A Review on Prevalence of Pesticide/Herbicide Associated Cardiovascular Diseases Among Agricultural Workers: Global, Asian And Indian Scenario

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Abstract- *Agricultural production has increased drastically with the usage of pesticides and fertilizers. These chemicals despite their beneficial side have the potential to cause health hazards on exposure. Worldwide several researches were carried out to understand the severity of health problems like skin disorders, respiratory diseases, CVD and others caused to the agricultural labours. Effort was made to analyze the studies carried out particularly on cardiovascular diseases among agricultural pesticide sprayers.*

Keywords- CVD, pesticides/herbicides, agricultural workers

I. INTRODUCTION

In the modern world, the epidemiological transition from infectious and prenatal diseases to non-communicable diseases like the myocardial infarction is resulting due to the demographical and lifestyle changes [1]. Non-communicable diseases like diabetes, CVD and cancer contribute to more than two-fourth of global disease burden [2].

Cardiovascular disease is the leading cause for major global mortality and a contributor to the reduced quality of people's life. In 2017, an estimated death of 17.8 million worldwide was due to cardiovascular diseases, corresponding to 330 million total deaths [3].

Studies have reported about the possible link between CVD and pesticide exposure. Because, most of the pesticides and herbicides are fat-soluble, thus they can stored in the body and accumulate with time [4]. The industries located predominantly in urban areas, where CVD risk factors are high compared to those peri-urban or rural areas [5].

However, agricultural/horticultural practice in rural area also may alter the prevalence. For example, agriculture farmers exposed to pesticide/herbicide, both of which have been associated with risk for CVD [6].

This article on acknowledging the importance of agricultural workers aims to discuss about the studies on prevalence of risk cardiovascular diseases among agricultural workers especially pesticide/herbicide sprayers in global, Asian and Indian level.

II. REVIEW

Prevalence of pesticide/herbicide associated cardiovascular diseases: Global scenario

In industrialized countries, the Green Revolution of the 1960s significantly increased agricultural productivity by increasing the cultivated surfaces, mechanization, planting of hybrid crops with higher yields and pest control. The main effects of pesticides represent a great benefit for human health. Moreover, they insure increased food production, a safe and secure food supply and other secondary benefits. However, many first generation pesticides have been found to be harmful to the environment. Some of them can persist in soils and aquatic sediments, bio concentrate in the tissues of invertebrates and vertebrates, move up tropic chains and affect top predators [7].

Rachel Carson's book "*Silent Spring*", published in 1962, first drew attention to the hazard of the widespread extensive use of pesticides for the environment (namely birds) and also for human health. The book resulted in big modifications to the US national policy on pesticides, leading to a national ban on DDT and certain other pesticides. Worldwide consumption of pesticides for agricultural use is constantly increasing, rising from 0.49 kg/ha in 1961 to 2 kg/ha in 2004 and humans and wildlife are today continuously exposed to a number of pesticides via the environment

(surface water, ground water, and soil), food and drinking water [8].

CVD risk factors are multi-factorial. The inter-heart study showed that nine risk factors including smoking, hypertension, psychosocial factors, alcohol consumption, diabetes, cholesterol accumulation, lack of physical activity and environmental toxicants accounts for nine out of ten cardiovascular events. Certain environmental toxicants including dioxins, PCBs, pesticides and herbicides can pose as risk for cardiovascular disease especially, heart attack and stroke [9].

Agricultural activities are also associated with CVD risks due to prolonged exposure to toxic pesticides, disease vectors and food borne diseases, even though agriculture increases availability and production of nutritious foods and also higher levels of physical activity is associated with agricultural labour [10].

This pilot study demonstrated the high prevalence of CVD risk factors among Migrant Agricultural Workers on screening farm worksite labours in USA [11].

Prevalence of pesticide/herbicide associated cardiovascular diseases: Asian scenario

According to Richter, that not only intentional but even unintentional pesticide poisoning results to about 4% diarrhoeal disease, 6% respiratory diseases and 10% cardiovascular diseases [12].

Study conducted in a village Central Java, Indonesia on the pesticide sprayers revealed that almost all the subjects admitted the risk of pesticide poisoning and they were also aware that pesticide spraying affects their health. Despite their awareness more than 90% and 35% of the subjects did not use glasses and gloves during mixing and spraying of pesticide respectively [13].

Retired rural residents and agricultural workers from Vietnam had a higher CVD mortality rate than older individuals, whereas the prevalence of CHD did not differ with employment in a study from rural India. Five out of nine studies suggested that people who engaged in agriculture had a lower prevalence of hypertension (a symptom of CVD) than migrant, urban, factory and retired sedentary workers [14].

Prevalence of pesticide/herbicide associated cardiovascular diseases: Indian scenario

A study showed significant changes in the ECG, the serum LDH levels, and cholinesterase (ChE) activities in the spray men, indicating cardio toxic effects of methomyl. Observations confined to health surveillance in male formulators engaged in production of dust and liquid formulations of various pesticides (malathion, methyl parathion, DDT and lindane) in industrial settings of the unorganized sector revealed a high occurrence of generalized symptoms (headache, nausea, vomiting, fatigue, irritation of skin and eyes) besides cardio respiratory, psychological, neurological and gastrointestinal symptoms coupled with low plasma ChE activity [15]. Data on reproductive toxicity were collected from 1,106 couples when the males were associated with the spraying of pesticides (OC, OP and carbamates) in cotton fields [16].

Anand in his work examined cardiac abnormality in acute OP poisoning and revealed that there were cardiac discoloration or blotchiness, patchy pericarditis, auricular thrombus, right ventricular hypertrophy, myocardial interstitial edema, vascular congestion, patchy interstitial inflammation and mural thrombus [17].

Agricultural labours of Shirol region, Maharastra on a study with 100 pesticide spraying labours reported the presence of signs and symptoms like itching (97.43%), eye irritation (82.05%), breathing difficulties (70.51%), convulsions (15.38%) and other problems during pesticide spraying days than non-spraying days [18].

The production of pesticides started in India in 1952 with the establishment of a plant for the production of BHC near Calcutta, and India is now the second largest manufacturer of pesticides in Asia after China and ranks twelfth globally [19]. Many previous studies have suggested tea-garden workers as a special population ‘‘sub-group’’ at high CVD risk, concurrent comparison with the general population in the same region has been lacking [20,21].

Indian farmers on exposure to pesticide are at great risk of getting poisoned and other non-communicable diseases (CVD, Hypertension, etc.). There is a necessity to change farmers’ perception on pesticide handling and to educate farmers regarding pesticide poisoning management [22].

III. CONCLUSION

Agriculture is an occupation chiefly carried out in rural areas. It is very important to impart sufficient knowledge to the farmers regarding the ill effects of pesticides and the necessary protective actions to be done. In India studies pertaining to the CVD and health hazards on agricultural

pesticide sprayers are only limited. For the betterment of farmers who do the backbone occupation of India it is advised to carry out further more exploratory and educational research in this aspect.

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