from the Veterans Administration Dental Longitudinal Study. These indexes included calculus deposition, plaque accumulation, gingival inflammation, periodontal pocket depth, alveolar bone loss and tooth mobility. Cigarette smokers had significantly more calculus deposition than pipe/cigar smokers, although both smoker groups had more calculus than nonsmokers. Cigarette smokers accumulated slightly less plaque than pipe/cigar smokers, and both smoker groups accumulated less plaque than nonsmokers. Gingival inflammation and tooth mobility did not differ between smokers and nonsmokers, or between the two smoker groups. Cigarette smokers had significantly greater pocket depth than nonsmokers, in contrast to pipe/cigar smokers who were not different from nonsmokers. Radiographic measurements indicated that cigarette smokers had significantly more alveolar bone loss than either pipe/cigar or nonsmokers. After covariance adjustment for age and calculus, all smokers had less plaque, gingival inflammation and tooth mobility than nonsmokers, similar periodontal pocket depth, but only cigarette smokers had greater bone loss. This finding of greater alveolar bone loss in cigarette smokers suggests a tobacco product-related effect in systemic physiologic action

Locker D, Leake JL (1993)[16] This study examined risk indicators and risk markers for periodontal disease experience, in 624 adults aged 50 years and over living independently in four communities in Ontario, Canada. The data were collected as part of the baseline phase of a longitudinal study of the oral health and treatment needs of this population.

Periodontal disease experience was assessed in terms of attachment loss, measured at two sites on each remaining tooth. Bivariate and multivariate analyses were used to examine the relationship between a number of sociodemographic, general health, psychosocial, and oral health variables and three indicators of periodontal disease experience. These were: mean attachment loss, the proportion of sites examined with loss of 2 mm or more, and the probability of the subjects having severe disease, arbitrarily defined as a mean attachment loss in the upper 20th percentile of the distribution. Mean attachment loss was 2.95 mm (SD = 1.41 mm), and 76.6% of sites examined had loss of 2 mm or more. In bivariate analyses, the most consistent predictors of periodontal disease experience were: age, education, income, smoking, dental visiting, the number of remaining teeth, the number of decayed coronal surfaces, and the number of decayed root surfaces. In multivariate analyses, age, education, current smoking status, and the number of teeth had the most consistent independent effects. These data confirm the results of recent US studies indicating that periodontal disease experience is influenced by social and behavioral factors.

Albandar JM, Streckfus CF, Adesanya MR, Winn DM(2000)[17] conducted a study with a purpose to test the hypotheses that cigar and pipe smoking have significant associations with periodontal disease and cigar, pipe, and cigarette smoking is associated with tooth loss and to assess whether a history of smoking habits cessation may affect the risk of periodontal disease and tooth loss. A group of 705 individuals (21 to 92 years-old) who were among volunteer participants in the ongoing Baltimore Longitudinal Study of Aging were examined clinically to assess their periodontal status and tooth loss. A structured interview was used to assess the participants' smoking behaviors with regard to

cigarettes, cigar, and pipe smoking status and was found that cigarette and cigar/pipe smokers had a higher prevalence of moderate and severe periodontitis and higher prevalence and extent of attachment loss and gingival recession than non-smokers, suggesting poorer periodontal health in smokers. In addition, smokers had less gingival bleeding and higher number of missing teeth than non-smokers. Current cigarette smokers had the highest prevalence of moderate and severe periodontitis (25.7%) compared to former cigarette smokers (20.2%), and non-smokers (13.1%). The estimated prevalence of moderate and severe periodontitis in current or former cigar/pipe smokers was 17.6%. Cigar/pipe smokers had on average 4 missing teeth. Multiple regression analysis also showed that current tobacco smokers may have increased risks of having moderate and severe periodontitis than former smokers. However, smoking behaviors explained only small percentages (<5%) of the variances in the multivariate models.

Cepeda-Benito A, Ferrer AR(2000)[18]

A total of 212 Spanish smokers completed a Spanish version of a smoking questionnaire based on the Smoking Consequences Questionnaire--Adult (A. L. Copeland, T. H. Brandon, & E. P. Quinn, 1995) and a nicotine dependence (ND) measure. Confirmatory factor analysis results supported an a priori defined 8-factor structure. The results also indicated good internal consistency for the instrument and the scales derived from each factor. Positive outcome smoking expectancies scales were significantly and substantially associated with ND scores. Also, after controlling for the influence of ND, the authors found higher smoking expectancies in women than in men in (a) weight control, (b) craving reduction and addictiveness, and (c) negative-affect reduction. The results support the instrument's construct validity.

of periodontitis cases among adults in the United States. A large proportion of adult periodontitis may be preventable through prevention and cessation of cigarette smoking

Warren CW (2000) et al[21] Conducted a study Tobacco use by youth: a surveillance report from the Global Youth Tobacco Survey project. The Global Youth Tobacco Survey (GYTS) project was developed by the World Health Organization and the US Centers for Disease Control and Prevention to track tobacco use among youth in countries across the world, using a common methodology and core questionnaire. The GYTS is school based and employs a two-stage sample design to produce representative data on smoking among students aged 13-15 years. The first stage consists of a probabilistic selection of schools, and the second consists of a random selection of classes from the participating schools. The findings showed that tobacco use in the surveyed age group ranged from a high of 33% to a low of 10%. While the majority of current smokers wanted to stop smoking, very few were able to attend a cessation program. In most countries the majority of young people reported seeing advertisements for cigarettes in media outlets, but anti-tobacco advertising was rare. The majority of young people reported being taught in school about the dangers of smoking. Environmental tobacco smoke exposure was very high in all countries. These results show that the GYTS surveillance system is enhancing the capacity of countries to design, implement, and evaluate tobacco prevention and control programmes.

Chen X, Wolff L, Aeppli D, Guo Z, Luan W, Baelum V, Fejeskov O.2001[22] The primary purpose of this study was to determine the association of salivary and gingival crevicular fluid (GCF) cotinine levels with periodontal disease status in smokers and non-smokers.147 male smokers and 30 male non-smokers were included in the current

longitudinal study. The 177 individuals were part of a group of 200 subjects (89%) seen 10 years previously for a baseline survey. Oral hygiene indices, probing depth and attachment loss were recorded. Salivary and GCF cotinine levels of 58 smokers were determined by means of ELISA. Results indicated that no significant difference was found in subjects who smoked, when compared to subjects who did not smoke with respect to plaque accumulation and calculus deposits. Smokers, however, had fewer gingival bleeding sites. Cigarette smoking was associated with a greater increase in probing depth and attachment loss, as well as greater tooth loss at an earlier age. There was greater tooth loss in smokers than non-smokers ($p < 0.001$). 11 smokers became edentulous, while only 1 non-smoker lost all his teeth within 10 years. The degree of periodontal tissue breakdown was different in each age group with greater periodontal deterioration as age increased. All smokers had detectable salivary and GCF cotinine. Mean GCF cotinine was about 4x higher than mean salivary cotinine levels. Individuals who smoked > or = 20 pack years when compared to <20 pack years, had significantly higher saliva and GCF cotinine levels ($p <$ or $= 0.05$). Neither salivary cotinine nor GCF cotinine was significantly correlated with probing depth, attachment loss and tooth loss ($p > 0.05$).

Haffajee AD, Socransky SS(2001)[23]The present investigation examined clinical features of periodontal disease and patterns of attachment loss in adult periodontitis subjects who were current, past or never smokers. 289 adult periodontitis subjects ranging in age from 20-86 years with at least 20 teeth and at least 4 sites with pocket depth and/or attachment level >4 mm were recruited. Smoking history was obtained using a questionnaire and was found that the current smokers had significantly more attachment loss, missing teeth,

deeper pockets and fewer sites exhibiting bleeding on probing than past or never smokers. Current smokers had greater attachment loss than past or never smokers whether the subjects had mild, moderate or severe initial attachment loss. Increasing age and smoking status were independently significantly related to mean attachment level and the effect of these parameters was additive. Mean attachment level in non smokers <41 years and current smokers >49 years was 2.49 and 4.10 mm respectively. Stepwise multiple linear regression indicated that age, pack years and being a current smoker were strongly associated with mean attachment level. Full mouth attachment level profiles indicated that smokers had more attachment loss than never smokers particularly at maxillary lingual sites and at lower anterior teeth.

Hashim R, Thomson WM, Pack AR (2001)[24] The aim of this study was to examine the role of chronic exposure to cigarette smoking as a risk factor for greater prevalence and extent of periodontal loss of attachment among 26-year-old participants in a longstanding prospective cohort study. Loss of attachment (LOA) was measured at three sites per tooth in two randomly selected contra lateral quadrants (one upper, one lower). Cigarette smoking history was obtained at ages 15, 18, 21 and 26, and used to categories participants as "never-smokers", "ever-smokers", "long-term smokers" or "very long term smokers". Periodontal data were available for 914 Study members, among whom the prevalence of LOA of 4+mm was 19.4%. Among those who smoked at ages 15, 18, 21 and 26, it was 33.6%, and, after controlling for sex, self care and dental visiting, they were nearly three times as likely to have one or more sites with 4+mm LOA. Chronic exposure to smoking was found to be a strong predictor of periodontal disease prevalence in young adults.

RK Chadda and SN Sengupta (2003)[27] conducted a study to determine Tobacco use by Indian adolescents. Adolescents are the most vulnerable population to initiate tobacco use. It is now well established that most of the adult users of tobacco start tobacco use in adolescence. There has been a perceptible fall in smoking in the developed countries after realization of harmful effects of tobacco. The tobacco companies are now aggressively targeting their advertising strategies in the developing countries like India. Adolescents often get attracted to tobacco products because of such propaganda. There has been a rapid increase in trade and use of smokeless tobacco products in recent years in the country, which is a matter of serious concern to the health planners. It is important to understand various factors that influence and encourage young teenagers to start smoking or to use other tobacco products. The age at first use of tobacco has been reduced considerably. However, law enforcing agencies have also taken some punitive measures in recent years to curtail the use of tobacco products. This paper focuses on various tobacco products available in India, the extent of their use in adolescents, factors leading to initiation of their use, and the preventive strategies, which could be used to deal with this menace.

Bergström J (2004)[28] Tobacco smoking is the main risk factor associated with chronic destructive periodontal disease. No other known factor can match the strength of smoking in causing harm to the periodontium. The harmful effects manifest themselves by interfering with vascular and immunologic reactions, as well as by undermining the supportive functions of the periodontal tissues. Depending on the definition of disease and the exposure to smoking, the risk is 5- to 20-fold elevated for a smoker compared to a never-smoker. For a smoker exposed to heavy long-life smoking, the risk of attracting

destructive periodontal disease is equivalent to that of attracting lung cancer. The outcome of periodontal treatment is less favorable or even unfavorable in smokers. This contention is valid irrespective of treatment modality, suggesting that smoking will interfere with an expected normal outcome following commonplace periodontal therapies. As a consequence, the elevated morbidity in smokers does not depend on particular microflora. The mechanisms behind the destructive effects of smoking on the periodontal tissues, however, are not well understood. It has been speculated that interference with vascular and inflammatory phenomena may be one potential mechanism. Nicotine and carbon monoxide in tobacco smoke negatively influence wound healing. Smoking research has revealed that environmental and lifestyle factors are involved in the onset and progression of the disease. Thus, chronic destructive periodontal disease in smokers is initiated and driven by smoking. Its progression may or may not be amplified by unavoidable microbial colonization.

Erdemir EO[1], Duran I, Haliloglu S(2004)[29]

Smoking is an important environmental risk factor for the initiation and progression of periodontal diseases. The aim of this study was to evaluate the effects of smoking on clinical parameters and the gingival crevicular fluid (GCF) contents of the pro-inflammatory cytokines interleukin-6 (IL-6) and tumor necrosis factor-alpha (TNF-alpha) levels in patients with chronic periodontitis. The study base consisted of 41 patients including 22 volunteer current smokers with an age range of 32-59 (44.41+/-7.88) years and 19 volunteer non-smokers with an age range of 36-59 (46.94+/-6.07) years. The first month after non-surgical periodontal therapy was accepted as the baseline of the study. The clinical parameters including plaque index (PI), gingival index (GI), bleeding on

probing (BOP), probing depth (PD), clinical attachment loss (CAL) were recorded and GCF samples were collected for analysis of GCF contents of IL-6 and TNF-alpha levels. At the 3rd and 6th months, all of these procedures were repeated. It was found that in smokers, only CAL was significantly higher at the 3rd month compared with non-smokers ($p<0.05$). GI and BOP were higher in non-smokers than smokers in both periods ($p<0.05$). PI showed increases from the initial to the 6th month in smokers ($p<0.05$). Although the differences between two groups with regard to IL-6 and TNF-alpha were not significant ($p>0.05$), the total amount of TNF-alpha in GCF decreased from the initial to the 6th month in smokers ($p<0.05$). There were no significant correlations between the mean total amount of IL-6 and TNF-alpha in GCF and clinical parameters in both evaluation periods in smokers ($p>0.05$).The present study demonstrated that cigarette smoking increases the amount of dental plaque over time in smokers and does not influence GCF contents of IL-6 and TNF-alpha.

