

**STHE EFFECT OF ORDINARY BENZENE IN THE BRAIN OF ADULTS FEMALE  
OF LABORATORY MICE (*MUS MUSCULUS L.*)**

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**ABSTRACT**

This data was done to study the histopathological effect of toxicity of ordinary benzene inhalation on brain in laboratory mice (*Mus musculusL*).The present study was taken sixty adult female aged 2-3 month weighting 25-28 gm grouped into four groups that exposed to inhalation of 45 ppm, 9 pmm, 4.5 ppm, and fresh air for an hour/ day for 45 days. Then the mice were sacrificed and the brain prepared for histopathological exam. The result showed some clinical symptom and there is histopathological picture:-The group which exposed to inhalation of high dose appears of vaculation and gliosis of myelined nerve fiber also vaculation perkanji nerve cells in cerebrilum and there is neural vaculation in grey matter and oligosis, oligodendrocyte and astrocyte. In case of 9ppm there is gliosis with decreased in number of oligodendrocyte and moderate vaculation white and grey matters. In lesser dose there is less vaculation and gliosis of nerve fiber in white matter due to degeneration of myelin and there is vaculation of purkinje and nerve fiber as well as there is gliosis of oligodenderocyte and astercyte with grouped of neurons.

**KEYWORDS:** Ordinary Benzene, Brain and Mice.

**INTRODUCTION**

In modern society, thousands of hazardous chemicals and heavy metals are being produced and used in wide variety of work places all over the world. (1) Benzene is an hydrocarbon used as a solvent is found in the air from missions, from burning coal and oil gasoline service, station and motor vehicle.(2)

Benzene is widely distributed in the environment. The exposure scenario of most concern to the general public low-level inhalation over long period (3)

Erythroid leukemia, non Hodgkinslymphoma, myelomas and myelogenous leukemia have all been reported in human exposed to high concentration of benzene (4). The most characteristic effect resulting from intermediate and chronic benzene exposure is arrested development of blood cells. Also it auses a life threatening disorder caused aplastic anemia in human and

animals (5) Acute (short- term) inhalation exposure of human to benzene may causedrowsiness, dizziness, headaches as well as eye, skin,and respiratory tract irritation. (6)and long term inhalation exposure of benzene has been shown to cause hematotoxicity and increased incidence of acute myelogenousLeukemia in human. (7). Also long term inhalation exposure of benzene has been shown in B6C3f1 mice increased incidence of Lymphoma (8).Therefore our study provides in evidence for Ordinary benzene on the brain histologically.

### **Material and Method**

Sixty (60) adult female of *MusmusculusL*. Weighting (25-28)gm were used for these experiment they were housed and kept under controlled condition ( temperature  $26\pm 1$ , relative humidity 50-60 % , 12h –light-dark cycle, light on 7:00 a.m. ). Animal had free access to standard laboratory food and water. Experimental animals had been approved by a local ethics committee and were done in accordance to National Institutes of Health regulation and guidelines on animal experimentation.

Mice were randomly assigned into four groups each consisting of (15 mice)and exposed daily different doses of ordinary benzene inhalation for one hour every day during 45 days

- 1- Exposed to fresh air(controlled)
- 2- Exposed to inhalation of ordinary benzene (45ppm)/hour/day (a)
- 3-Exposed to 9ppm/hour/day (b)
- 4-Exposed to 4.5 ppm/hour /day (c)

The experiment continued for 45 days then themice were sacrificed by de capitation ,then the brain were carefully dissected from each mice and were prepared for histopathological exam( 9). Tissue was prepared for embedded in paraffin wax then sections were cut at 5 micron and stained with routine stain H&E (10)

### **Results**

The control group which exposed to fresh air showed normal histological section in brain that composed of grey matter and white matter and both matter contained neurological cells and nerve cell (figure 1,2 ). Inhalation of ordinary benzene in female of the mice during 45 days of experimental period to the different doses appears that in rodent (mice) toxic effect of ordinary benzene on brain give clinical symptom and there is such histopathological picture :-

