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Temperature Rise During Human Teeth

Bleaching Using Diode Laser (810 nm).

An In Vitro Study

A Thesis Submitted in partial fulfillment for the requirement of
the degree of diploma in laser application in dentistry.

By

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الملخص

تبييض الأسنان يمثل طريقة تُصِحِّحِيَّةً إقْتِصَادِيَّةً مَحَافِظَةً بِالْحَدِّ الْأَدْنَى لِلأَسْنَانِ وَتُسْتَعْمَلُ لِمَعَالِجَةِ
الأسنان ذات الألوان المشوَّهة. ويستعمل في هذه العملية بيروكسيد الهيدروجين، بربرات الصوديوم،
وبيروكسيد الكارباميد كمعامل تبييض.

شملت هذه الدراسة 12 سنَّ مُنْتَزَعَةً قَسَمَ إِلَى 3 مَجْمُوعَاتٍ طَبَقًا لِقُوَّةِ اللَّيْزْرِ الْمُخْتَلِفَةِ (1، 2، و 3
وات) وَضَعُ فِي كُلِّ سَنِّ طَبَقَةً 2 مِلِيْمِتْرٍ مِنْ مَعَامِلِ التَّبْيِيضِ (بيروكسيد هيدروجين 35% هلام-
Opalesant Xtra- الولايات المتحدة الأمريكية) وَأَضَاءَ بِلَيْزْرِ diode بِطَوْلِ الْمَوْجَةِ 810
نانومتر. رُوَقِبَتِ دَرَجَةُ حَرَارَةِ السِّنِّ السُّطْحِيَّةِ وَدَرَجَةُ حَرَارَةِ لُبِّ السِّنِّ الدَّاخِلِيَّةِ قَبْلَ ذَلِكَ وَأَثْنَاءَ
تَطْبِيقِ اللَّيْزْرِ وَسُجِّلَتِ إِرْتِفَاعَاتُ دَرَجَةِ حَرَارَةِ فِي سُلْطَاتِ اللَّيْزْرِ الْمُخْتَلِفَةِ (1، 2 و 3 وات)
وَلْفَتْرَاتِ تَعَرُّضٍ مُخْتَلِفَةٍ (10 و 20 ثانية).
إِرْتِفَاعَاتُ دَرَجَةِ حَرَارَةِ السُّطْحِيَّةِ تَبَيَّنَ بِأَنَّهُمْ كَانَتْ أَعْلَى بِكَثِيرٍ مِنْ قَرَاءَاتِ الدَّاخِلِيَّةِ.
كَشَفَتْ نَتِيجَتُنَا بِأَنَّ الزِّيَادَةَ مِنْ الْقُوَّةِ تُؤَدِّي إِلَى الزِّيَادَةِ فِي دَرَجَاتِ حَرَارَةِ وَهَذِهِ النَتَائِجُ مُشَابِهَةٌ
لِلدِّرَاسَاتِ الْمُخْبَّرَةِ عَنْهَا سَابِقًا.

فِي هَذِهِ الدِّرَاسَةِ، إِرْتِفَاعَاتُ دَرَجَةِ حَرَارَةِ السِّنِّ السُّطْحِيَّةِ لِّلْيْزْرِ فِي قُوَّةٍ وَاحِدَةٍ وَإِثْنَانِ
وَإِثْنَانِ كَانَتْ أَعْلَى مِنْ الْمَعْدَلِ الْحَرَجِ (5.5 سي)، لَكِنْ فِي ثَلَاثَةِ وَاتٍ كَانَتْ إِرْتِفَاعَاتُ دَرَجَةِ حَرَارَةِ
الَّتِي سُجِّلَتْ لِأَكْثَرِ الْحَالَاتِ ضَمْنَ أَوْ قَرِيبَةً مِنْ دَرَجَةِ حَرَارَةِ الْحَرَجَةِ، خُصُوصًا بِزَمَنِ 20
ثَانِيَّةً.

ضَبْطُ الطَّاقَةِ الضَّوئِيَّةِ فِي 1-2 وَاتٍ، وَ3 وَاتٍ لِمُدَّةِ 10 ثَوَانٍ ضَمْنَ بَارَامِتْرَاتِ أَمَانِ
لِإِسْتِعْمَالِ لَيْزْرِ diode بِطَوْلِ الْمَوْجَةِ 810 نَانُومِتْرٍ فِي تَنْشِيطِ عَامِلِ التَّبْيِيضِ.
ضَبْطُ الطَّاقَةِ الكَهْرَبَائِيَّةِ فِي 3 وَاتٍ لِمُدَّةِ 20 ثَانِيَّةً لِرُبَّمَا تَسَبُّبِ بَضْرَرِ لُبِّ الأَسْنَانِ، وَعَلَيْهِ يَجِبُ
تُؤَخِّي الحَذَرَ عِنْدَ إِسْتِعْمَالِ هَذِهِ الْقُوَّةِ لِأَكْثَرِ مِنْ 10 ثَوَانٍ.

الطَّبِيبُ السَّرِيرِيُّ يَجِبُ أَنْ يَكُونَ مُدْرِكًا بِأَنَّ الْقُوَّةَ الْعَالِيَةَ وَالتَّطْبِيقَاتِ الْأَطْوَلَ قَدْ يُلْحَقَانِ
بَضْرَرًا بِلُبِّ السِّنِّ الدَّاخِلِيِّ

ABSTRACT

Bleaching provides a minimally conservative, economical, corrective method used to treat discolored teeth. Hydrogen peroxide, sodium perborate and carbamide peroxide are conventionally used. Bleaching technique achieved significant advances with use of coherent or incoherent radiation sources to activate the bleaching agents. The energy source can be derived from halogen curing units, high-intensity curing units, and lasers. In this study twelve extracted teeth were divided into three groups according to the different laser power (1,2 , 3 w) each tooth received 2mm layer of bleaching agent (hydrogen peroxide 35% gel , Opalesant Xtra, USA) and irradiated with diode laser with wave length of 810 nm. The tooth surface temperature and intrapulpal temperature before and during laser application were monitored and temperature rises registered in different laser powers (1, 2and 3 watts) and for two different exposure time (10 and 20 seconds).

The surface temperature rises were found to be much higher than pulpal readings. Our result revealed that increasing of power lead to increase in temperatures and this findings is similar to previously reported studies.

In this study, the temperature rises recorded for the laser at power one and two watts was bellow the critical threshold (5.5C), but at three watts the temperature rises recorded for the most instances within or close to the critical temperature, especially with 20 seconds. Power setting of 1-2w and 3w for 10s is within safety parameters for the use of diode laser 810nm in activation of bleaching agent. Power setting of 3w for 20 second may have a potential for pulpal damage, and care should be taken when using this power setting for more than 10second.

The clinician should be aware that high power and longer applications may cause pulpal damage.

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