

**A critical appraisal of “A Critical Effect of Laser Therapy on  
Chronic Osteoarthritis of the Knee in Older Subjects”.**

**By**

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**In partial fulfillment of the**

**Requirements for the course:**

**PT 7240 Evidence-Based Practice in Physical Therapy**

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**November 09, 2017**

## **Abstract**

Angelo State University Physical Therapy requires first year students to partake in an Evidence-base Practice Seminar. This course allows SPTs to focus on evidence-base practice and clinical research that will be used in the acute care practicum in the semester. In this evidence-based course, the SPT was asked to construct various clinical questions pertaining to physical therapy and be able to find reliable articles related to those constructed questions. The SPT developed the following clinical question: “What is the efficacy of low-level laser therapy on adults with knee osteoarthritis?”

The article selected from PubMed was “Effect of Laser Therapy on Chronic Osteoarthritis of the Knee in Older Subjects” by E. Youssef, Q, Muaidi, and A. Shanb, which was published in the Journal of Lasers in Medical Sciences. In this article, the authors discuss the effects that low-level laser therapy can provide to older patients with chronic knee osteoarthritis when combined with an exercise program.

This critical appraisal discusses the steps an SPT went through to find the selected article, the strengths and weakness regarding the methods, results, discussion, and overall student discussion. The SPT found that that the article was well-written with sufficient detail and information regarding the benefits of LLLT on KOA patients.

## **Key words**

**Knee, Osteoarthritis (OA), Knee Osteoarthritis (KOA), Low level laser therapy (LLLT)**

## **Introduction**

Osteoarthritis (OA) is defined as a degenerative joint disease that typically affects weight-bearing joints such as the knee. The knee is the joint most commonly affected by OA, with this condition mostly being seen in older patients. Knee osteoarthritis (KOA) is commonly associated with pain, restricted range of motion, and muscle weakness resulting in difficulty performing activities with daily living and impaired quality of life. Currently there are treatments to assist with OA such as pharmacological and non-pharmacological modalities. However, in recent studies, low level laser therapy (LLLT) had been used to control pain and recommended for its anti-inflammatory effects. SPT developed the following clinical question; “What is the efficacy of low-level laser therapy on adults with knee osteoarthritis?”

## **Methods**

To answer the clinical question, the SPT began their search with PubMed by using low-level therapy and KOA as keywords. The results were limited in PubMed by placing a filter that narrowed the search to publications within the last five years, to make sure that the most recent information was obtained. This was able to refine the search, from 60 to 38 results. On the articles found, the researchers had inclusion and exclusion criteria which allowed the researchers the most accurate data without bias or false leads. For example, the target population consisted of older patients that had KOA because their joints begin to deteriorate as they age which affects activities of daily living (ADLs). It is then logical that two of the articles reported studies that targeted patients that were 60+ and one of them targeted individuals 50+. Additionally, two of the studies had patients who had a KOA grade 2-4 on the Kellgren-Lawrence scale which eliminated patients with early onset of KOA. While Rashoud and his colleague had a more

detailed patient recruitment which included average pain intensity of  $\geq 3$  on a 10-cm visual analogue scale (VAS), ability to perform all movements included in the evaluation forms, etc.

Of the articles found, the findings were limited to three articles and then ultimately one article titled “Effect of Laser Therapy on Chronic Osteoarthritis of the Knee in Older Subjects”. This article was constructed by E. Youssef, Q. Muaidi, and A. Shanb and was published in March 27, 2016 in the *Journal of Lasers in Medical Sciences*. This article was selected because each individual was randomly assigned into three different groups by a blinded and independent research assistant and were all managed the same treatment, except for that fact that one group was provided with laser therapy. This article was also chosen because all of the patients came from an outpatient clinic, had to have met certain inclusion and exclusion criteria, and the clinicians used reliable and valid tools like the VAS and the WOMAC. Also, the clinicians and assessors demonstrated competence because there were physical therapists, professors and doctors in a university in Saudi Arabia, where the study was conducted.

## **Results**

### Summary of the study

Youssef discovered through research that an older adult who had KOA would improve more and have more pain relief with LLLT and exercise training program than solely exercise program alone due to the increase in the physiological effects of each other. They found that the active laser groups demonstrated a significant reduction in previously mentioned areas which improve the patient’s ADLs, therefore demonstrating the efficacy of LLLT on adults with KOA's.

### Appraisal of the study introduction

The introduction had its strengths and weaknesses. For example, the introduction gave me the general picture of the study, hit highlights, and tied in everything smoothly. It explained KOA

and what it affected, why the clinicians chose the knee, and why LLLT relevant to a physical therapist. They also explain different treatments, in particular, non-pharmacological treatments such as LLLT. They mentioned the purpose of the experiment, answered everything needed to understand the study and did not need further information.

The article did have some weaknesses that could not be overlooked. After reviewing the 23 citations, some sources were from the early 2000s. However, even though these were not as current as possible, they still dealt primarily with KOA and treatments. However, there were articles from 2010 and forward that dealt primarily with LLLT which makes sense since it's an up-and-coming treatment. All the sources were primary sources except for three that were systems reviews and meta-analysis articles. Lastly, the clinicians did not address all the keywords sufficiently. Laser therapy and OA were addressed frequently within the article and title, but life quality was addressed twice throughout the article and not mentioned in the title. Overall this introduction is clear and well-written with many strengths and minor weaknesses.

