



**PESTICIDES; ACUTE POISONING, SUICIDES AND DISABILITY IN HUMANS**

<sup>a</sup> Muhammad Ramzan\*, <sup>a</sup> Unsar Naeem-Ullah, <sup>a</sup> Syed H. M. Bokhari, <sup>a, b</sup> Shafia Saba

<sup>a</sup> Department of Entomology, Muhammad Nawaz Shareef University of Agriculture, Multan Pakistan,

<sup>b</sup> Department of Epidemic Prevention and Control Programme. District Health Authority, Multan,

**ABSTRACT**

Pakistan is a place where only pesticides is considered as an effective source for control of pests and diseases, and we are using these deliberately by involving wide range of pesticides. Majority of chemicals are used in agriculture as data suggests that about 49399 million metric tons of pesticides had been used only in agriculture sector in 2010 in the country. Use of pesticides in other fields such as public health, fisheries, forestry and food industry is not included in the data. Though pesticides are useful in managing pest populations but these have adverse effects on humans, animals and ecosystems. The current work exhibits the effects of pesticides on human health in the country. Acute poisoning is one of the key issues resulted by unsafe handling and storage of pesticides in on-farm and off-farm premises in developing economies. From various areas in the country, pesticides are reported to be used as tool for suicide by teen agers due to easy access. According to department of Plant Protection (Karachi), total of 200 workers get affected showing low enzyme activity in their blood. In Multan, an adverse situation was observed as elevated levels (87.5 %) of acetylcholinesteras (AChE) activity was recorded in female cotton pickers as compared to males which have low (36 %) AChE activity because cotton is picked mostly by women in Pakistan. The aim of this work is to sum-up the weaknesses in practicing / implementing current policies and legislations for safe handling, storage and judicious use of pesticides. The acquired knowledge will later be used in making and improving the existing regulations for the subject.

**Key word:** Pesticides, cotton, human health, Pakistan.

\*Corresponding email address: [ramzan.mnsua@gmail.com](mailto:ramzan.mnsua@gmail.com)

Received: 25 May 2019 Accepted: 29 June 2019

**INTRODUCTION**

The term pesticide is complex mixture of chemicals which are used freely to control a wide number of insect pests such as fungus, rodents, molluscs, nematodes and other also. Pesticides contain some of very toxic action which can cause change in DNA (Garcia *et al.*, 2012). In Pakistan chemicals have been used from a very long time but the documented reports show the use of agrochemicals which started after the mid of 19<sup>th</sup> century. In 1960, pesticide usage was increased up to 7000 tons per annum and the number was higher in 16.226 metric tons per annum in 1976-1977. There were no rules and regulation about the use of chemicals but before 1971, they govt. of Pakistan started to check and balance on the imported chemicals with the help of Department of Plant Protection (DPP). APO was formulated in 1971 and 1973. The basic aim of that was to keep deep eye on formulations, import, sales and registration of pesticide in the country (Mazari, 2005). Unfortunately, there is no recommendation for the minimal or maximum residue on the food products and for now (Tariq, 2009). Punjab was the area in which there is large amount of pesticide used during the 1980's and 1990's. in 1989, after the involvement of private sector there was tremendous increase in pesticide usage with five time increase in that year however, production of crops did not increase that way. The private sector contributed more in usage of chemicals by disseminating knowledge about pesticide and control of pest through them using the electronic and print media. Hence,

we can say that it may be the biggest reason of contamination of food products (Tariq, 2009). In this modern date, there are 30 types of fungicides, 39 types of weedicides, 5 types of acaricides, and 6 diverse types of rodenticides which are registered while the imports of pesticide are increasing on daily basis (Qureshi *et al.*, 2010). In our country 80 % of the pesticide is used on our important cash crop *i.e.* cotton while other includes paddy, sugarcane, fruits and vegetables etc (Tariq *et al.*, 2007).

