
Evaluation of non-vital teeth with various endodontic pathologies-a retrospective study

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ABSTRACT: Most of the time non-vital teeth are associated with various pathologies. The early intervention would save the teeth from its loss. Depending on the etiology and the duration, the pathology differs among the non-vital teeth. The aim of this study was to evaluate non-vital teeth with various endodontic pathologies. This retrospective study included patients who were diagnosed with non-vital teeth from July 2019 to March 2020 in a dental hospital. The case records of all patients were retrieved which included the clinical, radiographic examination and treatment done for the patients. Variables such as age, gender, any associated endodontic pathologies were retrieved from the case sheets. Data was tabulated and was subjected to statistical package IBM SPSS version 20.0. Around 80,000 patients were reviewed and 238 patients met the inclusion criteria. Out of 238 patients, 71.8% were males and 28.2% were females. On analysing the prevalence of non-vital teeth among different age groups, 21-30 years age group (32.8%) were more affected. On comparing the non-vital teeth with endodontic pathology, non-vital teeth without periapical lesion (74.4%) were found to be in a higher prevalence. Among non-vital teeth with endodontic pathology, periapical abscess (14.3%) was found to have higher prevalence followed by periapical cyst (2.9%) and calcified canal (2.9%). On analysing the prevalence of non-vital teeth among gender, males (71.8%) were more affected. No statistically significant association was found between age, gender and non-vital teeth. ($p > 0.05$). Within the limitation of the study, the prevalence of non-vital teeth without periapical lesion were found to be higher. Among non-vital teeth with endodontic pathology, the most common pathology was chronic periapical abscess. Males were more affected with non-vital teeth and had higher prevalence among the 21-30 years age group.

Keywords: Abscess, Cyst, Granuloma, Internal resorption, Sinus tract, innovative

INTRODUCTION

Non-vital teeth are teeth with a necrotic pulp. Initially it starts as a carious lesion or consequence preceding trauma. Over the time, bacteria in the root canal induces inflammation resulting in the formation of an apical granuloma or cyst. (Hossain *et al.*, 2015; Carmen *et al.*, 2017). If not treated, they may progress into a sinus tract or fistula. In cases of trauma, there is presence of internal resorption with abscess formation. (Akbar, 2015). Trauma to the anterior teeth with the underlying esthetic, psychosocial, functional, and therapeutic problems adversely affect an individual's quality of life. (Andreasen, Andreasen and Andersson, 2018)

Diagnosis for a non-vital tooth is done by clinical and radiographic examination. There are various advanced tests for assessing the pulp vitality. (Janani, Palanivelu and Sandhya, 2020) Pulp necrosis is suspected when a tooth does not react to thermal, electric or mechanical stimulation but the definite diagnosis is established only after inspection and probing of the pulp chamber and the root canal. (Beer, Baumann and Kielbassa, 2006; Mobeen, 2015).

Treatment of a non-vital tooth involves the treatment of an infectious disease process. (Bhagwat and Mehta, 2013) The objective of treating a non-vital tooth is to remove the necrotic tissue and tissue breakdown products from the root canal, eliminate infection, seal the root canal and thereby establish a functioning tooth in a healthy periodontium. (Kojima *et al.*, 2004) 2004)

Periapical lesion affecting the periodontium may be treated successfully by a surgical- endodontic approach in which the apical granulation tissue which is infected is curetted out or surgically removed. (Vanka *et al.*, 2010). In cases of non-vital young permanent teeth and when the non-vital teeth are not associated with any periapical

pathology, they are treated by non surgical management.(Carmen *et al.*, 2017). Recall and review is done to assess the status of the tooth at regular intervals so that appropriate treatment measures can be carried out when it is required.

Though clinical success of a root canal treatment is achieved by careful and thorough debridement, preparation and obturation of the root canals, the major concern for the patient is the post-operative pain. They can be reduced by medical management or by incorporating proper technique and protocol during the root canal treatment.

