بسم الله الرحمن الرحيم

إِنَّمَا يَخْشَى اللَّهَ مِنْ عِبَادِهِ الْعُلَمَاءُ

سورة فاطر -أية (٢٨)

EFFECT OF LASER PUNCTURE ON MECHANICAL LOW BACK DYSFUNCTION

BY
AMINA BASHIR SALEH IBRAHIM
B.Sc., in physical Therapy(2004)


Acknowledgement

•First and above all, I pray thanking GOD.

PROF. DR. MOHSEN EL-SAYYAD

•who took my hands to start the first step in the practical work by his unlimited helpful consultation and continuous generous guidance, and special appreciation to him for giving me the chance for using the BROM device in the clinical part of the study.

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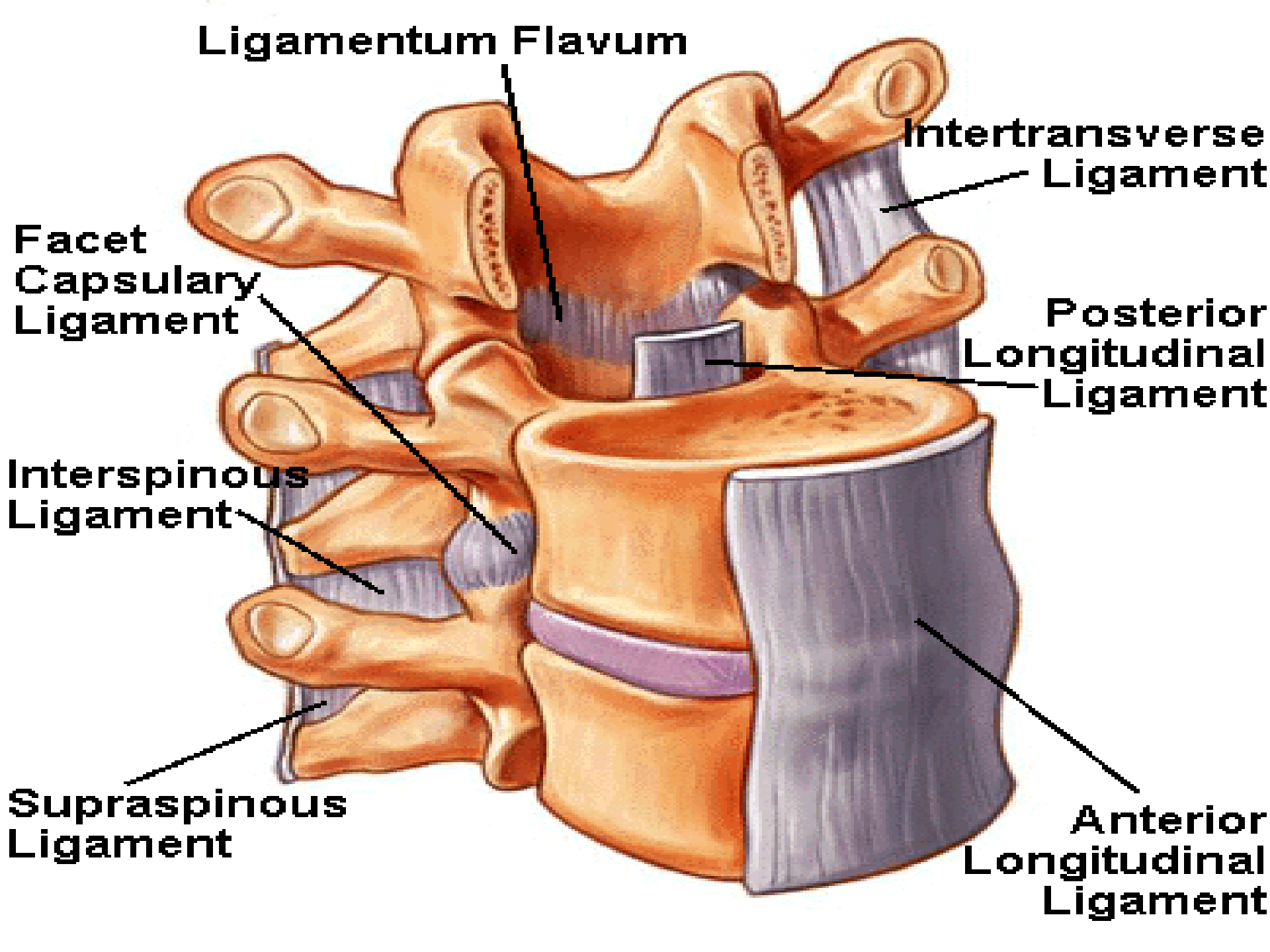
Dedication


To my Family, whose love and support enabled me to carry out this endeavor


Introduction

- Low back dysfunction (LBD) is a common musculoskeletal disorder that is highly prevalent in the general population ***(Fiore et al., 2011)***.

- Approximately 70-80% of the population will experience at least one episode of LBD during his/her lifetime ***(Behbahani, et al., 2010)***


Ligamentum Flavum
Intertransverse Ligament
Facet Capsulary Ligament
Posterior Longitudinal Ligament
Interspinous Ligament
Supraspinous Ligament
Anterior Longitudinal Ligament

ADVANTAGES OF LLLT

1-Accelerate wound healing

2-Enhance repair and remolding of bone

3-Accelerate restoration of neural function after injuries

4-Pain attenuation

5- Stimulate endorphin release

How does a laser work?

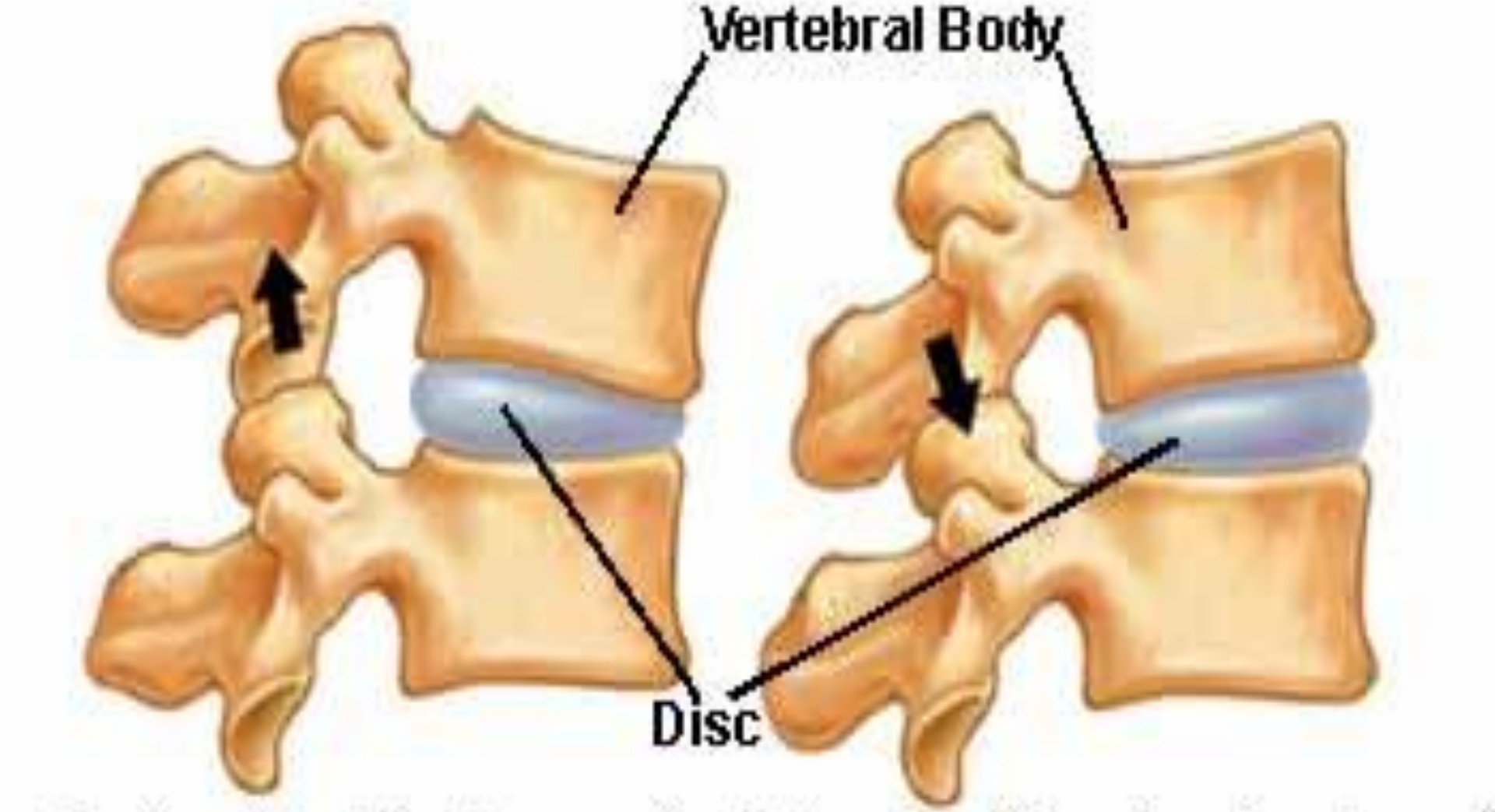
Electrons surrounding atoms are excited into higher energy states to create a "population inversion".

