Document heading doi: 10.21276/apjhs.2019.6.1.11 **Research Article**

A study of various pesticides in the grape garden: their effect on grape garden workers

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Abstract

A total 34 workers (Male and Female) were select with age group 20-50 years. The workers were selected based on their work category in the grape garden. Those workers were directly involved in spraying activities more than five years. Blood samples were collected for Hematological and Biochemical test after one month of spraying activity. Present study showed that a pesticide significantly affects the hemoglobin level of workers. It also increase platelets count, affects on total W.B.C. counts and increase the uric acid level by altering the kidney function and affects the liver function by increasing the GTP, GOT level as well as bilirubin level in blood of grape garden workers. These finding showed that the continuous work in the grape garden affects liver, kidney and hematological parameters of grape garden workers.

Keywords: Grape garden, Pesticides, hematological and biochemical parameters, workers.

Introduction

Pesticides are large and diverse groups of chemicals [1].Those are use to kill and eradicate rodents, fungi, insects, and weeds[2]. As well as an important, cause of morbidity and mortality in developing countries (Sexena, 2010). It include wide range of compounds like insecticides, fungicides, herbicides, rodenticides, molluscicides, nematicides, plant growth regulators [3]. The extensive use of insecticides has caused great concern because of the possible effects of these compounds on human being as well as wild and domestic animals [4]. It affects several organs of human beings, but liver is most susceptible and have carcinogenic. Pesticides uptake occurs mainly through the skin and eye, by ingestion[5-9]. Walwa is large village. It is Tahsil of Sangli District. More than Ten thousand populations are live in this area. Farmers in this village are mostly cultivated cash crop such as sugar cane and grape. Padmbhushan Dr.Krantiveer Nagnath (Anna) Nayakawadi Hutatma Kisen Ahir cooperative sugar factory is establish in this area. The permanent source of water from Krishna River and black fertile soil are enhancing better production. More than eight hundreds grape garden are located in this village.

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Last few years farmer of this area were cultivated seedless yellow grape. Large numbers of seedless grape gardens found but now day's farmers are cultivated and diverted to seedless black grape and huge number of black garden are located in this area. This is due to high yield capacity better economy and exported. Therefore farmer are use variety of chemical fertilizers and pesticides in the grape garden. The chemical fertilizers are directly throwing during plouhging and first time cultivation of grape garden. The pesticides are use from proper growth of grape plants to maturation of grape. The period for using pesticides is very long. The pesticides exposure represents a major potential health hazard for workers in the grape garden. Major chemical groups of pesticides used in the grape garden are Organophosphate, Carbamate, Organochlorines, nitro and Chlorophenols and Pyridyle derivatives[10-14]. WHO in (1993, 1994) reported that liver enzyme activity has been altered during exposed to Organophosphrous pesticides. It has been observe that maximum exposures occur while mixing and handling of pesticides[15-18]

Objectives of Study

1. To known about agricultural economy of farmer in walwa village.
2. To known about number of grape gardens
3. To study the various pesticides and chemical fertilizer used in the grape garden.

4. To study the direct and indirect effects of pesticides on grape garden workers

Methodology

We were used various method namely question and answer method, survey and observation method. The data was collect in various steps. In first step, we were collected information about grape field in walwe village. In second step, more than hundred workers selected for question-answer by using questionnaire. Direct observation method was use to observe equipments, behavior, face, eyes, ears, nose, toung, fore limb, hind limb of workers in the grape garden. Note down the observation. In third step we were collected blood sample of more than 34 workers (Male and Female) with age group 20-50 years. Workers selected based on their work category in the grape garden. Those workers were directly involved in spraying activities more than five years. Blood sample collected for Hematological and Biochemical test after one month of spraying activity by using EDTA bulb and plain tube[19-22].

