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COMPARATIVE EFFECT OF DEXTROSE PROLOTHERAPY AND PLATELET RICH PLASMA THERAPY IN PRIMARY OSTEOARTHRITIS KNEE

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ABSTRACT

Introduction: Primary Osteoarthritis knee most common degenerative condition in old age group. Osteoarthritis knee produce greater impact on physical activity and quality of life.

Objective & Aim: Evaluate and Compare the effect of Dextrose prolotherapy and Platelet rich plasma therapy on Functional & Clinical outcome.

Methodology: Open label comparative study was performed, were Age and sex matched, subjects with primary OA knee were enrolled in this study. Assessment & outcome of Pain and physical performance by VAS & LKI score.

Results: A total of 72 subjects were enrolled. Mean age in Dextrose and PRP Groups were 49.94±8.28, 50.17±8.57 respectively. There was a significant improvement over time in VAS & LKI score in both groups at the end of study period.

Conclusion: Result of present study suggested PRP therapy is more effective in reduction in Pain & improvement in physical activity as compared to dextrose prolotharapy.

Introduction: -

Osteoarthritis knee is a heterogeneous group of conditions that lead to joint sign and symptoms which are associated with defective integrity of cartilage in addition to related changes in underlying bone and at joint margins. It is most common degenerative musculoskeletal disorder in old age patients.[1] Pathologically, it is characterized by gradual degeneration of articular cartilage. The early changes in cartilage degradation include increased hydration along with the progressive breakdown of collagen fibrillar network, especially due to denaturation of type 2 collagen. Later on, there is an area of both replication and death of chondrocytes disruption to the cartilage surface with the formation of fibrillated area and clefts.[2] Osteoarthritis represents most widespread cause of physical morbidity and impaired quality of life throughout world. In Asia, prevalence rate of osteoarthritis knee were found to be high in elderly people, especially women. In India, the prevalence of osteoarthritis range from 22 to 39%. About 13% of women and 10% men aged 50 years and older have symptomatic knee osteoarthritis.[3] Osteoarthritis of knee can be widely categorized as primary and secondary. Primary osteoarthritis being commoner of two is due to wear and tear of knee. The exact aetiology of osteoarthritis is unknown, but there are several risk factors like systemic factors which include age, ethnicity, genetic predisposition, gender, overweight and malalignment ; Intrinsic factors like joint disorder, congenital factors, previous trauma, muscle weakness, laxity and surgery;. Extrinsic factors include overweight, strenuous and sports activity.[4] Management of osteoarthritis is multimodal approach like pharmacological, non pharmacological & surgical interventions. Pharmacological interventions include oral drugs (Nonsteroidal anti-inflammatory drugs, opioids analgesics, chondritin sulphate), Intraarticular injections (corticosteroids, prolotherapy & hyaluronic acid). Non pharmacological interventions include education, weight loss, exercise therapy, physical modalities (hot, cold & laser therapy), orthosis and shoes modifications. Surgical interventions include debridement, arthroscopic loose body removal, osteotomy and total knee arthoplasty.[5]

Agency for Healthcare Research and Quality has called for the development of new therapies to prevent and treat knee osteoarthritis.[6] Contemporary injection techniques were formalized in the 1950s, in which the more commonly used term is prolotherapy (from proliferative therapy),. The mechanism of action is unclear. Contemporary hypotheses suggest that prolotherapy stimulates local healing of chronically injured extra- and intra-articular tissue, though definitive evidence is lacking.[7-8] Hypertonic dextrose is a commonly used injectant.[9] Prolotherapy injections target multiple potential pain generators in and around the knee joint; it may be well-suited to address the multifactorial cause of knee pain from osteoarthritis. Mechanism of action of Prolotherapy is unclear. Hypothesis behind Dextrose Prolotherapy suggests improvement in healing of chronically injured tissue by activation of inflammatory cascade. Autologous platelet rich plasma prolotherapy suggests improvement in healing of chronically injured tissue by release of various growth factors by high concentrated platelets.[10-11] A single randomized control trial and one open label study on dextrose prolotherapy reported in improvement in outcome. Various studies of platelet rich plasma prolotherapy on osteoarthritis knee are being performed. However, in this study we evaluated and compared the effectiveness and outcome of three courses of injections of 25% dextrose and platelet rich plasma prolotherapy with 2 week intervals in an open label study.

