

Assessment Of Knowledge, Attitude And Practice Based Survey On The Incidence Of Pulp Stones In Maxillary Molars Among Endodontists And General Practitioners - A Questionnaire Based Survey

Running title : KAP on incidence of pulp stones in maxillary molars

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Abstract : *Aim* The aim is to assess the knowledge, attitude and practice on the incidence of pulp stones in maxillary molars among endodontists and general practitioners. *Introduction* Pulp stones are discrete calcified masses found in the dental pulp tissue or embedded into dentin. Based on their radiographic features, they can be classified into true and false which are located more often in the coronal region of the tooth. True pulp stones are made up of dentine and lined by odontoblasts, whereas the false pulp stones are formed from degenerating cells of the pulp that get mineralized. *Materials and Methods* The sample size is 102 people and a random sampling method is used to minimise bias. Internal validity was a pre tested questionnaire and external experiment and cross verification with existing studies was performed. Data analysis was done in SPSS and Statistical test used is chi square test and dependent variables are demographic data such as gender and experience and independent variables are pulp stones incidence and knowledge. *Results* From this survey it was found that 70% were aware about the types of pulp stone, 62% were able to diagnose pulp stones radiographically and 60% encountered pulp stones rarely in maxillary molars. *Conclusion*

Within the limitations of the study , the prevailing knowledge in regard to the prevalence of pulp stones among endodontists was high when compared to the general practitioners. More awareness can be created among general practitioners about pulp stones. Furthermore, the existing Attitude and practice among respondents was high among endodontists and general practitioners when compared to knowledge.

Keywords : Incidence ; pulp stones; knowledge; attitude; endodontists ; general practitioners

1. INTRODUCTION

Pulp stones are discrete calcified masses found in the pulp chamber of healthy, diseased or even unerupted teeth [1,2]. They are located more often in the coronal portion than in the radicular portion of the pulp organ [3,4]. They can be seen as free, attached or embedded into the dentine and structurally/ histologically pulp stones can be classified into true and false forms; True stones contain irregular dentin and are coated with odontoblasts whereas the false pulp stones are formed from degenerating cells of the pulp that get mineralised [3,5,6].

Number of predisposing factors that can lead to pulp stones formation are such as age, caries, operative procedures, periodontal disease, orthodontic tooth movement, circulatory disturbances in pulp, genetic predisposition or idiopathic factors [7][8–12]. Pathological irritation of microorganisms on pulpal tissue can cause vascular wall injury, resulting in deposition of calcium salts within the tissue [13,14]. Number of pulp stones in a single tooth can vary from small microscopic particles to large masses that might almost obliterate the pulp chamber [15–17].

Radiographically pulp stones appear as round or ovoid opacities which may also occur as a single dense mass or as several small opacities [18–20]. Radiographically pulp stones are not clearly evident [21,22]. The calcification of pulp tissue might lead to failure of root canal therapy and loss of the teeth [23][24,25].

The frequency of incidence of pulp stones has been reported to increase with age [13,26–28]. Few studies suggest that females are more prone to pulp stones than males [28–32]. The aim of this survey was to assess the knowledge, attitude and practice on the incidence of pulp stones in maxillary molars among endodontists and general practitioners.

2. MATERIALS AND METHODS

A questionnaire was prepared and a survey was conducted in an online setting among endodontists and general practitioners. The sample size was 102 people and the simple random sampling method was used. In order to minimise bias all variables were included (Randomisation) and no sorting process was done. Internal validity was a pre tested questionnaire, external validity was homogenisation, replication of experiment and cross verification with existing studies.

Data analysis was done in SPSS (Statistical Package for the Social Sciences) software version 26 by IBM and the statistical test used was chi square test. Dependent variables are gender and experience and independent variables are pulp stones incidence and knowledge. Type of analysis in use was correlation and association. Data collection software used was google forms and the results were tabulated in the excel sheet and transferred to SPSS for analysis and represented in bar graphs. Data collection is verified by 2 reviewers.

3. RESULTS

It is a questionnaire based study conducted among general practitioners and endodontists. Majority of the subjects in this study population were males (51.9%) and females (48.1%) in which 71.5% were General practitioners and 29.4% were endodontists [figure 1].

In the present study it is evident that 51.9% of general practitioners and 17.6% of endodontists were aware about the types of pulp stones and only 18.6% of general practitioners and 11.7% of endodontists were unaware about the types of pulp stones [figure 2]. And 40.1% of general practitioners and 21.5% of endodontists diagnose pulp stones radiographically whereas 30.3% of general practitioners and 7.8% of endodontists diagnose clinically [figure 3].

According to the present study 38.2% of general practitioners and 17.6% of endodontists encounter pulp stones in maxillary molars rarely. 9.8% of general practitioners and 5.8% of endodontists encounter maxillary molar pulp stones very rarely, 19.6% of general practitioners and 4.9% of endodontists encounter them often and 2.9% of general practitioners and 0.9% of endodontists encounter them very often [figure 4].

