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薑黃 추출물의 암세포 성장 억제 효과

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Curcuma Longa L. Extract Controls Cancer Cell (Sarcoma 180) Growth

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ABSTRACT

Objectives : The anticancer response of three different types of water extracts of Zingiberaceae *Curcuma longa* L. tested for sarcoma 180. Only few studies carried out to investigate the effects of other contents of *Curcuma longa* L. in anticancer activities, therefore, in this study we have investigated the effects of other component then curcumin in *Curcuma longa* L. for anticancer activities.

Methods : Three different types of water extracts of *Curcuma longa* L. were prepared as follows. The sarcoma cells (S180) were maintained in Dulbecco's modified Eagle's medium (DMEM) and were seeded on 24-well cell culture cluster flat bottom with lid tissue culture treated non-pyrogenic polystyrene. The growth of sarcoma 180 was monitored for 1, 2 and 5 days. The sarcoma cells were pictured using inverted microscope and cell density was counted using hemocytometry.

Results : After 5 days in the culture medium the results showed high growth of sarcoma 180 for control condition and the surface of CCP plates were fully covered with the cells. In case of medium in which the 10 % of filtered water extract of *Curcuma longa* L. was added a very limited growth of sarcoma 180 was observed. The results were showed only small difference in cell density for two different concentrations of unfiltered water extracts of *Curcuma longa* L. whereasin case of filtered water extracts the control of sarcoma growth shows better result.

Conclusion : The filtered water extracts showed the best result relatively to the unfiltered water extracts for two different concentrations. This indicates that the water extracts of *Curcuma longa* L. can have anticancer activities possibly without curcumin.

Key words : *Curcuma Longa* L., sarcoma 180, cell growth.

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Introduction

In The ayurvedic medicine has been used for medical care in south Asia since many thousands years[1]. The food and eating have a great effect on our health and particularly it has symbolic value among many south Asian ethnic groups[2]. For example, the *Curcuma longa* L. (Indian yellow curry powder) it has many medical benefits in the human body and commonly used in the food. Many researcher showed it has antioxidant[3-6] and anti tumour[7, 8] activities those can applied for breast cancer[9], lung cancer[10], leukemia[11], and skin cancer[12] treatments as well as is effective for HIV anti-activity[13].

The main chemical contents in *Curcuma longa* L. are protein, fat, mineral matter, carbohydrates, the essential oil. The other components can be obtained by steam distillation of the rhizomes has the following constituents -phellandrene, sabinene, cineol, borneol, zingiberene, sesquiterpenes, curcumin as well as the monodemethoxy and bisdemethoxy derivatives of curcumin have been isolated from the rhizome[1]. In above mentioned component the curcumin was reported the main component for anti-tumour, anti-oxidant, anti-inflammatory and anti HIV activities[3-8, 13] as this may be due to capability of inducing apoptosis in numerous cellular systems. The properties and mode of action of curcumin has been discussed by Duvoix et al[14] in a review paper describing the carcinogenesis, gene expression mechanisms and drug metabolism. Mohanty et al[15] have evaluated the cardioprotective potential of *Curcuma longa* L. (Turmeric) in the ischemia-reperfusion model of myocardial infarction.

In above all studies the chemo-preventive activities of curcumin might be due to its ability to induce apoptosis and to arrest cell cycle, however, the accurate effect of this compound is not yet fully known. Pillai et al[10] have investigated the cellular and molecular changes induced by curcumin leading to the induction ofapoptosis in human lung cancer cell lines A549 and H1299. They have treated lung cancer cells with curcumin and it inhibited the growth of both the cell lines in a concentration dependent manner.

The role of curcumin for antioxidant, anti tumour and anti cancer studied extensively by many researchers as discussed above and only few studies carried out to investigate the effects of other contents of *Curcuma longa* L. in anticancer activities. Therefore, in this study we have investigated the effects of other component then curcumin in *Curcuma longa* L. for anticancer activities. The curcumin is insoluble in water and water extracts of *Curcuma longa* L. showed the resistance to neuron cell damage of PC12 cells from pyrogallol-induced cell death and hypoxic/ischemic brain injury[16].

Therefore the present author have used the water extracts of *Curcuma longa* L. to investigate the effects of water extract contents other than curcumin in *Curcuma longa* L. for anticancer activities in sarcoma 180.

Materials and Methods

Curcuma longa L. is also known by the names Jiang Huang, Curcuma, and Haridra. The part of the plant used medicinally is the rhizome, and is native to Southern Asia. To make certain the genus originality, the root tuber of *Curcuma longa* L. was purchased from India.

Three different types of water extracts of the root tuber of *Curcuma longa* L. were prepared as follows. 1 gram of *Curcuma longa* L. root tuber powder purchased from local market in India was refluxed in 10 ㎖ of H_2O for 10 min at room temperature. After that the solution was centrifuged at 1,200×*g* for 15 min, the solution was separated in three parts of 3 ㎖ each. One part was filtered using a membrane filter of 0.25 ㎛ pore size and referred as (CL F). The second part was remains as it is without any filtrations (CL C) and third part was diluted with adding 3 ㎖ water (CL D).

The sarcoma cells (S180) were maintained in Dulbecco's modified Eagle's medium (DMEM)

supplemented with 10 % fetal bovine serum (FBS), 100 ㎎/L streptomycin, and 100 IU/ml penicillin at 37 ℃ in a humidified atmosphere of 5 % CO_2. The sarcoma cells (1×10^4 number/㎖) were seeded on 24-well cell culture cluster flat bottom with lid tissue culture treated non-pyrogenic polystyrene (Corning Incorporated Costar 3526 ; Corning, USA).

