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Research Article

Comparison Between Acupuncture Therapy and Low Level Laser Therapy on Acupuncture Points in Relieving Pain and Improvement on Functional Ability in Patients with Knee Osteoarthritis

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Abstract: The objective of the study was to know the comparison between Acupuncture Therapy and Low Level Laser Therapy on acupuncture points in relieving pain and improvement on functional ability in patients with knee osteoarthritis. This study was an experimental study with pre-test -post test control group design. Sampling was done by consecutive sampling, which is all subjects who came and met the inclusion criteria included in the study until the required number of subjects met. In this study, 34 subjects were successfully analyzed (17 subjects in the group of Acupuncture, and 17 subjects in the group of Low Level Laser Therapy on acupuncture points). Relieving pain were measured by the Visual Analogue Scale (VAS), and functional value as measured by the Western Ontario and McMaster Universities (WOMAC). These assessments were measured before treatment and 8 weeks after treatment. The use of Acupuncture therapy as well as Low Level Laser Therapy on acupuncture points equally reduce pain and improve functional ability of patients with knee osteoarthritis (p=0,000). At the time of comparison, the average Low Level Laser Therapy on acupuncture points and Acupuncture therapy seems no different on pain(1.241 versus 1.547) but on functional Low Level Laser Therapy on acupunture points seems superior than Acupunture therapy (3.235 versus 4.235). But statistically, there was no significant difference in both groups(P> 0.05). Both therapies in this research equally have significant effect in relieving pain and improvement on functional ability in patients with knee osteoarthritis. When compared, on average, Low Level Laser Therapy on acupuncture points is superior in improvement on functional ability in patients with knee osteoarthritis. However, both the rapies are not statistically different.
Keywords: Knee osteoarthritis, Acupuncture, Low Level Laser Therapy on acupuncture points, Visual Analogue Scale, Western Ontario, McMaster Universities

INTRODUCTION

Osteoarthritis (OA) is a systemic disorder and chronic inflammation that characterized by a degradation process at the joint cartilage that associated with pain and disability in elderly [1, 2]. Osteoarthritis is one of many cause of disability in elderly that affects weight bearing joints such as hip, knee, ankle. The most common site of the weight bearing joints affected is the knee joint [1, 3-5]. Osteoarthritis management consists of exercise, physical modalities (hot/cold therapy, ultrasound, acupuncture, taping), orthosis, joint injection and surgery.

Prevalence of OA increases within the aging process. Symptomatic OA is rare, only found in 5% individual below 40 years of age. Prevalence increases approximately 10% in male population and 20 % in female population [2].

In Physical Medicine and Rehabilitation's point of view, OA causes impairment, disabilities and up to handicap, whereas OA inhibits the patient to adjust him/herself to the surroundings regarding his/her impairment and disabilities. Osteoarthritis affects synovial joints, degenerate and also destruct the hyalin cartilage within. Main goals of physical modalities used in OA therapy are to reduce pain, improve functional status of the joint and prevent and or stop the deformity that might occur [6].

Acupunture is a therapy based on Traditional Chinese Medicine (TCM). According to TCM, all forms of pain or disease happened because of the in continuity of the energy called qi. Then the treatment goal is to make the qi in continuum, increase the qi flow by puncturing an acupuncture needle through the skin on a meridian points. Cochrane states that acupuncture therapy has been proven to reduce pain [7-9]. Previous

research showed the effect of acupuncture therapy in knee OA, by using the *gall bladder* 34 (GB 34), *spleen* 5 (SP 5), *stomach* 35 (ST 35), *xi yan* and *large intestine* 11 (LI 11).The acupunture therapy showed improvement on the *Western Ontario and McMaster Universities Osteoarthritis Index* (WOMAC) within 3 months [9].

Low Level Laser Therapy (LLLT) is a therapy, uses red-beam or near-infrared laser with wavelength of 600-1000 nanometer (nm) and intensity of 5-500 Mw [10, 11]. This therapy used as a pain controller in musculoskeletal disease [11, 12]. Hegedus stated that OA patients who received LLLT with the wavelength of 830nm and 50 mW of intensity and dosage of 6 J improve their microcirculation within the site [13]. Rayegani also stated that OA patients who received LLLT also improve their pain degree, joint stiffness and disability [14].

