Comparative efficacy of stem cells and secretome in articular cartilage regeneration: a systematic review and meta-analysis

ABSTRACT

Articular cartilage defect remains the most challenging joint disease due to limited intrinsic healing capacity of the cartilage that most often progresses to osteoarthritis. In recent years, stem cell therapy has evolved as therapeutic strategies for articular cartilage regeneration. However, a number of studies have shown that therapeutic efficacy of stem cell transplantation is attributed to multiple secreted factors that modulate the surrounding milieu to evoke reparative processes. This systematic review and meta-analysis aim to evaluate and compare the therapeutic efficacy of stem cell and secretome in articular cartilage regeneration in animal models. We systematically searched the PubMed, CINAHL, Cochrane Library, Ovid Medline and Scopus databases until August 2017 using search terms related to stem cells, cartilage regeneration and animals. A random effect meta-analysis of the included studies was performed to assess the treatment effects on new cartilage formation on an absolute score of 0-100% scale. Subgroup analyses were also performed by sorting studies independently based on similar characteristics. The pooled analysis of 59 studies that utilized stem cells significantly improved new cartilage formation by 25.99% as compared with control. Similarly, the secretome also significantly increased cartilage regeneration by 26.08% in comparison to the control. Subgroup analyses revealed no significant difference in the effect of stem cells in new cartilage formation. However, there was a significant decline in the effect of stem cells in articular cartilage regeneration during long-term follow-up, suggesting that the duration of follow-up is a predictor of new cartilage formation. Secretome has shown a similar effect to stem cells in new cartilage formation. The risk of bias assessment showed poor reporting for most studies thereby limiting the actual risk of bias assessment. The present study suggests that both stem cells and secretome interventions improve cartilage regeneration in animal trials. Graphical abstract.

Keyword: Animal trial; Cartilage regeneration; Secretome; Stem cells; Systematic review