Effects of Viscum Extract on Fibroblastoma Viability in Cell Culture

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Abstract—Studies have shown association between some herbal extracts and cell proliferation in in vitro laboratory experiments. The aim of this study was to determine the effects of viscum extract on fibroblastoma cells viability in cell culture. In this laboratory experimental study, we used MTT assay to determine cell viability following administration of different doses of viscum extracts in fibroblastoma cell culture. The data were statically analyzed using ANOVA. The results showed that the administration of lower doses of viscum resulted in increased viability of fibroblastoma cells, however, of higher doses of viscum resulted in reduced viability of fibroblastoma cells. Our findings indicate that viability of fibroblastoma cells is influenced by viscum extract and based on the dose of extract the viability may be reduced or increased.

Keywords—Viscum Extract, Fibroblastoma, Viability.

I. INTRODUCTION

Viscum album is a species of mistletoe in the family Santalaceae, commonly known as Mistletoe, which is native to Europe and western and southern Asia [1]. It is a hemi-parasitic shrub, which grows on the stems of other trees. It has stems 30–100 centimetres long with dichotomous branching. The leaves are in opposite pairs, strap-shaped, entire, leathery textured, 2–8 centimetres long, 0.8–2.5 centimetres broad and are a yellowish-green in colour. The insect-pollinated flowers are inconspicuous, yellowish-green, 2–3 millimetres diameter. The fruit is a white or yellow berry containing one seed embedded in the very sticky, glutinous fruit pulp. It is commonly found in the crowns of broad-leaved trees, particularly apple, lime, hawthorn and poplar [2].

Studies have shown that Viscum extract has an antiobesity effect and protects against hepatic steatosis in mice with high-fat diet-induced obesity [3]. The inhibitory effects of viscum extract on pancreatic cancer also has been investigated and the results showed an association between viscum extract consumption and elevated survival rates in patient [4]. The reports also indicate that additional therapy with extracts of Viscum album [L.] (VaL) increases the quality of life of patients suffering from early stage breast cancer during chemotherapy [5]. It has also been shown that fermented mistletoe extract plays a role as a multimodal antitumoral agent in gliomas [6]. Viscum album L. extracts protects HeLa cells against nuclear and mitochondrial DNA damage [7]. Sedative, antiepileptic and antipsychotic effects of Viscum album L. (Loranthaceae) in mice and rats also have been reported [8]. On the other hand, giant fibroblastoma cells are rare types of soft tissue tumor marked by painless nodules in the dermis and subcutaneous tissue. These tumors may come back after surgery, but they do not spread to other parts of the body. They occur mostly in boys and are related to dermofibrosarcoma protuberans [9].

Despite considerable reports on inhibitory effects of viscum on cancer cells, there is not considerable report on the effects of Iranian viscum extract on cancer cells, particularly fibroblastoma cells. The main aim of this study was to determine the effects of viscum extract on fibroblastoma cells viability in cell culture.

II. MATERIAL AND METHODS

A. Extract preparation

Viscum extract was prepared according to previous studies [4]-[8] and different concentrations of extract (10mg/ml, 1mg/ml, 0.1mg/ml, 0.001mg/ml) were used in our study.

B. Protocol of Study

We used MTT assay in this work to determine the effects of viscum extract on fibroblastoma cells viability in cell culture. Briefly, the procedure was carried out in the following steps: DAY ONE: 100 µl of cells (15000 cells) was added into each well (96 well plate) and incubate at 37 with 5%CO2 overnight. DAY TWO: The media was removed and extract was added and incubated at 37 with 5%CO2 overnight. For control 10%FBS was added to media. DAY THREE: extract was removed from media. 20 µl of 5 mg/ml MTT was added to each well and incubated for 4 hours at 37°C. 150 µl isopropanol was added and covered with tinfoil and agitate cells on orbital shaker for 15 min. Absorbance was read at 570 nm with a reference filter of 630 nm and recorded.
C. Statistical Analysis

Statistical significance was evaluated by one-way analysis of variance (ANOVA) using SPSS 19. Significance was measured using Fisher’s least significant for the exact P values and significant differences are noted in the results. Differences with P<0.05 were considered significant

III. RESULTS

Figure 1 represents viability of fibroblastoma cells related to different doses of viscum extract.

![Viability of fibroblastoma cells in response to different doses of viscum extract.](image)

Our results show that lower doses (1- 7.5 mg/ml) of viscum extract have proliferative effects on fibroblastoma cell, however, higher doses (>7.5 – 10 mg/ml) of viscum extract have inhibitory effects on cell viability of fibroblastoma cells.

IV. DISCUSSION

In our study, we reported the dose dependent inhibitory or excitatory effect of viscum extract on cell viability of fibroblastoma cell. Our findings indicate that higher doses of viscum extract have inhibitory effects on fibroblastoma tumor cells proliferation. In accordance with our study there are other reports indicating that administration of viscum extract inhibit tumor growth [6], [7]. Viscum also has proved a significant anticancer effect in both experimental studies and clinical trials [10]. The reports also indicate that a new development of triterpene acid-containing extracts from Viscum album L. displays synergistic induction of apoptosis in acute lymphoblastic leukaemia [11]. In line with our findings, the reports also show that the inhibitory effects of viscum extract on tumor cells in cell culture is dose dependent [12].

V. CONCLUSION

We have shown that higher dose of Iranian viscum extract has inhibitory effect on cell viability of fibroblastoma cells, indicating the potential power of viscum extract in treatment of cancer cells.

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REFERENCES