DELETERIOUS EFFECTS OF IONIZING RADIATION & LEAD ON BLOOD OF SWISS ALBINO MICE. THIS PROTECTED BY EMBLICA OFFICINALIS. LINN.

1K.K. NAYAK, 2A. CHAKRAWARTI, 3R.K. PUROHIT

1NAVJEEVAN SCIENCE COLLEGE
2LABORATORY OF ZOOLOGY
3SIKAR (INDIA) PIN 332001
23RADIATION BIOLOGY LABORATORY,
23DEPARTMENT OF ZOOLOGY,
23GOVT. DUNGAR COLLEGE, BIKANER (INDIA) PIN 334001

Abstract- The extensive use of ionizing radiation recent in various branches of natural economy, medicine, Physiology and science- Technology has made radiation injury on urgent problem attracting the attention not only of specialists in a variety of clinical disciplines but also of a vast army of theoretical scientists. The heavy metals such as Lead entre in human body via food chain and cosmetics. Various public health measures have been undertaken to control, prevent and treat metal toxicity. Emblica is a natural herbs which have been proved to be potent enough to check the radiation and heavy metals induced histopathological histochemcall, biochemical and Hematological levels in swiss albino mice. the recent study will shed light upon the modulatory influence of Emblica against the deleterious effects induced by simultaneous exposure of radiation and heavy metal in the blood of Swiss albino mice. Here, six to eight week old male swiss albino mice were selected and divided in to seven group: Group I (Sham. irradiated), Group II (Treated with Lead acetate 20 ppm), Group III (Irradiated with 3.0 Gy and 6.0 Gy gamma rays) Group IV (Irradiated and Lead acetate treated), Group V (Lead acetate and Emblica treated), Group VI (radiation and Emblica treated) Group VII (radiation and Lead acetate and Emblica) were scarified at each post treatment intervals of 1,2,4,7,14 and 28 days. The blood, was taken out quantitatively analyzed for different biochemical parameters. Value of blood cells and Hb were found to decrease in all groups as compared to normal group and Biochemical value of M.CV, PCV, SGOT/AST and SGPT/ALT were also found. to decrease and combined treatment of radiation and Lead acetate synergistic effects were observed but Emblica treated animals exhibited less severe damage as compared to nondrug treated animals at all. the corresponding Intervals. Emblica reduced the severity of damage and made the recovery of biochemical Parameters. Therefore Emblica has reported as a good radioprotection in radiotherapy during clinical application of human beings.

Keywords: Mice, Blood, Radiation, Lead, Emblica

INTRODUCTION

Since the discovery of the deleterious effects of ionizing radiation, studies have been focused on developing chemical radio protectors that have to ability to decrease the ill effects of radiation on normal tissues.Several phytoceuticals and plant extracts with innumerable pharmacological property in recent past have been reported to at as good radio protectors due to the ability of scavenging the free radical and modulating antioxidant defense system of the body up/down regulation of the antioxidant the gene expression.Emblica officinalis Gaertn. or Phyllanthus emblica Linn, commonly known as Indian gooseberry or amla, is arguably the most important medicinal plant in the Indian traditional system of medicine, the Ayurveda. Plant extracts of Emblica Officinalis has been found to have protective effects against the radiation induced disorders in mammals. In light of the above, the present study was aimed to evaluate the Protection provided by Emblica officinalis Linn. against radiation and lead induced Haematological changes in the Swiss albino mice Modification of radiation and lead acetate induced response is obtained by means of chemical substances that can significantly decrease the magnitude of response when present in biological system. This type of modification is classified as chemical protection and the substances responsible for it are called chemical protectors. A large number of compounds have been investigated for protective action by different workers. But these protectors are highly toxic at their effective dose levels except MPG

METHODOLOGY

Animal

For the purpose, six to eight weeks old male Swiss albino mice were procured from Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar. The Govt. Dungar College, Bikaner is registered (1066/ac/07/CPCSEA) under CPCSEA, Chennai. The College has its own Institutional Animal Ethics Committee. All the experiments in present investigation conducted under the supervision and guidelines of IAEC. The animals were kept in the polypropylene cages in the departmental animal house. The standard mice feed and water was provided ad libitum. The temperature of animal house was maintained between 20-25°C.
Amla (*Emblica officinalis*)
Fresh fruits of the Emblica officinalis were cleaned, cut into small pieces, air dried, powdered and extracted with double distilled water (DDW) by refluxing for 36 hrs. (12 hrs x 3). The extract thus obtained was vacuum evaporated so as to make it in powder form. The extract was redissolved in DDW just before oral administration. An approximate 38% yield of the extract was obtained. The drug was given orally in the form of Emblica extract at a dose of 1000mg/kg body weight/animal/day from seven days prior to Lead acetate treatment or irradiation till last autopsy day there for the present study was undertaken to evaluate the role of Emblica in modifying the radiation and lead induced hematological changes in the Swiss albino mice.

