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ORIGINAL ARTICLE

# Effectiveness of the intra-articular injection of platelet rich plasma in the treatment of patients with primary knee osteoarthritis



Ali Soliman Hassan <sup>a</sup>, Abeer Mohamed El-Shafey <sup>a,\*</sup>, Hanan S. Ahmed <sup>b</sup>,  
Mohamed Soliman Hamed <sup>c</sup>

<sup>a</sup> Rheumatology and Rehabilitation Department, Faculty of Medicine, Zagazig University, Egypt

<sup>b</sup> Clinical Pathology Department, Faculty of Medicine, Zagazig University, Egypt

<sup>c</sup> Rheumatology and Rehabilitation Department, Al-Ahraar Hospital, Ministry of Health, Egypt

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## KEYWORDS

Platelet rich plasma;  
Intra-articular injection;  
Osteoarthritis;  
Knee;  
Ultrasonography;  
International knee document  
committee (IKDC) scale

**Abstract** Osteoarthritis (OA) is the most prevalent form of arthritis in the world.

*Aim of the work:* To evaluate the effect of 6-monthly intra-articular injection of platelet rich plasma (PRP) on the functional status of knee joint measured by the International Knee Document Committee scale (IKDC), the visual analogue scale for pain (VAS) on the ultrasonographic findings of OA knee. Assessment of its safety as a new line of treatment was taken into consideration.

*Patients and methods:* The study was carried out on 20 patients with mild to moderate primary knee OA. They were injected intra-articularly with 5 ml PRP for each affected joint, at 1 month intervals for 6 injections. Clinical examination, VAS, IKDC score and diagnostic Doppler ultrasonography were performed before and after PRP treatment.

*Results:* After 6 months of PRP, there was a significant improvement in the duration of inactivity stiffness ( $8.3 \pm 2.4$  min), VAS score ( $3.9 \pm 1.1$ ) and IKDC score ( $74.3 \pm 10.2$ ) compared to baseline values ( $18.7 \pm 6.5$  min,  $5.9 \pm 1.3$  and  $40.9 \pm 10.4$  respectively;  $p < 0.001$ ). A significant improvement in Doppler activity ( $p = 0.04$ ) and synovial thickening ( $p < 0.001$ ) was found after 6 months of PRP. A significant correlation was found between age of patients, body mass index and disease duration with the VAS ( $r = 0.55$ ,  $p < 0.001$  and  $r = 0.29$ ,  $p = 0.03$  and  $r = 0.71$ ,

\* Corresponding author at: Rheumatology and Rehabilitation Department, Faculty of Medicine, Zagazig University, Al-Modeer Street, Zagazig City, Sharkia Governorate, Egypt. Tel.: +20 1144704146.

E-mail address: [abeerelshafey@hotmail.com](mailto:abeerelshafey@hotmail.com) (A.M. El-Shafey).

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$p < 0.001$ ) and a negative correlation with the IKDC score ( $r = -0.32$ ,  $p = 0.03$ ,  $r = -0.96$ ,  $p < 0.001$  and  $r = -0.79$ ,  $p < 0.001$  respectively).

**Conclusion:** Intra-articular injection of PRP is an effective and safe method for treatment of knee OA. Maximal improvement is obtained in patients with young age and short disease duration.

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## 1. Introduction

Osteoarthritis (OA) is the most prevalent form of arthritis in the world. With the progressive ageing of the population, it becomes a major problem of public health. Osteoarthritis is a degenerative affection characterised by many disorders leading to structural and functional defect of one or several joints [1]. The combination of biochemical markers with clinical and radiographic data was most helpful to improve the diagnostic and prognostic values on assessment of patients with early knee OA and in determining disease progression [2].

The management of chondral disease is challenging because of its inherent low healing potential. In fact, the regeneration ability of cartilage is limited due to its isolation from systemic regulation and its lack of vessels and nerves [3]. Intra-articular injection of Human umbilical cord blood as a new source of mesenchymal stem cells was found effective for cartilage repair in rats with osteoarthritis [4].

