Histological Changes in the Lung Tissues of male albino mice Exposed to Mospilan 20SG insecticide

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Abstract

Oral administration of (20 mg/ml), of Acetamidine the active ingradiant of mospilan 20SG , the neonicotinoid insecticide that is effective against both soil and plant insects (LD50=200mg\kg), for 30 days in male albino mice aged (6-7weeks), resulted Histopathologically significant alterations in the lungs included marked. Haemorrhage and inflammatory cells infiltration and thickening in connective tissue stroma. The oral toxicity study of Acetamidine revealed that this neonicotinoid insecticide is of highly risk in albino mice.

Key words: Insecticide, Mospilan 20SG, Histopathology.

Introduction

The use of insecticides in agriculture in recent years has increased tremendously and overshadowed all other control measures as means of crop protection. However, their use in agriculture and veterinary practices has also been associated with numerous health problems in man and animals (1, 2). Some of the major problems linked to excessive and indiscriminate insecticide use are the presence of residues in food and feed commodities, environmental pollution, insecticide resistance and insect resurgence (3). Among the various problems associated with pesticide use is the possibility of its biological accumulation in animals (4).

Neonicotinoids are systemic insecticides that are taken up by a plant through either its roots or leaves and move through the plant just like water and nutrients do. These insecticides provide very effective control of piercing and sucking insects. Over the last few years, the neonicotinoid class of insecticides has become important for use in agriculture and home landscapes. There are currently more than 465 products containing neonicotinoids (often called “neonics”) (5).

The mode of action of neonicotinoid pesticides is modeled after the natural insecticide, nicotine. They act on the central nervous system of insects. Their action causes excitation of the nerves and eventual paralysis, which leads to death. Because they bind at a specific site (the postsynaptic

nicotinic acetylcholine receptor), they are not cross-resistant to the carbamate, organophosphate, or synthetic pyrethroid insecticides, which was an impetus for their development. As a group, they are effective against sucking insects, but also chewing insects such as beetles and some Lepidoptera, particularly cutworms. All neonicotinoid products are classified as general use and have been registered under EPA's Conventional Reduced Risk Program due to their favorable toxicological profiles (6, 7, 8). Neonicotinoids are successful insecticides largely because the acute toxicity to mammals and repeatedor chronic exposure can lead to cumulative effects over time (9, 10, 11).

Mospilan 20SG, systemic insecticide from the neonicotinoidic group of products, is used routinely in agriculture and domestic areas against a wide range of insect pests. Active substance acetamidine is a broad-spectrum agricultural insecticide used excessively for getting effective results besides knowing standard concentration doses of insecticides knowingly and unknowingly by framers and peoples (12).

Materials and Methods

The present study was conducted on Eighteen healthy albino male mice (6- 7) weeks old.are divided into two groups, each with 9 mice. The first group was normal controls, which were treated with 0.1 ml of distilled water. The other one included mice orally administrated with 0.1ml acetamidine (20mg/ml) for 30 day.

Histopathology

Half of the mice were sacrificed (under anesthesia) on day 15, and the rest on day 30 ,and were examined by conducting postmortem examination for the presence of gross pathological changes and then tissue samples (lung) were dissected out and cleaned with physiological saline solution (0.89%). The tissues were immediately put in 10% neutral formalin solution for subsequent processing and histopathological studies. The formalin fixed tissues were thoroughly washed in running tap water, dehydrated in ascending grades of alcohol and acetone, cleared in xylene, and embedded in paraffin wax at 58 °C. Five microns thickness sections from paraffin embedded tissues were stained with haematoxyline and eosine (H&E) stain (13).

Results

Hemorrhage and numerous inflammatory cells infiltrating the alveolar septum were noticed in lungs of mice at day15 of administration. (Figure-2, 3) at day 30 . The underlying connective tissue stroma was thickened (Figure-4), highly cellular and composed of mixed inflammatory infiltrates. and congested blood vessels (Figure- 5, 6). These features were

in keeping with acute lung injury. (Figure-7) showed some cells under mitosis.