The excited electrons release their energy in the form of photons which can, in turn, collide with other excited electrons and cause them to release an identical photon - this is called stimulated emission

- Many studies have shown the positive effects of low-level laser therapy in the treatment of bone disease. However, laser radiation is scattered in skin surface which reduces the initial photon density for tissue penetration, and consequently therapeutic efficacy and stimulation of acupuncture points is increasing collagen and ATP production, increased circulation, and pain less. ***(Yousefi, 2008)***.

- The natural history of low back dysfunction is a recurrent problem during a long time span affecting the ability to function in activities of daily living and work place ***(Zeevir and Keating, 2003***

Facet Joints in Motion



Statement of the problem

Low back dysfunction (LBD) is a major problem which cause disability that may lead to pain, symptoms in lower extremity which may affect ROM and function in activities of daily living and work abilities. Laser puncture is favoured in treating of LBD. SO the study aimed to answer the following research question:

Does laser puncture affect on the treatment of low back dysfunction?

Purpose :

To investigate the effect of the laser puncture on pain , ROM , and function in activities of daily living for cases with low back dysfunction

Operational definition

Low back dysfunction

Low back dysfunction (LBD) is a common musculoskeletal disorder that is highly prevalent in the general population **Pain in the lower lumbar region without neurological deficit, caused by postural or occupational stress which may lead to irritation of pain sensitive tissues. Those patients characterised by reducing spinal mobility and painful functional activity.**


Justification of the study

There is no doubt that the laser technology is being applied number of procedures, many of which have clear advantages over the other methods. Regardless of the kind of medical applications; lasers safety to the patient and administering staff against any harmful exposure or effects that may arise in the use and handling of lasers is an important consideration

Method

Subjects:

Thirty patients 17female and 13 male with LBD, were randomly assigned into two treatment groups .

subjects in the control group A(n=15)with a mean age (45.7± 6.6) years , mean weight (77.4± 10.4) Kg , mean height (169.3 ± 21.7) cm.

Where subject in experimental group B (n = 15) with a mean age (46.4± 6.7)) years, mean weight (79.1±12.8) Kg , mean height (170.7±10.1) cm participated in this study

•Inclusion Criteria

- Age ranged 40 to 60 years.

- The selected patients were diagnosed as LBD by orthopedist.

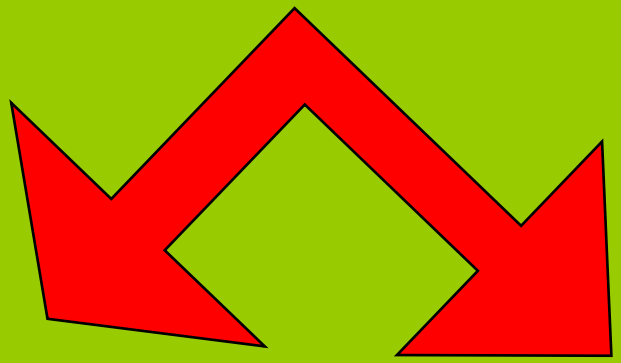
- **Exclusive Criteria**

- **There was no surgical approach at lumber area.**
- **.Pregnant women were not selected.**
- **There was no pathology of hip, knee or ankle joint.**

- Cardiopulmonary disease , which decrease the patients tolerance and activities.


