

## **Comparative Effect of Ultrasound Therapy and Laser Therapy for Relief of Pain, Swelling and Trismus Following Third Molar Surgeries**

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**Abstrac:** *Inability to open the mouth even within its normal limits is called a trismus. This is so due to a reflex spasm of the masticatory muscles leading to a completely or incompletely limited mouth opening in a patient. It is diagnosed from clinical examination of the maximal interincisal distance (MID) of less than 40-45mm caused by contracture not by obstructive joint impingement. Objectives of the study was to evaluate the comparative effectiveness of ultrasound therapy & laser therapy in addition to mouth opening exercises in patients with pain, swelling and trismus following third molar surgeries. 30 subjects aged 18-35 yeras were made part of the study based on inclusion and exclusion criteria and then divided into two groups named group A and group B. Group A received ultrasound therapy for frequency of 1MHz, pulsed 20% and dose 1.0W/sq.cm for 7minutes for first three days after surgery. Group B received laser therapy as output power 15mW, pulsed 80% and dose 4.3J/sq.cm for 6minutes for also first three days after surgery. Material used in study were Sliding Caliper, Graduated tape, Wooden splints. Pain- It will be evaluated by using VAS scale. Swelling- It will be measured by measuring in between horizontal and vertical directions. Horizontal- It will be measured as horizontal distance from tip of tragus to ipsilateral commissure of mouth. Vertical- It will be measured from lateral external canthus of eye to ipsilateral gonion. Trismus- It will be measured of interincisal distance. Additionally mouth opening exercises both active and passive were given to all the patients in both the groups. Pre and post treatment readings were taken of pain, swelling and trismus. Results showed that there was a significant difference between pain, swelling and trismus within the groups. But there was not a significant difference between both the groups. The study concluded that though statistically both groups showed the significant improvement in all parameters. But when we compare both groups with each other then there is no statistical difference between them. So null hypothesis was accepted.*

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### **I. Introduction**

The third molar extraction is one of the most common surgical procedures in oral surgery. After a surgical trauma, an inflammatory process usually appears accompanied

with pain, trismus and facial edema. These symptoms can affect quality of life of the patients during the first days of the postoperative process.(Sato FR et al 2009 and Colorado et al 2006). A wide variety of analgesics, non-steroidal anti-inflammatory drugs (NSAIDs), local or systemic corticosteroids, long-term anesthetics, etc., designed to control these complications.(Vegas-Bustamante et al 2008). However, these drugs are unsafe and can sometimes induce side-effects. Hence, there is a growing interest in developing alternative or complementary methods free of adverse effects.(Merry AF et al. 2010). The most severe pain usually occurs during the first 3-5 hrs after the disappearance of the effect of the local anesthesia.(Fisher SE et al 1988). Swelling in contrast, usually reaches its peak between the first 24-48 hrs and gradually decreases in the following days to completely disappear between 5 and 7 days later. As the swelling subside, trismus decreases.(Berge TI et al 1994). Low power laser (LPL) induces primary (photochemical, photoelectrical, and photoenergetic) and secondary (stimulation of cell metabolism and microcirculation) biostimulation potential and reduces pain and edema after surgery.(Miserendino et al.1995). As there is no ideal means of prevention the postoperative trismus yet, it appears that the application of LPL in certain postoperative period could contribute to the more successful and faster recovery of a patient, especially considering that there are no adverse effects of irradiation.The biologic effect of different types of ultrasound was tested, and it was concluded that the use of the non-invasive low intensity pulsed ultrasound (LIPUS) has an optimal biologic effect in promoting tissue healing.(Tanzer et al 1996).

## **II. Need of study**

The treatment of trismus over the past few years have been varied, which includes medical & surgical management but with unpredictable results. So for the betterment of the patients symptoms the role of physiotherapy treatment to enhance the speedy recovery of the patients needs to be further evaluated. Since the data lacks concrete evidence for the use of ultrasound in trismus, study is needed to monitor the effect of the same.

### **Aim of the study**

To compare the effectiveness of ultrasound therapy and laser therapy with pain, swelling and trismus following third molar surgeries.

