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Original Research

Evaluation of histopathological changes of liver in agricultural poisoning

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ABSTRACT:

Background: Acute poisoning by pesticide compounds is a major global clinical problem. The present study was conducted to evaluate histopathological changes of liver in agricultural poisoning. **Materials & Methods:** The present study was conducted on 70 autopsies of liver of both genders. Type of poison was confirmed by toxicological evaluation reports. During Autopsy detailed internal and external examinations were done and random portion of Liver were collected for histological examination. **Results:** Maximum cases were of age group 25- 35 years which comprised of 28 males and 4 females followed by 35-45 years (20), >45 years (12) and 15-25 years (6). Major poison was organophosphorous seen in 35 cases followed by Aluminium and zinc phosphate in 18, Pyrethrin compounds in 10 and Unknown in 7 cases. Group I liver changes was seen in 9, group II in 23 and group III in 38 patients. The difference was significant ($P < 0.05$). **Conclusion:** Authors found that maximum cases were of group III liver changes and age group 25- 35 years. There was male predominance.

Key words: Liver, Aluminium, Zinc phosphate

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INTRODUCTION

Acute poisoning by Pesticide compounds is a major global clinical problem, with thousands of deaths occurring every year. Most of these pesticide poisoning and subsequent deaths occur following an intentional self-ingestion of the poison. The potential adverse impact on human health from pesticides exposure is likely to be higher due to easy availability of highly hazardous products.[1]

A great proportion of acute poisoning cases are caused by exposure to pesticides, especially organophosphate (OP) compounds.[2] The toxicity of organophosphorus insecticides results in negative effects on many organs and systems such as the liver, kidney, nervous system, immune system and reproductive system. Organophosphorus insecticides exert their biological effects through electrophilic attack on the cellular constituents of hepatic and brain tissues with simultaneous generation of reactive oxygen species.[3]

Toxicity of organophosporus insecticides used compounds against human and animals were always evaluated by assessment of such biochemical parameters alterations and histopathological changes in tissues and organs. In developing countries like India major source of human poisoning is through agricultural poisons. The problem is getting worse with time as newer drugs and chemicals are developed in vast numbers. The commonest pesticides agents in India appear to be organophosphates, carbamates, pyrethroids and aluminium/zinc phosphide.[4]

After ingestion, most of the poisons are rapidly absorbed throughout the gastrointestinal tract and it is

carried to the liver by the portal vein for metabolism and excretion. It is known that most of the compounds are toxic to liver can cause liver dysfunction.[5] The present study was conducted to evaluate histopathological changes of liver in agricultural poisoning.

MATERIALS & METHODS

The present study was conducted in the department of Forensic Medicine. It comprised of 70 autopsies of liver of both genders. Ethical approval was obtained prior to the study.

A detailed history was taken from from relatives in all cases type of exposure, manner of death and treatment history were taken from hospital case records. Further, type of poison was confirmed by toxicological evaluation reports. During Autopsy detailed internal and external examinations were done and random portion of Liver were collected for histological examination and fixed in 10% formalin and stained with Hematoxylin and eosin and the findings recorded.

Group I changes were congestion, sinusoidal dilatation, mononuclear and neutrophillic infiltration, group II changes were nuclear fragmentation, cytoplasmic vacuolization and hydropic degeneration and group III were patchy or centrilobular necrosis and patchy hemorrhages. Results thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS

Table I Distribution of autopsies

Age group (Years)	Male	Female	Total
15-25	3	3	6
25-35	28	4	32
35-45	14	6	20
>45	8	4	12

Table I shows that maximum cases were of age group 25- 35 years which comprised of 28 males and 4 females followed by 35-45 years (20), >45 years (12) and 15-25 years (6). The difference was significant (P < 0.05).

Table II Type of poison detected by chemical analysis

Poison	Number	P value
OGP	35	0.05
Aluminium and zinc phosphate	18	
Pyrethrin compounds	10	
Unknown	7	

Table II, graph I shows that major poison was organophosphorous seen in 35 cases followed by Aluminium and zinc phosphate in 18, Pyrethrin compounds in 10 and Unknown in 7 cases. The difference was significant (P < 0.05).