Albandar JM (2005) et al [30] conducted a study to assess epidemiology and risk factors of periodontal diseases. Periodontal diseases are chronic inflammatory disorders encompassing destructive and nondestructive diseases of the periodontal supporting tissues of teeth. Gingivitis is a nondestructive disease ubiquitous in populations of children and adults globally. Aggressive periodontitis is characterized by severe and rapid loss of periodontal attachment often commencing at or after the circumpubertal age and is more prevalent among Latin Americans and subjects of African descent, and least common among Caucasians. Chronic periodontitis is a common disease and may occur in most age groups, but is most prevalent among adults and seniors world-wide.it was found that approximately 48% of United States adults have chronic periodontitis, and similar or

higher rates have been reported in other populations. Moderate and advanced periodontitis is more prevalent among the older age groups and rates of 70% or more have been reported in certain populations. It was also found that Chronic and aggressive periodontitis are multifactorial diseases caused primarily by dental plaque microorganisms, and with important modifying effects from other local and systemic factors. The study of the significance of demographic, environmental, and biologic variables is important for risk assessment and the control of periodontal diseases

Baljoon M(2005)[31] conducted a with an objective to investigate the relationship between tobacco smoking and vertical periodontal bone loss cross-sectionally and longitudinally. All participants had a full set of intra-oral radiographs including 16 periapical and 4 bitewing projections that were assessed with regard to presence or absence of vertical defects. It was found that the number of defects per person increased with age. Vertical defects were more common in the posterior as compared to the anterior region of the dentition and the distribution of defects within the maxilla as well as the mandible typically revealed right-left hand side symmetry. Cigarette smoking was significantly associated with the prevalence and severity of vertical bone defects. The relative risk associated with cigarette smoking was 2 to 3-fold increased. The impact of water pipe smoking was of the same magnitude as that of cigarette smoking and the relative risk associated with water pipe smoking was 6-fold increased compared to non-smoking. In addition, the risk of vertical defects increased with increased exposure in cigarette smokers as well as water pipe smokers.

Glorian Sorensen, PhD, Prakash C. Gupta, DSc, FACE, and Mangesh S. Pednekar (2005)[32] conducted a study to assess social disparities in the prevalence of overall

tobacco use, smoking, and smokeless tobacco use in Mumbai, India, by examining occupation, education, and gender-specific patterns. Data were derived from a cross-sectional survey conducted between 1992 and 1994 as the baseline for the Mumbai Cohort Study (n=81837).Odds ratios (ORs) for overall tobacco use according to education level (after adjustment for age and occupation) showed a strong gradient; risks were higher among illiterate participants (male OR = 7.38, female OR = 20.95) than among college educated participants. After age and education had been controlled, odds of tobacco use were also significant according to occupation; unskilled male workers (OR = 1.66), male service workers (OR = 1.32), and unemployed individuals (male OR = 1.84, female OR = 1.95) were more at risk than professionals.

Lung ZH, Kelleher MG, Porter RW, Gonzalez J, Lung RF(2005)[33] This study was done to investigate patients' knowledge of the effects of smoking on periodontal health. One thousand patients attending restorative consultant clinics and primary dental care were included in this study. Patients who attended GKT Dental Institute, King's College, London for dental treatment. Patient answered questionnaires, which were anonymous.Results showed that 78% of patients were aware that smoking had a negative impact on health. However, 52% of these patients who were aware could not state what the negative effects were on oral health. Seven per cent of patients stated that smoking affected the gums but did not state how it affected the gums. Only 6% of respondents knew specifically of the link between smoking and periodontal disease. The only statistically significant factors associated with increased awareness were smoking status, ie being a non-smoker and being registered with a general dental practitioner. Non-smokers and those registered with GDPs were more likely to be aware of the association

between smoking and periodontal diseases. This study highlighted patients' lack of awareness of the relationship between smoking and periodontal diseases, with only 6% of respondents knowing of the link between tobacco and periodontal diseases.

Natto SB (2005)[34]conducted a study in Saudi Arabian population to explore whether water pipe smoking is associated with periodontal health in a manner similar to cigarette smoking.355 residents in Jeddah City, Saudi Arabia, were invited to participate in the study, 100 women and 255 men (17-60 years). A standardized questionnaire and digital panoramic dental radiographs were taken. It was found in this study that tobacco smoking is associated with a suppression of the gingival bleeding response to plaque accumulation. A suppressive effect was observed in both cigarette and water pipe smokers compared to non-smokers. Both cigarette and water pipe smoking were associated with the presence of more than 10 pockets of ≥ 5 mm probing depth. The relative risk for periodontal disease was 5.1-fold and 3.8-fold increased in water pipe and cigarette smokers, respectively, compared to non-smokers ($p < 0.01$). The relative risk associated with heavy smoking was about 8-fold elevated in water pipe smokers and 5-fold elevated in cigarette smokers, suggesting an exposure-response effect. Tobacco smoking was associated with a reduction of the periodontal bone height. The reduction was of similar magnitude in water pipe smokers and cigarette smokers. The relative risk of periodontal bone loss of more than 30% of the root length was 3.5-fold and 4.3-fold elevated in water pipe and cigarette smokers, respectively, compared to non-smokers ($p < 0.01$). The relative risk associated with heavy smoking was 7.5-fold elevated in water pipe smokers and 6.3-fold elevated cigarette smokers. it was also found that cigarette smokers, water pipe smokers and non-smokers exhibited similar periodontal microflora .

Palmer RM, Wilson RF, Hasan AS, Scott DA (2005)[35]

This study was conducted to review the potential biological mechanisms underlying the effects of tobacco smoking on periodontitis. This study found that smoking has major effects on the host response, but there are also a number of studies that show some microbiological differences between smokers and non-smokers. Smoking has a long-term chronic effect on many important aspects of the inflammatory and immune responses. Smoking induces a significant systemic neutrophilia, but neutrophil transmigration across the periodontal microvasculature is impeded. Protease release from neutrophils may be an important mechanism in tissue destruction. Tobacco smoke has been found to affect both cell-mediated immunity and humoral immunity. Research on gingival crevicular fluid has demonstrated that there are lower levels of cytokines, enzymes and possibly polymorphonuclear cells in smokers.

Preshaw PM, Heasman L, Stacey F, Steen N, McCracken GI, Heasman PA(2005)[36] did a study to evaluate longitudinally the effect of smoking cessation on clinical and radiographic outcomes following non-surgical treatment in smokers with chronic periodontitis. 49 smokers with chronic periodontitis who wished to quit smoking were recruited. Full-mouth probing depths, bleeding and plaque data were recorded at baseline, 3, 6 and 12 months. After 12 months, it was found that of patients with complete data, 10 had continuously quit smoking (20% of the original population), 10 continued smoking and six were oscillators (those patients who quit and then relapsed). There were no differences between the groups following treatment with respect to mean clinical or radiographic parameters. Analysis of probing depth reductions between baseline and month 12, however, and comparing quitters with the other two groups combined,

demonstrated a significant difference in favour of quitters (p<0.05). Furthermore, quitters were significantly more likely to demonstrate probing depth reductions > or =2 and > or =3 mm than non-quitters and oscillators (p<0.05).

Torrungruang K , Nisapakultorn K, Sutdhibhisal S, Tamsailom S, Rojanasomsith K, Vanichjakvong O, et al (2005)[37] The aim of this study was to determine the effect of cigarette smoking on the severity of periodontitis in a cross-sectional study of older Thai adults. The study population consisted of 1,960 subjects (age 50 to 73 years old). All subjects received both medical and dental examinations. Periodontal examinations, including plaque score, probing depth, and clinical attachment level, were done on all teeth present in two diagonal quadrants. Sociodemographic characteristics and smoking status were obtained by questionnaires. Multinomial logistic regression was used to address the association between cigarette consumption and mean clinical attachment level. In this study population, 48.7% were non-smokers, 14.4% were current smokers, and 36.9% were former smokers. Current smokers had higher percentage of sites with plaque, deeper mean probing depth, and greater mean clinical attachment level than former smokers and non-smokers. The odds of having moderate and severe periodontitis for current smokers were 1.7 and 4.8 times greater than non-smokers, respectively. Former smokers were 1.8 times more likely than non-smokers to have severe periodontitis. Quitting smoking reduced the odds of having periodontitis. For light smokers (<15 packyear), the odds for severe periodontitis reverted to the level of non-smokers when they had quit smoking for > or =10 years. For moderate and heavy smokers (> or =15 packyear), the odds of having severe periodontitis did not differ from those of non-smokers when they had quit smoking for > or =20 years.

Heasman L, Stacey F, Preshaw PM, McCracken GI, Hepburn S, Heasman PA(2006)[38]Smoking has been identified as a significant risk factor for periodontal diseases and is regarded as being responsible for incomplete or delayed healing in patients following treatment. The aim of this conventional review was to review, collate and tabulate the relative effectiveness of treatments of chronic periodontitis in smokers, non-smokers and ex-smokers.it was found that the majority of clinical trials show significantly greater reductions in probing depths and bleeding on probing, and significantly greater gain of clinical attachment following non-surgical and surgical treatments in non-smokers compared with smokers. This benefit is also seen at class I and II furcation sites and in patients prescribed systemic or local antimicrobial treatments. Data from epidemiological, cross-sectional and case-control studies strongly suggest that quitting smoking is beneficial to patients following periodontal treatments. The periodontal status of ex-smokers following treatment suggests that quitting the habit is beneficial although there are only limited data from long-term longitudinal clinical trials to demonstrate unequivocally the periodontal benefit of quitting smoking.

Katono T, Kawato T, Tanabe N, Suzuki N, Yamanaka K, Oka H, Motohashi M, Maeno M (2006)[39] result of this study showed that nicotine affected mineralized nodule formation, and that nicotine and lipopolysaccharide stimulated the formation of osteoclast-like cells by increasing production of macrophage colony-stimulating factor (M-CSF) and prostaglandin E2 (PGE2) by human osteoblastic Saos-2 cells. In the present study, we examined the effects of nicotine on the expression of matrix metalloproteinases (MMPs), tissue inhibitors of matrix metalloproteinases (TIMPs), the plasminogen activation system including the component of tissue-type plasminogen activator (tPA),

urokinase-type PA (uPA), and PA inhibitor type 1 (PAI-1), alpha7 nicotine receptor, and c-fos. We also examined the effect of the nicotine antagonist D-tubocurarine on nicotine-induced expression of MMP-1. Gene expression was examined using real-time polymerase chain reaction (PCR) to estimate mRNA levels. In addition, expression of the MMP, TIMP, uPA, tPA, and PAI-1 proteins was determined by Western blotting analysis. Nicotine treatment caused expression of MMP-1, 2, 3, and 13, but not MMP-14, to increase significantly after 5 or 10 d of culture; MMP-14 expression did not change through day 14. Enhancement of MMP-1 expression by nicotine treatment was eliminated by simultaneous treatment with D-tubocurarine. In the presence of nicotine, expression of uPA, PAI-1, or TIMP-1, 2, 3, or 4 did not change over 14 d of culture, whereas expression of tPA increased significantly by day 7. Nicotine also increased expression of the alpha7 nicotine receptor and c-fos genes. These results suggest that nicotine stimulates bone matrix turnover by increasing production of tPA and MMP-1, 2, 3, and 13, thereby tipping the balance between bone matrix formation and resorption toward the latter process.

Nasry HA, Preshaw PM, Stacey F, Heasman L, Swan M, Heasman PA(2006)[40] The purpose of this study was to determine quit rates for smokers with chronic periodontitis who were referred to a dental hospital for treatment. Forty-nine subjects with chronic periodontitis who smoked cigarettes were recruited. All subjects received periodontal treatment and smoking cessation advice as part of an individual, patient-based programme provided by dental hygienists trained in smoking cessation counselling. Smoking cessation interventions included counselling (all patients), and some patients also received nicotine replacement therapy (NRT) and/or Zyban medication. Smoking

cessation advice was given at each visit at which periodontal treatment was undertaken (typically four to six visits) over a period of 10-12 weeks. Smoking cessation advice was also given monthly during the programme of supportive periodontal care over the following nine months. Smoking status was recorded at three, six and 12 months and was confirmed with carbon monoxide (CO) monitors and salivary cotinine assays. 41%, 33%, 29% and 25% of patients had stopped smoking at week four, months three, six and 12, respectively. Gender, age, the presence of another smoker in the household, and baseline smoking status (determined using subject-reported pack years of smoking) were not significant predictors of quit success (P < 0.05). Baseline CO levels were significantly associated with quit success, however, and were significantly higher in those subjects who continued to smoke compared to those subjects who were quitters at week four, month three and month six (P < 0.05).

Coleman T, Wilson A, Barrett S, Wynne A, Lewis S(2007)[41]data collected during a research project which involved questionnaires on smoking being distributed to patients before and after appointments with general practitioners (GPs) is analyzed to investigate the impact of this data collection method on doctors' documenting of smoking advice in medical records. Researchers distributed questionnaires on smoking behaviour to 6775 patients who attended consultations during surgery sessions with 32 GPs based in Leicestershire, UK. We obtained the medical records for patients who had attended these surgery sessions and also for a comparator group, during which no researcher had been present. Authors compared the documenting of advice against smoking in patient's medical records for consultations within GPs' surgery sessions where questionnaires had been distributed with those which occurred when no questionnaires had been given out.

