

## ORIGINAL ARTICLE

# The Treatment of Hexavalent Chromium Induced Ovarian Cancer in Albino Rats with *Emblica Officinalis*. A Comparative Study

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## ABSTRACT

**Background:** Ovarian cancer may be treated with medicinal herbs like extract from *Emblica officinalis* Phytochemicals of this herb have antioxidant efficacy against oxidants and reduce cellular as well as genotoxicity.**Aims and objectives:** In current study hexavalent chromium induced ovarian cancer in albino rats were treated with *emblica officinalis* extract through a piolet project and measured its efficacy with the passage of time.**Research Design:** A comparative study of medicinal herbs, *Emblica officinalis* against ovarian cancer.**Population Sampling:** In this study female albino rates of about 100 gram body weight were selected comparatively.**Sample Size:** 15 female albino rates about equal weight were selected and divided them into different groups.**Place and Duration:** Present study was conducted from January 2022 to June 2022 at animal house of IMBB the University of Lahore and Biochemistry Department of Lahore Medical & Dental College Lahore Pakistan.**Methodology:** Total 15 female albino rates were selected in this study and divided them into different groups. In Group-A which is control all individuals were normal and not treated with anything. In Group-B and Group-C there were 5 rates in each group and they were treated with different strength of *Emblica officinalis* extract in distil water.**Results:** It has seen that the blood serum levels of CA-125, Alpha-fetoprotein and Lactate dehydrogenase in both group-B and group-C presented in table-2, table-3, table-4 and table-5 showed a remarkable significant changes ( $P \leq 0.05$ ) after intervals of time. The significant changes in blood serum levels of CA-125, Alpha-fetoprotein and Lactate dehydrogenase ( $37 \pm 0.01$ ,  $42 \pm 0.01$ ,  $341 \pm 0.01$ ) were noted in group-C individuals how were treated with 10mg/body weight ethanolic extract of *Emblica officinalis* for two month as compared to the control group-A.**Practical implication****Conclusion:** The significant changes in blood serum levels of CA-125, Alpha-fetoprotein and Lactate dehydrogenase ( $37 \pm 0.01$ ,  $42 \pm 0.01$ ,  $341 \pm 0.01$ ) were noted in group-C individuals how were treated with 10mg/body weight ethanolic extract of *Emblica officinalis* for two month as compared to the control group-A.**Keywords:** Alpha-fetoprotein, Lactate dehydrogenase, *Emblica officinalis*, Hexavalent Chromium

## INTRODUCTION

There are two ovaries in the female reproductive system, one on either side of the uterus. The reproductive hormones progesterone and estrogen are secrete by ovaries while eggs are also produced by these ovaries<sup>1</sup>. Cancer is a condition in which the body's aberrant cells proliferate uncontrollably<sup>2</sup>. Even if it later spreads to other body areas, cancer is typically termed after the area of the body where it first develops<sup>3</sup>. A category of illnesses known as ovarian cancer start in the ovaries or in nearby organs like the fallopian tubes and the peritoneum. On either side of the uterus, a woman's fallopian tubes are a pair of long, slender tubes are located<sup>4,5</sup>. The fallopian tubes carry eggs from the ovaries to the uterus<sup>6</sup>. Different researchers claimed in their studies that ovarian cancer have different stages initial stage is localized in which malignant cells found only in the ovaries or fallopian tubes and do not move in the body<sup>7,8</sup>. On the other hand in Meta or regional stage cancer cells move randomly to the nearest organs. While at distant stage malignant cells travel all over the body freely and caused serious side effect on the biological functions of different organs<sup>9</sup> The grade, on the other hand, describes how aberrant the cancer cells seem. In case of ovarian cancer many lab tests are recommended for example blood test, Imaging tests, Laparoscopy and Biopsy<sup>10</sup>.

