

The Antigenotoxicity of *Eruca sativa* Mill Extract on Bone marrow Cells of Male Albino Mice Treated With Vincristine

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Abstract

Chemotherapy drugs have a major role in fighting cancer but, that doesn't mean they are clear from side effect on human health. One of these drugs is vincristine this study, the chemopreventive potency of the crude extract of *In Eruca Sativa* Mill Which have a good reputation as antioxidant and anticancer against chromosomal aberration and suppressed mitotic index in bonemarrow cells of male albino mice treated with 50 μ l of vincristine intrapritoneally(ip) have been detected.

Results Showed a Significant increasing in the percentage of the mitotic index nearly to the control group and a significant decrease in chromosomal aberration after (35) days of treatment with 250 mg/kg crude extract of *Eruca sativa*. These results suggested a strong antigenotoxicity effect against vincristine damages on bonemarrow cells.

Key Words: Antigenotoxicity ,Bonemarrow cell, Vincristine ,*Eruca Sativa*

Introduction

Folk medicine uses many medicinal herbs, Which are not free from Toxic effects. Some of them can cause adverse effects or interact with other medication [1]. It is Known that green plants in general are primary source of antimutagens as Well as a natural toxic agent can be considered as mutagenic, clastogenic and carcinogenic both *in vivo* and [1,2,3,4,5]. *troIn vi* It this study the extract of *Eruca sativa* Mill Which commonly Known as Rocket plant or Aljarjeer was used .It is a herbaceous plant with great importance as salad vegetable and spice, especially among Mediterranean people[6]. It is one of Brassicaceae family possesses medicinal and therapeutic properities including inhibition of tumorigenesis[7], eye infection, digestive and Kidney problems, antiscrbutic, diuretic and it's always considered potent aphrodisiac [6]. Also, it has been reported the antioxidant and anticancer abilities [8]. Another research showed the cytoprotective and antiulcer activities[9]

Lamyet *al.* [10] showed the antigenotoxicity of rocket extract on (HepG2) cells (human hepatoma cells) . Non aqueous extract of this plant showed maximum antibacterial activity against BLB bacterial leaf blight disease of rice[11]. Also, antimicrobial resistant gram negativity and positive bacteria [12]. Methanolic extract of rocket enhanced the activity of clarithromycin against resistant *E.coli* strains [13]. Finally, the rocket seed extract was used as anti-inflammatory[14].

Material and Methods

A-*Eruca sativa* extraction:

The plant material was purchased from local market in Baghdad, Iraq. For the extraction, the plant was first washed free of sand ,then crushed in to very small pieces and the juice was subsequently squeezed out[10].

B-Animal treatment:

Twenty four adult male mice with weight rang between(30-36) gm were purchased form Biotechnology Research Center and maintained on (10-14) hour light dark cycle in the animal house. Control and treated mice were provided with food and water *ad libitum*, there were no differences in food intaka, each composed of eight mice.

The first group received normal saline as control group. The second group received 50 μ l of vincristine obtained from BDH chemicals(ip) intrapritoneally.

The third group received the same does of vincristine then treated

With 250 mg/kg of body weight crude extract of *Eruca sativa* for35 days of treatment.

C-Cytogenic experiments:

1-Chromosome preparation from mouse bonemarrow. This preparation was done according to Allenet *al.*[15].

2-Mitotic Index (M.I)

The slides were examined under high dry power (40X) of light microscope and (1000) divided and non-divided cells were counted and the percentage rate was calculated for only the divided ones according to the following equation:-

No.ofdividing cells $\times 100$ [16]

M.I = -----

No.ofdividingcells+No.o fnondivding cells

D- Statistical analysis:

Statistical analysis was performed using (ANOVA) test. Statisticalsignificancewas determined at $p < 0.05$ [17]

Results

A-The effect of *Eruca sativa* extract on mitoticindex in bonemarrow cells of male albion mice treated with vincristine:

Table (1) showed a significant ($p < 0.05$) decrease in mitotic index of albino mice bonemarrow treated with vincrstine but, after the use of *Eruca sativa* extract there was an increase in the percentage of mitotic index similar to that found in control group.

B-The effect of *Eruca sativa* extract on chromosomal aberration induced by vincristine in bonemarrow cells of male albino mice:

There was significant increase ($p < 0.05$) in the percentage of chromosome aberration compared with control group Table(2), the percentage of ring chromosome, was similar to that found in control. Due to the use of *Eruca sativa* extract, obvious decrease in the percentage of chromosome aberration was found.

Discussion

In spite of the benefits of chemotherapeutic drugs against cancer. It also, can cause chromosomal abnormalities due to the interfering with cell division and targeting the synthesis and function of DNA by binding to it (18). They considered a clastogenic compound [19, 20]. Also, they can affectct the fertility and progeny outcome [12].

