

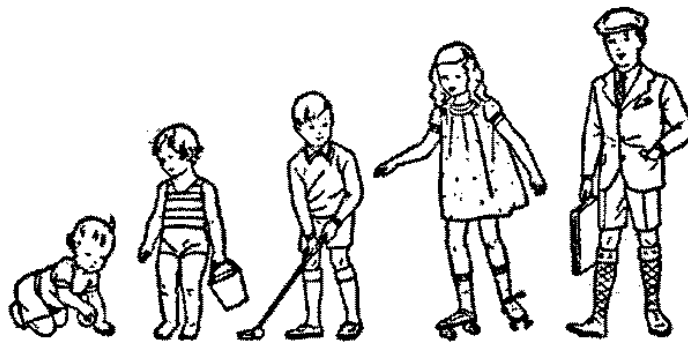


Action Programme Environment and Health



Workshop on Exposure of Children to Substances used as Ingredients in Pesticides

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“Environment and Health”

Federal Institute for Health Protection of Consumers
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II.3.3. Health effects from exposure to pesticides in Germany

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Objective:

Poison centres (PCs) give advice in most acute exposures to all kinds of products and natural organisms. PCs keep record of all cases in which they are involved in electronic databases which can be searched for epidemiological studies. A basic set of information is recorded for all cases, a selection of cases (with well defined patient's history) is followed up carefully with respect to symptoms and outcome. The frequency of pesticide exposures and the character of pesticide-related intoxications in childhood is investigated in North Western Germany.

Method:

The GIZ-Nord poison centre's database is searched for cases with exposure during the years 1996-2000, especially for cases with exposures to pesticides in children. The number of exposed human beings was calculated by eliminating calls without human exposure from the data set and correcting cases with more than one patient. Age groups for detailed analysis were children (below 10 years) and juveniles (10 to 18 years old) according to the harmonised EU – recommendations for poison centre reports (1). Product names recorded in the database were classified according to a category system developed in the German research project EVA (2). Severity of clinical symptoms was scored using the IPCS poisoning severity score (PSS) (3).

Results:

The GIZ-Nord poison centre provides service for 12,800,000 inhabitants in North Western Germany. In the time between 1996 and 2000, in total 108,558 calls were answered and recorded (1,696 calls / 1,000,000 inhabitants per year). 52 % of all calls were received from the general public, 46 % from medical doctors, and 2 % from other health professionals. During the period under investigation 99,109 patients had experienced any exposure, including 48,746 children and 6,485 juveniles.

In Tab. 1 an analysis of the products involved in exposures is presented. Most of the exposures are with medical drugs (38.3 %), chemical products (23.4 %), and plants (13.0 %). 2,968 exposures with pesticides were recorded. In 1,095 cases, children were exposed and in 65 cases juveniles. This corresponds to 3.0 % of all exposures and 46 exposures per year and million inhabitants served (2.2 % for children).

Table 1: products in all exposures (GIZ-Nord, 1996 - 2000)

Product type	% of all exposures
medical drugs	38.3
chemical products	23.4
plants	13.0
food, beverages, tobacco	6.1
cosmetic products	4.5
pesticides	3.0
others	11.7

Children's pesticide exposures were analysed for the type of pesticide involved (Tab. 2 a). More than half (56.6 %) of all cases were exposures with insecticides, while rodenti-

cides contribute to 18.4 %. Pesticide subcategories with most exposure were alkyl phosphates (353 cases, 32.2 %), pyrethroids (107 cases, 9,8 %), and anticoagulant rodenticides (104 cases, 9.5 %).

Table 2: Pesticide Exposures in Children (GIZ-Nord, 1996 - 2000)

a)		b) N° cases			
	% of all children's pesticide exposures	with symptoms	without symptoms	evaluation not possible	total
insecticides	56.6	85	526	9	620
<i>alkyl phosphates</i>	32.2	37	311	5	353
<i>pyrethroids</i>	9.8	19	87	1	107
<i>chlorinated hydrocarbons</i>	1.3	6	7	1	14
<i>carbamates</i>	1.1	4	8	0	12
<i>others or unknown</i>	12.2	19	113	2	134
rodenticides	18.4	32	156	14	202
<i>anticoagulants</i>	9.5	11	87	6	104
<i>phosphides</i>	1.9	4	16	1	21
<i>others or unknown</i>	7.0	17	53	7	77
repellents	6.7	10	61	2	73
herbicides	6.3	20	47	2	69
fungicides	3.7	12	27	1	40
molluscicides	3.7	7	31	2	40
wood protection products	3.0	10	23	0	33
seed disinfectants	0.8	0	9	0	9
Others or unknown	0.8	0	9	0	9
In total ...	100.0	176	889	30	1,095

Children's pesticide exposures were further analysed with respect to the severity of symptoms observed (Tab 2 b):

1065 cases (97.3 % of the total number of children's pesticide exposures) could be scored for severity of symptoms:

- In **889 cases** (83.5%) no symptoms were reported, while in **176 cases** (16.5 %) at least minimal symptoms were observed and reported.

Cases with symptomatic patients were evaluated for the degree of poisoning according to the Poisoning Severity Score (PSS):

- **No severe intoxications** were observed; there were **no cases** with **lethal outcome**.
- **7 patients** (0.7 %, 1,4 cases per year) had **moderate** symptoms: two cases concerning insecticides, three rodenticides, and one case each concerns a herbicide and a wood protection product. From the description of the patients' history and symptoms

observed (Tab. 3) the routes of exposure and absorbed doses can roughly be estimated: The exact exposures were low or unknown in all these cases.

- **169** (15.9 %) pesticide exposed **children** suffered from **minor symptoms**.