Treatment is most effective when ovarian cancer is diagnosed in its early stages. It is crucial to pay attention to your body and understand what is typical for you because ovarian cancer frequently manifests as signs and symptoms. The only method to determine whether symptoms are due to something other than cancer is to visit doctor, nurse, or other healthcare provider<sup>11</sup>. There are numerous distinct tumor types and subtypes

of ovarian cancer<sup>12,13</sup>. Adenocarcinoma is the most typical tumor type, and serous adenocarcinoma is the most typical subtype of this tumor type<sup>13</sup>. The majority of serous adenocarcinomas are high-grade, rapidly expanding tumors. In different studies it has proved that when ovarian cancer develops by the mutation in DNA genetic code<sup>14</sup>. The precise reason for these genetic alterations is frequently unknown. Genetic alterations that take place in lifetime are the main cause of ovarian cancer. However, these genetic alterations can occasionally be inherited, which means new life born with them<sup>15</sup>.

Hereditary ovarian cancer is ovarian cancer brought on by inherited genetic abnormalities. Additionally, the genetic variants BRCA1 and BRCA2 can increase your risk of developing ovarian cancer<sup>16</sup>. Your risk of breast and other cancers is likewise increased by these two changes<sup>17,18</sup>. Since ancient times, the Indian traditional medical system known as "Ayurveda" has employed the fruit of the plant known as *Emblica officinalis* (Amla) to cure a variety of illnesses, including cancer<sup>1,19</sup>. There are 11 recognized medicinally significant components in the fruit of the *Emblica officinalis*, including ascorbic acid, 3-ethylgallic acid, isostrictinin, gallic acid, ellagic acid, 3,6-di-O-galloyl-D-glucose, chebulinic acid, quercetin, corilagin, and 1,6-di-O-galloyl-beta-D-glucose<sup>20,21</sup>.

**Significance of Study:** Medicinal plants are so safe than the synthetic compounds. The fruit of *emblica officinalis* i.e. Amla has number of medical applications even it is used against cancer.

**Research Gap:** Still the phytochemical of *emblica officinalis* are not fully extracted and this is a reason its proposed mode of action against cancer is identified

**Rationale of study:** The aims and objectives of current research were to study hexavalent chromium induced ovarian cancer in albino rats and treat them with ethanolic emblica officinalis extract through a piolet project and measured its efficacy with the passage of time.

**MATERIAL AND METHODS**

**Ethics Statement:** All animals (albino rats) were selected for current study according to the standard guidelines of health department of veterinary sciences Pakistan and study was approved by ethical committee Lahore Medical & Dental College Lahore.

**Research Design:** A comparative study of medicinal herbs, Emblica officinalis against ovarian cancer.

**Population Sampling:** In this study female albino rates of about 100 gram body weight were selected comparatively.

**Sample Size:** 15 female albino rates about equal weight were selected and divided them into different groups

**Emblica officinalis extract:** Water soluble ethanolic extract of Emblica officinalis fruit were used for treatment of ovarian cancer, 10mg/body weight and 5mg/body weight compositions in distil water .

**Sample collection method:** 3 ml blood taken from tail vein of each rat after intervals of one month total three samples of blood were taken and store in blood container after centrifugation.

**Hexavalent Chromium:** 3mg/body weight Hexavalent Chromium in distil water was given to the albino rates orally for the induced ovarian cancer

**Blood Tests and biopsy:** Blood serum levels of CA-125 blood test, alpha-fetoprotein (AFP), lactate dehydrogenase (LDH) and biopsy of ovaries were measured.

**Exclusion and inclusion criterial:** When 3mg/body weight Hexavalent Chromium in distil water was given to the albino rates orally malignancy developed in different biological parts. Inclusively other cancer parts and elements of carcinoma were not considered in study and focused only on ovarian cancer. While many factors like feed of albino rats blood collection water intake duration of treatment and number of sampling were considered the part of research and prepare results under their consideration.

**Data presentation:** Raw data of each parameter were presented after the application of Bio-statistic version- 22 in which standard mean deviation (Mean ± SD) with required significant (P≤0.05) value were considered for each biomarker.

