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## POISONING BY SUBSTANCES OF ABUSE IN MOROCCO: MOROCCAN POISON CONTROL CENTER DATA (1980 TO 2009) AND RISKS FACTORS FOR DEATH.

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### Abstract:

**Background:** Poisoning by substances of abuse in Morocco is a public health problem. The aim of this retrospective study of a case series is to describe the distribution of poisoning by substances of abuse reported to Moroccan Poison Control Center (CAPM) to identify risk factors influencing the occurrence of death.

**Methods:** This is a retrospective study from 1980 to 2009, for all cases of poisoning by substances of abuse reported to CAPM.

**Results:** 1941 cases of poisoning by substances of abuse were collected. The most represented region was the Grand Casablanca (31.6%) followed by Tadla-Azilal (12.9%). The average age of intoxicated patients was  $21.8 \pm 9.4$  years with a sex ratio (M/F) of 5.3. The most affected age group was adults (62.2%). The mixture Called "Mâajoune" was the most offending (62.6%), followed by cannabis (22.8%), drugs (5.2%) and alcohols (4%). The addictive circumstance was the most frequent (47.6%), followed by accidental circumstance (44.5%). Oral route was the most encountered (89.4%). The most frequently signs encountered were gastrointestinal signs (47.2%), followed by signs of central and peripheral nervous system (27.6%) and disorders of heart rate and rhythm (10.4%). 32 cases of death were reported. Risk factors associated with death were the alcohol methanol, the addictive circumstance and the disorders of the frequency and pulse.

**Conclusion:** Reporting cases of poisoning by substances of abuse to CAPM is necessary to generate alerts on new substances or practices and to identify risk factors of death.

### KEY WORDS:

risks factors ,Moroccan Poison Control ,gastrointestinal.

### BACKGROUND:

Substances abuse use is a growing public health problem. Internationally, several epidemiological studies attest to its increase in all social strata. This consumption is not without risks that can be fatal. In 2005 and 2006, deaths due to substances of abuse accounted for 3.5% of all deaths in Europe. In Morocco, The national survey of mental health and substance abuse conducted in 2003 by Moroccan Ministry of Health showed that the prevalence of illicit substance abuse was 3% [1]. But in Morocco, there is a lack of data about overdoses and poisonings by substances of abuse in general and especially concerning the substances used, circumstances and evolution.

Title: POISONING BY SUBSTANCES OF ABUSE IN MOROCCO: MOROCCAN POISON CONTROL CENTER DATA (1980 TO 2009) AND RISKS FACTORS FOR DEATH. .Source: Review of Research [2249-894X] HANANE CHAOU<sup>1,2</sup>, NAIMA RHALEM<sup>1,2</sup>, ILHAM SEMLALI<sup>1</sup>, MOHAMED BADRI<sup>1</sup>, LAHCEN OUAMMI<sup>1,2</sup>, ABDELMAJID SOULAYMANI<sup>2</sup> AND RACHIDA SOULAYMANI-BENCHEIKH<sup>1,3</sup> yr:2014 vol:3 iss:5

The aim of this retrospective study of a case series was to describe the epidemiological features of poisoning by substance of abuse collected by the Moroccan Poison Control Center (CAPM) and to identify risk factors that influence the evolution of these poisonings.

#### MATERIALS AND METHODS

It is a retrospective study over a period of 30 years from January 1980 to December 2009, which involved all cases of poisoning by substance of abuse reported to CAPM by mail or telephone. These statements constitute a database and this database of statements is based on two systems:

Intoxication declaration forms of poisoning cases received from health provinces facilities through Morocco: each poisoning case received by a provincial health facility is reported on a form, and sent to CAPM. The declaration forms collected at CAPM are systematically centralized and analyzed. Phone calls from both the population and health professionals through the Toxicological Information department which delivers information in toxicology 24 hours/24 to health professionals and population about poisonings. The physicians who receive calls make the toxicity assessment, and monitor the patient by phone until the final evolution.

Both Data collected from Intoxication declaration forms and phone calls are entered on an input mask that contains the following variables: date, time of poisoning, the person who reported the case, patient origin (urban or rural area), patient (sex, age, weight), toxicant suspected (number, name, type), intoxication (isolated or collective circumstances, place, route, symptoms, treatment and evolution). The information is completed and patient monitoring is assured by regular telephone contacts (raises) until the final evolution.

