

Assessment of Knowledge Regarding Furcation Defects among Dental Practitioners: A Multinational Survey

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ABSTRACT

This study was undertaken to assess knowledge regarding furcation defects among dental fraternity. This is an open-ended, randomized, web-based cross-sectional multinational online survey. A total of 904 responses were gathered by sending 13 questions through a google form. Data were expressed in frequency and percentages. Chi-square test was performed to determine significant difference between gender, education level and variation between dentists of India and other countries. P value <0.05 was considered to be statistically significant. Present study had 650 dentists from India and 254 dentists from other countries. For overall knowledge regarding furcation, 90.7% (average of first and second question) of dentists had knowledge regarding furcation. There was no significant difference between males (range 54%-93%) and females (range 46%- 95%) ($p>0.05$) in terms of knowledge. Majority (88.7%) of post-graduates knew about the use of Nabers probe for furcation measurements and values were significant ($p<0.05$). Present study also revealed 65%-67% of undergraduates and post-graduates knew that Degree II furcation defects showed predictable periodontal regeneration, however values were non-significant ($p>0.05$). There was no statistical significance ($p>0.05$) between dentists of India and other countries. Dental fraternity in general had adequate knowledge regarding the furcation defects, their treatment modalities and expected complications.

INTRODUCTION

Knowledge and awareness in simpler terms means, the amount of information that is gathered and recorded in the brain that can be helpful to treat an abnormal condition and educate the public regarding the same. This will help to reduce the intensity of recurrence or restore the condition to normalcy [1]. Therefore, thorough knowledge and awareness is always required for any person to combat the continuous process of evolution. Thus, people in medical and dental profession should

have thorough knowledge and awareness pertaining to their respective fields so that they are well versed in treating any anomaly with sound scientific technology [2]. Dentistry apart from knowledge is a skilled based profession. Among the various dental specialities, periodontology is a speciality which deals with periodontal tissues and help in maintenance of the same for long term [3].

The space between the multiple roots of teeth is called as furcation. The bone loss that occurs within this space is known as furcation involvement [4]. The major factors for furcation involvement are greater plaque and calculus accumulation, improper brushing techniques, developmental abnormalities like cervical enamel projections, deep grooves on furcation area, anatomical positioning of tooth, and shorter roots (where earlier furcation involvement occurs) [5]. All the above cited factors will hamper the maintenance of furcation leading to poor oral hygiene, gingival inflammation and periodontal attachment loss cum bone loss sequentially [6]. Moreover furcation

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shares a complex anatomical area that cannot be debrided with normal conventional curettes. Various microsurgical curettes and furcation curettes were also tried to debride and treat the furcation area. Due to improper debridement, the bacteria present in the debris release endotoxins which further promoted bone destruction [7].

The solution to this involves various treatment modalities like non-surgical periodontal therapy (NSPT), additional treatments like furcationoplasty, osteoplasty, odontoplasty (for Degree I furcation/incipient cases) GIC (glass ionomer cement) curtain technique, regenerative surgical techniques using guided tissue regeneration (various collagen membranes, amnion- chorion membranes etc.), bone graft materials alone or combination with platelet concentrates (1st, 2nd and 3rd generations) (For Degree II furcation cases), root resection or hemi-section or bi-cuspidization procedures, (for Degree III furcation cases) and tunnelling procedures (for severe cases of advanced Degree II and Degree III furcation cases). Consequently it becomes a challenge for periodontists to treat furcation defects as both their morphology as well as response to treatment is un-predictable [8].

Basic problem with these surgical techniques are treatment predictability, technosensitivity and increased incidence of root caries. Studies done by Agarwal et al. [9] treated Degree II furcations with Decalcified Freeze Dried Bone Allograft (DFDBA) + Platelet Rich Fibrin and DFDBA alone and achieved good furcation bone fill and gain in various clinical parameters. Supporting the above study, a recent systematic review and meta-analysis done by Jepsen et al. [10] also concluded that regenerative therapy had better treatment outcomes than open flap debridement alone. In the present scenario, there are no studies published that have evaluated the knowledge regarding furcation defects among dental practitioners. Thus, the present study aimed to assess the knowledge of furcation defects among multinational dental practitioners using a web based survey.

