



“Effect Of Electro -Acupuncture On Modulating Pain InSubjects With Osteoarthritis Of Knee Joint”

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Abstract:

The possibility of electroacupuncture [EA] to reduce pain in individuals with osteoarthritis [OA] of the knee joint has been investigated. According to research, EA can significantly reduce inflammation and modulate pain pathways to provide analgesia. This paper proposes To assess the pretest and post-test level of knee pain among subjects of both sex of age above 35 years who has osteoarthritis. The effectiveness of electro acupuncture on knee pain among subjects of both the sex of age above 35 years who has osteoarthritis. And at last find out the association between the pre-test level of knee pain among subjects of both the sex of age above 35 years who has osteoarthritis.

Keyterms: *Acupuncture therapy, Knee, cartilage Eлектроacupuncture, Intervention, osteoarthritis proteoglycans*

1. Introduction

As a matter of fact, age is the most prominent risk factor for initiation and progression of osteoarthritis. The common explanation for this is the cumulative effect of mechanical load over the years, resulting clinically in “wear and tear” and pathologically in cartilage breakdown [18]. Aging also has profound effects on cellular processes notably leading to enhanced apoptosis and reduced cellular regeneration[20]. On a molecular level, aging research has revealed intrinsic changes in the structure of extracellular matrix proteins such as collagen or proteoglycans [19]. During the last decade, however, it became clearer that OA is not a purely mechanical problem. Inflammatory and metabolic processes are substantially involved in the pathogenesis and progression of OA. [18]Stiffening of the collagen network or increased glycation provoke a functional impairment of cartilage and joint function [19]. Nonenzymatic collagen cross linking leads abnormalities in bone toughness and stiffness. Bone plasticity is further suppressed by an increase of osteon density, which leads to a lower potency of crack bridging mechanics. [21]. Synovitis is frequently involved in OA, notably in the early phase of the disease [22].

Osteoarthritis is a chronic, degenerative disorder of unknown cause characterized by gradual loss of articular cartilage. It is the most prevalent disease in our society, with a worldwide distribution[1]. The most common type of osteoarthritis is the knee osteoarthritis and it is major cause of pain and disability in older people. [1]. It is characterised by focal loss of articular cartilage, subchondral osteosclerosis, osteophytes formation at the joint margin and remodelling of joint contour with enlargement of affect joints. [1]. The American College of Rheumatology have produced criteria for the diagnosis of osteoarthritis. They were developed for epidemiological purposes and are not recommended for use in routine clinical practice[25].

Although the mechanism of KOA is still unclear, it is known that several mechanical and biological factors including age, obesity, trauma, inflammation, and genetic susceptibility have a great influence on

catabolism and anabolism within chondrocytes, which vastly affects equilibrium of microenvironment of the knee joint. The imbalance of synthesis and degradation of chondrocytes, extracellular matrix [ECM], and subchondral bone eventually results in KOA [32].

The major types of OA are Primary OA: occurs in elderly more commonly in women than men. Due to wear and tear with repeated minor trauma, heredity, obesity, ageing per se.

Secondary OA: may appear at any age and is the result of any previous wear and tear phenomena involving the joint such as previous injury, fracture, inflammation, loose bodies and congenital dislocations. [3] The SIGNS AND SYMPTOMS are as follows

- Joint pain with activity
- Reduced range of movement
- Stiffness
- Joint instability
- Bone spur
- Crepitus

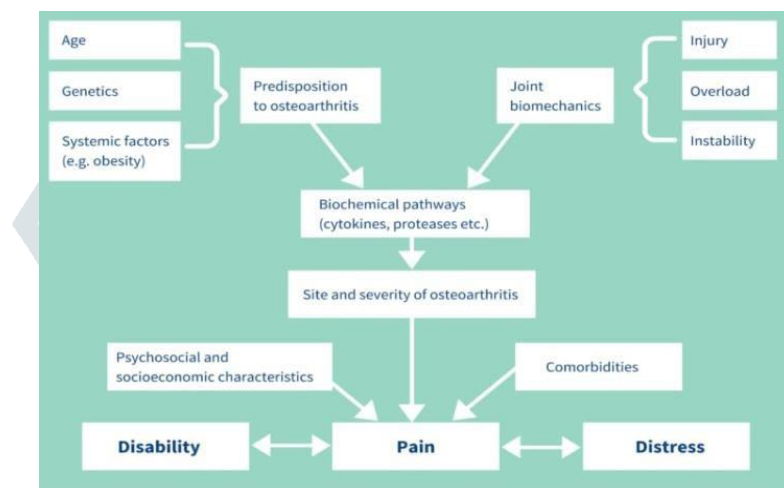


Figure1: Risk factors for the development of OA

There are many risk factors for the development of OA which are as follows.

