

Frequency of C Shaped Canals in Permanent Mandibular 2nd Molar in Pakistani Population

C Shaped Canals
in Permanent
Mandibular 2nd
Molar

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ABSTRACT

Objective: Evaluation of C-shaped canal frequency and its types in permanent mandibular 2nd molars in patients presenting with irreversible pulpitis.

Study Design: Cross Sectional study

Place and Duration of Study: This study was conducted at the Operative Dentistry department, Punjab Dental hospital, Lahore from January, 2019 to July, 2019 for a period of six months.

Materials and Methods: 100 patients were examined suffering from irreversible pulpitis, C-shaped canals and its types were assessed using Min's classification system by using Dental loupes with 3.5 magnification and recorded information. SPSS Version 20 used for entering/analyzing data.

Results: In the 100 individuals, 42% were males and 58% females. 19% according to Min's classification had a C-shaped canal in mandibular second molar. Of these, 21% had type-1 (a peninsula), 47.4% had type II (a buccal), and 31.6% had type III (only one mesial) C-shaped canal. The major number was among 16-25 years, 08 (42.1%) but statistically insignificant differences was observed (p-value = 0.138). Similarly, maximum no of C-shaped canal was found among females, 11 (57.9%) but statistically insignificant difference was observed (p-value = 0.992).

Conclusion: There are a significant percentage of C-shaped canals among 2nd molars mandibular in Pakistani people. Thus treating dentists need to know C-shaped root canal systems their presence as well as configuration so that endodontic treatment success rate increases.

Key Words: C-shaped canal, Mandibular permanent 2nd molar, Irreversible pulpitis

Citation of article: Munir B, Altaf A, Mahmood F, Umar M, Sajjad I, Ali M. Frequency of C Shaped Canals in Permanent Mandibular 2nd Molar in Pakistani Population. Med Forum 2021;32(7):11-14.

INTRODUCTION

The variability among mandibular molars is related to their shape as compared to other teeth and these teeth have complex internal anatomy^{1,2}. C shaped canal is one such variation occurring in 2nd molar mandibular which is not only easily neglected, it is also difficult to prepare and obturate which is required for optimal endodontic treatment.^{3,4} In a study, it has been further noted that age, gender or tooth position has no effect on prevalence of C shaped canals. If C shaped canals exists bilaterally then they will be symmetrical up to 81% of the cases.⁵

They can be with simple C shape with no separation or division or they can resemble a semicolon resulting in discontinuation of C shaped outline or at times in two canals or three canals types or lastly as one round canal variation.⁶

The occurrence of these forms of root morphologies reaches up to 41.27% percentage in Asian population which is very high and are challenge in dental practice only a thorough knowledge of C shaped canals morphologies will enable a dental practitioner to treat these variations properly.⁷ Cleaning of C shaped canals after identifying them is essential for endodontic treatments success.^{3,6} Four types were classified by Min et al regarding orifice and pulp floor based on the pulp, chamber floor shape and the dentin fusion location.⁷

The frequency of C shaped mandibular 2nd molar is between according to Mandana Naseri et al 6.96% and up to 41.27% in accordance to Yan Wang et al in populations across the world.^{3,8} Yan Wang et al found mandibular 2nd molar C shaped canals were 41.27% in Chinese population. Cases on the basis of clinical examination showed C-shaped canal as 22.94% were C1; 48.11% were C2; whereas 15.59% had C3a; 13.36% showed C3b.¹ The C-shaped root canal among mandibular 2nd molar showed prevalence that ranged from 2.7% - 44.5%.⁹

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Received: February, 2021

Accepted: May, 2021

Printed: July, 2021

Various studies showed that gender based differences was not found regarding its distribution and in addition maxillary 2nd deciduous molars showed this root canal system.¹⁰⁻¹² While, permanent teeth had been reported predominantly incurring this condition. Developed countries individuals like Americans and Europeans had relatively lower numbers of these systems as compared to developing countries such as Asians.¹³ All types of the tooth could have this condition especially the 02 unusual features in their structure. Three types of these C-shaped canals had been reported in a study.¹⁴ The higher incidence of these canals was reported using combination of various methods such as if used examination using microscope there was 41.27% occurrence seen, using clinical examination alone showed 39.18% while radiography reported 34.64%¹⁵⁻¹⁷. The crown morphology of teeth with C-shaped anatomy does not present with any special features that can aid in the diagnosis. A longitudinal groove on lingual or buccal surface of the root with a C-shaped anatomy may be present.¹⁸ Such narrow grooves may predispose the tooth to localized periodontal disease, which may be the first diagnostic indication.¹⁹⁻²⁰

Data regarding frequency of C shaped canals in mandibular 2nd molar among Pakistani population is scarce and in order to help local dental practitioners and endodontists for understanding how often they would come across these canals during root canal treatment to the patients. So, this study was planned to know the C-shaped canal frequency among irreversible pulpitis patients of Punjab dental hospital, Lahore.

MATERIALS AND METHODS

All patients with irreversible pulpitis were assessed for C-shaped canal presence during specified time period (30-01-2019 to 30-07-2019) at Punjab dental hospital, Lahore. 100 patients were examined to confirm the irreversible pulpitis presence, then C-shaped canals were assessed and also types of these canals on the basis of Min’s classification system by using Dental loupes with 3.5x magnification and information was recorded on predesigned questionnaire. The data was reviewed and entered on questionnaire was analyzed using SPSS Version 20.0. Frequency along with percentages was calculated for categorical variables and Mean±SD was calculated for quantitative variables. Chi square test was used for association between socio-demographic and certain factors. Statistically significance was set as p-value ≤ 0.05.