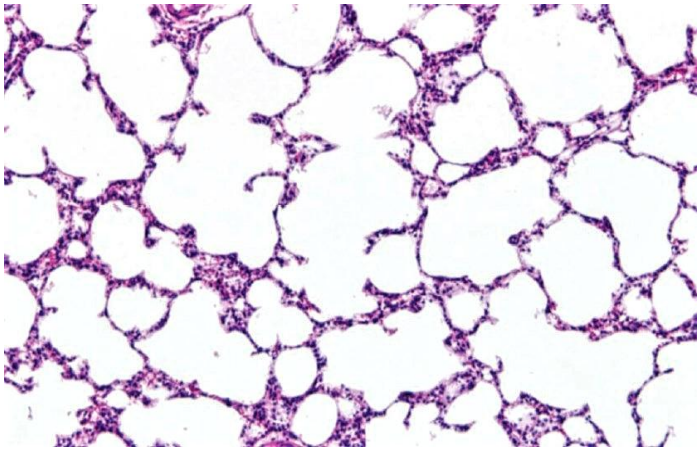


Fig1

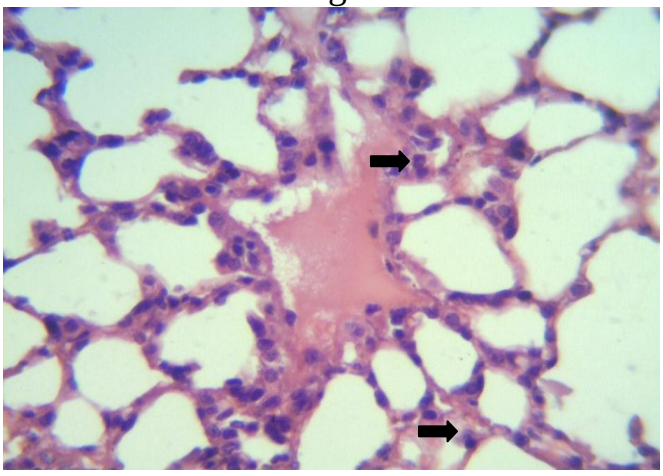
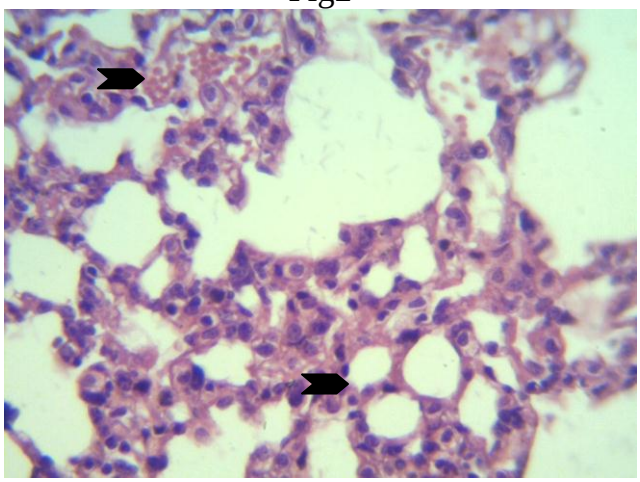
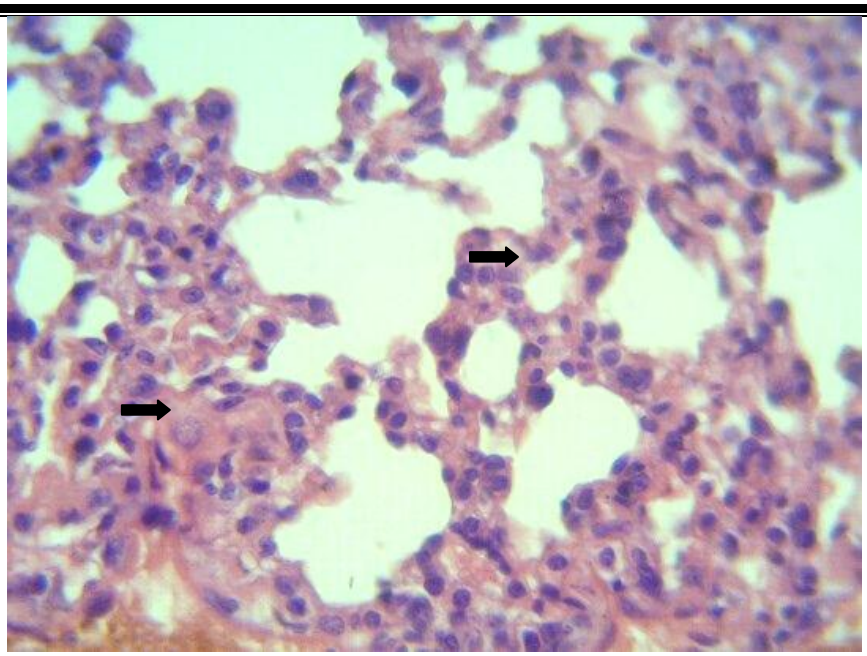


Fig2



Fig(1):positive control, (2,3) Histological findings in the lung tissue after 15 days of administration showing hemorrhage and numerous inflammatory cells infiltrating the alveolar septum were noticed . Hematoxylin-eosin, 400x.



