DonnishJournals

Donnish Journal of Dentistry and Oral Hygiene
Vol. 8(5) pp. 042-045 July 2022.
http://www.donnishjournals.org/djdoh
ISSN: 2984-8806

Original Research Paper

Effective Pulp Sensibility Tests Responses in Type 2 Diabetes Patients and Healthy Patients

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Accepted 19th May, 2022.

Introduction: The pulp sensibility test includes thermal and electric tests, which determines pulp health from sensory response; A study was conducted on diabetes-induced rats where changes were noted in the structure and function of the blood vessels responsible for supplying the dental pulp. Materials and methods: Electric and cold pulp sensibility tests performed for premolar teeth and the electric pulp test results were recorded based on the pulp testers grade that evoked a response. Power of the sample was calculated as well as the sample size. Results: Comparing the differences in sensibility test on the basis of duration of diabetes, a statistically significant (p-value = 0.039) was found. It was noted that higher sensibility scores were recorded among patients with the longest duration of diabetes as compared to a shorter duration. Conclusion: Overall, there was no statistically significant difference among diabetic and healthy patients.

Keywords: Pulp sensibility, Type 2 diabetes, Thermal tests.

INTRODUCTION

Diabetes mellitus (type II) is a metabolic disorder that affects the physiological functions of the body in a pernicious way. It has been shown that long-term damage to vital organs including the oral cavity was brought on due to the elevation of blood glucose, which means that the structural components of the dental pulp may be directly affected as well as the influence on the sensory nerves too.

The dental pulp condition is assessed by stimulating the pulp through dental pulp testing, and that makes it a useful and essential diagnostic tool. The pulp sensibility test includes thermal and electric tests, which determines pulp health from a sensory response, A study was conducted on diabetes-induced rats where changes were noted in the structure and function of the blood vessels responsible for supplying the dental pulp (FENN et al, 2019).

Another study was conducted on diabetes mellitus (type II) patients, the results showed a significantly reduced response to the cold test when done on their upper premolars, especially to those >45 years of age, the age of patients with diabetes might influence their response to the cold test (KERMANI et al, 2020). In a study done by (MORARU et al, 2017) pulp response to injury has been discussed; it is slower and more rapidly overwhelmed than in a non-diabetic tooth, and other studies have confirmed that the diabetic pulp has a lower blood flow.

An estimation was done by the World health organization (WHO) that around 7 million of the population are diabetic even more concerning worldwide. Saudi Arabia ranks seventh in the world for the rate of diabetes (Abdulaziz Al Dawish et al, 2016).

Sensory disorders, taste problems, periodontial disease, xerostomia, salivary gland dysfunction, oral infections, and dental caries are oral problems that manifest in diabetic patients in high prevalence.(Muhammad Ashraf Naziret al, 2018).

In addition, delayed mucosal wound healing, as well as mucosal neuro-sensory disorders have been reported in patients with diabetes, there is a lack of awareness in regards to these complications worldwide (Awatif Y. Al-Maskari et al, 2011)

Other than inducing dental pulp metabolic changes, diabetes mellitus has been shown to have the ability to influence both sensory and vascular structures (Ciecielski M. et al, 2016)

Furthermore; little information exists regarding the responses of type II diabetes patients to the pulp sensibility tests (i.e., cold and electric) in Saudi Arabia. Therefore, the need ~~of~~for the study to be done will aid in improving the best intervention methods for diabetic patients.

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THE HYPOTHESIS

The dental pulp response of type II diabetic patients differs from the pulp responseof normal healthy patients.

AIMS OF THE STUDY

To determine whether the pulp response of type II diabetic patients is slower than normal patients or is at the same rate.