Method: - In this study we enrolled 72 patients recruited after taking written informed consent and clearance from institutional ethics committee. Subject between 40 to 80 years of age having fulfilled the American college of rheumatology diagnostic criteria were enrolled, for grading of knee osteoarthritis initial evaluation by digital x-ray both knee anterior-posterior & lateral view. Duration of study period was six months. Exclusion criteria included pregnancy, diabetes, anticoagulation therapy, history of total knee replacement, prior knee prolotherapy, any knee injection within 3 months, infl ammatory or postinfectious knee arthritis, daily use of opioid medication, allergy or intolerance to study medication, body mass index (BMI) greater than 40 kg/m^2,

and comorbidity severe enough to prevent participation in the study protocol. Each knee was assessed separately for eligibility.

Study design: -
Patients who enrolled randomly assign into two groups by computer generated system. Each groups received either, 25% dextrose or platelet rich plasma injection given at regular scheduled intervals. Pre injection & post injection evaluation was performed in both groups by Lequesne knee index and visual analogue scale.

Injection intervention: -
Injections were given on day 1, 3rd and 5th week. One group received, 5 ml of 25% dextrose (hospital supply), injected through suprapatellar approach by 22G needle. For the process of PRP preparation and injection, 25–30mL of blood was first collected from the patient's upper limb cubital vein using an 18G needle. Then, 5mL of ACD-A was added to the sample as an anticoagulant .1mL of the blood sample was sent for complete blood count. The rest of the sample passed twostages of centrifuge (first with 1600 rpm for 15 minutes for separation of erythrocytes and next with 2800 rpm for 7 minutes in order to concentrate platelets). The final product was 5mL of PRP containing leukocytes. No local anaesthetic agent was injected. Instead, patients were given a single dose of acetaminophen-codeine 2 hours before the injection. No use exogenous factor for the process of activation. The skin of the injection site was prepped and draped and the liquid PRP was injected in a sterile condition using a 22G needle through the classic approach for intra-articular injection (suprapatellar). After 15–20 minutes of rest, patients were asked to actively flex and extend their knees so that the PRP could spread evenly across the joint space before changing into gel. No non-steroidal anti-inflammatory drugs (NSAIDs) or any other medication for their osteoarthritis was given during the study period.

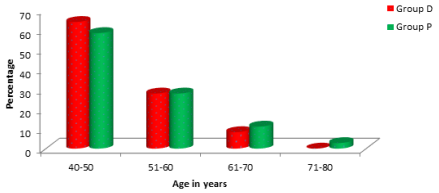
Result: -
72 patients with OA knee were enrolled in the study. These patients were randomized through computer generator system into two groups (36 in each). 26 patients had concomitant disease along with OA knee like hypertension; type 2 DM, Coronary artery disease. There was no significant difference observed in demographic and baseline values between two groups. Mean age in Dextrose and PRP Groups were 49.94±8.28, 50.17±8.57 respectively. 25% of patients in Dextrose prolotherapy group had knee varus deformity while in PRP group 19.4% had knee varus deformity. Socioeconomic evaluation in both group shows majority of patients belong to low socioeconomic followed by medium and high. Most of the patients in both groups were found to be literate (80.6% in dextrose prolotherapy group and 83.3% in PRP group). Occupational evaluation in both groups shows house wife had more participation and regular follow up, followed by government employee, labourer & retired persons. Radiographic grading (Kellegran Lawrence grading) in dextrose group grade 1 (55.6%), grade 2 (33.3%), grade 3 (11.1%) while in PRP group have grade 1 (47.2%), grade 2 (38.9%), grade 3 (12.5%) respectively. Patients were clinically evaluated for pain by VAS and discomfort, walking & ADL by Lequesne knee index. Mean pain scores & LKI recorded at baseline values are mentioned in Table 3. We observed in the dextrose prolotherapy group, the mean value of Lequesne knee index (A, B, C sub score) dropped from 4.69±1.19, 2.47±0.94 and 3.08±1.20 before treatment to 2.61±0.80, 1.69±0.52 and 1.92±0.91 respectively at end of follow up. In PRP group, LKI sub score dropped from 5.19±0.98, 2.83±0.97 and 3.67±0.99 before treatment to 2.14±0.87, 1.39±0.55 and 1.61±0.60 respectively at the end of follow up. Inter group analysis of LKI different time periods for both groups were statistically significant. The mean visual analogue score at baseline have been mentioned in Table 4. We observed, in the dextrose prolotherapy group, the pain score dropped from 5.39±1.18 before treatment to 2.69±0.75 at the end of follow up. In PRP group, pain score dropped from 5.44±1.23 before treatment to 1.94±0.79 at the end of follow up. Inter group comparisons of pain in different time periods for both groups were statistically significant.

