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Effect of *Physalis Peruviana* Against Lead Induced Toxicity in Male Albino Rats

A Thesis submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy

In

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ABSTRACT

Heavy metal pollution of food and water is one of the most difficult current global challenges. Lead is among the most abundant pollutants identified as a dangerous and widespread toxic substance. Lead can accumulate in the body leading to liver and kidney poisoning. It also affects the nervous system and is associated with high-risk complications for children's neurobehavioral growth. Recently, the use of folk drugs has become increasingly widespread in both urban and rural areas. Physalis Peruviana is one of the most effective in improving public health and preventing the harmful effects of heavy metals such as cadmium and carbon tetrachloride. Accordingly, the aim of this work is to assess the effect of *Physalis Peruviana* against lead induced toxicity.

A total of 72 rats were classified into 6 groups; three groups include 8 rats, and the three groups include 16 rats. The course of the study last for eight weeks (56 days). The study protocol was implemented into two phases every phase last for 4 weeks (28 days).

The following Parameters were measured after 4 and 8 weeks for the different groups:

- Weight change percentage
- Liver enzymes function tests (Serum alanine aminotransferase (ALT) and Serum aspartate aminotransferase (AST))
- Antioxidant and lipid peroxidation (oxidative stress markers)
  - Glutathione (GSH)
  - Catalase (CAT)
  - Superoxide dismutase (SOD)
  - Malondialdehyde (MDA)
- Concentration of lead in liver tissue
- Complete blood count.
- Histopathological examination for liver & kidney tissue

Conclusion

It could be concluded from the study that:

The presence of lead in diet of rats for 4 weeks increases each of the following:

↑ Serum alanine aminotransferase (ALT)

↑ Serum aspartate aminotransferase (AST)

↑ Malondialdehyde (MDA) in liver tissue

↑ Concentration of lead in liver tissue

The presence of lead in diet of rats for 4 weeks decreases each of the following enzymes in the liver tissue.

↓ Glutathione (GSH)

↓ Catalase (CAT)

↓ Superoxide dismutase (SOD)

The oral administration of *Physalis Peruviana* fruit solution to rats fed on lead acetate was found to mitigate the toxicity by:

Lowering the increase of the following parameters:

↓ Serum alanine aminotransferase (ALT)

↓ Serum aspartate aminotransferase (AST)

↓ Malondialdehyde (MDA) in liver tissue

↓ Concentration of lead in liver tissue and

Lowering the decrease, the following enzymes:

↑ Glutathione (GSH)

↑ Catalase (CAT)

↑ Superoxide dismutase (SOD)

In addition, oral administration of *Physalis Peruviana* fruit solution helped to reverse the damage occurred in liver tissue as a results of lead toxicity.

Co-administration of *Physalis Peruviana* with lead, as a prophylaxis measure, succeeded to reduce the development of histopathological changes associated with lead hepatotoxicity and reduced lead accumulation in liver tissue.

Recommendations

- ✓ Minimizing the further entry of lead into the environment.
- ✓ Conducting further studies on Physalis *Peruviana* plant
- ✓ Raising public awareness about the sources of heavy metals pollution, especially lead, because of their high-risk effects on public health.