**RESULTS**

During research blood serum levels of each group such as CA-125 blood test, alpha-fetoprotein (AFP), lactate dehydrogenase (LDH) were measured with the help of standard kit method and biopsy of ovaries were measured through high magnifying microscope. There were 15 female albino rats in three different groups. Individuals of group-A were not treated with any medicinal herb of with Hexavalent Chromium. Whereas 3mg/body weight Hexavalent Chromium orally in distal water were given to all individuals of Group-B and Group-C for induced ovarian cancer and 5mg/body weight and 10mg/body weight water soluble ethanolic extract of Emblica officinalis fruit were used for treatment of ovarian cancer. Blood samples were collected in two phases first after one month while second after two month of treatment and at the end of project biopsy were performed.

Table-1: Group-A: Control Group all individuals are non- treated

Biomarkers	Units	Mean ± SD	P value
CA-125	U/mL	7±0.01	0.01
Alpha-fetoprotein	ng/mL	11±0.02	0.02
Lactate dehydrogenase	IU/L	140±0.04	0.04

(P≤0.05)

Table-2: Group-B: Individuals treated with 5mg/body weight ethanolic extract of Emblica officinalis results after one month

Biomarkers	Units	Mean ± SD	P value
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CA-125	U/mL	49±0.01	0.01
Alpha-fetoprotein	ng/mL	78±0.02	0.02
Lactate dehydrogenase	IU/L	490±0.04	0.04

(P≤0.05)

Table-3: Group-B: Individuals treated with 5mg/body weight ethanolic extract of Emblica officinalis results after two month

Biomarkers	Units	Mean ± SD	P value
CA-125	U/mL	45±0.01	0.01
Alpha-fetoprotein	ng/mL	68±0.02	0.02
Lactate dehydrogenase	IU/L	440±0.04	0.04

(P≤0.05)

Table-4: Group-C: Individuals treated with 10mg/body weight ethanolic extract of Emblica officinalis results after one month

Biomarkers	Units	Mean ± SD	P value
CA-125	U/mL	40±0.01	0.01
Alpha-fetoprotein	ng/mL	52±0.01	0.01
Lactate dehydrogenase	IU/L	380±0.01	0.01

(P≤0.05)

Table-4: Group-C: Individuals treated with 10mg/body weight ethanolic extract of Emblica officinalis results after two month

Biomarkers	Units	Mean ± SD	P value
CA-125	U/mL	37±0.01	0.01
Alpha-fetoprotein	ng/mL	42±0.01	0.01
Lactate dehydrogenase	IU/L	341±0.01	0.01

(P≤0.05)

It has seen that the blood serum levels of CA-125, Alpha-fetoprotein and Lactate dehydrogenase in both group-B and group-C presented in table-2, table-3, table-4 and table-5 showed a remarkable significant changes (P≤0.05) after intervals of time. The significant changes in blood serum levels of CA-125, Alpha-fetoprotein and Lactate dehydrogenase (37±0.01, 42±0.01, 341±0.01) were noted in group-C individuals how were treated with 10mg/body weight ethanolic extract of Emblica officinalis for two month as compared to the control group-A.

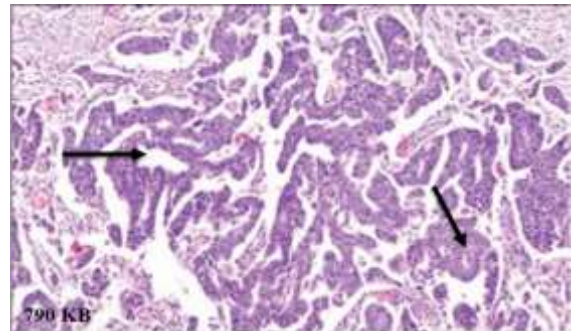


Figure-1: Treated with 5mg/body weight ethanolic extract of Emblica officinalis, group-B individuals under (790KB).