Study obtained records for 77.9% (5276/6775) of all adult patients who attended GPs' surgery sessions, with 51.9% (2739) being from sessions during which researchers distributed questionnaires. Discussion of smoking was recorded in 8.0% (220/2739) of medical records when questionnaires were distributed versus 4.6% (116/2537) where these were not. After controlling for relevant potential confounders including patients' age, gender, the odds ratio for recording of information in the presence of questionnaire distribution (versus none) was 1.78 (95% CI, 1.36 to 2.34). This has implications for the design of some types of research into addictive behaviors and further research into how data collection methods may affect patients' and doctors' behaviors is warranted.

Haffajee AD, Socransky SS (2007)[42] This study was done to examine clinical features of periodontal disease and patterns of attachment loss in adult periodontitis subjects who were current, past or never smokers. 289 adult periodontitis subjects ranging in age from 20-86 years with at least 20 teeth and at least 4 sites with pocket depth and/or attachment level >4 mm were recruited. Smoking history was obtained using a questionnaire. Measures of plaque accumulation, overt gingivitis, bleeding on probing, suppuration, probing pocket depth and probing attachment level were taken at 6 sites per tooth at all teeth excluding 3rd molars at a baseline visit and was found that current smokers had significantly more attachment loss, missing teeth, deeper pockets and fewer sites exhibiting bleeding on probing than past or never smokers, greater attachment loss than past or never smokers whether the subjects had mild, moderate or severe initial attachment loss. Increasing age and smoking status were independently significantly related to mean attachment level and the effect of these parameters was additive. Mean attachment level in non smokers <41 years and current smokers >49 years was 2.49 and

4.10 mm respectively. Full mouth attachment level profiles indicated that smokers had more attachment loss than never smokers particularly at maxillary lingual sites and at lower anterior teeth.

Thomson WM, Broadbent JM, Welch D, Beck JD, Poulton R(2007)[43] Conducted a study to assess periodontal problems among 32-year-olds cigarette smokers. Periodontal examinations was conducted at ages 26 and 32 in a longstanding prospective study in Dunedin (New Zealand) in 1972/1973. Longitudinal categorization of smoking exposure was undertaken using data collected at ages 15, 18, 21, 26 and 32. Result showed that Current and long-term smoking in young adults is detrimental to periodontal health, but smoking cessation may be associated with a relatively rapid improvement in the periodontium.

Rosa GM et al(2008)[44] conducted a study with a purpose to evaluate the effect of smoking on alveolar bone in young adults. 81 dental students (mean age: 20.5 years), considered not to have periodontitis according to clinical criteria, participated in this study. 42 subjects were smokers, and 39 subjects had never smoked. A parallel-arm prospective design was used. The following clinical variables were measured before and after the DHP (dental hygiene program), plaque index (PI), gingival crevicular fluid (GCF) flow rate, gingival index (GI), probing depth, and clinical attachment level (CAL). Standardized posterior vertical bitewing radiographs were taken and digitized pre-experimentally and on days 180, 365, and 545 and was found that the mean PI and GI were significantly greater in the smokers (P <0.01). The mean GCF flow rate was significantly lower in the smokers (P <0.01). CAL and the number of sites with recession were significantly greater in the smokers (P <0.001). The BHM indicated a significantly

lower mean alveolar bone height in the smokers (P <0.01). The smokers showed significantly lower bone density. The smokers had a significantly higher mean percentage of sites that had decreased density, as assessed by DSR (P <0.001). The mean percentage of sites with decreased density, as assessed by DSR, had increased significantly by days 365.

Vered Y, Livny A, Zini A, Sgan-Cohen HD(2008)[45] conducted a study with the aim to evaluate the periodontal status and present smoking habits among a representative sample of young adult Israelis and to investigate possible associations.A representative sample of young adult Israelis was examined and interviewed on the day of release from compulsory military service. Clinical examination included the recording of periodontal health status according to the Community Periodontal Index (CPI). Seven thousand and fifty-six young adults were examined. Sixteen per cent were classified as CPI 0, 78% as CPI 1-2 and 6% as CPI 3-4. In total, 36% of the sample reported a current smoking habit. Periodontal status was significantly improved among non-smokers, females and children of fathers born in Israel or Western countries.

Al-Habashneh R, Al-Omari MA, Taani DQ (2009)[46] Conducted a study with an aim to assess the relationships between aggressive periodontitis (AgP), caries and smoking.A cross-sectional study was conducted among patients who were specifically referred to the Dental Teaching Clinic in Irbid, Jordan for periodontal treatment. Self-administered questionnaire related to socio-demographic data and smoking habits was completed. The oral hygiene, gingival status, periodontal health and dental status of the participants was determined by using the plaque index of Silness and Loe, the gingival index of Loe and Silness, clinical attachment level (CAL) and decayed, missing and filled teeth (DMFT)

The authors **D. K. Gautam, Vikas Jindal, S. C. Gupta, Amrinder Tuli, Bhanu Kotwal, and Rambhika Thakur(2011)**[49] conducted a cross sectional study to determine effect of cigarette smoking on the periodontal health status was assessed bin a comparative, on 400 males aged 18-65 years (200 smokers 200 non- smokers) in to evaluate the periodontal health status among cigarette smokers and non cigarette smokers, and oral hygiene measures. The subjects were randomly selected from the patients attending dental out-patient department of civil hospital and Himachal Dental College, Sundernagar. Community Periodontal Index (CPI) score was recorded for each patient and a questionnaire was completed by each patient. Periodontal condition as assessed by CPI score showed that there was statistically significant difference in the findings between cigarette smokers and non-smokers. It was found that cigarette smoking was associated with lesser gingival bleeding and deeper pockets as compared to non-smokers and non smokers are more likely to have gingival bleeding, cigarette smokers more likely to have calculus present, non smokers more likely to have shallow pockets when compared to smokers.

This study also found that mean tooth brushing frequency in cigarette smokers was slightly higher compared with the non smoker group, but was not found to be statistically significant. Cigarette smokers also reported that they brushed their teeth for longer than non smokers. The tooth brushing time per minute was not statistically significant.

Matthews JB, Chen FM, et al(2011)[50]Aim of this study was to determine the effect of nicotine, cotinine and cigarette smoke extract (CSE) on the neutrophil respiratory burst and their effect on activation of the nuclear factor-κB (NFκB) pathway in oral epithelium, and was found that smoke extract alone caused increased neutrophil extracellular

isoluminol-dependent chemiluminescence, not detectable with luminol. However, pre-treatment with smoke extract reduced both total and extracellular reactive oxygen species (ROS) generation in response to all stimuli. Nicotine and cotinine had no effect on the neutrophil respiratory burst. Smoke extract, nicotine and cotinine did not induce oral epithelial cell NFκB activation. These data demonstrated that smoke extract reduces the ability of neutrophils to generate ROS after stimulation with F. nucleatum and IgG-opsonized S. aureus but, at high concentrations, stimulates extracellular ROS generation. During periodontitis, cigarette smoking may differentially affect neutrophil function, generally preventing elimination of periodontal pathogens but, in heavy smokers, also stimulating ROS release and oxidative stress mediated tissue damage.

Torrungruang K, Nisapakultorn K, et al (2011)[51]The aim of this study was to determine the effect of cigarette smoking on the severity of periodontitis in a cross-sectional study of older Thai adults.

The study population consisted of 1,960 subjects (age 50 to 73 years old). All subjects received both medical and dental examinations. In this study population, 48.7% were non-smokers, 14.4% were current smokers, and 36.9% were former smokers. Current smokers had higher percentage of sites with plaque, deeper mean probing depth, and greater mean clinical attachment level than former smokers and non-smokers. The odds of having moderate and severe periodontitis for current smokers were 1.7 and 4.8 times greater than non-smokers, respectively. Former smokers were 1.8 times more likely than non-smokers to have severe periodontitis. Quitting smoking reduced the odds of having periodontitis. For light smokers (<15 packyear), the odds for severe periodontitis reverted to the level of non-smokers when they had quit smoking for ≥10 years. For moderate and

Desiraju K (2012)et al[54] The present study examined beliefs about the harms of smoking and the impact of health knowledge on intentions to quit among a sample of 249 current smokers in both urban and rural areas in two states (Maharashtra and Bihar) from the 2006 TCP India Pilot Survey, conducted by the ITC Project. The overall awareness among smokers in India of the specific health risks of smoking was very low compared to other ITC countries, and only 10% of respondents reported that they had plans to quit in the next six months. In addition, smokers with higher knowledge were significantly more likely to have plans to quit smoking. For example, 26.2% of respondents who believed that smoking cause CHD and only 5.5% who did not believe that smoking causes CHD had intentions to quit ($\chi 2 = 16.348$, $p < 0.001$). Important differences were also found according to socioeconomic factors and state: higher levels of knowledge were found in Maharashtra than in Bihar, in urban compared to rural areas, among males, and among smokers with higher education. These findings highlight the need to increase awareness about the health risks of smoking in India, particularly in rural areas, where levels of education and health knowledge are lower.

Prabhakar B, Narake SS, Pednekar MS (2012)[55] Conducted a study to assess social disparities in tobacco use, smoking, and smokeless tobacco use by examining occupation-, education-, and gender-specific patterns. Three-stage sampling in urban areas and two-stage sampling in rural areas for selection of households. Data has been derived from GATS 2009-2010, wherein the sample was collected through household interviews and was found, as a person entered adulthood, the prevalence of ever tobacco use increased by 51.5% among men and 28.8% among women. Prevalence was 2.5 times higher in men (mainly smoking) as compared to women (predominantly smokeless form). ORs for

tobacco use were higher among illiterate respondents as compared to the college educated (male OR = 4.23, female OR = 8.15). Unemployed, able to work (male OR = 1.50, female OR = 1.23) showed highest risk, while students (male OR = 0.35, female OR = 0.52) showed the least. The combined effect of occupation and education showed synergistic interaction among females and antagonistic interaction among males.

Corsi DJ, Subramanian SV, Lear SA, Teo KK, Boyle MH, Raju PK, Joshi R, Neal B, Chow CK (2013)[56] conducted a study to examine tobacco use and smoking quit rates along gender and socioeconomic dimensions in rural Andhra Pradesh. Data was obtained from a cross-sectional survey. Markers of socioeconomic status (SES) were education, occupation, and income. Regression analyses were undertaken to examine determinants of current smoking, smoking quit rates, tobacco use by type (cigarettes, bidis, and chewing), and quantity consumed (number per day, pack-years). It was found from the present study that the weighted prevalence of current smoking and tobacco chewing was higher in men (50.3%, 95% confidence interval, CI, 48.1-52.6 and 5.0%, 95% CI 4.1-5.9, respectively) compared with women (4.8%, 95% CI 3.9-5.7 and 1.0%, 95% CI 0.6-1.4, respectively) and higher among older age groups. Illiterate individuals were more likely to be current smokers of any type compared to those with secondary/higher education, although cigarette smoking was higher in men of high SES. Smoking quit rates were positively associated with higher education. Level of consumption increased with SES and those with secondary/higher education smoked an additional 1.93 (95% CI 1.08-2.77) cigarettes or bidis per day and had an additional 1.87 (95% CI 0.57-3.17) pack-years compared to illiterates.

significant factors associated with increased awareness were smoking status, i.e. being a non-smoker and being registered with a general dental practitioner. Non-smokers and those registered with GDPs were more likely to be aware of the association between smoking and periodontal diseases. This study highlighted patients' lack of awareness of the relationship between smoking and periodontal diseases, with only 6% of respondents knowing of the link between tobacco and periodontal diseases.

National Center for Chronic Disease Prevention and Health Promotion (US) Office on Smoking and Health.Atlanta (GA): Centers for Disease Control and Prevention (US); 2014[60] it is one of the most important—and widely cited—findings from the 1994 and 2012 Surgeon General's reports on smoking and health was that virtually all cigarette smoking begins before 18 years of age. It was found from the present study that among adults who had ever smoked cigarettes daily, 86.9% had tried their first cigarette by the time they were 18 years of age, while an additional 11.5% did so by 26 years of age. About two-thirds (64.3%) of adults who had ever smoked daily began to do so by 18 years of age, and almost one-third of adults who had ever smoked (22.7%) began to smoke daily between 18–26 years of age. Virtually no initiation of cigarette smoking (<1.5%) and few transitions to daily smoking (<4.3%) actually occurred in adulthood— that is, after 26 years of age. Of note, initiation of cigarette smoking often occurred early in adolescence (before 18 years of age); 13.6% of adults who had ever smoked daily began smoking by age 14, before entering high school.

