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IMPACT OF PESTICIDE ON HEALTH OF COFFEE PLANTATION WORKERS

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ABSTRACT
Farmers and farm workers face varied occupational risks, which includes biological, chemical, and farm machinery risks along with environmental and social pressures. Chemical risks include toxicity caused by pesticides. As India stands one among the top 10 nation in coffee production, a commonly used pesticide in coffee plantation chlorpyrifos was selected and 100 farmers at mudigere who were exposed to this pesticide was selected and surveyed through questionnaire. The result obtained showed that among the individuals exposed to chlorpyrifos poisoning 50.5% show symptoms immediately, in which 67.2% report with redness, 59% with watering of eyes and breathing difficulty. 42.6% of them get symptoms within 6 hours in which 51.7% reported with rashes, 49.2% with numbness, 48.3% with headache and heaviness in chest. In 3.62% of individuals symptoms appear within 1 week in which 6.8% experienced with numbness, 6.7% with heaviness in chest and 5.6% with pain in abdomen. And 3.02% of them within 15 days among which 6.6% with running nose, 5.9% with pain in abdomen and 3.45 with diarrhea. 66.7% of them had not used any protective measures during the exposure where as 33.3% of them use mask and gloves. So, there is an urgent need to create awareness among the coffee plantation workers exposed to pesticides.

KEYWORDS : Pesticide, Chlorpyrifos, Health

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INTRODUCTION

Farmers and farm workers face varied occupational risks, which includes biological, chemical, and farm machinery risks along with environmental and social pressures [1]. Total of 9,217,911 tons of coffee are produced annually worldwide, with an annual production volume of 3,019,051 tons, Brazil is the world's top producer of coffee. And India stands one among the top 10 nations that produce coffee. The principal crops grown in south India is coffee, Karnataka alone produces 75% of coffee. Two varieties of these little trees, Arabic and Robusta, both have white flowers that bloom only once a year for about 3–4 days. According to the variety and climate, the time between flowering and fruit maturity varies; for Arabica, it takes around 7 months, while for Robusta, it takes around 9 months. Arabica at first gained popularity. But because coffee rust severely infested this species, another kind of coffee plant known as Liberica was popularized. Growth of fungi is one of the most frequent diseases associated with coffee plantation in India. Heiliea vastatrix is an endophytic fungus which grows inside the leaf. Coffee rot is an additional widespread disease that can do considerable harm during the rainy season, especially to the plants in Karnataka; hence, pesticides are widely used [2]. A pesticide is typically a chemical or biological substance, such as a virus, bacteria, antibiotic, or disinfectant that renders the pests ineffective or kills them. One of these pesticides is chlorpyrifos, which is routinely used; using products with chlorpyrifos outdoors or as part of an occupational exposure to the pesticide. Chlorpyrifos affects the neurological systems of people, pets, and other animals in a manner similar to that of the target insect. Signs and symptoms post exposure, could flare up in minutes to hours or can take days to weeks. The body repairs the depleted enzymes in the nervous system during this time so it is able to resume normal function. Chlorpyrifos exposure in tiny doses could cause eye watering, nasal congestion, and excessive salivation or drooling. Perspiration, headache, nausea, and dizziness are all possible side effects. More serious exposures might result in coordination problems, tremors, muscle twitching, weakness, vomiting, diarrhea as well as blurred or dim vision, convulsions, unconsciousness, paralysis, loss of bladder and bowel control, difficulty breathing, can also occur[3]. Globally usage of pesticide has significantly expanded, reaching 4.1 million tons per year in 2017, an increase of approximately 81% from 1990. The World Health Organization estimates that the incidence of pesticide poisoning is between 1 and 5 million victims with 300,000 death cases annually. It was acknowledged that the effects of pesticide poisoning were primarily observed by those living in developing countries, and that the actual number of cases was likely much

greater because so many instances go unreported. Up to this point of time, no recent estimates of unintended pesticide poisoning (accidental or occupational) is established. [4] Hence, the immediate and long-term effects of this chemical on coffee plantation workers was evaluated in this study as farmers are on direct and frequent exposure to these. As Mudigere is an agricultural region where most people are exposed to this chemical and no survey studies on their negative effects being made this part of land was selected for the study.

METHODOLOGY

Study design- It is an observational – in-person interview with coffee plantation workers using semi-structured questionnaires and open-ended questions.

Area of the study - The survey was conducted at Mudigere Taluk of Chikhamagalur district in Karnataka.

Time period - The study took place from January 2023, to April 2023.

Inclusion criteria – 18 – 60 years old individual who developed symptoms after the exposure to pesticides were included

Exclusion criteria – Individual with systemic disorders before the exposure to pesticide were excluded.