From the present study it is evident that 51.9% of general practitioners and 21.5% endodontists tend to remove pulp stones even after finding the canal whereas 18.6% of general practitioners and 7.8% of endodontists don't tend to remove pulp stones if the canal is identified [figure 5].

According to the present study 27.4% of general practitioners and 15.6% of endodontists experience difficulty in canal identification, 23.5% of general practitioners and 4.9% of endodontists experience instrument fracture and 13.7% of general practitioners and 4.9% of endodontists experience perforation due to the presence of pulp stones due to the pulp stones [figure 6]. And 52.9% of general practitioners and 18.6% of endodontists feel difficulty in canal identification due to pulp stones [figure 7].

From the present study, it is evident that 34.3% of general practitioners and 10.7% of endodontists prefer the use of ultrasonic instruments to remove pulp stones whereas 21.5% of general practitioners and 16.6% of endodontists prefer the use of hand instruments to remove pulp stones [figure 8].

According to the present study 55.8% of general practitioners and 18.6% of endodontists experience iatrogenic errors while removing pulp stones whereas 14.7% of general practitioners and 10.7% of endodontists do not experience any iatrogenic errors [figure 9]. And 30.3% of general practitioners and 12.7% of endodontists responded root canal success rate will not decrease due to the presence of pulp stone whereas 25.4% of general practitioners and 4.9% of endodontists responded root canal success rate will not decrease due to the presence of pulp stones [figure 10].

4. DISCUSSION

From the present study it was found that knowledge, attitude and practice in regard to pulp stones were high among endodontists when compared to general practitioners. 51.9% of general practitioners and 17.6% of endodontists were aware about the types of pulp stones. 40.2% of general practitioners and 21.57% of endodontists diagnose pulp stones radiographically whereas 30.3% of general practitioners and 7.5% of endodontists diagnose them clinically. 51.9% of general practitioners and 21.5% of endodontists tend to remove pulp stones even after finding the canal. It is because endodontists were exposed more and they are specialised in the field whereas general practitioners have good theoretical knowledge but they were not exposed to pulp stones more often [33].

Pulp stones are foci of calcification in the dental pulp [34]. They range in size from small microscopic particles to large masses that almost obliterate the pulp chamber [35]. Pulp stones can also be classified as adherent and are attached to less dentine than embedded pulp stones[36]. There is limited research to give an accurate understanding of the cause of pulp stones but there have been some implications such as tooth movement caused by orthodontics, age, gender, genetic predisposition caries, deep restorations and chronic inflammation[35]. Generalized pulp stones throughout the dentition are usually associated with systemic or genetic disorders of dentin[34] . Normal anatomy of the pulpal system can be altered by the presence of pulp stones which will cause difficulty in locating root canal orifices[37]. Ultrasonic scaling special or sealer tips plays an important role in pulp stone removal as they are a minimally invasive option to allow the precise and accurate removal without increasing the risk of perforation.

A study done by Gulsahi et al., has similar evidence depicting 56% of pulp stones were diagnosed clinically [30]. Similar results are seen in a study by Bains et al., which shows that 66% of dental practitioners encounter pulp stones in maxillary molars rarely and the prevalence rate of pulp stones in maxillary molars was 50-75% . According to a study by Goga et al.,51% of dentists feel canal visibility as the difficulty because of the presence of pulp stones which is in accordance with the present study [36] . Moss salentijn et al.,mentioned that 78% of pulp stones are removed using ultrasonic instruments which is in agreement with the study results.

Limitations of the study were a smaller population number of respondents . Future scope of the study is to establish in a larger population or particularly to certain speciality or age or experience group among dentists .

5. CONCLUSION

Within the limitations of the study , it shows that knowledge, attitude and practice among general practitioners was higher when compared with endodontists. This is due to the unequal distribution of questionnaires within the respondents. Among the endodontists, knowledge , attitude and practice with respect to pulp stones was satisfactory.

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Author contribution :

AarthiMuthukumar carried out the KAP survey , collection and analysis of data and drafted the manuscript. Dr A. HimaSandeep aided in conception of the topic, supervision and appraisal of the manuscript.