### **Objectives of the study**

To compare the effect of ultrasound therapy and laser therapy for relief of pain, swelling and trismus following third molar surgeries.

To analyse the effect of ultrasound therapy for relief of pain, swelling and trismus following third molar surgeries.

To analyse the effect of laser therapy for relief of pain, swelling and trismus following third molar surgeries.

### **Hypothesis**

Null hypothesis

There will be no significant difference in the effect of ultrasound therapy and laser therapy with mouth opening exercises in patients with pain, swelling and trismus in third molar surgeries.

Alternate hypothesis

There will be a significant difference in the effect of ultrasound therapy and laser therapy with mouth opening exercises in patients with pain, swelling and trismus in third molar surgeries.

Study design- Prospective, randomized, comparative and an experimental study design.

Sample- 30 subjects

Sampling technique- Random sampling technique

Inclusion criteria-

Patients were included in the present prospective randomized study irrespective of sex, caste, religion and socio-economic status.

Patients of age group between 16-35yrs.

Patients with post-operative mouth opening is less than equal to 30mm on day one.

Exclusion criteria –

Post operative complications like acute sepsis, hemorrhage, etc.

Tumours.

Implants.

Anaesthetic area.

Non-cooperative patients.

Procedure-

A total of 30 patients will be included in the study based on the inclusion and exclusion criteria. These patients will be then randomly divided into two groups that is group I (15 patients) and group II (15 patients). Both groups I and II are under experimental group. Following surgical removal of third molars in the department of oral and maxillofacial surgery by an oral surgeon, group I will receive ultrasound therapy and group II will receive laser therapy as per the protocol. The ultrasound will be given as frequency of 1MHz, pulsed 20% and dose 1.0W/sq.cm for 7minutes for first three days after surgery. The laser will be given as output power 15mW, pulsed 80% and dose 4.3J/sq.cm for 6minutes for also first three days after surgery. Both applied extraorally near the insertion of the masseter muscle. All the patients in both the groups will be given same pre and post of medication. Additionally mouth opening exercises both active and passive will be given to all the patients in both the groups.

Dependent Variables-

Visual analogue scale.(VAS).

Edema coefficient (Ec)

Trismus coefficient (Tc).

Independent variables

Mouth opening exercises.

Ultrasound therapy

Laser therapy.

Operational tools

Ultrasound therapy

Laser therapy.

Statistics

Paired t-test will be done between pre and post observations of VAS scale in both group I and group II.

Paired t-test will be done between pre and post Edema coefficient(Ec) and Trismus coefficient(Tc) in both group I and group II

Unpaired t- test to difference between both the group I and group II.

Results

Table 1  
Comparison of VAS within both the group

Paired Samples Statistics			Paired Differences						
VAS (N=15)		Mean+Std Deviation	Std. Error Mean	Mean	Std. Deviation	Std. Error Mean	t Test	df	P Value
GROUP A	PRE	6.74+1.28	0.330	5.60	1.183	0.306	18.33	14	0.000 SIG
	POST	1.14+0.36	0.091						
GROUP B	PRE	6.54+1.13	0.291	5.47	1.060	0.274	19.97	14	0.000 SIG
	POST	1.07+0.26	0.067						

Figure 1.1

Comparison of VAS within both the groups

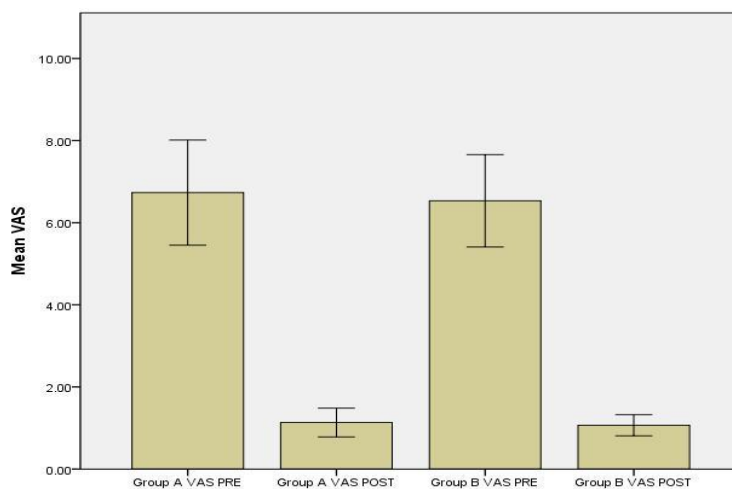


Table 2

Comparison of pre and post swelling in horizontal position within both the groups

