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Testing of the Antimicrobial Efficiency of Helbo Laser and NaOCl againts Candida Albicans

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Abstract: ***The aim of our study is to evaluate the efficiency of antimicrobial therapy through the application of photodynamic therapy and convencional irrigation methods. Materials andmethods. In this study we used 28 extracted one root teeth. We used the types of* Candida albicans *ATCC 10231. In the first group (n=6) we used NaOCl 2, 5% to disinfect the root canal, while in the second group (n=18) we used Helbo Minilaser 2075 F dent to disinfect the root canal. This group was divided into three subgroups; in the first subgroup (n= 6)we applied Helbo laser for one minute, in the second subgroup (n=6)we applied Helbo laser for 3 minutes and in the third subgroup (n=6)we applied Helbo laser for 5 minutes. Results. In this study we used ANOVA and Post-Hokc test. The number of dead cells was 92. 63%(p=0. 087) in the group treated with NaOCl 2. 5%. The number of dead cells was 93. 65%(p=0. 589) in the group treated 5 minutes with laser, the number of dead cells was 91. 81%(p=0. 669) in the group treated with 3 minutes laser and in the group treated with 1 minute laser the number of dead cells was 95. 36% (p<0. 001). The degree of significance is (p <0. 05). These results confirmed that our results are accurate in 95% of the samples. Conclusion. There are no significant differences between the methods of treatment in our study.***

Key words: Candida albicans, Naocl, Helbo Minilaser, Mtwo

1. Introduction

Studies have proved that Candida albicans in the oral cavity of healthy persons is 30 % to 45 % [1] whereas in patients infected with the immunodeficiency virus is 95 % [6]. Colonies of Candida albicans organisms in the root canal systems are the etiological factors which cause endodontic infections. [9]-[13]. Possibility of penetration of C. albicans from the oral cavity in the root canal is possible in cases of long endodontic treatments. Baumgartner et. al identified the fungus in the infected root canals and the dentinal tubules [4]. Results were also confirmed in similar studies conducted by Sundqvist et. al [11] and Hancock et. al [9]. The process of healing of infected root canal is the main goal of endodontic therapy [7]. Different irrigation processes are used for the destruction of microorganisms in infected canal [14]. Sodium hypochlorite is an irrigant which is currently used mostly due to its better antimicrobial effect. [5]. Sena et. al [12] confirmed the antimicrobial action of NaOCl 2. 5 % against Candida albicans. Valera et. al studied the effect of the action of NaOCl versus Candida albicans inoculated in root canals [15]. Fidalgo et. al tested the irrigant antimicrobial effect against Candida albicans [8]. Most irrigants had better antimicrobial effect against Candida albicans. TFD has toxic effect against bacteria, fungi and viruses. Application of laser alone had no significant effect in reducing bacteria [3].

2. Purpose

The aim of our study was to compare the efficiency of antimicrobial therapy by applying photodynamic therapy and conventional methods of irrigation 2. 5 % NaOCl.

3. Material and methods

In our study we used 28 extracted one rooted teeth. Extracted teeth were stored in 0. 9% saline solution. After the exploration of the root canals with a manual file number 10, we continued with gradual expansion of all the root canals by using Mtwo instrument.

The teeth were sterilized with absolute alcohol and then rinsed with 17 % EDTA solution(pH=8, 3). Working methodology was based on fungus cultivation and their identification. We used types of fungi Candida albicans ATCC 10231. For inoculum in tooth root canal were used the spectrometric suspensions cultures.

In the first group (n=6) the root canals were treated with NaOCl 2, 5%. In the second group (n=18) we applied Helbo Photodynamic Systems in the infected root canal, which was let to act for 1 minute. After that in the root canal was applied Helbo Minilaser 2075 F dent, in time intervals of 1 minute, 3minutes and 5 minutes. We analysed 4 untreated teeth for positive controls in liquid cytometer. In the same time, we conducted controls with laser and NaOCl 2, 5% in blood agar in comparison to the liquid cytometer. To determine the percentages we used The Cell Viability Kit with Liquid Counting Beads.

4. Statistical Analysis.

In this study we used ANOVA and Post-Hokc test.

5. Results

From the figure 1 it is confirmed that the highest the percentage of dead cells of Candida Albicans after NaOCL 2. 5% irrigation was 92. 63%, the highest percentage of live

cells was 4, 01% and the highest percentage damaged cells was 16. 30%.