Conflict of interest :

No conflict of Interest

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Figure 6: Prevalence rate of pulp stones in maxillary molars

Figure 7: Removal of pulp stones after finding canals

Figure 8: Level of difficulty to remove pulp stones

Figure 9: Difficulties during removal of pulp stone

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Figure 13: Root canal success rate and pulp stones

QUESTIONS	CATEGORY	FIELD OF PRACTICE		CHI-SQUARE VALUE	P VALUE
		General practitioner	Endodontist		
Are you aware about the types of pulp stones?	Yes	53	18	1.854	0.173
	No	19	12		
How'll you diagnose a pulp stone?	Clinically	41	22	2.409	0.121
	Radiographic	31	8		
How often do you encounter pulp stones in maxillary molars?	Very rare	10	6	1.737	0.629
	Rare	39	18		
	Often	20	5		
	Very often	3	1		
Do you tend to remove pulp stones even after finding the canal?	Yes	53	22	0.001	0.977
	No	19	8		
What difficulty do	Instrument fracture	24	5		

Do you face while removing pulp stones?	Canal visibility	28	16	3.721	0.293
	Perforation	14	5		
	Others	6	4		
Do you experience difficulty in canal identification due to pulp stones?	Yes	54	19	1.417	0.234
	No	18	11		
Which method do you prefer to remove pulp stones?	Burs	12	2	7.239	0.045
	Ultrasonic instruments	35	11		
	Hand instruments	22	17		
	Others	3	0		
Do you make any iatrogenic errors while removing pulp stones?	Yes	57	19	2.795	0.095
	No	15	11		

Do you think root canal success rate will decrease due to presence of pulp stones?	Yes	26	5	5.574	0.062
	No	31	13		
	Maybe	15	12		

Table 1: shows the field of practice, categories, number of responses, pearson's chi square value and p value of various entities.

DEMOGRAPHIC VARIABLES	CATEGORIES	NO. OF RESPONDENTS	TOTAL
Gender	Male	53	102
	Female	49	
Field of practice	General practitioner	72	102
	Endodontists	30	

Table 2:showing demographic data of participants : 53 males and 49 females were participated in the survey, 72 were general practitioners and 30 were endodontists in the population

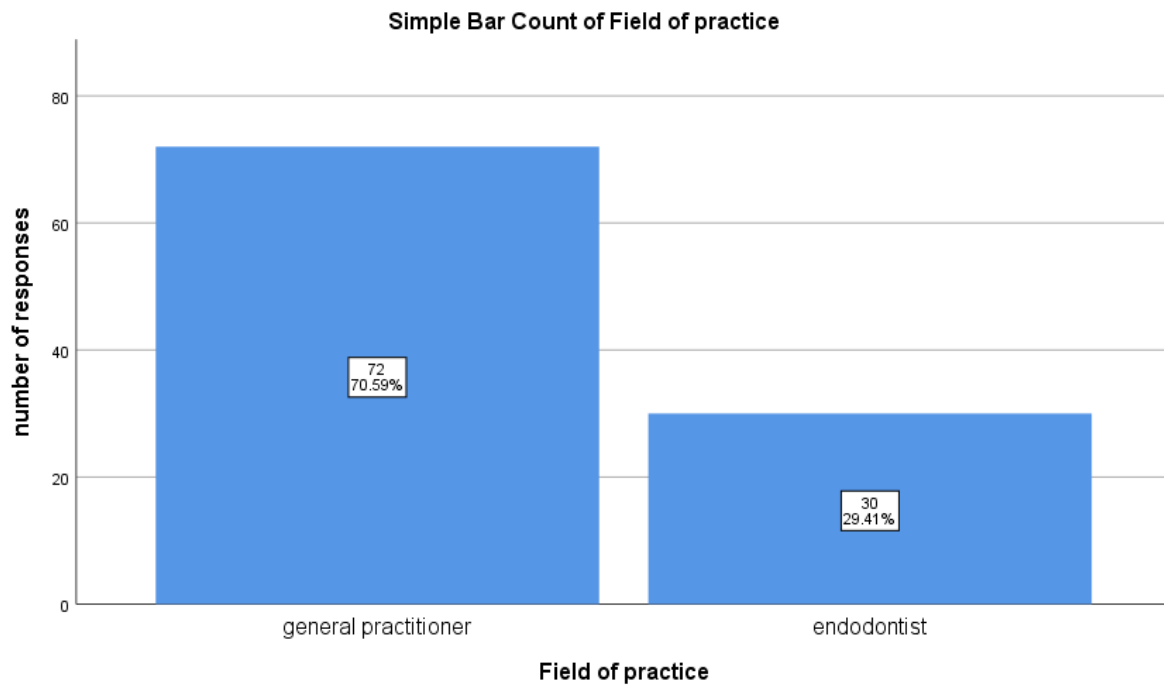


Figure 1: Bar graph represents the frequency of field of practice in the study population. X axis represents the field of practice and Y axis shows the number of responses. It shows, predilection of general practitioners is higher than endodontists in the study population.