There is vacuolated of white matter in brain due to degeneration of myelin and evidence of neural degeneration characterized by degrees of toxicological changes in relation to degrees of toxicological benzene inhalation. In group A which Exposed to high dose (45ppm) the tissue of brain showed sever gliosis and vacuolation of myelinated nerve fibers. Also vacuolation of purkinje nerve cells in cerebellum ( figure 3)and neural vacuolation in grey matter, there is oligosis of oligodendrocytes and astrocytes ( figure 4) The data have shown that exposed to the (9ppm) ordinary benzene appeared of gliosis with decreased in number of oligodendrocyte and astrocyte and there is moderate vacuolation in nerve fiber in white matter(figure 5) also the result showed vacuolation in neuron in gray matter (figure 6). Finally during exposure to lesser dose(4.5 ppm) the histopathological picture is less or moderate changes such as vacuolation and gliosis of nerve fiber in white matter due to degeneration of myelin(figure7) .Also there is vacuolation of purkinje cells and nerve fiber as well as there oligosis of oligo denderocyt and asterocyt with grouped of neurons(figure 8)

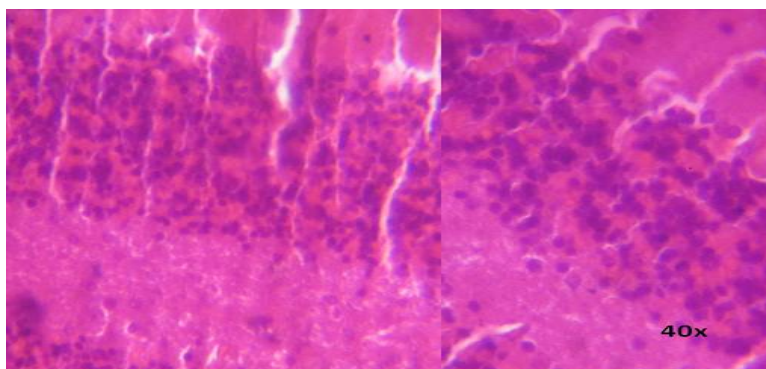


Figure (1) section though grey matter shows neurons (cerebellum) in control(H&E stain)

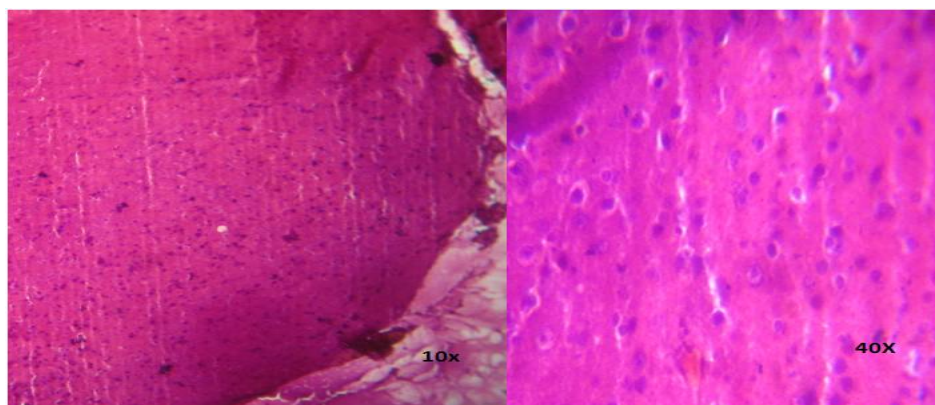
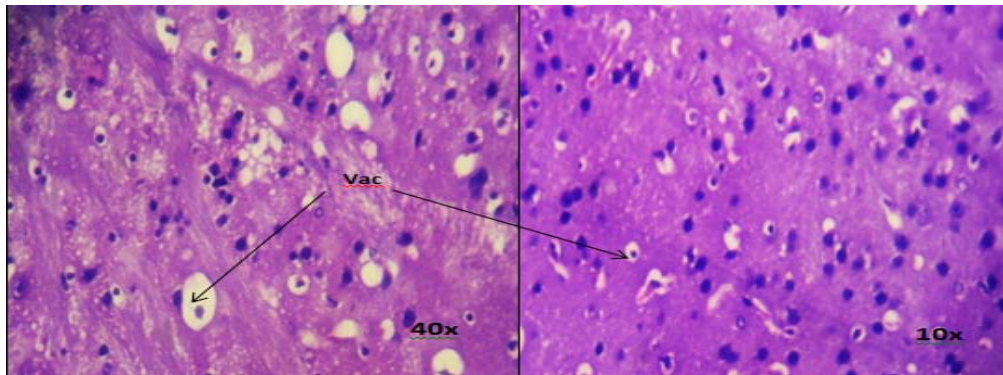
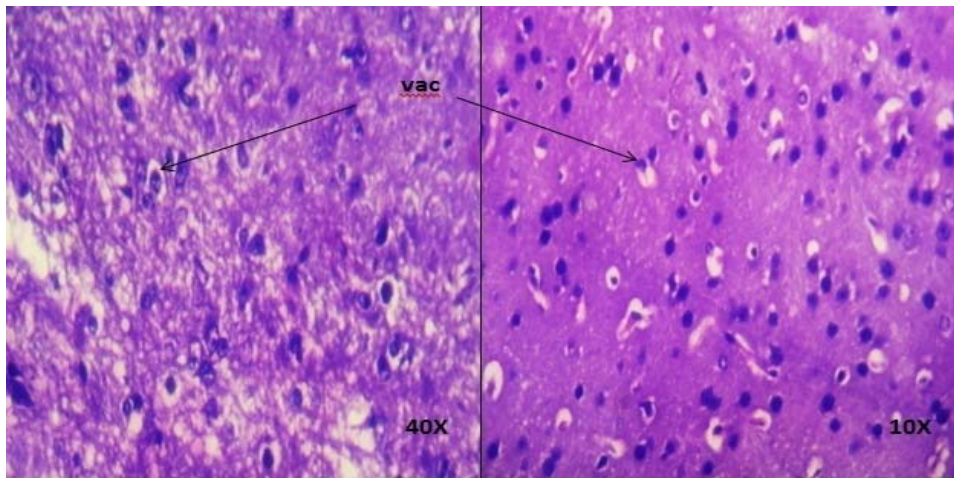