MATERIALS AND METHODS

Present study was an open-ended, randomized, web-based cross-sectional multinational questionnaire survey. Questionnaire Google Forms were prepared in Department of Periodontology and Public Health Dentistry. It consisted of two sections. First section consisted of age, gender, country and education level whereas second section consisted of 13 questions regarding the furcation defect which was prepared by an

experienced periodontist and checked for content validity and reliability by an experienced public health dentist. Of these 13 questions, questions 1 to 4; questions 8-10 and 12 were related to knowledge regarding furcation defects while questions 5 to 7 and 11, 13 were depicting the awareness and perception regarding the furcation. Based on the correct answer that was opted for each question responses were gathered and frequency percentages of knowledge and awareness was calculated. In the present study Hamp et al classification was considered as it is widely used in many studies. Subject's enrolment was done randomly using a randomiser table and multi-nationally (world-wide) by sending the google form link through online via Email, *WhatsApp* and *Facebook*. Prior to the conduction of study, ethical clearance was obtained from institutional review board (IEC/IDS/153/2021). Study was performed during the month of May 2021 complying with Helsinki Declaration of 1975 modified in 2000.

Present study was not for commercial purpose and dental professionals participated of their own accord. All the participants gave their informed consent and willingness to take part in the study. While sending the link, pros and cons were explained through informative statements attached long with the google form. A total of 904 responses were included in the present study, out of which 652 were females and 252 were males respectively with their ages ranging from 25-45 years. Before the conduction of study to assess the validation of questions, a pilot study was performed among 25 dentists and its *Cronbach's alpha* was found to be 0.79. These pilot study responses were not included in the present study. Present study utilized a convenience sampling technique (where observers approached dental practitioners to fill the forms across the world through social networking) and snow ball sampling (where further the forms link was distributed among the personal contacts and so on) to gather as much sample as possible.

Dental Professionals included Bachelors of Dental Surgery (BDS), Doctor of Dental Surgery (DDS) under undergraduate group. Masters of Dental Surgery, Doctor of Philosophy (PhD) and Dentists who were doing exclusive clinical practice and combination of both clinical and college based teaching for post graduates were included under post-graduate group. Dentists who were not willing to participate or gave irrelevant responses and incompletely filled questionnaires, periodontology professionals which includes post graduate's academicians and clinicians relating to it, medical

doctors and professional people other than dentistry were also excluded from study.

Questionnaire Google Link was distributed through the Email, Facebook and WhatsApp to dental professionals across the world. No time frame was kept to fill the questionnaire. Prior settings were done to receive the responses and stored in a pre-determined storage area. After receiving the responses, spread sheet was created automatically which contained the entire data. Only the principal investigator had access to this data.

Entire data was transferred to Microsoft excel spread sheet and subjected to statistical analysis using statistical package of social sciences (SPSS) version 23.0 IBM Pvt Ltd, Chicago, USA. Data was expressed in frequency distribution percentages. Chi-square test was performed to find out the association gender wise, undergraduates cum post graduates and for comparison between India and other countries. P value <0.05 was considered to be statistically significant.

RESULTS

Demographic data regarding the age, gender, education, job and country wise frequency distributions of dentists is depicted in Table 1. Briefly 76.8% individuals were 25-30 year age group, 18.4% were 35-40 year group, 3.5% were 36-40 year group and 1.2% were 41-45 year age group individuals. For gender wise distribution 72.1% were females and 27.9% were males. Regarding the level of education 54.9% were undergraduates and 45.1% were postgraduates. Further for job category 6.2% were academicians, 13.7% were doing both clinical and academic practice, 24.3% were exclusive clinicians and 55.8% were students. Regarding country wise distribution 71.9% were from India, 5.8% from USA, 5.1% from Canada, 4.8% from Nepal, 4.5% from Albania, 4.6% from Srilanka and 2.9% from Turkey.

