



## Association between failed root canal treatment and systemic diseases

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### ABSTRACT

Apical periodontitis is a group of inflammatory diseases caused by microorganisms infecting the necrotic root canal system. The pathogenesis of different types of apical periodontitis and even the same type in different individuals is unlikely to follow a stereotyped fashion with regard to the involved bacterial mediators. Apical periodontitis starts as local inflammation in the periodontal ligament and when untreated can lead to larger destruction of the periapical tissues. The study was aimed to find if there was an association between failed root canal treatment and systemic diseases. Data was collected retrospectively from the records of the private dental college. The population included in the study were the patients who reported with failed root canal treatment. Descriptive statistics, Cross tabulation and chi square test were done. The most common systemic disease in the patients' undergoing retreatment was diabetes. There was no significant association between gender and the systemic diseases. General health condition of a patient may influence the healing periapical lesions and therefore the outcome of the root canal treatment. Both systemic and tooth related factors can have a negative impact on the success of endodontic treatment.

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### INTRODUCTION

Apical periodontitis is a chronic infection with some essential features such as polymicrobial pathogenesis with predominance of anaerobic bacteria and inflammatory host response with locally and systemically elevated cytokine levels. [1] Apical periodontitis is an inflammatory disorder resulting from a failed dynamic encounter between microbial infection of endodontic origin and subsequent host defense response. Apical periodontitis starts as local inflammation in the

periodontal ligament and when untreated can lead to larger destruction of the periapical tissues [2] Apical periodontitis has been related to cardiovascular diseases and diabetes. [3] Previously our team had conducted numerous clinical trials and lab studies and in-vitro studies [4–19] over the past 5 years. Now we are focussing on epidemiological surveys. Dental problems and systemic diseases share many associated risk factors. [20] There is a correlation that exists between some systemic diseases and the pathogenesis of endodontic disease [21]. Several

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systemic diseases were found to be related to the outcome of the endodontic treatment. [22][23]

Diabetes mellitus is reported to be associated with reduced healing rates in teeth with preoperative existing infection and periapical lesions.[24] Diabetes Mellitus is found to serve as a disease modifier. [25] Systemic diseases such as diabetes mellitus and hypertension are found to be significantly associated with reduced survival of endodontically treated teeth. [26] Studies and literature reviews show that systemic medical conditions should not be considered only as etiologic factors of endodontic infections, but also as factors that influence the healing outcome of endodontically treated teeth. [27]

The aim of this study was to investigate the impact of systemic health factors on the outcome of endodontic treatment. This also helps in finding which systemic diseases can negatively influence the healing of periapical lesions.

## MATERIAL AND METHOD

### Study Setting

The present study was conducted to find if there is any association between systemic diseases and failed root canal treatment. The pros of the study included the available data and similar ethnicity and the cons being geographical limitations. Ethical clearance for this study was obtained from the institutional Ethical Committee (SDC/SIHEC/2020/DIASDATA/0619-0320) The study included 226 patients who had failed root canal treatment. Consent was obtained from the patients who were taken in the study. Two examiners were involved in the study.

### Sampling

It is a retrospective study. The data was collected from the patient records between June 1, 2019 to March 31, 2020. Around 80,000 patients records were reviewed, out of which 226 case sheets met the inclusion criteria. The inclusion criteria was patients more than 18 years of age and undergoing endodontic retreatment, patients with systemic diseases. The exclusion criteria was patients less than 18 years, patients who did not undergo endodontic retreatment. Simple random sampling, collecting more data sources and including the data only from the institute were the measures taken to minimize the bias.

### Data Collection Data Analysis

The data was collected from patients' records and the results were tabulated. The incomplete or censored data were verified and excluded from the study. The data was entered and analyzed using IBM SPSS Software Version 20.0. Descriptive statistics (e.g., frequency and percentages) were calculated to explore the general features of the

data. A cross tabulation analysis was conducted to examine the categorical variables. Independent variables were age and gender and dependent variables were systemic disease and failed root canal treatment. Chi-square test was used to identify any significant differences between the different variables.

