

A Review of Poisoning Cases Examined by the Department of Chemistry, Malaysia from 1968 to 1972

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Introduction

THE TOXICOLOGICAL EXAMINATION OF exhibits and specimens in cases involving poisons are carried out by the laboratories of the Department of Chemistry in Petaling Jaya, Penang, Kuching, Kuala Trengganu and Johor Bahru. This review covers all cases of human poisoning for the period 1968 to 1972 and the data is on all cases received from all the States of Malaysia during this period.

Poison as mentioned in this paper means any foreign substance not normally taken by a person that would cause upset of the person's system which may or may not ultimately result in death.

Aim

A review of poisoning cases examined by the Department of Chemistry, Malaysia for the period 1963 to 1967 was published in this Journal in 1969. The aim of the present survey is to review the cases of poisoning examined during the period 1968 to 1972 and compare the results for the two periods.

Techniques of Analysis

The increase in the number of poisons identified in suspected poisoning cases depends partly on the development of the techniques of analysis. In the Department of Chemistry modern analytical methods were used in the following order: Paper Chromatography in 1952, Column Chromatography in 1953, U.V. Spectrophotometry in 1953, Quartz Spectrography in 1953, Ion-exchange in 1955, I.R. Spectrophotometry in 1958, X-ray diffraction in 1958, Thin layer Chromatography in 1963, Gas-Chromatography in 1967 and Atomic Absorption

Spectrophotometry in 1972. The use of these analytical techniques has resulted in a far larger number of positive identifications of poisons than was previously possible.

The Range of Poisons Identified

The range of poisons identified is described in Table I. Although a wide range of poisons has been found some of which are unusual, in the majority of cases, 19 types of poisons predominate - these are discussed in detail below.

Table I

The Various Poisons Isolated from Exhibits

1. Acids

Acetic Acid
Formic Acid
Hydrochloric Acid
Oxalic Acid
Sulphuric Acid

2. Alcohols

Ethyl Alcohol
Methyl Alcohol

3. Aldehydes

Formaldehyde (Formalin)

4. Alkalis

Ammonia
Calcium Hydroxide
Potassium Carbonate
Sodium Carbonate
Sodium Hydroxide

5. **Alkaloids**

Chloroquine
Codeine
Ephedrine
Ergometrine
Heroin
Morphine/Opium
Yohimbine

6. **Disinfectants, Antiseptics**

Acriflavine
Calcium Hypochlorite
Cresol
Dettol
Iodine
Izal
Jeyes Fluid
Lysol
Mercurochrome (Merbromin)
Phenol
Potassium Permanganate
Sodium Hypochlorite
Thymol

7. **Drugs - Others**

Acetylsalicylic Acid/Salicylic Acid
Adrenaline
Amitriptyline
Amphetamine
Benzyl Benzoate
Carbimazole
Chlorpheniramine
Chlorpropamide
Cortisone
Diphenhydramine
Hydroxyamphetamine
Imipramine
Lignocaine
Methapyrilene
Paracetamol
Penicillin
Pentazocine
Phenacetin
Phenylbutazone
Phenylephrine
Phenytoin
Prednisolone
Promazine
Promethazine
Salicylamide
Streptomycin Sulphate
Sulphadimidine
Sulphamerazine
Sulphapyridine
Tetracycline

8. **Hypnotics**

Barbiturates – Allobarbitone
Amylobarbitone
Barbitone
Butobarbitone
Cyclobarbitone
Hexobarbitone
Phenobarbitone
Pentobarbitone
Quinalbarbitone

Non-Barbiturates – Bromisovalum
Carbromal
Dichloralphenazone
Glutethimide

9. **Inorganic**

Calcium Carbide
Glass
Hydrogen Sulphide
Potassium Cyanide
Zinc Phosphide

10. **Insecticides/Weedicides/Fungicides**

See Table III

11. **Metallic**

Arsenic
Copper
Lead
Mercury
Selenium

12. **Mineral Oils**

Kerosene
Petrol

13. **Tranquillisers**

Chlordiazepoxide (Librium)
Chlorpromazine
Meprobamate
Perphenazine
Prochlorperazine (Stemetil)
Thioridazine
Trifluoperazine

14. **Miscellaneous**

Acetone
Amanita Toxins (Mushroom Poisons)
Camphor
Carbon Tetrachloride
Castor Oil
Clove Oil
Citronella Oil
Detergents
Methyl Salicylate
Naphthalene
Petroleum Ether
Pyridine
Shellac
Tuba Root.