RESULTS

Among all patients requiring endodontic treatment for permanent 2nd mandibular molars presenting with irreversible pulpitis, 100 patients were selected and enrolled for this study. Among these 42(42.0%) were males and remaining 58(58.0%) were females, age

ranged from 16 - 45 years. The mean age of the patients was 32.78 ± 9.25 years. In the 100 individuals, 19 (19.0%) people according to Min’s classification had a C-shaped canal in 2nd molar in mandibular region. Among these, 04 (21%, n= 19), had type-1 (a peninsula), 09 (47.4%, n=19) had type II (a buccal), 06 (31.6%, n=19) had type III (only one mesial) C-shaped canal and no one had type IV C-shaped canal.

Table No.1: Frequency distribution of characteristics and C-shaped canal system among patients

Variables		Frequency	%age
C-Shaped Canal	Yes	19	19
	No	81	81
C-Shaped Type (n=19)	type-1(A peninsula)	04	21
	type-2(A buccal)	09	47.4
	type-3(Only one mesial)	06	31.6
Gender	Males	42	42
	Females	58	58
Age (Years)	16-25	25	25
	26-35	28	28
	36-45	47	46
Total		100	100

*Mean±SD

■ type-1(A peninsula) ■ type-2(A buccal) ■ type-3(Only one mesial)

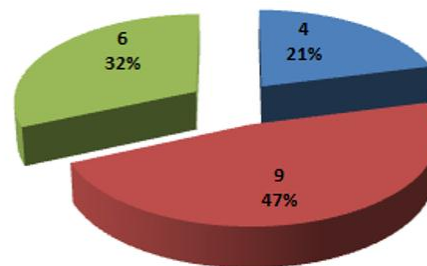


Figure No.1: C-Shaped Canal Type among Patients

There were 32% patients with C-shaped canal system that were having age 16-25 years, 17.8% were having age 26 to 35 years and 13% had age 36-45 years (p-value = 0.138). Regarding gender, there were 19% male patients with c-shaped canal system as compared to 18.9% female patients suffering from the disease (p-value = 0.992) as shown in table no: 2.

Table No.2: Age and Gender association with C-shaped canal system

Variable	C-Shaped Canal System		p-Value	
	Yes (%)	No (%)		
Age (Years)	16-25	08 (32%)	17 (68%)	0.138
	26-35	05 (17.8%)	23 (82.2%)	
	36-45	06 (13%)	41 (87%)	
Gender	Males	08 (19%)	34 (81%)	0.992
	Females	11 (18.9%)	11 (81.1%)	
Total		19 (19%)	81 (81%)	

DISCUSSION

During endodontic treatment, C-shaped canal poses difficult situations while performing the procedure.²¹ The individual canals are connected via isthmus characterized by the anatomical variants of the root systems. Asians are mostly affected by these morphological types especially in region of 2nd molar mandibular. So, dentists must be known about the importance of this complex system.²² The incidence is affected by the ethnic origin of the individuals, Asians showed highest rate up to 44.5% as compared to other regions.²²

Yin et al results demonstrated that among Chinese population enrolled in their study, 32% had condition of such root system (i.e. the radiograph cross sectional looked alike the 'C' letter), although of these, the actual problem was present among 14% of the respondents.²³ Whereas, in another Chinese study done in 2011 by Zheng O et al, the prevalence of such condition was 39% in the respondents. The differences seen might be attributed to operational definition of the studies, sampling sources, study methodology and anatomy of 2nd molar mandibular.⁶ However, in the present study, 19% of the Pakistani population was affected. The difference from the other studies was attributed to geographical location of the in particular Pakistan and in general the South East Asia.

A study described classification for the C-shaped roots that was used to check its frequency in our population.⁷ In our study out of 19 patients with C-shaped canal; type-I (a peninsula) was found in 4(21.1%) patients, type II (a buccal) was in 9(47.4%) and type-III was observed in 6(31.5%) mandibular permanent 2nd molar. In a recently published study from Pakistan showed that single-rooted (18%), double-rooted (80%) and three roots were present only in 2% of the respondents. The canal types seen were category I and II (3 each) while category III (07) individuals out of 100.²⁴ A study also reported that category III systems occurred most frequently, which is not in agreement with our study.²⁴ In our study C-shaped canal of the second molar was more common among females than males but statistically insignificant differences were observed between C-shaped canal and its types with respect to age and gender. In the literature, it is stated that among Asians, the Korean population showed highest prevalence ranging from 31-45 percent.²⁵ The study results demonstrated that females had two times more single root canal than males thus describing gender as an important factor for evaluation for non-surgical randomized control trials.²⁵ The contrary results from our study showed that almost 70% individuals had C-shaped canal found in opposite tooth if it is previously present on one side. Recent study done on Korean population demonstrated that C-shaped canals were present in 74.4% on both sides.²⁶

The morphology of tooth specifically regarding pulp determines the variation in canal system and thus accessing obturation and cavity for the teeth.²⁶ The techniques used might be needed to modify them such as distal and mesial spaces could be prepared as well as obturate being standardized canals; but if only lateral condensation is used the difficulty lies in sealing of lingual or buccal isthmus; therefore, certain other procedures like plasticized gutta-percha is recommended.²⁷

CONCLUSION

The conclusion drawn from this study showed that significant percentage of C-shaped canals occurs in permanent mandibular 2nd molars in Pakistani people, therefore treating dentists need to know C-shaped root canal systems their presence as well as configuration so that they can first identify and perform endodontic treatment properly in these challenging cases.

Author's Contribution:

Concept & Design of Study:	Bader Munir
Drafting:	Ali Altaf, Faisal Mahmood
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Revisiting Critically:	Bader Munir, Ali Altaf
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Conflict of Interest: The study has no conflict of interest to declare by any author.

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