



## MORPHOFUNCTIONAL CHANGES IN THE MAXILLARY SINUSES UNDER THE INFLUENCE OF PESTICIDES

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**Abstract:** This study investigates the morphofunctional changes in the structure of the maxillary sinuses under the influence of pesticides. Pesticides are known to exert toxic effects on the body, particularly damaging the respiratory tract and sinus functions. The study utilized a laboratory animal model to analyze the impact of pesticides on the maxillary sinuses. In recent years, concerns about environmental degradation and the widespread use of chemical substances such as pesticides have raised alarms about their potential negative effects on sinus functions.

**Key words:** Maxillary sinuses, morphofunctional changes, pesticides, toxic effects, respiratory tract, sinus functions, laboratory animal, chemical substances, negative effects.

### INTRODUCTION

The maxillary sinuses (maxillary antra) are a crucial part of the respiratory system. They facilitate breathing, contribute to voice resonance, and reduce the weight of the skull.

In recent years, concerns about environmental degradation and the widespread use of chemical substances such as pesticides have raised alarms about their potential negative effects on sinus functions.

This study aims to examine the toxic effects of pesticides on the maxillary sinuses and identify the morphological and functional changes resulting from such exposure.

### MATERIALS AND METHODS

**Study Model-** Healthy male rats ( $n = 30$ ) were selected as the laboratory animal model for this experiment. They were divided into three groups:

1. **Control group** — not exposed to pesticides.
2. **Experimental group 1** — exposed to low concentrations of pesticides.
3. **Experimental group 2** — exposed to high concentrations of pesticides.

### Pesticide Administration

The animals were administered pesticide solutions orally at specific concentrations for 14 days. Dosages were determined according to international toxicological standards.

### Examination Methods

1. **Morphological Analysis:** Histological sections of the maxillary sinuses were stained with hematoxylin and eosin and examined under a microscope.

2. **Functional Analysis:** The volume of fluid within the sinuses, the extent of epithelial damage, and secretion functions were evaluated.

3. **Statistical Analysis:** Data were analyzed using the ANOVA method ( $p < 0.05$  was considered statistically significant).

## RESULTS

### Morphological Changes

In the experimental groups, the following changes were observed compared to the control group:

**Experimental group 1:** Mild epithelial damage in the maxillary sinuses and early stages of inflammatory infiltration.

**Experimental group 2:** Necrotic epithelial damage, formation of fibrous tissue in the sinus walls, and intensified inflammatory processes.

### Functional Changes

**Secretion Disturbances:** Pesticides caused a decrease in mucus production and fluid accumulation (exudation) within the sinuses.

**Respiratory Difficulties:** Higher doses of pesticides led to observable signs of respiratory distress in the animals.

## DISCUSSION

The study findings confirm that pesticides exert significant toxic effects on the maxillary sinuses. While low concentrations caused moderate morphological and functional changes, high concentrations resulted in severe pathological alterations. These changes may exacerbate inflammatory processes and disrupt sinus functions, increasing the risk of respiratory conditions such as sinusitis in humans.

## CONCLUSION

The maxillary sinuses are highly sensitive anatomical structures prone to damage under pesticide exposure. The study results indicate that prolonged or high-concentration exposure to pesticides can lead to irreversible morphofunctional impairments. Therefore, enhanced environmental safety measures and stricter control over pesticide use are essential.

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