Human Poisoning

The majority of cases in which exhibits are submitted for examination are in connection with suicide and attempted suicide. Exhibits and specimens in these cases are submitted by the medical officer through the Police. Other exhibits include clinical specimens submitted for toxicological examination.

Table II lists the most common poisons consumed by people who committed suicide or attempted to commit suicide. The figures for the period

TABLE II

The Most Common Poisons Consumed by People Who Committed Suicide or Attempted to Commit Suicide in Malaysia During The Period 1968 to 1972.
(Data on Race, Age, Sex Included). Figures for The Period 1963 to 1967 Given in Parenthesis.

P O I S O N	R A C E										A G E (I N Y E A R S)					S E X	
	Total	Dead	Alive	Chinese	Indian	Malay	Others	10 & Below	11 - 20	21 - 30	31 - 40	41 - 50	51 - 60	60 & Over	Male	Female	
Insecticides - Organophosphorus	316(207)	231(125)	85(82)	96(41)	210(163)	7(3)	3(2)	3(2)	123(79)	92(68)	40(24)	25(14)	17(12)	16(8)	148(83)	168(124)	
FORMIC ACID	295(232)	220(169)	75(63)	125(91)	146(115)	21(26)	3(0)	1(2)	72(46)	85(76)	46(33)	31(20)	17(30)	43(25)	166(153)	129(79)	
Arsenic	271(308)	234(186)	37(122)	86(79)	171(218)	13(11)	1(0)	4(6)	95(103)	74(108)	38(32)	28(21)	18(26)	14(12)	163(199)	108(109)	
Insecticide - Organochlorine	206(115)	103(44)	103(71)	54(30)	132(77)	17(8)	3(0)	8(6)	91(42)	52(36)	25(16)	11(5)	7(7)	12(3)	96(51)	110(64)	
Sodium Hydroxide/ Sodium Carbonate	144(232)	87(80)	57(152)	98(163)	40(61)	6(8)	0(0)	2(2)	35(48)	40(79)	29(30)	16(31)	9(23)	13(19)	63(97)	81(135)	
Barbiturates	124(99)	45(34)	79(65)	84(77)	28(20)	6(2)	6(0)	2(0)	20(17)	55(49)	26(16)	12(8)	8(5)	1(5)	55(54)	69(45)	
Weedicides/ Fungicides	82	61	21	40	33	7	2	2	24	29	12	4	8	3	46	36	
Non-Barbiturate - Hypnotics	57(38)	7(5)	50(33)	44(31)	8(6)	3(1)	2(0)	0(0)	14(6)	28(25)	9(5)	2(1)	1(0)	3(1)	30(24)	27(14)	
Acetyl Salicylic Acid/Salicylic Acid	47(23)	31(13)	16(10)	32(13)	7(7)	5(3)	3(0)	5(0)	15(6)	13(7)	9(6)	2(0)	1(2)	2(2)	23(13)	24(10)	
Phenols	46	18	28	21	21	1	1	4	17	13	0	2	4	6	23	23	
Methyl Salicylate	37(21)	25(12)	12(9)	18(13)	15(7)	4(1)	0(0)	1(3)	12(6)	12(6)	6(0)	3(2)	1(2)	2(2)	13(12)	24(9)	
Sulphuric Acid	27(61)	18(31)	9(30)	11(24)	11(25)	5(12)	0(0)	1(2)	2(8)	6(22)	2(10)	6(6)	7(6)	3(7)	12(44)	15(17)	
Methyl Alcohol	24	17	7	3	12	0	9	0	6	7	5	2	1	3	10	14	
Tranquillisers	24	8	16	18	3	2	1	0	6	11	5	1	1	0	14	10	
Opium Alkaloids	22(18)	10(15)	12(3)	16(17)	2(1)	2(0)	2(0)	4(2)	4(3)	5(4)	4(3)	2(2)	0(2)	3(2)	15(11)	7(7)	
Detergents	14	2	12	11	3	0	0	0	8	3	1	1	1	0	1	13	
Chloroquine	13	12	1	2	5	2	4	2	2	5	3	0	0	1	4	9	
Ammonia	(32)	(8)	(24)	(12)	(19)	(1)	(1)	(1)	(7)	(8)	(7)	(2)	(4)	(3)	(11)	(21)	
Hydrochloric Acid	(10)	(8)	(2)	(5)	(2)	(3)	(0)	(0)	(1)	(3)	(1)	(0)	(4)	(1)	(9)	(1)	
TOTAL	1749(1396)	1129(730)	620(666)	759(596)	847(721)	101(79)	42(0)	39(26)	546(371)	530(491)	260(183)	148(112)	101(123)	125(90)	882(761)	867(635)	

