Null Hypothesis [H_0] – There is no difference in the mean Endotoxin levels between 3 time intervals.

Alternative Hypothesis [H_A] – There is no difference in the mean Endotoxin levels between 3 time intervals.

Comparison of mean Endotoxin levels measured at different time intervals using Repeated Measures of ANOVA Test						
Time	N	Mean	SD	Min	Max	p-value
S1	10	16.027	3.153	11.83	21.64	<0.001*
S2	10	10.922	2.701	7.31	15.35	
S3	10	6.565	3.336	1.58	13.30	

* - Statistically Significant

Note: S1: Initial value after access opening, S2: Intermediate value after BMP and ultrasonic activation & S3: Final value after Laser irradiation

The table evaluates endotoxin levels at three time intervals: S1 (initial value after access opening), S2 (intermediate value after BMP and ultrasonic activation), and S3 (final value after laser irradiation).

At the initial time point (S1), the mean endotoxin level is 16.027 with a standard deviation (SD) of 3.153, ranging from 11.83 to 21.64. At the intermediate time point (S2), the mean endotoxin level decreases significantly to 10.922 (SD: 2.701), with values ranging from 7.31 to 15.35. Finally, at the last time point (S3), the mean endotoxin level further decreases to 6.565 (SD: 3.336), ranging from 1.58 to 13.30. The test results indicate that the changes in endotoxin levels across these time intervals was statistically significant at $p<0.001$.

Multiple comparison of mean difference in the Endotoxin levels b/w diff. time intervals using Bonferroni's post hoc Test					
(I) Time	(J) Time	Mean Diff. (I-J)	95% CI for Diff.		p-value
			Lower	Upper	
S1	S2	5.105	1.393	8.817	0.009*
	S3	9.462	5.614	13.310	<0.001*
S2	S3	4.357	1.991	6.723	0.001*