Paired Samples Statistics				Paired Differences					
SWELLING HZ(MM) N=15		Mean+Std. Deviation	Std. Error Mean	Mean	Std. Deviation	Std. Error Mean	t Test	df	P Value
GROUP A	PRE	112.4+8.254	2.131	4.40	4.421	1.141	3.86	14	0.002 SIG
	POST	108+5.452	1.407						
GROUP B	PRE	108.14+4.241	1.095	There is no difference between PRE and POST values					
	POST	108.14+4.241	1.095						

Table 3

Comparison of pre and post swelling in vertical position within both the groups

Paired Samples Statistics				Paired Differences					
SWELLING VC(MM) N=15		Mean+Std. Deviation	Std. Error Mean	Mean	Std. Deviation	Std. Error Mean	t Test	df	P Value
GROUP A	PRE	111.6+10.12	2.613	4.27	3.283	0.848	5.03	14	0.00 0 SIG
	POST	107.34+8.304	2.144						
GROUP B	PRE	107.87+7.03	1.815	There is no difference between PRE and POST values					
	POST	107.87+7.03	1.815						

Figure 2.1

Comparison of pre and post swelling in horizontal position within the groups

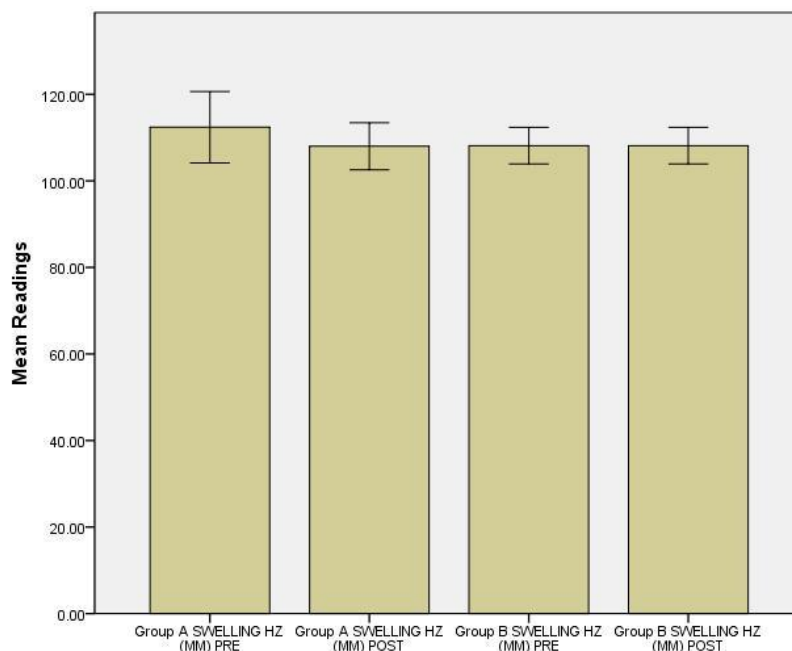