Vincristine is one if these drugs which used as anticarcinogenic. Various types of secondary tumors in normal cells could resulting from prolonged use of these drugs . So, supplementation with natural antioxidant material may be reduced thegenotoxicity caused by chemotherapy [22, 23]. Due to the good reputation of *Eruca sativa* or rocket plant or aljarjeer which is widely used in folk medicine ;this study tried to evaluate the effect of this plant extract on the genotoxicity caused by vincristine .the results in table 1 and 2 showed a significant arising in mitotic index percentage and a significant decrease of chromosome abnormalities and that is similar to the results of Lamyet *al.*[10] when they noticed the antigenotoxicity of rocket extract on human hepatoma (HepG2) cells towards benzo (a)

pyrene induced DNA damage. Many researches explained the antimutagenic potential of different plant extracts[24,25,26,23].

Concerning the results of this study, the putative role of *Eruca sativa* extract on cancer chemoprevention due to the bioactivity of (GLS) Glucosinolate hydrolysis product namely (Isothiocyanate) ITCs and its derived Erucin (ER) which is a major component found in rocket salad leaves and other parts.

There is so many evidences about the cancer chemoprevention of ER *in vitro* and *in vivo* studies [8]. The antioxidant effect of ER due to its reactivity with hydrogen peroxide and alkylhydroperoxides accumulated in cell and peripheral blood to form water and an alcohol [27,28], or induction of phase II enzyme, or acting as precursor of sulforaphene (potent inducers detoxification electrophiles and increase cellular antioxidant defenses) [28,29].

Other compounds beside ITCs may also protect DNA from damage, like: polyphenolic compounds, carotenoids, volatile oils, flavonoids [10,14,30,31,32,33,34]. Vitamin C which also antioxidant both *in vitro* and *in vivo* has the potential of altering the genotoxic effects of reactive oxygen metabolic (ROMS) which can promote carcinogenesis by damaging DNA [35,36]. All these compounds known for their chemopreventive activities and the interaction of these compounds led to the strong antigenotoxicity of *Eruca sativa* extract [10].

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Table (1): Percentage of mitotic index in male mice bone marrow cells of different experimental groups.

Groups	Mitotic index % (mean \pm SE)
Control	A 10.66 + 1.93
Vincristne (50 μ l)	B 3.83 + 1.45
(250mg/kg) <i>Eruca sativa</i> extract	A 11.92+ 2.03

Different letters (A,B,C) mean Significant at (p<0.05)

Table (2): Percentage of chromosomal aberration in male mice bone marrow of different experimental groups

Groups	Chromosomal Aberration % $m \pm SE$								
	Chromatid break	Chromatid gap	Deletion	Dicentric	Acentric	Ring	Chromosome break	Chromosome gap	Total
Control	A 0.05+0.005	A 0.04+0.006	A 0.19+0.006	A 0.18+0.009	A 0.21+0.006	A 0.04+0.008	A 0.08+0.004	A 0.02+0.009	A 0.81+0.023
Vincristine (50 μ l)	B 0.22+0.09	B 0.21+0.07	B 0.32+0.07	B 0.51+0.32	B 0.82+0.33	A 0.04+0.004	B 0.12+0.006	B 0.14+0.030	B 2.38+0.81
(250mg/kg) <i>Eruca sativa</i> extract	C 0.00+0.00	A 0.01+0.003	A 0.12+0.008	C 0.03+0.001	C 0.06+0.005	B 0.01+0.003	A 0.03+0.008	A 0.00+0.000	A 0.35+0.007

marrow of different experimental groups

Different letters (A,B,C) mean significant at ($p < 0.05$)

الفعالية المضادة للسمية الجينية لمستخلص نبات الجرجير على خلايا نقي العظم لذكور الفئران البيض المعاملة بعقار الفنكروستين

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الخلاصة

العقاقير المضادة للأورام لها دور كبير وأساسي في محاربة السرطان. لكن هذا لا يعني خلو هذه العقاقير من التأثيرات الجانبية في صحة الإنسان، احد هذه العقاقير هو الفنكروستين. في هذه الدراسة تم التحقق من القابلية الوقائية للمستخلص الخام لنبات الجرجير والذي يحظى بسمعة جيدة بوصفه نباتاً مضاداً للسرطان و ضد النشوهات الكروموسومية وانخفاض دالة الانقسام لخلايا نقي العظم في ذكور الفئران البيض المعاملة بجرعة 50 مايكروليتر من الفنكروستين المحقون داخل الخلب البريتوني.

بينت النتائج زيادة معنوية في دالة الانقسام مقارنة لنسبة مجموعة السيطرة وكذلك انخفاض معنوي للنشوهات الكروموسومية بعد خمسة وثلاثين يوماً من المعاملة بجرعة 250غم لكل كيلو غرام من وزن الجسم بالمستخلص الخام من نبات الجرجير. هذه النتائج تبين تأثيراً مضاداً للسمية الجينية في خلايا نقي العظام الناتجة من المعاملة بعقار الفنكروستين.

الكلمات المفتاحية: الفعالية المضادة للسمية الجينية، خلايا نقي العظم، عقار الفنكروستين، الجرجير .