International
Journal of Medical and Exercise Science
(Multidisciplinary, Peer Reviewed and Indexed Journal)

ORIGINAL ARTICLE

COMPARATIVE EFFECT OF LOW-LEVEL LASER THERAPY AND SHOCKWAVE THERAPY ON OSTEOARTHRITIS OF KNEE

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ABSTRACT

Background of the study: Children who display clumsiness, poor performance in sports or delayed motor milestones may face challenges in gross motor skills. Research has shown many factors that influences Gross Motor Skills such as BMI and physical activity participation. However, few research has shown relationships between sensory processing and gross motor skills. Therefore, this study aims to investigate the correlations between sensory processing abilities and gross motor skills among children aged 7- years old. **Methodology:** The study was conducted at a children's gym and a primary school where 56 typically developing children between ages 7-10 years old were collected. Their parents were given a questionnaire known as the Short Sensory Profile to assess the sensory processing abilities while the subjects were observed by the researcher using the Test of Gross Motor Development – 2 in order to assess the gross motor skills. **Results:** The results indicate that there is a significant correlation between sensory processing -abilities and gross motor skills among children aged 7 - 10 years old [p-value < 0.05; p-value = 0.012]. Under the short sensory profile subscales, only the under responsive/sensation seeking was found to be significantly correlated with gross motor skills [p-value <0.01; p-value = 0.003]. **Conclusion:** Child who faces challenges in gross motor skills could also likely exhibit atypical sensory processing abilities. Therefore, a child should also be screened for deficits in sensory processing when they display poor performance in gross motor skills. However, the results of this study do not imply causation.

Key words: Osteoarthritis of knee, Shockwave therapy, Low level laser therapy, visual analogue scale, Goniomete

Received on 14th August 2023, Revised on 20th August 2023, Accepted on 28th August 2023
DOI:10.36678/IJMAES. 2023.V09I03.002

INTRODUCTION

Osteoarthritis is the most common degenerative joint disease, affecting more than 25%of the population over 18years old pathology changes seen in OA joint include progressive loss and distraction of articular cartilage, thickening of the subchondral l bone, formation of osteophytes, variable degrees of inflammation of the synovium, degeneration of ligaments and menisci of Knee and hypertrophy of the joint capsule. They are 2types of Osteoarthritis (OA)1. Primary Osteoarthritis2. Secondary Osteoarthritis. Primary Osteoarthritis is worn and tear on joints as people age cause primary OA therefore it's starts showing up people age 50 to60.everyoneexperiences cartilage breakdown as they get older, but some cases are more severe than others. Secondary Osteoarthritis involved a specific trigger that exacerbates cartilage breakdown. Here are some of the most trigger for secondary Osteoarthritis: Injury, obesity, genetics and inflammation.

They are 4stages of Osteoarthritis are

1. Minor: minor wear and tear in the joints. Little to no pain in the affected area.

2. Mild: more noticeable bone spurs the affected area feels stiffs after sedentary periods patient needs braces.

3. Moderate: Cartilage in the affected are begins to erode. the joints become inflamed a Cause discomfort during normal activities.

4. The patients are in a lot of pain in cartilage is almost completely gone, leading to an inflammatory response from the joint. Over growth of Bony spurs (osteophytes)may cause severe pain.

Symptoms and causes:

Osteoarthritis of the knee happens when yours Knee joint cartilage wears out or is damage. articular cartilage is tough, rubbery tissue on the ends of your bones that lets you bend and move. Meniscal cartilage absorbs shock from pressure on your knee. Knee pain is the most common symptom of Osteoarthritis in the knee, making it painful for you doing physical activity (jogging, running, climbing stairs or kneel). In over time of Osteoarthritis knee can change the shape of your knee joint. It making your joint feel unstable or wobbly. They knee looks swollen or fells puffy. they can hear a cracking or grinding noise while moving their knee. Physiotherapy for Osteoarthritis of Knee: Osteoarthritis of knee can sometimes seem like a double edge sword. Over using your knee can worsen your joints health and knee osteoarthritis, but the less you move your knee, the weaker they can get. You need to find that balance of keeping your knee joints moving just enough so they strong and healthy and physical therapy helps you do that. The muscles surrounding the knee can become stiff. This makes it difficult to do every day, such as walking or getting out of bed. Physical therapy can help to reduce the pain, swelling and stiffness of knee osteoarthritis and it can help[1]

improve knee joint function it can also make it easier for them walk, bend, knee squat and sit. In fact, a 2000 study found that a combination manual physical therapy and supervised exercise hag function benefit for patients with knee osteoarthritis and delay or prevent the need for surgery. It can help to reduce the pain, swelling and stiffness of knee osteoarthritis, and it can also make it easier for you to walk, bend ,kneel, squat and sit . The two main types of physical therapy passive and active treatment can help make your knee osteoarthritis more manageable. Passive treatment the physical therapist does the majority of the work but with active treatment, you do more of the work, home exercise.