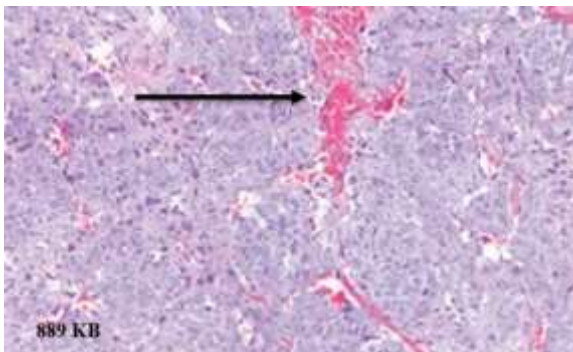


Figure-2: Treated with 5mg/body weight ethanolic extract of Emblica officinalis Section-based carcinoma In group-B individuals under (889KB).

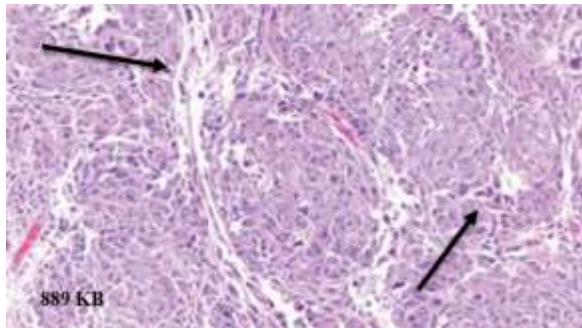


Figure-3: Treated with 10mg/body weight ethanolic extract of Emblica officinalis high-grade serous carcinoma in Group-C individuals under (889KB).

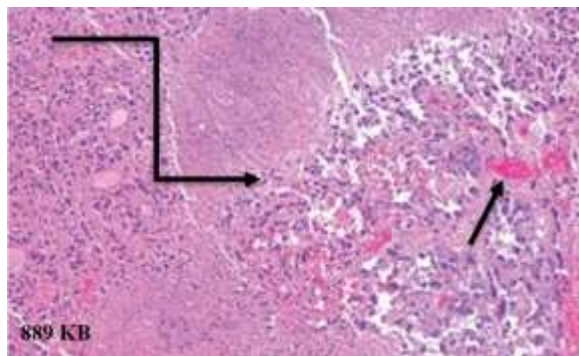


Figure-4: Treated with 10mg/body weight ethanolic extract of Emblica officinalis ovarian carcinoma in Group-C individuals under (889KB).

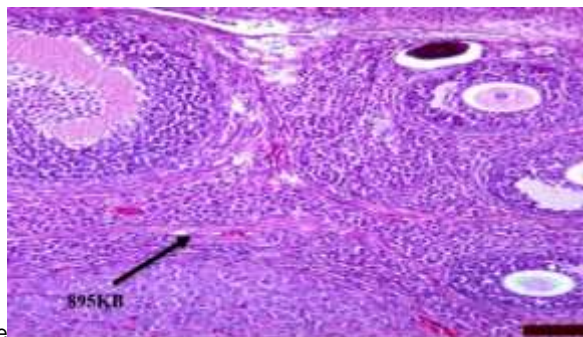


Figure-5: Control Ovary of female albino rat group-A

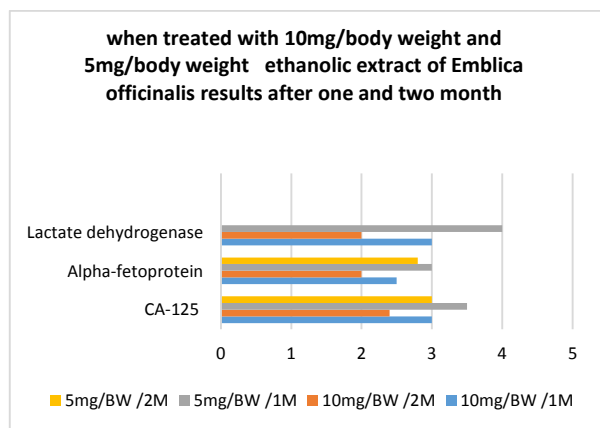


Figure-6: when individuals of B&C group treated with 10mg/body weight and 5mg/body weight ethanolic extract of Emblica officinalis Results after one and two month.

