



RESEARCH ARTICLE

PREVALENCE AND CHARACTERISTICS OF FURCATION INVOLVEMENT WITH POSSIBLE ETIOLOGIC FACTORS IN POPULATION ASSOCIATED WITH SWAMI VIVEKANAND SUBHARTI UNIVERSITY, MEERUT - AN EPIDEMIOLOGICAL STUDY

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ABSTRACT

**Introduction:** Furcation defects occur when bifurcation or tri-furcation of multi-rooted teeth are involved as a result of periodontal disease. The extent and configuration of the defect determines the prognosis and treatment planning.

**Aim and Objective:** Aim of the study is to quantify and analyse the prevalence and characteristics of furcation involvement (FI) and also to plan the possible treatment modality.

**Materials and Methods:** The study included 100 systemically healthy subjects between 30 - 60 years, selected randomly from population within Swami Vivekanand Subharti University, Meerut, of which 42 were females and 58 males. After ethical clearance and obtaining consent from subjects, UNC-15 probe and calibrated Naber's furcation probe was used to clinically detect the configuration of FI based on the Glickman's classification. Data obtained was statistically analysed and results arrived at.

**Result:** Total of 57 subjects had furcation involvement out of which, subjects between 30-40 years especially males had maximum furcation involved teeth. A total of 370 molars were examined of which 247 had furcation involvement while 123 were unaffected. Mandibular molars showed a higher prevalence rate as compared to maxillary molars, 21.05% vs 14.03%, with right quadrant being more afflicted.

**Conclusion:** Most common etiologic factors were low income group, brushing once/day and using tooth powder. Grade-II FI being most common and Grade-IV being the least. Non-surgical periodontal treatment was planned for all the cases with second stage surgery to be carried out in 68.42%.

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INTRODUCTION

According to American Academy of Periodontology, a FI exists whenever periodontal disease has involved the bifurcation or trifurcation of a multi-rooted teeth. (Glossary of Terms, 1977) Knowledge of the morphology of the multi-rooted teeth and their position in the dental arch is a fundamental prerequisite for understanding problems which may occur when these teeth get involved in destructive periodontal diseases. Root complex is located below cemento-enamel junction (CEJ) and is divided into two parts: Root trunk – the undivided portion of the root complex, and Root cones – the divided portion of root complex which may vary in size and position. (Carnevale 6<sup>th</sup> edition) Furcation is the area located between individual root cones (Fig.1). Classification for FI has been done by various authors based on the location of furcation and the amount of bone loss in vertical and

horizontal plane. In the present study classification given by Glickman (1958) has been used.

- Grade I–*Incipient* lesion, with an associated periodontal pocket remaining coronal to the alveolar bone. The pocket primarily affects the soft tissue. Early bone loss may have occurred but is rarely evident radiographically.
- Grade II –*Cul-de-sac* lesion, with a definite horizontal component to the bone loss between roots, but sufficient bone still remains attached to the tooth (at the dome of the furcation) so that multiple areas of furcal bone loss, if present, do not communicate.
- Grade III - *Through-and-through* lesion, with bone no longer attached to the furcation of the tooth, resulting in a tunnel. In early grade III lesions, soft tissue may still occlude the furcation involvement, thus, making it difficult to detect.
- Grade IV – *Clinically visible* grade III lesion, with excess of gingival recession and bone loss to make it visible clinically as well as radiographically.

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FI is most commonly seen in adults and either sex can be effected. A considerable number of maxillary and mandibular molars are lost because of periodontal destruction in the furcation area. (Ross and Thompson, 1980) A major complication for the successful management of furcated molars by either the periodontist or the patient is the complex anatomy of the inter-radicular aspect of the roots. Treatment for patients with FI can be categorized as either non-surgical involving scaling and root planing or surgical involving root resection, tooth hemi-section, bicuspidization or regenerative procedure using bone graft and guided tissue regeneration. (Kinsel et al., 19958)

Bower (1979) microscopically examined the furcations of extracted molars and stated that maxillary first molars were concave in 94% of mesiobuccal roots, 31% of distobuccal roots, and 17% of palatal roots, and the deepest concavity was on the interradicular aspect of the mesiobuccal root; mandibular first molars were concave in 100% of mesial roots and 99% of distal roots, and the deeper concavity was found in the mesial root rather than the distal root.