A variety of agents, such as nonsteroidal anti-inflammatory drugs, glucosamine, chondroitin-sulphate, hyaluronic acid, and glucocorticoids have been proposed as non-invasive solutions for pain treatment, improvement in function, and disability, and ultimately modification of severe chondral degeneration and osteoarthritis with varying success rates [5].

Glucosamine, chondroitin-sulphate, and intra-articular hyaluronic acid have not been clearly demonstrated to be effective, and due to the continuing controversies and lack of common accepted beneficial evidence they should not be considered ideal procedures for the treatment of chronic severe chondropathies or osteoarthritis [6].

The field of using platelet rich plasma (PRP) in clinical and basic science research is growing. There is experimental evidence for positive effects of PRP in the context of soft tissue healing, ligament and bone regeneration, and inflammation reduction [7–10]. In another study on Egyptian patients with lateral epicondylitis and with plantar fasciitis, PRP was found promising and effective in both [11].

The aim of this work was to evaluate the effect of 6-monthly intra-articular injection of PRP on the functional status of the knee joint as measured by the International Knee Document Committee scale (IKDC), on the visual analogue scale for pain (VAS) and on the ultrasonographic finding of the OA knee. Assessment of its safety as a new line of treatment in knee OA was taken into consideration.

## 2. Patients and methods

### 2.1. Patients

The study was carried out on 20 patients with mild to moderate primary knee OA, recruited from Rheumatology and Rehabilitation outpatient clinics in Zagazig University

Hospitals, during the period from May 2012 to March 2013. They were diagnosed according to The American College of Rheumatology (ACR) classification criteria of OA [12]. The study was approved by the local ethics committee and by the Institutional Review Board (IRB) of the institution. An informed written consent was taken from all the participants. **Inclusion criteria** for patients selection included history of chronic (at least 4 months) pain or swelling of the knee, not responding to NSAIDs and/or physical therapy and radiographic findings of minimal (grade 1: definite osteophyte, unimpaired joint space) to moderate (grade 2: moderate diminution of joint space) OA of the knee joint, according to Kellgren-Lawrence scale [13]. **Exclusion criteria** were systemic disorders, such as diabetes, rheumatoid arthritis, major axial deviation (varus more than 5 deg, valgus more than 5 deg), haematological diseases (coagulopathies), severe cardiovascular diseases, infections, immunosuppression, patients on therapy with anticoagulants–antiaggregants or use of NSAIDs within 5 days before blood donation.

### 2.2. Clinical, functional and radiological assessment

At the first visit all patients were subjected to full history taking, general examination and complete knee joint examination. The severity of pain was assessed by VAS [14]. Patients were asked to complete the International knee documentation committee (IKDC) osteoarthritis scale in order to evaluate the function of the affected knee [15]. Plain X-ray of the affected knee, anteroposterior and lateral views were done for grading of knee OA which was done according to the Kellgren–Lawrence grading system [13].

Sonographic Doppler examination was performed on the affected knee with 5.12 MHz linear array transducer (Medison R3). Patients were supine on an examination bed, with the knee flexed as much as possible [16]. Ultrasonography reports included comment on increased vascularity (Doppler activity), synovial hypertrophy, cartilage thickness, regularity of the cartilage margins and effusion.

Ultrasonographic detection of cartilage degeneration of the osteoarthritic knee was done according to Saarakkala et al. [17], in which they recommended supine position and the knee was fully flexed. First, the intercondylar notch area, including femoral condyles just above the patellar bone (later called sulcus), was depicted. Subsequently, the cartilage in medial and lateral femoral condyles were fully scanned by sweeping the full surfaces of the cartilage from proximal to distal with the probe always in transverse position. The ultrasound beam was kept perpendicular to the surface of the femur all the time. They evaluated the cartilage and gave the following grades: **Grade 0:** a monotonous anechoic band having sharp hyperechoic anterior and posterior interfaces. **Grade 1 (Mild degenerative changes):** loss of the normal sharpness of cartilage

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