Discussion: -
Treatment of Osteoarthritis is mainly conservative approach initially (non invasive and minimal invasive approach), advance cases requires surgical approach. Minimal invasive approaches are intraarticular hyaluronic acid injection, corticosteroid, platelet rich plasma, prolotherapy, Ozone therapy, growth hormones as well as radiofrequency have been used. Various studies of PRP effectiveness on osteoarthritis knee showed reduction in pain and improvement of quality of life. Activated platelet results in release of growth factors and cytokines; it helps in proliferation and differentiation of chondrocytes. PRP also have anti-inflammatory action due to inhibition of NF-k B pathway. Hyperosmolar dextrose prolothearpy increases the level of PGDF and act as an irritant to repair of connective tissue injury. Dextorse prolotherapy is more effective in reduction of inflammation than PRP. In the present study comparison over time between PRP and dextrose prolotherapy shown that PRP can significantly decrease pain and improve quality of life. Rahimzadeh et al compared the effect of PRP and dextrose prolotherapy in primary OA knee. In their study they used WOMAC as an outcome measure. PRP injection was more effective in reducing pain, stiffness and functional limitation in the end of study. VAS and LKI were used in the current study. Rabago et al conducted a randomized study on dextrose prolotherapy and found significant improvement in the WOMAC score as compared with saline injection at the end of the study. Systemic review of dextrose prolotherapy on chronic musculoskeletal pain found consistent significant improvement in pain and functioning among the patients randomized to dextrose versus control group. Systemic review of PRP injection on primary OA knee has significant long term improvement as compared with corticosteroid, hyaluronic acid, oral NSAID's, and placebo. Chang et al compared the effect of PRP and hyaluronic acid in primary OA knee and found PRP is more effective than hyaluronic acid. Another study compared the effect of PRP injection with corticosteroid on primary OA knee and showed PRP injection is more effective and longer acting in reducing pain and functional outcome. In the current study PRP is more effective than dextrose prolotherapy in reducing pain and functional outcome. Other studies shown prolotherapy can useful in primary OA knee as compared to other conventional way of treatment such as exercise, orthotic and others.

Limitation of study: -
Small sample size; lack of control group; lack of morphological assessment of cartilage and soft tissue; short time follow up and assessment. PRP need specific kit like centrifuge machine and centrifuge vial, so cost is high than dextrose prolotherapy.

Conclusion: -
In the present study compare the effectiveness of PRP and dextrose prolotherapy, PRP was more effective in reducing pain, stiffness and improvement in functional outcome at the end of study.

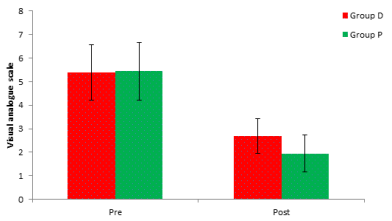
Conflict of interest: - None



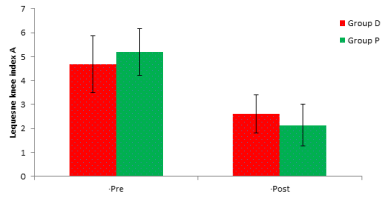
Age distribution in PRP and Dextrose group

Gender	Group D	Group P	Total
Female	26(72.2%)	25(69.4%)	51(70.8%)
Male	10(27.8%)	11(30.6%)	21(29.2%)
Total	36(100%)	36(100%)	72(100%)

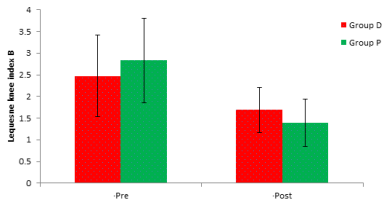
Gender distribution of patients



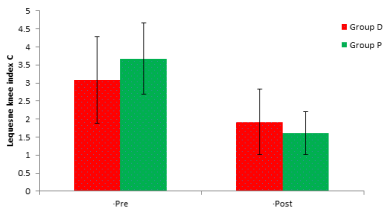
Visual Analogue scale in dextrose and PRP group pre & post therapy



LKI-A in Dextrose & PRP group pre & post therapy



LKI-B in Dextrose & PRP group pre & post therapy



LKI-C in Dextrose & PRP group pre & post therapy

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