Fig(4): Histological findings in the lung tissue after 30 days of administration showing: The underlying connective tissue stroma was ➡ thickened . Hematoxylin-eosin, 400x.

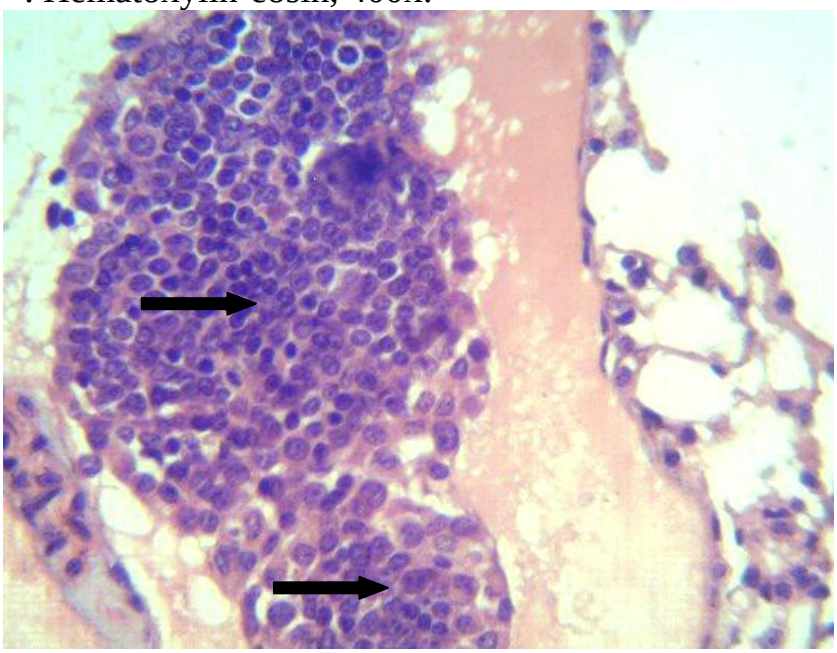


Fig5

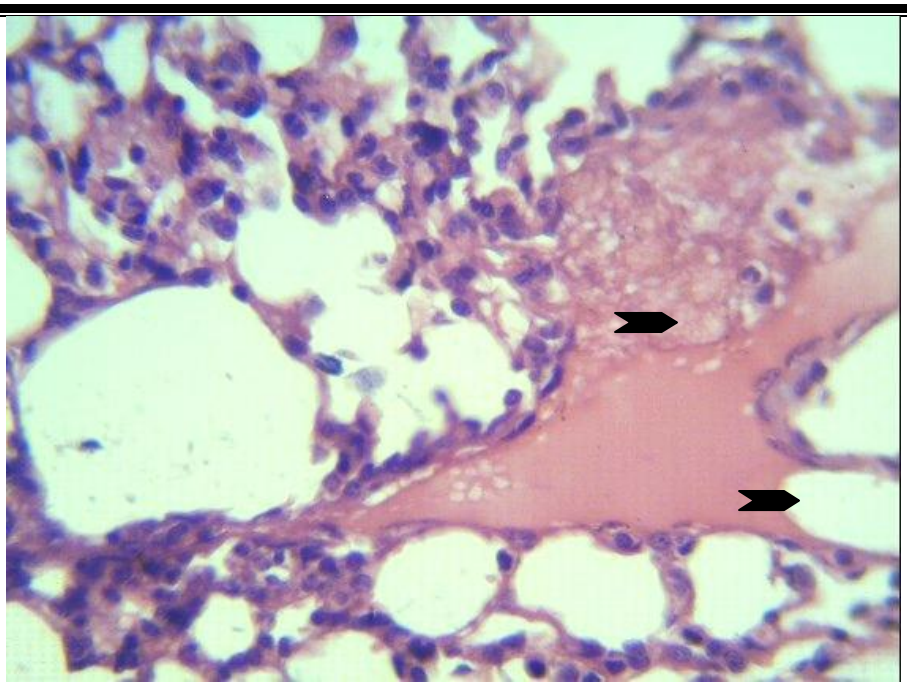


Fig6

Fig (5, 6): Histological findings in the lung tissue after 30 days of administration showing: Highly cellular and composed of mixed ➡ inflammatory infiltrates and congested blood vessels ➡ Hematoxylin-eosin, 400x