Esha Bali, BR Chinmaya, Sachin Chand, Shourya Tandon, Sumanth Prasad, Deepsikha Sahu, Sahil Handa (2015)[61] conducted a study with an aim to investigate the characteristics, behavior, and perceptions related to hookah smoking

among the youth smokers in Gurgaon, Haryana. 215 established hookah smokers participated in this study. Data were collected using a 28-item questionnaire, constructed using three main domains: Characteristics (socio demographic and personal), behavior and perceptions (about harmful effects in comparison to cigarette smoking). It was found that the mean age of starting hookah smoking in the present study was 17.3 years. Most of the participants 60-70% had misperception about the safety of hookah smoking over cigarette smoking, and 36-82% participants were unaware of health effects.

Mishra S,Joseph RA, Gupta PC, et al (2015)[62] conducted a study to determine trends in bidi and cigarette smoking in India from 1998to 2015, by age, gender and education and was found that during this period, cigarette smoking in men became about twofold more prevalent at ages 15–69 years and fourfold more prevalent at ages 15–29 years. By contrast, bidi smoking among men at ages 15–69 years fell modestly. The absolute numbers of men smoking any type of tobacco at age 15–69 years rose by about 29 million or 36% in relative terms from 79 million in 1998 to 108 million in 2015. This represents an average increase of about 1.7 million male smokers every year. By 2015, there were roughly equal numbers of men smoking cigarettes or bidis. About 11 million women aged 15–69 smoked in 2015. Among illiterate men, the prevalence of smoking rose (most sharply for cigarettes) but fell modestly among men with grade 10 or more education. The ex-smoking prevalence in men at ages 45–59 years rose modestly but was low, only 5% nationally with about 4 current smokers for every former smoker.

Vandana KL, Nadkarni RD, Guddada K (2015)[63] conducted a study to compare various risk indicators among patients with chronic (CP) and aggressive periodontitis (AP) in Davangere population. Total of 89 CP and 90 AP patients were selected from

outpatient Department of Periodontics, College of Dental Sciences, Davangere. This study demonstrated that AP is manifested early in life in susceptible individuals. Proven risk indicators for AP and CP in the present study population included young age, place of residence, income and education levels, frequency of dental visits. Patients with AP had better oral hygiene habits and oral hygiene index results than patients with CP. Paan chewing and smoking could be considered as risk factors, both in CP and AP cases. The similar association of plaque scores but higher bleeding tendency in AP patients supported the fact of higher susceptibility of AP patients to periodontal breakdown. Malocclusion being present in the majority of cases could also be put forth as a risk factor for AP and CP.

Material and Methods

Present study was done to evaluate the association between tobacco smoking, periodontal health status and early loss of teeth among tobacco smokers and non tobacco smokers of Lucknow.

Study Area

Lucknow is the capital city of Uttar Pradesh. Lucknow elevation is 123.45 m above sea level, spread over an area of 310.1 km^2, with a population of 4,815,601 (2011 census).

It is surrounded on the eastern side by District Barabanki, on the western side by district Unnao, on the southern side by Raebarelli and on the northern side by Sitapur and Hardoi districts. The city is on the northwestern shore of Gomti river, which flows through it.

Study Design

A Cross sectional study was conducted to evaluate the association between tobacco smoking, periodontal health status and early loss of teeth among tobacco smokers and non tobacco smokers of Lucknow.

Ethical Clearance

Ethical clearance was obtained from institutional ethical committee of Babu Banarsi Das College of Dental Sciences, BBDU, Lucknow. Study participants were explained about purpose of the present study and verbal consent was obtained.

Pilot study

A pilot study was conducted on 25 adults aged between 22- 55 years. It was done to assess the validity and feasibility of the study. Pilot study was conducted in the Department of Public Health Dentistry of Babu Banarsi Das College of Dental Sciences. These 25 individuals were not included in the main study.

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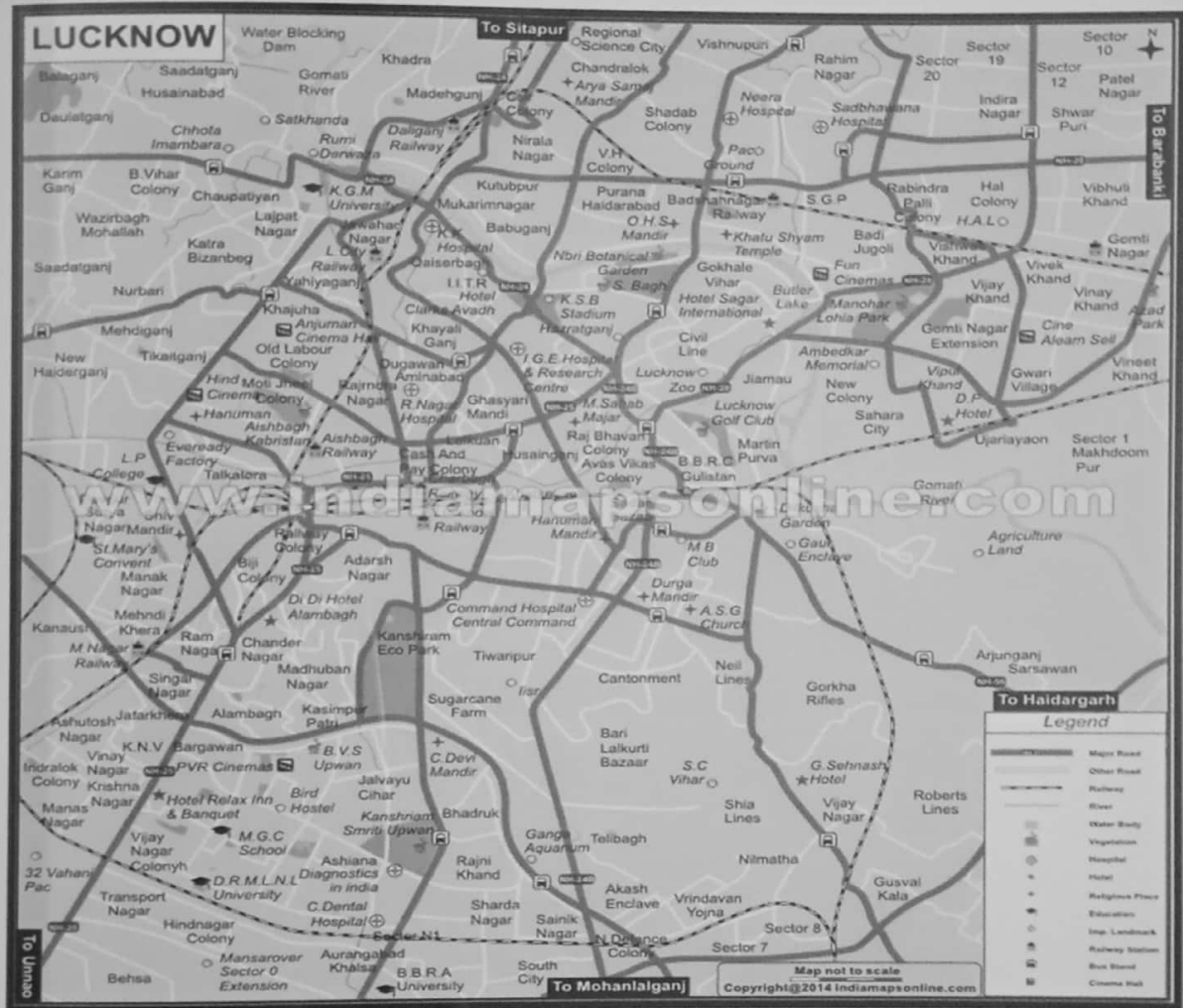
MAP OF LUCKNOW

Schedule of the survey

❖ Survey was scheduled in the month of March- April 2016.

❖ An average of 25-30 students was examined per day.

Sample size estimation

Considering the prevalence of 51% smoking, a sample size of 385 was required to be needed in each group with a precision of 5% and level of confidence of 95%. However, considering the non response rate of 20%, a sample of 465 was minimum required which was rounded to 495 in non smoker and 499 in smoker group.

Sampling Technique

All required information regarding urban, peri urban and rural area was obtained from district map of Lucknow.

In the first stage Lucknow was divided into four zones, East, West, North, South , approximately 22 wards came under each of these geographic zones.

In the second stage, four wards were randomly selected from each zone.

The four wards selected were:

1. East Zone – Indira Nagar, Gomti Nagar,

2. West Zone – Alambagh, Krishnanagar, Chowk, Rajaji Purum

3. North Zone- Khurram Nagar, Jankipuram, Aliganj

4. South Zone- Telibagh, South City, Vrindavan Yojna

Areas were selected from each ward by multistage cluster random sampling technique to conduct dental check up camps. A total of 994 adults were examined and interviewed.

Inclusion criteria

The criteria for choosing patients under smokers group:

- Patient who were smoking since 3 years or more.

- Patients who did not have any known systemic conditions that could influence periodontal therapy or any antibiotic medication during the last 6 months.

  The criteria for choosing patients under non-smokers group:

- Subjects who had not smoked at anytime in their lives.

- Patients who did not have any known systemic conditions that could influence periodontal health.

- Patient must not be subjected to periodontal therapy or any antibiotic medication during the last 6 months.

Exclusion criteria

- Female patients

- Physically debilitated patients

- Patients having Aggressive periodontal disease.

- Medically compromised patients (systemic diseases like diabetes, heart diseases).

Armamentarium

Sufficient number of instruments (30-40) sets were made available toavoid any interruption in the examination. Instrument and materials used are :

- Mouth mirror

- CPITN probe

- Tweezers

- Kidney trays

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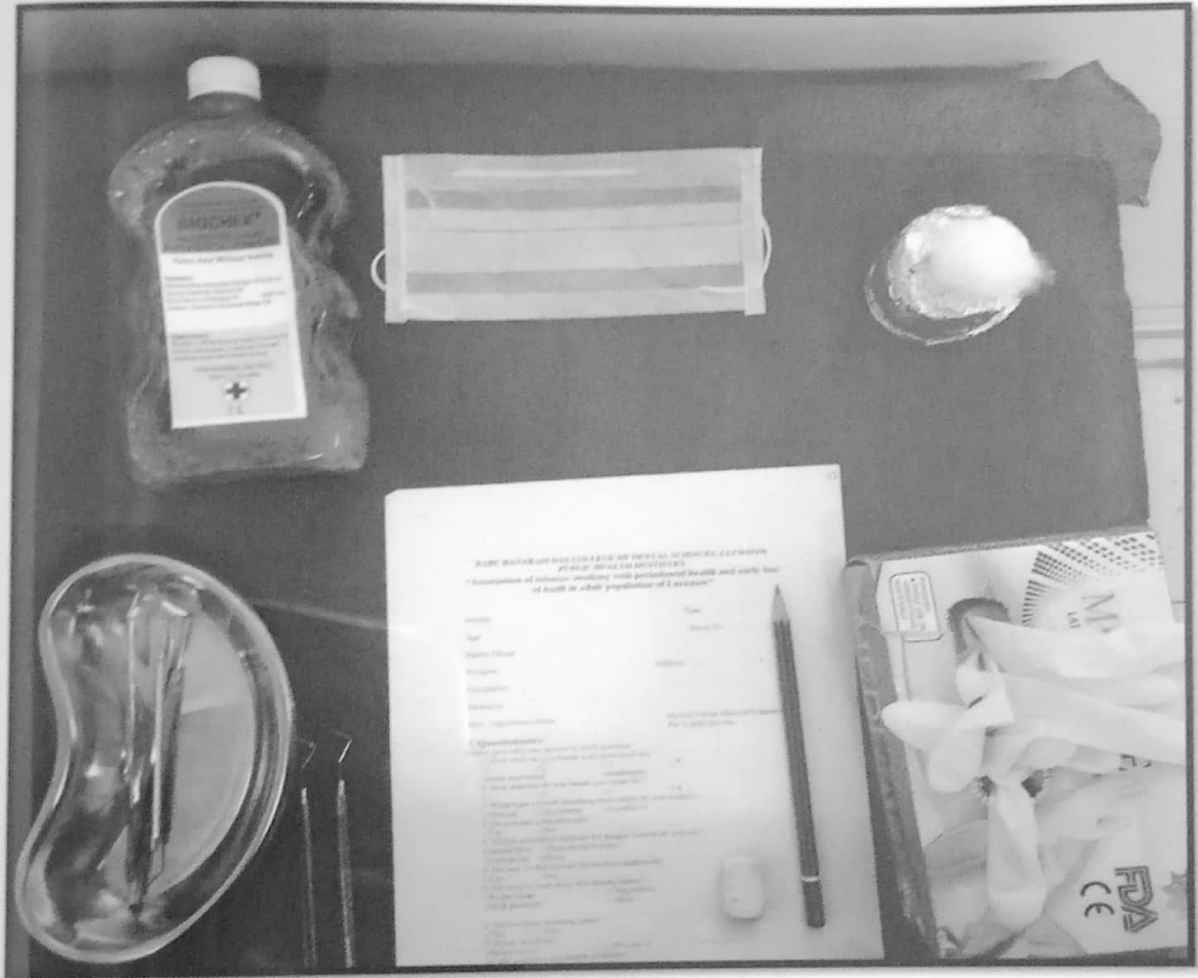
ARMAMENTARIUM

- Disposable Mouth Mask

- Disposable Gloves

- Sterilized cotton and gauze pieces

- Proforma

- Anti septic solution

- Towel

- Soap

Infection control

Sufficient numbers of autoclaved instruments were carried to the examination site to avoid interruption during study. After examination all the instruments were carried back to the college and were autoclaved.