Everett (1958) described another anatomic feature that complicates optimal plaque removal—the bi-furcational ridge, which is located at the junction between the fluting on the radicular and apical surfaces of the root trunk.

Masters (1964) observed a slender enamel projection as predisposing factor that extended from the enamel of the crown of multi-rooted teeth into the furcation.

Ramfjord et al. (1980) observed that tooth types affect the response to different treatments. Maxillary molars showed less short-term reduction in pocket depth and more long term increase in pocket depth than did the other tooth types.

Nordland et al. (1987) stated that the anatomic configuration and reduced accessibility of molar furcations limits the efficacy of nonsurgical therapy in these sites.

### Aim and Objectives

1. To quantify and analyse the prevalence and characteristics of furcation involvement.
2. To plan the possible treatment modality.

## MATERIALS AND METHODS

The study sample included 100 systemically healthy subjects of either sex aged between 30 to 60 years, selected randomly from population residing within Swami Vivekanand Subharti University, Meerut. All subjects were informed about the study and an informed consent form was signed by them. UNC-15 probe and calibrated Naber’s furcation probe was used to clinically detect the configuration of F.I based on the Glickman’s classification. Data obtained was recorded in a pre-structured proforma and then it was statistically analysed and results arrived at.

**Ethical approval:** Material and method has got ethical clearance from the ethical committee of Subharti Dental College and Hospital, Meerut

### Inclusion criteria

1. Systemically healthy individuals.

2. Subject of either sex.
3. Age ranging from 30 – 60 years.
4. Subjects residing within Swami Vivekanand Subharti University, Meerut.

### Exclusion criteria

1. Systemically unhealthy individuals.
2. Subjects having less than three molars.
3. Subjects undergone any periodontal surgery within last 3 months.
4. Subjects with any deleterious habits.

### Methodology

Subjects meeting the inclusion criteria were examined for periodontal pockets by UNC-15 probe. Naber’s probe was used to detect the furcation from buccal and lingual surfaces of mandibular molars and buccal, mesial and distal surfaces of maxillary molars. All third molars were excluded from the study. Radiographs were also taken to examine the FI by using Radio-visiography (RVG). Subjects were divided into four groups according to their age. Detail about their income and brushing habits along with the mechanical aid used were also recorded to detect their possible correlation with FI.

## RESULTS

Among the 100 subjects examined, 42 were females and 58 males, with a total of 57 subjects having furcation involvement among which males were predominant with a ratio of 66.66% (Table 1). Most prevalent age group was between 30-40 years (Table 2). A total of 370 molars were examined of which 247 had FI while 123 were unaffected (Fig.2). Mandibular molars showed a higher prevalence rate of 21.05% as compared to maxillary which showed the prevalence of 14.03%, with right quadrant being more afflicted (Fig.3,4). Subjects were categorized into four group based on their income (Fig.5) and the most prevalent group is of low income with habit of brushing once in a day using tooth powder (Fig.6,7). In the present study non-surgical periodontal treatment was planned for all the cases with second stage surgery to be carried out in 68.42% (Fig.8).

**Table 1. Frequency of individuals and prevalence of furcation involvement**

Total subjects	100
Male	58
Female	42
Subjects with presence of F.I	57
Males with F.I	38
Females with F.I	19

**Table 2. Percentage distribution of individuals according to age group**

Age group	Frequency	Percentage (%)
30 – 40 yrs	28	49.12
40 – 50 yrs	22	38.59
50 – 60 yrs	7	12.28

## DISCUSSION

Ross and Thompson, (1980) concluded that FI among maxillary molars is three times more in mandibular molars.