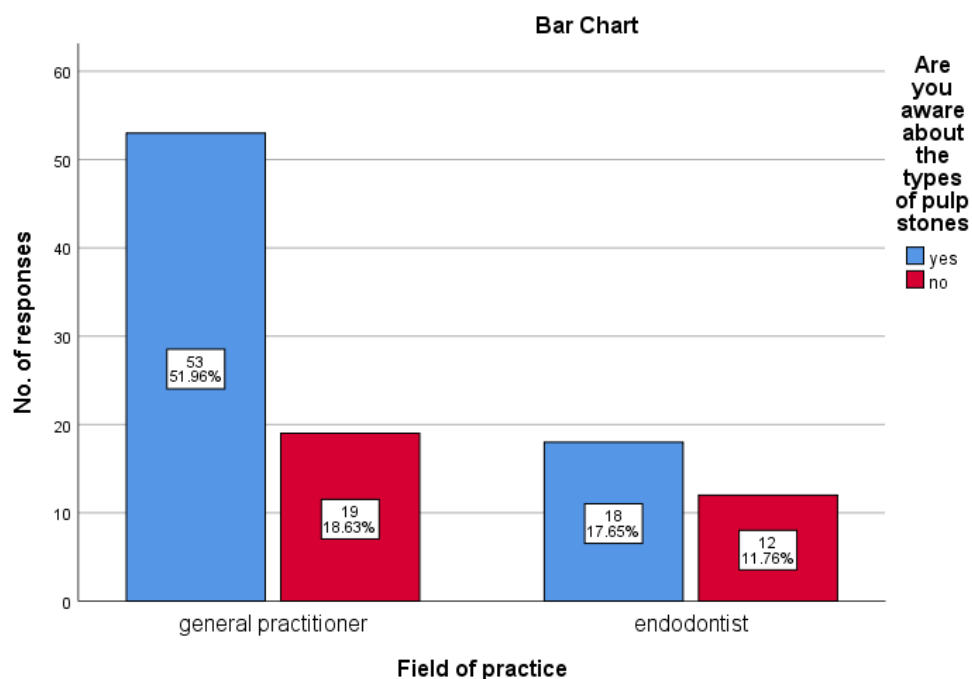


Figure 2 Bar graph represents the association between field of practice and awareness on the type of pulp stones. X axis represents the field of practice and type of response whereas Y axis shows the number of responses in each category. Chi square test was done and association was found to be statistically not significant. Pearson's Chi square value : 1.854, p value -0.173 (>0.05), proving that general practitioners have better awareness than endodontists.

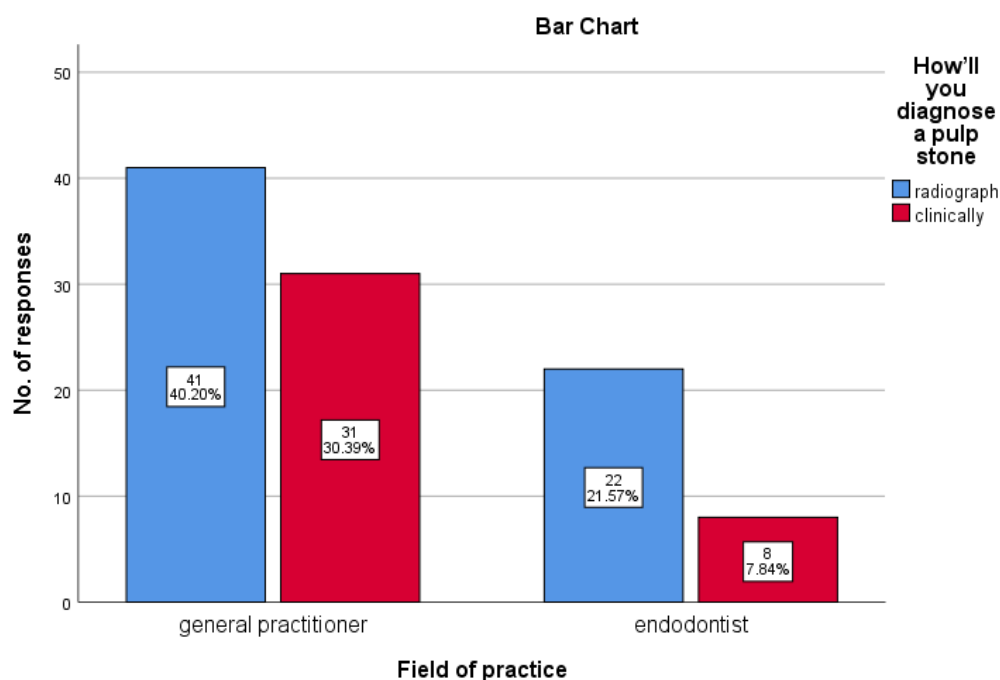


Figure 3: Bar graph represents the association between field of practice and method used to diagnose pulp stones. X axis represents the field of practice and type of response whereas Y axis shows the number of responses in each category. Chi square test was done and

association was found to be statistically not significant. Pearson's Chi square value : 2.409, p value -0.121 (>0.05), proving that radiographic methods of pulp stone diagnosis have higher acceptance than clinical methods.