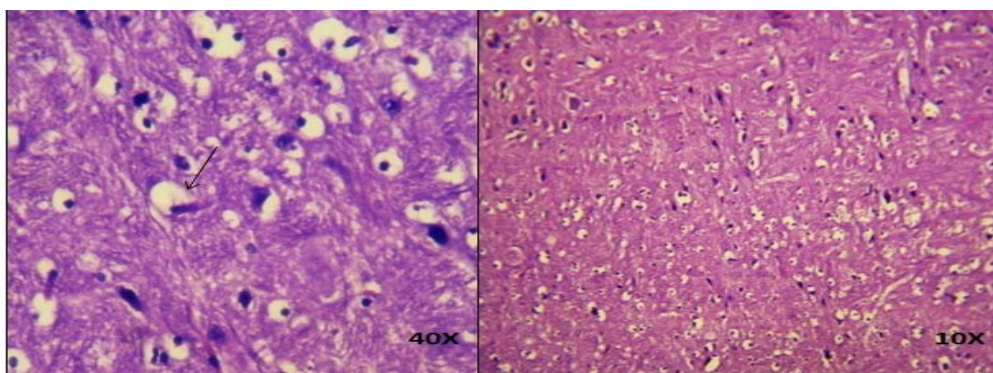
Figure (2) section though grey matter shows neurons in control(H&E stain).



Figure(3): Transverse section through white matter shows severe vacuolation of oligodendrocyte in group A (H&E stain)



Figure(4): Section through grey matter shows vacuolation of oligodendrocyte in group A (H&E stain)



Figure(5): Section show vacuolated nerve fiber of white matter in group B (H&E stain)