1963 to 1967 are given in parenthesis. The figures include data on race, age and sex.

Table III lists all the organo-pesticides consumed by people who committed suicide or attempted to commit suicide. Data on their relative percentage occurrence is also given.

Table III

List of Consumed Organo-pesticides 1968 – 1972

Insecticides: Organophosphorous	Percentage
Malathion	73.1
Parathion	5.3
Gusathion	5.0
Diazinon	5.0
Diazinon	2.9
DDVP	1.7
Dipterex	1.7
Tamaron	1.4
Dimethoate	0.6
Bidrin	0.3
Sumuthion	0.3
Phenthoate	0.3
Unidentified Organophosphorous Compound	7.4
Insecticides: Organochlorine	
Dieldrin	24.5
BHC	21.2
Thiodan	20.8
DDT	20.0
Endrin	9.0
Aldrin	1.6
Telodrin	0.5
Unidentified Organochlorine Compound	2.4
Insecticides: Others	
Pyrethrum	61.2
Carbamate	16.7
Nicotine	16.7
Dimethylphthalate (Insect repellent)	5.4
Weedicides/Fungicides	
Paraquat	68.2
2-4D	15.9
2-4-5 T	4.6
Pentachlorophenol	4.6
2-2 Dichloropropionic Acid (Dalapon)	3.4
Captan	1.1
Weedazol	1.1
Diuron	1.1

The Most Commonly Consumed Poisons

1. Organo-pesticides

(i) *Insecticides* – As we stated in the earlier paper the incidence of poisoning by insecticides is on the increase and during the period of review the organophosphorous insecticides have been the most frequently consumed poison. The organochlorine insecticides are also frequently consumed

(fourth on the list). These insecticides are readily available to the public and are therefore chosen by those who intend to commit suicide.

From Table III of the organophosphorous insecticides malathion (73.1%) is the most frequently consumed. Parathion (5.3%) an extremely potent poison is the next most frequently consumed although its importation is prohibited.

Of the organochlorine insecticides, dieldrin (24.5%) is the most frequently consumed whilst BHC (21.2%), thiodan (20.8%), DDT (20.0%) follows closely behind.

(ii) *Weedicides/Fungicides* – The increased use of weedicides and fungicides in estates and vegetable gardens has made available these chemicals as a source for those who want to commit suicide. From Table III, paraquat (68.2%) has been the most frequently consumed. In nearly all such cases the result of ingestion has been fatal.

In general, the frequency of the consumed organo-pesticides depends largely on their availability.

2. **Acids** – Formic acid which is used as a coagulant of rubber latex in estates is used frequently (2nd highest on the list) for suicide purposes. It is easily available in rubber estates and is thus used by rubber tappers and estate labourers most of whom are Indians. Sulphuric acid is also used by would be suicides.
3. **Arsenic** – Arsenic consumed as a poison has decreased slightly. The reason for this is that the use of sodium arsenite as a weedicide has decreased in recent years and many estates have switched to other weedicides.
4. **Alkali** – Caustic soda is another commonly consumed poison. It is usually taken by those who live in towns where the poison is more readily available. There has been a significant decrease in the number of persons who consumed this poison in the period (1968 – 1972) when compared to the earlier period (1963 – 1967). This could be due to more efficient implementation of the Poisons Ordinance 1961 which restricts its sale to the general public. This poison is usually taken by the lower income group of Chinese.