The significant changes in blood serum levels of CA-125, Alpha-fetoprotein and Lactate dehydrogenase ( $37\pm 0.01$ ,  $42\pm 0.01$ ,  $341\pm 0.01$ ) were noted in group-C individuals how were treated with 10mg/body weight ethanolic extract of Emblica officinalis for two month as compared to the control group-A. All cellular toxicity and genotoxicity of each group showed in figure-1, figure-2, figure-3, figure-4, and figure-5 reactively.

## DISCUSSION

We are constantly exposed to substances in our surroundings and food that have the potential to harm the integrity of our genome<sup>9,21</sup>. Reactive oxygen species produced during cell respiration and a number of xenobiotics are carcinogenic<sup>2,5</sup>. It was demonstrably shown that Emblica officinalis reduces mutagenesis in vitro using the traditional test for carcinogenicity, the Ames test. In vivo validation of this idea is more difficult<sup>12</sup>. Human cancer prevention research is a time-consuming, difficult task with many confounding variables. Fortunately, rat models of different malignancies can be used to investigate chemo- preventive capabilities of drugs<sup>5,7</sup>.

Numerous risk factors have been identified by researchers that could raise a woman's chances of acquiring epithelial ovarian cancer<sup>3</sup>. Other less prevalent forms of ovarian cancer include germ cell tumors and stromal tumors are not affected by these risk factors. Age increases the likelihood of acquiring ovarian cancer<sup>10,20</sup>. In women under the age of 40, ovarian cancer is uncommon. After menopause, most ovarian malignancies start to appear. Women 63 years of age or older account for half of all cases of ovarian cancer<sup>14,21</sup>. Numerous malignancies are more likely to be developed in people who are obese. Obesity and the risk of ovarian cancer are not well understood at this time<sup>11,13</sup>. Obese women those with a body mass index [BMI] of at least 30 are probably at a higher risk of getting ovarian cancer, though perhaps not the most severe forms, including high grade serous malignancies. A woman with ovarian cancer may experience worse overall survival if she is obese.<sup>4,8</sup>

Emblica officinalis is a significant herbal remedy that is frequently utilized in South Asian and Arab countries' Ayurvedic and Unani medical systems<sup>19</sup>. In these medical systems, various components of this tree have medicinal uses for things like cancer and boosting the immune system<sup>6,17</sup>. Important cellular processes, including as inflammation, cellular proliferation, and apoptosis, as well as the cell cycle and response indicators, are influenced by phytochemicals in emblica officinalis extracts<sup>1,18</sup>. Human colorectal (SW620), lung (A549), breast (MDA-MB-231), cervical (HeLa), ovarian (SK-OV3), and liver (HepG2) cancer cell lines are significantly inhibited in their ability to proliferate by Emblica officinalis<sup>3,16</sup>. This suppression was linked to the death receptor-mediated apoptosis pathway; apoptosis was brought on by the activation of caspase-3, caspase-7, and caspase-8<sup>14,15</sup>.

In present study the findings are very similar to the previous studies and it indicated that the blood serum levels of CA-125, Alpha-fetoprotein and Lactate dehydrogenase in both group-B and group-C presented in table-2, table-3, table-4 and table-5 showed a remarkable significant changes ( $P\leq 0.05$ ) after intervals of time<sup>1,19</sup>. The significant changes in blood serum levels of CA-125, Alpha-fetoprotein and Lactate dehydrogenase ( $37\pm 0.01$ ,  $42\pm 0.01$ ,  $341\pm 0.01$ ) were noted in group-C individuals how were treated with 10mg/body weight ethanolic extract of Emblica officinalis for two month as compared to the control group-A<sup>17,21</sup>.

## CONCLUSION

In this study the significant changes in blood serum levels of CA-125, Alpha-fetoprotein and Lactate dehydrogenase ( $37\pm 0.01$ ,  $42\pm 0.01$ ,  $341\pm 0.01$ ) were noted in group-C individuals how were treated with 10mg/body weight ethanolic extract of Emblica officinalis for two month as compared to the control group-A.

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