Hematological parameters: Total red blood cell (RBC) counts (Mill/Cumm), Hemoglobin (Hb) content (g/dl), Total WBC counts (Cells/Cumm) and platelet count (Lakh/Cumm) were assessed using hematological analyzer. Liver function test: Determination of serum alkaline phosphatase (ALP), serum glutamate pyruvate transaminase (SGPT), serum glutamate oxaloacetic transaminase (SGOT), serum bilirubin (T), serum bilirubin (D), indirect bilirubin were carried out by kinetic method suggested by International Federation of Clinical Chemistry. All the tests performed with commercially available diagnostic kits. Kidney function test: Determination of serum creatinine (mg/dl) and blood urea (mg/dl) level done with help of commercially available kits.

For statistical analysis data were consider according to age and sex for hematological and biochemical parameters. Data were analyzed using statistical package. Significant differences between mean values of study and control group statistically analyzed using the student's t- test. Results considered significant when p-value is <0.05.

Result

In present study, direct observation method was show that spraying equipments were not wash properly. The behavior of workers was abnormal such as abrupt thanking, shouting etc. The faces of workers were mostly pale. The eyes of some workers were reddish especially male workers. Runny nose observed in female workers. Losses of hearing observed in some workers.

The colour of plasma was yellowish to deep yellow. The normal level of R.B.C. in male was 4 to 5.5 cu mm and in female was 4.2 to 5.4 cu mm. The normal hemoglobin content of blood varies from individual to individual. In men, the average value was 13 to 15 gm/dl. The normal range (average 14.5gm/dl) and 12 to 15gm/dl in women (average 13.5gm/dl). The value of Hb was variable according to age. The average values of Hb in female workers (study group) was (10.9), where as male workers was (12.70). The values of Hb were not significant decreased. The normal level of total W.B.C. count was 4200 to 9800/cu mm in male and 4000 to 11,000/ cu mm in female. The total Platelets counts observed, more in female workers (3.22/cumm) while lower in male workers. (Table.1)

Table 1: Hematological parameters in study group and control group (Value are expressed as Mean ± S.D)

Sex	RBC(Mill./Cumm)		Hb(gm/dl)		WBC (Cells/Cumm)		PLT (Lakh/Cumm)	
	Study Group	Control	Study Group	Control	Study Group	Control	Study Group	Control
Male	4.74 ±0.92 (17)	5.20 ± 0.98	12.70 ±3.26 (17)	14.10 ± 2.26	7447 ± 1996 (17)	8500 ± 1890	2.65 ± 0.79 (17)	5.56 ± 1.05
Female	4.42 ± 0.42 (17)	4.50 ± 0.46	10.9 ± 2.15 (17)	12.14 ± 1.99	8711 ± 2171 (17)	9800 ± 2272	3.22 ± 0.76 (17)	2.36

RBC-Red Blood Cells, Hb-Hemoglobin, WBC-White Blood Cells, PLT-Platelets indicate significance

Table 2: Liver and Kidney parameters in control and study group (Value are expressed as Mean ± S.D)

Sex	ALP(U/L)	SGPT(U/L)	SGOT(U/L)	Serum Bilirubin (T)(mg/dl)

	Study Group	Control	Study Group	Control	Study Group	Control	Study Group	Control
Male	111.35 ± 20.27(17)	97.00 ± 18.27	33.17 ±9.78 (17)	34.00 ± 8.98	25.91 ±14.16	30.00 ± 16.17	0.98 ± 0.52 (17)	1.00 ± .58
Female	79.6 ±22.89 (17)	80.23 ± 18.23	31.5 ± 6.97 (17)	31.00 ± 7.12	31.5 ±6.97	28.00 ± 7.00	0.92 ± 0.45	0.94 ± 0.56
Sex	Serum Bilirubin (D) (mg/dl)		Indirect Bilirubin (mg/dl)		Serum Creatinine (mg/dl)		Blood Urea (mg/dl)	
	Study Group	Control	Study Group	Control	Study Group	Control	Study Group	Control
Male	0.38 ± 0.35 (17)	0.30 ± 0.32	0.75 ± 0.39	0.95 ± 0.46	0.94 ±0.11	0.97 ± 0.16	25.94 ± 3.22	36.0 ± 3.28
Female	0.30 ± 0.28 (17)	0.30 ± 0.28	0.62 ± 0.30	0.93 ± 0.50	0.91 ± 0.45	0.94 ± 0.18	27.7 ± 2.64	30.0 ± 2.69