## RESULTS AND DISCUSSION

Table 1 and Graph 1 shows the frequency of systemic diseases in the patients with failed root canal treatment. It was found that 88% of the patients had no systemic diseases, 4% had diabetes mellitus, 2.2% had blood pressure, 1.8% had thyroid disorder, 0.9% had asthma.

Graph 2 shows the relationship between gender and systemic diseases. It was found that females were more affected with systemic diseases than the males. In males, 3.8% had asthma, 15.3% had hypertension, 11.5% had diabetes, 3.8% had malignancy, 3.8% had thyroid disorders. In females, 3.8% had asthma, 3.8% had hypertension, 23% had diabetes and 11.5% had thyroid disorders. Diabetes mellitus was more common in females (23%) and hypertension was more common in males (15.3%). There was no significant difference between the gender and the systemic diseases. (Chi square test,  $p=0.393$ )  $p$  value  $>0.05$ .

In our study it is found out that the most common systemic diseases in the patients undergoing retreatment was diabetes mellitus followed by hypertension. In females diabetes was the most common systemic and in males it was found to be hypertension. The reasons for women to be more likely associated in increased risk of diabetes is because women have a smaller mass of muscle than men and therefore less muscle available for the uptake of the fixed glucose load. Also physical inactivity and unhealthy diet was more common in females.

Men are at high risk for hypertension and the most common reason would be smoking.

Lopez et.al., [28] reported that root canal treatments are more common in patients suffering from diabetes mellitus. The outcome of the root canal treatment was also found to be poor. The outcome is poor because of the impaired healing of the periapical lesion in the diabetic patients.

According to Segura - Egea et.al, [29] diabetes mellitus patients develop periapical lesions more often than healthy patients. The reason being diabetes patients are more prone to infection than healthy individuals, aggravation of the dental caries was common in diabetic patients. Higher glycaemia causes greater periapical inflammatory infiltrate. Marotta et.al, [30] reported that there is no association between diabetes mellitus and endodontic treatment outcome.

According to Berlin - Brener et.al, [31] cardiovascular diseases and infections of endodontic origin share similar inflammatory mediators in the initiation and progression of the process and they suggest an association between cardiovascular diseases and existing periapical lesions. Martin et.al, [32] stated that the impaired immune response associated with systemic diseases together with the proinflammatory status may affect periapical healing which is the common reason for retreatment. According to Liljestrand et.al, [33] there was no difference in the outcome of the root canal treatment between patients with cardiovascular disease and healthy ones.

The limitations of the study was that a small sample size was included and since it was an institutional study there was no variation in the population involved. The future scope of the study is that both systemic and tooth - related factors can be taken into consideration in clinical decision making and also future studies can be conducted with more sample size and in different geographical populations.

## CONCLUSION

Within the limits of the study, it was found that the most of the patients undergoing retreatment were free of any systemic disease. Among the systemic diseases diabetes mellitus was more common followed by hypertension. In females diabetes was the most common systemic disease and in males it was found to be hypertension.

## AUTHORS CONTRIBUTIONS

First author (R. Keerthana) performed the analysis, and interpretation and wrote the manuscript. Second author (Dr. Iffat Nasim) contributed to conception, data design, analysis, interpretation and critically revised the manuscript. Third author (Dr. Manjari Chaudhary) participated in the study and revised the manuscript. All the three authors have discussed the results and contributed to the final manuscript.

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## CONFLICT OF INTEREST

No conflict of interest.

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Self.