Data collection - The survey took approximately 15-20 minutes to complete per person. It began with the demographic information of the individuals. The individuals answered the questions accordingly and the survey focused on specific information regarding the frequency of exposure, signs, symptoms, protective equipments used etc. the survey included open-ended questions as well as free comment space to express their views. Data analysis -After completion, the data was stored on Microsoft excel and closed items were analyzed using descriptive statistics.

OBSERVATION AND RESULTS

Individuals in this study were workers of coffee plantations who get frequently exposed to chemical pesticides. Reports were prepared by collecting the complete details with the help of questionnaires, and symptoms were classified according to the period of exposure i.e. immediately after exposure, within 6 hours, within 1 week, within 15 days.

Table no 01

Sl.no	Symptoms	immediately	Within 6 hours	Within 1 week	Within 15 days
1.	Headache	46.7%	48.3%	2.3%	2.7%
2.	Sneezing	49.2%	44.3%	3.6%	2.9%
3.	Cough	47.5%	47.5%	2.3%	2.7%
4.	Throat irritation	59%	37.7%	3.1%	0.2%
5.	Watering in eyes	59%	37.7%	2.5%	0.8%
6.	Redness in eyes	67.2%	29.5%	3.3%	0%
7.	Breathing difficulty	59%	37.7%	0%	3.3%
8.	Running nose	49.2%	39.3%	4.9%	6.6%
9.	Heaviness in chest	41.7%	48.3%	6.7%	3.3%
10.	Itching	49.3%	39.3%	4.8%	6.6%
11.	Tingling sensation	46.6%	46.6%	4.5%	2.3%
12.	Numbness	40.7%	49.2%	6.8%	3.3%
13.	Rashes	43.1%	51.7%	2.1%	3.1%
14.	Burning sensation	47.5%	47.5%	2.3%	2.7%
15.	Nausea	53.3%	41.7%	2.3%	2.5%
16.	Vomiting	50.5%	40.7%	4.7%	2.1%
17.	Diarrhea	52.5%	40.7%	3.4%	3.4%
18.	Pain in abdomen	49.2%	39.3%	5.6%	5.9%

Results show that among individual exposed to chlorpyrifos poisoning 50.5% show symptoms immediately, in which 67.2% report with redness, 59% with watering of eyes and breathing difficulty. 42.6% of them get symptoms within 6 hours in which 51.7% reported with rashes, 49.2% with numbness, 48.3% with headache and heaviness in chest. In 3.62% of individuals symptoms appear within 1 week in which 6.8% experienced with numbness, 6.7% with heaviness in chest and 5.6% with pain in abdomen. And 3.02% of them within 15 days among which 6.6% with running nose, 5.9% with pain in abdomen and 3.45 with diarrhea. 66.7% of them do not use any protective measures during the exposure where as 33.3% of them use mask and gloves.

DISCUSSION

The global pesticide consumption in 2019 was approximately 4.19 million metric tons, where China was the largest pesticide-consuming country (1.76 million metric tons) followed by the United States Brazil, and Argentina. In South Asia WHO reported an annual increase in pesticide usage up-to 20% of developing countries as pesticide consumers, including Cambodia, Laos, and Vietnam. India belongs to one of the major pesticide-producing countries in Asia [5]. Due to this people are directly exposed without taking any precautionary measures and are suffering from acute and chronic disorders. Considering the pesticide used by these participants i.e. chlorpyrifos comes under class two toxin. There are studies in India on chlorpyrifos residue in crops and human exposure resulting from it. One such study was taken in 2015 in Punjab in which chlorpyrifos was detected in the milk samples[6] and the other study which was taken in 2019 in Rajasthan found complaints of itchiness of skin redness of eyes, muscle pain etc[7]. So we took a similar study in which screening of 100 coffee plantation workers are done through a survey method using structured questionnaires and open-ended questions.

Out of 100 participants in the survey, the maximum distribution was found in the ages 45 -60 years. Participants under this category are working in coffee plantations for 15-25 years. There was more distribution of gender towards male (65%) and female (35%) as according to Indian families many of the women in this area were homemakers.

Results indicate that exposure to pesticides through ocular exposure cause acute effects such as redness of the eyes, watering of the eyes as unprotected eyes exposed to pesticides absorb it into the ocular tissue, which could be hazardous to the eyes [8] through inhalation there will be excessive oxidative burden on lungs leading to respiratory symptoms like difficulty breathing, heaviness in the chest, running nose etc [9] through dermal contact the absorption of these chemical takes place leading to rashes itchiness etc. By ingestion of these chlorpyrifos particles will lead to decrease in brain serotonin levels resulting in different neurological symptoms like headache, numbness etc [10] some gastro intestinal symptoms like nausea and vomiting are also reported.

CONCLUSION

The survey study claims that within 15 days of exposure to chlorpyrifos poisoning, coffee plantation employees began to experience a variet y of health problems. Hence there is an urgent need to raise awareness on the same.

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