Previously our institution has done numerous clinical studies(Ramamoorthi, Nivedhitha and Divyanand, 2015; Ramanathan and Solete, 2015; Hussainy, Nasim and Thomas, 2018; Nandakumar and Nasim, 2018; Ravinthar, 2018; Teja, Ramesh and Priya, 2018; Rajendran *et al.*, 2019; Siddique and Sureshbabu, 2019; Teja and Ramesh, 2019; Janani, Palanivelu and Sandhya, 2020) , systematic reviews(Noor, S Syed Shihaab and Pradeep, 2016; Kumar and Antony, 2018; Rajakeerthi and Ms, 2019) and surveys(Manohar and Sharma, 2018; Jose, P. and Subbaiyan, 2020).Now we are focussing on retrospective studies. Our university is passionate about research we have published numerous high quality articles in this domain over the past years ((Kavitha *et al.*, 2014) , (Praveen *et al.*, 2001),(Devi and Gnanavel, 2014), (Putchala *et al.*, 2013), (Vijayakumar *et al.*, 2010), (Lekha *et al.*, 2014a, 2014b) (Danda, 2010) (Danda, 2010) (Parthasarathy *et al.*, 2016) (Gopalakannan, Senthilvelan and Ranganathan, 2012), (Rajendran *et al.*, 2019), (Govindaraju, Neelakantan and Gutmann, 2017), (P. Neelakantan *et al.*, 2015), (PradeepKumar *et al.*, 2016), (Sajan *et al.*, 2011), (Lekha *et al.*, 2014a), (Neelakantan, Grotra and Sharma, 2013), (Patil *et al.*, 2017), (Jeevanandan and Govindaraju, 2018), (Abdul Wahab *et al.*, 2017), (Eapen, Baig and Avinash, 2017), (Menon *et al.*, 2018), (Wahab *et al.*, 2018), (Vishnu Prasad *et al.*, 2018), (Uthrakumar *et al.*, 2010), (Ashok, Ajith and Sivanesan, 2017), (Prasanna Neelakantan *et al.*, 2015). Thus , the aim of this study was to evaluate non-vital teeth with endodontic pathologies.

MATERIALS AND METHODS

Study setting and study design:

In this retrospective study, we reviewed the case records of the patients who reported to a dental hospital from July 2019 to March 2020 among which 238 patients diagnosed with non vital teeth were included in the study. Consecutive sampling method was used for the study. The study was approved by the scientific review board and ethical clearance was obtained from the Institutional Ethical Committee.. The ethical clearance number was SDC/SIHEC/2020/DIASDATA/0619-0320.

Data collection: Patients of 11- 80 age groups , both males and females were included in the study. All types of endodontic pathology associated with non vital teeth were taken into consideration and the digital case records with clinical , radiographic examination and the treatment done to the patients were retrieved. Intra oral photographs and IOPA were used to cross verify the data.Variables such as age , gender and the associated endodontic pathology were retrieved from the case records. Patients with incomplete or censored data were excluded from the study.

Statistical analysis: The data was collected , tabulated and exported to IBM SPSS version 20.0 Statistical analysis. Variables were defined. Both descriptive (Frequency) and inferential statistics were employed. Chi square analysis was performed to analyse the association between age , gender and non vital teeth with the significance set at $p < 0.05$.

RESULT AND DISCUSSION

In the present study, among 238 patients with non vital teeth, the higher prevalence was found to be among 21 - 30 years age groups(32.8%) followed by 31- 40 years. (23.5%).The least prevalence of non vital teeth was found among the 71-80 years age group(0.4%). [Table 1,Figure 1]

On comparing the prevalence of non vital teeth among gender, the higher prevalence was found among males (71.8%) than females.(28.2%).[Table 2, Figure 2]

On analysing the prevalence of non vital teeth among patients, the higher prevalence was found to be non-vital teeth without periapical lesion (74.4%). On analysing the non vital teeth with endodontic pathologies (25.6%); 2.5% reported with chronic pulpitis; 0.4% reported internal resorption; 4.3% reported with periapical abscess; 0.8% reported with sinus tract; 2.9% reported with periapical cyst; 2.9% reported with calcified canal; 0.8% reported with Elis VI and 0.8% reported with Elis VII.[Table 3, Figure 3]

On analysing the association between non vital teeth and different age groups it was found that the non vital teeth with endodontic pathology (9.24%)and without periapical lesion (23.53%) were seen in higher prevalence among the 21-30 years age group.There was no statistically significant association between the age and the non vital teeth.(p value-0.546)[Table 4, Figure 4]

On analysing the association of gender and non vital teeth. The non-vital teeth without periapical lesions was more prevalent among males (55.04%) and non vital teeth with endodontic pathology were more common in males(16.81%).There was no statistically significant association between gender and the non vital teeth. (p value-0.195)[Table 5, Figure 5]

In the present study, males had higher prevalence of non vital teeth than females. The prevalence of non-vital teeth without periapical lesion was the highest. On comparing the prevalence of non-vital teeth with endodontic pathology, the most common was periapical abscess. On analysing the age group, the higher prevalence of non vital teeth was among 21-30 years age group.