Pesticides are poisonous material which affected millions of lives and engulfed millions of lives too. Here is a small review of patients affected globally. First time in 1973, WHO announced about the cases of people affected by pesticide nearly about 0.5 million. All the data was based on hospitalization of patients excluding the suicide attempts. A local study was carried out by WHO in which a country was highlighted and that was a Sri Lanka in which there is about 10,000 cases of acute poisoning of pesticides occurred with the death of 1000 patients causing a huge loss to the country. This figure got highlighted as the deaths were twice then the deaths caused by whooping cough and malaria it includes every kind of patient affected by the pesticides etc. After this there were reports of continuous incidences by pesticides and death too in 1985 there were 3 million cases with 220,000 deaths occurred in globe. Among the Asian countries Malaysia has a problem of parquet poisoning which involves 73.4% is of suicides and 13.8% accidental while 1.07% to occupational incidence. In the recent years ago, Africa was a

place in which 11 million people have been noticed to be affected by the pesticides however; the figure includes the overall cases like minor as well as major cases. There are many of the peoples which have been affected by pesticides cases. In Indonesia about 30,000 with 2400 are admitted in hospitals while in Thailand 4046 cases with 289 deaths occurred. According to some rough estimates that there are 3% agricultural workers residing in the underdeveloped countries. It means that there are 830 million workers out of which 25 million cases of agricultural workers are exposed. The situation is worse as the patients are not getting reported or they heal themselves by use of old ways. There are countries where farmer seek treatments like in Indonesia, Malaysia and in Sri Lanka the percentage is high 69.9%, 67.8% and 83.5% while the condition is poor in Thailand where 8.4% seek treatment in hospital. According to WHO, there are about 877000 deaths are every year in which suicide was a major factor in 2003. China and South-East Asia is a place where over alone 60 % of the intentional pesticide drinking happens. 300000 deaths have been reported just because of self-drinking poison (Gunnell and Eddleston, 2003). In Brazil, the hospitalized data show 18 % male and 7% female because of self-ham (Fleischmann *et al.*, 2005). In Southern Trinidad, a place where 80% of the mortalities occurred due to poisoning in a rural area. However suicidal ratio is high in Suriname where fatal is 55 and non-fatal is 44%. In Africa, cases from Zimbabwe shows elevated level of drinking pesticide made from organophosphates in 200 admitted patients were shown in a study (Graafsma *et al.*, 2006). Malawi is a place where 80 % of deaths were due to suicides by drinking pesticides (Dong and Simon, 2001; Dzumalala *et al.*, 2006).

If we talk about the diseases caused by pesticides, they are not one or there are many diseases. Asthma is a disease which make difficult in taking breath has been said to be the root cause because of pesticides. During a study carried out in California, the research surveyed 4000 children's in which they find out that the children's who passed 1<sup>st</sup> year of life in herbicide and in the report, it was mentioned that toddler get asthma tow time more if they will be exposed to insecticides (Salam *et al.*, 2004). Birth and fatal defects are also due to pesticides during a birth of three children in Florida the babies were defected it was found out that all the women worked in a factor where they produce or have a contact with chemicals. It has been said that increased rate of birth defects in USA is due to pesticide and occur in spring and summer months when there is large amount of usage of pesticide start to occur which result in the mixing of pesticide either water including spina bifida, cleft lip, clubfoot (Winchester *et al.*, 2009). Breast cancers are also due to the same. A study reveals that in North America there is cancer because of pesticides and it is the major cause for woman of round about 35-50 years. Beside all that, pesticides have the potential to affect the reproductive factor Epidemiological studies have associated with the cancer, gastric, skin, kidney,

liver, prostate, testis in individuals exposed; besides sarcomas, leukaemia, non- Hodgkin lymphoma, myeloma and others (Teitelbaum *et al.*, 2006).

**Literature survey:** During 1989, a survey for the monitoring of different levels of organochlorine was done in Pakistan (Quetta). Data was usually collected from Sandeman Provincial hospital where they found different levels of chemicals in fat tissue and in blood. They encountered median and maximum levels of pesticide which is usually high than other reported patients in Germany. 4,4- DDT, 4,4- DDE, a-HCH, B-HCH, and r-HCH was observed in blood and fat tissues. The levels of insecticide in blood are as follows 0.61 (median) 4.83 (maximum), for fat tissues 0.87 (median) 10.10 (maximum). B-HCH in blood is 1.39 (median) 6.05 (maximum). Also, the condition was somewhat matching by other said pesticides (Teitelbaum *et al.*, 2006).

Multan in 1972 faced a tough situation just because of chemicals. Once, the unloading of Phorate consignment caused a death of seven workers as they are not much dressed according to rules and also, they were working in extreme environment. Deaths are also the fate of many workers who found to work under the premises of pesticides. During the outbreak in malaria control programmes a total of seven deaths were reported however, data regarding which pesticides resulted into their death is not available. According to the department of Plant Protection (Karachi), total of 200 workers get affected showing the low enzyme activity in their blood. Chakwal district faced a considerable death of patients which was accidently. Total 198 people belonging to different villages was died just by eating sugar which includes residues (Fleischmann *et al.*, 2005). Data suggested that 70 % of the cases were children with age 1-9 years and 19 of the patients died during the incidence. Unintentional cases of pesticide also exist like some peoples eat monosodium glutamate (lindane) and get affected. Wife of a researcher is also not safe she used to grow mint in her home. To treat it soil she used 10% aldicarb (granular form). When she used the leaves (4-6) near to treated soil she showed symptoms of infection after 34 days. More than 150 children in the past obtained meditation because they used to pass through a corn field to reach their school. Persons who treated their room with pesticides using a hot plate and showed symptoms within six months and unfortunately, it was only first-time use.