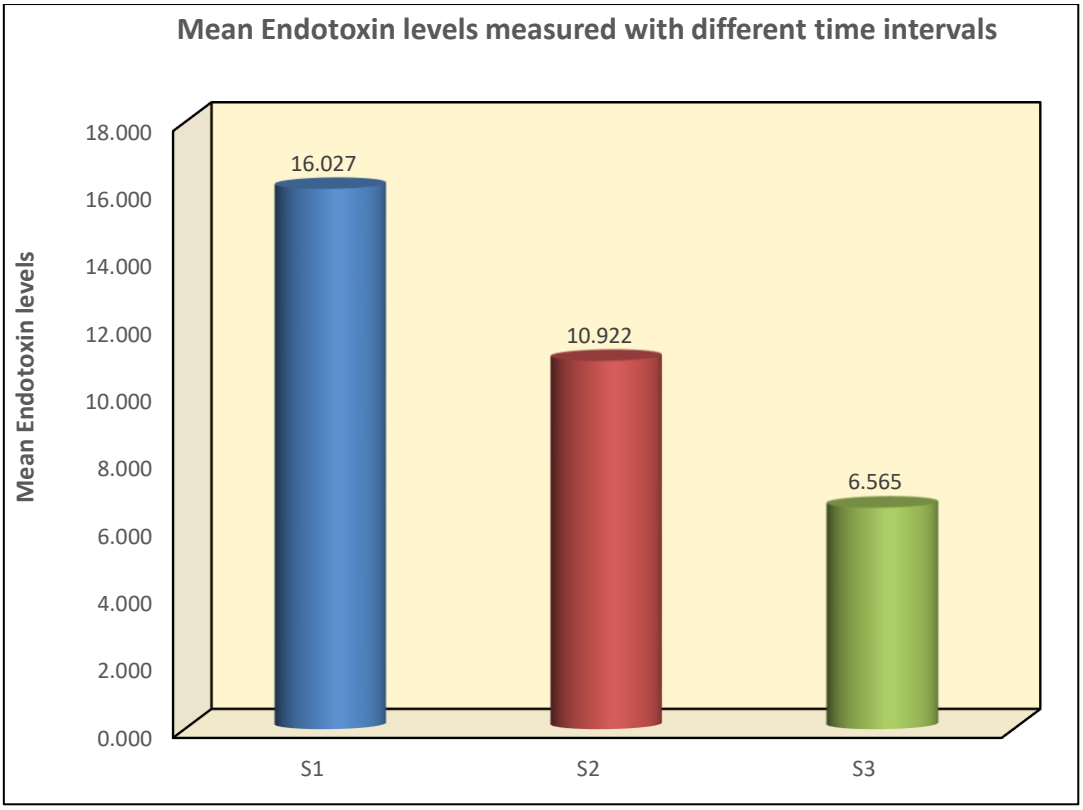
* - Statistically Significant

Note: S1: Initial value after access opening, S2: Intermediate value after BMP and ultrasonic activation & S3: Final value after Laser irradiation

The table evaluates the differences in mean endotoxin levels between three time points: S1 (initial value after access opening), S2 (intermediate value after BMP and ultrasonic activation), and S3 (final value after laser irradiation).

The mean difference between S1 and S2 is 5.105 with a 95% confidence interval (CI) ranging from 1.393 to 8.817, indicating a significant reduction in endotoxin levels at $p=0.009$. Comparing S1 and S3, the mean difference is 9.462 with a 95% CI of 5.614 to 13.310, and a showing a highly significant reduction at $p<0.001$. Finally, between S2 and S3, the mean difference is 4.357 with a 95% CI of 1.991 to 6.723, indicating a significant decrease at $p=0.001$.

In summary, the multiple comparison test shows significant reductions in endotoxin levels at each subsequent time point, with the most substantial decrease observed from the initial value (S1) to the final value after laser irradiation (S3). This demonstrates the effectiveness of the BMP and ultrasonic activation, as well as laser irradiation, in significantly lowering endotoxin levels over time.



Null Hypothesis [H_0] – There is no difference in the mean Endoscore between 3 time intervals.

Alternative Hypothesis [H_A] – There is no difference in the mean Endoscore between 3 time intervals.

Comparison of mean Endoscore measured at different time intervals using Repeated Measures of ANOVA Test						
Time	N	Mean	SD	Min	Max	p-value
S1	10	72.30	11.24	53.0	88.0	<0.001*
S2	10	50.80	14.45	30.0	77.0	
S3	10	20.60	7.40	9.0	30.0	

* - Statistically Significant

Note: S1: Initial value after access opening, S2: Intermediate value after BMP and ultrasonic activation & S3: Final value after Laser irradiation

The table evaluates the mean Endoscores at three different time intervals: S1 (initial value after access opening), S2 (intermediate value after BMP and ultrasonic activation), and S3 (final value after laser irradiation).

At the initial time point (S1), the mean Endoscore is 72.30 with a standard deviation (SD) of 11.24, with values ranging from 53.0 to 88.0. After BMP and ultrasonic activation (S2), the mean Endoscore decreases significantly to 50.80 (SD: 14.45), with a range of 30.0 to 77.0. Finally, after laser irradiation (S3), the mean Endoscore further decreases to 20.60 (SD: 7.40), with values ranging from 9.0 to 30.0. The test results indicate that these changes are statistically significant at $p<0.001$.