Figure 3.1

Comparison of pre and post swelling in vertical position within the groups

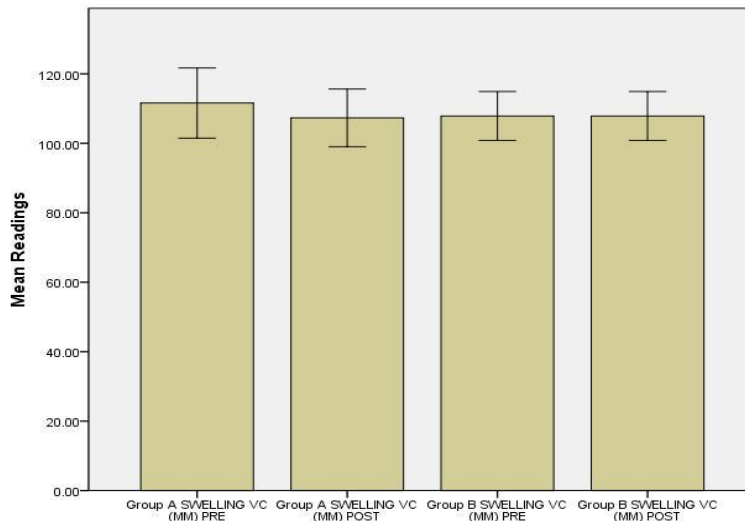


Table 4

Comparison of trismus within the groups

Paired Samples Statistics				Paired Differences					
TRISMUS(MM) N=15		Mean+Std. Deviation	Std. Error Mean	Mean	Std. Deviat ion	Std. Error Mean	t Test	df	P Value
GROU P A	PRE	34.87+7.06	1.823	-6.13	4.969	1.283	-4.78	14	0.000 SIG
	POST	41+3.163	0.817						
GROU P B	PRE	41.74+2.86 6	0.740	There is no difference between PRE and POST values					
	POST	41.74+2.86 6	0.740						

Figure 4.1

Comparison of trismus within the groups

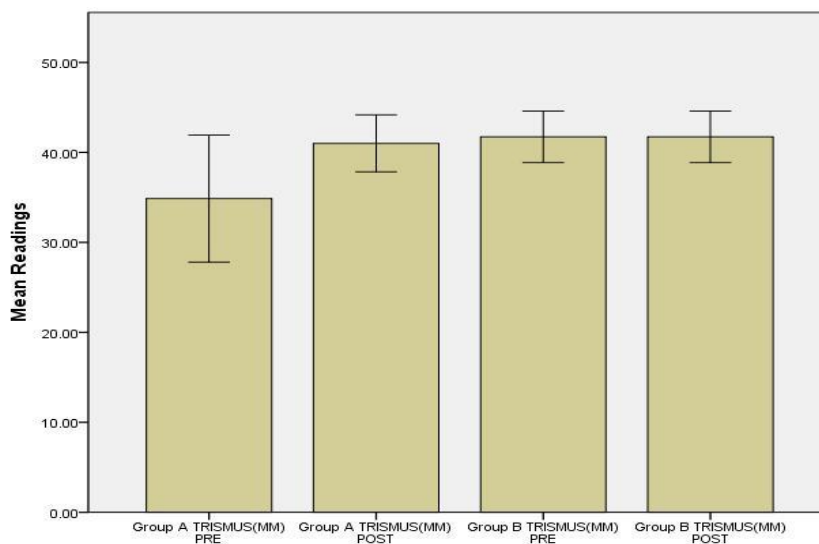


Table 5  
Comparison of VAS in between the groups

N=15	GROUP	Mean+Std	Std. Error Mean	t test	df	P Value	Mean Difference	Std. Error Difference
VAS PRE	GROUP A	6.74+1.28	0.330	0.454	28	0.653NS	0.200	0.440
	GROUP B	6.54+1.126	0.291					
VAS POST	GROUP A	1.14+0.352	0.091	0.592	28	0.559NS	0.067	0.113
	GROUP B	1.07+0.259	0.067					

