

Antiproliferative effects of aspirin and diclofenac against the growth of cancer and fibroblast cells: In vitro comparative study

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Background

Non-steroidal anti-inflammatory drugs (NSAIDs) inhibit the growth of several cancer cell lines. Regular uses of non-steroidal anti-inflammatory drugs (NSAIDs) may reduce the risk of cancers of colon, breast, lung and ovary.

Aims

The study aims to compare the cytotoxic effect of aspirin with diclofenac on the growth of HeLa cell, mammary cell carcinoma, rhabdomyosarcoma and fibroblast cell lines in the culture media.

Methods

The cells are cultured in RPMI-1640 culture media supplemented with 5% fetal calf serum and antibiotics. Aspirin (5 mg/well) and diclofenac (0.625 mg/well) significantly inhibit the growth of HeLa, rhabdomyosarcoma and fibroblast cells.

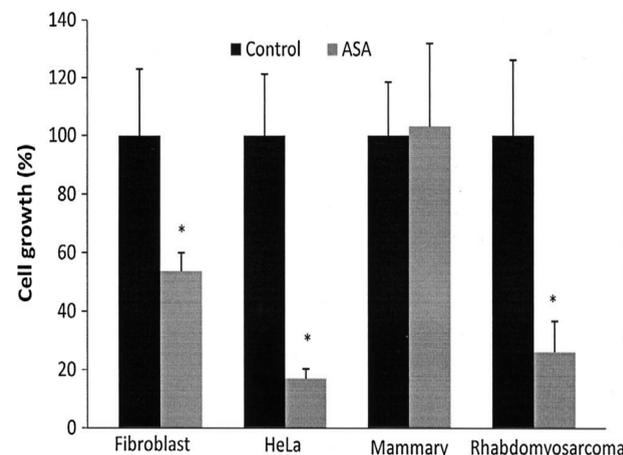


Figure 1 Effect of aspirin on the growth of different cell lines. The results are expressed as mean \pm SD of each treatment (n= 8), *p< 0.001

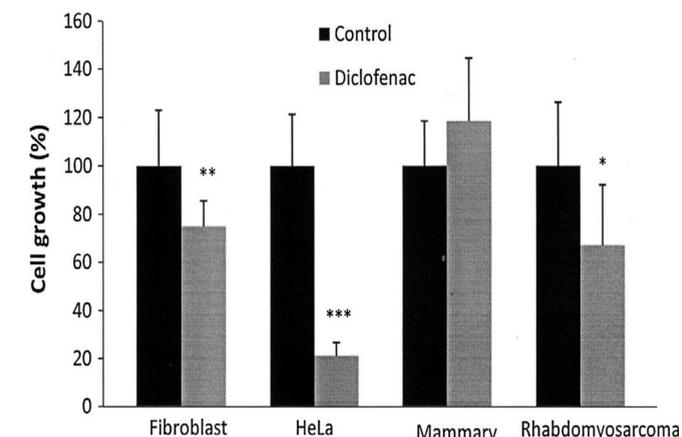


Figure 2 Effect of diclofenac on the growth of different cell lines. The results are expressed as mean \pm SD of each treatment (n= 8), *p< 0.05, **p< 0.02, ***p<0.001

Results:

Aspirin significantly ($p < 0.001$) inhibits the growth of fibroblast cell ($53.7\% \pm 6.3\%$) compared with un-treated cells ($100 \pm 23\%$) (Fig. 1). A significant ($p < 0.001$) inhibitory effect of aspirin against the growth of HeLa cell line is observed ($17.0 \pm 3.3\%$) compared with untreated cells ($100 \pm 18.5\%$) (Fig. 1). The growth of rhabdomyosarcoma cell line is significantly ($p < 0.001$) inhibited with aspirin ($26.1 \pm 10.6\%$) compared with un-treated cell line ($100 \pm 26.1\%$) (Fig. 1). As with aspirin, diclofenac has no significant effect against the growth of AMN3 mammary cell line compared with un-treated cell line ($118.5 \pm 25.9\%$ versus $100 \pm 18.5\%$, respectively). The significant effects of diclofenac against fibroblast, HeLa and rhabdomyosarcoma cell lines are inferior to that observed with aspirin (Fig. 2). The percents of fibroblast, HeLa and rhabdomyosarcoma cell lines growth decreased into $74.9 \pm 10.8\%$, $21.2 \pm 5.5\%$ and $67.0 \pm 25.3\%$ respectively. The cytotoxic effect of aspirin against rhabdomyosarcoma is significantly ($p < 0.001$) higher than that of diclofenac with a potency approximated 2.6.

Discussion

Aspirin and diclofenac significantly inhibit the growth of HeLa, rhabdomyosarcoma and the fibroblast cell line. The inhibitory effects of aspirin are higher than diclofenac sodium that reached significant against rhabdomyosarcoma. This effect may be related to the cyclooxygenase expression as well as to the level of the matrix metalloproteinase enzymes of the cells (Ito et al., 2004; Dickens and Cripe, 2003). The results of NSAIDs on the mammary cell growth do not agree the previous studies. Therefore, NSAIDs inhibit the growth of breast cell cancer in specific experimental models, otherwise, their cytotoxic effect is missed.

Conclusion

It concludes that aspirin and diclofenac inhibit the growth of fibroblast and cancer cell by inhibiting the up-regulation of cyclooxygenases enzymes in cancer cells. Aspirin is more effective than diclofenac against the growth of rhabdomyosarcoma cell line.

Reference

<http://www.sciencedirect.com/science/article/pii/S1319016415000031>