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Comparison between Effect of Massage and Mud Pack Therapy on Knee Osteoarthritis

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Abstract
Overview: Osteoarthritis (OA) is the most common form of joint disease and knee is one of the most commonly affected joint. The less popular form of treatment, mudpack is not much used in treatment of OA Knee.
Materials and Method: Thirty participants with OA knee were included in the study and were divided into two groups. Group A was given massage for 15 minutes to the knee joint, 5 days/week for 3 weeks, manual traction in high sitting position for 30 seconds and 10 seconds rest period. Repeated 4 times, for 2 minutes of traction mobilization. Group B was treated with mudpack therapy applied to affected knee joint for 15 minutes over knee joint and manual traction as explained above. NPRS scale was used to measure the intensity of pain.
Results: Individual treatment was effective and on comparison between two groups there was no significant difference in treatment.

Keywords: Mudpack, Massage, Manual traction, Osteoarthritis

1. Introduction

Osteoarthritis (OA) happens to be a common arthritic joint disorder and it is not confined to humans but occurs in most mammalians species. Historically, OA is an ancient disorder. Egyptian mummies or pre historic fossils clearly demonstrated that OA is as old as mammalian species. This arthritic disorder is also known as degenerative arthritis, degenerative joint disease, osteoarthrosis, and arthritis deformans and wears & tears arthritis. It is a degenerative disease of synovial joints characterized by chondropathy (cartilage loss) and simultaneously proliferation of new bone with remodeling of joint contour [1]. The word „osteoarthritis originated from the Greek word "osteo" meaning "of the bone", "arthro" meaning "joint", and "itis" means inflammation, although the "itis" of osteoarthritis is somewhat of a misnomer – inflammation is not a bodacious feature which is present in rheumatoid or autoimmune types of arthritis. Some clinicians refer to this condition as osteoarthrosis to signify the lack of inflammatory response [2]. OA is a non-inflammatory progressive disorder of movable joints, particularly weight bearing joints. OA is defined as a heterogeneous group of conditions leading to joint signs and symptoms associated with defective integrity of articular cartilage. The disease causes limitations in everyday activities, such as getting in and out of bed, dressing and climbing stairs [3].

Mainly OA is grouped into primary OA Knee and secondary OA Knee. Primary OA Knee mostly occurs in the younger age group due to any joint pathology, trauma, additional load into joint frequently, repetitive injury, bleeding from joint and any congenital disease and secondary OA knee occurs in older age group mainly it affects weight bearing joint, it follows a wear and tear phenomena [2].

Pathology: OA involves all the structures around a joint such as articular cartilage, bone, ligaments and muscles.

Articular cartilage: softening, flattening, splitting, fibrillation, fragmentation and breaking of flake of cartilage are the progressive changes in articular cartilage. All these changes occur in weight bearing as well as nonweight bearing areas of joint.

Bone: bony changes include eburnation, i.e. hardening and polishing of bone surface, cystic cavities, micro fractures and accretion of osteophytes at the margin of articular surfaces.

Synovial membrane: hypertrophy, edema, and fibrous degeneration resulting in reduction of synovial fluid secretions that reduces lubrication of articular cartilage.

Capsule: it undergoes fibrous degeneration and there is a low-grade inflammatory change.

Ligaments: ligaments may become contracted or elongated and undergoes fibrous degeneration

Muscles: it may undergo atrophy, which may be related to disuse [4, 5]. Clinical features of OA are pain, stiffness, tenderness, swelling, crepitus, and loss of movement, valgus or varus deformity and locking of the knee. On auscultation scratching, crepitus and later on loud crackling sound is heard from joint. The characteristics of pain are dull and aching type. In the initial stages of the disease the pain is present only on movement or activity. Later on the patient may experience rest pain. Tenderness may be localized; it could be due to inflammation of synovial membrane. Stiffness is present initially after rest but with progression of the disease it may be more persistent. Significant morning stiffness is unusual being a feature of inflammatory disease. Swelling is firm due to synovial, capsule and bone thickening. There may be minimal loss of movement but gradually as the disease progresses the joint may become completely immobile. Crepitus is indicative of roughness of the opposing articular surfaces which is felt on movement like grating and grinding

noise. Deformity like genu varum and genu valgum may be present in the late stages of OA knee. There may be locking of the knee joint in advanced cases of OA. [4, 6, 5].