5. **Hypnotics** – There has been an increase in the consumption of hypnotics such as barbiturates, non-barbiturate hypnotics and tranquillisers. Most of these cases involve those in the middle and upper income groups.
6. **Others** – The other common poisons found include acetyl salicylic acid, phenols, methyl salicylate, methyl alcohol, opium alkaloids, detergents and chloroquine.

The Incidence of Suicide

The majority of poisoning cases examined by this Department are in connection with suicide cases.

Figure 1 gives details of the distribution of the most commonly consumed poisons. A study of these figures show that there has been an increase in the cases in which insecticides have been used while there has been a decrease in the use of arsenic. The decrease in the use of arsenic has been offset by an increase in the use of weedicides. There has also been a significant increase in the use of formic acid and a significant reduction in the use of caustic soda (sodium hydroxide) and sulphuric acid. There have been an increase in the use of barbiturates and other hypnotics.

Figure 2 gives the number of deaths and survivals according to the type of poisons taken. It is noted that in cases where organophosphorus insecticides, formic acid and arsenic were consumed, the number of deaths were significantly more than survivals in both the review periods. In the cases where barbiturates, non-barbiturate hypnotics and tranquillisers were taken there were more survivals than deaths in both the review periods. In the case with organochlorine insecticides there were more survivals than deaths for the review period 1963 – 1967 but there were equal numbers of deaths and survivals for the review period 1968 – 1972. In the case of caustic soda (sodium hydroxide) there were more survivals in the earlier review period while there were more deaths in the present review period. There were more deaths when weedicides/fungicides were taken.

The three main factors affecting death or survival are:

1. The availability of the poisons in the concentrated or technically pure forms for example, sodium arsenite, malathion, formic acid and paraquat when consumed they would more than often result in death.

2. The availability of medical attention. The urban suicide cases have the advantage of immediate and effective medical attention and their chances of survival are higher whereas certain types of medical facilities are not speedily available to the rural suicide cases. This is illustrated in both the review periods where there are more deaths than survivals in arsenic, formic acid, malathion and paraquat poisoning cases and more survivals than deaths in tranquilliser, barbiturate and non-barbiturate hypnotic poisoning cases. The former being consumed more by the rural population whereas the latter being consumed more by the urban population.

3. The mode of action of the poison after it has been ingested. Corrosives if ingested would more than often result in death as on contact they would puncture the alimentary canal. This is in contrast to the consumption of non-corrosive poisons where they act only after they have been absorbed into the blood stream.

The distribution of suicides according to race is given in Figure 3. In the previous paper covering the period 1963 – 1967 it was noted that the largest number of suicide cases were to be found among the Indian (51.6%) who constitute the smallest percentage of the population (9.0%) while the smallest percentage of suicides was among the Malays (5.7%) who constitute the largest proportion of the population (46.8%). The Chinese accounted for 42.7% of the suicides. They make up 34.1% of the population. In the present survey the percentages of suicides was 48.4% Indians, 43.3% Chinese, 5.8% Malays and 2.4% others. The figures for the two review periods are almost similar* thus indicating that the pattern of suicides among the three main races in this country remain the same over the ten year period 1963 to 1972. The type of poison taken and the availability may have a bearing on the consumption of these poisons. For instance insecticides, acids, arsenic and weedicides are used in rubber estates where the majority of workers are Indians.

Figure 4 gives the suicides according to age. There has been a shift in the age group which is most prone towards suicide. In the present survey it is noted that the 11 – 20 years age group is the most prone (546 cases) while the 21 – 30 years old group is a very close second (530 cases). In the previous survey the 21 – 30 years age group (491 cases) were the highest group while the 11 – 20 years age group (371 cases) were the second.