Survey instrument

Data was collected by using a pre tested study specific proforma which was divided into two parts:

First part contained questions on demographic details, occupation, education and income and a questionnaire, following data was obtained from subjects using this questionnaire:

- Frequency and duration of brushing teeth

- Methods of brushing teeth

- use of secondary plaque control aids(mouthwash, dental floss, inter dental brushes etc)

- information regarding diet

- bleeding gum problems

- other health problems

❖ smoking habit related information (history, type and frequency)

Second part included details of clinical examination:

❖ Total numbers of teeth present were recorded

❖ Community Periodontal Indices (CPI) was recorded

Examination Procedure

Type III examination was carried out by investigator herself with the help of a clerk to record the specific findings. The examiner organized camps in various zones of Lucknow on the scheduled dates with one recording clerk. One table along with chairs were arranged by people living in the area of camp organized. The available subjects belonging to age group of 22-55 years were examined and interviewed. Subjects were examined under natural light sitting on the chair provided. The recording clerk was made to sit near the examiner to avoid any disturbance in recording the codes and instruction.

An intern posted in the department of Public Health dentistry was appointed throughout the survey as a recording clerk, who helped in recording the data.

Calibration

Before the start of the survey the examination procedure was standardized for the reliability, variability and reproducibility of data. Prior to the data collection to maintain the consistency of the examination the examiner was trained, calibration exercises were carried out on adults of same age group visiting Babu Banarsi Das College of Dental Sciences, Lucknow. A subsample (10%) of subjects were re-examined for periodontal diseases on the next day to reduce intra examiner variability.

PELLET-3
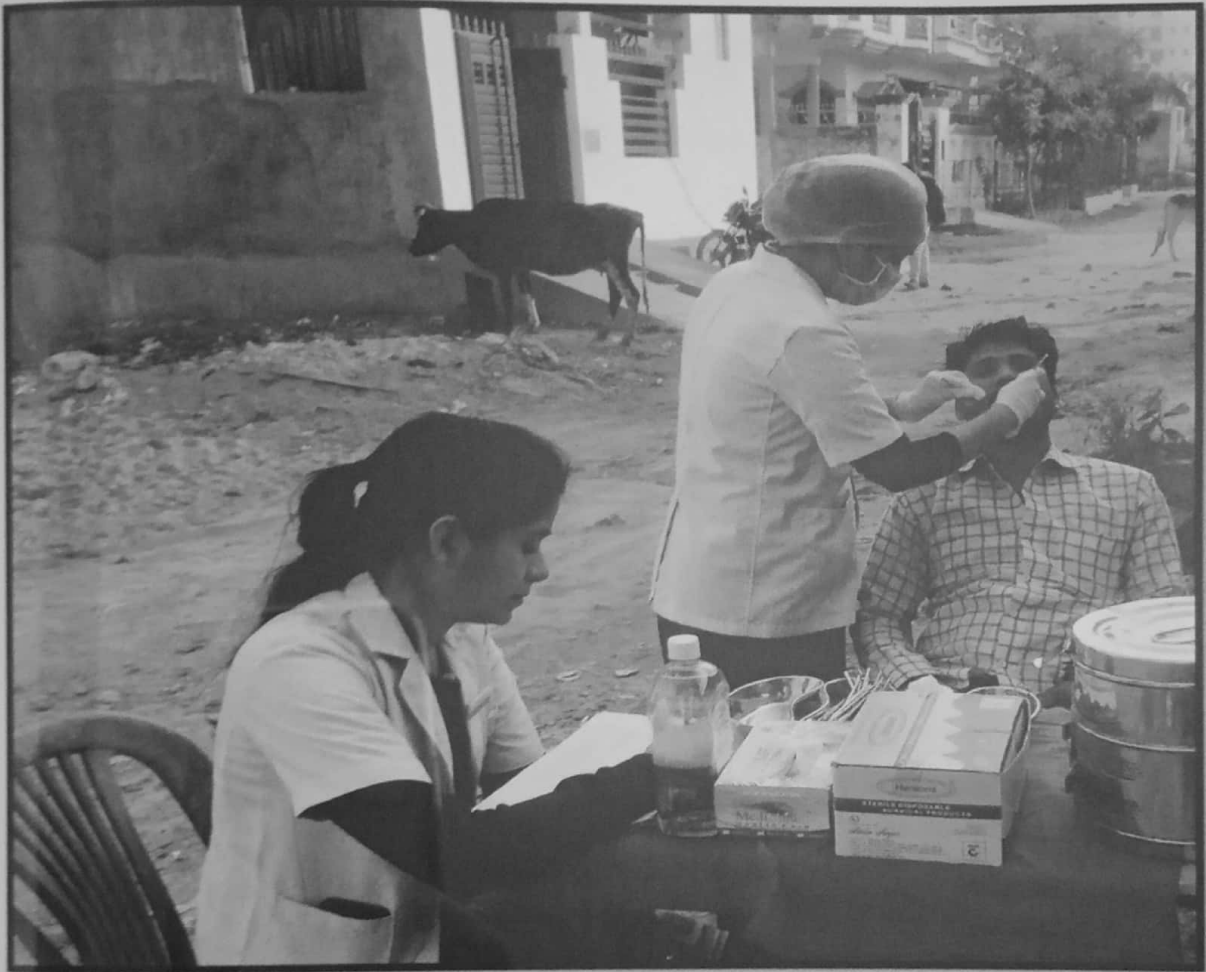
EXAMINATION OF STUDY SUBJECT

TOBACCO COUNSELLING OF A STUDY SUBJECT

INDICES USED IN STUDY

Indices used for dental caries assessment

Community Periodontal Index (CPI) modified[64]

This was introduced by WHO in 1994.Two indicators of periodontal status are used for this assessment are gingival bleeding and periodontal pockets. A specially designed, lightweight CPI metallic probe with a 0.5-mm ball tip is used, with a black band between 3.5 and 5.5 mm, and rings at 8.5 and 11.5 mm from the ball tip. All teeth present in the mouth are examined for absence or presence of gingival bleeding and absence or presence of periodontal pockets; pocket depth is measured with the WHO CPI periodontal probe.

Gingivae of all teeth present in the mouth should be examined by carefully inserting the tip of the WHO CPI probe between the gingiva and the tooth to assess absence or presence of bleeding response. The sensing force used should be no more than 20 g.
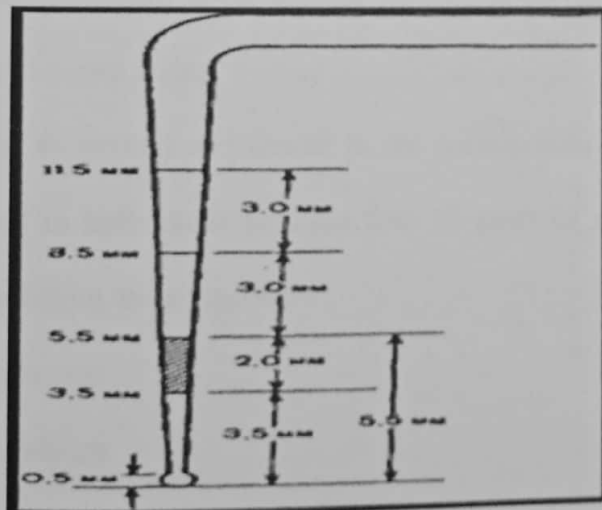
The WHO Community Periodontal Index probe recommended for clinical examination

A practical test for establishing this force is to ask examiners to place the probe point under their thumbnail and press until blanching occurs. Alternatively, examiners can use a mirror and insert the probe into the gingival sulcus of their own anterior teeth using the lightest possible force that will allow movement of the probe ball tip along the tooth surface. These exercises should be conducted as part of the training when examiners are calibrated for reliability and consistency.

When the probe is inserted, the ball tip should follow the anatomical configuration of the surface of the tooth root. If the subject being examined feels pain during probing, this is indicative of the use of too much force. The probe tip should be inserted gently into the gingival sulcus or pocket and the full extent of the sulcus or pocket explored. For example, place the probe in the pocket at the distobuccal surface of the second molar, as close as possible to the contact point with the third molar, keeping the probe parallel to the long axis of the tooth. Move the probe gently, with short upward and downward movements, along the buccal sulcus or pocket, to the mesial surface of the second molar. A similar procedure is carried out for lingual surfaces, starting on the distolingual aspect of the second molar.

All teeth present should be probed and scored in the corresponding box. Periodontal pockets are not recorded in individuals younger than 15 years of age. The codes for scoring bleeding and pocketing are given below:

Gingival bleeding scores

0 = Absence of condition

1 = Presence of condition

9 = Tooth excluded

PELLLET- 5

POSITION OF WHO CPI PROBE IN GINGIVA

X = Tooth not present

Pocket scores

0 = Healthy

1 = Bleeding observed, directly or by using mouth mirror, after probing

2 = calculus detected during probing, but all the black band on the probe visible

3= pocket 4-5 mm (gingival margin within the black band on the probe)

4= pocket 6 mm or more (black band on the probe not visible)

9 = Tooth excluded

X = Tooth not present

17/16	11	26/27
47/46	31	36/37

Statistical Analysis

Statistical Analysis used in the study.

The continuous data were summarized as Mean±SD. A p-value of <0.05 was considered statistically significant. The Chi-square test was used to test whether the variables had normal or non-normal distribution. All the analysis was done using SPSS version 18.

The Standard Deviation

The standard deviation (SD) is the positive square root of the variance, calculated as,

$$SD = \sqrt{\frac{\Sigma X^2 - \frac{(\Sigma X)^2}{n}}{n-1}}$$

Where n= no. of observations

Chi- Square Test

The Chi- Square ($X2$) test is used to compare the categorical data as,

$$X^2 = \sum \frac{(O-E)^2}{E}$$

Where, 0 is the observed frequency while E is the expected frequency. The degrees of freedom (DF) is calculated as,

$$DF=(r-1)(c-1)^{65}$$

Results

The present study determines the Assessment of periodontal health status and loss of teeth among smokers and non- smokers of Lucknow. A total of 994 adults were selected randomly from different areas of Lucknow. Of total 994 individuals, 499 were tobacco smokers and 495 were non- smokers. Assessment of periodontal health was done using CPI (Community Periodontal Index). Oral hygiene and smoking habits were assessed using a questionnaire. Other information i.e. age, address, occupation and income was also recorded in demographic section of proforma. Findings of smokers and non- smokers are summarized separately below.

A. Basic characteristics (age groups, residential areas)

Table 1 depicts the residential area wise distribution of the adults that were included in the study. In non- smokers group maximum population was from urban area (47.2%), in smokers group it was 19.4%. Peri urban population was 42.5% and 36.9% in non- smokers and smokers group respectively. Tobacco smoking was highest among rural population (43.7%)

Table 2 shows age wise distribution of the adult population included in the study. Amongst the total population of 994 adults under age group of 22-35 yrs were 93 (18.8%) and 140 (28.1%), under age group of 36-45 yrs were 195 (39.3%) and 87 (17.4%) ; under age group of 45-55 yrs were 72 (14.5%) and 93(18.6%) and under age group of >55 yrs were 136 (27.4%) and 179 (35.9%) in non smokers and smokers groups respectively.

B. Smoking habits related to Occupation

It was seen that smoking habit was higher in individuals who were in unskilled occupation (70.5%) followed by 57.6% in clerical workers, 56.4% in skilled workers and

50% in unemployed. It was lowest in professionals (25.6%). Table 3 and Graph 2 shows Smoking habits in various occupation (classified according to Kuppuswamy scale) among adults who were smoking. Table 4 and Graph 1 shows type of smoking in individuals from various occupations.

Table 4 and Graph 1 shows type of smoking among all occupations. It was seen that cigarette smoking was higher as compared to other type of smoking (beedi, hukka and others). It was reported that 74.4% professionals have been tried quitting tobacco smoking at least once in their life.

Frequency of smoking was also recorded in smokers related to their occupation, highest frequency, more than 20 times of smoking was reported highest (56.3%) among unemployed individuals. It was lower in only 7% in professionals and 7.8% in semi professionals were seen to smoke. Lowest frequency (1-4 times) was higher in semi professional (56.3%) and professional (34.2%) it was lowest in clerical and unemployed individuals (0%). Lowest frequency (1-4 time a day) was least in skilled (25.1%) and semi professional (25.5%) workers. All clerical and unemployed individuals used to smoke 1-4 times a day.

C. Periodontal health status (CPI scores)

Table 5 and Graph 3 shows periodontal health status recorded among smoking and non smoking adults included in the study. Community periodontal index (CPI) was recorded to assess periodontal health status and CPI score was given according to periodontal conditions of all individuals.