Table 3: Cases with Moderate Symptoms After Pesticide Exposures in Children (GIZ-Nord, 1996 - 2000)

➤	Parents reported that their 6 month old boy became apnoic for 30 sec after an episode of crying. Two weeks before the family's apartment had been (professionally) treated with 7 l of a insecticidal solution containing fenitrothion, pyrethrum, and piperonyl butoxide.
➤	A 1½yo girl developed hemorrhagic diarrhea for two days after licking an ant-trap with unknown insecticidal ingredients.
➤	At night, a 2½yo boy developed a series of three seizures. The ground around the family's house was treated with an anticoagulant-type rodenticide product.
➤	A 6yo boy suffered from seizures, was afterwards disoriented and developed cyanosis after oral uptake of an unknown dose of unknown rodenticide .
➤	A 3yo girl was found stuporous with open eyes, not reactive to verbal stimuli. A relation with an oral uptake of an unknown dose of an unknown rodenticide was questioned.
➤	Parents reported that their 8y boy inhaled an unknown dose of a fungicide containing azoxystrobin and developed a strong allergic reaction (unknown type).
➤	A 2½yo girl developed a seizure while playing in wooden sand-box which was treated with a wood protection product containing fume cyclohex, dichlofluanid, and permethrin. Later she suffered from diarrhea.

In Tab. 4, all symptoms reported to the poison centre are compiled. Tab 4 a shows all minor and moderate symptoms that were observed at least two times, Tab 4 b lists minor symptoms occurring only once.

Table 4 b: Minor Symptoms Observed Only Once After Pesticide Exposure in Children (GIZ-Nord, 1996 - 2000, cases described in Tab. 3 are excluded)

Insecticides	
<i>Carbamates</i>	frequent belching
<i>chlorinated hydrocarbons</i>	atopic dermatitis
<i>alkyl phosphates</i>	sore throat, thirst, irregular taste perceptions, slightly elevated liver enzymes, change of hair consistency
<i>pyrethroids</i>	(slight) dyspnoe, discoloration of feces, paleness
<i>others or unknown</i>	refusal of drinking
Herbicides	detachment of skin (1 finger), respiratory sound, urticaria
Fungicides	disturbed perception, cardiac sound
Wood protection products	asthmatic attack (minor), edema (small area of arm)

Frequently - in 42 % of all cases - patients suffered from gastrointestinal irritation after exposure to pesticides, especially to rodenticides and insecticides. With lower frequency fever and dermal irritations are reported. Other symptoms occurred in less than 10 % of all symptomatic patients; higher frequencies of these symptoms are not observed if selected pesticide groups or subgroups were analysed.

Discussion:

The data analysis shows that inquiries to the poison centre on pesticide exposures in childhood are rare events in Northern Germany. This is different in other parts of the world, especially in developing countries. Clinical symptoms during or after exposure to pesticides seldom occur in these pediatric patients. In most documented cases symptoms were minor. The reason for this is not systematically analysed yet, but obviously the absorbed doses were low in the majority of the cases analysed.

Table 4 a: Frequency of Symptoms Observed More Than Once After Pesticide Exposures in Children (GIZ-Nord, 1996 - 2000)

	general weakness	fever	any bleeding	mild dermal irritation	mild irritation of eye	mild irritation of airways, cloughing	tachycardia	hypersalivation	any symptom of GI irritation	nausea	vomiting	bowel pain	diarrhea	sedation	sleep disorder or hyperactivity	seizure	tremor	ataxia	mydriasis or miosis	headache	vertigo	paresthesia / anesthesia	others	N° patients	
insecticides	1	11	3	7	5	5	2	3	36	3	23	8	11	4	5		2	2	2	2		3	11	85	
<i>alkyl phosphates</i>		5	2	4	3		1	1	13	1	5	7	5	2	1			1	1	1		1	5	37	
<i>pyrethroids</i>	1	1			2	2		1	8	1	6		2	1	2			1	1	1		1	3	19	
<i>chlorinated CH</i>		2		1		1			2		1		2										1	6	
<i>carbamates</i>							1		2	1	1			1	1		1						1	4	
<i>others or unknown</i>	3	1		2		2		1	11		10	1	2		1		1					1	1	19	
rodenticides		6	2	3					18	4	12	4	4	1	3	2				2				2	32
<i>anticoagulants</i>		3	1	1					5	1	3	2	1	1	1	1				2					11
<i>phosphides</i>				1					4	1	1	2	1		1										4
<i>others or unknown</i>		3	1	1					9	2	8		2		1	1								2	17
repellents				2	2				4	1	1	2	1	1									1		10
herbicides	1	3		6		1			7	1	6	3							1			1	3	20	
fungicides		3		2	3	2			3	1	3			1	1						1	2	2	12	
molluscicides				2		2		2	3		3			1					1						7
wood protection prod.					1	3			3		2		1		1						1		2	10	
total	2	23	5	22	11	13	2	5	74	10	50	17	17	8	10	3	2	2	3	5	2	7	18	176	

All symptoms described may have different causes and are not specific effects leading conclusively to one xenobiotic. Furthermore, in many cases (including all cases evaluated as "moderate") the effects reported after exposure are different from effects known from descriptions of adult poisoning cases or experimental animal toxicology with the suspected substances.

For the majority of the cases this may indicate that the symptoms were not caused by the exposure described. For some substances, however, these observations may help to recognise toxic effects of pesticides not described earlier. Compilation of data from other sources, e.g. other poison centres (possible when similar database structures are used), and continuation of data collection in the future may often help to differentiate between these two alternative meanings.

References:

1. Annex II to EU council resolution 90/C329/03 (24-11-1995)
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3. Persson HE, Sjöberg GK, Haines JA, Pronczuk de Garbino J (1998) Poisoning Severity Score. Grading of Acute Poisoning. Clin. Toxicol. 36, 205-213

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