FIGURE 1
MOST COMMONLY CONSUMED POISONS

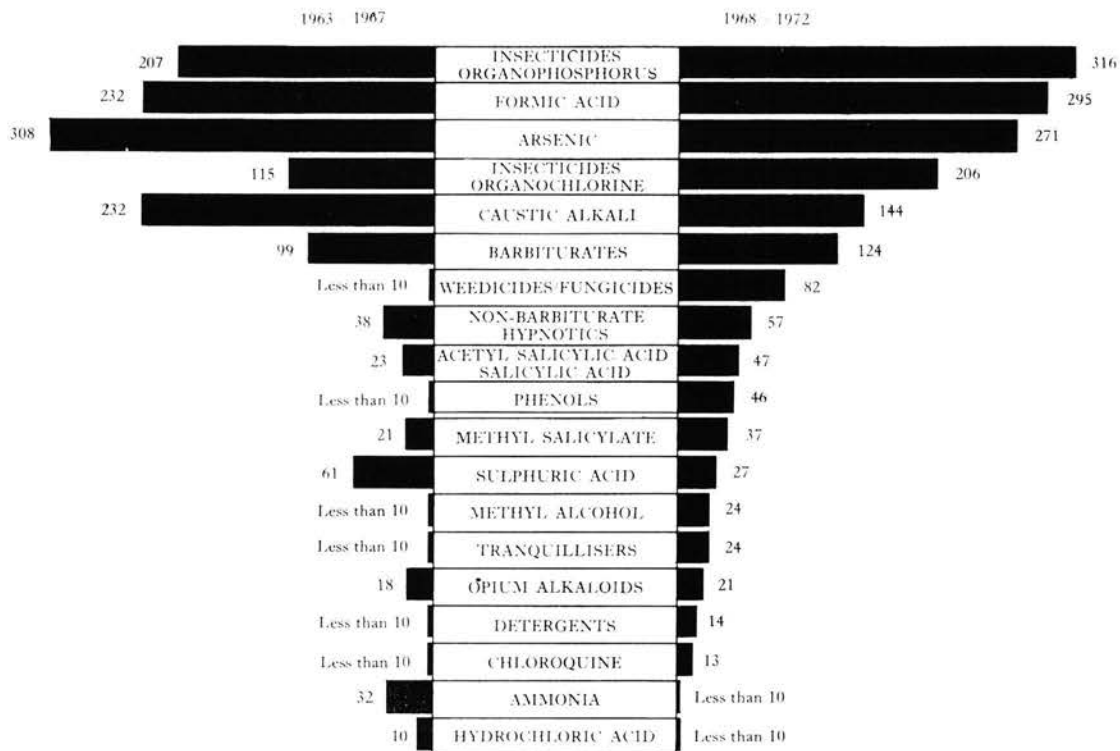


FIGURE 2
NUMBER OF DEATHS AND SURVIVALS IN SUICIDE CASES