Substances are declared to CAPM by their common name French, Arabic or Berber. When it was a plant, we added the scientific name (international nomenclature) of the substance of abuse. The term "mixture" was given to ground and mixed herbal preparations.

**Substance of abuse definition adopted was:** Any substance which is used only to achieve an euphoric or psychotropic effect and which is not classified under any other category.

#### **Substance of abuse classification used was [2]:**

**Alcohol:** Ethyl alcohol (ethanol) or methyl alcohol (methanol) in the form of a commercial or illicitly brewed product.

**Opioids/Opiates:** Any of a group of alkaloids derived from the opium poppy (*Papaver somniferum*), their derivatives, such as heroin, and their synthetic analogues, such as morphine and codeine

**Cannabinoids:** Natural extract from the Cannabis plant and synthetic analogues

**Depressants:** Any agent that suppresses, inhibits, or decreases some aspects of central nervous system activity. Includes sedative/hypnotics, and neuroleptics. Excludes alcohol and opioids

**Cocaine:** Natural psychoactive alkaloid from coca leaves and synthesized salts, including crack

**Amphetamines:** A group of substances, mostly synthetic, with closely related chemical structure which have, to varying degrees, a stimulating effect on the central nervous system (CNS). Based on the predominant pharmacological effect (at common dose levels), the group comprises (i) CNS stimulants such as amphetamine, methamphetamine and methylphenidate; (ii) anorectics (appetite suppressants) such as phenmetrazine, amfepramone (diethylpropion); and (iii) entactogens or 'ecstasy'-type substances.

**Hallucinogens:** A chemical agent that induces illusions, hallucinations, delusions, paranoid ideations and other alterations of mood and thinking

**Tobacco:** Products made entirely or partly of leaf tobacco as the raw material, which are intended to be smoked, sucked, chewed or snuffed

**Volatile solvents/inhalants:** Organic chemicals found in household and professional products that readily

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form vapour or gas at room temperature. These chemicals may be used as solvents, propellants or gases (e.g. anaesthetic gases) or they may be manufactured specifically to be inhaled, e.g. some alkyl nitrites. These chemicals are deliberately inhaled to produce a euphoriant effect.

**Steroids:** Synthetic variants of natural steroid hormones. Anabolic steroids are deliberately abused in order to build muscle mass.

**Mixtures:** A preparation combining a mixture of different substances intended to be used to produce and altered mental or behavioural state

**Other:** Any substance of abuse not categorized above.

**Unknown:** A substance of abuse of unknown identity.

All data collected are entered using:

- IPCS INTOX classification for age [2];

Neonate: A newly-born baby up to 4 weeks post birth.

Pre-term: Born at any time before the 37<sup>th</sup> completed week of gestation.

Full-term neonate: Born at any time from the beginning of the 38th week of gestation.

Infant: 4 weeks -12 months

Toddler: 1-4 years

Child: 5-14 years

Adolescent: 15-19 years

Adult: 20-74 years

Elderly: >75 years

WHO ART or WHO Adverse Reaction Terminology classification proposed by WHO Uppsala Monitoring Centre for clinical signs [3];

- Poisoning Severity Score (PSS) for clinical severity [4]:

Severity Grade: none (0): any symptoms or signs related to poisoning

Severity Grade: Minor (1): Mild, transient and spontaneously resolving symptoms

Severity Grade: Moderate (2): Pronounced or prolonged symptoms

Severity Grade: Severe (3): Severe or life-threatening symptoms

Severity Grade: Fatal (4): Death

Statistical analysis was done by Excel and SPSS. It concerned frequency, time and space distribution, the characteristics of the patients and the substance of abuse.

## RESULTS

From 1980 to 2009, the CAPM has collected 1941 cases of poisoning by substances of abuse. Amongst 22.2% of these cases were reported by phone and 77.8% by mail (Intoxication declaration forms). Annual evolution of cases is shown in Figure 1. The most represented region was the Grand Casablanca region (31.6%) followed by Tadla Azilal region (12.9%) and Rabat-Salé-Zemmour-Zaer region (9.4%) (Table I). This type of poisoning took place in urban areas in 88.6% and in rural areas 11.4% of cases.