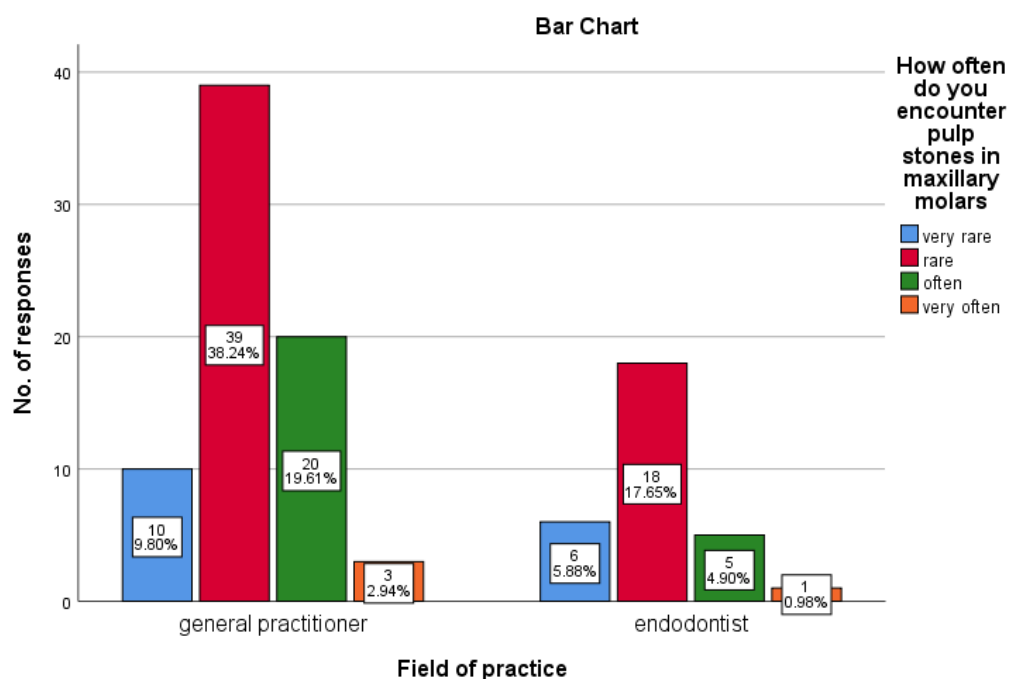


Figure 4: Bar graph represents the association between field of practice and the frequency of pulp stones in maxillary molars. X axis represents the field of practice and type of response whereas Y axis shows the number of responses in each category. Chi square test was done and association was found to be statistically not significant. Pearson's Chi square value : 1.737, p value -0.629 (>0.05), proving that both general practitioners and endodontists rarely encounter pulp stones in maxillary molars.

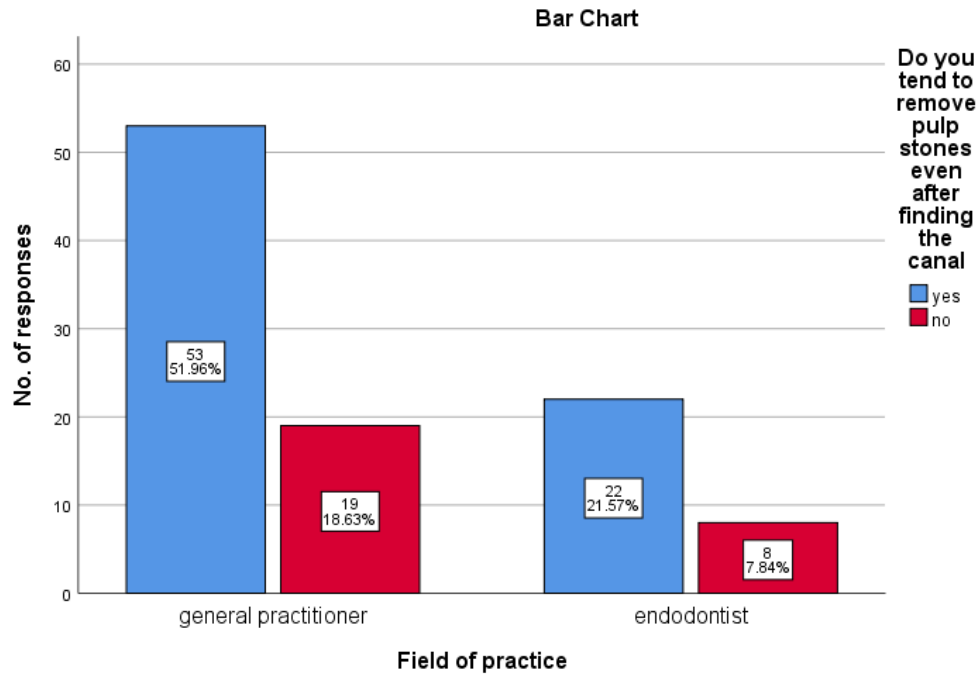


Figure 5: Bar graph represents the association between field of practice and their knowledge on removing pulp stones after finding the canal. X axis represents the field of practice and type of response whereas Y axis shows the number of responses in each category. Chi square test was done and association was found to be statistically not significant. Pearson's Chi square value : 0.001, p value -0.977 (>0.05), shows that removing the pulp stones after finding the canal was higher in general practitioners when compared to endodontists.