Investigations for diagnosing OA knee include knee radiographs, Computed Tomography (CT scan), Magnetic Resonance Imaging (MRI), arthroscopy, synovial fluid analysis. Knee radiograph reveals uneven narrowing of joint spaces mainly present in medial compartment, subchondral sclerosis, dense bone under the articular surfaces, and osteophytes at the margins of bone, loose bodies, deformities and subluxation [3, 7]. Radiographs can be read with the mnemonic ABCDE where A is for alignment, B is for bone density, C is for cartilage space, D is for deformity and E is for erosion [3]. Classification criteria listed by the American College of Rheumatology (ACR) are 1. Age >50 years, 2. Morning stiffness lasting <30 minutes, 3. Crepitus with active motion, 4.Crepitus with active motion, 5.Bony tenderness, 6.Bony enlargement, 7. No warmth on touch [8, 9, 10].

OA knee can be treated with pharmacologic, non-pharmacologic therapies and surgical management. A range of oral analgesics, topical treatments, and intra-articular injections can be used to condense pain and improve function in patients with osteoarthritis of the knee [11]. According to American College of Rheumatology 2012 the recommendations are; pharmacologic therapy includes: 1. Oral- acetaminophen, cyclooxygenase (COX-2)-specific inhibitor, Nonselective Nonsteroidal Anti-Inflammatory Drugs (NSAIDS) with addition of a proton pump inhibitor, nutritional supplements and other analgesics- tramadol or other Opioids. 2. Intraarticular: glucocorticoids 3. Topical: capsaicin, trolamine salicylate, NSAIDS. Non pharmacologic therapy consists of patient education, self-psychosocial interventions, weight loss, aerobic exercise or resistance land based exercise program, aquatic exercise, thermal agents and manual therapy in combination with supervised exercise, walking aids, patellar tapping, tai chi, lateral/ medial wedged insoles, rest, occupational therapy, acupuncture, assistive devices for activities of daily living. Water-based and land-based exercises such as walking, quadriceps strengthening, and resistance exercises also reduces pain and disability. Surgical management for OA knee includes arthrodesis (artificial induction of joint ossification between two bones via surgery), arthroplasty (articular surface of joint is replaced, remodeled or realigned by osteotomy or some other procedure), high tibial osteotomy (a wedge of bone is removed from outside of tibia, under healthy side of knee, when surgeon closes the wedge the knee straightens), unicompartmental knee replacement (in one of knee compartments in which damaged parts of knee are replaced), patellofemoral replacement (replacing just the undersurface of the kneecap and its groove{trochlea}) and total knee arthroplasty (knee joint are replaced with artificial parts{prosthesis}) [12, 13, 14].

Mud pack therapy, massage and manual traction can also use for the treatment of knee osteoarthritis. The use of manual knee traction or distraction of tibia-femoral joint is improving the overall functional outcome in OA Knee [15]. Effects of Intermittent traction includes increase vascular and lymphatic flow (suction aspiration effect) which tends to reduce stasis, edema and coagulates in chronic congestions. Proprioceptive reflexes are stimulated by traction and helps to tone muscles, which tends to reduce fatigue and restore elasticity and resiliency [16].

Mud Pack therapy includes Thermal mud at 45°C was applied to affected knee joint for 30 minutes (min). [17]Benefits of Mud therapy are: It relaxes muscles and improves blood circulation. It is useful in conditions of inflammation/ swelling and relieves pain and also useful in condition of stiff joints [18]. Mud therapy has been successfully used for treating the patients with neurological, rheumatologic and cardiovascular disorders, gynecological conditions and skin pathology [19]. Massage is generally used to relieve pain from musculoskeletal disorders cancer, and other conditions, rehabilitate sports injuries, reduce stress, increase relaxation and decrease feelings of anxiety and depression [20].