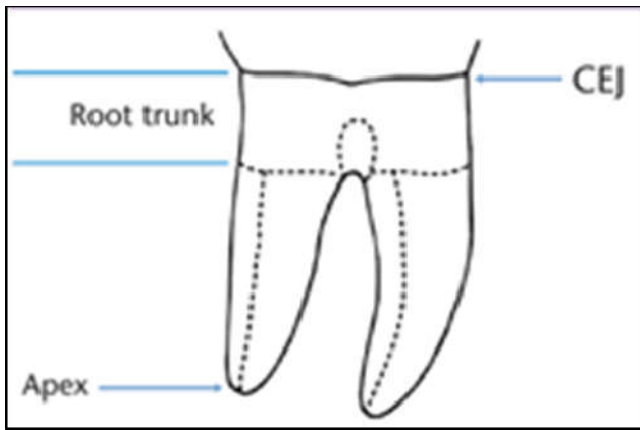


Fig.1. Diagram showing location of furcation

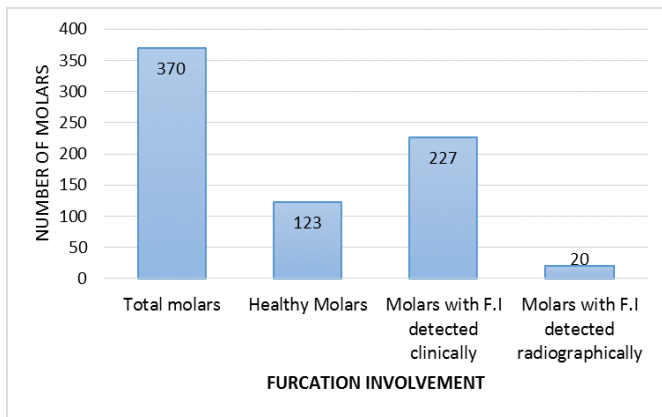


Fig.2. Frequency of Molar Involvement.