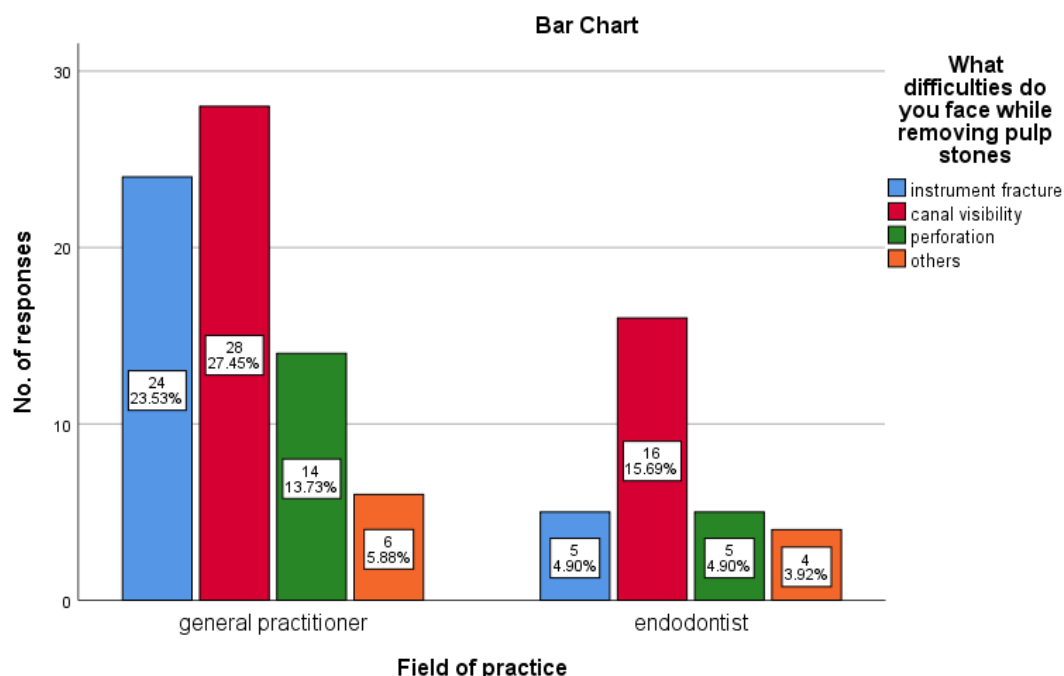


Figure 6: Bar graph represents the association between field of practice and the difficulties faced while removing pulp stones. X axis represents the field of practice and type of response whereas Y axis shows the number of responses in each category. Chi square test was done and association was found to be statistically not significant. Pearson's Chi square value : 3.721, p value -0.293 (>0.05), proving that canal visibility while doing the root canal treatment was the most common difficulty faced by respondents.