## ETHICAL CLEARANCE

It is taken from "Saveetha Institute Human Ethical Committee" (Ethical Approval Number-SDC/SIHEC/2020/DIASDATA/0619-0320

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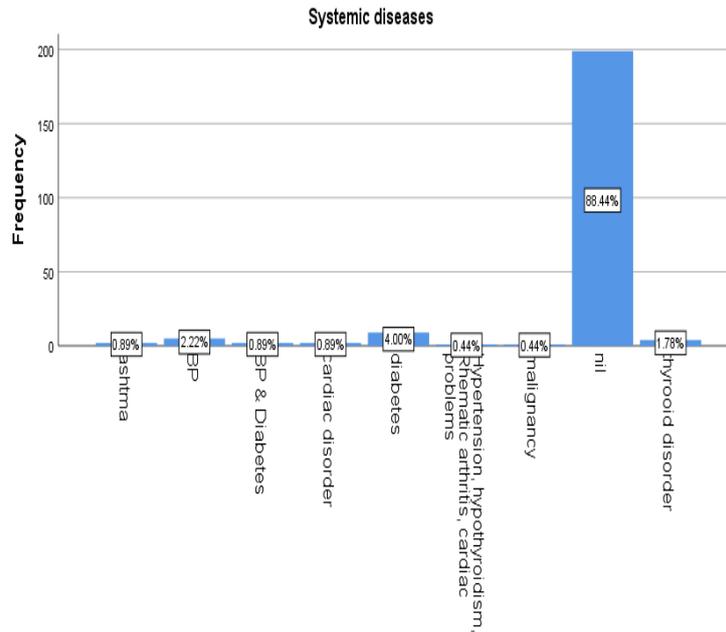
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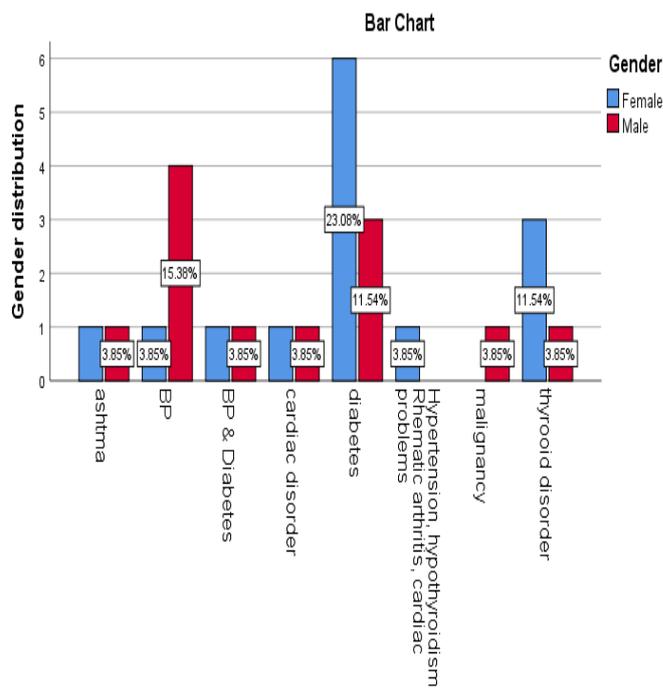
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**Table 1: This table shows the frequency and percentage of the systemic diseases in the patients undergoing retreatment.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Asthma	2	.9	.9	.9
	BP	5	2.2	2.2	3.1
	BP & Diabetes	2	.9	.9	4.0
	Cardiac disorder	2	.9	.9	4.9
	Diabetes	9	4.0	4.0	8.8
	Hypertension, hypothyroidism, Rheumatoid arthritis, cardiac problems	1	.4	.4	9.3
	Malignancy	1	.4	.4	9.7
	Nil	200	88.5	88.5	98.2
	Thyroid disorder	4	1.8	1.8	100.0
	Total	226	100.0	100.0	



**Graph 1:** This bar chart shows the frequency of the systemic diseases in the patients undergoing retreatment. X axis shows the systemic diseases and Y axis shows the frequency of patients with each systemic disease. Most of the patients did not present any systemic disease and the most common systemic disease in the rest of the population was diabetes. (4%)



**Graph 2:** This bar chart shows the association between gender and systemic diseases. X axis shows the systemic disease, and Y axis shows gender. Diabetes mellitus was common in females (23%) and hypertension was common in males (15.3%). There was no significant difference between the gender and the systemic diseases. (Chi square test,  $p=0.393$ )  $p$  value  $>0.05$ .