



A CROSS SECTIONAL STUDY ON PREVALENCE OF NEUROLOGICAL SYMPTOMS IN FARM WORKERS DUE TO PESTICIDE EXPOSURE IN RURAL AREA OF KOLHAPUR.

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ABSTRACT **Background** - The increase use of pesticide raised an alarm to take some preventive measures against its hazardous effects to human and environment. So, the present study was done to determine whether occupational exposure to pesticide was associated with self-reported neurological symptoms in farm workers in rural area of Kolhapur.

Methodology- This study analyzed the cross sectional data on neurologic symptoms from 102 subjects (Study group -62 and control group- 40) aged 35 to 45 years. All participants completed a specially designed questionnaire (Q 16) on neurological symptoms associated with pesticide exposure (AHS website 15) and data was statistically analyzed.

Results- Among all self reported neurological symptoms headache was observed in 59%, lacrimation in 13% ,weakness in 56%,irritation in 37%, loss of concentration in 21%,loss of coordination in 8 %, difficulty in interpreting meaning of words in 5%,short memory loss in 19 %,tingling numbness in 55%,palpitation in 56 %, loss of appetite in 11 %, forgetfulness in 53 %,sweating in 40%, depression in 34%.

Conclusion-We found that there is high prevalence of neurological symptoms associated with exposure to pesticides, resulting from indoor and outdoor environmental exposure to these pesticides.

KEYWORDS : Neurological symptoms, pesticides, farm workers

INTRODUCTION-

The occupational Health hazards have been a widespread problem in agriculture community due to use of pesticides⁽¹⁾. So, it is the need of an hour to identify the various occupational health hazards and evaluate them for safety of farmers. The major goal of this study is to better understand how their work environment, mainly exposure to pesticides, affects their health. Literature review suggests that the high use of pesticides has been recognized as a major global public health challenge for agriculture-based communities, due to their associations with adverse neurological outcomes⁽²⁾. Data suggest that the main mechanism of action of pesticides is the irreversible inhibition of the enzyme acetylcholine esterase (AChE), which hydrolyzes the neurotransmitter acetylcholine in the peripheral as well as central nervous systems. It causes the accumulation of acetylcholine at cholinergic synapses, causing overstimulation of muscarinic and nicotinic receptors, and thus neurotoxicity. Also it leads to developmental changes in neurons, which can produce oxidative stress.^(3,4)

The main purpose of this study was to determine whether occupational exposure to pesticide was associated with self-reported neurological symptoms especially in the context of chronic low dose exposure to pesticides. Also, there is a paucity of data about neurobehavioral health status among this population in kolhapur region where agricultural industry is having major role in economy of the society and the farm workers are the important stakeholders of this industry. Keeping all these facts in mind, the present cross sectional study was done to determine whether occupational exposure to pesticides is associated with self reported neurological symptoms in farm workers in rural areas. Neurological symptoms were assessed on the basis of a 'Q16' questionnaire and clinical examination. A Q16 questionnaire is widely used questionnaire to evaluate the effects of occupational exposure to neurotoxicants established by Lundberg et al.⁽⁵⁾

METHODOLOGY

This cross sectional study was undertaken among 62 workers compared with 40 control subjects taken by simple randomization, after approval from institutional ethical committee.

Data Collection:

Subjects were selected on the basis of the selection criteria specifically designed for this study. Subject for the control group were selected from the general population not directly exposed to the pesticides.

Selection Criteria-

Farm workers occupationally exposed to the pesticides were randomly selected on the basis of inclusion and exclusion criteria.

Inclusion Criteria:

Farm workers (exposed subjects) include fulfilling following criteria: Male or female workers with age group of 35–45yrs do not have either mental disorders or experiencing mental retardation, be able to read, write, speak and respond well and working in farms for at least one year at Farm previously.

Exclusion criteria of workers (exposed subjects) include individuals with a history of stroke, goiter, and had suffered from head injuries, consuming drugs such as benzodiazepines, opiates, anticonvulsants, barbiturates, and antipsychotics.

Control subjects were randomly selected on the basis of inclusion and exclusion criteria. Inclusion criteria of control group subjects include male and female residents who are not working at farm or engaged in any agricultural activities and having similar socio economic status and age group of exposed subjects. Also control group participants do not have either mental disorders or experiencing mental retardation, be able to read, write, speak and respond well.

Individuals with a history of stroke, goiter, and had suffered from head injuries, consuming drugs such as benzodiazepines, opiates, anticonvulsants, barbiturates, and antipsychotics were excluded from control group.

All the participants underwent routine general examination. Informed consent was taken from all the participants and the information collected in this regards kept strictly confidential.

A preliminary questionnaire was designed to record the personal and occupational information along with pesticide exposure factors, including the pesticide type, spraying frequency, spraying time, spraying duration, working years, and the Personal Protection Equipment (PPE) usage.