A long-term study was conducted at Nishtar Hospital, Multan during 1996-2002. During their study period, a total of 578 patients were reported to be affected among them the cases of suicide, occupational and accidental incidences were recorded. In 578, the number of males was more than females while the age group that was affected more (81%) is within 14-30 years. Suicides were recorded as follows; male (120) female (76), during their work; male (71) female (14), accidental cases; male (71) female (17). While the death record includes 34 males and 20 females (Azmi *et al.*, 2006). Blood samples of people were collected from Gadap a rural

area of Karachi. A total of 14 stations were selected for sampling based on the exposure of humans to pesticides. Some were showing high residues of cypermethrin (8.95), Diazinon (5.40), Mono (11.20), low levels; cypermethrin (0.64), DDT (3.17), DDE (0.17) with multiple residues in single sample; Cypermethrin (6.39), Mono (2.69), DDT (0.49) respectively. Malathion infected 7500 workers who were working in epidemic control of mosquito in 1976. In the same year, extreme high numbers of cases were recorded excluding the number of 2800. Managers, spray men and mixers were affected at that time and also, they were showing skin marks (Malathion) on three main regions i.e. arm, chest and forehead. Their range on arm, chest and forehead is 2.9-88.2, 1.4-105.0 and 6.7-202.5 (Bhalli *et al.*, 2006).

The DNA damage in workers who worked in pesticide factory was also reported. Overall 29 workers got infected who were working under the premises of organophosphates, carbamates, and pyrethroids. SAGE or comet assay was the sampling method for knowing DNA damage. Exposed peoples were showing longer comet tail than the normal ones (Khwaja *et al.*, 2013). Inhabitants of Karachi were selected to know about the organochlorine residues of pesticides in their blood. Persons were showing elevated levels of  $\alpha$ -endosulfan (1.565 mg/kg) and  $\beta$ -endosulfan (1.233 mg/kg) while the average concentrations (mg/kg) are HCH (0.819); Cycloienes (2.839); Diphenylaliphatics (0.240) respectively. Enzyme activity was also found to be high like GPT IS 57  $\mu$ /L and GOT was high in males with the age 31 years i.e. 264  $\mu$ /L. RBC was also counted in which female was showing fewer blood counts 3.4 mill/uL. As the people are carrying magnified chemicals so they are very much prone to diseases (Wei and Chua, 2008). There is a sequence of suicidal death with in Pakistan. As reported in Dawn news, a girl living in Malakand District ended her life by consuming phosphate tablets. While another case of 15years old girl ended her life by use of same. A resident of Kot, living in Meena society consumed poisonous pills thus killing him. Dozens of teenagers have lost their life by using wheat pills (phosphorous laden tablets) from Kot Manzari Baba. Around 15 cases have been reported from the same that was reported in RHC, in which four cases of teenagers was involved and other aged persons. All of them had used the wheat pill as the most readily source of suicide (Ejaz, 2014).

From Mauza Badri Nrainpura, Minchinabad overall 13 suicides have been reported in past and in 2013, four suicides had been reported and all of them are teenager the ages are 19 and 17 years. The same use of wheat pills has been used in other places such as Basti Behram ka Avtar, Mohallah Parachan, Suraj pur Colony as suicide one case from each reported place and also a group of teenager boys from Basti Behkan Bodla used the same tool (Fareedullah, 2016).

Unintentional killing through pesticides has been documented such as in Layyah. In these cases peoples bought

sweets from their occasion. When they used there was high mortality and enormous number of affected cases occur thus creating the situation more critical. In the eve of this incident a total of 26 deaths have been reported (Khan *et al.*, 2013) Cotton picker ladies are not safe though during the picking they also acquire somewhat levels of pesticides by inhaling and by cuts which they faced during work or when they use sticks at home for fuel. The major reason for cotton workers to be in trouble is the dressing which they do not adopt properly hence, affecting them selves

#### CONCLUSION

Pesticides should not be sale openly or without any regulation. It should not be available readily on any market place. The increased trend in suicide is mostly by use of chemicals and chemicals also burned the skin of workers and also can be major factor in promoting disease. Thus, proper regulation should be adopted and humans should know how much toxic a chemical can be.

