ABSTRACT

MECHANISM OF FULL THICKNESS CARTILAGE DEFECT REGENERATION IN NEW ZEALAND WHITE RABBIT USING FREEZE DRIED BOVINE CARTILAGE POWDER SCAFFOLD – ALLOGENIC BM-MSCs – PLATELET RICH PLASMA COMPOSITE (SMPC) IMPLANTATION

**Introduction**: Recent advance treatment on full thickness cartilage defect is using tissue-engineering technique that combine cell, scaffold and or without signaling molecules. In this study researcher used combination of Scaffold-Mesenchymal Stem Cells-Platelet Rich Plasma Composite (SMPC) that will implanted in full thickness cartilage defect.

**Objectives**: The aim of this research is to explain regeneration mechanism on full-thickness cartilage defect which was implanted with SMPC.

**Method**: This is a true experimental research with posttest only control group design using New Zealand White Rabbit. 50 rabbits is divided into three groups of SMPC, BM-MSC and Scaffold FDBC. Result was evaluated after twelve weeks.

**Result**: 37 rabbits has been evaluated. SMPC-treated group had the best healing result. Histopathologic examination showed that chondrocyte counts, collagen thickness and cartilage width is highest on the SMPC-treated group. Immunohistochemical examination showed that SMPC-treated group had the highest counts of FGF2-R, Sox-9 and MAPK expressing chondroprogenitor cell. Brown Forsythe test resulted in significant increase of chondrocyte counts (p=0,010), collagen thickness (p=0,000) and cartilage surface width (p=0,015) and also increase of FGF2-R (p=0,000), MAPK (p=0,000) and Sox-9 (p=0,000) on SMPC-treated group. Using path analysis, there were a strong influence from FGF2-R, MAPK, and Sox-9 to the increase of chondrocyte counts, collagen thickness, and cartilage surface width.

**Conclusion**: Full-thickness cartilage defect regeneration mechanism on SMPC implantation can be explained.

**Keyword**: Full thickness cartilage defect, BM-MSCs, Freeze Dried Bovine Cartilage powder, Platelet rich plasma, Scaffold, SMPC, Regeneration.