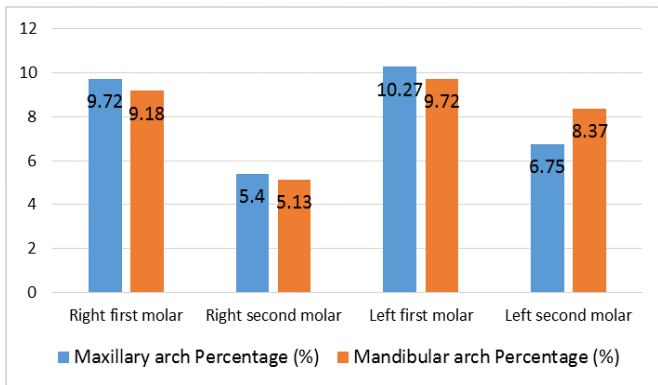


Fig.3. Prevalence of tooth Involved

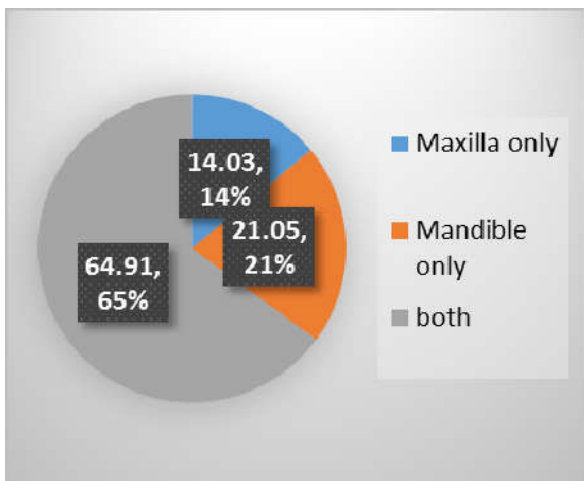


Fig.4. Prevalence of Arch involved

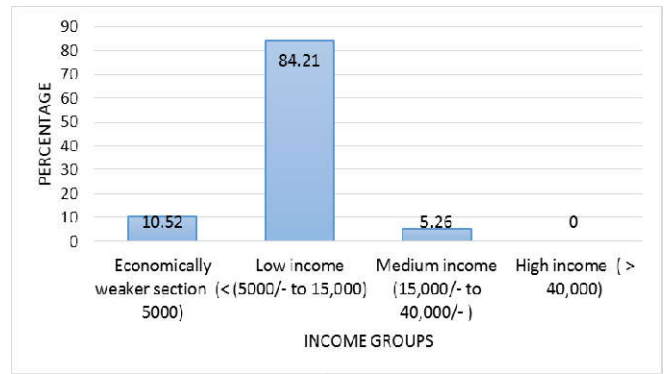


Fig.5. Frequency distribution of subjects with different income group

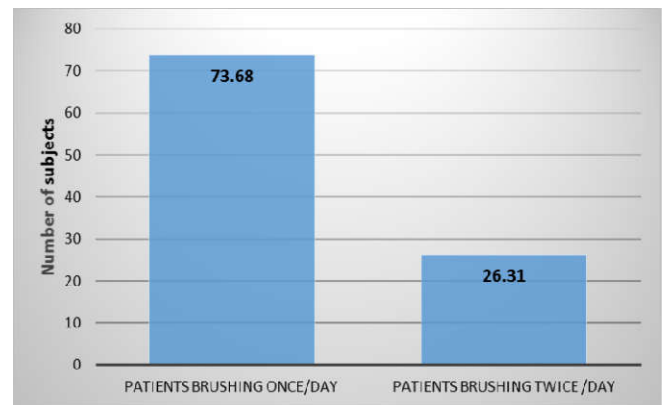


Fig.6. Prevalence of Brushing

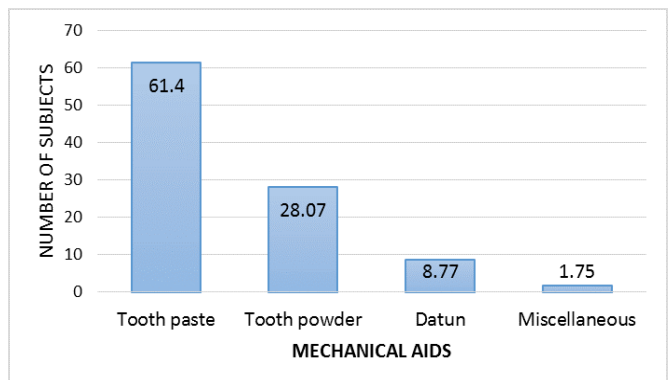


Fig.7. Mechanical aids used by different Individuals

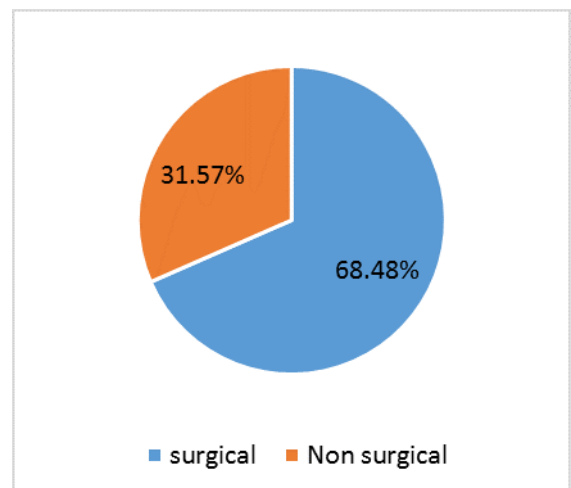


Fig.8. Frequency distribution for treatment required

However in the present study, it was seen that prevalence rate of mandibular molars is more than in maxillary. This difference could be because the authors included all the unfavourable molars in their study which were extracted. The results of the present study are in accordance with those of Becker (1979) who stated that mandibular first and second molars had the highest incidence for furcation involvement than maxillary molars and they also had the highest mean pocket depth increase. In the present study it has been observed that bone loss was more prevalent in mandibular molars. Similar findings were stated by Payot *et al*, (1987) according to which bone inside the furcation of mandibular teeth showed a greater loss of bone density over a period of two years in untreated population. Bjorn and Hjort, (1982) did a longitudinal study of 13 years by using OPG and bitewing radiography and concluded that prevalence of destruction of inter-radicular bone septa in molars increased from 18% to 32.3% leading to extraction of 9.5% of furcated molars. However in the present study no extractions were carried out. Evans *et al* (2013) stated that periodontitis is directly associated with low level of education and higher levels of poverty, both of which influences the use of dental services by individuals. This is in accordance with the present study in which FI is more prevalent in subjects with low income group.

Cancro *et al*. (1985) also found a similar relationship between the tooth brushing frequency and gingival health. Once daily brushing maintained the good oral hygiene, but reduction of tooth brushing frequency resulted in a 50% increase in plaque scores and 20% increase in gingival inflammatory scores. This also supported the present study according to which prevalence of FI is less in subjects with regular brushing habit.

### Conclusion

From the present study it was concluded that subjects with low income group, brushing once/day and using tooth powder were having FI, with Grade-II FI being most common and Grade-IV being the least. Non-surgical periodontal treatment was planned for all the cases with second stage surgery to be carried out in 68.42%.

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