2. Materials and methodology

2.1 Materials

Data was collected from 30 participants with (Grade 1 &2) with age group of (50-70 years) knee osteoarthritis from OPD of Dr. A.P.J. Abdul Kalam, College of Physiotherapy, Loni, Collected by Principal Investigator. This Prospective and Comparative was based on Random Sampling for 4 Months with intervention of 3 weeks. Individuals with Any recent trauma to knee, any recent lower limb fracture, Hospitalization for any life threatening disease were excluded from the study.

2.2 Methodology

The study received ethical approval from Institutional committee. The participants were screened as per the inclusion and exclusion criteria and eligible participants were selected. Participant's demographic details were obtained and an informed written consent was taken from them. Selected participants were briefed about the study and duration of intervention. Intensity of pain on the affected side was measured before and after intervention in terms of Numerical pain rating scale (NPRS).A total of 30 subjects with clinically diagnosed OA Knee were selected and were divided into 2 groups. Initially patients were asked to get relax in supine position and the area to be treated was wiped with a wet cloth, gel was applied and massage was given for 15 minutes to anterior aspect of knee joint along with quadriceps. Massage therapy included petrissage (compression or manipulation of soft tissue between the fingers and thumb), effleurage (gliding of hands over the skin or soft tissues), and tapotement (percussion-based massage where hands strike soft tissue in a repetitive, rhythmic fashion) and after that the area was cleaned with cotton.

Then manual traction was given, for that participant was seated on the edge of the couch with towel supporting the underside of the distal thigh. The therapist stands at the participant's side facing the patient's feet so as to direct his forearms in the line of force. Leaning forward with the trunk produces a long axis distraction. It is performed with the knee joint at ninety degree of flexion. This technique was used as general mobilization to increase tibio-femoral joint play for pain control. To sustain the effect of distraction an alternate method of sling is wounded around ankle with stirrup attachment for placement of therapist foot to apply distraction. This allows the therapist to palpate the joint space as the distraction is applied. The traction was applied continuously for 30 seconds followed by a 10 second rest period. The sequence was repeated 4 times, for a total of 2

minutes of traction mobilization per session. Each participant received four sessions in a week and overall of 12 sessions of manual distraction for a 3 week period. Group B was treated with mud pack therapy which included black soil mixed with hot water that makes Thermal mud pack at 45°C which was applied to the affected knee joint for 15 minutes with a thick layer of 1 inch. Then area was cleaned with wet cloth and after that manual traction was given as explained above.

3. Result and Discussion

3.1: Result

Table 1: Shows NPRS values of pre and post intervention on group A

Group A	Mean+-SD	T Value	P Value
Pre	5.714+-1.729	3.741	0.0025
Post	4.642+-1.646		

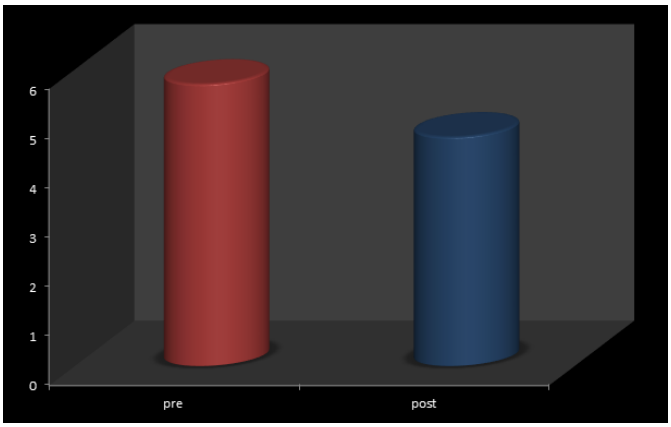

Fig 1: NPRS values of pre and post intervention on group A

3.2 Result

shows that on comparison of pre and post intervention of massage therapy on knee osteoarthritis in group A using NPRS scale using paired t test in which t value 3.741 and p value is 0.0025; it indicated very significant.

