



## Original Article

## Is there a treatment protocol in which platelet-rich plasma is effective?



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## ABSTRACT

**Aim:** We aimed to reveal whether there are prospective suggestions for effective and standard platelet-rich plasma applications.

**Methods:** We searched for clinical trials and traced all the references of incorporated documents.

**Results:** In literature, there was no study indicating which disease is treated by which mechanism of action, how much dose and content are prepared and applied, when the treatment is applied and how many cures are applied.

**Conclusion:** Guides introducing which concentrations of PRP are used for which diseases are to be prepared immediately by a committee which is comprised of primarily orthopedists, clinical pharmacologists and toxicologists.

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## 1. Introduction

Health-related quality of life is decreasing year by year in the world due to muscle and musculoskeletal injuries.<sup>1</sup> As there have not been promising results in the present studies regarding treatment of these injuries, clinical and social problems come up. Scientists turn towards repair of damaged tissues using biological methods in their studies.<sup>2</sup>

As the number of studies regarding the growth factors in wound healing and their interaction increases, it paves the way for personal and cell-based biological treatments, which can be applied as self-executing and combined. While treating damaged tissues, treatments that can provide rapid tissue repair and functional healing, and treatment modalities that are biological-oriented are targeted. In this respect, PRP constitutes an important step.<sup>3</sup>

PRP has gained popularity, which allows non-pharmaceutic and biologic repair-oriented recovery process by releasing local growth factors in the environment. Besides, it has functions of homeostasis and coagulation. It involves PLT, which abundantly contains cytokine and growth factors that are important in tissue repair and bone mineralization.<sup>4</sup> Furthermore, it contains lots of growth factors – in protein and peptide structure – which play key roles in synthesis of tissue matrix.<sup>5</sup>

As a result, in literature, PRP is reported to affect not only resorption of necrotic tissues but also macrophages which accelerate tissue healing, mesenchymal stem cells and osteoblasts. It is also reported to cause release of bioactive proteins.<sup>6</sup> For this very reason, it is applied in all fields of medicine including orthopaedic surgery in tissue damage treatments.<sup>7,8</sup>

PRP's use has been increasing in many cases such as primarily osteoarthritis,<sup>9</sup> proximal hamstring,<sup>10</sup> Achilles,<sup>11</sup> patellar tendinopathies,<sup>12</sup> talar osteochondral lesions,<sup>13</sup> rotator cuff damage repair,<sup>14</sup> lateral epicondylitis treatment,<sup>15</sup> relieving pains following arthroplasty<sup>8</sup> and contributing to bone healing of tibia in distraction osteogenesis.<sup>8</sup>

However, as there are contradictory results reported in some cases in literature where PRP was applied, there are some questions regarding the efficiency of PRP treatment.<sup>16–18</sup> Some

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manuscripts indicated that PRPs with different contents are superior in clinical treatment.<sup>19</sup> There was no well-proven study in which PLT and leucocyte (WBC) rates were separately discussed in PLT concentrations in PRP content. There was not enough evidence regarding how much WBS is responsible from curative or negative effect in clinics.<sup>20,21</sup>

Recently, the use of PRP has gained popularity and has become a treatment option all by itself.<sup>22</sup> There are some questions to be answered such as to whom, when, how and by which mechanism it is to be applied. It is important that a standardization be processed in consequence of basic and clinical studies as using different commercial kits might result in different results, which leads some issues concerning the evaluation of clinic studies.

The purpose of the present study is to determine the different applications of PRP in clinics after reviewing the literature and set forth whether there are suggestions for efficient and standard PRP application.

## 2. Materials and methods

### 2.1. Search strategy

The databases of the US National Library of Medicine National Institutes of Health, Embase, OVID and the Cochrane Library, as well as the references within the retrieved articles were searched to find all relevant orthopaedic injury and PRP clinical trial studies from 1954 to June 4, 2016, without any language restrictions. The following keywords were used in the search: “platelet-rich plasma”, “PRP”, “OA”, “proximal hamstring”, “achilles tendinopathy”, “patellar tendinopathy”, “talar osteochondral lesions”, “rotator cuff”, “lateral epicondylitis” and/or PRP.

The percentage distribution of articles by year was recorded, and the evidence level was determined according to Lijmer et al.<sup>23,24</sup> Bibliographies thought to be missed during the database research were examined again. Unpublished grey literature, including articles, comments, letters, editorials, protocols, guides, meta-analyses and collections were not included. The most highly

cited articles were defined and re-examined in order to avoid double entries.