In the present study, 90.7% (average of first and second question) of dentists had knowledge regarding furcation, 74.3% individuals answered in the affirmative that Nabers probe was used for measuring furcation, 90.3% knew to classify furcation defects, 70.4% dentists reported that furcation varied with type of teeth and 93.4% agreed that furcation could be treated. About 92.5% of dentists concurred that periodontists were the specialists to treat furcation defects whereas 86.7% of dentists recognized that furcation obliteration, resection, regeneration, bi-cuspidization and tunnelling are the treatment modalities in furcation defects. Results of this study

also showed that 46.5% of the dentists recognized that Degree II furcation defects were more favourable for regeneration procedures and 87.6% of them were aware that improper debridement while attempting surgery, root caries treatment failure and post-operative accumulation are the common clinical difficulties experienced by a dentist during furcation treatment. Further 80.5% dentists acknowledged that hemi-section meant Removal of part of root along with crown and 73.9% stated that bi-cuspidization was a procedure that involved splitting the molar at furcation of tooth and restoring it as two premolars respectively. Further, 65.9% of dentists opined that Degree I and II furcation had better prognosis (Table 2).

Table 1. Distribution regarding age, gender, education, job and country of dentists

Variables	N=904	%
Age (In Years)		
25-30	694	76.8
31-35	167	18.4
36-40	32	3.5
41-45	11	1.2
Gender		
Female	652	72.1
Male	252	27.9
Level of education		
Undergraduates	496	54.9
Post graduates	408	45.1
Job		
Academician	56	6.2
Clinical Practice& academics	124	13.7
Clinical Practice	220	24.3
Student	504	55.8
Country		
India	650	71.9
Other Countries	254	28.1
USA	53	5.8
Canada	47	5.1
Nepal	44	4.8
Albania	41	4.5
Sri Lanka	42	4.6
Turkey	27	2.9

In the present study, there was no significant statistical difference ($p>0.05$) regarding the knowledge of furcation defects between male and female dental professionals (Table 3). When undergraduates and post graduates were compared with respect to use of Nabers probe and treatment of Degree II furcation defects, statistical significant difference was found ($p<0.05$) (Table 4) and when comparison was done regarding knowledge, perception regarding the furcation defects between India and other countries there

was no significant difference ($p>0.05$). Briefly, regarding knowledge of furcation 93-95% has knowledge between India and other countries. Further for what is a furcation and what it is meant (93.7% and 85.3%), predictability of regenerating

furcation defects (48.8%), anticipated clinical difficulties (88.2%) and bi-cuspidization procedural involvement (74.8%) frequency percentages were numerically higher for other countries than India but values were non-significant ($p>0.05$) (Table 5).

Table 2. Response of the participants regarding furcation

Questions	N	%
Do you have knowledge regarding furcation?	860	95.1
What do you mean by a furcation?	780	86.3
What is the type of probe that is used for measurement of furcation?	672	74.3
Can you classify furcation defects	816	90.3
Do you think furcation were different for different teeth?	636	70.4
Can furcation be treated?	844	93.4
Who are the specialists to treat a furcation defect?	836	92.5
What are the treatment modalities available for furcation?	784	86.7
What are the furcation defects in which predictable regeneration procedures can be attempted?	420	46.5
What are the clinical difficulties anticipated by a dentist in the treatment of furcation defects?	792	87.6
Hemisection means ...	728	80.5
Bicuspidization is a procedure which involves..	668	73.9
Which furcation defect has the better prognosis?	596	65.9

Table 3. Comparative results between males and females regarding furcation knowledge