**Lead**
Lead salt in the form of Lead acetate was procured from Ranbaxy Laboratory Limited, India. Lead acetate was given in the drinking water at the dose of 20 ppm.

**Source and procedure of irradiation**
Cobalt-60 gamma radiotherapy source (Theratron) of AECL make, obtained from Canada was used to expose the animals. This facility was provided by the Radiotherapy Department of Prince Bijay Singh Memorial Hospital, Bikaner (Rajasthan).

The animals were irradiated at the dose rate ranging from 0.69 Gy/min to 1.22 Gy/min. The dose was calculated at the midpoint by multiplying dose rate and tissue air-ratio. The tissues of Swiss albino mice were assumed to be equivalent to human soft tissues.

**Plan of experimentation**
The animals were divided into the following
- Group – I: Sham-irradiated animals (normal).
- Group - II: Lead acetate treated animals
- Group - III: Only irradiated animals
  - Sub-group III a: 3.0 Gy
  - Sub-group III b: 6.0 Gy
- Group - IV: (Radiation + lead acetate)
  - Sub-group IV a: 3.0 Gy + lead acetate
  - Sub-group IV b: 6.0 Gy + lead acetate
- Group - V: Lead acetate + Emblica
- Group - VI: (Radiation + Emblica)
  - Sub-group VI a: 3.0 Gy + Emblica
  - Sub-group VI b: 6.0 Gy + Emblica
- Group - VII: (Radiation + lead acetate + Emblica)
  - Sub-group VII a: 3.0 Gy + lead acetate + Emblica
  - Sub-group VII b: 6.0 Gy + lead acetate + Emblica

**Autopsy of animals**
A minimum of three animals from each group were autopsied after 1, 2, 4, 7, 14 and 28 days of treatment. Three sham-irradiated mice were also be autopsied. The animals were sacrificed by cervical dislocation. Prior to autopsy the animals were weighed.

1. **Haematological Studies:**
   1. Red blood corpuscles (RBC)
   2. White blood corpuscles (WBC)
   3. Haemoglobin (Hb)
   4. Packed cell volume (PCV)
   5. Mean cell volume (MCV)
   6. Mean corpuscular haemoglobin (MCH)
   7. Mean corpuscular haemoglobin concentration (MCHC)
   8. Differential Leucocyte Counting

2. **Biochemical Studies:**
   1. Serum glutamic oxaloacetic transaminase (SGOT) /
   2. Aspartate amino transferase (AST)
   3. Serum glutamic pyruvic transferase (SGPT) /
   4. Alanine amino transferase (ALT)
Result and Discussion
In this experiment Haematological change observed which dose dependent in the blood of swiss albino mice. The severe changes seen in the blood of model Animal after treated to heavy metal and 3. Gy, and 6 Gy gamma radiation the symptom appeared within 3 to 05 days after exposure in model animal such as low intake of food and water, weight loss, weakness, irritability and ruffling of hair. these changes were marked on day 7 but on day 14 the sign of recovery were observed and day 28, comparatively better Hematological value was observed

