

PESTICIDE EXPOSURES AMONG FARM WORKERS: PHASE-I CHILLI CULTIVATORS OF GUJARAT

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The rural population in India constitutes 72.22 % of the total population and majority of this population is engaged in agriculture related activities. In Gujarat, as per Census of India 2001, approximately 97 % of the workers in rural areas are engaged in agriculture related activities. The major cash-crops in the state are cotton, groundnut, tobacco, sugar cane, cumin and vegetables including green chillies. As per the figures available from department of Agriculture, Govt. of Gujarat, the total estimated consumption of technical grade pesticides in 2001-02 was 3643 metric tonnes. Of these more than 80% are insecticides, which include mainly organophosphates, synthetic pyrethroids, organochlorines and others. The maximum amounts of pesticides are used on vegetables and cotton crops. Among vegetables, chillies, cabbage and cauliflower crops need the maximum number of pesticide-sprays. In the chilli-crop, which is cultivated from July to March, frequent sprays of mixtures of pesticides and fungicides, are used mainly during first four months of the crops (Fig. 1). The sprays are done by paid-farm labourers mostly living with their families on the farms. This group of workers is likely to have maximum exposure to a variety of pesticides and since their families also live on the farms, women and children may also be exposed (Fig.2). These exposures may result in acute and chronic health effects. Therefore it is important to determine the extent of exposures in the high-risk groups. Present study was undertaken to assess the extent of pesticide exposure and the level of awareness among the agricultural workers engaged in the irrigated-cotton and vegetables crops.



Fig.1. Pesticide spraving on chilli crop



Fig. 2. Chilli farm workers

It was found that 73.5 % of the workers sprayed pesticides 11–20 times and 15.3 % of them sprayed 21–30 times during the season (Table-1). The pesticides used for spraying were phorate, monocrotophos,

folidone, roger, sulphur powder, chlorpyriphos, fenvalerate, endosulphan, fighter, novacron, monocil, phosmite, sumicidine etc. Most of the workers had pesticide related symptoms, which included nausea (3.9%), lacrimation (3.9%) abdominal pain (18%), dizziness (5.9%) and skin itching (72.3%). Among them eight of the workers had past history of acute pesticide poisoning. The activities of plasma cholinesterase and RBC cholinesterase were found to be depressed significantly at the end of the spraying season. The plasma cholinesterase levels were found to be 3154 ± 109 and 2789 ± 112 Units/L (Mean \pm SE, $P < 0.005$) before and at the end of the spraying season respectively and those of RBC cholinesterase were found to be 28.93 ± 0.83 and 23.98 ± 0.96 Units/gm of Hb (Mean \pm SE, $p < 0.005$) respectively (Table-2).

Table-1: Frequency of pesticide sprays by the agriculture workers during the season.

No. of Pesticide Sprays	No. of Workers	Percentage
1-10	24	10.2
11-20	173	73.5
21-30	36	15.3
31-40	1	0.5
41-50	1	0.5

Table-2: Plasma and RBC Cholinesterase activity among the agriculture farm workers.

Group	Before Exposure	After Exposure	% Inhibition
Plasma Cholinesterase (PchE) Unit/L	3154 ± 109 (77)	2789 ± 112 (77)	11.58
RBC Cholinesterase Unit/g Hb	28.93 ± 0.83 (76)	23.98 ± 0.96 (76)	17.11

*The figures in the parenthesis indicate the number of subjects
The values are Mean \pm SE*