### 2.2. Eligibility criteria

Double-blind placebo-controlled randomized clinical trials or researches of level I were included to our study. All studies not containing the above information were excluded. The study inclusion process is summarized in Fig. 1.

### 2.3. Data collection and evaluation

The authors selected the included studies independently and, in order to minimize selection bias, the studies were revised by all authors. In the event of conflicting results, the final decision was taken by authors, who have greater experience regarding PRP preparations design. Finally, the senior authors were consulted and the topics were revised, if necessary.

### 2.4. Statistical analysis

It was found that the obtained data are not based upon the fact that they were collected from the sources that had probability distribution function. Therefore, non-pragmatic statistical methods were used. Nonetheless, given the lack of common findings, statistical analyses could not be performed and complementary statistical methods were applied instead. Microsoft Office Excel (2010) was used and the results were shown as mean  $\pm$  standard deviation or frequency (%).

## 3. Results

A total of 13,248 studies were found to have potential for inclusion. The number of articles published per year is shown in Fig. 2. Following revision of the full text, 10 articles were finally included (Table 1), all of which were comparative, randomized controlled clinical trials.<sup>8–14,25–27</sup>

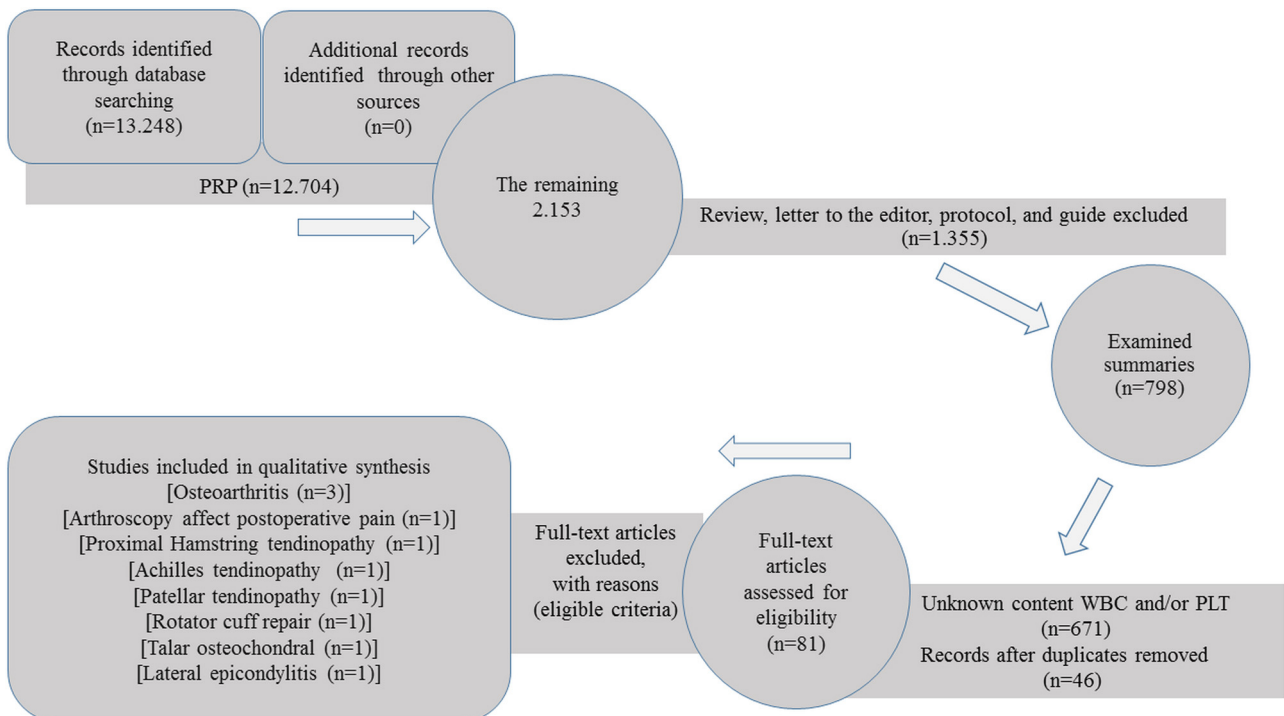


Fig. 1. The follow chart of literatures identification.

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