In non smokers 18.4% individuals had bleeding gums which was higher than smoking individuals (10.4%). Calculus was significantly higher in smokers group (58.3%) than

non smokers (38.6%).4-5mm Pocket formation was significantly higher in non smokers (30.9%) than in smokers (14.2%). Highest pocket formation (>6mm) was higher in smokers (17.0%) than non smokers (12.1%) in non- smokers.

D. Oral hygiene practices

Most of the individuals were brushing their teeth once a day which were 77.2% and 64.7% in non smokers and smokers group. 21.4% individuals among smokers group were brushing their teeth twice a day which was significantly higher than non smokers group (10.7%). 10.2% individuals from smokers group said they brush after each meal which was higher than non smokers group (6.3%).

There were 5.8% and 3.6% individuals who brush only sometimes from both non smokers and smokers group respectively.

Most of the populations (69.8% and 69.1%) reported using horizontal movements of brushing their teeth, followed by combined movements (19% and 21.6%) in both non smokers and smokers respectively. Only 11.3% and 9.2% individuals from non smokers and smokers group respectively used vertical movements while brushing their teeth.

Along with brushing 28.5% smokers used mouthwash which was higher than non smoking individuals (20.4%). Use of secondary plaque control methods was not significant among individuals of both groups. Over all use of toothpick was higher in individuals which were 6.9% in non smokers and 1.8% in smokers group. Awareness of use of dental floss was lowest with 2.0% and 3.4% in non smokers and smokers group, respectively.

Duration of tooth brushing was also recorded in both groups. Longest duration (5min or more) was higher in smokers (20.4%) than in non- smokers (9.5%). Most of the smokers

(48.3%) used to brush their teeth for 3-4 minutes followed by 23.8% smokers who said they brush their teeth for 2 minutes; only 7.4% smokers were brushing their teeth for 1minute.

In non- smokers group 43.5% were brushing their teeth for 3-4 minutes; 37.9% non-smokers were doing it for 2min. overall most of the population from our study was brushing their teeth for 3-4min in both smokers and non- smokers.

E. Loss Of Tooth

Table 7 shows missing teeth according to various age groups in smokers and non-smokers. Results showed that tooth loss increased with age and till reaching more than 55yrs all of the smokers had missing tooth on the other hand 88.9% of non-smokers aged more than 55yrs had missing tooth. At the age between 22-35 yrs 55.9% non- smokers had missing teeth which was significantly higher than smokers (27.1%). Graph 6 and Graph 7 shows missing teeth in various age groups in smokers and non smokers respectively.

Table 1: Area wise distribution of Population

		Non- smokers		Smokers	
Residential Area	Urban	233	47.2%	97	19.4%
	Rural	51	10.3%	218	43.7%
	Peri urban	211	42.5%	184	36.9%

Table 2: Age group distribution among study Population

		Group			
		Non-smokers		Smokers	
		N	%	N	%
Age	22-35	93	18.8%	140	28.1%
	36-45	195	39.3%	87	17.4%
	45-55	72	14.5%	93	18.6%
	>55	136	27.4%	179	35.9%

Table 3: Occupation related smoking habits in Smoker Group

		OCCUPATION												p-value
		Professional		Semi-professional		Clerical		Skilled		Unskilled		Unemployed		
		N	%	N	%	N	%	N	%	N	%	N	%	
Do you smoke?	Yes	11	25.6%	25	49.0%	38	57.6%	101	56.4%	79	70.5%	24	50.0%	0.714;
	No	0	.0%	0	.0%	0	.0%	0	.0%	0	.0%	0	.0%	NS
	quit	32	74.4%	26	51.0%	28	42.4%	78	43.6%	33	29.5%	24	50.0%	

Table 4 :Type And Frequency of Smoking In Occupations

		Professional		Semi-professional		Clerical		Skilled		Unskilled		Unemployed		p-value
If you are a smoker, what do you smoke?	Beedi	5	11.6%	19	37.3%	21	31.8%	57	31.8%	35	31.3%	9	18.8%	0.663; NS
	Cigarette	37	86.1%	28	54.9%	40	60.6%	111	62.0%	68	60.7%	33	68.8%	
	Hukka	1	2.3%	4	7.8%	5	7.6%	11	6.1%	9	8.0%	6	12.5%	
	any other	0	.0%	0	.0%	0	.0%	0	.0%	0	.0%	0	.0%	
If you are a smoker, how many times do you smoke daily?	1-4	15	34.2%	29	56.9%	0	0%	73	40.8%	13	11.6%	0	0 %	p-value
	5-10	18	40.2%	13	25.5%	11	16.7%	45	25.1%	15	13.4%	3	6.3%	0.663; NS
	11-20	8	18.6%	5	9.8%	35	53.0%	45	25.1%	31	27.7%	18	37.5%	
	>20	3	7.0%	4	7.8%	20	30.3%	16	8.9%	13	47.3%	27	56.3%	

Graph 1: Frequency of smoking in all occupations

Graph 1: Frequency of smoking in all occupations. X-axis categories: 1-4., 5-10., 11-20., >20. Legend: Professional, Semi-professional, Clerical, Skilled, Unskilled, Unemployed.

Values shown:
- 1-4.: 34.20%, 56.90%, 1.00%, 40.80%, 11.60%, 0.00%
- 5-10.: 40.20%, 25.50%, 16.70%, 25.10%, 13.40%, 6.30%
- 11-20.: 18.60%, 9.80%, 53.00%, 25.10%, 27.70%, 37.50%
- >20: 7.00%, 9.80%, 30.30%, 8.90%, 47.00%, 56.30%

Graph 2 : Type of Smoking in all occupations

Graph 2: Type of Smoking in all occupations. X-axis categories: Beedi, Cigarette, Hukka. Legend: Professional, Semi-professional, Clerical, Skilled, Unskilled, Unemployed.

Values shown:
- Beedi: 32.60%, 37.30%, 31.80%, 31.80%, 31.30%, 18.80%
- Cigarette: 65.10%, 54.90%, 60.60%, 62.00%, 60.70%, 68.80%
- Hukka: 2.30%, 7.80%, 7.60%, 6.10%, 8.00%, 12.50%
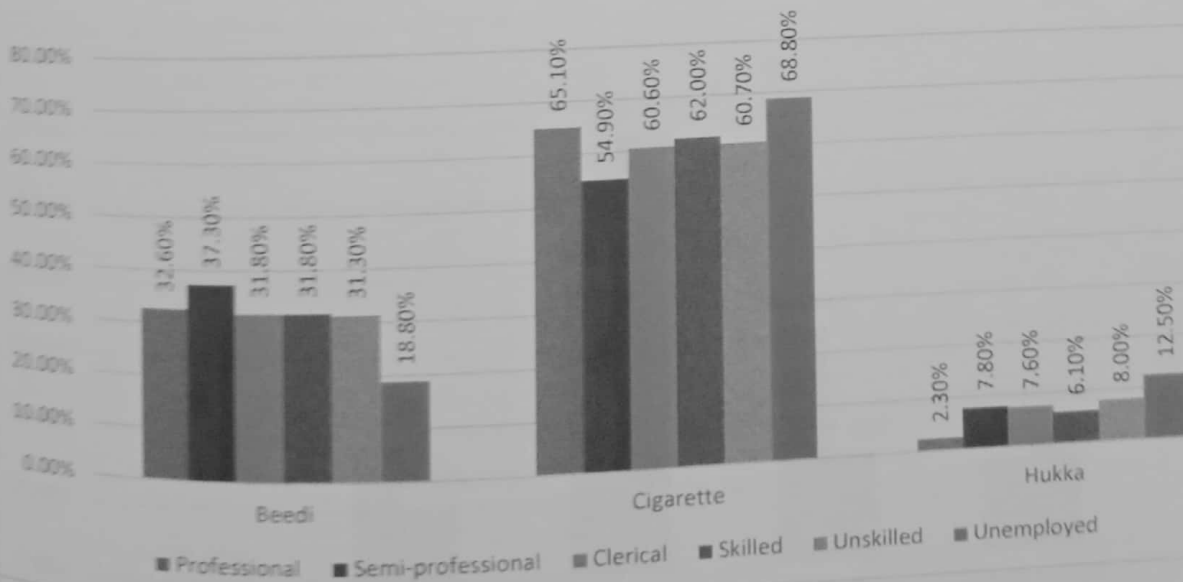
Table 6: Oral hygiene Practices in Smokers and Non Smokers group

		Non - smokers		Smokers	
How often do you brush your teeth?	Once	383	77.2%	323	64.7%
	Twice	53	10.7%	107	21.4%
	after each meal	31	6.3%	51	10.2%
	Sometimes	29	5.8%	18	3.6%
How many minutes do you brush your teeth?	1min	45	9.1%	37	7.4%
	2min	188	37.9%	119	23.8%
	3-4min	216	43.5%	241	48.3%
	5min/more	47	9.5%	102	20.4%
What type of tooth brushing movements do you use?	Horizontal	346	69.8%	345	69.1%
	Vertical	56	11.3%	46	9.2%
	Combined	94	19.0%	108	21.6%
Do you use mouthwash?	Yes	101	20.4%	142	28.5%
	No	394	79.6%	357	71.5%
Which secondary methods for plaque control do you use?	dental floss	10	2.0%	13	3.4%
	Inter dental brush	13	2.6%	9	2.4%
	Toothpick	34	6.9%	7	1.8%

Graph 4: Frequency of Tooth Brushing in Smokers and Non Smokers group
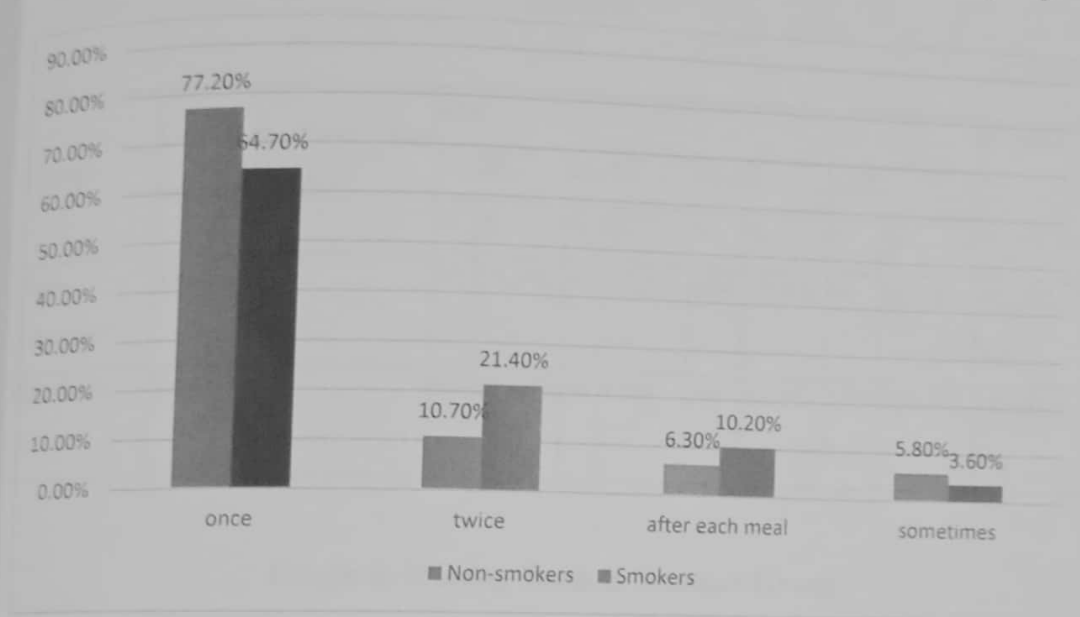
Graph 5: Duration of tooth brushing in smokers and non- smokers
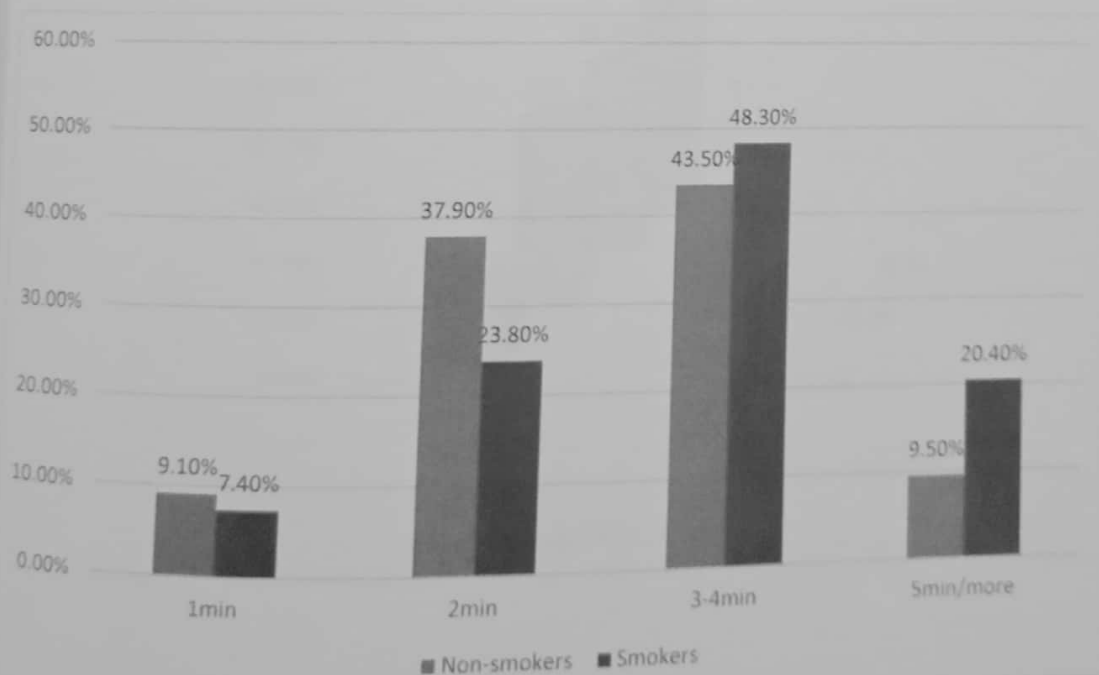
Table 7: Missing teeth according to various age groups in smokers and non-smokers

