

# Poisoning in Jordan: Analysis of Three Year Data from Jordan National Drug and Poison Information Center

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## Abstract

**Objectives:** This study aims at analyzing the patterns of poisoning cases reported to the Jordan National Drug and Poison Information Center and emphasizes the roles and challenges faced by the center from a practical perspective.

**Materials and Methods:** A retrospective analysis of a three year period 2006- 2008 was conducted depending on the data collected by the center.

**Results:** Analysis of data shows that a total of 914 inquiries were received by the center during the study period. More than 90% of the enquiries were from health care providers and 3.6% from the public that included victims and victims' relatives. The exposed population age ranged from less than 1 year to 80 years, with the highest incidence in children less or equal to 5 years (34.9%). The most common reason of poisoning was unintentional (49.39%), followed by suicidal attempts (23.94%). The highest incidence of poisoning was due to drugs which accounted for more than 42% of all exposures, where acetaminophen products were responsible for most of the cases within this category (13.4%).

**Conclusion:** The poisoning features in Jordan reflect mostly the incidences of poisoning within Amman- the capital of Jordan- in addition to other major cities in the country. Yet the center seeks more perception from the public, support from healthcare providers and verification from related governmental parties, which will enable the center to fulfill its duties according to international standards.

**Keywords:** Poisoning, Information, Jordan.

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## Introduction

In Jordan, acute poisoning exposure is not infrequently seen in daily practice, but unfortunately it is frequently underestimated and in most of times unreported. Accordingly, data on human poisoning in Jordan are seldom seen from a clinical point of view.<sup>1-4</sup> However, the feasibility of forensic rather than clinical data

resulted in publications concerned more with the medico legal aspects of toxic exposure. These studies included toxins that are of forensic interest such as alcohol<sup>5, 6</sup> carbon monoxide,<sup>7</sup> pesticides<sup>8</sup> and drugs of abuse.<sup>9</sup> Furthermore, some studies have underlined the importance of technical solutions offered by toxicology laboratory in solving certain clinical dilemmas in acute poisoning cases such as in pesticides,<sup>10</sup>

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alcohol, paracetamol and benzodiazepines exposures.<sup>11</sup> These local studies dealt with various aspects of toxicology: forensic, clinical and analytical, nevertheless, they detected the insufficient toxicology services and the need for such services within the country.<sup>1-4,11</sup>

In July 2004, a national poison information center was launched in Jordan to meet a significant need, recognized by the Jordanian healthcare professionals and regulators, for a comprehensive and centralized resource of information of poisoning and clinical toxicology. The center started the dissemination of poison information and poison prevention education with the ultimate goal of preventing accidental poisonings and decreasing morbidity and mortality associated with toxic exposures. Since 2006, The Jordan National Drug and Poison Information Center (JNDPIC) has been in operation with official staff available at all times. In addition, the center provides a comprehensive collection of the finest, up-to-date, Toxicology Resources in the country: both national and international books and databases are available and can be used, for free, by anyone via the center. The Thomson MICROMEDIX<sup>®</sup> health care series is considered as the focal reference. Peripheral databases for drugs, chemicals and natural poisons were home-made and are annually updated. In 2007, a simple Microsoft<sup>®</sup> excel-based information retrieval and statistical evaluation system was established. Today the center provides poisons' information, clinical toxicology consultation and analytical toxicology services.

## Materials and Methods

In an attempt to survey human poisoning in Jordan, a retrospective analysis of a 3 year period (2006- 2008) was conducted depending on the data records in JNDPIC.

### Data Collection

Ever since the establishment of the JNDPIC, every enquiry received is recorded on a pre-designed form. The time, date, mode of enquiry,

enquirer's name and location, patient demographics (age and gender), toxic agent (type and quantity), circumstances of poisoning, signs and symptoms, treatment (including specific therapies and decontamination methods), investigations performed, source of information used, and the Poison Center recommendations are documented. In cases of acute poisoning, follow-up calls and visits are made to ascertain the medical outcome.

## Criteria for Data Analysis

### 1. Clinical Outcome

The clinical outcome, adopted from the American Association of Poison Control Centers (AAPCC) data collection system,<sup>12</sup> is divided into five categories and classified as no effect, minor effect, moderate effect, major effect and death. *No effect*: the patient developed no signs or symptoms as a result of exposure. *Minor effect*: the patient developed some signs or symptoms following the poison exposure, but they were minimally bothersome and resolved rapidly without residual disability. *Moderate effect*: the patient exhibited signs or symptoms as a result of the exposure that were more pronounced, more prolonged or more generalized than minor effects, but not life-threatening, and treatment is indicated. *Major effect*: the patient exhibited signs or symptoms following the poison exposure that were life-threatening or resulted in significant residual disability or a disfigurement. *Death*: the patient died from the exposure or from complications.

The clinical outcome was categorized according to the resulting signs and symptoms reported by emergency physicians, internal medicine specialists, and intensive care unit consultant.

### 2. Exposure Classes

Toxic agents involved are classified as one of ten categories: alcohol, hydrocarbon, drugs, pesticides, gases (Carbon monoxide), heavy metals, household products bites/stings, others (including plants, miscellaneous) and unknown agents.