ALP- Serum alkaline phosphatase, SGPT- serum glutamate pyruvate transaminase, SGOT- serum glutamate oxaloacetic transaminase

Table.2: showed that there was significant increased in enzymatic activity of male worker than female. The average value of alkaline phosphatase (ALP) in male workers was (111.35 ± 20.27) and female was (79.6 ±22.89). Glutamate pyruvate transaminase (SGPT) was drastic changed as compared to control group during study period between both workers but the average value was similar (31.5 to 33.17). Glutamate oxaloacetic transaminase (SGOT) was slightly different in male and female workers. The average value of direct bilirubin increased in male worker than female workers. Serum bilirubin (T) was not significant difference between the both workers. Indirect bilirubin was less in female than male. Serum creatinine was similar between both workers. The average value of blood urea decreased in male workers (25.94 mg/dl) than female workers (27.7 mg/dl).

Discussion

The use of pesticides represent major health hazard for workers in the grape garden[23]. Chronic Old pesticides poisoning due to over and unsafe use at their field are the most serious occupational hazards of agricultural workers in developing countries. Organophosphate (OP) is one of leading chemical dominantly used as pesticides throughout the world. Use of pesticides not only affects our surrounding but also affects the health of our workers and farmers [8]. In present study the result of study group showed that the colour of plasma was yellowish to deep yellow. The handbook of medical laboratory technology stated that the colour of plasma yellowish to deep yellow cause's jaundice. The level of R.B.C.in study group was decreased. The same finding by Patil et al.,(2007) of 85 male pesticide sprayer in grape garden exposed to different class of pesticides. Gaikwad et al.,(2015) showed no significant difference in R.B.C. of study group and control group. The values of Hb were not significantly difference in study group and control group. Similar finding by Gaikwad et al.,(2015) among pesticides sprayers in grape garden.In present study total W.B.C. were not drastic changed between study group and control group but opposite result were find by Gaikwad et al.,(2015). Total Platelets count was more in female workers than male. Rastogi et al., observed that total platelets count were increased and hemoglobin decreased[24-25] The young workers were more affected, leukocyte and platelet count were increased, and hemoglobin decreased significantly, reflecting an acute poisoning after evaluating the health impact of insecticides on Palestinian farm workers in the Gaza Strip by Abu Mouradin 2005. It was conclude that pesticides lead to alteration in hematological parameters. Furthermore, people involved in pesting,

selling not take proper precaution therefore may be much chances exposure to toxicants.

The enzymatic activity of SGPT, SGOT and ALP, uric acid, creatinin and blood glucose increased among study group than control group. Increased level of GTP and ALP it may conclude that pesticides can alter liver function. Sahil,1995 evaluated the hepatotoxic and nephrotoxic effects of Dimethoate and Diazinon and showed that the levels of the ALT and AST as well as ALP, uric acid, creatinin and blood glucose in the serum of treated rabbits significantly increased compared to control animals. It was show that pesticides increase blood uric acid level by altering kidney function. In the study, bilirubin level of workers exposed to pesticides was determined with the aim of evaluating the effect of pesticides on liver function. The value of both direct and indirect bilirubin in blood was significant increase. Yousef et al.,(2006) have mentioned same results. Patil et al.,(2009) compared hematologic parameters and liver and kidney function tests in Occupationally exposed pesticide sprayers of grape garden and found an increase in serum bilirubin, creatinine, blood glucose and urea

Conclusion

Present study showed that a pesticide significantly affects the hemoglobin level especially in female workers than male workers. It also increase platelets count, affects on total W.B.C. counts and increase the uric acid level by altering the kidney function and also affects the liver function by increasing the GTP,GOT level as well as bilirubin level in blood of grape garden workers. Overall we conclude that pesticide sprayers in grape garden are more likely under risk. Protective measures must be undertaken while sharing of foodstuffs during the work, avoided smoking, to prevent the spread of hepatitis B, whose virus usually found in saliva.

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