MATERIALS AND METHODS

This was an experimental study.
Study subject: diabetes patient (type 2) and normal healthy patient in the hospital RIYADH ELM UNIVERSITY, Riyadh, Kingdom of Saudi Arabia
Target sample size: was around 100 male and female patients.
Premolar teeth in 50 patients who had type 2 diabetes and Premolar teeth in 50 individuals with no medical condition were investigated.
Electric and cold pulp sensibility tests were performed for premolar teeth and the electric pulp test results were recorded based on the pulp testers grade that evoked a response.
Power of the sample was calculated as well as the sample size.
Duration of the study: It will start at the beginning of February2021 until the beginning of Apr.

METHODS

Electronic questionnaire was constructed, which was answered in the clinic after signing the informed consent. Random glucose test (blood sugar level around 200 milligrams or above per deciliter) and clinical trials pulp sensibility tests (cold and electric) were conducted.
The collected data was subjected to statistical analysis using SPSS 22.

Inclusion

51 diabetic (29 diabetics without any other medical condition and 22 with medical conditions) patients and 55 normal healthy patients were selected

Teeth should be:
- Premolars
- Sound; free of caries
- No recent history of trauma
- Vital

Exclusion

- Patient with braces and pacemaker.
-Any other teeth except premolars
- Teeth with a recent history of trauma
- Non-vital teeth
- Carious teeth

The Questionnaire included:

Section 1: Demographic information

- Gender
- Age
- Medical condition.

Section 2: Disease information

- the duration of diabetes mellitus (type 2)
- the state of the patient diabetes mellitus (type 2)
- the result of random glucose test

Section 3: After this experimental
- patient response

Types of variables

- Nominal: gender, medical condition, and state of the disease.
- Ordinal: Paine response.
- Ratio: age, the duration of disease, and the result of random glucose test.

Based on the variables, the analysis types were done to find association and comparison

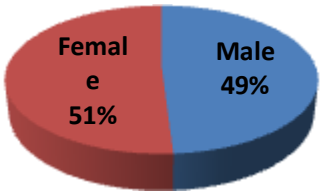
RESULTS

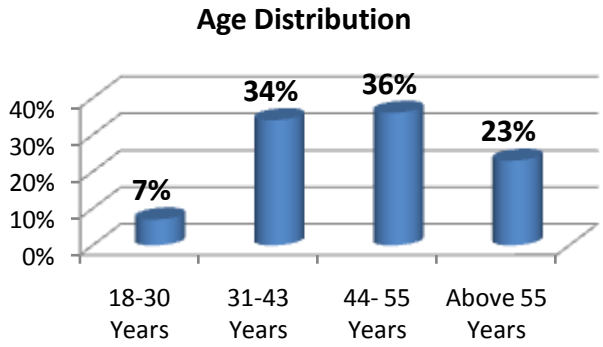
A total of 106 cases were utilized in this study, which included 52 (49.1%) males and 54 (50.9%) females. Regarding their age, 8 (7.5%) belonged to 18-30 years, 36 (34%) belonged to 31-43 years, 38 (35.8%) to 43-55 years and 24 (22.6%) to 55 or above. Participants were also divided according to their medical condition, which showed that 29 (27.4%) had diabetes without any other medical condition, 22 (20.8%) had diabetes with another medical condition and 55 (51.9%) were healthy patients without any medical condition. Regarding their duration of diabetes, 31.4% had less than 5 years, 31.4% had 5-10 years and 37.3% had more than 10 years of duration. As far as their state was concerned, 86.3% had controlled and 13.7% had uncontrolled diabetes.

Pulp sensibility tests were conducted among all the participants and comparisons were made on the basis of gender, age, medical condition, duration of diabetes, and state of diabetes on 4 different teeth of each study subject using the Chi-square test. When compared on the basis of gender, a statistically significant difference was observed at (p-value= .032), shown in table 1, however, no statistically significant differences between gender were found when conducted test on each tooth (p-value > .05). When compared on the basis of age, no statistically significant differences were found on each tooth (p-value > .05) as shown in table 2.

When compared on the basis of duration of diabetes, a statistically significant difference was obtained at (p-value = 0.039), while all other differences were not significant. Our main objective was to determine whether there is a difference in sensibility test results when conducted in patients with diabetes and without diabetes. It was noted from the findings that the patients having diabetes showed higher sensibility scores as compared to healthy patients. However, this difference was not statistically significant.