### 3. Reasons of Exposure

Summarized as: intentional, unintentional, homicidal, suspected suicidal, medical errors, bite/sting and unknown.

### 4. Route of Exposure

Defined as: ingestion, inhalation, parenteral, topical, rectal, ocular and unknown.

### Results

A total number of 914 inquiries were presented to JNDPIC during the 3 year study period. The inquiries were divided into two major groups: exposure to a toxic agent (93.8%, n= 857) and information request calls (6.2%, n= 57) which are exclusive of any exposure incident. Calls concerning acute exposure are the focus of this study.

Throughout the study duration, a significant increase in the number of cases was observed with a growth percentage of 63% and 102% in the years 2007 and 2008, respectively, considering the year 2006 as a baseline. The corresponding poisoning incidences are shown in table (1).

The distribution of cases by age shows that the majority of cases (34.9 %) were under or equal to the age of 5 years old. Whereas the age group of (20-29) years old was second in line (Table 2).

Among all poisoning exposure cases, exposure involving males was slightly more prevalent than those involving females. The overall male to female ratio was 1.12 (52.2% Vs 46.7%) with

gender unidentified in 10 (1.2%) cases. On the other hand, female exposures were found notably higher than males' within the drug category, but the gender distribution is reversed in all other classes (Table 3).

Toxic agents most commonly involved were drugs (42%), paracetamol [acetaminophen] being the most frequent drug presented within this category accounting for 13.4% of drugs, followed by benzodiazepines, NSAID and then antihistamines. Insect and animals' bite/sting constituted (23.7%), household products (10.2%) and gases (8.2%) of the reported cases with toxic exposure, where the predominant gas was CO (Table 3).

Routes of exposure presented to JNDPIC were, in descending order: Ingestion (60.5%), topical (21.4%), inhalational (10.9%), parenteral (1.9%), ocular (0.2%), rectal (0.7%) and unknown (10.9%).

Medical outcomes of poisoning were: no effect (15%), minor (32%), moderate (24%), major (20%) and unknown (4.9%). Furthermore, there were 4 fatalities with an overall mortality rate of 0.43%. Fatalities followed pesticides and gas exposures.

Seasonal variation was noted in the presentation of poisoned patients to JNDPIC with peak presentation appearing during summer, specifically in August. A circadian variation in the presentation of poisoned patients was also noted where the call frequency was generally higher from the beginning of the afternoon until midnight, with a peak call volume from 12 to 3 p.m.

**Table (1): Annual number of cases of toxic exposure and information inquiries reported to JNDPIC.**

Year	Population served*(in millions)	Number of reported cases	cases per 100,000 population
2006	5.6	197	3.51
2007	5.723	322	5.62
2008	5.846	399	6.87

\* According to Hashemite Kingdom of Jordan (HKJ) Department of Statistics<sup>13</sup>

**Table (2): Distribution of toxic exposure cases in relation to age and gender over a three year period (2006-2008).**

<i>Age</i>	<i>Females (n)</i>	<i>Females (%)</i>	<i>Males (n)</i>	<i>Males (%)</i>	<i>Unknown (n)</i>	<i>Unknown (%)</i>	<i>Total (n)</i>	<i>Total (%)</i>
<i>≤ 5 years old</i>	112	13.06	184	21.47	3	0.35	299	34.88
<i>6-12 years</i>	23	2.68	44	5.13	0	0	67	7.81
<i>13-19 years</i>	53	6.18	37	4.31	0	0	90	10.50
<i>20 - 29 years</i>	109	12.71	86	10.03	0	0	195	22.75
<i>30- 39 years</i>	44	5.13	42	4.90	0	0	86	10.03
<i>40-49 years</i>	23	2.68	20	2.33	0	0	43	5.017
<i>50-59years</i>	15	1.75	11	1.28	0	0	26	3.03
<i>≥ 60</i>	16	1.86	17	1.98	0	0	33	3.85
<i>Unknown</i>	5	0.58	6	0.70	7	0.81	18	2.10
<i>Total</i>	400	46.67	447	52.15	10	1.16	857	100

**Table (3): Exposure classes in relation to gender among cases with toxic exposure over a three year period (2006-2008).**

<i>Exposure class</i>	<i>Females (n)</i>	<i>Females (%)</i>	<i>Males (n)</i>	<i>Males (%)</i>	<i>Unknown (n)</i>	<i>Unknown (%)</i>	<i>Total (n)</i>	<i>Total (%)</i>
<i>Alcohol</i>	5	0.58	9	1.05	0	0	14	1.63
<i>Bite / Sting</i>	92	10.73	110	12.83	1	0.11	203	23.68
<i>Drug</i>	189	22.05	167	19.48	6	0.70	362	42.24
<i>Gas</i>	32	3.73	37	4.31	1	0.11	70	8.16
<i>Heavy metals</i>	8	0.93	12	1.40	2	0.23	22	2.56
<i>Household</i>	45	5.25	43	5.01	0	0	88	10.26
<i>Hydrocarbons</i>	6	0.70	15	1.75	0	0	21	2.45
<i>Others</i>	3	0.35	14	1.63	0	0	17	1.98
<i>Pesticides</i>	19	2.21	34	3.96	0	0	53	6.18
<i>Unknown</i>	1	0.11	6	0.70	0	0	7	0.81
<i>Total</i>	400	46.67	447	52.15	10	1.16	857	100

## Discussion

Since one of the aims of this study is to highlight the experience of JNDPIC and the challenges it faces, it included data pertaining to poisoned patients on a national level that have been presented to JNDPIC, and no other source was used for collection of data. Results indicate that the usage of the center is increasing as shown in table (1).