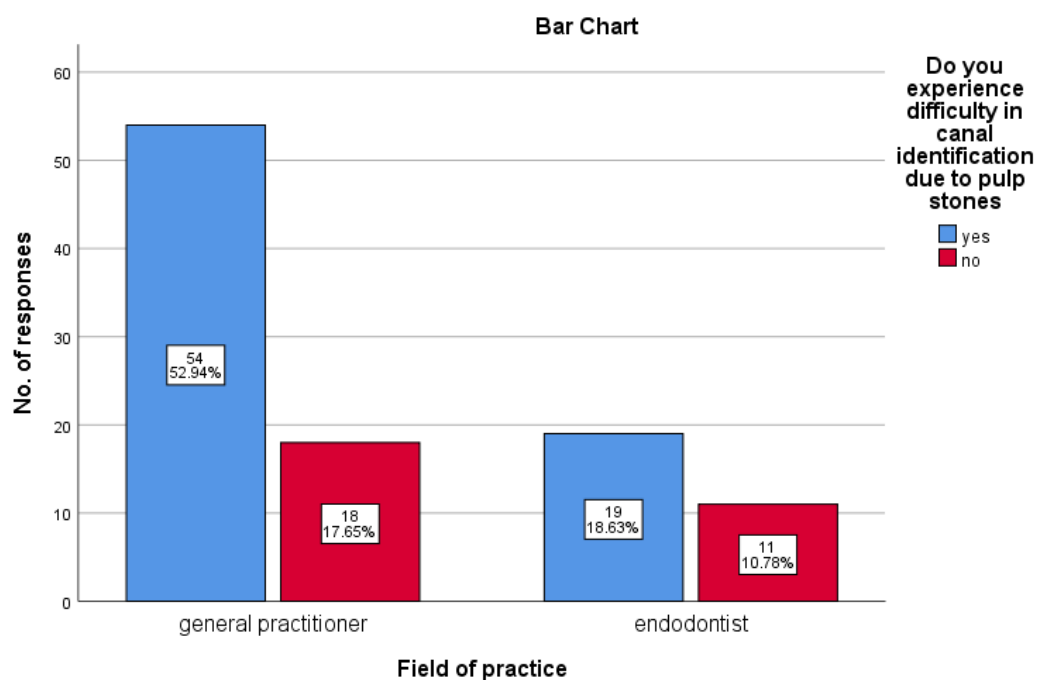


Figure 7: Bar graph represents the association between field of practice and difficulty in canal identification due to pulp stones. X axis represents the field of practice and type of response whereas Y axis shows the number of responses in each category. Chi square test was done and association was found to be statistically not significant. Pearson's Chi square

value : 1.417, p value -0.234 (>0.05), proving that general practitioners faced difficulty in canal identification when compared to endodontists.

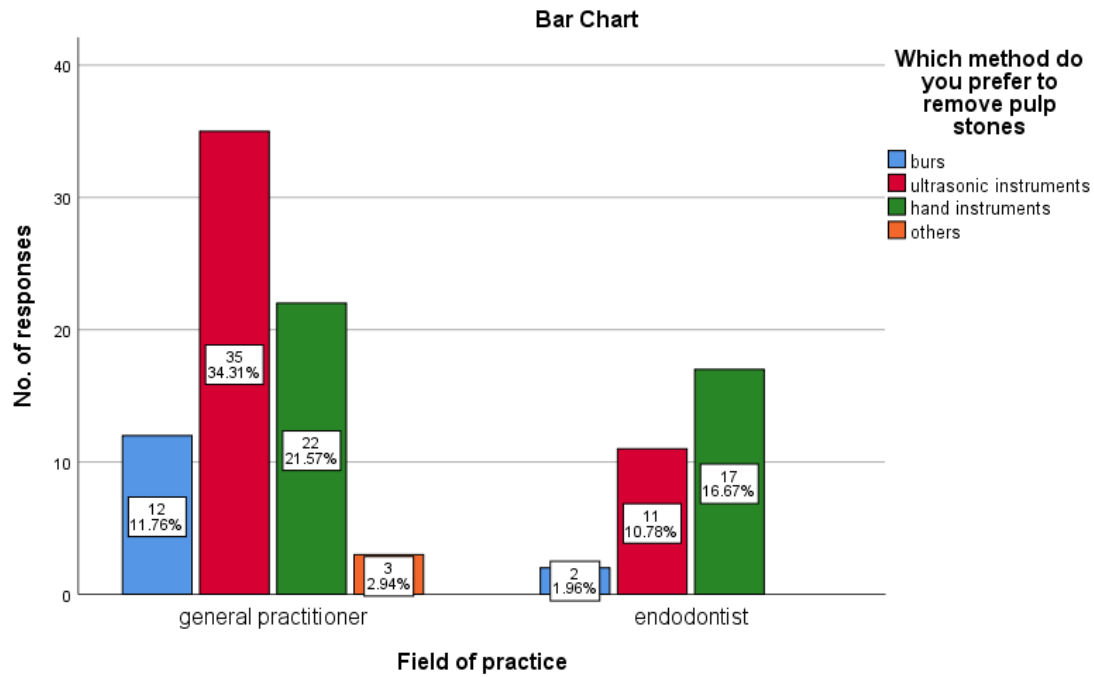


Figure 8: Bar graph represents the association between field of practice and method used to remove pulp stones. X axis represents the field of practice and type of response whereas Y axis shows the number of responses in each category. Chi square test was done and association was found to be statistically significant. Pearson's Chi square value : 7.239, p value -0.045 (<0.05), proving that general practitioners prefer the use of ultrasonic instruments whereas endodontists prefer using hand instruments.