The average age was  $21.8 \pm 9.4$  years [1 day - 98 years]. The most affected age group was adults (62.3%). Patients age under 15 years old (Newborn, Infant, Toddler and children) accounted for 14.6% of cases (Table II). Sex ratio (M/F) was 5.3.

The mixture called "Mâajoune" was the most incriminated (62.6%), followed by cannabis (23.5%), alcohols (3.7%), depressants (4.2%) and tobacco (1.4%) (Table III).

Addictive circumstance was the most frequent (47.7%) followed by classical accident (44.4%). The use of substances of abuse for suicide attempts accounted for 5.4% of cases. Criminal cases represented 2.10%. Oral route was the most encountered in 89.4% followed by inhalation (smoke) (10.1%). In our database was not registered intoxication by injection.

These poisonings occurred mainly at home in 62.4% and in public places in 35.2%. Patients were symptomatic in 82.40% of cases. The most frequently encountered signs were gastrointestinal signs (40.2%) followed by central and peripheral nervous system signs (33.3%), and by heart frequency and rhythm disorders (9.8%) (Table IV).

Outcome was favorable in 98.7% and deaths occurred in 1.7% of cases (32 cases). 12 deaths were recorded with methanol (8 in Doukkala-Abda and 4 in the region of Rabat-Salé-Zemmour-Zair). The addictive circumstance was very significantly associated with death ( $\chi^2 = 10.08, p < 0.01$ ). The substance Methanol was highly significantly associated with death ( $p < 0.001$ ). The presence of disorders of the heart rate and rhythm was strongly associated with a fatal outcome ( $p < 0.01$ ).

## DISCUSSION

The data presented in this study do not reflect the real extent of addiction in Morocco, but try to give an idea of poisoning caused by substances of abuse. The number of reported cases in our study is much lower than the actual data and than the data of foreign poison control centers. During 2006, Lille (France) poison control center recorded 433 cases of poisoning by substances of abuse for a total of 46 413 cases of poisoning [5]. This is part of an overall underreporting of cases of poisoning concerning all toxicants, and of routine consumption in Morocco of certain substances of abuse, particularly cannabis [1]. Increase in poisoning by years is related to notifications increase and to substances of abuse raise use in all social strata, which is demonstrated by several epidemiological studies [1]. Incidence of poisoning was the highest in the Grand Casablanca region because it is among areas where substances of abuse use is the highest [6].

All age groups were affected. Poisoning by substances of abuse in children is described in the literature. One hundred thirty-four cases of poisoning by substances of abuse have been identified by the Marseille Poison Control Center in children aged between 1 to 3 years [7]. In our series, poisoning by substance of abuse in children of less than 14 years are essentially accidental, but nevertheless we found 61 cases of poisoning in the age group "child" that occurred under voluntary circumstance. Analysis of these cases shows that their age is between 10 and 14, which shows the precocity of addictive behaviour within the Moroccan population. Among infants, 5 cases of poisoning have been reported in our study, all due to cannabis, and their evolution was favorable. These infants presented neurological symptoms (clouding, loss of consciousness and hypotonia). In most cases, this type of accident occurs owing to the child normal development phase when he carries anything he comes across to his mouth. The child can also mistake a piece of cannabis resin or "Mâajoune" mixture with a piece of chocolate [7]. This shows that parental substances of abuse use may constitute a danger to children, especially for substances such as Cannabis and "Mâajoune" whose consumption is casual in our country.

Concerning the nature of used toxicants, it should be noted that consumers of substances of abuse are poly-addicted. There are at least two reasons for this:

- 1- The content of the product consumed is unknown [8] For example, the purity of cocaine available in the United States "market" has been estimated at between 8 and 90% in different studies; the desired molecule is sometimes not even in the sample and additives of unknown nature, participate to increase acute or chronic toxicity and prevent any estimate of the exact amount of active ingredient consumed.
- 2- Voluntary association of others substances of abuse. The most frequent associations are with alcohol, other illicit substances including benzodiazepines. These associations may participate to increase toxicity. From this it follows, that nothing is certain neither for consumer, nor doctors about the product and the quantity consumed outside laboratory analysis [9].