- Advanced age
- Female sex
- Obesity
- Occupation which involves repetitive loading of particular joints (e.g. shipyard workers)
- Sports activities
- Previous injury to joint
- Muscle weakness
- Proprioceptive deficits
- Genetic factors
- Acromegaly
- Calcium crystal deposition disease

The main symptoms of OA are pain and restriction of joint movement. Patient is usually above 45 years (often over 60 years). Pain is of insidious onset over months or years. Usually one or few joints are affected and weight bearing joints are commonly involved (such as knee and hip). It is variable or intermittent over time ('good days, bad days'). It is worse on movement and weight-bearing, and relieved by rest. Morning stiffness is less (<15 minutes) compare to rheumatoid arthritis (>1 hour). Examination of the involved joint shows restricted movement (due to capsular thickening and blocking by osteophyte), coarse crepitus on movement (due to rough articular surfaces), bony swelling (osteophyte) around joint margins, joint deformity, and joint-line tenderness. Muscle wasting is present around the involved joint.

Generalized OA involves multiple joints. It initially starts at interphalangeal joints (IPJs) of fingers affecting distal interphalangeal joints (DIP) more than proximal interphalangeal joints (PIP). Affected joints develop posterolateral swellings on each side of the extensor tendon which enlarge and harden to become Heberden's (DIP) and Bouchard's (PIP) nodes.