Objectives

To determine the benefit(s) of acupunture therapy and LLLT in acupuncture points on OA patients. Are they able to reduce pain and improve functional status in OA patients ? And of course to be a consideration in choosing the right physical modalities fo OA patients.

MATERIALS AND METHODS

This study was an experimental study with pre-test -post test control group design. Sampling was done by consecutive sampling, which is all subjects who came and met the inclusion criteria included in the study until the required number of subjects met. In this study, 34 subjects were successfully analyzed (17 subjects in the group of Acupuncture, and 17 subjects in the group of Low Level Laser Therapy on acupuncture points). Relieving pain were measured by the Visual Analogue Scale (VAS), and functional value as measured by the Western Ontario and McMaster Universities (WOMAC). These assessments were measured before treatment and 8 weeks after treatment.

RESULTS

Table 1 shows the distribution of the subjects based on gender. Most of the participants are women with the total of 28 subjects (82.4%).

Table 2 shows the distribution of the subjects based on occupation. Most of the participants are retirements with the total of 16 subjects (47.1%) and housewives with the total of 7 subjects (20.6%).

Data of pain intensities (before and after the acupunture program) was tested for its normality by using *Kolmogorov-Smirnov* test and proceed to *Wilcoxon Signed Ranks Test*. *Wilcoxon Signed Ranks Test*s shows significant decrease of pain in acupuncture group.

Table 4 shows the differences of functional status in acupuncture group. The datas were also tested for its normality by using *Kolmogorov-Smirnov* test and proceed to *Wilcoxon Signed Ranks Test*. The results show us that there was a significant decrease of functional status in Acupuncture group.

Table 5 shows the differences of pain intensities in LLLT group. The datas were also tested for its normality by using *Kolmogorov-Smirnov* test and proceed to *T- Test.* There was a significant decrease of pain intensities in LLLT group.

Table 6 shows the differences of functional status in LLLT group. The datas were also tested for its normality by using *Kolmogorov-Smirnov* test and proceed to *Wilcoxon Signed Ranks Test*. The results show us that there was a significant decrease of functional status in LLLT group.

Table 7 shows the differences of therapy effectiveness between Acupuncture and LLLT group in decreasing pain intensities. The datas were also tested for its normality by using *Kolmogorov-Smirnov* test and proceed to *Mann Whitney Test*. The results show us that there was no significant differences of functional status in LLLT group.

Table 8 shows the differences of therapy effectiveness between Acupuncture and LLLT group in towards functional status. The datas were also tested for its normality by using *Kolmogorov-Smirnov* test and proceed to *Mann Whitney Test*. The results show us that there was no significant differences of functional status in LLLT group.

Table 1: Distribution of the subjects based on gender

Gender	Therapy		Total
	Acupunture	LLLT	
Men	4	2	6 (17.6%)
Women	13	15	28 (82.4%)
Total	17	17	34 (100%)

Table 2: Distribution of the subjects based on occupation

Jenis Pekerjaan	Jenis terapi		Total
	Akupuntur	Terapi laser	
Teacher	0	1	1 (2.9%)
Housewife	4	3	7 (20.6%)
Priest	1	0	1 (2.9%)
Retirement	7	9	16 (47.1%)
Goverment employee	1	4	5 (14.7%)
Entepreneur	4	0	4 (11.8%)
Total	17	17	34 (100%)

Table 3: Data of pain intensities

Pain intensities	Mean	Standard Deviation	Median	Z(p)
Before program	7.058	1.106	7.500	-3.622
After program	1.547	0.833	1.700	(p<0.001)

Table 4: The differences of functional status in acupuncture group

Functional status	Mean	Standard Deviation	Median	Z(p)
Before program	74.470	11.141	75.000	-3.622
After program	4.235	1.437	5.000	(p<0.001)