In Morocco, the mixture called "Mâajoune" tops the list of products used. The "Mâajoune" is a paste made locally and which has, as a rule, cannabis as the main ingredient. Other substances such as atropine hallucinogenic plants: datura seeds, berries of belladonna, seeds of henbane, and mandrake are added to the mixture. Other substances may be involved such as Spanish fly, nutmeg, Cardamom, the maniguette etc. The composition of "Mâajoune" may contain poppy seeds, psychotropic drugs and various substances depending on the region where it is made [10].

Cannabis comes in second position. Derivatives of the plant are widely available both in quantity and quality. Forms of cannabis used, mainly grass (marijuana) or resin (also known as Hashish more concentrated in active ingredient), are becoming richer in tetra hydroxyl cannabinol (THC) [11]. If recently, use of herb, known better, renewed interest among regular users, resin remains the most widely consumed because of its greater accessibility. This explains that most poisonings are due to the resin because it is more available on the Moroccan market [7]. Besides, it can be consumed on festive occasions, for auto medical, or on a daily basis [11], resulting in a number of physical, psychological and behavioral complications.

Alcohols are in the 3rd position. The Moroccan specificity to such poisoning is that alcoholic products are often handcrafted (brandy or Mahia), whose use has been diverted from adulterated products. This has serious consequences on the health of consumers.

Concerning natural hallucinogens, there is a craze for these substances especially among young

consumers. Accessibility and lack of its regulation, made Datura appreciated for young people seeking thrills. However, consumption remains weak and isolated and is often combined with other substances (Mâajoune) [12].

For cocaine, 9 cases have been reported in our study. Eight of the 9 cases occurred after 2000, underscoring changing trend over choice of addictive substances.

The clinical signs observed in our series are similar to literature. For cannabis, rare cases of coma and respiratory depression appear for large ingestion of this [13]. Severe cases of our series seem to follow this rule (even if the quantity is not always precisely known). It is also interesting to note the higher concentrations of active ingredients in current products [11]. Thus, we cannot estimate severity of poisoning just on quantity of product consumed, it also depends on the concentration of toxic active ingredient, something that is very difficult to determine without quantitative laboratory tests.

### **CONCLUSION**

Substances of abuse use is a known youth risk. The challenge is to reduce the risks of this consumption, which despite the fact that it often remains isolated, can lead to poisoning. The delay before obtaining effects, lead the young to consume more. Also, the intoxication can be severe and even fatal from the first outlet for some high toxic substances (eg. Ecstasy). Therefore, CAPM encourages health stakeholders and public to report any cases of poisoning by substances of abuse in order to intervene in time to support patient, track consumer trends and generate alerts to address this scourge. List of abbreviations and acronyms

**CAPM:** Moroccan Poison Control Center

**IDF:** Intoxication Declaration Forms

**IPCS INTOX:** International Program on Chemical Safety INTOX

**WHO ART:** World Health Organization Adverse Reaction Terminology

**PSS:** Poisoning Severity Score

**SPSS:** Statistical Package for the Social Sciences

**THC:** Tetrahydrocannabinol

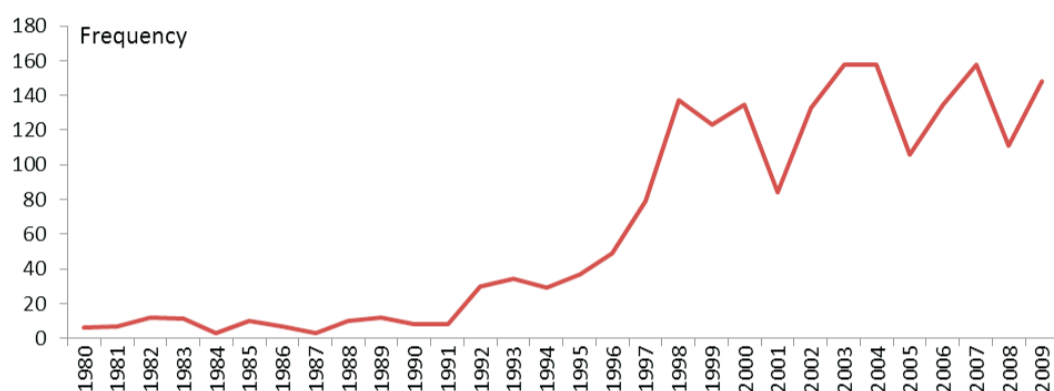
**MDMA:** 3,4 - methylen-dioxy-methylamphetamin