Instrumentation

Procedures

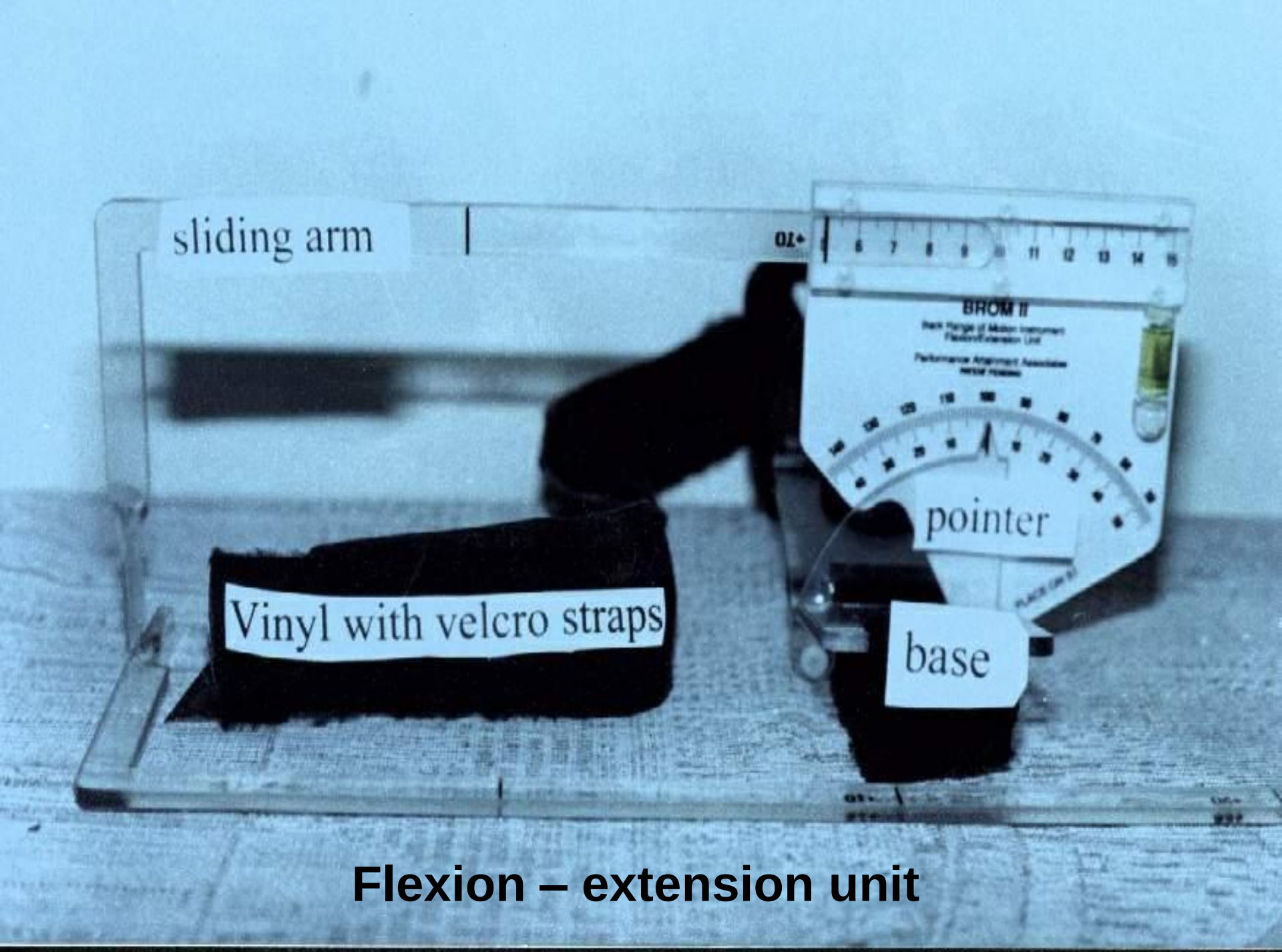


Evaluation Procedures

Treatment Procedures

+30
+20
+10
NORTH

Rotation – lateral flexion unit

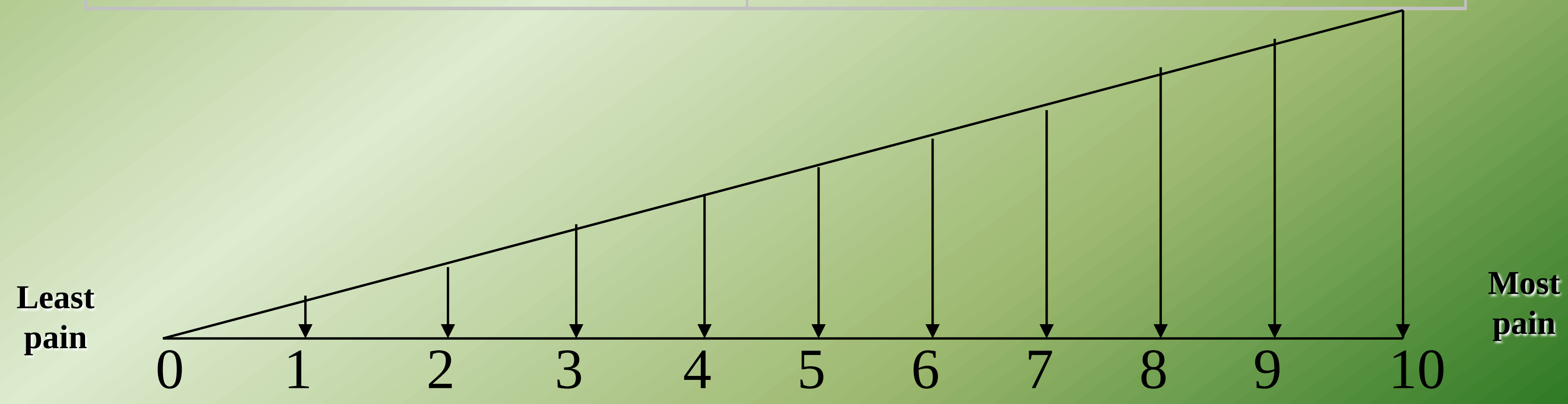


Flexion – extension unit

Back Pain Measurement

Modified Visual Analogue Scale

The line drawn below is	[illegible]
devided into ten devisions	[illegible]
ranging from (0) least pain	[illegible]
to (10) most	[illegible]
Please detect the severity	[illegible]
of your pain by drawing a	[illegible]
line	



Measurement of pain level was assessed by VAs, patients functional disability was assessed by Oswestry disability index and back ROM by BROM device. were assessed before and after treatment in both groups .

Back ROM Measurement

Brom Recording Sheet

Date : / /

Name :……

Serial Number :……

Spinal Movement	Pretreatment	Post treatment
1. Forward flexion.		
2. Extension.		
3. Left side rotation.		
4. Right side rotation.		
5. Left side lateral flexion.		
6. Right side lateral flexion.		

Information Sheet

1. Personal History :

Date : / /
Patient's name: .....
Gender : Male ( ) Female ( )
Age : ( ) years.
Occupation : .....
Address : .....
Telephone number : .....
Special habits: .....

2. Diagnosis :

.....

3. Chief Complaint :

.....
.....

4. Present History :

Onset : .....
Course : .....
Duration : .....
Site of Pain : .....

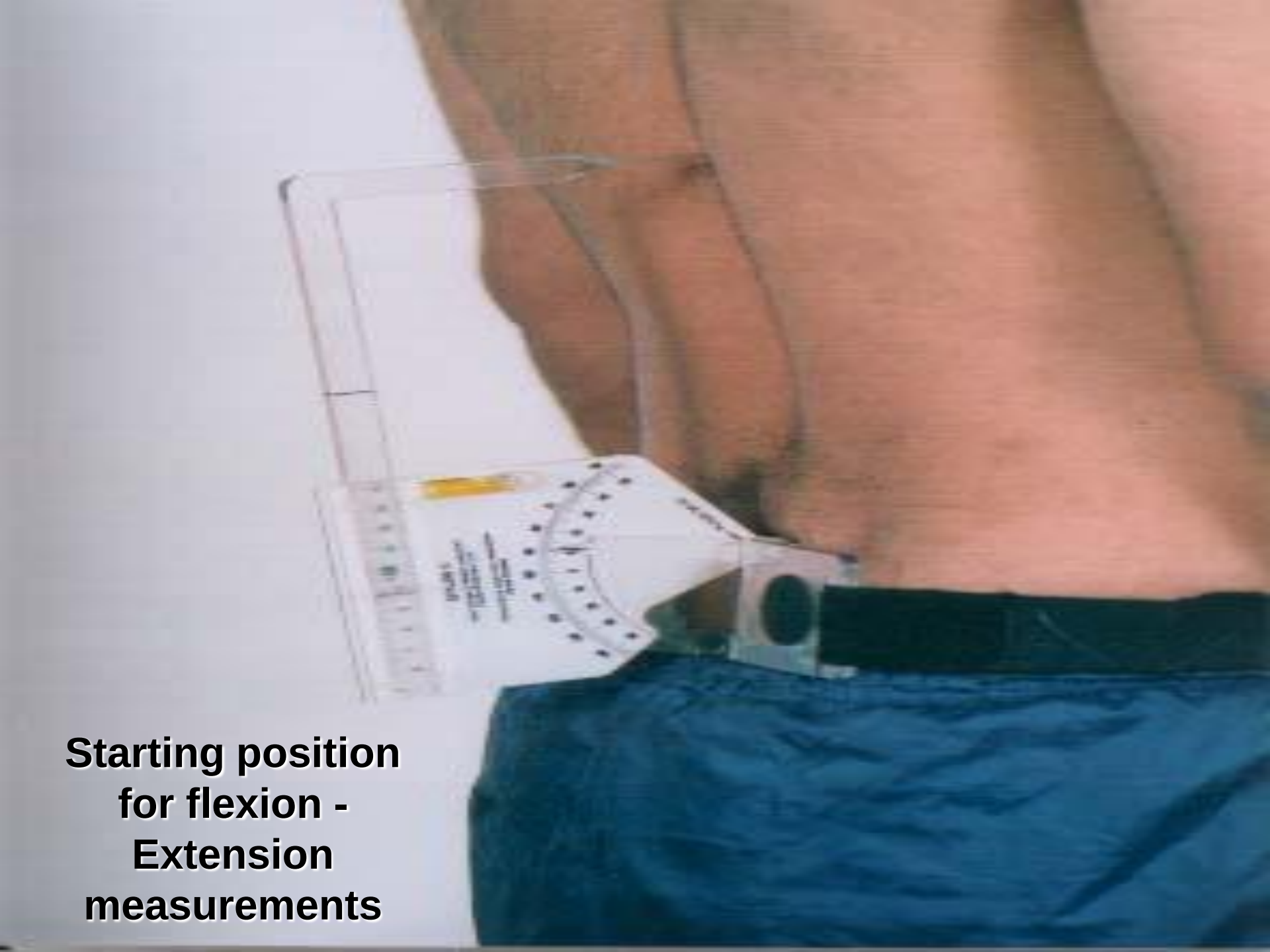
5. Past History :

.....

6. Medical History :

.....

Right Rotation Measurement



Starting position for flexion - Extension measurements

Control group A(n=15)received traditional physical therapy treatment (infrared radiation , ultrasonic and therapeutic exercise).