Figure 5.1  
Comparison of VAS in between both the groups

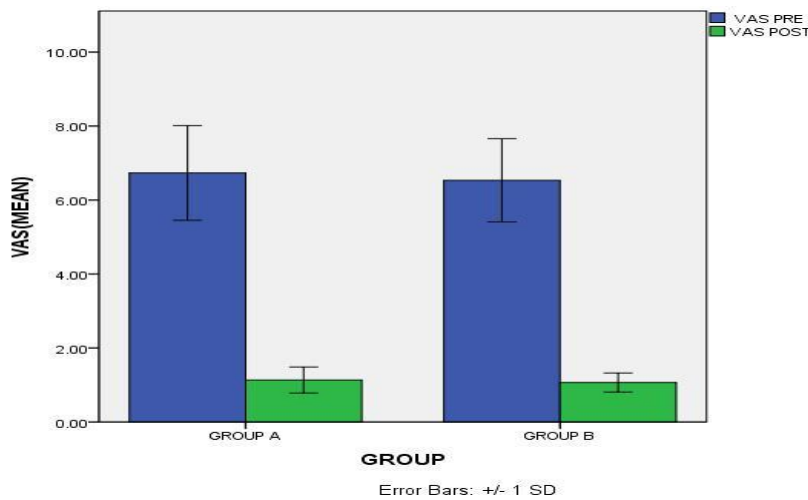


Table 6  
Comparison of swelling in horizontal in between both the groups

N=15	GROUP	Mean+Std	Std. Error Mean	t test	df	P Value	Mean Difference	Std. Error Difference
SWELLING HZ(MM) PRE	GROUP A	112.4+8.254	2.131	1.781	28	0.086NS	4.267	2.396
	GROUP B	108.14+4.241	1.095					
SWELLING HZ(MM) POST	GROUP A	108+5.452	1.407	-0.075	28	0.941NS	-0.133	1.783
	GROUP B	108.14+4.241	1.095					

Figure 6.1

Comparison of swelling in horizontal in between both the groups

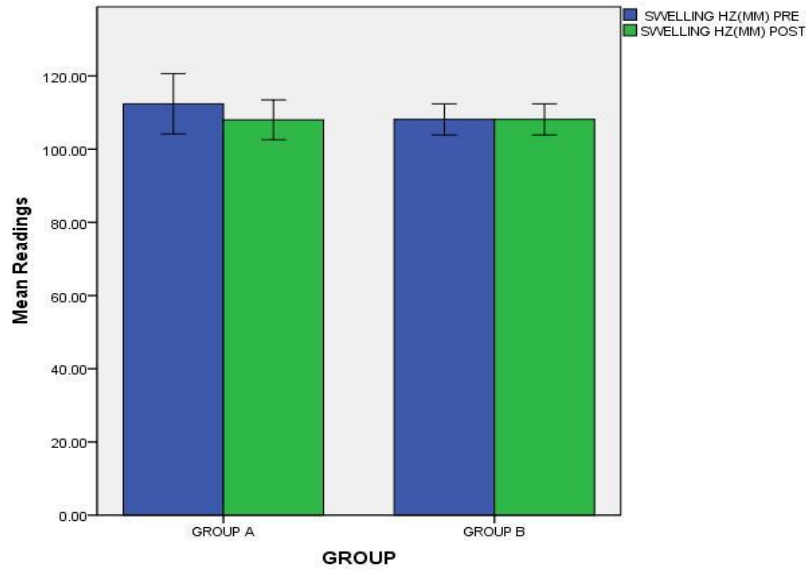


Table 7

Comparison of swelling in vertical in between both the groups

N=15	GROUP	Mean+Std	Std. Error Mean	t test	D f	P Value	Mean Difference	Std. Error Difference
SWELLING VC(MM) PRE	GROUP A	111.6+10.12	2.613	1.174	28	0.25NS	3.733	3.181
	GROUP B	107.87+7.03	1.815					
SWELLING VC(MM) POST	GROUP A	107.34+8.304	2.144	-0.190	28	0.851NS	-	2.809
	GROUP B	107.87+7.03	1.815					