In the present study the prevalence of non vital teeth was found among 11-80 years and the higher prevalence was found among younger adults. Previous studies have compared the colour differences among vital and non vital teeth and have involved the age group from 11 - 70 which is in accordance to our study. (Greta *et al.*, 2018). Our findings are in accordance with the previous study.

In the present study, there was male predominance of non vital teeth with periapical abscess. Males have a higher prevalence of non vital teeth when compared to females; males are more often involved in accidents/trauma. They do not consider aesthetics as superior as females and so after a trauma or injury the non vital teeth progresses to a periapical pathology and they report only when there is a pain or an emergency. (Vanka *et al.*, 2010; Pigg *et al.*, 2016). Our findings are in accordance with the present study.

In the present study, on comparing the prevalence of non vital teeth among different age groups, higher prevalence was found among 21-30 years age groups. Due to changes in the diet and the modern lifestyle, younger adults are more prone for caries and infections. This could be considered as an important factor for disease progression and prevalence among younger adults. (Amaral *et al.*, 2005; Vanka *et al.*, 2010). Our findings are in accordance with the present study.

In the present study, when comparing the different endodontic pathologies associated with non vital teeth, the most common pathology was periapical abscess. During acute pulpitis, there is pain during mastication. When progressed to chronic pulpitis, the pain subsides and there is merely mild or no pain. This could be a contributing factor for the progression to periapical lesion. In cases of trauma, the pulp response differs among individuals and based on the severity of the trauma there may be a progression to a periapical lesion. (Özbaş, Aşçı and Aydın, 2011; Hossain *et al.*, 2015; Mobeen, 2015)

Future research should be based on the various treatment modalities for non vital teeth and about the advancements in the diagnosis and treatment of the endodontic pathologies. The limitation of the study was that it was a retrospective study and data was collected from online digital case records. The case records were retrieved and were analysed by a single calibrated examiner to avoid subject variation. The sample size was not generalized to the entire population. So multicentric study with large sample size should be conducted.

CONCLUSION

Within the limitation of the study, the prevalence of non-vital teeth without periapical lesion were found to be higher. Among non-vital teeth with endodontic pathology, the most common pathology was chronic periapical abscess. Males were more affected with non vital teeth and had higher prevalence among the 21-30 years age group.

AUTHORS CONTRIBUTION

Prashaanthi.N contributed acquisition of data, analysis, literature collection and also in drafting the article and revising it critically for important intellectual content. Iffat Nasim contributed in conception, the study design, interpretation of data, formatting, manuscript preparation, supervision and guidance. Shantha Sundari.K.K contributed in editing, supervision and final approval of the submitted version of the manuscript.

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TABLES AND FIGURES:

Table 1 : The frequency and percentage distribution of non vital teeth among different age groups

AGE	FREQUENCY	PERCENTAGE
11-20	31	13
21-30	78	32.8
31-40	56	23.5
41-50	35	14.7
51-60	25	10.5
61-70	12	5.0
71-80	1	0.4
TOTAL	238	100