Group	Do you have any missing teeth?	age								p-value
		22-35		36-45		45-55		>55		
		N	%	N	%	N	%	N	%	
Non-smokers	Yes	52	55.9%	80	59.3%	144	73.8%	64	88.9%	<0.001; Sig
Smokers	Yes	38	27.1%	64	73%	76	82.0%	179	100.0%	<0.001; Sig

Graph 6: Missing Teeth in Smokers Group
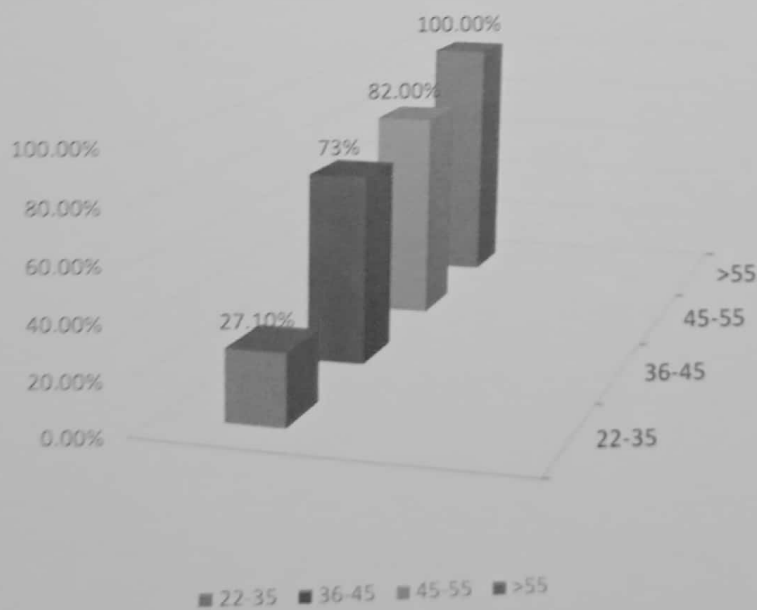
Discussion

The tobacco epidemic is one of the biggest public health threats the world has ever faced, killing around 6 million people a year. More than 5 million of those deaths are the result of direct tobacco use while more than 600 000 are the result of non-smokers being exposed to second-hand smoke.[67]

Nearly 80% of the more than 1 billion smokers worldwide live in low- and middle-income countries, where the burden of tobacco-related illness and death is heaviest.[68] In 2010, an estimated 120 million Indian adults smoked, making India second only to China in number of smokers.[69] In 2010, smoking caused about 1 million deaths, or 10% of all deaths in India with about 70% of these deaths occurring at the ages of 30–69 years.[70]

Despite great achievements in the oral health of populations globally, problems still remain in many communities around the world particularly among underprivileged groups in developed and developing countries. Dental caries and periodontal diseases have historically been considered the most important oral health burdens[71] At present, the distribution and severity of oral diseases vary in different parts of the world and within the same country or region. The significant role of socio-behavioral and environmental factors in oral disease and health is demonstrated in a large number of epidemiological surveys. In many developing countries, access to oral health services is limited and teeth are often left untreated or are extracted because of pain or discomfort. Throughout the world, losing teeth is still seen by many people as a natural consequence of ageing. While in some industrialized countries there has been a positive trend of reduction in tooth loss among adults in recent years, the proportion of edentulous adults aged 65 years and older is still high in some countries. Globally, most children have signs of gingivitis and,

among adults; the initial stages of periodontal diseases are prevalent. A survey was held by WHO using the so-called Community Periodontal Index severe found periodontitis in 15% population of 35-44 years old.[72]

In industrialized countries, studies show that smoking is a major risk factor for adult periodontal disease, responsible for more than half of the periodontitis cases in this age group.[73] Risk decreases when smokers quit, and the prevalence of periodontal disease has decreased in countries experiencing reductions in tobacco use. While oral and pharyngeal cancers are both preventable, they remain a major challenge to oral health programs. The prevalence of oral cancer is particularly high among men, the eighth most common cancer worldwide. Incidence rates for oral cancer vary in men from 1-10 cases per 100 000 inhabitants in many countries.

In south-central Asia, cancer of the oral cavity ranks amongst the three most common types of cancer. In Asia, the age standardized incidence rate of oral cancer per 100 000 population ranges from0.7 in China to 4.6 in Thailand and 12.6 in India. The high incidence rates relate directly to risk behaviors such as smoking, use of smokeless tobacco and alcohol consumption.

The consumption pattern of tobacco has likely changed over the last decade in response to substantially higher income in India paired with population growth and perhaps in response to modest tobacco control efforts.[74] Study done by Gupta PC et al reported Smoking cessation to be common in high SES population than lower SES population. Same was found in our present study where quit rate was highest (74%) in professionals and minimum was in unskilled workers (29.5%).

In study by chockalingam k et all the overall prevalence of tobacco use was significantly higher in the rural (23.7%) compared to semi-urban (20.9%) and urban (19.4%) areas (P value <0.001) Tobacco smoking prevalence was 14.3%, 13.9% and 12.4% in rural, semi-urban and urban areas respectively.[75]

In our present study maximum population with smoking habit was from rural area (43.7%) followed by 43.7% in peri urban area and was lowest among people living in urban area (19.4%). Study done by C Kolappan in 2013 also showed highest tobacco smoking in rural area (23.7%) compared to semi-urban (20.9%) and urban (19.4%) areas.

It shows relation with socioeconomic status and education level of people. Important differences were also found in a study done by C. Sansone et al that, according to socioeconomic factors higher levels of knowledge were found in urban compared to rural areas among smokers with higher education who wanted to quit smoking. These findings highlight the need to increase awareness about the health risks of smoking in India, particularly in rural areas, where levels of education and health knowledge are lower.[76]

In our present study 28.1% individuals aged 22-35 years, mostly included college going students. Smoking among college and school going students have been increased and become a trend nowadays. Study done by C RK et al (2003) found the prevalence of smoking from 6.9 to 22.5% among the male school and college students.

A number of factors influence the use of tobacco by children and teenagers. Some of these are the family history of tobacco use by elders, peer influence, experimentation, easy access to such products, personality factors, underlying emotional and psychological problems, accompanied risk-taking behaviors, and most importantly, the aggressive marketing strategies of the tobacco industry.[77]

A surveillance report from the Global Youth Tobacco Survey, which was developed by the World Health Organization and the US Centers for Disease Control and Prevention to track tobacco use among youth in countries across the world found tobacco use in the surveyed age group (13-15 yrs) ranged from a high of 33% to a low of 10% which is high to be noted and act upon.

In our present study there was a dispute in tobacco smoking habit (type, frequency,etc) was found among various occupations. Age wise distribution of the adult population was reported in our study, among tobacco smokers. Amongst the total population of 995 adults under age group of 22-35 yrs were 93 (18.8%) and 140 (28.1%), under age group of 36-45 yrs were 195 (39.3%) and 87 (17.4%) ; under age group of 45-55 yrs were 72 (14.5%) and 93(18.6%) and under age group of >55 yrs were 136 (27.4%) and 179 (35.9%) in non smokers and smokers groups respectively.

According to a report by The Health Consequences of Smoking—50 Years of Progress: A Report of the Surgeon General.[78] In the United States, the widespread use of tobacco was seen in two-thirds (64.3%) of adults who began to do so by 18 years of age, and almost one-third of adults who had ever smoked (22.7%) began to smoke daily between 18–26 years of age.

In our study smoking habits were reported in relation to occupation of smokers and it was found to be highest among unskilled workers(70.5%) and lowest was seen among professional workers. Smoking was second highest in clerical (57.6%) and skilled workers(56.4%). Smoking was higher among unemployed too with 50%.

In former studies smoking among unemployed people found to be higher as a result of their mental or emotional stress. In a Study done by gupta pc in year 2005 it was highest

with 47% in unemployed population and 26.3% in professional workers.[79] High smoking among unemployed people shows need of proper professional tobacco counseling. Although high SES is also found related with high tobacco smoking but as age increases they also reported high quit rates in our study. An earlier study done by Corsi DJ in year 2014 showed same results as it is in our study. Tobacco use was higher among illiterate respondents as compared to the college educated (male OR = 4.23, female OR = 8.15). Unemployed, able to work (male OR = 1.50, female OR = 1.23) showed highest risk, while students (male OR = 0.35, female OR = 0.52) showed the least. The combined effect of occupation and education showed synergistic interaction among females and antagonistic interaction among males. This can have far-reaching policy implications in addressing disparities in tobacco use[80]

In our present study it was found that out of 499 smokers 317 (63.6%) were smoking cigarette. It was highest among professional workers may be because of high SES but it was higher than beedi in lower SES also (60.6%, 62%, 60.7% in clerical, skilled and unskilled workers respectively). It shows increase trends of cigarette among tobacco smokers over a period.

Study done by Mishra et al also stated that cigarette smoking has been increased from 1998 to 2015 and there is a fall in prevalence of beedi smoking in India. It was seen in this study that cigarette smoking was higher in young adults 15-29 yrs and fell as age increases. Higher cigarette smoking can because of increase in young smokers who start smoking as a trend in school or college. In our present study out of 499 smokers 140 smokers were between 22-35 years which was just second to 234 smokers aged more than 55 years. After 22-35 yrs smoking was declined according to age and was again seen

high in old age. These data also show quitting rate increases according to increasing age in high SES smokers who are well aware of adverse effects of smoking. Lower knowledge among older smokers living in rural area was found to be high in study done by Mishra S et al in year 2016.[81]

A report by Teodori M[82] found in a survey which was done by WHO that 46.7 percent of men in lower socioeconomic strata are smokers, compared to 21.8 percent of rich men and Only 7.6 percent of Indian women smoke, but here, too, the discrepancy is stark: women in lower socioeconomic strata are four times more likely to smoke than their more affluent counterparts – 12.4 percent of women from a lower income bracket have taken up the habit, as opposed to just 3.1 percent of wealthy women. This disparity does not merely represent a difference in lifestyle choices – it highlights the stress of poverty that leads to addiction and points to a growing health gap between the rich and poor in India. The survey was initiated in response to reports that poorer people actually faced a greater risk of dying from smoking than more affluent people.

According to the WHO, the 'smoking divide' also deepens the gulf of income inequality, since the poor divert their limited wages away from housing, better food or healthcare towards the purchase of tobacco products.

Results were same alike in our present study where highest frequency (>20 times) of smoking was reported highest (56.3%) among unemployed individuals. It was lower in professionals (7%) and (7.8%) in semi professionals. Lowest frequency (1-4 times) was higher in semi professional (56.3%) and professional (34.2%) it was lowest in clerical and unemployed individuals (0%). Lowest frequency was least in skilled (25.1%) and semi professional (25.5%) workers. It can be because individuals in professional or semi

professional occupation could not smoke so many times at working place as compared to unemployed or other occupations.

It was seen in our study that cigarette smoking was higher as compared to other type of smoking (beedi, hukka and others). It was reported that Tobacco cultivation was started in southern Gujrat in the 17th century. In those period hookah and chillum smoking was popular among local people.

Bidis were soon after developed by labourers who would roll leftover tobacco in leaves of the astra tree and smoke at leisure. Till year 1900 bidi become a small-scale industry.[83]

In India changing trends in tobacco smoking documented increased use of cigarette among Indian population. In a study done by Mishra S et al[84] it was found that in India from 1998 to 2015 bidi smoking rates fell moderately and there was increase in cigarette smoking. Cigarette smoking was higher among young and middile or upper SES population. Hukkah and chillum was only used by old people living in rural areas but now hukkah is new trend among school and college going young adults.

Study done by Bali E et al in the year 2015 found that the mean age of starting hookah smoking in their present study was 17.3 years. Hookah smoking on a daily basis was reported by 37.7% participants. Another 44.7% participants smoke hookah in hookah cafes with friends and the total number of participants who informed that hookah is easily available and accessible are 83.3%. Most of the participants 60-70% had misperception about the safety of hookah smoking over cigarette smoking, and 36-82% participants were unaware of health effects.[85]

In our study very less daily hukkah which was mostly used by old people living most of the time at their home because hukkah cannot be taken anywhere. There was ban before

on hukkah smoking in lounges but people started using it at home so ban was removed after some time.