Table 2: NPRS values of pre and post intervention in group B

Group B	Mean+-SD	T Value	P Value
Pre	6.214+-2.045	5.213	0.0002 extremely significant
post	3.857+-1.351		

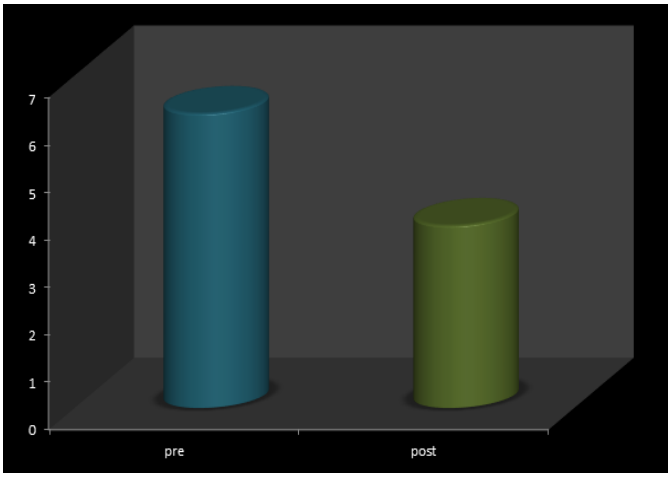

Fig 2: NPRS values of pre and post intervention in group B

3.3 Result

Shows that on comparison of pre and post intervention of mud pack therapy on Knee osteoarthritis in group B using NPRS scale using paired t test in which t value 5.213 and p value is 0.0002; it indicated extremly significant.

Table 3: Comparison of post intervention NPRS values of group A and group B

Group	Mean +-SD	T value	P value
Post group A	4.642 +-1.646	1.381	0.1791
Post group B	3.857+-1.351		

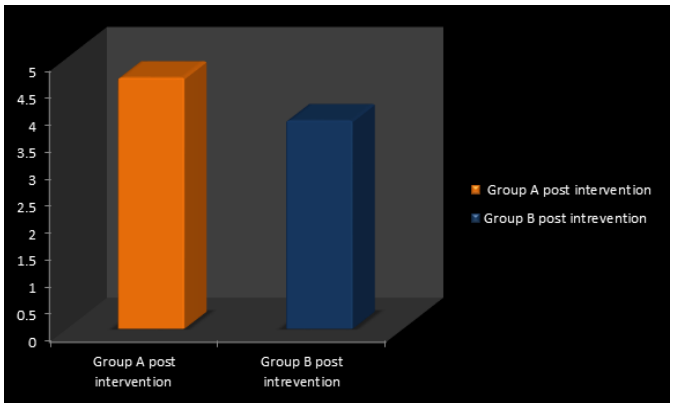

Fig 3: Comparison of post intervention NPRS values of Group A and Group B

3.4 Result

shows that on comparison of post intervention of massage and mud pack therapy on Knee osteoarthritis in group A and group B using NPRS scale using unpaired t test in which t value 1.381and p value is 0.1791; it considered not significant.

4. Discussion

The present study conducted on "Comparison between effect of massage and mud pack therapy on knee osteoarthritis" was conducted from Dr. APJ Abdul Kalam College of Physiotherapy, Loni. Total 30 participants with OA Knee with age group between 50- 70 were included in this project. Kellgren Lawrence grading scale for OA Knee was used with grade 1&2 osteoarthritis on radiographic changes. NPRS scale was used to measure the intensity of pain before and after 3 week treatment session. The Mean score on NPRS scale before intervention in group A was 5.714+-1.729 and after intervention was 4.642+-1.646 which considered very significant. The Mean score in group B pre intervention was 6.214+-2.045 and post intervention was 3.857+-1.351 which considered extremely significant. Mean score of group A and group B after post intervention was 4.642+-1.646 for group A and 3.857+-1.351 for group B which considered not significant.