Questions	Female		Male		P-VALUE
	N	%	N	%	
Do you have knowledge regarding furcation?	628	95.1	232	92.1	>0.05
What do you mean by a furcation?	560	86.3	220	87.3	>0.05
What is the type of probe that is used for measurement of furcation?	492	74.3	180	71.4	>0.05
Can you classify furcation defects	588	90.3	228	90.5	>0.05
Do you think furcation defects are different for different teeth?	440	70.4	196	77.8	>0.05
Can furcation be treated?	608	93.4	236	93.7	>0.05
Who are the specialists to treat a furcation defect?	604	92.5	232	92.1	>0.05
What are the treatment modalities available for furcation?	576	86.7	208	82.5	>0.05
What are the furcation defects in which predictable regeneration procedures can be attempted?	284	46.5	136	54.0	>0.05
What are the clinical difficulties anticipated by a dentist in the treatment of furcation defects?	572	87.6	220	87.3	>0.05
Hemisection means ...	540	80.5	188	74.6	>0.05
Bicuspidization is a procedure which involves..	480	73.9	188	74.6	>0.05
Which furcation defect has the better prognosis?	440	65.9	156	61.9	>0.05

Table 4. Comparative results between Undergraduates and Post graduates regarding furcation knowledge

Questions	Undergraduates		Post graduates		P-VALUE
	N	%	N	%	
Do you have knowledge regarding furcation?	460	92.7	400	98.0	>0.05
What do you mean by a furcation?	424	85.5	356	87.3	>0.05
What is the type of probe that is used for measurement of furcation?	316	63.7	360	88.2	< 0.05*
Can you classify furcation defects	440	88.7	376	92.2	>0.05
Do you think furcation defects are different for different teeth?	336	67.7	300	73.5	>0.05
Can furcation be treated?	464	93.5	380	93.1	>0.05
Who are the specialists to treat a furcation defect?	448	90.3	388	95.1	>0.05
What are the treatment modalities available for furcation?	420	84.7	364	89.2	>0.05
What are the furcation defects in which predictable regeneration procedures can be attempted?	176	35.5	244	59.8	>0.05
What are the clinical difficulties anticipated by a dentist in the treatment of furcation defects?	440	88.7	352	86.3	< 0.05*
Hemisection means ...	396	79.8	332	81.4	>0.05
Bicuspidization is a procedure which involves..	336	67.7	332	81.4	>0.05
Which furcation defect has the better prognosis?	324	65.3	272	66.7	>0.05

*Statistically significant

Table 5. Comparison between respondents of India and other countries regarding furcation knowledge

Questions	India		Other Countries		P-VALUE
	N	%	N	%	
Do you have knowledge regarding furcation?	620	95.4	238	93.7	>0.05
What do you mean by a furcation?	550	84.6	218	85.8	>0.05
What is the type of probe that is used for measurement of furcation?	484	74.5	185	72.8	>0.05
Can you classify furcation defects	580	89.2	226	88.9	>0.05
Do you think furcation defects are different for different teeth?	462	71.1	180	70.9	>0.05
Can furcation be treated?	592	91.1	230	90.6	>0.05
Who are the specialists to treat a furcation defect?	602	92.6	228	89.8	>0.05
What are the treatment modalities available for furcation?	574	88.3	220	86.6	>0.05
What are the furcation defects in which predictable regeneration procedures can be attempted?	292	44.9	124	48.8	>0.05
What are the clinical difficulties anticipated by a dentist in the treatment of furcation defects?	564	86.8	224	88.2	>0.05
Hemisection means ...	526	80.9	196	77.2	>0.05
Bicuspidization is a procedure which involves..	472	72.6	190	74.8	>0.05
Which furcation defect has the better prognosis?	422	64.9	160	62.9	>0.05

DISCUSSIONS

Periodontitis is a multifactorial disease resulting in attachment and bone loss. Treating these cases is a herculean task [11]. Thus, dental professionals should have sufficient knowledge regarding the sequential and advanced treatment modalities regarding the same so that they can treat or at least refer when in need to a periodontist for better outcomes. Existing literature pertaining to furcation is entirely clinical and deals with various surgical techniques and materials used in treating it [4]. This study mainly focused on the knowledge of furcation defects and its management among dental fraternity in day today practice through online questionnaire survey.