Other smoking like chillum or cigar was not reported in our study it could be because cigar smoking is only limited to people of upper class SES because of its high cost and availability.

In our study Community periodontal index (CPI) was recorded to assess periodontal health status and it was found that in non smokers 18.4% individuals had bleeding gums which was higher than smoking individuals (10.4%). Calculus was significantly higher in smokers group (58.3%) than non smokers (38.6%).

A study done by Gautam DK in year 2011, there was 7% bleeding gums in smokers and 15.5% in non- smokers was seen which was 10.4% and 18.4% in our present study. In the same study non smokers calculus was significantly higher in smokers group (58.3%) than non smokers (43.5%) which is same as our study (58.3% and 38.6% in smokers and non-smokers). Reason behind low gingival bleeding among smokers has been explained in the study done by Nijeryali E in the year 2010, is nicotine induced vasoconstriction and heavy keratinization in smoker's gingival .study done by Nijerya'li et al also found less gingival bleeding in smokers due to induced vasoconstriction and heavy keratinization in smokers in their study.[86]Smoking is thought to impair the immune response and compromises the periodontal tissue's ability to heal, following a period of disease activity.[87]

Pocket depth measurements are found to be greater in smokers due to increased alveolar bone loss in our present study. Highest pocket formation (>6mm) was higher in smokers 17.0% in smokers and 12.1% in non- smokers.

Former studies proved Tobacco smoking resulting in reactive oxygen species release and oxidative stress mediated tissue damage causing bone loss. Smokers exhibited a decrease in several pro-inflammatory cytokines and chemokines and certain regulators of T-cells and natural killer cells.[101]. Studies done by stolenberg et al[88] This reflected that the immunosuppressant effects of smoking which may contribute to an enhanced susceptibility to periodontitis. It can be the reason of more missing teeth in smokers as compared than non smokers in our study. Study done by Pankaj et al in the year 2007 reported that in 25-34 year olds, (3.6%) smokers and (2.8%) non-smoker had missing teeth. In 35-44 years, (52.8%) smokers and (47.2%) non-smokers had missing teeth. In 45-54 years, (30.9%) smokers and (38.9%) nonsmokers had missing teeth. In 55-60 years, (12.7%) smokers and (11.1%) non-smokers had missing teeth. In our present study at the age of 22-35 yrs 55.9% non smokers and 27.1% had missing teeth, at 36-45 59.3% and 82%, at age of 45-55 yrs 73.8% and 82% and till the age of more than 55 yrs it was 88.9% and 100% in non smokers and smokers respectively.

Tobacco smoking has been found to be an important factor in the development of refractory periodontitis[89]. The association between cigarette smoking and periodontal diseases represent a significant oral health problem globally.[90]

In our study result s show higher percentages of missing teeth in both smoker and non smoker groups, it can be because of higher burden of other oral health problems i.e. dental decay, in this region of the country. These numbers definitely need higher and constant oral health promotion and attention from available oral health services in this region of the country. Former studies showed that impact of smoking varies according to the frequency of exposure to tobacco smoking in populations.[91]

There was significant difference in oral hygiene practices of smokers and non smokers. 21.4% smokers used to brush twice which was higher than non smokers (10.4%).

In our present study it was seen that smokers who had knowledge and were well aware of adverse effects of smoking on their oral health tried to maintain their oral hygiene status by brushing many times of day or using mouthwashes available in the market.[92] It can be so because of young adults who are college going students or belong to upper or middle SES are seem to be concern about their esthetic.

In non- smokers group 43.5% were brushing their teeth for 3-4 minutes; 37.9% non-smokers were doing it for 2min. overall most of the population from our study was brushing their teeth for 3-4min.

It is a topic of concern that very few percentages of this population using proper tooth brushing movements and other secondary methods of plaque control. In our study it was seen that percentage of tooth loss due to periodontal diseases among smokers was significantly higher. Similar findings were reported by other studies too. Hence also dental services that are available in Lucknow are not being utilized by the population for their benefit so more oral health promotion is needed. Although there have been seen increase in smoking cessation rate in our and other former studies , people living in rural and peri urban area have to get aware about the deleterious effects of the tobacco smoking and importance of tobacco cessation. Policy makers and government have to make efforts to increase numbers of tobacco cells in this region of the country.

Limitation and Recommendations

LIMITATIONS AND RECOMMENDATIONS

Limitation

- In our study, we used the CPI (Community Periodontal Index) as recommended by the World Health Organization. CPI is not a perfect measure of periodontal disease and excludes measurement of attachment loss, gingival recession, alveolar bone level, and other clinical periodontal parameters. Nevertheless, it was originally proposed as an appropriate estimation surveys and has contributed to an understanding of the epidemiology of periodontal disease on a global level.

Recommendations

- Dental health services are still out of reach for the most of the population living in rural and peri- urban area, hence dental public health professionals should organize regular oral health screening programs in rural and peri- urban areas.

- To conduct health education programs to educate and impart knowledge and awareness among these population so that they can get good support for initiating and establishing proper oral hygiene practices with the help of professionals.

- Tobacco cessation must be offered more widely by all the dental hospitals and institutes in both urban and rural areas. Integration of these services into the health care delivery system is needed.

- Tobacco cessation activities clearly need to be up-scaled, and the public better informed of the availability and relevance of such interventions.

- Younger persons using tobacco, rural populations and the economically underprivileged need to be more actively targeted.

Conclusion

In conclusion, the current study shows:

- ❖ Smoking is a major environmental factor associated with accelerated periodontal destruction in adults living in Lucknow.

- ❖ The progression and excessive loss of periodontal support in later life depends to a greater extent upon excessive smoking in adults.

- ❖ The finding highlight the need for preventive strategies aimed at young adults, many of whom take up smoking as a habit, early in life.

- ❖ Dental public efforts, therefore, need to include and emphasize the role of smoking same as oral hygiene in primary preventive efforts.

Summary

Present study was done on 22 to 55 years of adults of Lucknow. It was a descriptive cross sectional study to evaluate the association between tobacco smoking, periodontal health status and early loss of teeth among tobacco smokers and non tobacco smokers.

In the first stage Lucknow was divided into four zones, East, West, North, South , approximately 22 wards came under each of these geographic zones. Then in the second stage, four wards were randomly selected from each zone like Indira Nagar, Alambagh, Jankipuram, Aliganj, Telibagh etc. Areas were selected from each ward by multistage sampling. A total of 995 adults were examined and interviewed, i.e. 248 adults were selected from each zone.

Data was collected by using a pre tested study specific proforma which was divided into two parts first part contained questions on demographic details, occupation, education and income and a questionnaire contained details about oral health related problems and practices and smoking habit related information. Second part of proforma contains intra oral examination of total no of teeth present and Community Periodontal Index (CPI). Type III examination was carried out by investigator herself with the help of a clerk to record the specific findings.

Results of the study showed missing teeth according to various age groups in smokers and non- smokers. At the age between 22-35 yrs 55.9% non- smokers had missing teeth which was 27.1% in smokers. It was found in the study that loss of tooth increased with age and till reaching more than 55yrs all of the smokers had missing teeth on the other hand 88.9% of non-smokers aged more than 55yrs had missing tooth. Taking periodontal health status into consideration, in the present study it was found that in non smokers

18.4% individuals had bleeding gums which was higher than smoking individuals (10.4%). Calculus was seen significantly higher in smokers group (58.3%) than non smokers (38.6%).4-5mm Pocket formation was significantly higher in non smokers with total 30.9% than in smokers (14.2%). Highest pocket formation (>6mm) was also seen higher in smokers (17.0%) than non smokers (12.1%) in.

The results of this study revealed that a higher percentage of the adult population of Lucknow is affected with periodontal diseases. Tobacco smoking was found to be a common and strong factor affecting periodontal health status of adults living in Lucknow. Therefore it can be concluded that need for oral health education and tobacco cessation is higher among this population.

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Annexures

ETHICAL CLEARANCE FROM ETHICAL COMMITTEE OF BABU BANARSIDAS COLLEGE OF DENTAL SCIENCES, LUCKNOW

BABU BANARASI DAS COLLEGE OF DENTAL SCIENCES

(A Faculty of Babu Banarasi Das University)

BBD City, Faizabad Road, Lucknow-227105

INSTITUTIONAL RESEARCH COMMITTEE APPROVAL

The project titled **Association of Tobacco Smoking with Periodontal Health and Early Loss of Teeth in Adult Population of Lucknow** submitted by **Dr.Ranjana Yadav** Post graduate student from the Department of public Health dentistry as part of MDS Curriculum for the academic year **2014-2017** with the Accompanying proforma was reviewed by the institutional research committee present on 11th and 12th Dec 2014 at BBDCODS. The Committee has granted approval on the scientific content of the project. The proposal may now be reviewed by the institutional ethics committee for granting ethical approval.

Prof. (Dr).Vivek Govila
Dean
Chairperson Institutional Research Committee

Babu Banarasi Das College of Dental Sciences
(A Faculty of Babu Banarasi Das University)
BBD City, Faizabad Road, Lucknow – 227105 (INDIA)

Dr. Lakshmi Bala
Professor and Head Biochemistry and
Member-Secretary, Institutional Ethics Committee
Communication of the Decision of the 3rd Institutional Ethics Sub Committee Meeting.

IEC Code: 15   BBDCODS/ 15 /2015

Title of the Project: Association of Tobacco Smoking With Periodontal Health And Early Loss Of Teeth In Adult Population Of Lucknow

Principal Investigator: Dr. Ranjana Yadav.   **Department:** Public Health Dentistry

Name and Address of the Institution: BBD College of Dental Sciences Lucknow

Type of Submission: New, MDS Protocol.

Dear Dr. Ranjana Yadav.

The Institutional Ethics Sub Committee meeting was held on 09-01-2015. The sub committee comprises following four members :

1.	Dr. Amrit Tandon Member	Prof. & Head, Deptt. of Prosthodontics BBDCODS, Lucknow.
2.	Dr. Jiji George Member	Prof., Deptt. of Oral Pathology & Microbiology, BBDCODS, Lucknow.
3.	Dr. Ashish Saini Member	Reader, Department of Periodontology, BBDCODS, Lucknow.
4.	Dr. Lakshmi Bala Member Secretary	Prof. and Head, Deptt. of Biochemistry, BBDCODS, Lucknow.

The committee reviewed and discussed your submitted documents of the research study in the meeting. The proposal was reviewed and thoroughly revised.

Decisions of the IEC : As per the recommendations I.E.C. has taken following decisions for the current protocol of study "Association of Tobacco Smoking With Periodontal Health And Early Loss Of Teeth In Adult Population Of Lucknow"

The committee approved the above proposal from ethics point of view.

15/05/15

(Dr. Lakshmi Bala)
Member-Secretary IEC

Forwarded by:

(Dr. Vivek Govila)
Dean

SURVEY FORM

BABUBANARASI DAS COLLEGE OF DENTAL SCIENCES, LUCKNOW

PUBLIC HEALTH DENTISTRY

"Association of tobacco smoking with with periodontal health and early loss of teeth in adult population of Lucknow"

Gender

Age

Ehnic group

Religion

Occupation

Education

Diet- Vegetarian/Mixed

Per Capita Income

Date…………….........................

Serial No…………….....................

Address…….................................

………………………………………

Marital status………...................

I. Questionnaire:

(Please give only one answer to each question)

1. How often do you brush your teeth each day?

    ☐ 1   ☐ 2   ☐ 3   ☐

    ☐ After each meal   ☐ometimes

2. How minutes do you brush your teeth for?

    ☐ 1   ☐ 2   ☐ 3   ☐

3. ☐at type of tooth brushing movements do you employ?

    Vertical   ☐   Horizontal   ☐ Combined

4. Do you use a mouth wash?

☐ Yes   ☐ No

5. Which secondary methods for plaque control do you use?

☐ Dental floss

☐ Inter dental brushes

☐ Toothpicks

☐ None

6. Do you, or did you use an electric toothbrush?

☐ Yes   ☐ No

7. On what is your daily diet mainly based?

☐ Potato chips   ☐ Vegetables

☐ Milk Products   ☐ Meat

8. Do you have bleeding gums?

☐ Yes   ☐ No

9. If yes, are these:

☐ Spontaneous   ☐ Provoked   ☐ Not constant

10. Do you have any health problems?

☐ Yes   ☐ No

11. Do you smoke?

☐ Yes   ☐ No   ☐ Quit smoking

12. If you are a smoker, what do you smoke?

☐ Cigarettes   ☐ Beedi   ☐ Any other

13. If you are a smoker, how many times do you smoke daily?

☐ 1-10   ☐ 11-20

☐ 21-40   ☐ over 40

I. INTRA ORAL EXAMINATION:

1. No. of teeth present-

2. **Community Periodontal Index-**

17/16	11	26/27
47/46	31	36/37

0= healthy

1=bleeding

2=calculus

3=pocket 4-5 mm (black band on probe partially visible)

4=pocket 6mm or more (black band on probe not visible)

X=excluded