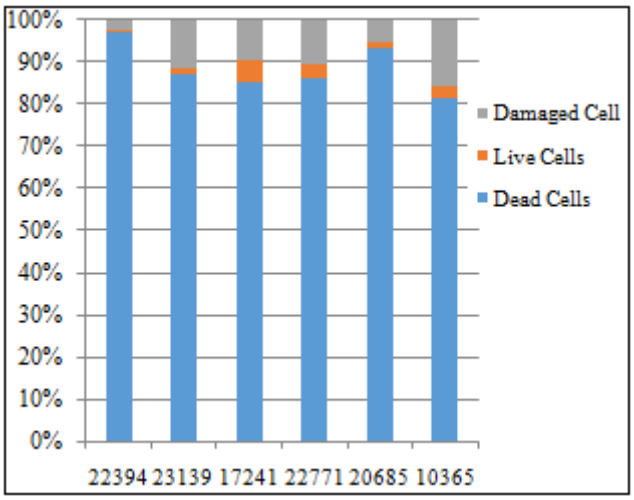

Figure 1: The percentage of dead cells, live cells and damaged cells of Candida Albicans in 6 root canals after NAOCL 2. 5% irrigation.

From the figure 2 it is confirmed that the highest percentage of dead cells of Candida Albicans TFD after application of TFD 1 minute duration was 95. 36%, the highest percentage of live cells was 92. 25% and the highest percentage of cells damaged was 6. 35 %.

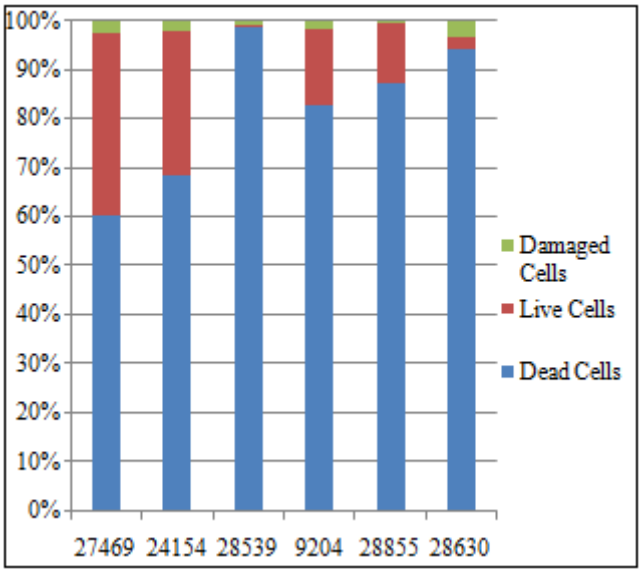

Figure 2: The percentage of dead cells, live cells and damaged cells of Candida Albicans in 6 root canals after the application of TFD1minute duration.

From the figure 3 it is confirmed that the highest percentage of dead cells of Candida Albicans TFD after application of TFD 3 min duration was 91. 81%, the highest percentage of live cells was 15. 33% and the highest percentage of cells damaged was13. 21%.

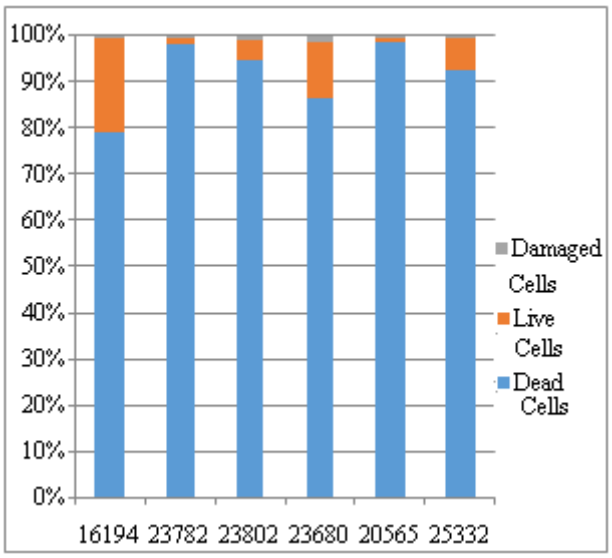

Figure 3: The percentage of dead cells, live cells and damaged cells of Candida Albicans in 6 root canalsafter application of TFD 3 min duration.

From the figure 4 it is confirmed that the highest percentage of dead cells of Candida Albicans TFD after application of TFD 5 minutes duration was 93. 65%, the highest percentage of live cells was 17. 01% and the highest percentage of cells damaged after TFD application was 1. 85%.

