

Adipose-Derived Mesenchymal Stem Cells in Cartilage Tissue Regeneration in Osteoarthritis

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INTRODUCTION

Tissue regeneration is the process of renewal and growth to repair or replace damaged or infected tissues¹. Adipose tissue-derived stem cells are mesenchymal cells with the capacity for self-renewal and multipotential differentiation². They provide a promising future in tissue regeneration due to their wide availability and ability to differentiate into other tissue types of the mesoderm³. In osteoarthritis, they prove to be effective in slowing down cartilage tissue degeneration.

METHODS

We conducted a systematic review searching MEDLINE (PubMed) for all relevant articles dealing with AdMSCs in tissue regeneration published in the last five years. The search criteria being (((("tissue regeneration") OR ("regenerative medicine")) AND (("Adipose tissue") OR (AdMSCs) OR (Adipose-derived mesenchymal stem cells) OR (Adipose-derived stromal cells) OR (ADSCs))) NOT ((Periodontal) OR (dental))). Records identified through database searching (n=77). Records identified through other sources (n=3). Records after duplicates removed (n=77). Records screened (n=77). Records excluded (n=56). Full-text articles assessed for eligibility (n=21). Full-text articles excluded, with reasons (n=11): not adipose derived (n=3); not about OA (n=1); not cartilage tissue (n=2); abstract only (n=1); not on humans (n=2); Same conclusion as another research (n=1). Studies included in final scoping review (n=10).

CONCLUSIONS

Some studies showed no significant changes in the cartilage volume, whereas some showed that AdMSCs could potentially prevent OA progression by increasing the cartilage volume of the joint, as seen in MRI results^{5,6,8}. However, there are concerns about the durability- after 1 or 2 years, the disease does not get worse, but it also does not get significantly better⁵.

AIM

This study aims to systematically review the role of AdMSCs in cartilage tissue regeneration, particularly in osteoarthritis.

RESULTS

We analysed 21 articles, and ten studies met the inclusion criteria. It is a relatively harmless procedure, and all results showed no serious adverse effects in using AdMSCs for regenerating cartilage tissues in OA^{5,8}. There are no known complications. Knee function and pain levels (as measured by WOMAC) improved^{4,5,9}, and there was no significant change in cartilage defect of OA in most patients⁹. However, during observation, the clinical outcomes deteriorated after a year for patients who received the low-medium dosage ($0.5-5.0 \times 10^7$ AdMSCs) and after two years for patients given the high dosage ($5-100 \times 10^7$ AdMSCs)^{5,7,8,10}. Other treatments (NSAIDs and corticosteroids) target symptoms, mainly pain relief. The option of surgery exists but is not advisable depending on factors such as age and activities- rehabilitation is also a point to reconsider as it is a long, painful process.