#### CONFLICT OF INTEREST

Authors have no conflict of interest

#### REFERENCES

- Azmi, M. A., S. Naqvi, M. A. Azmi and M. Aslam, 2006. Effect of pesticide residues on health and different enzyme levels in the blood of farm workers from gadap (Rural Area) Karachi Pakistan. *Chemosphere*, 64(10): 1739-1744.
- Bhalli, J. A., Q. Khan and A. Nasim, 2006. DNA damage in Pakistani pesticide-manufacturing workers assayed using the comet assay. *Environmental molecular mutagenesis*, 47(8): 587-593.
- Dong, X. and M. A. Simon, 2001. The epidemiology of organophosphate poisoning in Urban Zimbabwe from 1995 to 2000. *International journal of occupational environmental health*, 7(4): 333-338.
- Dzamalala, C. P., D. A. Milner and N. G. Liomba, 2006. Suicide in Blantyre, Malawi (2000-2003). *Journal of clinical forensic medicine*, 13(2): 65-69.
- Fareedullah, 2016. A village haunted by mass poisoning. Dawn News.
- Fleischmann, A., J. M. Bertolote, D. De Leo, N. Botega, M. Phillips, M. Sisask, L. Vijayakumar, K. Malakouti, L. Schlebusch and D. De Silva, 2005. Characteristics of attempted suicides seen in emergency-care settings of general hospitals in eight low-and middle-income countries. *Psychological medicine*, 35(10): 1467-1474.
- Garcia, F. P., S. Y. C. Ascencio, J. G. Oyarzun, A. C. Hernandez and P. V. Alavarado, 2012. Pesticides: Classification, uses and toxicity. Measures of exposure and genotoxic risks. *Journal of research environmental science and toxicology*, 1(11): 279-293.
- Graafsma, T., A. Kerkhof, D. Gibson, R. Badloe and L. Van de Beek, 2006. High rates of suicide and attempted suicide using pesticides in Nickerie, Suriname, South America. *Crisis*, 27(2): 77-81.
- Gunnell, D. and M. Eddleston, 2003. Suicide by intentional ingestion of pesticides: A continuing tragedy in developing

- countries. Oxford university press.
- Khan, D. A., K. Ahad, W. M. Ansari and H. Khan, 2013. Pesticide exposure and endocrine dysfunction in the cotton crop agricultural workers of Southern Punjab, Pakistan. *Asia pacific journal of public health*, 25(2): 181-191.
- Khwaja, S., R. Mushtaq, R. Mushtaq, M. Yousuf, M. Attaullah, F. Tabbassum and R. Faiz, 2013. Monitoring of biochemical effects of organochlorine pesticides on human health. *Health*, 5(08): 1342.
- Mazari, R. B., 2005. Country report on international code of conduct on the distribution and use of pesticides. Department of Plant Protection, Ministry of Food, Agriculture Livestock Government of Pakistan. 26th July.
- Qureshi, A. S., M. A. Gill and A. Sarwar, 2010. Sustainable groundwater management in Pakistan: Challenges and opportunities. *The journal of the international commission on irrigation drainage*, 59(2): 107-116.
- Salam, M. T., Y.-F. Li, B. Langholz, F. D. Gilliland and C. s. H. Study, 2004. Early-life environmental risk factors for asthma: Findings from the children's health study. *Environmental health perspectives*, 112(6): 760-765.
- Tariq, M. I., 2009. Leaching and degradation of cotton pesticides on different soil series of cotton growing areas of Punjab, Pakistan in lysimeters. Ph. D. Thesis, University of Punjab.
- Tariq, M. I., S. Afzal, I. Hussain and N. Sultana, 2007. Pesticides exposure in pakistan: A review. *Environment international*, 33(8): 1107-1122.
- Teitelbaum, S. L., M. D. Gammon, J. A. Britton, A. I. Neugut, B. Levin and S. D. Stellman, 2006. Reported residential pesticide use and breast cancer risk on long Island, New York. *American journal of epidemiology*, 165(6): 643-651.
- Wei, K. and H. Chua, 2008. Suicide in Asia. *International review of psychiatry*, 20(5): 434-440.
- Winchester, P. D., J. Huskins and J. Ying, 2009. Agrichemicals in surface water and birth defects in the united states. *Acta paediatrica*, 98(4): 664-669.