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Cytotoxicity assay of nilotinib and nicotinamide in a myeloid cell line, K562

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Abstract

Nicotinamide is an active form of vitamin B3 with many physiological and pharmacological functions in various organisms. Its function as an NAD+ precursor and also a substrate for PARP-1 play an important role in DNA repair and also maintenance of the genomic to improve the capacity in DNA repair. Nicotinamide also inhibits poly (ADP-ribose) polymerase (PARP-1) that reassembles the DNA strand breaks caused by radiation and chemotherapy. Drug resistance towards the first-line treatment for Chronic Myeloid Leukemia has forced clinicians to switch to second- generation treatment such as nilotinib. The role of nicotinamide as a cancer preventive agent will be studied by investigating its effect in K562 cell line. This study aims to determine the IC_{50} of nicotinamide and nilotinib in a K562 cell line. The cell was cultured in a sterile environment with RF10 as the medium before being treated with nicotinamide and nilotinib for 72 hours. Concentration of dilution was done to obtain the desired concentration of nicotinamide (0.02 M, 0.04 M, 0.06 M, 0.08 M and 0.1 M) and nilotinib ($5.0x10^{-9}$ M, $1.0x10^{-8}$ M, $2.0x10^{-8}$ M and $4.0x10^{-8}$ M) with the final percentage of 0.1% DMSO in 96- well plate. Cell cytotoxicity assay was carried out by using Cell Counting Reagent SF at 450nm. These cell treatments have shown that more than 50% of the cell viability have been inhibited as the concentration increases. Nicotinamide and nilotinib were able to inhibit the proliferation of K562 cell line at 4.02-83.44% and at 7.95-66.32%, respectively. IC_{50} value was successfully determined by using software GraphPad Prism for nicotinamide (0.03433 M) and nilotinib ($8.788x10^{-9}$ M). These data will be used for the future study to investigate the effect of nilotinib supplemented with nicotinamide associated with poly(ADP-ribose) polymerase-1 (PARP-1) on K562 cell line.

Keywords: cytotoxicity assay; nicotinamide; nilotinib; K562 cell line

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