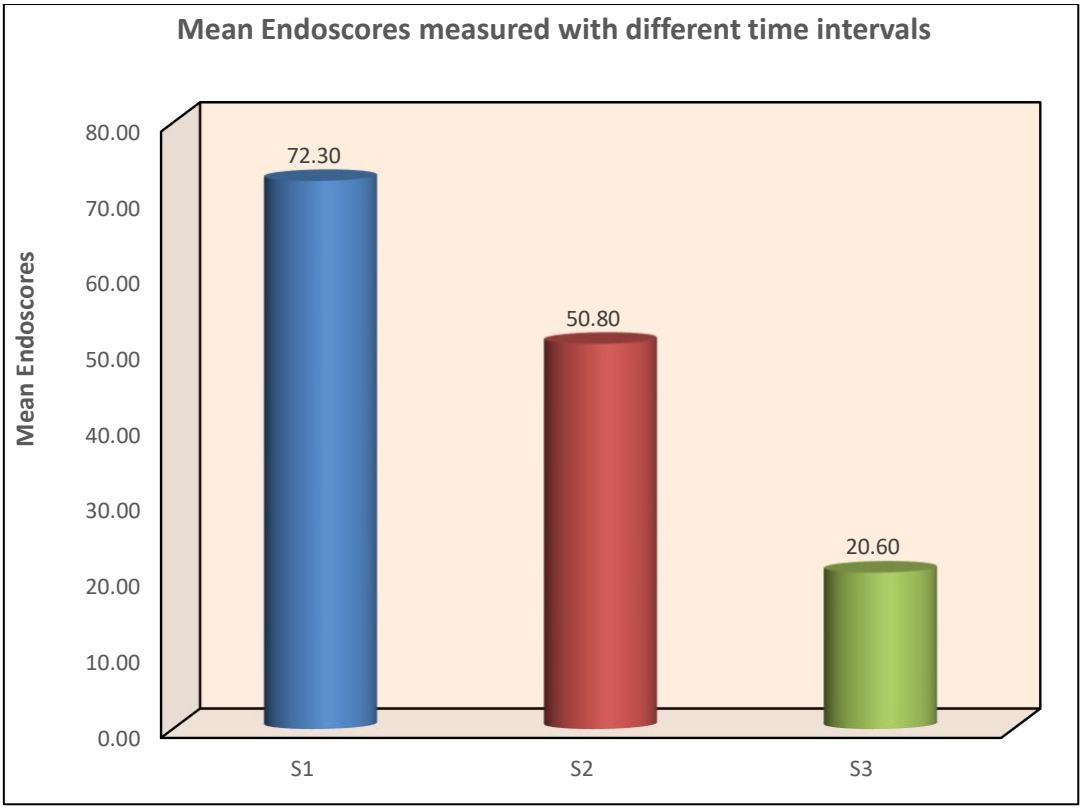
Multiple comparison of mean difference in the Endoscores b/w diff. time intervals using Bonferroni's post hoc Test					
(I) Time	(J) Time	Mean Diff. (I-J)	95% CI for Diff.		p-value
			Lower	Upper	
S1	S2	21.50	8.36	34.64	0.003*
	S3	51.70	38.88	64.52	<0.001*
S2	S3	30.20	15.32	45.09	0.001*

* - Statistically Significant

Note: S1: Initial value after access opening, S2: Intermediate value after BMP and ultrasonic activation & S3: Final value after Laser irradiation

The table evaluates the mean differences in Endoscores at various time intervals (S1, S2, and S3) show statistically significant reductions. Specifically, from S1 to S2, the mean difference is 21.50 with a 95% confidence interval (CI) ranging from 8.36 to 34.64, and the mean difference was statistically significant at $p=0.003$. The mean difference between S1 and S3 is 51.70 (95% CI: 38.88 to 64.52), with a p-value < 0.001, showing a highly significant reduction. Between S2 and S3, the mean difference is 30.20 (95% CI: 15.32 to 45.09), also indicating a significant decrease and the mean difference was statistically significant at $p=0.002$.

Overall, these results demonstrate that there is a significant reduction in Endoscores at each subsequent time interval, with the most substantial decrease observed from the initial value (S1) to the final value after laser irradiation (S3). This suggests that the interventions applied at each step are effective in significantly lowering Endoscores over time.


Mean Endoscores measured with different time intervals
Mean Endoscores
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
72.30
50.80
20.60
S1
S2
S3

Null Hypothesis [H_0] – There is no difference in the mean RLU values between 3 time intervals.

Alternative Hypothesis [H_A] – There is no difference in the mean RLU values between 3 time intervals.

Comparison of mean RLU values measured at different time intervals using Friedman's Test						
Time	N	Mean	SD	Min	Max	p-value
S1	10	4053.80	2536.21	963.0	9148.0	<0.001*
S2	10	1235.30	1259.69	220.0	4496.0	
S3	10	134.10	57.10	54.0	228.0	

* - Statistically Significant

Note: S1: Initial value after access opening, S2: Intermediate value after BMP and ultrasonic activation & S3: Final value after Laser irradiation

The table provided gives a detailed analysis of mean relative light unit (RLU) values measured at three distinct time. At the initial time point (S1), which corresponds to the value immediately after access opening, the mean RLU value is recorded at 4053.80, with an SD of 2536.21, having values ranging widely from 963.0 to 9148.0.