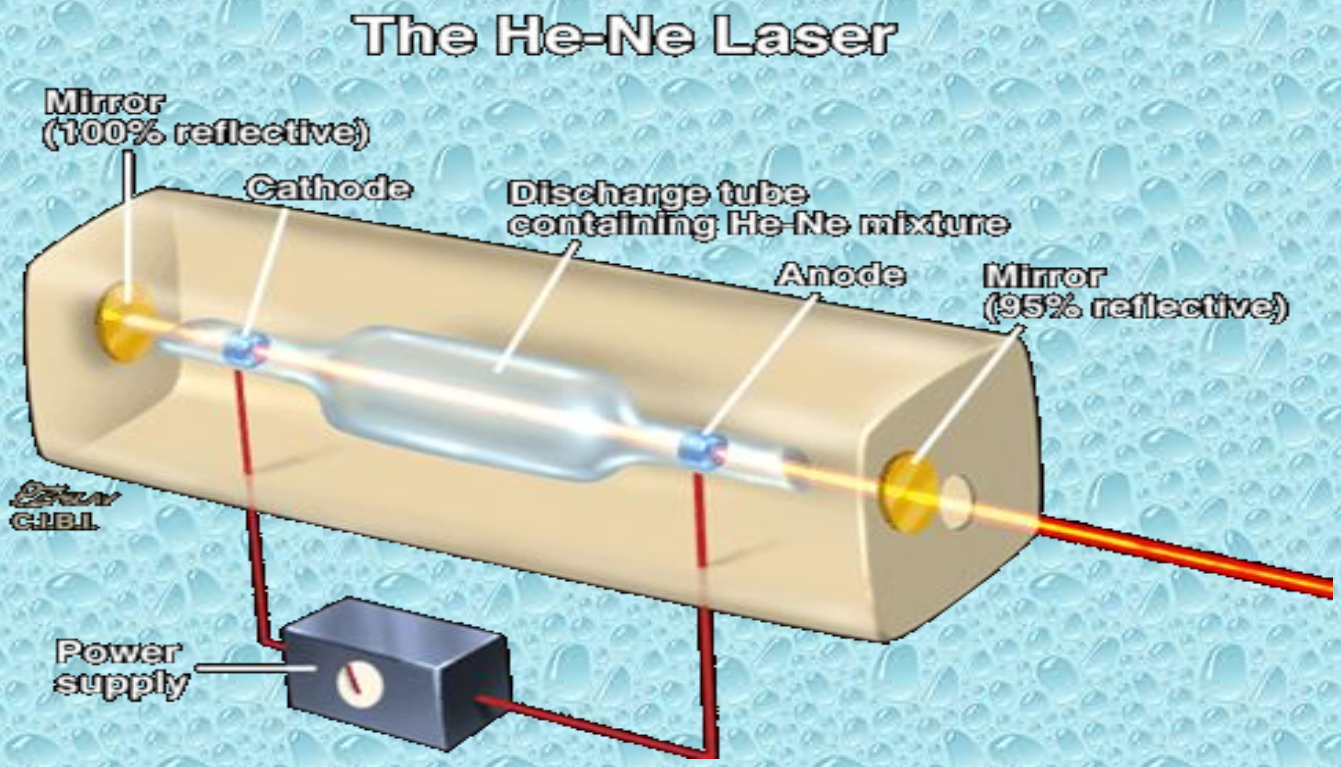
experimental group B (n = 15) were treated with infrared radiation , ultrasonic , therapeutic exercise ,as well as laser therapy in three days / week for four weeks.

(3 times per week over 4 weeks period).

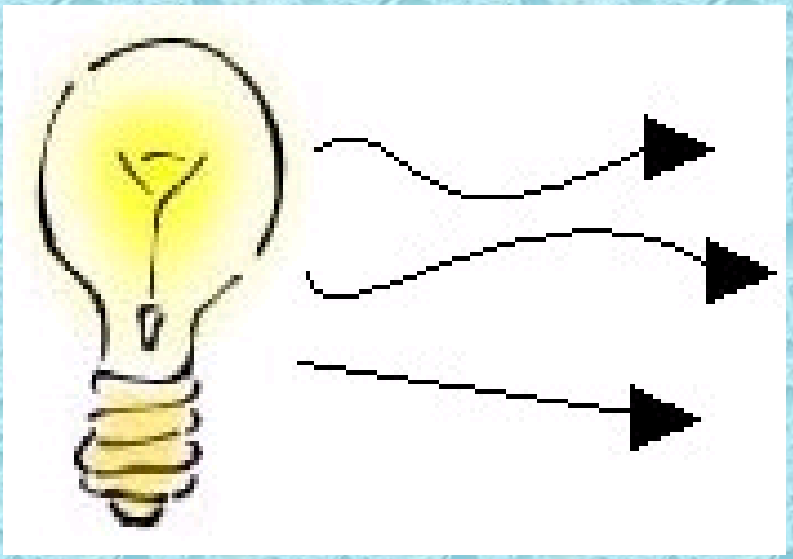

program
01
05
frequency: 1 MHz; intensity: 2.0 W/cm², DF: 100%, pulse frequency:
cont.
esc
enter
diag
prog
main
menu
user
press to start /stop
time
intensity

