

NOTE

Residues of Organochlorine Pesticides in Human Blood in Ahmedabad, India

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Three studies on the estimation of residues of organochlorine pesticides in the general population of Ahmedabad at different intervals were carried out. Observed trend for these contaminants is descending which may be due to restrictions imposed on the use of these chemicals. However, these levels are still higher than the studies originating from other developing countries.

Key Words: Residues, DDT, HCH, Human blood.

Organochlorine pesticides are released into the environment, enter living organisms and become biologically concentrated and their tendency to pass up the food chain. Owing to their long half-lives, these compounds tend to persist in tissues for many years. These chemicals have been implicated in the pathogenesis of many adverse health outcomes^{1,2}. The exposure of general population by these chemicals is relevant from a public health perspective. The residues of these persistent chemicals have been identified worldwide in humans and the environment³. However, higher levels of DDT and its metabolites have been identified in Indian general population⁴.

In view of the restriction imposed on the use of DDT and lindane (γ isomer of HCH) in recent years, the present manuscript is related to discuss the comparison of our earlier published reports on analysis of residues of persistent organochlorine insecticides in the human blood samples of Ahmedabad⁵⁻⁷.

The blood samples from healthy volunteers (male and female) of Ahmedabad (rural and urban areas) were collected in the years 1991, 1992 and 2003. It was ensured that the subjects had no previous work-related exposure to pesticides. They were requested to provide information on their demographics, dietary habits and smoking status. The method of Dale *et al.*⁸ was used for the extraction of serum samples and the final analysis of organochlorine pesticides by GC-ECD as defined earlier.

Data on total DDT and total HCH in blood serum samples in the general population of Ahmedabad in 1991, 1992 and 2003 have been depicted in Table-1. The observed trend for total DDT and total HCH reflected decline, which may be due to the restriction on the use of these pesticides in agriculture (Fig. 1). However, these levels are still higher than the studies originating from different other developing countries. The data reported from other countries during the period 1994–2002 showed blood level of DDT in the general population of Mexico⁹ (0.024 ppm), Vietnam¹⁰ (0.019 ppm), China¹¹ (0.017 ppm) and Japan¹² (0.006 ppm). The food chain is the main source of exposure to organochlorine residues in the human body and the available data on food samples including dairy products, livestock meat and water samples indicate the presence of these contaminants in significant amounts^{13, 14}. Certain persistent environmental chemicals termed as endocrine disrupters are known to elicit their adverse effects by mimicking or antagonizing natural hormones in the body which are responsible for maintaining homeostasis and controlling normal development¹⁵.

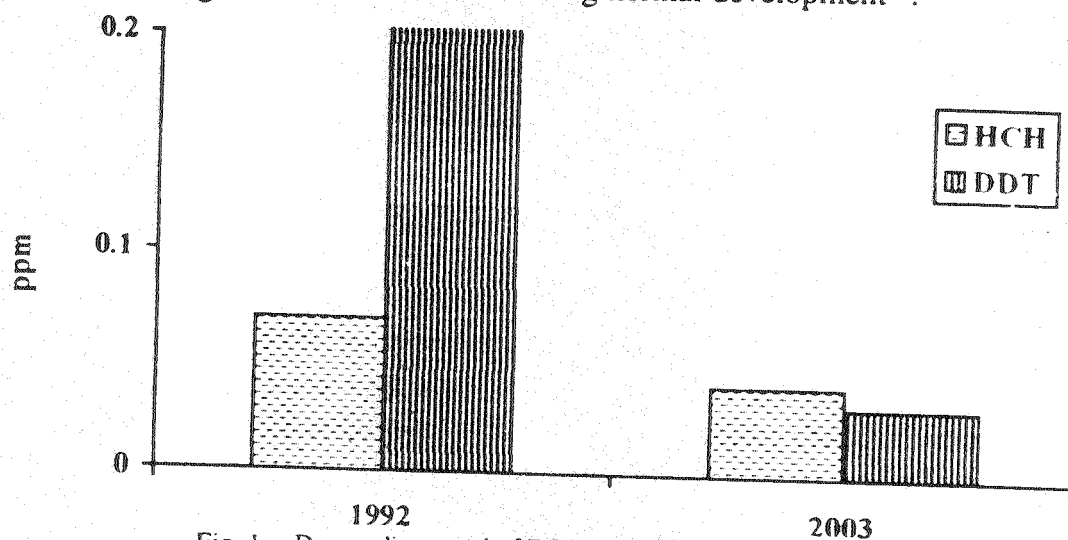


Fig. 1. Descending trend of DDT and HCH in human blood

TABLE-1
LEVELS OF DDT AND HCH CONTENT (MEAN VALUE) IN HUMAN BLOOD
SAMPLES IN AHMEDABAD IN DIFFERENT YEARS

City	Year	No.	\sum DDT (ppm)	\sum HCH (ppm)	Reference
Ahmedabad (rural)	1991	M = 31	0.048	0.148	5
Ahmedabad (urban)	1992	M = 10	0.210	0.070	6
		F = 10	0.170	0.060	
Ahmedabad (urban)	2003	M = 18	0.032	0.041	7

Levels of these chemicals in serum are far lower than those in adipose tissue but the measurement of serum levels of these chemicals is a reliable indicator of exposure and invasive also. The toxicological implications of the observed findings could not be examined very accurately as the sample size is small, however, it serves as a basis of diagnostic values for epidemiological work on

exposure assessment to persistent organic pollutants in the general population in developing countries. Although the benefits of pesticides are undeniable, the preventive measures such as use of protective devices and educational modules should be adopted to reduce the existing body burden in order to avoid any potential health effects subsequent to their use. Findings suggest that residues of pesticides in biologic samples are present in detectable amounts and the potential health risk to man and the environment remains.

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