Table 5: The differences of pain intensities in LLLT group

Pain intensities	Mean	Standard Deviation	Median	Z(p)
Before program	6.835	0.824	7.000	27.483
After program	1.241	0.617	1.400	(p<0.001)

Table 6: The differences of functional status in LLLT group

Functional status	Mean	Standard Deviation	Median	Z(p)
Before program	74.471	11.141	75.000	-3.622
After program	4.235	1.437	5.000	(p<0.001)

Table 7: The differences of therapy effectiveness between Acupuncture and LLLT group in decreasing pain intensities

Pain intensities	Mean	Standard Deviation	Median	Z(p)
Acupuncture	1.547	0.833	1.700	108.500
LLLT	1.241	0.617	1.400	(p<0.107)

Table 8: The differences of therapy effectiveness between Acupuncture and LLLT group in towards functional status

Functional status	Mean	Standard Deviation	Median	Z(p)
Acupuncture	4.235	1.437	5.000	85.500
LLLT	3.235	1.147	3.000	(p<0.018)

DISCUSSION

Mean of age of all 34 subjects in this research was 59.11 (59) years old. Most of them are women (28 subjects/82.4%). Sixteen subjects were retirements (47.1%) and 7 subjects were housewives (20.6%). This fact matches with what Alexandros's result in his research that stated, there was a positive correlation between more than 50 years old female gender and obesity. Knee OA was found in 50-59 female group of age and has nothing to do with occupation [3].

Acupuncture has an analgesic effect, called Acupunture Analgesia (AA) [15]. As mentioned before, "De-qi" has to be felt by the patient in order to induce the AA effect. To do so, the acupunture needle need to be moved up and down simultaneously to gain mechanic stimulation for Aβ, Aδ dan C sensory fiber [16]. In acupuncture group, mean of pain intensities was about 7 before the program and became 1.547 after the program. Statistically, it shows that we accept hypothesis H1 and refuse hypothesis H0, which means that acupunture was effective to reduce pain intensities

in knee OA patients. This fact goes along with the results from Itoh's previous research that stated acupunture significantly decreases pain intensities in knee OA patient [5].

Acupuncture was also effective to increase functional status in knee OA patients whereas acupuncture affects the muscle's blood flow. Seventeen subjects improved their functional status from 74.470 to 4.235 after the program. This fact shows goes along with the results from Eric's previous research that stated acupunture significantly increases functional status in knee OA patient [4].

Mechanisms of reducing pain using LLLT were studied and documented in some previous study. They conclude that the increasing of β-endorfin was responsible for that matter. It is a neurotransmitter of pain. Low Level Laser Therapy increases the serotonin metabolism which is a precursor of β-endorfin. In Brosseau's study, they stated that analgesic effect in LLLT was mediated by photochemical action in cellular stage through the increasing of β-endorfin which will modify pain intensities [17].

Low Level Laser Therapy was also proven to be able to increase functional status in OA patients. This fact shows goes along with the results from Alfredo's previous research that stated LLLT significantly increases functional status in knee OA patient [18].

Decrement of pain intensities were showed in both groups, but when they were compared, median value in LLLT group was more effective in reducing pain intensities in knee OA patients, even though final pain intensities in both groups were not so different statistically. Thus acupunture therapy was not a better therapy to decrease pain intensities in knee OA patient, comparing to the LLLT group.

Increment of functional status were showed in both groups, but when they were compared, median value in LLLT group was more effective in increasing functional status in knee OA patients, the differences between both groups were marked statistically. Thus, LLLT is a better mean in increasing functional status in knee OA patients. Palma states in his research that LLLT improves production of collagen and biostimulation occurs after 4 series of LLLT therapy. These effects speed up the healing process up to 40% by strengthening fibrous tissue and synthetizing collagen [19].

CONCLUSION

- Acupuncture therapy was effective in reducing pain and improving functional status in knee OA patients
- Low Level Laser Therapy was also effective in reducing pain and improving functional status in knee OA patients
- Both therapies were not so different in reducing pain intensities in knee OA patients, but marked differently in improving functional status in knee OA patient.

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