At the intermediate time point (S2), which comes after BMP and ultrasonic activation, the mean RLU values was 1235.30 with an SD of 1259.69, and values range from 220.0 to 4496.0. At the final time point (S3), measured after laser irradiation, the mean RLU was 134.10, with an SD of 57.10 and the values range from 54.0 to 228.0. The test results showed a statistically significant reduction in mean RLU values across the three time intervals (S1, S2, and S3) at $p<0.001$.

Multiple comparison of mean difference in the RLU values b/w diff. time intervals using Wilcoxon Signed Rank post hoc Test					
(I) Time	(J) Time	Mean Diff. (I-J)	95% CI for Diff.		p-value
			Lower	Upper	
S1	S2	2818.50	1109.20	4527.80	0.005*
	S3	3919.70	1565.34	6274.06	0.005*

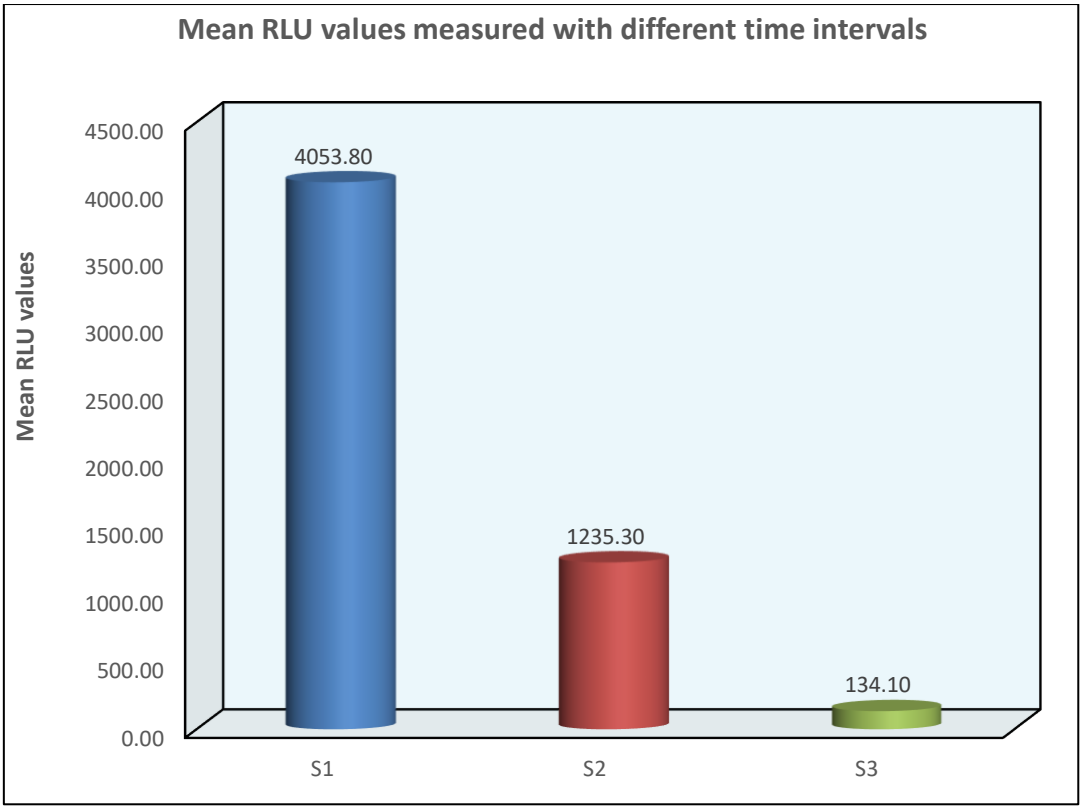
Multiple comparison of mean difference in the RLU values b/w diff. time intervals using Wilcoxon Signed Rank post hoc Test					
(I) Time	(J) Time	Mean Diff. (I-J)	95% CI for Diff.		p-value
			Lower	Upper	
S2	S3	1101.20	-56.92	2259.32	0.005*

