

Worldwide trends and diffusion of adipose tissue derivatives applications in orthopaedics: a systematic review

D. Cucchi ¹(d.cucchi@gmail.com), R. Ossendorff ¹, F. A. Schildberg ¹, P. Randelli ², D. C. Wirtz ¹, A. Menon ³

¹ Department of Orthopaedics and Trauma Surgery, Universitätsklinikum Bonn, Bonn, Germany

² Laboratory of Applied Biomechanics, Department of Biomedical Sciences for Health, Università degli Studi di Milano, Milano, Italy

INTRODUCTION & AIM

The biological enhancement of tissue regeneration and healing is an appealing perspective for orthopaedic surgeons and, in recent years, publications describing the use of adipose tissue derivatives flourished. This review aims to describe the global distribution of studies investigating the use of adipose tissue derivatives in orthopaedic surgery, and to provide information on their quality, on the products available and on their features.

METHODS

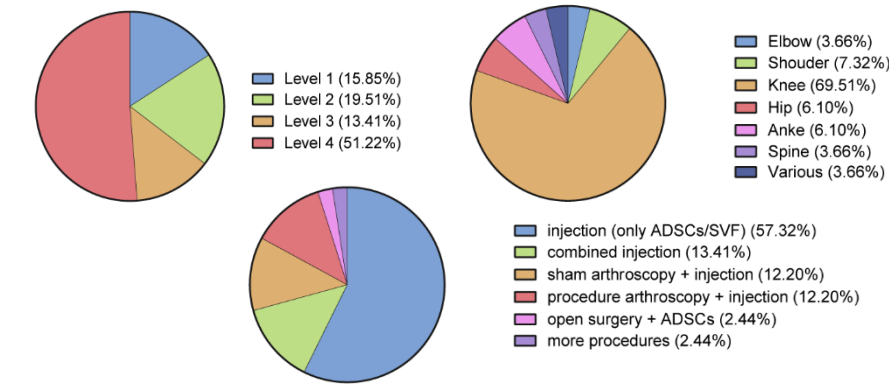
A systematic review was performed to analyse the use of adipose tissue derivatives in patients affected by orthopaedic pathologies. The quality of the included studies was assessed through the modified Coleman Methodology Score (mCMS) and through the Cochrane risk-of-bias tool for randomized trials. All the included articles were then categorised depending on the country the trial was performed in, the anatomical district of application, the source and type of adipose tissue preparation and processing (site, device, extraction, expansion characterization).

CONCLUSIONS

The systematic analysis of publications dealing with adipose tissue derivatives in orthopaedics shows a high heterogeneity in terms of types of performed procedures as well as choice and processing of adipose tissue derivatives. Although high-quality studies have been produced, many publications show low methodological quality, especially studies dealing with SVF.

RESULTS

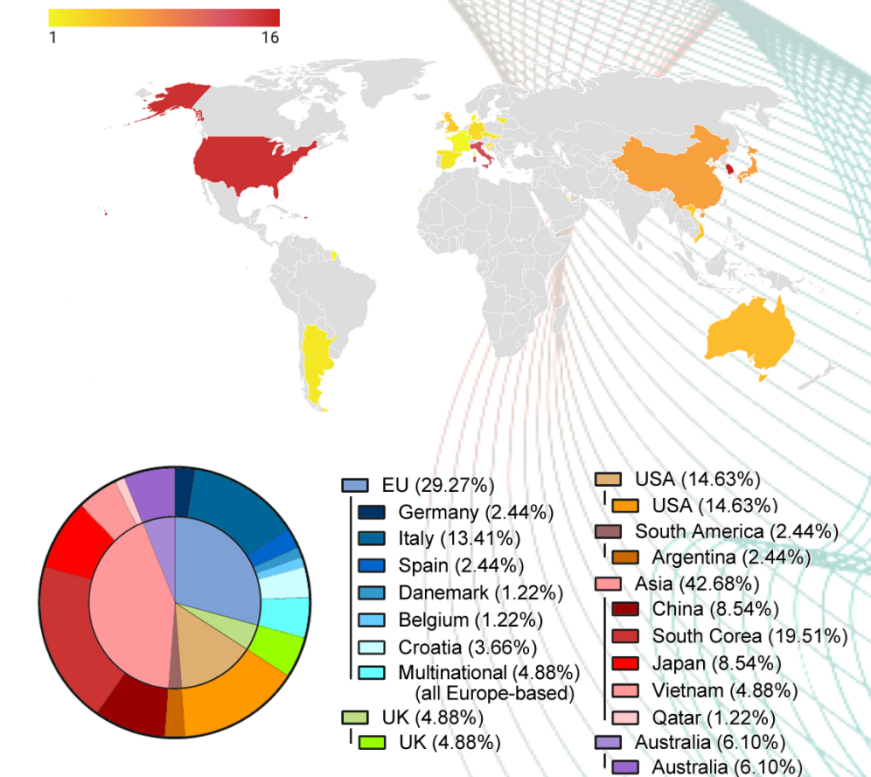
Eighty-two studies were included for a total of 3594 patients treated. 70% of the studied investigated the treatment of knee disorders, predominantly osteoarthritis; 26% of all studies dealt with expanded adipose-derived stem cells (ADSCs), 72% with stromal vascular fraction (SVF); 70% described injection of adipose tissue derivatives into the affected joint/tendon and 24% arthroscopic procedures augmented with adipose tissue derivatives. The average mCMS for all studies was 51.7±21.4 points, with a significantly higher score for the studies dealing with expanded ADSCs as compared to those dealing with SVF (p=0.0027).



Level of evidence (A), anatomical districts (B) and procedures (C) studied the included articles

	R	D	Mi	Me	S	O
Freitag 2019	?	+	+	+	?	?
Garza 2020	+	+	+	+	+	+
Hong 2019	+	+	+	+	+	+
Hurd 2020	?	+	+	+	+	+
Koh 2014	+	+	+	+	?	+
Koh 2016	+	?	+	?	?	?
Lee 2019	+	+	+	+	+	+
Lu 2019	+	+	+	+	+	+
Lu 2020	+	+	+	+	+	+
Myerson 2019	+	+	+	+	+	+
Peretti 2018	+	?	?	+	?	?
Quiao 2020	+	+	+	+	+	+
Randelli 2022	+	?	+	+	+	?
Song 2018	+	+	+	+	+	+
Usuelli 2018	?	?	+	+	?	?
Zhao 2019	+	?	+	+	+	?
Zhou 2021	+	+	+	+	+	+

D) Cochrane risk-of-bias analysis for Level I and II randomized studies.



E) Geographical distribution of the included studies

Commercial products used in the included studies



REFERENCES

R. Ossendorff, A. Menon, et al. Adipose derived stem cells, stromal vascular fraction and micro-fragmented adipose tissue applications in orthopaedics: a worldwide analysis of current evidence. 2023, *Under review*.