To date, this study is the first of its kind which assessed the knowledge of furcation defects among dental fraternity at multinational level and hence comparison was made with existing scant literature. In the present study, majority of the dental professionals (71.9%) were from India and the rest from other countries (28.1%). Females participated in the current study were 72.1% was better than a recent study conducted by Abdulbaki et al. [12] in 2020 where female participation was 56.6%. This can be explained partly by the fact that females placed more importance on aesthetics & health and partly because more females chose dentistry than males. In the present study, 55.8% of dental fraternity were students as compared to only 6.2% of the academicians which might be put down to enthusiasm of students in participating in this survey. Moreover, dentists in clinical practice & academicians might be busy with their schedules which could explain their scant participation. The current study also revealed that most of the dental fraternity had a fair idea regarding the furcation defects and their treatment. This might be due to sound clinical knowledge taught at classroom level. Males and females showed a similar knowledge regarding furcation defects with no statistical significant difference. This again reflected the sound clinical knowledge concerning the furcation defects, their treatment modalities and expected complications taught at clinics during under-graduation [13].

Present study also reported that 86-88% of study population knew the problems involved in furcation treatment like improper debridement during surgery, more plaque accumulation, root caries and Treatment failure which concurred with a review done by Hamp et al. [14] and Parihar AS. [15] where they stated that proper meticulous treatment of plaque retentive areas and good oral hygiene

restricted the bone destruction. This was even supported by Rasperini et al. [16] in 2020 where they recommended additional clinical recommendations like case selection, tooth morphology, patient attitude for treatment, bone levels, keratinized tissue width and depth of vestibule that should be considered for management and treatment planning of furcation involvement.

On an enquiry relating to periodontist as an expert for treating furcation defects, 92.5% of the study subjects agreed with no significant difference among male and females among India as well as other countries which was in agreement with a study conducted by Sathyamurthy et al. [17] in 2018 where 67.4% of their study participants would consult a periodontist for furcation involvement cases. Due to complex morphology and varying treatment involved in furcation defects, dentists should have a sound knowledge regarding the same. Present study results gave an encouraging sign that non-periodontists could create awareness in patients and promptly refer complex cases to a periodontist so that failure rate would decrease.

In this survey, 88.2% of post graduates had significant knowledge pertaining to the use of Nabers probe for furcation measurement as well as significant clinical acumen to identify Degree II furcation defects as those in which predictable amount of regeneration could be attempted. Study done by Karthikeyan et al. [18] in 2015 stated that clinical probing was always a reliable method for identification of bone loss within the furcation. Thus present study population had appreciable knowledge regarding the Nabers probe usage for clinical measurements of furcation. Concerning identification of predictable regeneration in Degree II furcation defects, systematic and meta-analysis reviews conducted by Panda et al. [19], Ortis et al. [8], Chen et al. [20] supported the same. Further American Academy of Periodontology Regeneration Workshop on Furcation Defects also concluded that regenerative therapies were the initial line of treatment for Degree II Furcation Involvement before conducting resective procedures or any other treatments [21]. This could be partly explained by the fact that post graduates performed short researches and thesis dissertations as a part of their curriculum and partly, due to knowledge gained by them during journal club discussions as well as advanced surgical and study material reading.

With respect to Indian and Foreign Dental Fraternity, there was no significant difference in

knowledge regarding furcation defects. This perhaps could be on account of standardization of teaching and clinical skills across the world. Regarding the prognosis of furcation defects, study population ranging 62-67% reported that Degree I&II furcation's had better prognosis. This was supported by Bowers et al. [22] in 2003 where they concluded that 74% of Degree II mandibular furcation defects achieved complete closure. Though the study had appropriate sample size, limitations of study was lack of comparison with other studies having similar design.

CONCLUSIONS

It can be concluded that dental fraternity had adequate knowledge regarding the furcation defects, its treatment modalities and type of complications expected in treating them.

DECLARATION OF INTEREST

Authors declare no conflict of interest.

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