Low level laser therapy: Low level laser therapy (LLLT)is form of medicine that applies low level

(low power) laser or light -emitting diodes (LED'S)to the surface of the body whereas High-power laser is used in laser medicine to cut or destroy tissue, it's is claimed that application of Low-power laser relives pain ore stimulation and enhance cell functions. The effects appear to be limited to a specified set of wavelengths, administering LLLT below the does range does not appear to be effective. The effects of LLLT appear to be limited to a specified set of wavelengths of laser, and administering LLLT below the dose range does not appear to be effective.

Shockwave therapy: It is non-surgical treatment and works by delivering impulses of energy, targeted to specific damaged tissue within the abnormal tendon. shockwave therapy is a non-surgical treatment and works by delivering impulses of energy, targeted to specific damaged tissues within the abnormal tendon. This increases the blood flow within the affected area, stimulating cell regeneration and healing and decreasing local factor which can cause pain. The impulses are delivered through the skin as a shockwave that spreads inside the injury tissue as an aspherical radial wave.

Aim of the study: The aim of study is to comparative effectiveness of low-level laser therapy and Shockwave therapy on Osteoarthritis of Knee.

Need of the Study: The need of the study is to highlight the outcome measures used in physiotherapy for treating the patient with osteoarthritis of knee.

METHODOLOGY

Study Design was Comparative study, Pre-Post type. Study setting done at ACS Medical college and hospital OPD Velappanchavadi, Chennai. Total sample size was 30, patients with knee pain. Sampling Method used was Simple random sampling, lottery method to allocate the samples in two groups; Group A:15 and Group B:15. Study conducted for a duration of 4months. Intervention Duration Low Level Laser therapy & Shockwave therapy was 3days per week. Inclusion Criteria of age group between 50 TO 60 years, both male & female subjects with Chronic OA, Trauma case & Obesity. Pain, ROM and Function was measured using Visual Analogue Scale, Goniometer and Koos test Pretest & posttest is recorded.

Intervention:

Group A (Low Level Laser Therapy): Group A received 3session of Low level laser therapy 3days per week four weeks total of 12sessions at the wavelength of 786-860 nm laser output of 30mw a dose of 45\cm square, the laser therapy was applied in circular motion on the insertion of osteoarthritis of knee.

Group B (Shock-Wave Therapy): Group B received 3sessions of shock-wave therapy at an energy of density 1OOOshocks\mins at 30j with each session given 3days per week for four weeks total of 12sessions.the shockwave therapy was applied on circular motion on the insertion of the site of osteoarthritis.

Procedure: Patient from outpatient physiotherapy department ACS Medical college with osteoarthritis of knee with the duration of past one month are screened by inclusion and exclusion criteria to the participant in the study. The purpose of the study was explained to the patient. After obtaining informed consent. Demographic information of the standardized history include age, gender, duration, of symptoms and occupation. The participation were asked to mark their intensity of pain on 10cm visual analogue scale in the data collection sheet with number 0 to 10 where 0 symbol has no pain 10 symbols sever pain. The outcome measure were recorded using measuring tools

(VAS) visual analogue scale and Goniometer before and after treatment as Pre and Post test score. Pre test measurement were recorded using ssVAS for the pain subjectively before the initiation of the 1st session of the treatment protocol and post test values were recorded at the end of the 12session for both group respectively . Goniometer was measured before the initiation of 1st session of treatment protocol for pre test values and post test values were measured at the end of 12th session for both group respectively. The participants were divided in two groups Group A were treated with Low level laser therapy. Group B were treated with Shockwave therapy.

GROUP A:

Group A consist of 15 subjects who received receiving the Low-level laser therapy.

Low level laser therapy:

Fig: 1 Patient received Low level laser therapy

Group B:

Group B consist of 15 subjects who will be receiving the shockwave therapy.

Fig: 2 Patient received Shockwave therapy

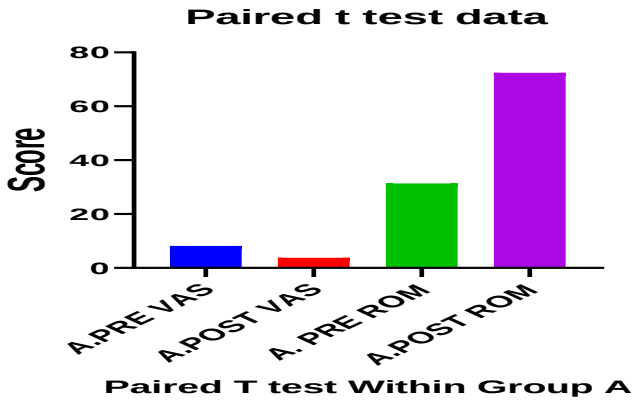
Data Analysis: Descriptive data analysis was used for demographic data. Paired t-test to analysis has to find the difference within Low level laser therapy and shockwave therapy group on osteoarthritis of knee. ANOVA used to find the difference between Low level laser therapy and shockwave therapy group