Heating

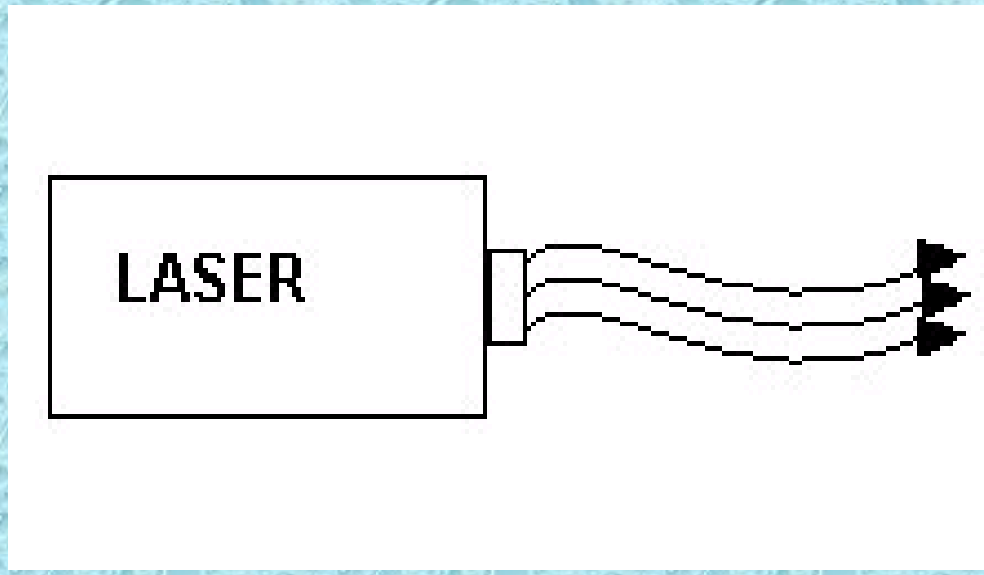
Fundamentals of Laser Operation



Incandescent vs. Laser Light

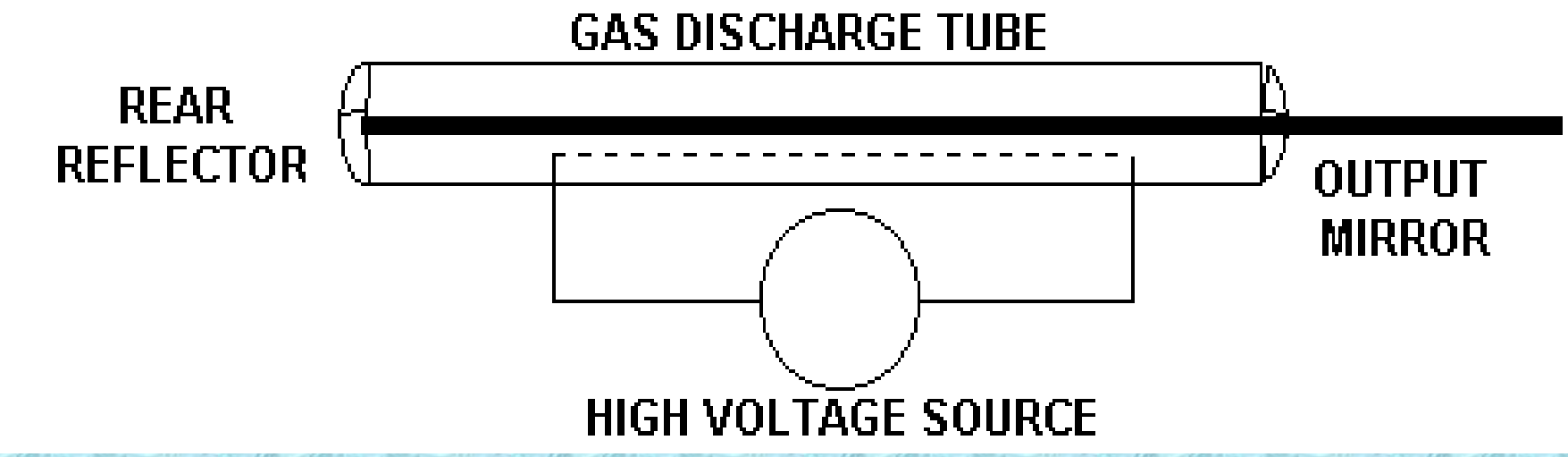


1. Many wavelengths
2. Multidirectional
3. Incoherent



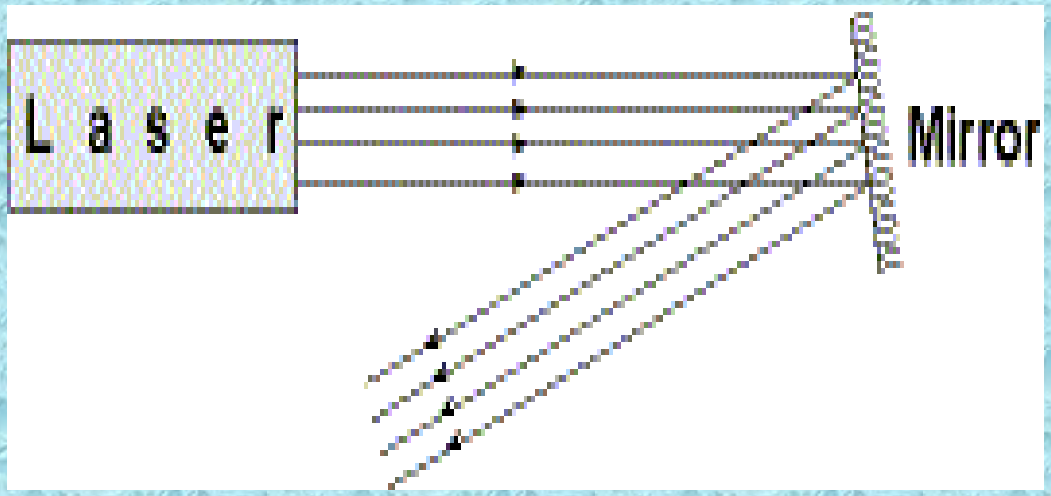
1. Monochromatic
2. Directional
3. Coherent

Laser Components

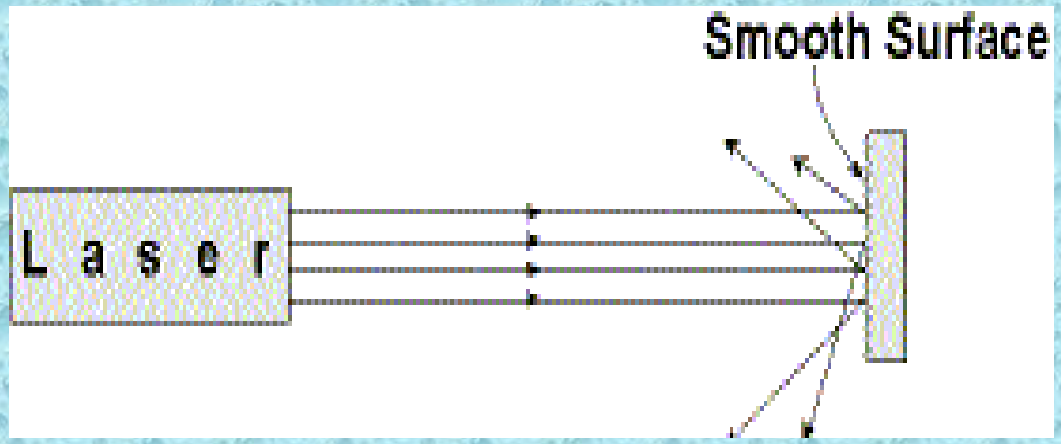


Gas lasers consist of a gas filled tube placed in the laser cavity. A voltage (the external pump source) is applied to the tube to excite the atoms in the gas to a population inversion. The light emitted from this type of laser is normally continuous wave (CW).

Reflection Hazards (cont'd)

