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Prevalence of true combined endodontic-periodontal lesions in adult patients with and without diabetes: A cross sectional survey

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Abstract
Aim: To investigate the prevalence of true combined endodontic-periodontal lesions in adult patients with diabetes and compare them with normal patients of the same age group.
Materials and Methods: A cross-sectional study was conducted on a sample of 152 patients that was divided into two equal groups: Group A (diabetic group) and Group B (control group). Clinical and radiographic examination were done to accurately detect the true combined endodontic-periodontal lesions. Data were then collected and statistically analyzed.
Results: True combined endodontic periodontal lesions in group A were significantly higher than group B with percentage of 13.15% and 6.58% respectively (p<0.05). Males had significantly higher true combined endodontic periodontal lesions than females in both groups (p<0.05). In group A about 70% of these lesions were in patients below 60 years while in group B about 80% of the patients with combined endodontic periodontal lesions were above 60 years.
Conclusion: Diabetics have a higher prevalence of true combined endodontic periodontal lesions and appears to be more prevalent in males than females. Age can be also and influencing factor in the development of these lesions.

Keywords: Endodontic-periodontal lesions, diabetes, patients

Introduction
Endodontic-periodontal lesions are usually encountered as a complicated dental condition which is difficult in both diagnosis and treatment. The dental pulp communicates with the periodontal ligament through various routes including dentinal tubules, apical foramen, palato-gingival grooves and vertical root fractures. Due to the complicated nature of endodontic-periodontal lesions, interdisciplinary approach is usually required for proper treatment. This signifies the importance of estimating the prevalence of such diseases. A recent study by Ruetters *et al*., found that the prevalence of endodontic-periodontal lesions was 4.9% in patients with mean age of 62.3 years and most of them was found with stage III and IV periodontitis (Ruetters *et al*., 2022) [13]. Another study by Grudianov and Makeeva found that the prevelance of endodontic-periodontal lesions was 17.78% (Grudianov and Makeeva, 2014) [6].

Several other classifications have been proposed to classify endodontic-periodontal lesions (Kujur *et al*., 2022) [7]. However, the most common classification is the classification proposed by Simon *et al*., for identifying etiologic factors, addressing the different clinical situations considering the primary etiology of a disease, such as the existence of a 1ry endodontic lesion; 1ry endodontic lesion with 2ry periodontal involvement; 1ry periodontal lesion; 1ry periodontal lesion with secondary endodontic involvement; and true combined lesion (Simon *et al*., 1972) [17].

However, true endodontic-periodontal illness is less common when it is coupled. It develops when an infected periodontal pocket that is growing apically combines an endodontic illness that is advancing coronally. (Simon *et al*., 1972, Shumilovich *et al*., 2021) [17, 16]. This kind of lesion always has a significant degree of attachment loss, the prognosis is typically not good, and additional surgical procedures are frequently required.

After a successful endodontic procedure, periapical healing is typically to be expected. Depending on how severe the combined endodontic-periodontal diseases are, the periodontal tissues may not respond well to treatment and may require specific surgical treatments. (Adam, 2021) [1].

About one million novel cases of diabetes mellitus are diagnosed every year. There are many reports documenting that the diabetic patients, especially when they are poorly controlled, have high prevalence of periodontal disease and tooth loss due to periodontal disease (Segura-Egea *et al*., 2012) [14]. However, very little information is available on the occurrence of endodontic peri-radicular lesions in patients with diabetes mellitus. Thus, according to our knowledge this is the first cross sectional study to evaluate the prevalence of true combined endodontic periodontal.

Materials and Methods

This cross-sectional study was conducted in the Cairo Dental Center with a sample of 152 patients of both genders. The sample was divided into two groups: Group A (diabetic group) including 76 patients diagnosed with type II diabetes mellitus. Group B (control group) including 76 healthy patients.

Inclusion criteria for the sample were as follows: patients with ASA 1 and ASA 2 medical condition according to the American society of anesthesiologists classification (Doyle *et al*., 2021) [3] and their age is ranging from 25 to 80 years. Exclusion criteria was as follows: smoking, patients taking drugs that affect the periodontium, rheumatoid arthritis or any chronic inflammatory disease.

To diagnose patients with true combined endodontic periodontal disease both clinical and radiographic examination was performed. The following parameters were recorded: age, sex, number of teeth and identification of the site of the lesion. In case of doubt, true combined endodontic periodontal disease was confirmed by Cone Beam Computed Tomography (CBCT) using a limited field of view.

Periodontal Evaluation

To preform periodontal clinical examination, a William's periodontal probe was utilized with markings of 1 mm, 2 mm, 3 mm, 5 mm, 7 mm, 8 mm, 9 mm, and 10 mm. The probe was utilized in presence of good illumination and dry field. The pocket depth was done at six areas in each tooth including 3 on the facial surface (mesio-facial, facial and disto-facial) and 3 on the lingual surface (mesio-lingual, lingual and disto-lingual). Naber's periodontal probe was utilized to detect furcation involvement.