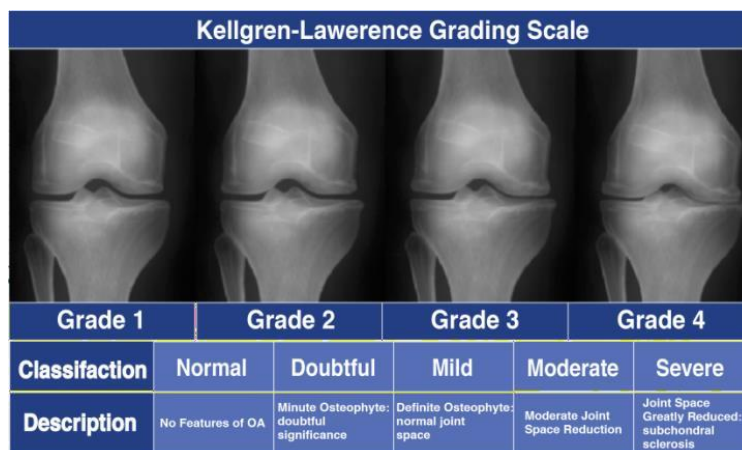


Figure2: Classification of Kellgren- Lawrence Grading scale

2. Review Of Literature

Knee osteoarthritis [KOA] is the most prevalent progressive osteoarthritis disease with persistent knee pain in the clinic. Its clinical manifestations include persistent paroxysmal pain of the knee joint, proprioceptive disorders, morning stiffness, joint swelling, feeling of bone friction, and limited movement. According to incomplete statistics, in foreign countries, KOA is experienced by 10% of the population. The proportion of female patients is higher than that of male patients, with the prevalence increasing with age [2]. KOA is a heterogeneous disease with various etiologies, pathophysiological pathways, clinical manifestations, and prognoses, causing clinical decompensation, serious disability, and psychological problems in most patients and bringing a great inconvenience to their lives and work. Osteoarthritis is a chronic, degenerative disorder of unknown cause characterized by gradual loss of articular cartilage. It is the most prevalent disease in our society, with a worldwide distribution. [1] Osteoarthritis is a degenerative joint disease that involves the degradation of joints, articular cartilage and subchondral bone as a result of mechanical stress on the area. The word Osteoarthritis is derived from Greek word "Osteo" which means of the bone "arthro" which means "joint, inflammation". [5], It has been estimated that 45% of all people develop knee OA at some point during life. Although some are asymptomatic, the lifetime risk of having a total knee replacement for OA in someone aged 50 is about 11% for women and 8% for men in the UK. [1] There are major differences in susceptibility: the prevalence of knee OA is higher in Africa, China, Japan and South Asia than in European countries. [1] In England and Wales, between 1.3 and 1.75 million people have symptomatic osteoarthritis. [25] Data from arthritis research campaign show that up to 550,000 people in the UK have the severe knee osteoarthritis and 2 million people visited their general practitioner in the past year because of osteoarthritis. [25] As a cause of disability in the elderly in the west, osteoarthritis is second only to cardiovascular diseases. [25] 10-15% of adults over 60 years have some degree of osteoarthritis, with an ageing population it is becoming an increasingly important disease. [25]

- About 15% of people in India suffer from arthritis.
- Prevalence of osteoarthritis accounts for 22%-39%.
- In female -31.6%
- In male-28.1%. [5]

3. Materials And Methods

The subjects participating in the study are the patients who consulted GNCYMC & H OPD for the improvement of their condition. The subjects who are eligible were asked to be a part of the study and contact the investigator for screening. Those identified through the screening process as potentially eligible subjects are scheduled to meet the study coordinator for consenting process and to undergo a baseline medical assessment including a complete medical history and physical examination by the study consultant. The study consultant confers the diagnosis of Osteoarthritis of knee and excludes from the study those individuals with other medical problems that could put the patient at risk.

3.1 Diagnosis of Osteoarthritis

- There is no single test for osteoarthritis. Diagnosing the condition may include the following:
 - Providing to a doctor a medical history that includes your symptoms, any other medical problems you and your close family members have, and any medications you are taking.
 - Having a physical exam to check your general health, reflexes, and problem joints.

- Having images taken of your joint using:
 - X-rays, which can show loss of joint space, bone damage, bone remodeling, and bone spurs. Early joint damage does not usually appear on x-rays.
 - Magnetic resonance imaging (MRI), which can show damage to soft tissues in and around the joint. Generally, MRI helps health care providers evaluate a joint that is locking or giving out.
- Having blood tests to rule out other causes for symptoms.
- Taking joint fluid samples to look for other causes of joint pain, such as infection or gout.

3.2 Investigations

The investigation taken place are as following for the Effect Of Electro -Acupuncture are as follows

- Blood counts, ESR and CRP are normal.
- Plain X-ray: This shows reduced joint space, marginal osteophytes and joint deformities.
- Synovial fluid analysis: Predominantly viscous with low turbidity; calcium pyrophosphate crystals maybe seen.

3.3 Differential Diagnosis:

The differential diagnosis are as follows

- Rheumatoid arthritis
- Gouty arthritis
- Tendinopathy,
- Bursitis,
- Synovial plica syndrome,
- Idiopathic anterior knee pain syndrome,
- Osseous malignancy
- Referred pain

3.4 Method Of Collection Of Data

3.4.1 Visual analog scale for pain

Visual analog scale is a tool ideal to help a person rate the intensity of certain sensations and feelings, such as pain is shown in Figure 3. The Visual analog scale for pain is a straight line with one end meaning no pain and other end meaning the worst pain imaginable. The pain marks a point on the line that matches the amount of the pain he or she feels 0 indicates no pain and 10 indicating the worst possible pain is as shown in Table 1. Measuring from the left end to the marked point the pain can be quantified.



Figure 3: Visual analog scale for pain

Table 1: Level of Pain

SCORE	LEVEL OF PAIN
0	No pain
1-3	Mild pain
4-6	Moderate pain
7-9	Severe pain
10	Worst pain

The Assessment During Study Period After recruiting, data of the subjects will be recorded pre and post interventions (for 10 days) by objective measures.