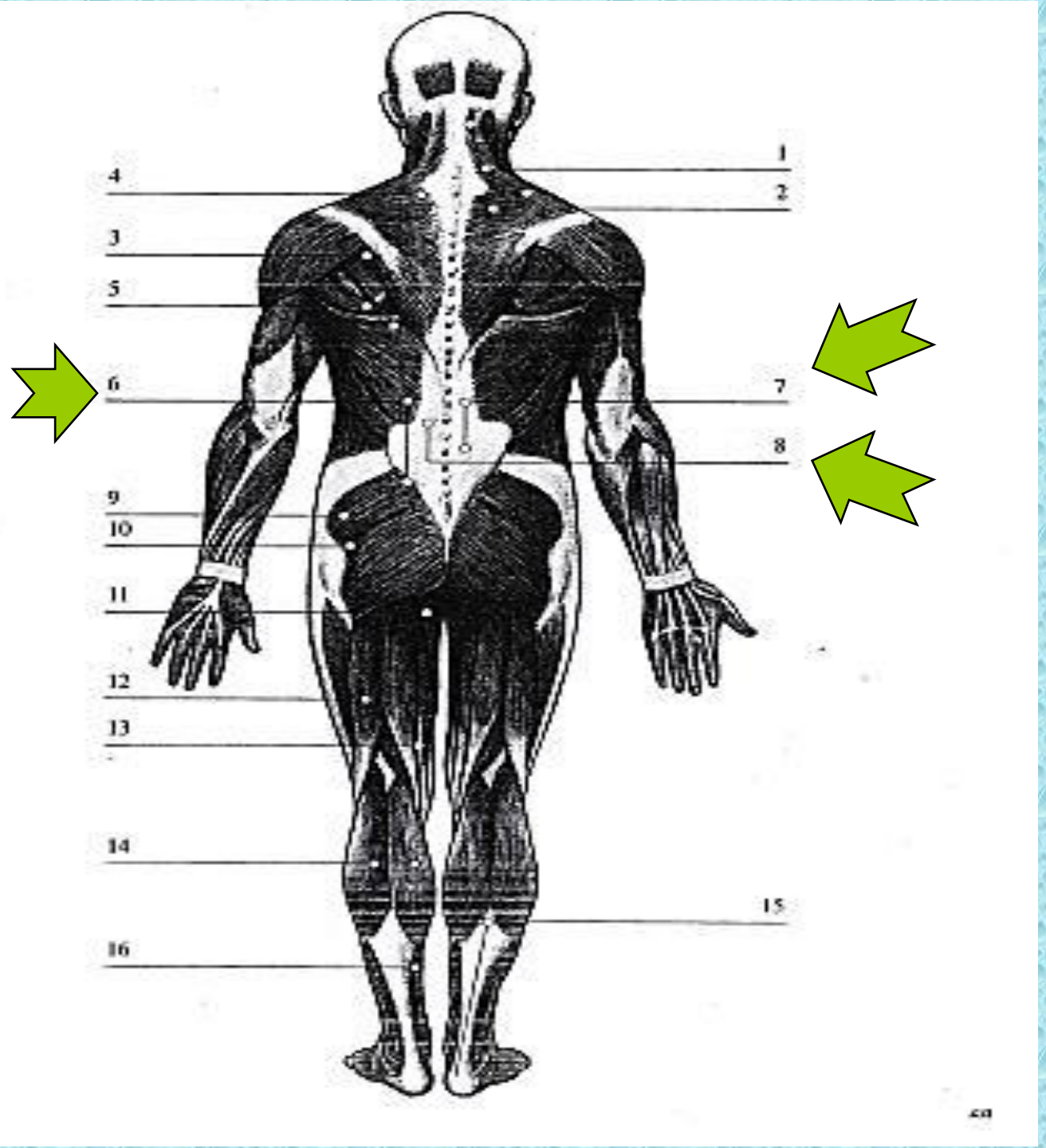


Specular Reflection



Diffuse Reflection


fisioline
LASER STOP
START
STOP
LUMIX 2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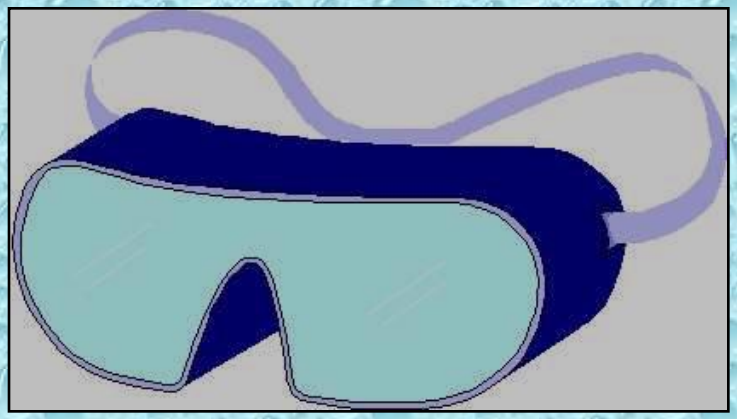
CONTROL MEASURES



Engineering Controls

- ✓ Interlocks
- ✓ Enclosed beam

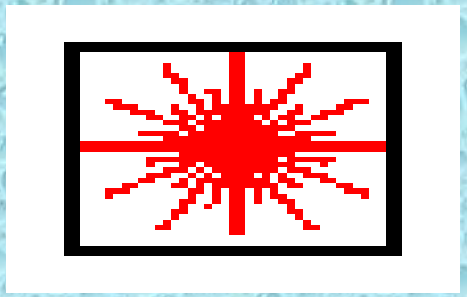
Administrative Controls

- ✓ Standard Operating Procedures (SOPs)
- ✓ Training

Personnel Protective Equipment (PPE)

- ✓ Eye protection

Common Laser Signs and Labels




Results

Result

Showed that , a significant effect of laser puncture on pain level , functional disability , back ROM in patients with mechanical low back dysfunction.

General Characteristics of patient in both groups A and B

	Age		Length		Weight	
	Control	Experimental	Control	Experimental	Control	Experimental
Mean	45.7	46.4	169.3	170.7	77.4	79.1
Standard Deviation	6.6	6.7	21.7	10.1	10.4	12.8
Median	45	45	172	169	80	82
Minimum	40	40	104	152	61.6	56
Maximum	65	59	195	192	96	95

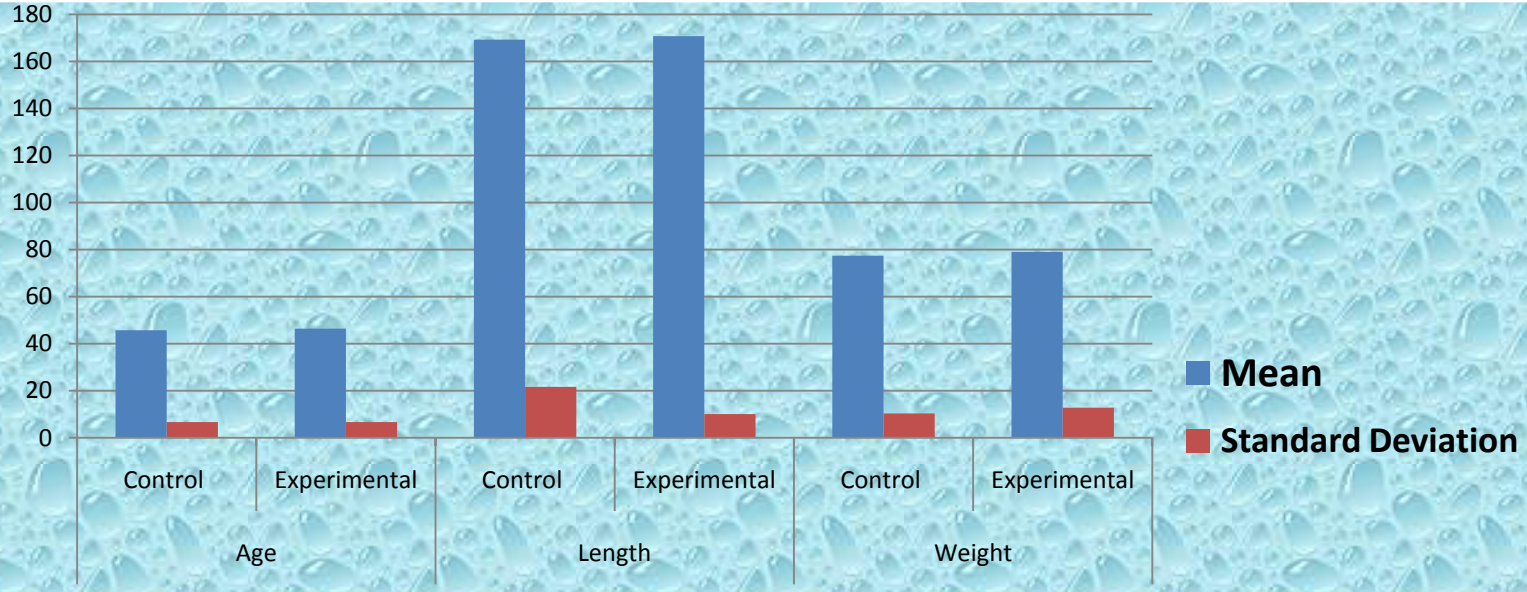
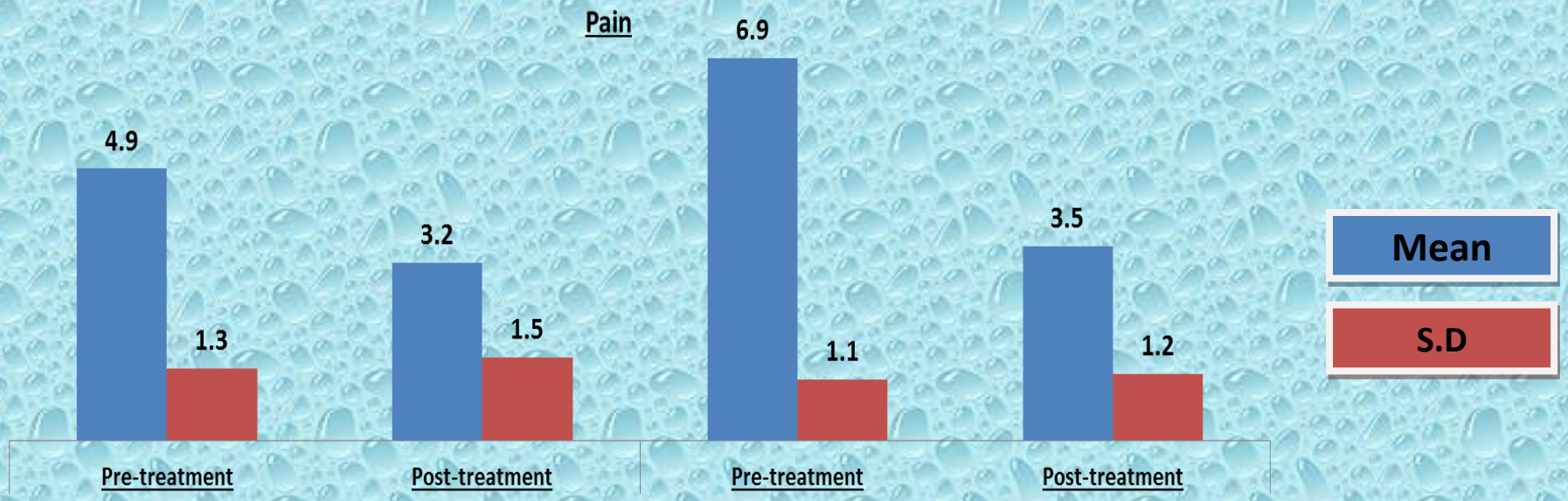