* - Statistically Significant

Note: S1: Initial value after access opening, S2: Intermediate value after BMP and ultrasonic activation & S3: Final value after Laser irradiation

The table evaluates the mean differences in relative light unit (RLU) values at various time intervals (S1, S2, and S3) using the Wilcoxon Signed Rank post hoc Test, showing statistically significant reductions. Specifically, from S1 to S2, the mean difference is 2818.50 with a 95% confidence interval (CI) ranging from 1109.20 to 4527.80, and the mean difference was statistically significant at p=0.005. The mean difference between S1 and S3 is 3919.70 (95% CI: 1565.34 to 6274.06), with a p-value of 0.005, showing a highly significant reduction. Between S2 and S3, the mean difference is 1101.20 (95% CI: -56.92 to 2259.32), also indicating a significant decrease and the mean difference was statistically significant at p=0.005.

Overall, these results demonstrate that there is a significant reduction in RLU values at each subsequent time interval, with the most substantial decrease observed from the initial value (S1) to the final value after laser irradiation (S3). This suggests that the interventions applied at each step—BMP and ultrasonic activation, followed by laser irradiation—are effective in significantly lowering RLU values over time.


Mean RLU values measured with different time intervals
Mean RLU values
4500.00
4000.00
3500.00
3000.00
2500.00
2000.00
1500.00
1000.00
500.00
0.00
4053.80
1235.30
134.10
S1
S2
S3

Pearson correlation test to evaluate the relationship between Endoscore and Endotoxin levels at different time intervals			
Endoscore & Endotoxin levels	S1	S2	S3
r	0.58	0.60	0.62
p-value	0.04*	0.03*	0.01*

* - Statistically Significant

The correlation coefficients are denoted by 'r'

Minus sign denotes negative correlation

Correlation coefficient range

0.0 - No Correlation

0.01 - 0.20 - Very Weak Correlation

0.21 - 0.40 - Weak Correlation

0.41 - 0.60 - Moderate Correlation

0.61 - 0.80 - Strong Correlation

0.81 - 1.00 - Very Strong Correlation

The table presents the results, evaluating the relationship between Endoscore and Endotoxin levels at different time intervals, specifically S1, S2, and S3. At S1, the correlation coefficient (r) of 0.58 indicates a moderate positive correlation between Endoscore and Endotoxin levels, with a statistically significant p-value of 0.04. Moving to S2, the correlation becomes moderate with an r value of 0.60 and a p-value of 0.03, further solidifying the presence of a moderate positive correlation. At S3, the correlation coefficient increases to 0.62, indicating a consistent and strong positive correlation, with a p-value = 0.01. Overall, the results across all three time intervals consistently show a moderate positive relationship between Endoscore and Endotoxin levels, with the correlation strength slightly increasing to strong correlation over time and the p-values confirming the reliability of these associations.

Pearson correlation test to evaluate the relationship between RLU values and Endotoxin levels at different time intervals			
RLU & Endotoxin levels	S1	S2	S3
r	0.63	0.63	0.65
p-value	0.01*	0.01*	0.009*

The table presents the results, evaluating the relationship between RLU values and Endotoxin levels at three different time intervals (S1, S2, and S3).

At S1, the correlation coefficient (r) is 0.63, indicating a strong positive correlation between RLU values and Endotoxin levels. The p-value of 0.01 signifies that this correlation is statistically significant. Similarly, at S2, the correlation coefficient remains 0.63, with a p-value of 0.01, maintaining the strong positive correlation and statistical significance.

At S3, the correlation coefficient increases slightly to 0.65, still indicating a strong positive correlation between the two variables. The p-value of 0.009 further underscores the statistical significance of this relationship.

Overall, the results across all three time intervals consistently demonstrate a strong positive correlation between RLU values and Endotoxin levels, with statistically significant p-values confirming the reliability of these associations.