Selection Criteria:

In this Inclusion criteria are

- Above 20 below 70 years
- Osteoarthritis of knee
- Both male and female patients

The Exclusion criteria are

- Age above 70 years
- Recent surgery

- Cancer
- Contagious skin disease
- Congenital anomalies
- Auto immune diseases
- Quadriplegia
- Paraplegia
- Sexually transmitted diseases
- Stent implantation
- Cardiac disorders

Study Plan

10 patients who are attending GNCYMC&H, Mysore OPD with diagnosis of Hemiparesis satisfying the selection criteria will be recruited for the study after they have been given informed consent to participate in the study. N=10 10 days Intervention Pre assessment Post assessment Treatment group: Electroacupuncture Intervention.

Intervention: Group (N=10) will receive electro acupuncture for the duration of 20 minutes for 10 days along with the conventional medicine (if any) which will be tapered according to the condition of the subject. Comparison of Pre-intervention and Post-intervention values of visual pain analogue scale, Fugl-Meyer assessment scale and Barthel index are made which determines the efficacy of electroacupuncture in the treatment of hemiparesis.

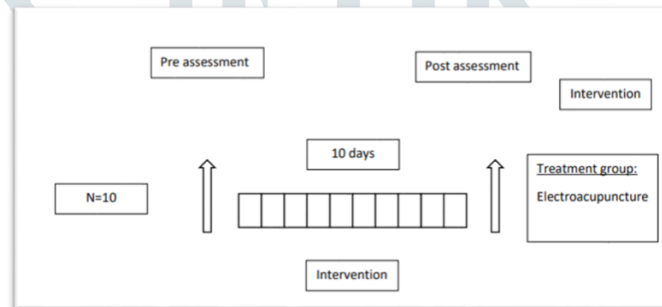


Figure 4: Electroacupuncture Intervention

Procedure of intervention:

The patient is asked to sit comfortably. The needles are pricked at specific points (LI-15, LI 14, SI-9, TW-14, GV-20, GB-20, LI-10, LI-11, TW-5, LI-4, ST-36, GB-31, GB-34, GB-33).

Electrical stimulation is given to those points except GV-20, GB-20, TW-5. The treatment is given for 20 minutes daily in the morning or evening.

4. Observations, Results & Discussions

In the present study, 10 participants were registered who underwent the intervention for 10 days.

Among these 10 subjects, Gender wise distribution:

- Male subjects-2
 - Female subjects-8
- Age wise distribution:
- 35-50 years-7
 - 50-60 years-3
 - 60-70 years-0

All the subjects were informed about the present study and the written consent was obtained for the same prior to the intervention.

The Graphical representation of data of individual subjects are as follows

Visual pain analog scale	WOMAC

Figure 5: Graphical representation of Individual subjects 1 to 10

The results are statistically and clinically significant in treating osteoarthritis of knee joint with Electroacupuncture. As mentioned in the above review of literature, several researches have proven that is of great value in relieving pain, swelling and improving the range of motion of osteoarthritis of knee joint. The same has been observed in this study both statistically and clinically. The subjects showed good responses like improvement in Visual pain analog scale (VAS) and WOMAC score after 10 days of intervention. Thus, proving to be effective in conditions of osteoarthritis of knee joint.