Table (2): Pain Treatment of back dysfunction in control N=15 and experimental group N=15

	Control group		Experimental group	
	Pre-treatment	Post-treatment	Pre-treatment	Post-treatment
Mean	4.9	3.2	6.9	3.5
Standard Deviation	1.3	1.5	1.1	1.2
Median	5	3	2	3
Minimum	3	1	5	2
Maximum	7	7	8	7



Fig(11) :Range of Motion Full Flexion (Pre & Post) treatment low back dysfunction in both groups Control and Experimental

	Control		Experimental	
	Pre	Post	pre	post
Mean	122.9	127.7	131.6	135.2
Standard Deviation	12.8	11.1	10.9	9.8
Median	119	130	137	139
Minimum	105	107	110	117
Maximum	143	144	143	147

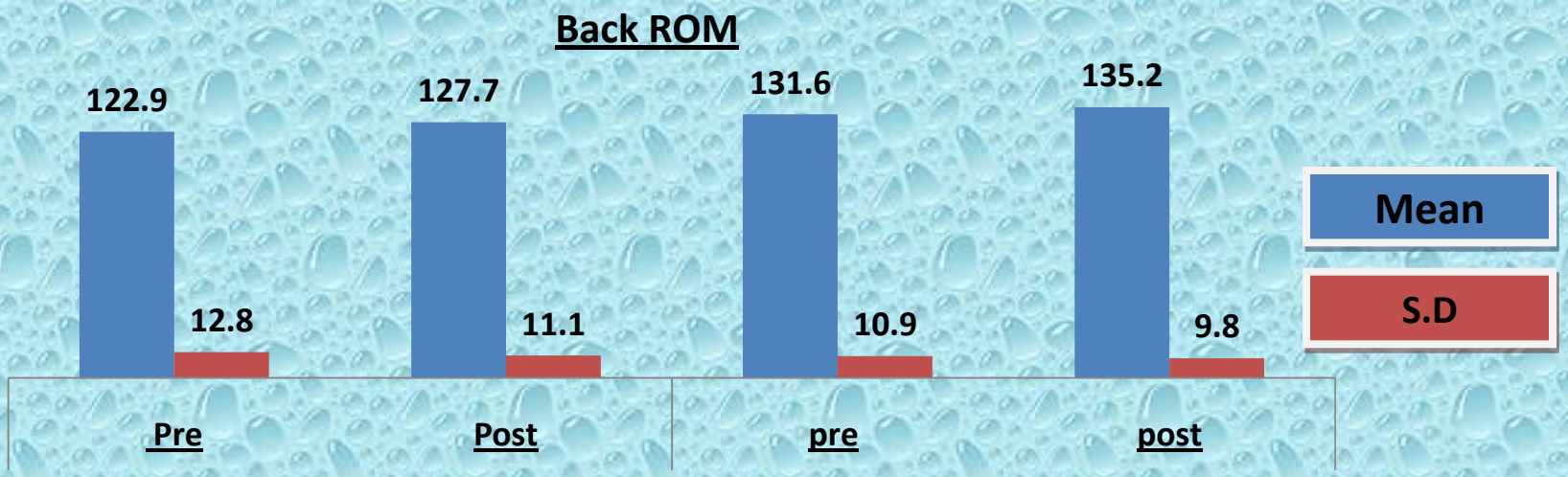
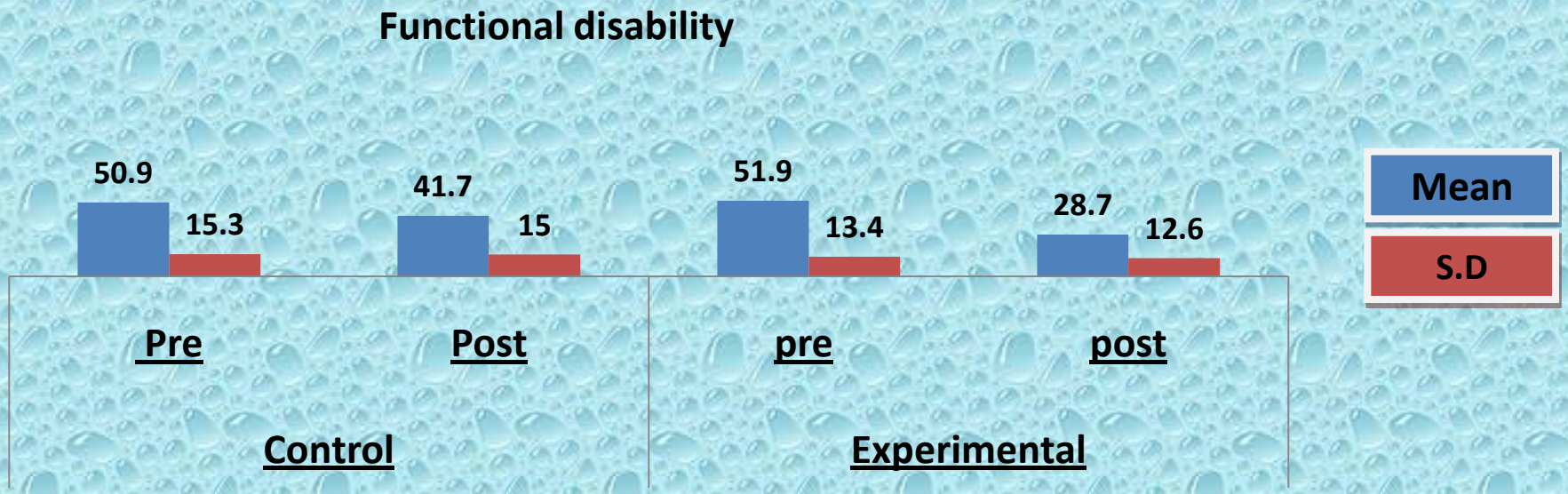


Fig (10): Pre and Post Functional disability (OSI) after physical therapy treatment in low back dysfunction

	Control		Experimental	
	Pre	Post	pre	post
Mean	50.9	41.7	51.9	28.7
Standard Deviation	15.3	15	13.4	12.6
Median	52	35	50	30
Minimum	24	18	28	10
Maximum	76	72	70	54



	Control				Experimental			
	Rt		Lt		Rt		Lt	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Mean	5.9	7.3	6.4	7.5	5.5	7.3	5.7	7.4
Standard Deviation	1.2	1.4	1.5	1.1	1.4	1	1.2	0.7
Median	6	8	6	8	5	8	6	7
Minimum	4	5	3	5	4	5	4	6