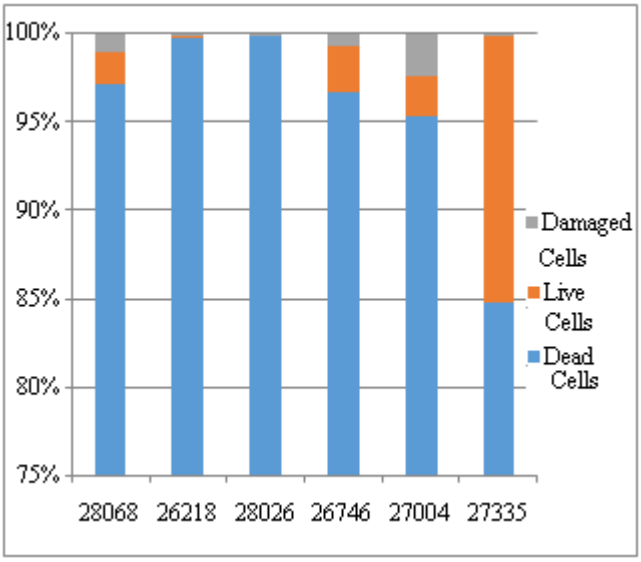

Figure 4: The percentage of dead cells, live cells and damaged cells of Candida Albicans in 6 root canals after application of TFD 5 minute duration**.**

For statistical analysis of the results is used ANOVA and Post- Hoc test where the rates of dead cells C. albicans are compared for all methods of disinfection of infected canals. The degree of significance is ($p < 0.05$). With this result is confirmed that our results are accurate in 95% of the samples. The average percentage of dead cells of C. albicans in the control group without any treatment has been of small significance ($p < 0.001$). Test Post - Hoc also shows distinction in the application of laser duration of 1 minute ($p < 0.001$).

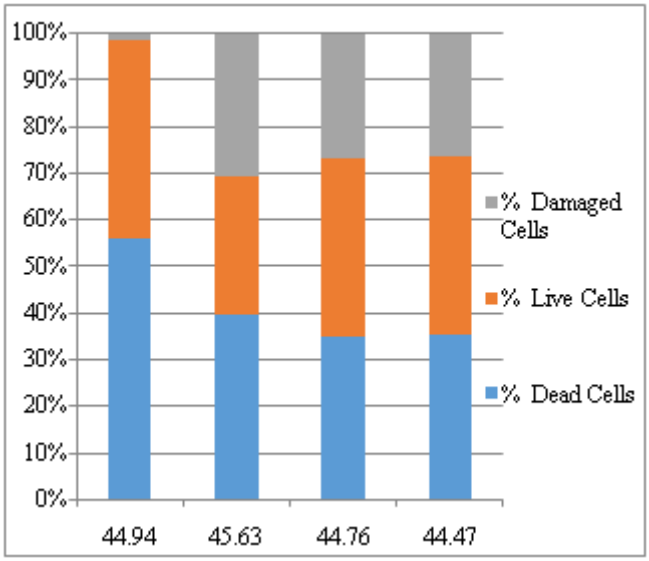

Figure 5: The percentage of microorganisms to dead Candida albicans, living Candida albicans and the percentage of Candida albicans damaged cells in positive controls in liquid cytometer analyzed in untreated teeth.

6. Discussion

C. albicans is part of the oral microflora. One of the problems in endodontic treatments is the presence of C. Albicans which must be eliminated in order to preserve the periapical tissue in normal condition. In our study for the evaluation of antimicrobial efficiency we chose two disinfection methods; conventional irrigiation with NaOCl 2. 5 % and photodynamic therapy. NaOCl irrigant is very important and has the ability to digest our organic tissue. Our study evidenced that in the groups of root canals treated with 2. 5 % NaOCl the number of dead cells after canal irrigation is 92. 63 % for C. albicans cells (p = 0. 087). The results obtained in our study after application of 2. 5 % NaOCl are similar to the results obtained from studies Fidalgo et. al [8], Sena et. al [12], Valera et. al [15], and Tirali et. al [16].

Our study highlights that the group of root canals treated with TFD with duration of 5 minutes, the number of dead cells is 93. 65 % (p = 0. 589). The group of canals treated with laser for 3 minutes duration, the number of dead cells is 91. 81 % (p = 0. 669). The group of canals treated with laser for 1 minute duration the number of dead cells is 95. 36 % for C. albicans (p < 0. 001). Our study shows that C. albicans showed almost the same sensitivity to all applicable methods of disinfection.

7. Conclusion

Based on the results in our study ex vivo we concluded that between the two treatment methods, irrigation with 2. 5% NaOCl and photodynamic therapy there are no significant differences and both methods have shown similar efficacy of disinfection.

8. Acknowledgment

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