ACCORDING TO THE POISON CONSUMED

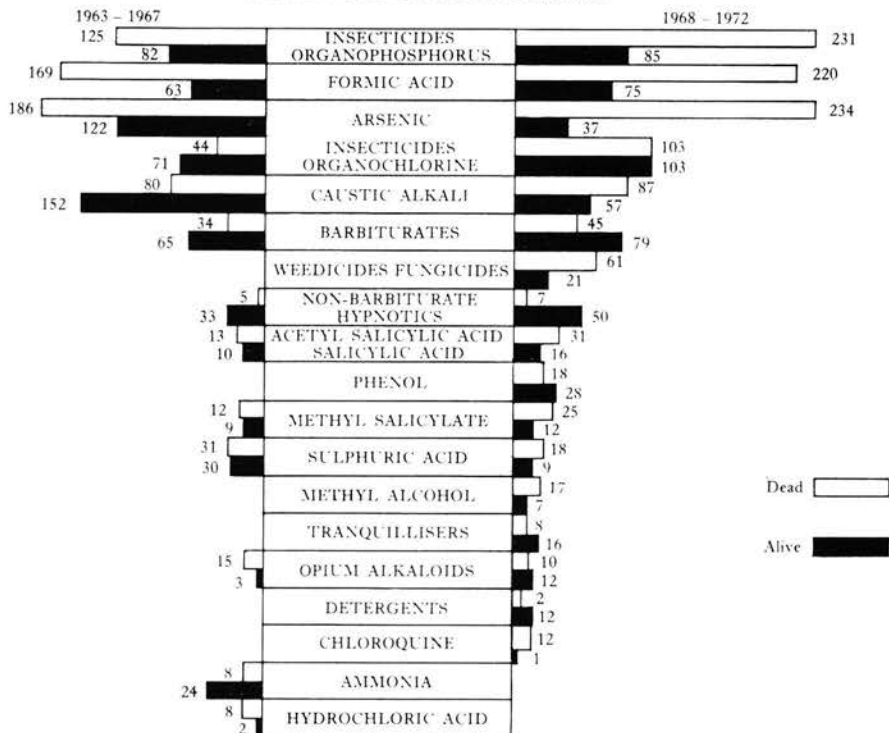
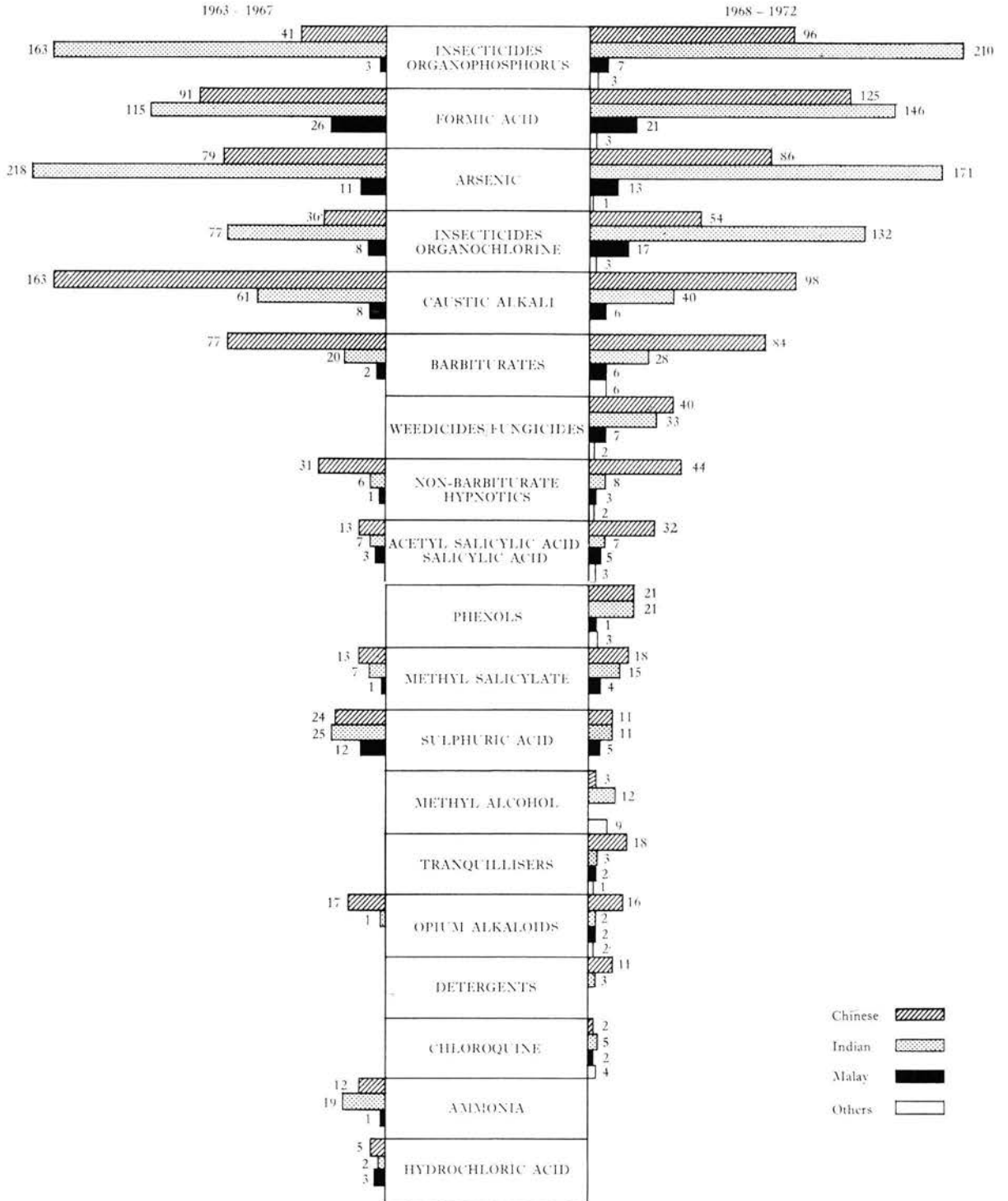