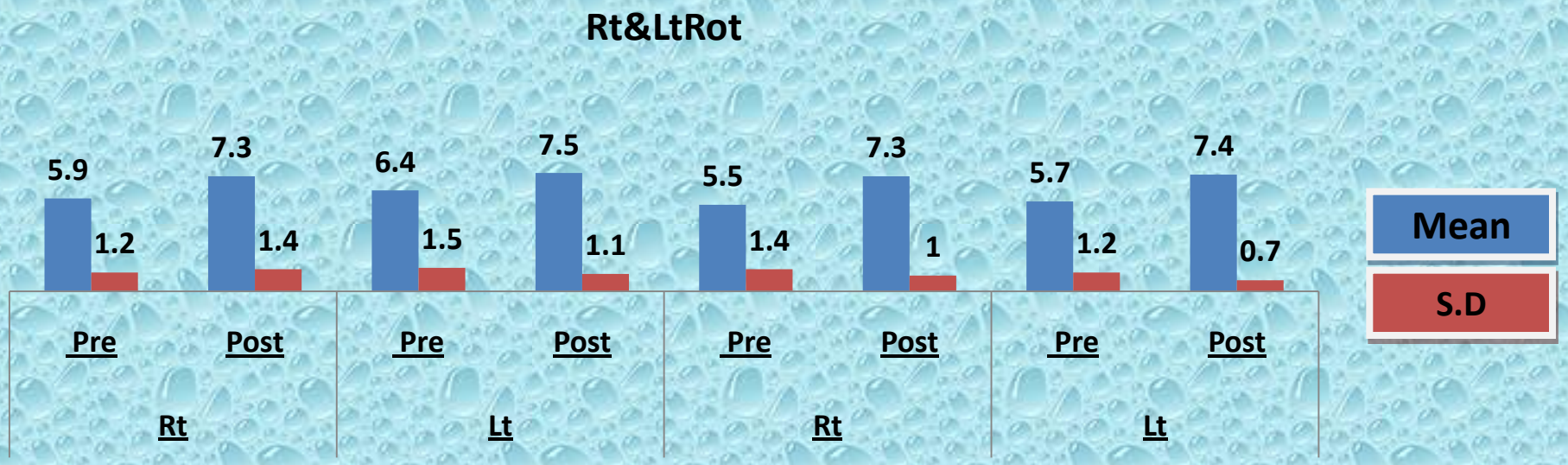


Fig (12) : Comparison between Rt and Lt Rotation after low back dysfunction (pre & post) in Control and Experimental group

Table (6): Statistical test in control and experimental group in pre and post III of low back dysfunction

	Control group			Experimental group		
	z	p-	value	z	p-	value
Post-III OSI - Pre III OSI	-2.788	0.005	0.02	-3.411	0.001	0.004
Post full flex-pre full flex	-3.308	0.001	0.004	-3.436	0.001	0.004
post treatment back pain	-3.252	0.001	0.004	-3.422	0.001	0.004
pre treatment back pain						
Rt rot post -rt rot Pre	3.402	0.001	0.004	-3.228	0.001	0.004
Lt rot post -Pre Lt rot	2.631	0.009	0.036	-3.341	0.001	0.004

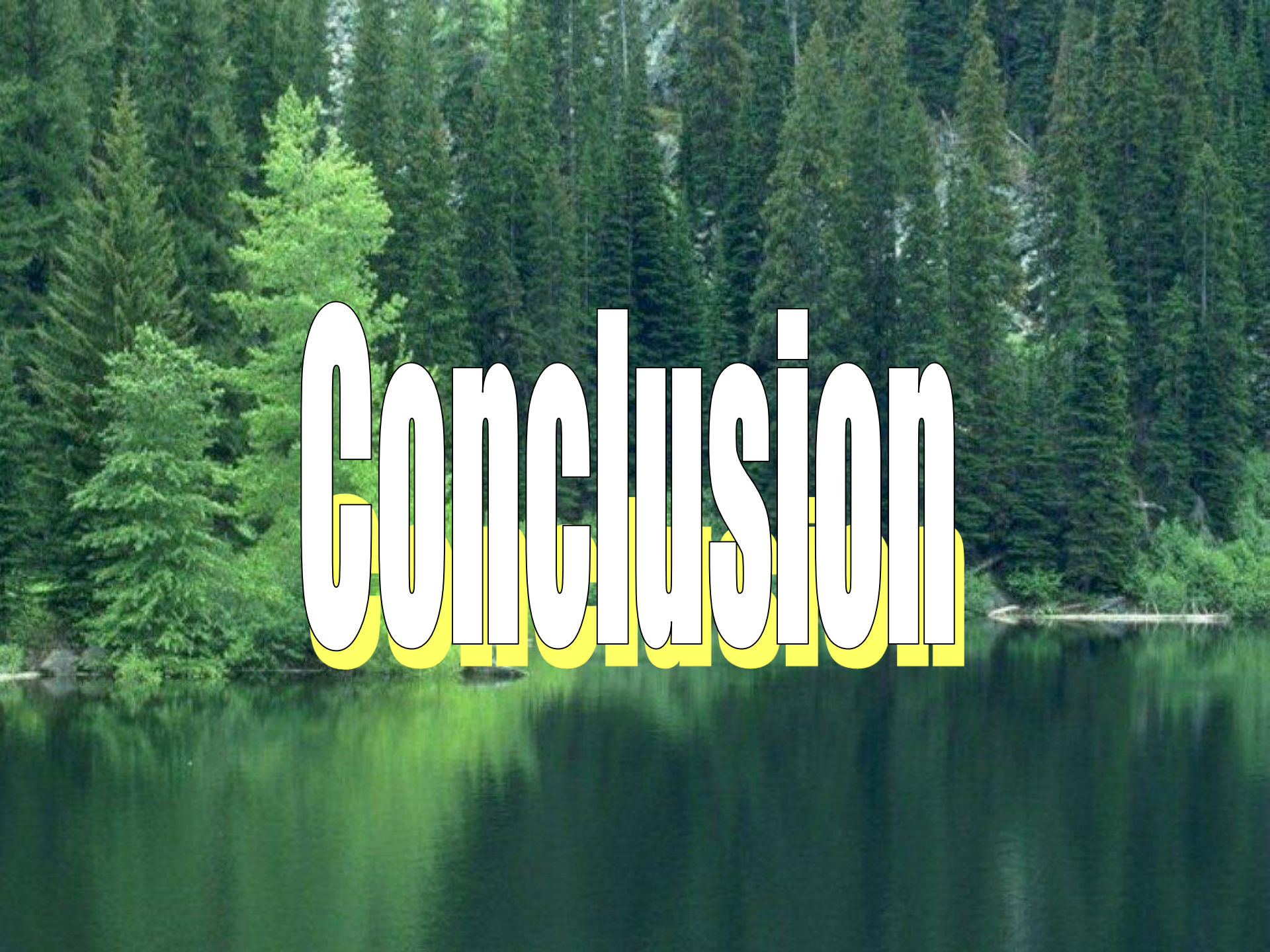
Table(7): Mann-Whitney test for non-parametric t-test

	Mann-Whitney u	Experimental group	Corrected P-value
Pre-III OSI	107.5	0.838	
Post-III OSI	60.5	0.029	0.116
Pre- Full Flex	69	0.074	
Post- Full Flex	65.5	0.5	0.2
Pre-III back Pain	28.5	<0.001	<0.001
Post-III back Pain	96	0.512	


Erosion

In comparison between the two groups , the results obtained in the current study showed a significant improvement in experimental group than the control group regarding the level of pain , function disability and back ROM.

Low-level laser therapy (LLLT) is a treatment strategy which uses a single wavelength light source. Laser radiation and monochromatic light may alter cell and tissue function. Many authors have reported significant pain reduction in a number of conditions such as rheumatoid arthritis, fibromyalgia, post-operative pain, headache, nervous system diseases, myofascial pain syndrome, chronic neck pain, and low back pain as a result of laser application.


Conclusion

low-level laser therapy could be considered in treatment of Low Back Dysfunction. Laser causes pain relief without any side effects. It could be helpful especially in patients suffering from LBD tolerated to drug therapy.

Conclusion :

the treatment with laser puncture were effective in reducing pain level ,functional disability and improving back Rang of motion.


Recommendation

1-There is a need to develop objective, repeatable, and reliable tests for evaluating Laser acupuncture and determining treatment outcome measures

2-Clinical studies need to further develop this technique to effectively differentiate between laser and other therapeutic modalities


Thank you