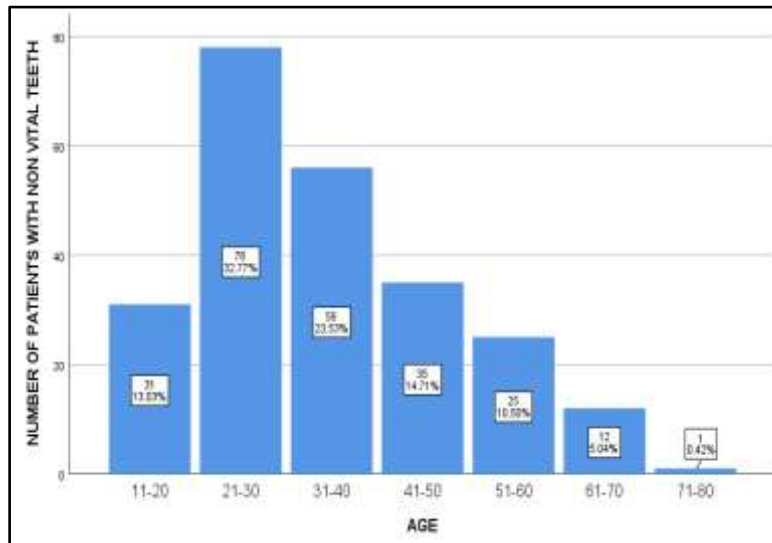


Fig.1: Bar graph showing the age wise distribution of patients with non vital teeth. X axis - age in years ; Y axis - number of patients with non vital teeth. Descriptive analysis showed there is higher distribution percentage of non vital teeth among 21-30 years (32.77%) and least prevalence of non vital teeth among 71-80 years.(0.42%)

Table 2: The frequency and percentage distribution of non vital teeth among males and females

GENDER	FREQUENCY	PERCENTAGE
MALE	171	71.8
FEMALES	67	28.2
TOTAL	238	100

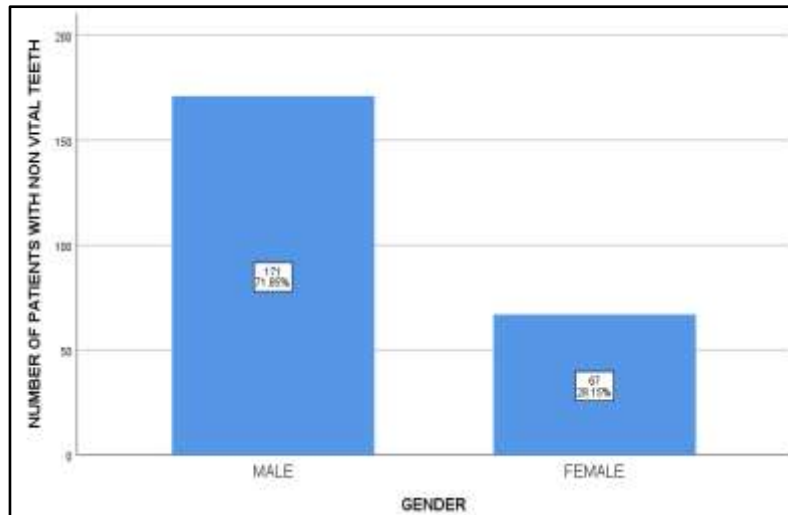


Fig.2: Bar graph showing the percentage distribution of non vital teeth among gender. X axis-gender (males/females) ; Y axis - number of patients with non vital teeth. Descriptive analysis showed there is higher distribution percentage of non vital teeth among males (71.85%) than females.(28.15%)

Table3: The frequency and percentage distribution of non vital teeth with endodontic pathology

NON VITAL TEETH	FREQUENCY	DISTRIBUTION
WITHOUT PERIAPICAL LESION	177	74.4
CHRONIC PULPITIS	6	2.5
INTERNAL RESORPTION	1	0.4
PERIAPICAL ABSCESS	34	14.3
SINUS TRACT	2	0.8
PERIAPICAL CYST	7	2.9
CALCIFIED CANAL	7	2.9
ELLIS VI	2	0.8
ELLIS VII	2	0.8
TOTAL	238	100

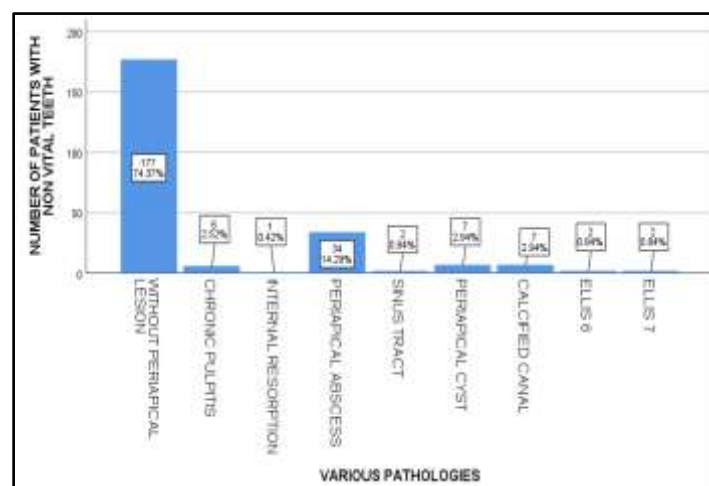


Fig.3: Bar graph showing the percentage distribution of non vital teeth with endodontic pathologies. X axis - various endodontic pathologies ; Y axis - number of patients with non vital teeth. Descriptive analysis showed there was higher prevalence among non vital teeth without periapical lesion (74.37%). Among the prevalence of non vital teeth with periapical pathology , the higher prevalence was found to be periapical abscess.(14.29%) and the least prevalence was found to be internal resorption.(0.42%)