Endodontic Evaluation

Pulp condition was evaluated by using cold test using the method utilized by Neves *et al*., using Endo-Frost cold spray (Roeko company, Germany) which was done after drying and isolation of the tooth with cotton rolls. Using a small tweezer and small piece of cotton, the spray was used to saturate the cotton then it was applied on the cervical third of the facial tooth surface up to 10 seconds to detect the patient response at this during this period. To avoid individual variations, cold test was repeated on the contralateral sound teeth after a 5-minute interval between the cold tests done on the evaluated tooth (Neves *et al*., 2017) [12]. Panoramic radiograph was used to detect radiographic bone loss and periapical lesions affecting the teeth.

Sample selection and sample size calculation

The sample of this study was collected using convenience sampling method as this method is dependent on the ease of access to the subjects of the study. Sample size calculation was based on a previous study by Ruetters *et al*., (Ruetters *et al*., 2022) [13] and the recommended sample size was found to be 152 with the power (1- β) set at 0.8 and $\alpha = 0.05$, two-tailed (Adly *et al*., 2022) [2]. This analysis showed that our sample size was sufficient to avoid the chances of type II error.

Statistical Analysis

Means and standard deviations for each group was measured and the differences between groups were compared using unpaired t-test. All data were calculated and statistically analyzed by an independent statistician using IBM SPSS statistical software version 20 (IBM, NY, USA) with a significance level of $\alpha = 0.05$.

Results

The current study was performed on 152 patients including 76 males and 76 females. Their age was ranged from 25 to 80 years with a total mean age of the sample 55.5±8.44 years (Table 1).

Table 1: Descriptive statistics of patients' age range (years).

	N		Mean	SD	Minimum	Maximum
	Males	Females				
Patients age in Group A	38	38	60.7	9.78	43	78
Patients age in Group A	38	38	50.3	7.69	39	75

N= Number of patients
SD = Standard Deviation

In general, the number of true combined endodontic periodontal lesions in group A was significantly higher than group B ($p<0.05$). Group A showed prevalence of 13.15% (10 patients) while group B showed 6.58% (5 patients).

Regarding gender, the number of true combined endodontic periodontal lesions in males was significantly higher than females in both groups ($p<0.05$). However, the difference in combined endodontic periodontal lesions between males and females in group A was higher than group B. As it was found that in group A 9.21% (7 patients) of the male patients had combined endodontic periodontal lesions while only 3.94% (3 patients) of the female patients had had combined endodontic periodontal lesions. On the other hand, males in group B had prevalence of 4.47% (4 patients) while females showed 1.31% (1 patient) with combined endodontic periodontal lesions (Figure 1).

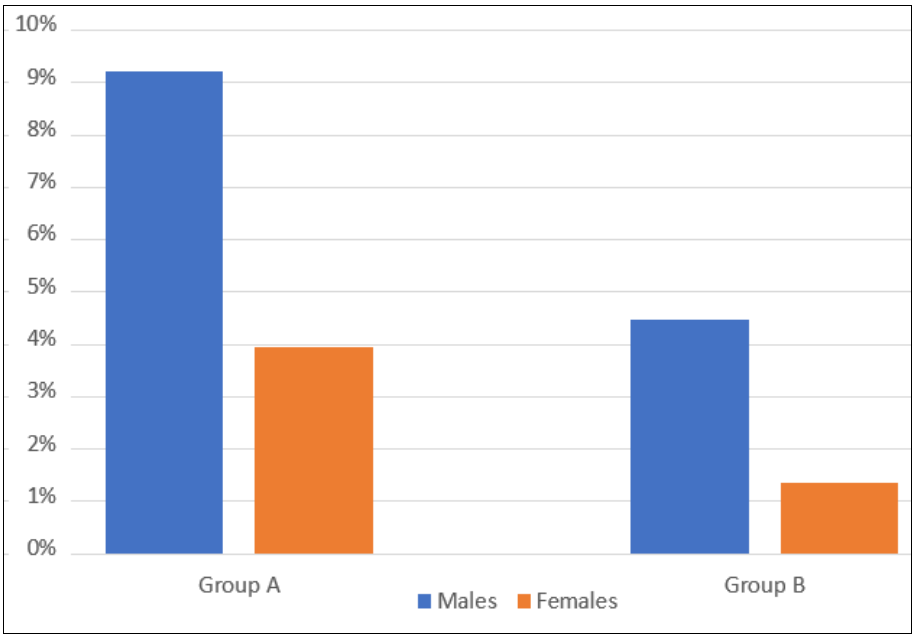

Fig 1: Percentages of true combined endodontic periodontal lesions among both genders in the selected sample

Regarding age group, in group A we found that about 70% of these lesions were in patients below 60 years. On the other hand, group B showed that 80% of the patients with combined endodontic periodontal lesions were above 60 years and all of the combined endodontic periodontal lesions of group B occurred in the age groups above 50 years (Figure 2).