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**Figure 1: Distribution of poisoning by substances of abuse, based on years, CAPM, 1980 – 2009.**

**Table I: Distribution of poisoning by substances of abuse, based on regions, CAPM, 1980 – 2009.**

Regions	Frequency	Pourcentage
Grand Casablanca	614	31.6
Tadla-Azilal	250	12.9
Rabat-Sale-Zemmour-Zaer	216	11.1
Marrakech-Tensift-Al Haouz	169	8.7
Meknes-Tafilalt	163	8.4
Souss-Massa-Daraa	120	6.2
Doukala-Abda	97	5.0
Chaouia-Ouardigha	85	4.4
Gharb-Cherarda-Beni Hsan	49	2.5
Tanger-Tétouan	47	2.4
Fes-Boulemane	37	2
Oriental	36	1.9
Unknown region	22	1.1
Guelmim-Es Semara	13	0.7
Laayoune-Boujdour-Sakia El hamra	11	0.6
Taza-Al Hoceima-Taounate	10	0.6
Al Haouz	3	0.2
Total	1941	100.0



**Table II: Distribution of poisoning by substances of abuse, based on age, CAPM, 1980 – 2009.**

Group age	Frequency	Pourcentage
Adulte	1171	62,3
Adolescent	433	23,0
Child	170	9,0
Toddler	98	5,2
Infant	5	0,3
Neonate	2	0,1
Elderly	2	0,1
Total	1881	100,00

**Table III: Distribution of cases of poisoning by substances of abuse based on classification of substances of abuse, CAPM, 1980 – 2009.**

Class of substances of abuse	Frequency	Pourcentage
<b>Alcohols</b>	<b>67</b>	<b>3,66</b>
Rubbing alcohol + ethylene glycol+ wine)	67	3,66
<b>Amphetamines</b>	<b>2</b>	<b>0,11</b>
MDMA (Ecstasy)	2	0,11
<b>Cannabinoids</b>	<b>431</b>	<b>23,5</b>
Cannabis	431	23,5
<b>cocaine</b>	<b>9</b>	<b>0,49</b>
<b>Depressants</b>	<b>77</b>	<b>4,2</b>
Amitriptyline	3	0,16
Benzodiazepines	43	2,35
Carbamazepine	4	0,22
Chlorpromazine	2	0,11
Clorazepate	2	0,11
Cyproheptadine	3	0,16
Haloperidol	8	0,44
Meprobamate	3	0,16
Methotriméprazine	7	0,38
Phenobarbital	2	0,11
<b>Hallucinogens</b>	<b>11</b>	<b>0,6</b>
Myristica fragrans Houtt.	2	0,11
Peganum harmala L.	3	0,16
Datura stramonium L.	4	0,22
Hyoscyamus divers	2	0,11
<b>Mixtures</b>	<b>1147</b>	<b>62,6</b>
Mâajoune	1147	62,6
<b>Other</b>	<b>29</b>	<b>1,58</b>
Mianserine	2	0,11
Others	25	1,36
Trihexyphenidyle	2	0,11
<b>Tobacco</b>	<b>25</b>	<b>1,36</b>
Nicotiana tabacum L.	25	1,36
<b>Unknown</b>	<b>10</b>	<b>0,55</b>
<b>Volatile solvents/inhalants</b>	<b>24</b>	<b>1,31</b>
Diluant	21	1,15
Gasoline Fuel	3	0,16
<b>Total</b>	<b>1853</b>	<b>100</b>

**Table IV: Distribution of clinical signs based on system organ classes' classification, poisoning by substances of abuse, CAPM, 1980 – 2009.**

<b>System organ classes clinical signs</b>	<b>Frequency</b>	<b>Pourcentage</b>
Gastro-intestinal system disorders	1072	40.2
Central & peripheral nervous system disorders	887	33.3
Heart rate and rhythm disorders	260	9.8
Respiratory system disorders	229	8.6
Psychiatric disorders	87	3.3
Body as a whole - general disorders	66	2.5
Cardiovascular disorders, general	28	1.1
Vision disorders	23	0.9
Skin and appendages disorders	5	0.2
Musculo-skeletal system disorders	5	0.2
Hearing and vestibular disorders	1	0.0
Urinary system disorders	1	0.0
Total	2664	100.0



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