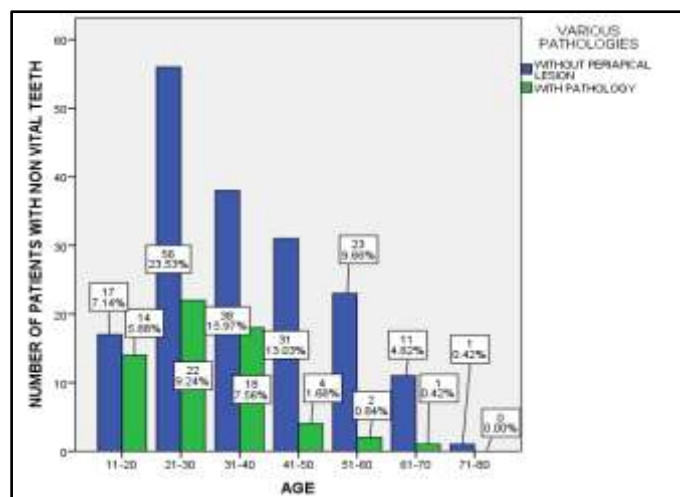


Fig.4: Bar graph showing the association of non vital teeth among different age groups. X axis - age in years and Y axis - number of patients with non vital teeth. The higher prevalence of non vital teeth without periapical lesion (blue) was seen among 21-30 years.(23.5%) and higher prevalence of non vital teeth with endodontic pathology (green) was seen among 21-30 years.(9.24%). Chi square analysis (pearson chi square - 46.209a ;df:48 ;p = 0.546) , (p>0.05) showed there was no statistically significant association between age and non vital teeth.

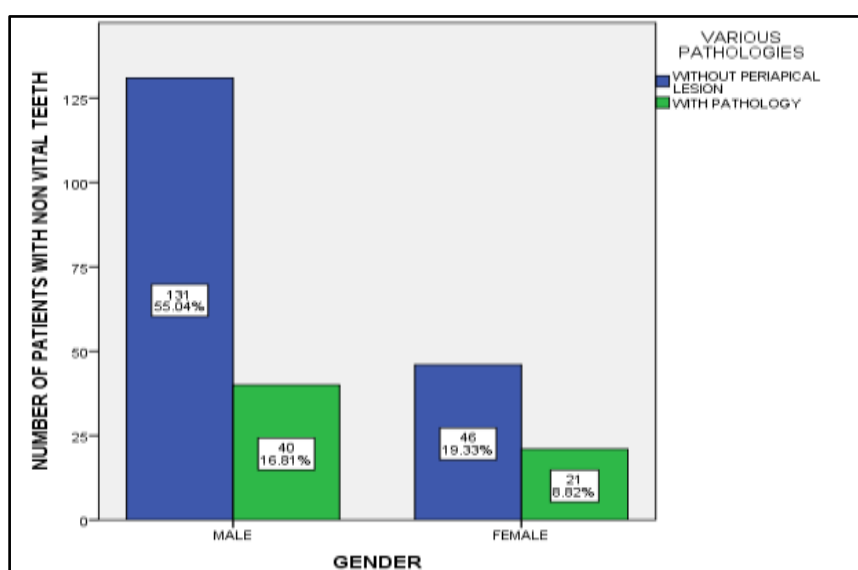


Fig.5: Bar graph showing the association of non vital among gender. X axis - gender (males/females) ; Y axis - number of patients with non vital teeth. The higher prevalence of non vital teeth without periapical lesion (blue) was seen among males (55.04%) and the higher prevalence of non vital teeth with endodontic pathology (green) was seen among males (16.81%). Chi square analysis (Pearson chi square - 11.112a ;df:8 ;p value- 0.195), (p>0.05) showed there was no statistically significant association between gender and non vital teeth.