Hematological Parameters
The values of RBC, WBC, Hb and PCV were found to decrease in all the groups as compared to normal group, but the decrease in these values was lesser in Emblica treated groups (V to VII) as compared to non-drug treated groups (II to IV). The values of MCV were also found to decrease but the difference from normal value was significant at previous intervals and it was non significant on later intervals. The values of MCH increased in all the groups as compared with normal group after days 1, 2, 4, 7 and 14. Thereafter a fall in the values was noted on day-28 without reaching to the normal. The increase in the value of MCH was lesser in Emblica treated groups (V to VII) as compared to non drug treated groups (II to IV). Besides this values of MCH in all the groups at various intervals but the values were lower in the Emblica treated groups (V to VII) as compared to non-drug treated groups (II to IV). The difference from the normal was non-significant in all the groups. The value of lymphocytes declined up to day-14 in non drug treated groups and day-7 in the Emblica treated groups. Similarly the values of monocytes and granulocytes percentage increased up to day-14 in the non drug treated animals and day-7 in the drug treated animals thereafter, a decrease in the value was noted up to day-28 without reaching to the normal. The values of SGOT/AST and SGPT/ALT elevated up to day-14 in the non drug treated groups and day-7 in the Emblica treated groups, thereafter a fall in the value was seen up to day-28. After exposure to a higher dose (6.0 Gy) similar changes were noticed but they were more pronounced and there was late manifestation of recovery. In the combined treatment of radiation and lead acetate synergistic effects were observed. The Emblica treated animals exhibited less severe damage as compared to non-drug treated animals at all the corresponding intervals. An early and fast recovery was also noticed in Emblica pretreated animals.

Lead Effect:
Lead toxicity is a Particularly insidious hazards with the potential of causing irreversible health effects. It is known to interfere with anumber of body. function and it is primarily affecting the Hematopoietic disorder in animal.

Radiation Effect:
The interaction of ionizing radiation with biological system results in the generation of many highly reactive short lived reaction oxygen species (ROS) mainly due to the hydrolysis of water. The major reactive species resulting from aqueous radiolysis include H, OH, RO2, H2O etc. These ROS attack cellular macromolecules like, DNA, RNA, Protein membranes etc. and cause it dysfunction and damage, ROS increased the membrane lipid peroxidation which Turn can alter the integrity of membrane structure leading to inactivation of membrane bound enzymes, loss of Permeability of the membrane and decrease in fluidity and DNA is the critical target of radiation damage in living cells, which may lead to alternation in the functional state of Cell and further to cell death.

Radio Protective Role of Emblica officinalis:
1. DNA strand breaks and mutation after exposure of radiation and also sign peroxidative changes in lipid and Protein.
2. Emblica extracts works as an antioxidant which reduces the oxidative change and DNA Damge
3. Emblica extract was also found to inhibit mutagenesis by direct bindings to certain mutagens as well as by in hibiting carcinogen. Activation Treatment of Emblica extract increased the 75H levels this Herb Showed good antioxidant activity in vitro.
4. Poly phenols are content of Emblica extract and these Polyphones works as a scavengers on free radicals which produced in the cell by radiation.
5. Emblica induced Haemopoiesis thus reducing the myelo seppression induced by radiation.
6. It stimulates antioxidant, activity and potent induced of Haemopoietic system, it is an excellent natural radioprotector.

CONCLUSION
• Ionizing radiation and Lead damage blood through a series of molecular events as the hematopoietic system is among the most radiosensitive in the body and it has a highest cell turn over. Alteration in cell division, cell death, depletion of stem cell pools is followed by haematological system dysfunction. The combined treatment of radiation and Lead showed synergistic changes. The blood of Emblica treated animals showed less severe radio lesions and early and fast recovery in comparison to non-drug treated animals. Thus, it seems that Emblica has protected the blood at both the dose levels with and without lead treatment. The Emblica might have protected the animals from radiation by more than one mechanism due its multiple properties of scavenging hydroxyl radicals and reducing alterations in enzyme activity. Thus, Emblica is a good herbal radio protector and future prospectus emphasize the potential in the area of natural product based radioprotector during discovery.
Normal RBCs and small Neutrophil

After 1 day of Lead acetate treatment showing crenation in RBCs and a complete monocyte.
After 7-days of Lead acetate treatment showing clusters and crenation in RBCs. Neutrophils are also seen.

After 1 day of gamma rays (3.0Gy) exposure displaying neutrophil and lymphocyte. Distorted RBCs are also seen.
After 4 days of gamma rays (3.0 Gy) exposure showing a complete neutrophil and lysing neutrophil. Crenated RBCs are also seen.

After 4 days of gamma rays (6.0 Gy) exposure showing bursting lymphocyte, crenated and clusters of RBCs.
After 7-days (Lead acetate+ 6.0 Gy) showing crenated and lysed RBCs with dissolving neutrophil.

After 14-day (6.0 Gy + lead acetate) showing normal neutrophil and dissolving neutrophil. Clusters of RBCs are also seen.
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