Four different types of medium were prepared a s : first 10 % of normal water was added in the normal culture medium (called control condition), second 10 % of CL F was added in the normal culture medium (called CL F treated), third 10 % of CL C was added in the normal culture medium (called CL C treated) and finally 10 % of CL D was added in the normal culture medium (called CL D treated). All these four mediums were used for sarcoma 180 cells seeded on cells culture polystyrene and put in the incubator. The growth of sarcoma 180 was monitored for 1, 2 and 5 days. The sarcoma cells were pictured using inverted microscope and cell density was counted using hemocytometry.

Results and Discussion

The inverted optical microscope images of the sarcoma 180 cells were taken after cultured at different times on cell culture polystyrene (CCP) for controlled and different water extracts of *Curcuma longa* L. Figure 1 shows a comparison of growth of the sarcoma 180 for controlled and treated with water extract of *Curcuma longa* L. at different times (seeding time (0 hr), 1 day, 2 days and 5 days). After 5 days in the culture medium the results showed high growth of sarcoma 180 for control condition and the surface of CCP plates were fully covered with the cells. In case of medium in which the 10 % of filtered water extract of *Curcuma longa* L. (CL F) was added a very limited growth of sarcoma 180 was observed. This indicates that the water extracts of *Curcuma longa* L. can have anticancer activities.

Figure 2 shows a comparatively larger scale microscopic (relatively to the figure 1) view of sarcoma cells growth for control and three different types of water extracts CL F, CL C, and CL D conditions after 5 days in culture medium. In case of control conditions the sarcoma cells were showed a uniform growth all over the place whereas on all there different water extracts conditions the sarcoma 180 growth was highly non-uniform and was very much limited. The filtered water extracts showed the best results to have a maximum control of the sarcoma 180 cells growth.

Figure 3 shows the quantitative analysis of cell density in control and three different water extracts. The results were showed only small difference in cell density for two different concentrations of unfiltered water extracts of *Curcuma longa* L. whereasin case of filtered water extracts the control of sarcoma growth shows better result. This shows the all water extracts can help to limit the growth of sarcoma 180.

As many authors reported that curcumin in *Curcuma longa* L. has a great effect as antioxidant and anti tumour in the human body. The above finding suggests that contents of water extracts of *Curcuma longa* L. (for example, protein, fat, mineral matter, carbohydrates, the essential oil) possibly other than curcumin (as curcumin is unsolvable in water) also has anti tumour effects.

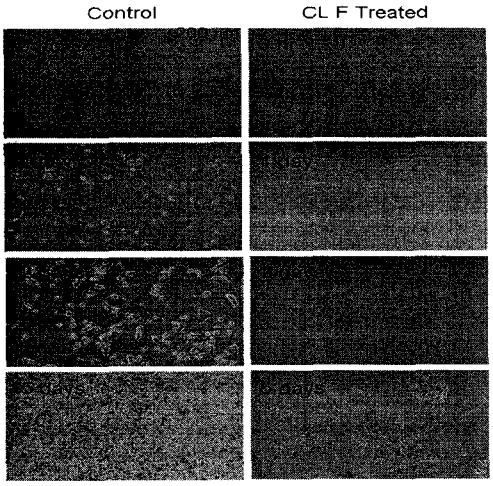

Figure 1 : Inverted microscopic pictures of sarcoma 180 cells at different times in control and CL F treated conditions.

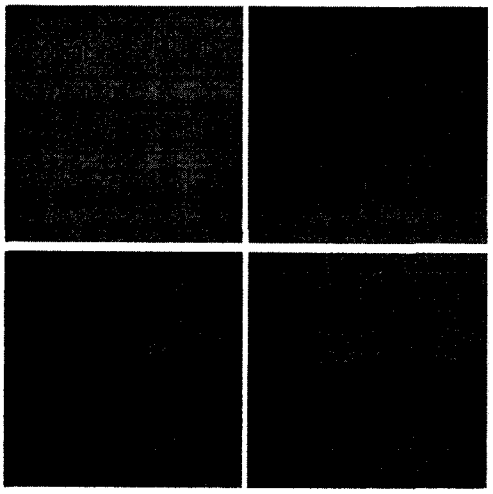

Figure 2 : Large scale view of inverted microscopic picture of sarcoma 180 cells for control and three different types of water extracts of *Curcuma longa* L. after 5 days in culture medium.

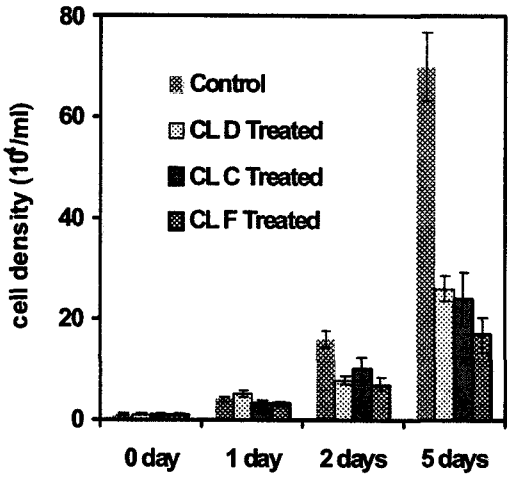

Figure 3 : Variation of sarcoma 180 cell density with different types of water extracts of *Curcuma longa* L. after 5 days in culture medium.

Conclusions

The anticancer response of three different types of water extracts of the root tuber of *Curcuma longa* L. tested for sarcoma 180. The growth of sarcoma was controlled when the water extracts were added into medium. The filtered water extracts showed the best result relatively to the unfiltered water extracts for two different concentrations. This indicates that the water extracts of the root tuber of *Curcuma longa* L. can have anticancer activities possibly without curcumin.

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