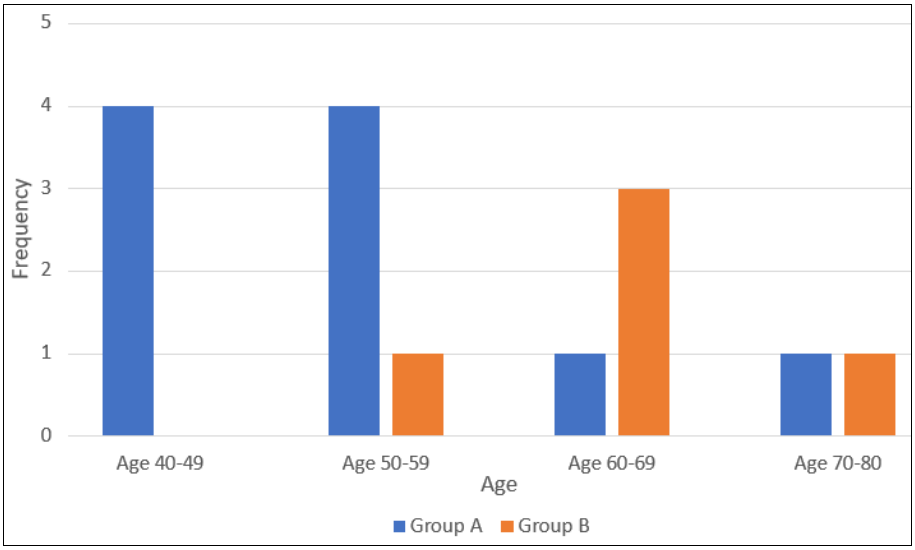

Fig 2: Frequency of true combined endodontic periodontal lesions among different age groups in the selected sample

Regarding stage of periodontitis in patients with combined endodontic periodontal lesions, group A had the worst outcome showing that 80% (8 patients) of patients had stage III and stage IV periodontitis. On the other hand, the results of group B were much better as only 20% had stage III and none of them showed stage IV periodontitis and most of them (80%) were stage I and stage II periodontitis.

Discussion

Diabetes mellitus was found to have a significant effect on the periapical and periodontal tissue. This cross-sectional study was aiming to find correlation between diabetes mellitus and true combined endodontic periodontal lesions. The true combined endodontic periodontal lesions in diabetic patients were significantly higher than control group. Several studies have confirmed a higher prevalence of endodontic periapical radiolucency in diabetic patients when compared to healthy controls (Segura-Egea *et al*., 2005, López-López *et al*., 2011, Marotta *et al*., 2012) [15, 9, 10]. A possible explanation for this is that in diabetics due to the hyperglycemic conditions certain bacterial species may flourish in the necrotic canals which are more virulent than that in non-diabetic patients (Fouad, 2003, Nagendrababu *et al*., 2020) [4, 11]. Similar correlations were also found between diabetes and periodontal diseases. Diabetes was found to increase inflammation in periodontium, impair new bone formation, and increase bone resorption (Graves *et al*., 2020) [5]. Thus, the increase of both endodontic and periodontal problems in diabetics can justify the significant increase in prevalence of combined endodontic periodontal lesions in the diabetic group of this study.

Gender was also a significant factor in our study as males showed worst outcomes when compared with females. This finding is in accordance with Liu *et al*., who found that there is significant gender differences in the associations between chronic periodontitis and diabetes. Male patients with diabetes had significant increase in moderate to severe periodontitis

when comapred to females. The reason suggested for this difference was poor oral care in males and lack of adhernece to oral hygeine measures (Liu *et al*., 2018) [8].

Age is another influencing factor that appeared in our study. Generally speaking, combined endodontic periodontal lesions were more prevalent in younger age diabetic groups when compared with the control group. This further illustrate the role of diabetes in rapid progression of endodontic and periodontal lesions as previously stated at the beginning of this discussion.

Finally, we found significantly more advanced stages of periodontitis in patients with diabetes when compared with the control group as the most prevalent stages in diabetics were stage III and stage IV periodontitis. This finding is in line with a study by Ruetters *et al*., who found that stage III and IV periodontitis were the most prevalent in endodontic-periodontal lesions (Ruetters *et al*., 2022) [13].

Conclusion

True combined endodontic periodontal lesions are more prevalent in diabetics than non-diabetic patients. Gender appears to have a significant role in the appearance of these lesions as it seems to be more prevalent in males than females. Age can be also and influencing factor as most diabetic patients that showed these lesions were below 60 years of age.

Conflict of Interest

Not available

Financial Support

Not available

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