Figure 7.1

Comparison of swelling in vertical in between both the groups

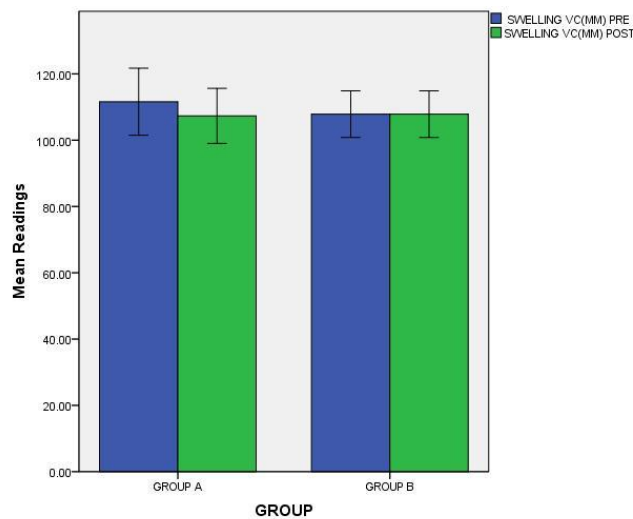


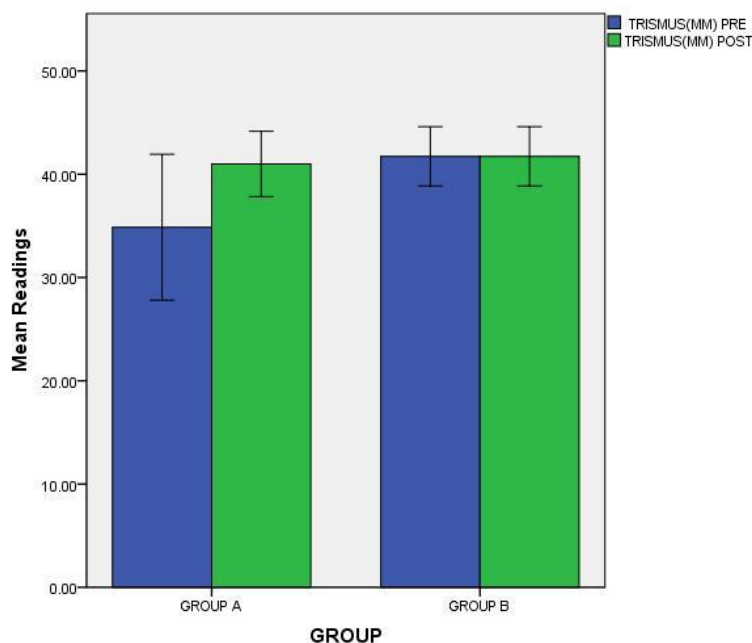


Table 8  
Comparison of trismus in between both the groups

N=15	GROUP	Mean+Std	Std. Error Mean	t test	df	P Value	Mean Difference	Std. Error Difference
TRISMUS(MM) PRE	GROUP A	34.87+7.06	1.823	-3.491	28	0.002 SIG	-	6.867
	GROUP B	41.74+2.866	0.740					
TRISMUS(MM) POST	GROUP A	41+3.163	0.817	-0.666	28	0.511 NS	-	1.102
	GROUP B	41.74+2.866	0.740					

Figure 8.1

Comparison of trismus in between both the groups



### III. Discussion

According to the results of our study, no statistically significant differences were observed in the levels of pain, swelling and trismus between both groups. This clinical finding disagreed with results of Jovanoic et al.,(2004)who expected a thermal insult to tissues stimulated with 100mW power density or more but as we shortened the stimulation time, no adverse thermal effects was encountered.

The use of therapeutic laser in the postoperative management of patients having surgical removal of impacted third molars, but without statistically significant differences.(Amarillas et al.,(2010).The low intensity pulsed ultrasound(LIPUS) signal is of low-enough intensity to be considered neither thermal nor destructive.Mechanical signal transduction of LIPUS act as adding mechanical stimuli. The ultrasound serves to take the place of the normal functional loading that would occur under physiological conditions and represent one pathway by which ultrasound may exert its effect on healing. The success of low intensity pulsed ultrasound (LIPUS) and low level LASER therapy(LLLT) to reduce the

discomforting symptoms after 3rd molar surgeries make it a promising tool for improving orthodontic treatment.

Keywords: Pain,swelling,trismus,ultrasound therapy,laser therapy, third molar surgeries.

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