Two methods were used which included massage and mud pack therapy along with manual traction after treating patients with this two methods results were compared in both groups. The result of the study was found not significant which indicated that massage and mud pack therapy was equally effective.

Manual traction was effective due to mechanics involved in long axis traction is designed to distract the knee and assist in

pulling the shortened soft tissues (ligament, capsule). The mechanism says that there is temporarily decrease joint compression, allow sufficient fluid mechanics. However, this procedure requires intact ligamentous and capsular structures in order to operate successfully. Some studies say that improvement in functional outcome after application of Mechanical Traction may be because of relief of abnormal pressure on nociceptive receptor systems. Effects of Intermittent Traction included increased vascular and lymphatic flow (suction aspiration effect) which tends to reduce stasis, oedema and coagulates in chronic congestions. Traction stimulates proprioceptive reflexes and helps to tone muscles, which tend to reduce fatigue and restore elasticity and resiliency. Radiographs showed increased joint space width and decreased subchondral sclerosis. Joint distraction showed significantly better results than debridement [16]. Antony Leo Aseer P [15] *et al.* conducted study on effectiveness of manual traction of tibio-femoral joint on the functional outcome in OA Knee results of this study showed there was a significant decrement of pain severity, minimal differences in improvement of knee flexion range and improvement noted in overall functional outcome following six sessions of manual knee traction.

Massage therapy was effective because it works through a variety of mechanisms. Blood circulation is increased to the muscles promoting gas exchange and delivery of nutrients and removal of waste products has been thought to be one of the outcomes and benefits of massage, and recent studies support this effect. Probably this may be mediated through the activation of mechanoreceptors in the deep tissues innervated by alpha beta fibers, subsequently central effects of nervous system (CNS) on the pituitary gland and limbic system and/or other mechanisms. The need for moderate pressure to achieve the effects of massage therapy may support this mechanism, deserves further investigation. Other potential outcomes and mechanisms of massage therapy's effectiveness include decreasing the muscle strain, balancing muscle tension across the joint, positive mechanical changes in muscles, increased joint flexibility and proprioception, increased lymphatic circulation, immunologic and inflammatory changes, improved sleep, and blocking pain signals [20]. Adam I. Perlman, *et al.* conducted study on Massage Therapy for Osteoarthritis of the Knee results of this study showed that Massage therapy seems to be efficacious in the treatment of OA of the knee.

Mud pack therapy was more effective because of their chemical and thermal effects. It has been reported that substances in aqueous mud extracts can permeate across human full thickness skin in quantities that have definite effects on spontaneous contractile activity of smooth muscle tissue. This finding implies the contribution of chemical properties of the mud on beneficial effects of mudpack treatment. However, which elements are essential and their ideal concentration in order to obtain an optimal response to treatment. Extensibility of collagen-rich tissues increases with thermal stimulation. Due to increase in the extensibility of collagen-rich tissues pain diminishes, and muscle spasm relieves. The analgesic effect of heat is due to increased □-endorphin concentration [17]. Ersin Odab Saşı, *et al.* conducted study on effect of mudpack therapy on knee osteoarthritis. Results of this study demonstrate that mudpack application is an effective treatment modality in knee OA. The supports the use of mudpack therapy in rehabilitating knee joint arthritis. [17]. Chadzopulu A. *et al.* conducted study on The therapeutic effects of mud results of this study demonstrated that Mud therapy can be successfully used in the treatment of musculoskeletal disorders, gynecological conditions (inflammatory and menstrual cycle disorders) as well as neurological, cardiovascular and skin pathology (eczema, acne, psoriasis) [19].

Black mud was effective because, Dark cotton soil having some greasiness is suitable for mud therapy as it is rich in minerals and also retains water for long time. It should always be free from contamination and any kind of pollution. Saraswathi. K.N, asst prof, Jsscon; mud therapy [18].

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