USE OF PESTICIDES IN AGRICULTURAL PRODUCTION AND CASES OF NEOPLASIA IN THE POPULATION RESIDING IN THE HEALTH REGIONS OF RIO VERDE/GO AND MINEIROS/GO (2012–2022)

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ABSTRACT
This article discusses the impacts of pesticide use on the health-disease process of populations exposed to agricultural practices, with emphasis on cancer development. The research is exploratory and uses secondary data from sources such as DATASUS to analyze notifications of exogenous pesticide intoxication. The study covers the period from 2012 to 2022 and focuses on the municipalities of Rio Verde/GO and Mineiros/GO. The results indicate an increase in soybean and sugarcane production in these municipalities. Regarding intoxication cases, a significant relationship can be inferred between exposure and acute manifestations, despite underreporting. Greater monitoring and follow-up are necessary to reach accurate conclusions about the chronic effects pesticides may cause.

Keywords: Agribusiness; Neoplasms; Public Health.

INTRODUCTION

Pesticides have boosted food production and are defined by the FAO as substances that control pests and insects. Their use began with the Green Revolution, bringing both socioeconomic and environmental benefits and challenges. Despite stimulating the economy through exports, Brazil has become dependent on international markets, perpetuating socioeconomic difficulties.[1234]

Organophosphate (OP) insecticides, responsible for 70% of pesticides in Brazil, irreversibly inhibit the enzyme acetylcholinesterase, causing an excess of acetylcholine, which affects motor and cognitive functions. Intoxication can be acute, subacute, or chronic, with severe consequences, including cancer and other genetic mutations. These compounds act as endocrine disruptors with carcinogenic potential. Pesticide intoxication is a global concern, causing approximately 20,000 deaths annually, according to the WHO.[25–11]

Long-term exposure and disease development, including neoplasms, are well documented in the literature. Therefore, considering the need for regional epidemiological studies, this article presents research results on the health regions of Rio Verde and Mineiros in Goiás, encompassing a total population of 295,777 according to census data.[12]

The research analyzed pesticide intoxication increases in Goiás between 2012 and 2022, focusing on Rio Verde and Mineiros, municipalities with economies based on agriculture. The study aimed to correlate the rise in agrochemical use and agricultural production with population growth and the increase in neoplasm cases in these municipalities.

METHODOLOGY

This is a descriptive study with a qualitative and quantitative approach, covering 10 years (2012–2022). Data were collected from digital information systems, including the National System of Toxic-Pharmacological Information (SINITOX), the Health Information System of the State of Goiás, Cancer Information System (SISCAN), Mortality Information System (SIM), Instituto Mauro Borges (IMB), Notifiable Diseases Information System (SINAN), and the Ministry of Agriculture, Livestock, and Supply (MAPA). The investigation focused on endogenous agents: agricultural, domestic, and public health pesticides.

Data were collected from multiple systems and physical records, analyzed descriptively and using non-parametric statistics. Descriptive statistics summarized data characteristics in tables, graphs, and summaries, while spatial statistics examined phenomena over time. Data were entered into Excel, tabulated, and analyzed with reference to agrochemical and neoplasm research.

RESULTS

Notifications of pesticide exposure in Rio Verde/GO account for over 80% of cases, reflecting the municipality's prominence as Goiás expanded its agricultural frontier. Growth in the region is largely due to soybean cultivation, with Goiás ranking third nationally in soybean production. Rio Verde is among the largest producers in Brazil, resulting in greater population exposure to pesticides, especially due to increased employment opportunities in agriculture.[13]

More than 90% of intoxications are acute and single events, manifesting symptoms such as irritation, vomiting, spasms, and respiratory problems, potentially leading to death, with symptoms appearing shortly after exposure.[14] Chronic exposure can induce gene mutations, particularly as endocrine disruptors, leading to neoplasms, especially breast cancer and non-Hodgkin lymphoma (NHL). While DATASUS data do

not report chronic exposure cases in either city, repeated acute intoxication cycles may have effects similar to chronic exposure.[10,13,15]

Over 90% of pesticide intoxication cases in Rio Verde and Mineiros result in recovery without sequelae, indicating effective acute management. However, long-term risks, including neurodegenerative diseases, cannot be dismissed.[14]

Although fewer fatalities and sequelae occur, loss of follow-up may indicate chronic problems such as neoplasms, which, if untreated, may be fatal. Underreporting hinders epidemiological control and action plans, highlighting the need for detailed investigations in high-impact agricultural areas.

The study also analyzed gender distribution in intoxication cases, revealing a higher proportion of affected men. This aligns with the 2017 Agricultural Census, which reported that 81.3% of rural workers in Brazil are men, and only 18.7% are women.[17] Additionally, men are 50% more likely to die from cancer than women, with lung, liver, and stomach cancers being most common, potentially influenced by lifestyle habits such as smoking, more prevalent among men in rural areas.[18]

High contamination levels in Rio Verde are associated with intense agribusiness activity, with possible underreporting of chronic population exposure. Sixteen pesticide types were identified in water, including glyphosate, which affects mitochondrial function and acts as an endocrine disruptor. Other pesticides, such as atrazine and trifluralin, were also detected, potentially causing endocrine disturbances and contributing to neoplasm development.[13,16]

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CONCLUSION

Pesticide use in Rio Verde and Mineiros presents a concerning scenario of acute intoxications, highlighting population health risks. Indiscriminate use exposes workers to severe and irreversible proliferative, neurological, endocrine, and reproductive damage. However, underreporting prevents a complete assessment of long-term impacts, complicating the implementation of effective action plans.

Most intoxications occur as single acute exposures, affecting more men and generally resulting in recovery without sequelae. Although this profile does not favor neoplasm development, repeated acute exposures and underreporting indicate the need

for more detailed epidemiological oversight. The study emphasizes pesticide-related neoplasm risks and the importance of preventive measures**.**

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