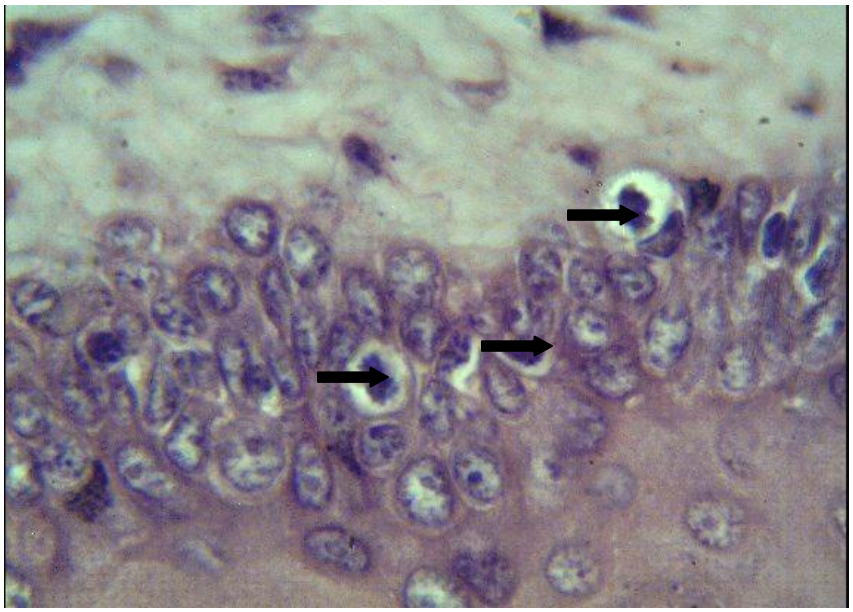


Fig 7

Fig (7): Histological findings in the lung tissue after 30 days of administration showing: some cells under mitosis ➡ , Hematoxylin-eosin, 400x.

Discussion

Microscopic changes in the lungs showed mild congestion and haemorrhage, similar to the work of (14) who observed congestion in the lungs following oral administration of acephate in mice, microscopic lesions of the lungs in paraquat toxicity in calves revealed varying degree of emphysema, moderate congestion and hemorrhages around the pulmonary vessels and interstitial spaces (15).

A number of pathological changes have been reported in Wistar rat after multiple exposures to (ACP) (16)observed histopathological changes in lungs like mild congestion and thickening of alveolar septa and infiltration of with mononuclear cells and red blood cells the similar mentioned by (17) after benzalkonium administration .

In the present study, the lung lesions may be the result of cyclic reduction oxidation of the pesticide, which were brought via circulation with subsequent release of superoxide radicals leading to lipid peroxidation in the cell of the alveolar wall. Congestion was seen in blood vessels. Bronchi and bronchioles were filled with exudates and RBC, and this extended into the interstitial spaces. Because of infiltration, the interalveolar septa were thickened. The poisonous substances cause damage in vascular endothelium as well as to the alveolar epithelial cells. As a result of damage in vascular endothelium and increased vascular permeability excessive fluid and mentioned by (18).

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التغيرات النسجية في رئات ذكور الفئران البيض المعرضة للمبيد الحشري Mospilan 20SG

مها عبد النبي غثوان و زهراء حسين
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الخلاصة:

عرضت مجموعة من ذكور الفئران البيض (بعمر 6–7 اسابيع) لجرع فموية من الاسيتاميدين وهي المادة الفعالة للمبيد Mospilan 20SG بلغت 20 mg/ml والمبيد من مجموعة النيونيكوتينويدز Neonicotinoid وهي المجموعة المعروفة بفاعليتها ضد حشرات التربة والنباتات، إذ تبلغ الجرعة الوسطية القاتلة له LD50=200mg\kg، وقد نتج عن هذا تغيرات نسجيه تمثلت بالنزف وارتشاح في الخلايا الالتهابية، وسمك في سدى النسيج الضام.

الكلمات المفتاحية: مبيد حشري، مبيد Mospilan 20SG، انسجة مرضية.