Introduction

Unlimited and uncontrolled cell proliferation are hallmarks of cancer, the second leading cause of death in the United States.\(^1\) Telomere maintenance mechanisms may be the key to this unlimited cell proliferation. Telomere maintenance mechanisms are mechanisms used by cancer cells to prevent the shortening of telomeres, protective structures of repeating DNA on the ends of chromosomes, after cell division. Apoptosis is triggered in a cell when telomeres become too degraded which is an apoptotic check that cancer cells avoid using telomere maintenance mechanisms. The two mechanisms are telomerase, an enzyme and alternative lengthening of telomere (ALT), a pathway based on homologous recombination. This study used two natural compounds, ellagic acid and quercetin to inhibit telomere maintenance mechanisms and trigger apoptosis in human fibrosarcoma cells. Ellagic acid and quercetin were chosen for this research due to being natural and having no negative effect on non-cancerous cells which increased the possibility of a new cancer specific treatment.\(^2,3\)

Overview

Objective: To investigate the ability of ellagic acid and quercetin to inhibit telomere maintenance mechanisms and trigger apoptosis in fibrosarcoma cancer cells.

H\(_0\): If fibrosarcoma cells were exposed to a combination of ellagic acid and quercetin, then the cells would die because the combination was inhibiting telomere maintenance mechanisms and inducing apoptosis in the cells.

H\(_1\): There would be no statistically significant difference between the experimental and control groups.

Independent Variable: 150μl ellagic acid/quercetin treatment

Dependent Variable: Cell viability (%)

Procedure

Objective: To investigate the ability of ellagic acid and quercetin to inhibit telomere maintenance mechanisms and trigger apoptosis in fibrosarcoma cancer cells.

Figure 1: Cells were initiated, maintained, and grown in cell culture flasks (Figure 1)

Figure 2: Cells were subcultured into control and experimental groups (Figure 2)

Figure 3: Experimental groups were introduced to polyphenol-flavonoid compound solution (Figure 3)

Figure 4: Cell count measurements were taken using a hemocytometer to quantify cell viability (Figure 4)

Results

Average Cell Viability for Each Group

![Average Cell Viability for Each Group](image)

Percent Cell Viability vs. Trial

![Percent Cell Viability vs. Trial](image)

Conclusions

The average change in cell viability (Figure 5.6) between the control and experimental groups suggests that the combination of ellagic acid and quercetin effects the telomere maintenance mechanisms and induced apoptosis in fibrosarcoma cells. Furthermore the null hypothesis could be rejected with 99% confidence due to the p-values of 1.052 X 10\(^{-4}\) (TABLE 1) and 5.198 X 10\(^{-4}\) (TABLE 2), which are less than the alpha value of .05 and the Bonferroni corrected alpha value of .025.

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References


*Additional references attached