Descriptive Data Analysis: In this comparative study, 30 osteoarthritis of knee patients were selected randomly and segregated by lottery method for Group A participation. Selected people were taken for this study .the participants in Group A were given Low level laser therapy for 3mins per day,3days a week for 4 weeks and Group B were given shockwave therapy for 3mins per day,3days a week for 4weeks.

Group A	TEST	Mean	Number of Pairs	Mean Diff.	SD, SEM	df	t	P value	Sig. Diff. (P < 0.05)
VAS	Pre Test	8.133	15	4.40	0.9856 0.2545	14	17.29	<0.0001	****
	Post Test	3.733	15						
ROM	Pre Test	31.33	15	41.07	6.319 1.631	14	25.17	<0.0001	****
	Post Test	72.40	15						

Table 1: Paired t test within the Group A on VAS and ROM

The above table 1 shows significant difference in Paired t test within the Group A on VAS and ROM with P value >0.0001



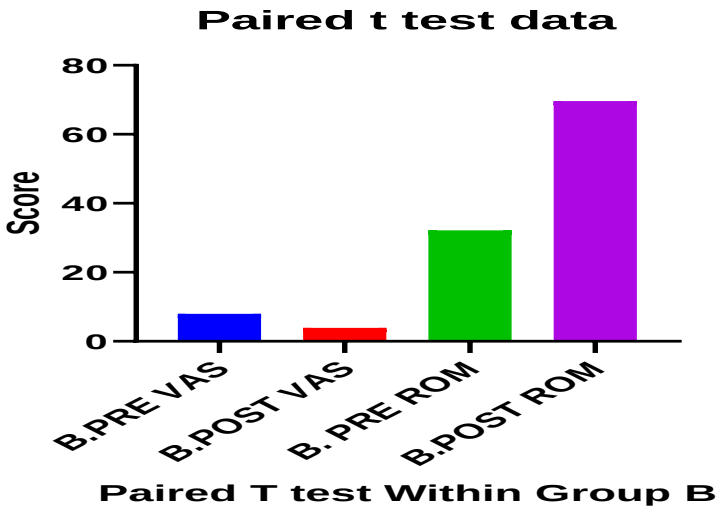
Graph 1: Presentation of VAS and ROM within the Group A

Group B

Table 2: Paired t test within the Group B on VAS and ROM

Group B	TEST	Mean	Number of Pairs	Mean Diff.	SD, SEM	df	t	P value	Sig. Diff. (P < 0.05)
VAS	Pre Test	7.933	15	4.067	1.223 0.3157	14	12.88	<0.0001	****
	Post Test	3.867	15						
ROM	Pre Test	32.13	15	37.47	7.269 1.877	14	19.96	<0.0001	****
	Post Test	69.60	15						

The above table 2 shows significant difference in Paired t test within the Group A on VAS and ROM with P value >0.0001

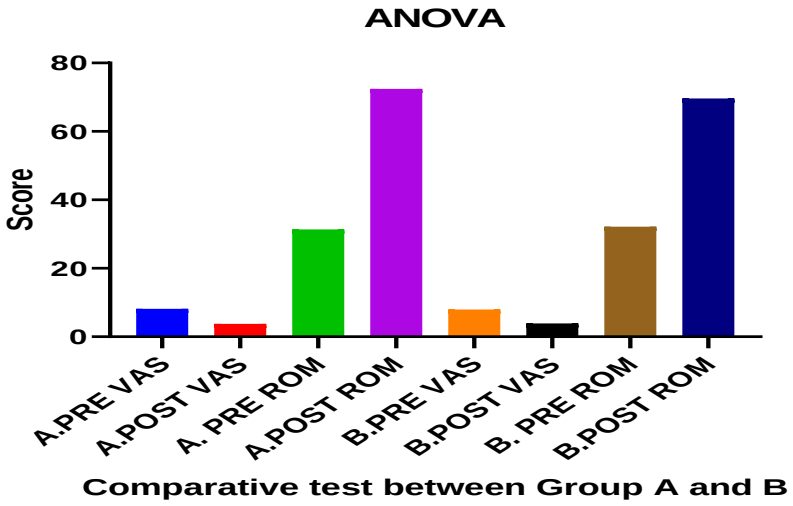


Graph 2: Presentation of VAS and ODI within the Group B

Table 3: ANOVA between Group A and B on VAS and ROM

Out come Measures	Exercise	Test	Mean	Mean Diff.	R Square	F	P value	Sig. diff. (P < 0.05)
VAS	Group A	Pre test	8.133	4.40	0.8840	142.2	<0.0001	****
		Post Test	3.733					
	Group B	Pre test	7.933	4.067				
		Post Test	3.867					
ROM	Group A	Pre test	31.33	41.07	0.9284	242.1	<0.0001	****
		Post Test	72.40					
	Group B	Pre test	31.33	37.47				
		Post Test	72.40					

The above table 3 shows significant difference between Group A and B on VAS and ROM with P value >0.0001.