Q16 questionnaire -

All the participants were interviewed using the standardized questionnaire 'Q16' which is widely used to evaluate the effects of occupational exposure to neurotoxicants to assess the neurobehavioral symptoms. It consists of 16 questions to measure the neurobehavioral symptoms. Response to each question was recorded in the form of 'YES' or 'NO'. If response is 'YES', further information regarding symptoms was recorded. The following parameters were studied with the use of Q16 questionnaire: Symptom specific to chemical neurotoxicity, particularly irritability, insomnia, dizziness, anxiety, fatigue, cholinergic toxicity and muscarinic clinical manifestations on exposure to pesticides.

Data Analysis-

The data was collected using questionnaire-based interviews. Data analysis was performed by using descriptive statistical methods All data was entered and analyzed statistically using SPSS software.

OBSERVATIONS AND RESULTS-

The present study was done in 102 participants (study group-n=62 , Control group n= 40). The Mean age of participants of study group is 37.7 ± 5.1 and that of control group 35.6 ± 4.1 .

Figure no. 1 showed prevalence of various neurological symptoms in study and control group. The neurological symptoms were more

common among the study group than control group .Overall prevalence of neurological symptoms among study group 59% which is statistically significant when compared with control group.

Among all self reported neurological symptoms headache (59%), weakness (56%), tingling numbness (55%), forgetfulness (53%), palpitationin (56 %), were the most prevalent followed by irritation in 37%, sweating in 40 % ,depression in 34%, loss of concentration in 21%, short memory loss in 19 %, lacrimation in 13% , loss of appetite in 11 % , loss of coordination in 8 %,difficulty in interpreting meaning of words in 5%.

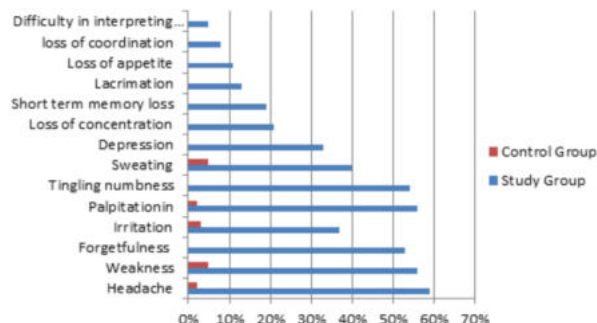


Figure 1: Prevalence Of Neurological Symptoms In Study And Control Group

Table No. 1 Personal And Occupational Information Along With Pesticide Exposure Factors

Pesticide exposure factors	Response
Pesticide type	Methyl parathion, Dichlorvos, Atrazine
pesticide exposure factors Storage practices of pesticides by farmers	Cowshed, Storeroom, Bathroom
Spraying frequency,	Weekly
Spraying duration	5hrs / day + 1.5
Working years,	10yrs + 2.5
Personal Protection Equipment (PPE) usage	
Yes	20
No	42

DISCUSSION

Pesticides are self poisoning that kills about 2, 00,000 people every year in rural regions of developing country like India. Pesticides affect many enzymes as well as the physiological systems like CNS, respiratory, CVS and reproductive. (6) In India 80% of people live in rural areas and of that more than 80% are farmers. Kolhapur is a district in western Maharashtra in India where agriculture is the main occupation of majority of people .Although the green revolution have won the central position in economy of Indian farmers,ill effects of pesticides on health raised a serious problem to the health of the society(7,8) . Participants in this study are engaged in farming occupation for 10-15 years on an average. In this study, it was also found that pesticides are stored in unsafe places by farmers.

Present study, showed that almost 59% of farm workers have some signs or symptoms of intoxications with headache being the most common one followed by weakness, forgetfulness, palpitations and tingling numbness observed in half of the study population. The results obtained in the present study are also observed in studies done by Gayatri Moharana et al, Kori RK et al, Banerjee I et al(9) observed that 85% of farmers reported some signs or symptoms of intoxications with headache being the most common one followed by nausea, red eyes, cough and muscle cramp. Two studies in farm workers showed that short-term neurological signs and symptoms were associated with early acute flare of exposure that ultimately escalated to long-term effects(9,10) .

Cited references also demonstrated a substantial prevalence of Acute Pesticide Poisoning (APP) that differed between farming systems and was strongly associated with neurobehavioural symptoms. Intensity of exposure was also clearly associated with these symptoms.

Early documentation of neurologic dysfunctions in present study can be useful for further intervention to decrease the risk factors in prone population. Lastly, this study is a simple, small but an important step to

generate supportive evidence for in depth further research in this underrepresented population. Results obtained in this study can be utilized for the development of systems to evaluate, intervene and decrease the risk factors and resulting disorders in prone population which is quite crucial and useful for safety of mankind and environment.

CONCLUSION-

Chronic exposure to pesticides , lack of use of personal protective equipment and very poor knowledge about the adverse effects of pesticides on health account for substantial neurological dysfunction observed in present study. In these situations, there is an urgent need for education and training on pesticide handling and safety measures to avoid adverse effects of pesticides.

The present study showed existing changes in neurological function related to pesticide exposure, and synthesized information to integrate primary prevention methods towards pesticide -related morbidity and mortality.The presnt study will help to understand and underline the issue of one of the most potential occupational health hazards in farm workers.

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