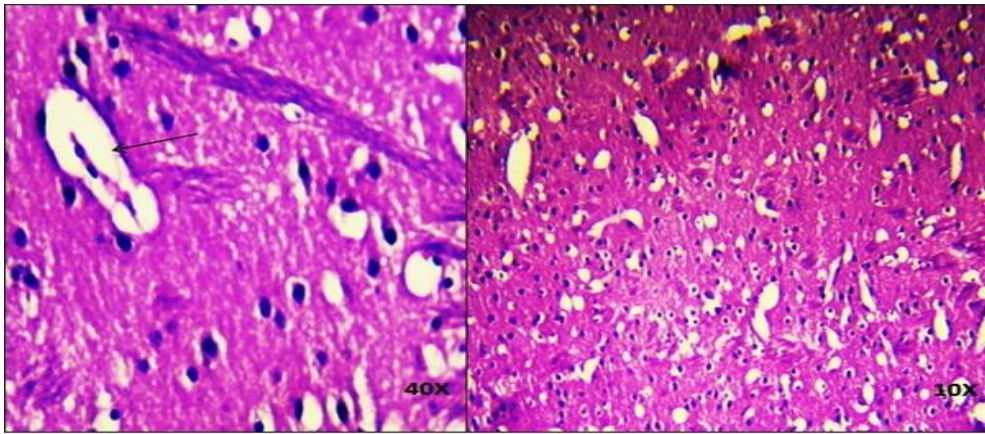
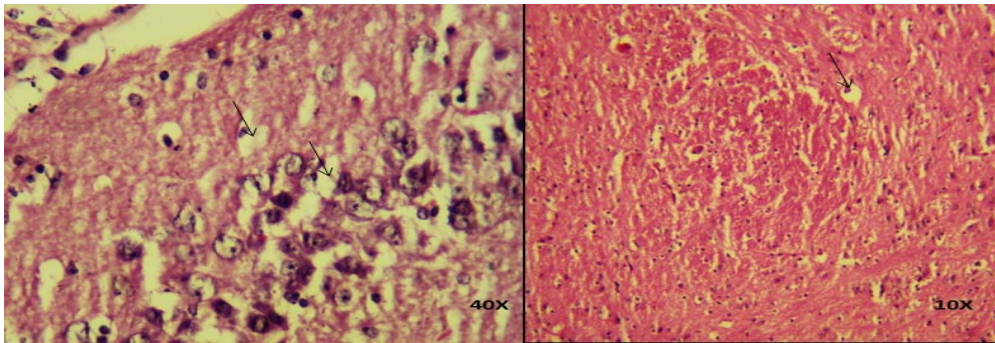
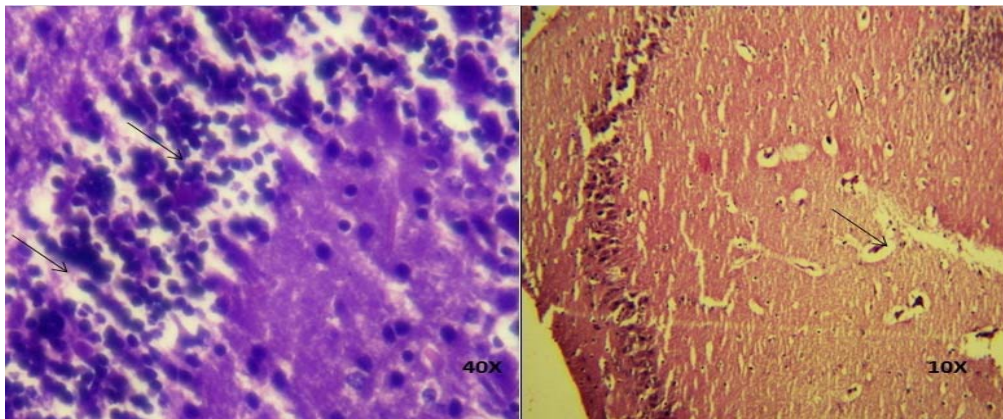


Figure (6) section thought vacuolated of nerve cells of grey matter in group B (H &E stain)



Figure(7):Section through grey matter shows vacuolation of neurons in group c (cerebellum ) (H&E stain ) roup A (H&E stain 100x)



Figure(8):Section through grey matter show vacuolation of neurons in group(c) (cerebellum ) (H&E stain ) roup A (H&E stain 100x)

## **Discussion**

The data show that the exposure to high dose appeared with clinical symptoms those in agreement with (4) that record such toxic signs and symptoms as well as neurological toxicity in human and animal. There was histopathological change in tissue of brain include vaculation and degeneration of myelin cases with that finding in agreement with (11) who showed that exposure to toluene exposure causes significant elevation in the level of lipid break down products in several brain regions in rats due to the generation of reactive oxygen species which cause neurodegeneration and cognitive deficits as well as Neurological effects have been commonly reported in depressed electrical activity in brain. Moreover that was supported by the study of (14) who showed the inhalation of toluene at a dose equivalent to 1000 ppm quarter an hour /day for 45 days the brain section of rat showed severe coagulative necrosis and the nuclei of the neurons show a degree of pyknosis. Also the finding of (12) who indicated that exposure to perchloroethylene greatly reduces the number of brain cells possibly glial cells. And the finding agreed with that of (13) who indicate the toluene inhalation caused severe coagulative necrosis.

As Presented on result of intermediate dose showed such histopathological brain changes in agreement with (15) who found that chronic acetone exposure caused brain gliosis in rat, Vaculation and There was brain lesions in form of mild hemorrhage around arterioles and venules in brain cortex (16).

In summary the present study demonstrated that high dose of ordinary benzene inhalation will appear sever histopathological changes in brain and this depended on the degrees of inhalation doses and finally in most neurotoxicity compounds the most effected part is the myelinted sheath of long tract axons due to present of high amount of fat also most of the neurotoxic compounds are fat soluble therefore it affect myeline sheath before any other part of neuron. Generally we did not see changes in the neuron itself but mostly in the axons of peripheral and central nervous system.

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