Comparing the differences in sensibility test on the basis of duration of diabetes, statistically significant (p-value = 0.039) was found. It was noted that higher sensibility scores were recorded among patients with the longest duration of diabetes as compared to a shorter duration. Finally, the comparison between controlled and uncontrolled showed that there was no statistically significant found (p-value > .05).





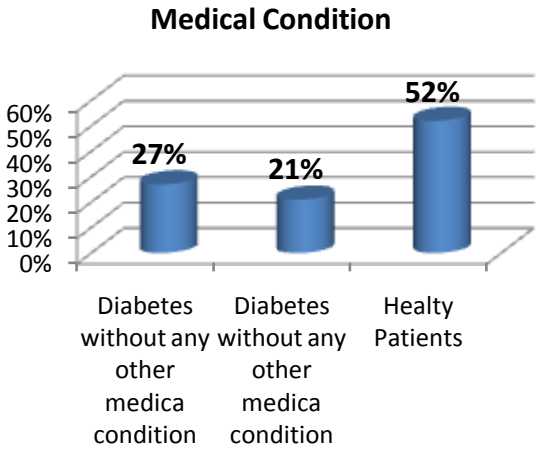


Table 1 Comparison on the basis of Gender

Item	Male	Female	P- Value
Gender	No Pain 12% Faint Pain 2% Week Pain 27% Mild Pain 23% Moderate Pain 16% Strong Pain 6% Intense Pain 12% Maximum Possible Pain 2%	No Pain 4% Faint Pain 4% Week Pain 7% Mild Pain 26% Moderate Pain 19% Strong Pain 24% Intense Pain 6% Maximum Possible Pain 11%	0.032

DISCUSSION

This study aimed to determine the effect of diabetes on the results of sensibility test, which has resulted in finding that overall there was no statistically significant difference among diabetic and healthy patients. Moreover, no association between age and the effects of the sensibility test on the tooth were observed in our study. A similar study conducted by Kermani et al., (2020) revealed a statistically significant association of age with the pulp response to sensibility tests. Moreover, they also found a statistically significant difference between diabetic and healthy patients, which reported that the

diabetic patients aged more than 45 years showed the least number of pulpal responses as compared to younger age groups and healthy patients. These findings were found to be different from what we observed among our study participants.

Another similar study done by Moderasi et al., (2017) revealed that there was a difference between diabetic group and healthy patients group. Still, after performing the test, the association was statistically insignificant. The achieved difference in results was reliable considering the sample size. Additionally, the findings of this study disclose the correlation between age and electrical stimulation threshold of teeth. A small difference between age groups was detected in regard to electrical stimulation threshold of teeth. This indicates that increased age leads to decreased sensitivity of teeth due to decreased size of pulp chamber. These findings are dissimilar to what we found, as both age and medical condition were not statistically significant associated with the sensibility scores.

One more investigation done by Barczak et al., (2020) reported that the threshold was significantly lesser in younger patients. The threshold of pulp sensitivity of the remaining groups of teeth was similar in both age groups. The correlation between sensibility of the pulp in the Caucasian population and gender was not confirmed. Age-related findings are not similar to our study but the gender association is similar to what we found.

However, there is a major disparity between Barczak et al., (2020) and Moderasi et al., (2017) when the age groups were compared as a former study reported lower sensibility scores among the younger age group and later among the older age groups. This is interesting to know as the later study also involved diabetic patients in their investigation, which may play an important role in determining this causal relationship. However, more studies need to be done in order to find a stronger association (if any) between diabetes and sensibility test scores.

CONCLUSION

- Overall, there was no statistically significant difference among diabetic and healthy patients.
- Moreover, no association between age and the effect of sensibility test on the tooth was observed in our study.

CONFLICT OF INTEREST

There was no conflict of interest among the authors.

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