

ABSTRAK

ISOLASI, KARAKTERISASI, DAN ANALISIS PROFIL EKSPRESI GEN SEL PUNCA MESENKIMAL DARI LIGAMEN PERIODONTAL ANJING

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Sel punca ligamen periodontal anjing (cPDLSCs) adalah sumber sel yang menjanjikan untuk terapi penyakit periodontal dan rekayasa jaringan tulang, tetapi karakterisasi molekuler komprehensif cPDLSCs masih terbatas. Penelitian ini bertujuan untuk mengisolasi serta mengkarakterisasi cPDLSCs secara morfologis dan molekuler menggunakan metode Real-Time Quantitative Polymerase Chain Reaction (qPCR). Isolasi dilakukan dengan metode eksplan jaringan ligamen periodontal dan sel dikultivasi hingga pasase ke-7 (P7). Morfologi cPDLSCs menunjukkan bentukan sel memanjang seperti gelondong (*spindle shaped*) yang homogen, melekat pada permukaan plastik, dan membentuk satu lapisan (*monolayer*). Uji *Colony Forming Unit* (CFU) menunjukkan kemampuan klonogenik dari cPDLSCs. Analisis qPCR terhadap 18 gen target menunjukkan profil ekspresi yang komprehensif. Sel mengekspresikan *stemness marker* (*NANOG*, *OCT4*, *REX1*) dan *surface marker* khas sel punca mesenkimal (MSC) (*CD73*, *CD90*, *CD105*, *CD44*). Kemurnian populasi sel ditunjukkan dari tidak terdeteksinya gen hematopoietik *CD45*. Status *multi-primed* yang mengindikasikan multipotensi ditunjukkan oleh ekspresi basal *differentiation marker* osteogenik (*RUNX2*, *OSX*, *OCN*), adipogenik (*PPAR γ* , *LPL*), dan kondrogenik (*SOX9*, *COL-X*). Ekspresi positif *periodontal marker* (*POSTN*, α -*SMA*) menunjukkan sel ini bersumber dari jaringan periodontal. Secara keseluruhan, hasil penelitian menunjukkan karakteristik cPDLSCs sesuai dengan kriteria minimal sel punca mesenkimal (MSC) yang ditetapkan oleh *International Society for Cellular Therapy* (ISCT), meliputi kemampuan adhesi pada plastik, profil penanda permukaan spesifik, dan *multipotent differentiation*. Hasil ini mendukung pemanfaatannya sebagai sumber sel untuk studi praklinis regenerasi periodontal.

Kata kunci: *anjing*, *ekspresi gen*, *mesenchymal stem cells (MSCs)*, *periodontal ligament stem cells (PDLSCs)*, *qPCR*.

ABSTRACT

ISOLATION, CHARACTERIZATION, AND GENE EXPRESSION PROFILING OF CANINE PERIODONTAL LIGAMENT-DERIVED MESENCHYMAL STEM CELLS

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Canine periodontal ligament stem cells (cPDLSCs) are a promising cell source for periodontal tissue regeneration and bone tissue engineering, yet their comprehensive molecular characterization remains limited. This study aimed to isolate and characterize cPDLSCs morphologically and molecularly using Real-Time Quantitative Polymerase Chain Reaction (qPCR). Cells were isolated from periodontal ligament tissue using the explant method and cultured to passage 7 (P7). The cPDLSCs exhibited a homogeneous, spindle-shaped morphology and demonstrated plastic adherence, forming a monolayer. The Colony Forming Unit (CFU) assay demonstrated cPDLSCs clonogenic capacity. The qPCR analysis of 18 target genes showed a comprehensive expression profile. Cells expressed stemness markers (*NANOG*, *OCT4*, *REX1*) and characteristic mesenchymal stem cell (MSC) surface markers (CD73, CD90, CD105, CD44). The absence of the hematopoietic gene CD45 confirmed the cell population purity. Basal expression of osteogenic (*RUNX2*, *OSX*, *OCN*), adipogenic (*PPAR γ* , *LPL*), and chondrogenic (*SOX9*, *COL-X*) differentiation markers indicated a multi-lineage priming status consistent with multipotency. Positive expression of periodontal markers (*POSTN*, α -*SMA*) confirmed their periodontal tissue origin. Overall, the results confirmed cPDLSCs characteristics in accordance with the minimal criteria for multipotent mesenchymal stem cells (MSCs) defined by the International Society for Cellular Therapy (ISCT), including plastic adherence, specific surface marker profiles, and multipotency. These findings support their potential use as a reliable cell source for preclinical studies in periodontal regeneration.

Keywords: *canine, gene expression, mesenchymal stem cells (MSCs), periodontal ligament stem cells (PDLSCs), qPCR*