EVALUATION OF ARTERIAL PRESSURE CHANGES IN PATIENTS UNDERGOING EXTRACTION OF IMPACTED THIRD MOLARS AND INTRAVASCULAR LASER BLOOD IRRADIATION

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ABSTRACT

The aim of this study was to evaluate and compare the blood pressure of patients who underwent extraction of impacted lower third molars and underwent modified intravascular laser blood irradiation (ILIB) or placebo. Eighteen individuals were allocated into two groups, the Placebo group (n=8) and the ILIB group (n=10). In the Placebo group, low-power laser equipment (InGaAlP) was used, coupled with a bracelet (LaserDuo, MMOptics Equipamentos, São Carlos, Brazil), worn on the wrist of one of the research participants, over the radial artery, but without irradiation. In the ILIB group, the laser was positioned in the same way, but in this case, the laser was irradiated. Both groups underwent a 30-minute treatment. Systolic and diastolic blood pressure were assessed at two time points: before the ILIB session and 4 minutes after local anesthesia. The placebo group showed a positive variation in systolic and diastolic blood pressure, while in the ILIB group a reduction was observed; however, this difference was not statistically significant. The findings suggest that ILIB may help reduce and better control blood pressure in patients undergoing third molar extraction; however, studies with a larger number of patients are needed.

Keywords: Laser Therapy, Low-Intensity Light Therapy, Third Molar; Blood Pressure.

INTRODUCTION

Anxiety, in anticipation of a future event, can cause an emotional reaction and lead to systemic changes. It is associated with changes in vital signs, such as heart rate, blood oxygenation, and blood pressure (BP). In addition to modifying salivary cortisol levels, changes may vary according to gender, age, and physical status classification according to the American Society of Anesthesiologists (ASA) (CUNHA et al. 2020; HOSGOR, COSKUNSES, TOKUC. 2021; YILDIRIM, TURKMENOGLU, MOLLAOGLU. 2022).

Aiming at better anxiety control in patients undergoing third molar extraction, a promising therapy, which is poorly studied and shows beneficial results in controlling

vital signs such as BP, is the modified intravascular laser blood irradiation (ILIB) technique. The technique consists of continuously irradiating the radial artery site with a low-power red laser. ILIB is suggested to have an anxiolytic effect in pediatric patients by modulating anxiety hormones (RANGEL, PINHEIRO. 2021). In addition, it has benefits in pain control, improved blood circulation, and modulation of inflammation through the inhibition of prostaglandin production (FU et al, 2022; TOMÉ et al, 2020).

However, to date, there are no studies that have evaluated the effectiveness of ILIB on blood pressure control in patients undergoing third molar extraction. Thus, the objective of this study was to evaluate the effect of ILIB on BP in patients undergoing extraction of impacted lower third molars.

METHODOLOGY

This study was approved by the Ethics Committee of UniEVANGÉLICA (CAAE: 70342023.0.0000.5076) and registered in the Brazilian Registry of Clinical Trials (REBeC: RBR-9ycg67p). For this clinical trial, 18 individuals undergoing surgery for impacted third molar extraction were selected. The participants were randomly divided into two groups: Group 1 (control) and Group 2 (ILIB). Randomization was performed to ensure the formation of groups with a fixed number of individuals, and the electronic generator "www.sealedenvelope.com" was used for block randomization of the research participants, with four participants per block. The participants were allocated to the following groups:

Group 1 (control group) – patients in this group (n=8) underwent placebo treatment. Low-power laser equipment (InGaAlP) coupled to a bracelet (LaserDuo, MMOptics Equipamentos, São Carlos, Brazil) was worn on the wrist of one of the research participants, over the radial artery. The equipment was programmed in mode il.1, however, the laser output port was covered by a device that prevented the passage of light, so that the equipment functioned normally, but no energy was irradiated to the patient. After the programmed time of 30 minutes, the equipment emitted a characteristic sound that identified the end of the therapy. Before each participant, the laser tip was disinfected with a 70% alcohol solution. The equipment was kept in the charger when not in use.

Group 2 (ILIB) – the participants in this group (n=10) underwent the ILIB session using the equipment mentioned above. Mode il.1 was selected on the device, with the following parameters: wavelength of 660 nanometers (red laser), 100 mW of power, continuous mode, with light irradiation for 30 minutes, and a laser beam exit area of $3mm^{2.}$ .The equipment was positioned over the radial artery and secured with the manufacturer's wristband. The irradiation was punctual and as perpendicular as possible. As with the previous group, before each participant, the tip of the laser was disinfected and wrapped in plastic film. The equipment was kept in the charger when not in use, and at the beginning of each working day, the power of the equipment was measured using Laser Check (MMOptics Equipamentos, São Carlos, Brazil).

Systolic blood pressure (SBP) and diastolic blood pressure (DBP) were measured at two points in time: before the ILIB session and 4 minutes after local anesthesia. Diastolic blood pressure and systolic blood pressure were measured using an electronic blood pressure monitor with a cuff (HEM-7122, Omron, Kyoto, Japan).

For statistical analysis of the data, the Student's t-test was used to compare the groups. To compare BP before and after anesthesia, the t-test for paired samples was used. Values of $p < 0.05$ were considered statistically significant.

RESULTS

The Placebo group showed a positive variation in SBP of approximately 0.87 ± 11.46 mmHg, while in the ILIB group there was a reduction in SBP of approximately -0.60 ± 11.64 (p=0.853; Student's t-test). te DBP variation was again higher in the placebo group (8.37 ± 27.52) compared to the ILIB group (-3.80 ± 11.12), however this difference was not statistically significant (p=0.256; Student's t-test). Table 1 shows the changes in systolic and diastolic BP in the study participants.

Table 1. Blood pressure data (mmHg) of study participants. Results expressed as mean ± standard deviation.

		Total (N=18)	**Placebo (n=8)**	**ILIB (n=10)**	**p-value****
PAS	t0	120.72 ± 13.47	120.13 ± 14.70	121.20 ± 13.20	0.816
	t1	120.78 ± 13.61	121.20 ± 14.97	120.60 ± 13.23	0.781

	Variation	0.56 ± 11.25	0.87 ± 11.46	-0.60 ± 11.64	0.853
	p-value*		0	0	
PAD	t0	73.11 ± 19.23	78.00 ± 12.80	78.20 ± 12.60	0.528
	t1	74.72 ± 8.96	75.13 ± 7.95	74.40 ± 10.11	0.637
	Variation	1.61 ± 20.40	8.37 ± 27.52	-3.80 ± 11.12	0.256
	p-value*		0	0	

Abbreviations: SBP – systolic blood pressure; DBP – diastolic blood pressure.
*Paired Student's t-test for comparison between initial SBP (t0) and 4 minutes after anesthesia (t1).
**Student's t-test for comparison between the Placebo *and* ILIB groups.

CONCLUSION

ILIB promoted a reduction in both SBP and DBP; however, this difference was not statistically significant when compared to the placebo group.

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