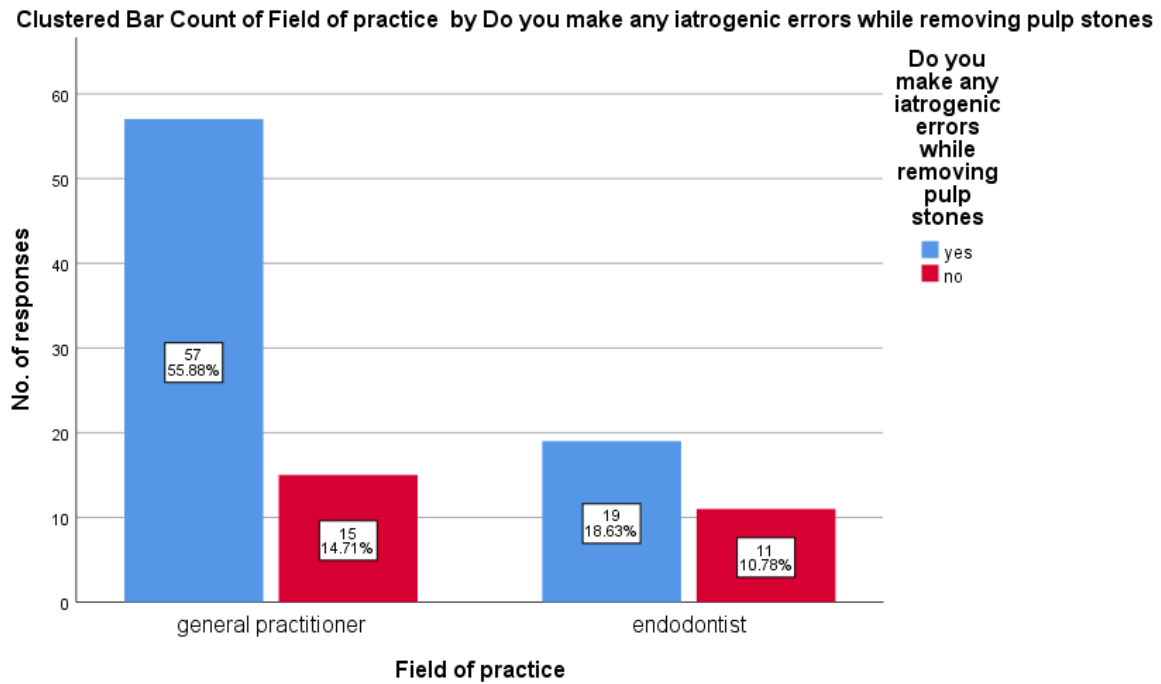


Figure 9: Bar graph represents the association between field of practice and the iatrogenic errors made while removing pulp stones. X axis represents the field of practice and type of response whereas Y axis shows the number of responses in each category. Chi square test was done and association was found to be statistically not significant. Pearson's Chi square value : 2.795, p value -0.095 (>0.05), proving that general practitioners experience iatrogenic errors more than endodontists.

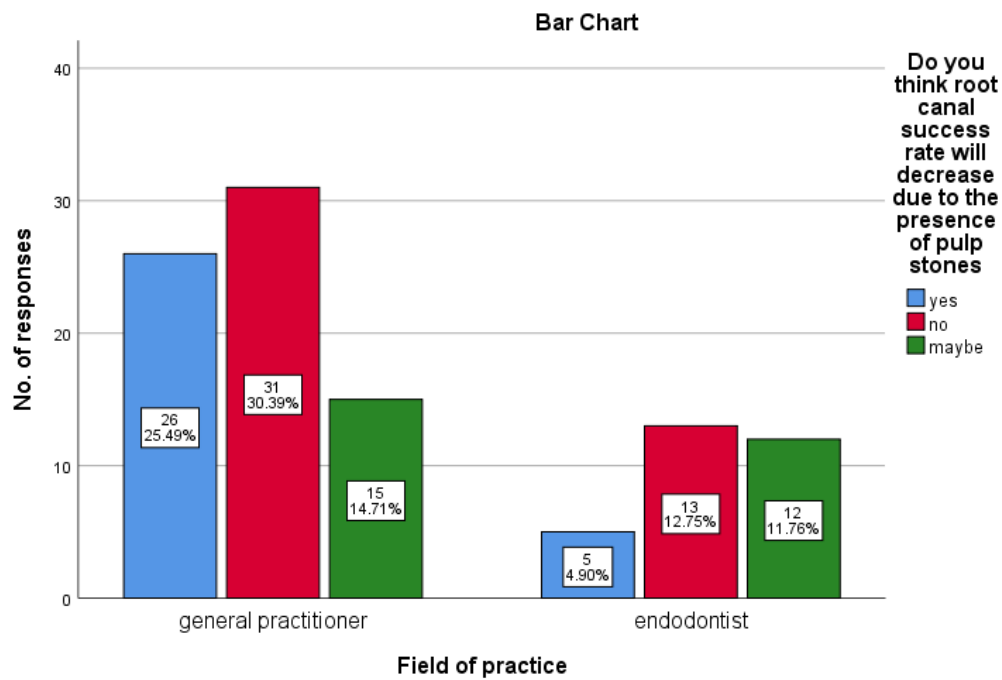


Figure 10: Bar graph represents the association between field of practice and knowledge on compromised success rate of root canal treatment due to pulp stones. X axis represents the field of practice and type of response whereas Y axis shows the number of responses in each category. Chi square test was done and association was found to be statistically not significant. Pearson's Chi square value : 5.574, p value -0.062 (>0.05), shows both general practitioners and endodontics contraindicating with presence pulp stones compromising the success of root canal treatment.