Graph 3: Presentation of ANOVA between Group A and B on VAS and ROM

RESULT

Total 30 participants with OA Knee included in the study based on specific selection criteria. Participants were both genders with age group between 50 to 60 years.

In Group A, VAS and ROM improved significantly with mean difference of 4.40 and 41.07 respectively with P value>0.0001

In Group B, VAS and ROM improved significantly with mean difference of 4.067 and 37.47 respectively, with P value>0.0001

Comparative study between Group A and Group B showed significant difference in VAS and ROM with F value 142.2 and 242.1respectively with P value>0.0001.

The study concluded that Group Ais more effective than Group B with mean difference of 4.40 and 41.07 respectively in VAS and ROM

DISCUSSION

The study was to assess the pain, muscle strength and function performance of Osteoarthritis of knee among the age of (50 to 60) or above elder age people and record the normative data with the help of VAS, Goniometer (Range of motion).

Osteoarthritis of knee (OA) is defined as a persist for more than 4months or longer than the expected healing period. The main aim of the study is to compare the effect of low-level laser therapy and shockwave therapy on osteoarthritis of knee in elder people. A Total of 30 subjects were selected with criteria and information that collected through the self - made assessment sheet. The 30 subjects were divided into 2groups Group A (Low level laser therapy) Group B (Shockwave therapy). The VAS, Goniometer score is taken to evaluate the severity of pain, muscle strength and functional performance. VAS, Goniometer scores are recorded before the intervention. After 8weeks of intervention the VAS, Goniometer has taken again.

Z Huang el al, J Chen, 2015, concluded that our findings indicate that the best available current evidence does not support the effectiveness of low-level laser therapy as therapy for patient with knee osteoarthritis.

Syed Mansor Rayegani ,2017, concluded that inspite of some positive finding, this meta-analysis data on how lowlevel laser therapy effectiveness is affected with important factors: wavelength energy density, treatment duration, number of sessions the treatment, severity of knee osteoarthritis and site of application.

Martin Bjorn Stausholm et at, 2019, concluded that low level laser therapy reduces pain & disability in knee osteoarthritis at 4-8j with 786-960nm wavelength & at 1-3J with 904nm wavelength per treatment spot.

Me Steujens et al ,2000, concluded, that restricted joint mobility, especially in flexion of the knee extension &external rotational of the hip, appear to be an important determinant of disability in patient with osteoarthritis.

Ethical Clearance: Ethical clearance has obtained from Faculty of Physiotherapy, Dr. MGR. Educational and Research Institute, Chennai, Tamil Nadu, Reference number: No: F-37/PHYSIO/IRB/2021-2022, Dated: 29/01/2022.

Conflict of interest: There was no conflict of interest to conduct this study.

Fund for the study: It was a self-financed study.

CONCLUSION

They prevent study concludes that there was showing improvement in both the groups.Group A(Low level laser therapy)and Group B(Shockwave therapy)on reducing the pain and improve the function ability on osteoarthritis of knee.

On comparing both groups, Group A (Low level laser therapy) and Group B (Shockwave therapy) Group B (shockwave therapy) showed better improvement than Group A (Low level laser therapy) in improvising the functional ability and reducing the pain on the subjects with osteoarthritis. Group A (Low level laser therapy) showed a beneficial improvement in post-test values when compared with posttest values of Group B (Shockwave therapy).

With reference to the statistical analysis done from the data collected using VAS, Goniometer. It is concluded that there is a significant difference in pain, muscle strength and functional performance following Low level laser therapy and shockwave therapy. Low level laser therapy is the best treatment for decreasing pain and increasing muscle strength and functional performance in osteoarthritis of knee LOW level laser therapy is involves the performance of muscle control activities and muscle balance.it is safest treatment for older age people for comfort zone while taking low level laser therapy treatment, while compare with shockwave therapy.

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Citation:
Jibi Paul, Saran Kumar. B V, Jeslin Jeba Sheela, Sony George (2023). Comparative Effect of Low-Level Laser Therapy and Shockwave Therapy on Osteoarthritis of Knee, ijmaes ; 9(3); 1580-1588.