Graph I Type of poison detected by chemical analysis

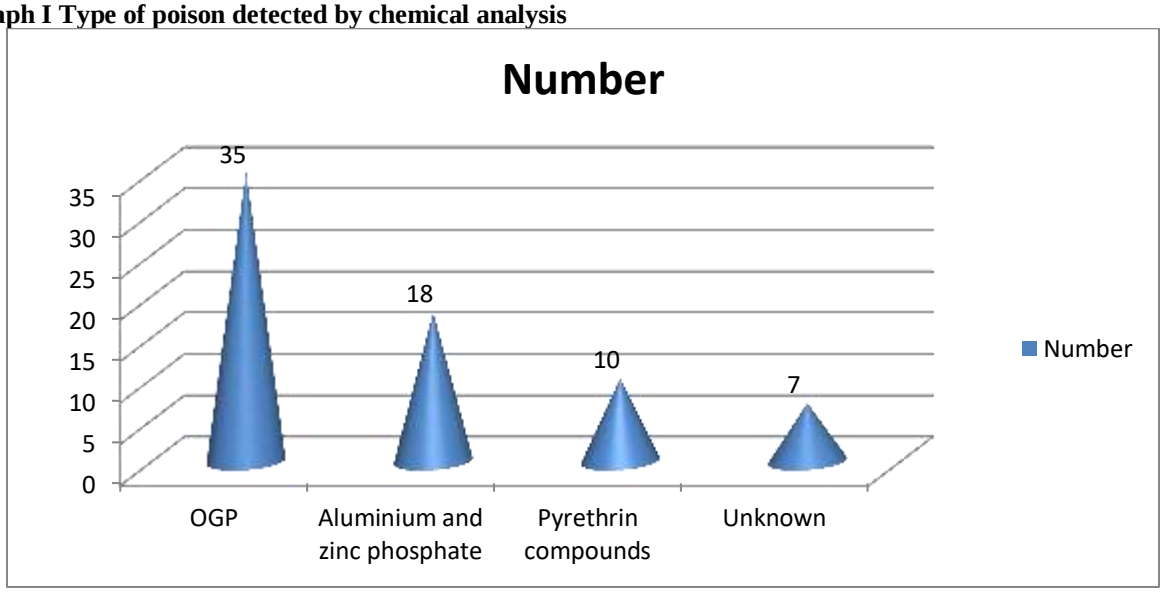

Table III Histological classification

Group	Number	P value
Group I	9	0.01
Group II	23	
Group III	38	

Table III shows that group I liver changes was seen in 9, group II in 23 and group III in 38 patients. The difference was significant ($P < 0.05$).

DISCUSSION

Suicide and deliberate self-harm using pesticides is a major but under-recognised public health problem in the developing world.[6] Each year 250,000–370,000 thousand people die from deliberate ingestion of pesticides. These deaths are responsible for about a third of suicides globally; the World Health Organization (WHO) now recognizes pesticide poisoning to be the single most important means of suicide worldwide. Within the rural developing world, high levels of pesticide use with storage at home increases the risk of acute poisoning. One strategy to reduce mortality is to restrict access to more toxic pesticides.[7] As a first line, countries should follow Food and Agriculture Organization (FAO) advice and withdraw the most toxic WHO/US Environmental Protection Agency (EPA) class I pesticides (see Table 1 for description of toxicity classifications) from agricultural practice. Further efforts can range from educating farmers in the use of safer pesticides to imposing regulatory restrictions on the sale and distribution of the most toxic class II pesticides. These strategies would be aided if countries developed pesticide policies that balanced agricultural and economic needs against the public health impact of acute and chronic human toxicity. The development of such a policy should be iterative and based on evidence about which pesticides are major public health concerns.[8] The present study was conducted to evaluate histopathological changes of liver in agricultural poisoning.

In present study, maximum cases were of age group 25-35 years which comprised of 28 males and 4 females followed by 35-45 years (20), >45 years (12) and 15-25 years (6). Karki et al[9] included 906 cases with the history of agricultural poisoning. In that 535 cases were females and 371 cases were male. Age of the individuals varied from 7years to 65 years. Amongst 80% of cases was in the age group of 25 to 35 years. Most of the cases are suicidal in nature and 2% are accidental in nature. In 643 cases poisons were confirmed by chemical analysis of state forensic science laboratory, in that 368 cases were organ phosphorus compound, 97 cases were aluminium phosphide and 81 cases were zinc phosphide, 97 cases are Pyrethrin compounds and in remaining cases poison was not detected by chemical analysis. In all cases liver was examined for both gross and histological changes, most cases showed severe congestion by gross examination. Group I histological changes were predominantly seen among organophosphorus compound and the persons who were treated less than one day, group II &III changes were predominant among phosphates, Pyrethrin compounds and the persons who were treated more than two to five days.

We found that major poison was organophosphorous seen in 35 cases followed by Aluminium and zinc phosphate in 18, Pyrethrin compounds in 10 and Unknown in 7 cases. Group I liver changes was seen in 9, group II in 23 and group III in 38 patients. Ateeq et al[10] undertaken to investigate the toxic effects of the organophosphorous pesticide, dimethoate on some organs of mice (liver and kidney).The Dimethoate was administration at the doses of 14mg/kg and 28 mg/kg. Treated mice groups showed many histopathological changes in the liver. There were congestion blood vessels, hemorrhage, infiltration, vasodilatation, hydropic changes, fatty changes and hypertrophy. Meanwhile, kidney showed some changes including Glomerular Degeneration, Tubular Degeneration, Hemorrhage, Infiltration, Hydropic Changes, Tubular Cast, Tubular Widened Lumen,Glomerular Shrinkage and Compressed Blood Vessel. The results of this study confirmed that dimethoate seriously deteriorate some organ in Digestive system (liver and Kidney) of Albino mice.

CONCLUSION

Authors found that maximum cases were of group III liver changes and age group 25- 35 years. There was male predominance.

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