FIGURE 3
COMMON POISONS FOUND IN SUICIDE CASES
DISTRIBUTION BY RACE



Chinese Indian Malay Others

FIGURE 4
POISONS FOUND IN SUICIDE CASES
DISTRIBUTION BY AGE

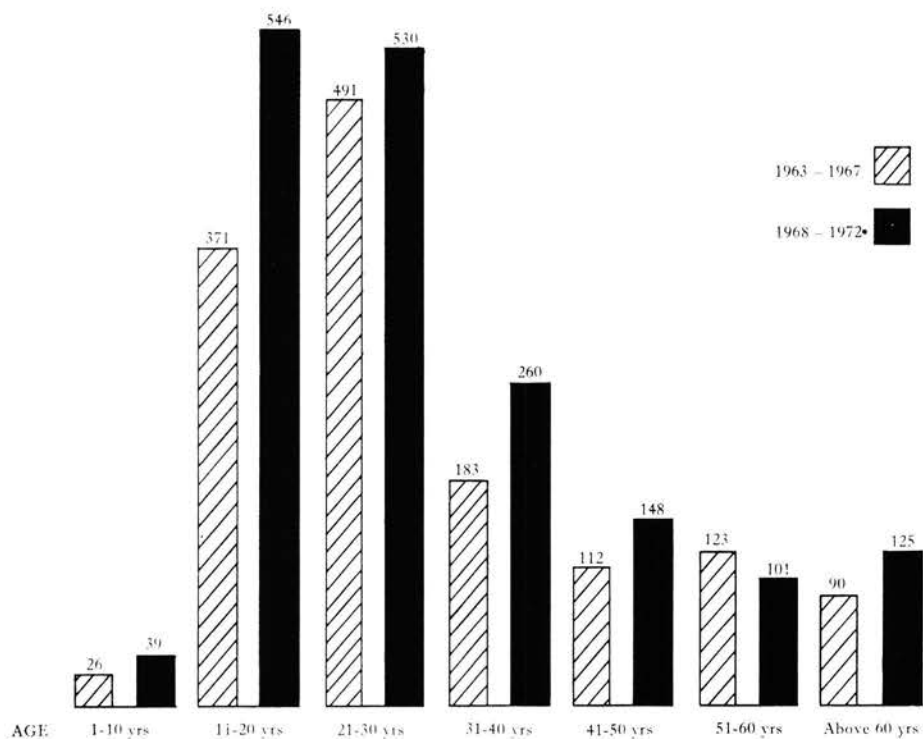


FIGURE 5
COMMON POISONS FOUND IN SUICIDE CASES
DISTRIBUTION BY SEX

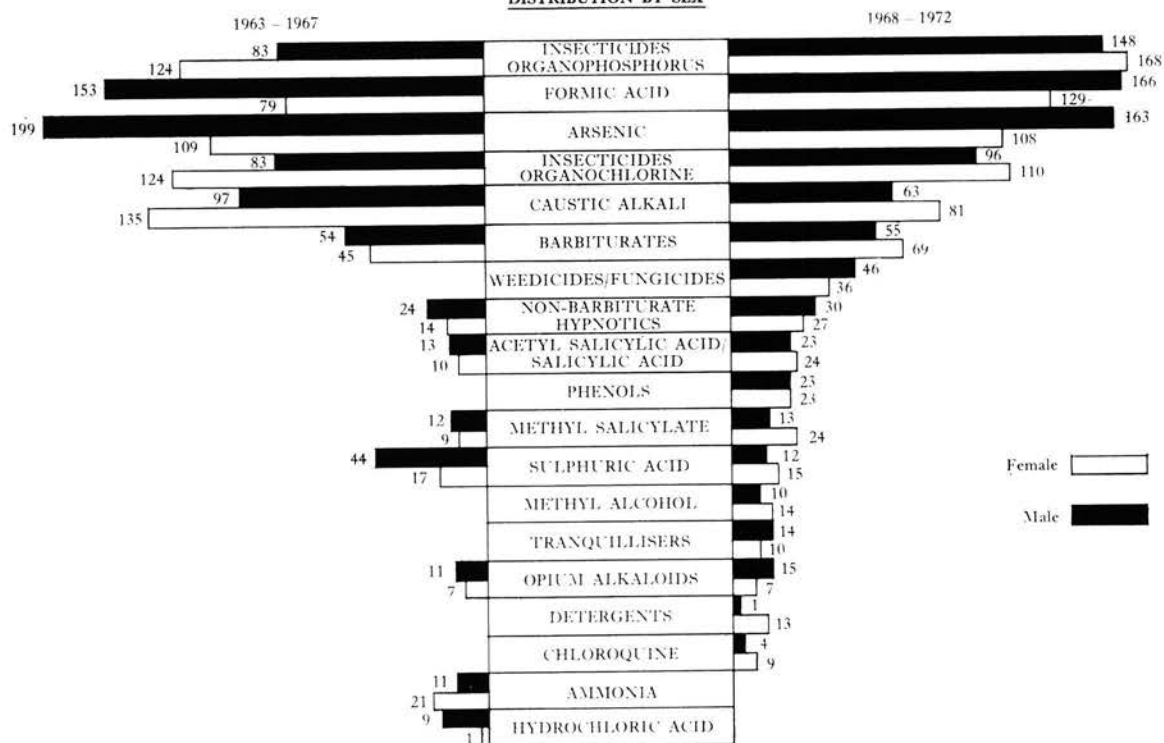


Figure 5 gives the suicides according to sex. The figures for number of cases of male and female are very close to each other indicating that both sexes are equally prone towards suicide. The previous survey indicated that males were slightly more prone than females.

*It is to be noted that the present study covers the whole of Malaysia while the previous study covered only West Malaysia. This will account for the small difference in the figures obtained for the two separate studies.

Conclusion

The results of the present study and the previous one are almost similar with slight variations. These variations are due to the increased availability of some poisons such as weedicides and the reduced availability of some poisons such as caustic soda (sodium hydroxide). This review confirms the earlier review that the Indians have the highest rate of suicides in the country followed by the Chinese. The Malays very rarely commit suicide or attempt to do so. It is interesting to note that whilst the number of cases in the 21 – 30 years age group has increased very slightly, the number of cases in the 11 – 20 years age group has increased very significantly over the first review period. Perhaps this could possibly be attributed to the social changes in our present society and the absence of adequate parental supervision both over their children and the storage of poisonous substances. Most of the

people who attempted suicide are in the lower income group. They are mainly rubber tappers, labourers, factory workers and domestic servants.

The lower income group of illiterate people generally consume poisons such as insecticides, acids, weedicides, arsenic and alkalis. In contrast the literate class of people usually takes to the more sophisticated drugs such as hypnotics.

The availability of poisons is also a contributing factor to the incidence of suicide.

Acknowledgement

We are grateful to the Director General of Chemistry, Dr. Surinder Singh J.S.M., for the interest shown in this study and for permission to publish these findings; to the Deputy Director General of Chemistry, Dr. Ong Kim Chye, K.M.N., for his advice and encouragement; to Mr. Kirat Singh, Mr. Yeo Hock Siew and Mr. Peter Chin Pit Ted for their contribution of data from our Branch laboratories in Johore Bahru, Kuala Trengganu and Kuching respectively.

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