#### Appraisal of the study methods

The method also has its strengths and weaknesses. For example, a strength would be that the research was designed as a double-blinded experiment which allowed for non-biased results. Another strength would be that they had a good sample size of 80 patients that were evaluated, leading to a total of 60 patients as 20 did not meet inclusion criteria. However, nine individuals dropped due to personal reasons that had nothing to do with the treatment itself. From those reasons, one could not conclude if the results would have been skewed or not. Another strength of the study is that the patients have similar sociodemographic, clinical, and prognostic characteristics at the start of the study which allows for minimal discrepancy. Another asset for this article was that the authors were very thorough. They explained where they placed the laser,

for how long, and at what power and wavelength the laser was used on. Also, the instruments were described thoroughly and each tool had appropriate evidence supporting the reliability and validity of it. They gave the correct amount of information without using unnecessary jargon, which makes it easier to replicate the experiment.

A blinded and independent research assistant opened sealed envelopes that contained a computer-generated randomization card, which concealed the group assignment to the individual enrolling the patients and to the patients. The article did not clearly state that the clinicians or outcome assessors were blinded. Even though they had three similar groups, the investigators did not manage all the groups in the same way. One group was the control group, one was treated with a laser dose of 3 J/cm<sup>2</sup> over 9 points over a flexed knee and the third group was treated with 6 J/cm<sup>2</sup> over 8 points on an extended knee. Although they were very thorough, they did not cover or explain how to measure life quality. If the other dependent variables (pain reduction, ROM improvement, muscle strength) improved, so would quality of life. Another minor problem, found was that they didn't describe what kind of stretches they used on the targeted muscles; however, they did determine the resistance needed for the strengthening exercises. Overall, the method is clear and well-written with slight room for improvement.

#### Appraisal of the study Results

The result section also has its strengths and weaknesses. For example, the results were presented in the same order as the research questions were asked and the procedures presented. They had headings above each result that corresponded to what they were analyzing and reported all the outcomes measure, presented in the methods, which made it very clear. Also, they clearly stated that the addition of LLLT to an exercise program can decrease pain, decrease stiffness, improve

physical function, knee extension, knee flexion and knee flexion ROM, answering the clinical question.

For the most part, the clinicians' results addressed the research and each hypothesis but the quality of life. They did not perform a standardized test to measure the quality of life of the patients prior or post treatment. Also, not all the figures and tables were presented clearly, accurately nor made sense. For example, Table 1 has a row titled "duration" and it was unclear what that had to do with the demographic data of the patient. It was difficult to pinpoint it to time of treatment, number of times the patient went for treatment, or the amount of times stretching. The addition of units could make this issue clear.

#### Appraisal of the study discussion

The authors further indicated the meaning of their findings. For example, they proved that adding LLLT to exercise training program could be an important modality for treating older persons with OA than exercise training alone. The authors also tied their findings from the study into existing literature. The literature ranged from 1957 to 2014, but was primarily in the early 2000s. Not all the resources were primary sources as couple were systematic reviews and meta-analysis. At first, the older articles were thought to be weak evidence; however, they are scales and classifications that have not changed. The authors also recognized that there are limitations to the current study. For example, the small sample size and the short-term follow up was a limitation. Therefore, having a larger sample size is necessary to provide a much better insight into the effectiveness of LLLT. The studies should be conducted to evaluate the long-term effect of LLLT and different intensities of LLLT on pain relief and functional movement on elderly subjects with OA. Overall, they had a solid discussion with little to no weaknesses.

#### **Discussion**

This article ties back to the clinical question, “What is the efficacy of LLLT on adults with knee osteoarthritis's?” Youssef and his colleagues found that an older adult who has KOA would improve more and have more pain relief with LLLT and exercise training program than solely exercise program alone due to the increase in the physiological effects of each other, decrease pain, decrease stiffness, improve physical function, knee extension, knee flexion and knee flexion ROM. If these clinicians discovered that the addition of LLLT to an exercise program can cause multiple finding, then they should be implemented.

The intervention appraised should be implemented because LLLT is safe, effective, and has solid scientific evidence to back it up. It has been proven that LLLT has pain relieving attributes that have helped improve the patients ADLs when added to an exercise program. Although there have been other studies that have found no evidence, LLLT should still be implemented because there is no long term side effect and seeing some improvement in some patients is better than no patients at all. The only side effects found were recommendations by the North American Association for Laser Therapy that recommended that individuals that have any known primary carcinoma or secondary metastasis, pregnant patients, or elipetic patients should not be exposed to the LLLT. If these are the only potential risk found, then the potential benefits outweigh the potential risks and PTs should implement LLLT. Implementation would increase if there were more consistent findings and if LLLT would be more cost efficient.

If judgement was based solely on this article, there is enough confidence in the research validity to use this intervention with future clients. The clinicians have clearly stated their methods with no confusion, they have listed valid results indicating that LLLT has pain reliving effects, discussed limitations, and have found that exercise program for KOA patients would improve



with the addition of LLLT. With proper training, skills, further studies, and proper usage of time and resources, this intervention should be implanted future patients and clients.

In conclusion, LLLT has beneficial effects and should be looked into further. The clinicians clearly stated that they have found evidence showing the efficacy of the LLLT on KOA for older patients. Overall, the article was well-written with sufficient detail and information regarding the benefits of LLLT on KOA patients.

### **Citations**

Youssef, E. F., Muaidi, Q. I., & Shanb, A. A. (2016). Effect of Laser Therapy on Chronic Osteoarthritis of the Knee in Older Subjects. Retrieved October 07, 2017, from <https://www.ncbi.nlm.nih.gov/pubmed/27330707>