Visualpainanalogscaleof 10subjectsDay-1preintervention

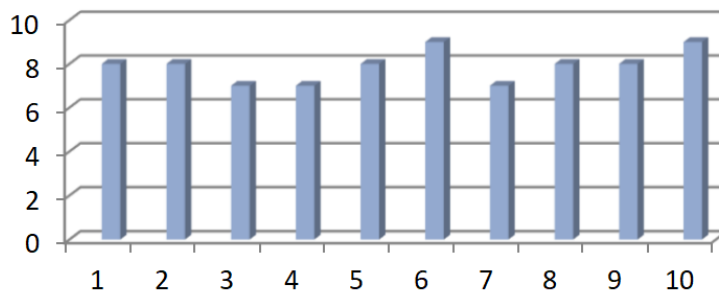


Figure 6: Visualpainanalogscaleof 10subjectsDay-1preintervention

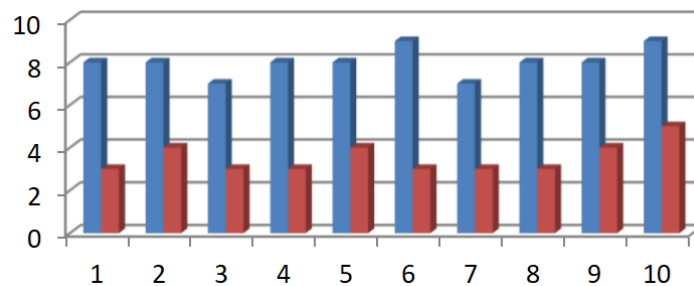


Figure 7: VisualpainanalogscaleSubject 1-10

WOMACscore of10subjectsDay-1pre intervention

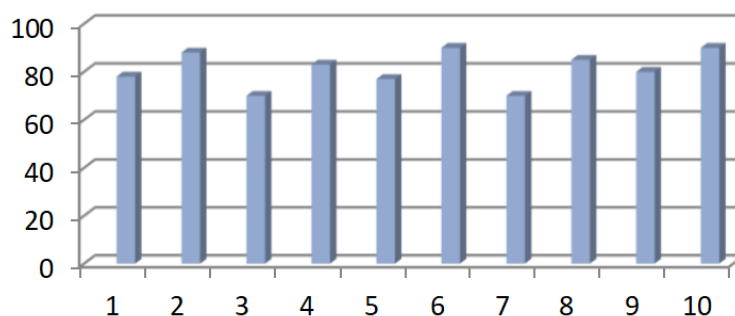


Figure 8: WOMACscoreof 10subjectsDay-1preintervention

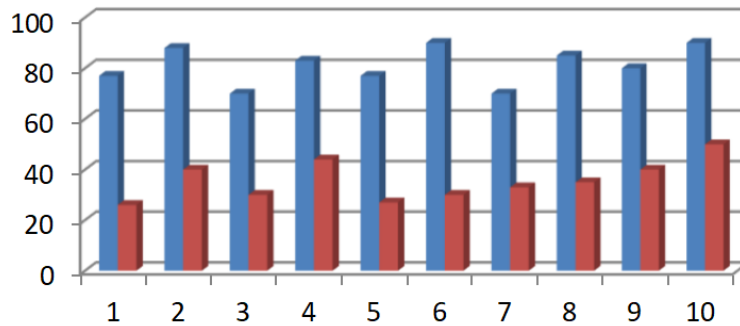


Figure 9: WOMACscore10subjectsDay-10postintervention

Electroacupuncture is one of the most sought treatment of naturopathy in cases of osteoarthritis of knee joint. In this study we have used Electro acupuncture for improving range of motion, reduced pain and swelling in subjects with osteoarthritis of knee joint and it has given effective results.

Electroacupuncture was administered to 10 patients of either gender diagnosed with osteoarthritis of knee joint is as shown in Figure 6 to Figure 9. The duration of the treatment was 10 days, by the end of 10th day improvement in the range of motion, alleviating pain and stiffness in osteoarthritic patients and it has given effective results. Naturopathy modalities have proven to be an effective mode of treating chronic disorders. Naturopathy being a drugless system, emphasizes on the self-healing capacity of the individual.

It promotes homeostatic mechanisms in the body of individuals. The treatment modalities such as hydrotherapy, acupuncture, massage therapy, physiotherapy, fasting therapy and diet, etc., emphasizes on healing the patient condition without causing the adverse effect.

5. Conclusion

Naturopathy modalities have proven to be an effective mode of treating chronic disorders. Naturopathy being a drugless system, emphasizes on the self-healing capacity of the individual. It promotes homeostatic mechanisms in the body of individuals. The treatment modalities such as hydrotherapy, acupuncture, massage therapy, physiotherapy, fasting therapy and diet, etc., emphasizes on healing the patient condition without causing the adverse effect.

In our study, we have used Electroacupuncture treatment modality, is of great value in improving the range of motion, alleviating pain and swelling in osteoarthritic patients of knee joint. The same has been observed in this study both statistically and clinically. The subjects showed good responses like improvement in Visual pain analog scale (VAS) and WOMAC score after 10 days of intervention. Thus, proving to be effective in conditions of osteoarthritis of knee joint.

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