Effect of Lidocaine on Local Invasion of Oral Cancer

Abstract

Objectives: The objective of this study was to explore the possible therapeutic effect of lidocaine in inhibiting secretion of the matrix-metalloproteinase 9 enzyme by SCC-9 cancer cell line. The second objective was to study the effect of lidocaine on invasion and migration pattern of SCC-9 cancer cells.

Methods: Human tongue SCC (SCC-9) was cultured with lidocaine at concentrations of (1-200µM) with the presence or absence of TNF-α at 20ng/ml for 4 hours and 24 hours. QuickZyme Human MMP-9 assay was used to quantify MMP-9 concentration. Invasion (Boyden-Chamber assay) was conducted by incubating SCC-9 cells with the stated condition before for 48 hours. Wound scratch healing assay was performed and SCC-9 cells were incubated for 24hours. Proliferation and viability of SCC-9 were tested at different lidocaine concentration (1-200µM) in different time intervals; 4,24,48 and 72 hours using MTT assay.

Results: In the absence of TNF-α, there was no MMP-9 enzyme secretion was recorded. At higher concentration of lidocaine (50-200µM) MMP-9 enzyme secretion was significantly reduced in 24 hours serum. The number of SCC-9 cells invaded through Transwell insert in invasion assay were recorded lowest when SCC-9 were incubated with 200µM lidocaine. In wound healing assay, the rate of SCC-9 migration was recorded highest (32.7nm/hour) in the presence of TNF-α alone. However, the recovery and rate of migrating cells were significantly reduced when SCC-9 cells were incubated with lidocaine at 1-200µM. Cell viability and proliferation was affected by lidocaine but the effect was dose and time-dependent. At higher concentration of lidocaine (50µM to 200µM) and prolonged incubation time, the reduction of cell viability was more pronounced.

Conclusions: In the presence of lidocaine, MMP-9 enzyme secretion and migration of tumour cells were affected. It shows that lidocaine has certain therapeutic value in cancer microenvironment which will need further research.