INTISARI

Latar Belakang: Kanker pankreas merupakan salah satu jenis kanker paling mematikan yang menduduki peringkat 4 di dunia. Penyebab utama tingginya angka kasus dan kematian pada kanker pankreas ini yakni maraknya kasus dengan keterlambatan diagnosis dan terbatasnya opsi pengobatan dalam penangannya.

Tujuan: Tujuan pada penelitian ini yakni untuk mengidentifikasi kandidat biomarker berbasis mikroRNA (miRNA) yang tersirkulasi pada plasma darah sebagai pendekatan diagnostik yang bertujuan sebagai deteksi dini kanker pankreas.

Metode: Pada penelitian ini dilaksankan pengujian terhadap 12 sampel RNA yang diperoleh dari pasien pankreatitis kronis, kolangiokarsinoma, kanker pancreas, dan individu normal. Perolehan sampel RNA dilaksanakan analisis profil miRNA menggunakan NanoString nCounter™ miRNA Assay perangkat lunak nSolver™ v4.0 dan Rosalind. Hasil perolehan profil miRNA yang mengalami disregulasi secara spesifik terhadap kanker pankreas dilaksanakan analisa lebih lanjut untuk mengidentifikasi gen gen target yang terlibat dalam aktivitas regulasi molekuler dengan menggunakan basis data Tarbase.

Hasil: Hasil penelitian menunjukkan ditemukannya 32 miRNA yang mengalami deregulasi spesifik pada kanker pankreas dari populasi normal dan pankreatitis kronis. Sebanyak 3 miRNA terekspresi *up-regulated*, yaitu hsa-miR-105p, hsa-miR-487a-3p, dan hsa-miR-590-3p, dan berpotensi sebagai *oncomiR* karena menargetkan gen terkait proliferasi, anti-apoptosis, dan imunosupresi. Sementara itu, 4 miRNA down-regulated, yaitu hsa-miR-1304-3p, hsa-miR-381-3p, hsa-miR-302d-3p, dan hsa-miR-302b-3p diklasifikasikan sebagai *Tumor SuppressormiRNA* (ts-miR). Pola ekspresi spesifik ini mendukung potensi ketujuh miRNA tersebut sebagai kandidat biomarker kanker pankreas.

Kesimpulan: Tujuh miRNA teridentifikasi, terdiri dari oncomiR dan tumor suppressormiR, berpotensi menjadi kandidat biomarker untuk mengevaluasi progresivitas kanker pankreas pada populasi normal dan pankreatitis kronis

Kata Kunci: Kanker pankreas, biomarker, miRNA, deteksi dini, NanoString

Abstract

Background: *Pancreatic cancer* is one of the deadliest types of cancer, currently ranked as the fourth leading cause of cancer-related deaths worldwide. The primary factors contributing to its high incidence and mortality are delayed diagnosis and limited treatment options.

Objective: This study aims to identify circulating *microRNA* (*miRNA*)-based candidate biomarkers in blood plasma as a diagnostic approach for the early detection of *pancreatic cancer*.

Methods: A total of 12 RNA sampels were obtained from patients with *chronic pancreatitis*, *cholangiocarcinoma*, *pancreatic cancer*, and healthy individuals. *miRNA* profiling was conducted using the *NanoString nCounter™ miRNA Assay* and analyzed with the *nSolver™ v4.0* software. *miRNAs* that showed specific deregulation in *pancreatic cancer* were further analyzed to identify their target genes involved in molecular regulatory activity using the *TarBase* database.

Results: The study identified 32 *miRNAs* with specific deregulation in *pancreatic cancer*, derived from the *normal* and *chronic pancreatitis* populations. Among them, three *up-regulated miRNAs*, *hsa-miR-105-5p*, *hsa-miR-487a-3p*, and *hsa-miR-590-3p*, were predicted to act as *oncomiRs* by targeting genes related to proliferation, anti-apoptosis, and immunosuppression. Meanwhile, four *down-regulated miRNAs*, *hsa-miR-1304-3p*, *hsa-miR-381-3p*, *hsa-miR*—302d-3p, and *hsa-miR-302b-3p* were classified as *tumor suppressor miRNAs* . These specific expression patterns support the potential of these seven *miRNAs* as candidate biomarkers for *pancreatic cancer*.

Conclusion: A total of 7 *miRNAs* were identified as significantly and specifically deregulated in *pancreatic cancer*. The deregulation of these *miRNAs* reflects their functional roles in regulating target genes involved in key biological processes such as proliferation, apoptosis, and angiogenesis. These findings suggest a crucial involvement of *miRNAs* in the pathogenesis of *pancreatic cancer* and support their potential use as non-invasive diagnostic biomarkers.

Keywords: *Pancreatic cancer*, *biomarker*, *miRNA*, *early detection*, *NanoString*