Jordan has an estimated population of 5.9 million,<sup>13</sup> and ever since the start of the center a toll-free number 109 was provided by the government to fulfill both the need for easy

accessibility and quality assurance within developing poison centers.<sup>14, 15</sup> With this population size and easy-to-use connection more poisoning cases are expected to be reported in comparison to data published by other developed and developing countries.<sup>12, 16-18</sup> Still, it is to be recognized that in most countries, reporting to the center is voluntary and this point should be discussed with regulatory parties within the country to set up rules where- at least- healthcare providers and institutions are obliged to report poisoning cases received by them to JNDPIC. In this study, healthcare providers have reported 90% of the cases.

This result is not considered satisfactory from a poison center's perspective, since the healthcare provider reports cases where he/she is in need for certain answers on how to manage a particular case, and if he does not need such an answer, the case goes unreported. Cases of minor or no medical outcome were also reported, but unfortunately, the reporting time was delayed until post hospitalization in 47% of the cases. Such a pattern makes it evident that JNDPIC services could have been more appropriately utilized to scale down medical costs<sup>19</sup> as well as save hospital beds especially in Emergency Rooms (ERs). Out of all the calls coming in to the center, Jordan University Hospital (JUH)- which is considered a highly referral hospital in the capital Amman- has reported 74% of the cases collected within our database. The reason for this is that JNDPIC is physically located in the ER department within JUH, which proved to be advantageous as JNDPIC has succeeded in establishing itself credible to JUH and hence this resulted in more collaboration between the two parties. Presently, the center's target is to implement educational programs, specifically designed for healthcare providers, in other major hospitals within the country.

Analysis of the data- although modest- puts a primary pattern of poisoning within Jordan where unintentional poisoning (49.39%) is the leading reason for calls especially in children, and primarily associated with no or minor medical outcome in (63%) of the cases, while major medical outcome is observed in only 13% of such incidences. On the other hand, intentional exposure (23.9%), including suspected suicidal poisoning, was more associated with adults and a medical outcome ranging from moderate to major in 69% of the cases. These associations are logical due to the fact that intentional poisoning is in its nature more aggressive than unintentional exposure. Bites and stings were relatively highly prevalent (23.7% of exposures), which is justified by the geographical nature of Jordan. The leading causative agents of poisoning cases were drugs, especially over-the-counter drugs such as paracetamol, NSAIDs and antihistamines, and although benzodiazepines are prescribed drugs, yet it seems they are more

available at homes than supposed to. Availability and ease of purchase of such drugs, in addition to lack of education, sometimes makes parents and caregivers oblivious to the inherent toxicity of drugs. As for pesticides exposure pattern, intentional exposures presented clinically in this study are similar to a previous local study<sup>8</sup> that discussed fatalities due to pesticide exposures in Jordan, where it was prevalent among the age group 20- 29 years and carbamates were commonly involved. Yet, unintentional exposures are more familiar to JNDPIC and are evident in those aged less than 12 years old, where miscellaneous agents are involved such as pyrethroids, superwarfarin, and carbamates. Jordan requires legislation that would restrict pesticide purchase in order to reduce easy accessibility and the consequence of common misuse of such products. Pesticides are a major concern because they result in major medical outcomes and fatalities even in unintentional exposures with small amounts of the toxin, this also applies to carbon monoxide gas<sup>7</sup> to which exposures are basically noted in winter seasons.

The pattern of exposures in relation to genders was not significant but the slight increase in the number of exposed males can be justified by the fact that males are the predominant gender according to Jordan census all through the years 2006 up until 2009.<sup>13</sup> However, poisoning features from this study reflect mostly the incidences within the capital Amman and to a lesser extent some other cities yet not the rural parts of the country. Two reasons can justify such a situation; the population is mostly concentrated in the capital Amman (38.7%),<sup>13</sup> and JNDPIC-like any other health care service within the country- has not yet fully approached rural parts of the country. At this point, the use of media should be considered; otherwise it would be difficult to reach inhabitants of those areas.

Many functions and roles are undertaken by the center to execute its primary mission in preventing accidental poisonings and to update healthcare providers with the latest protocols in management of poisoned patients. Data retrieval is a vital role in detecting patterns of poisoning

with a future potential of being a toxicosurveillance tool. To reach such a position, full recognition of the center's role should be embraced by regulatory parties. In addition, JNDPIC should be supported by means of staffing to have a quality assurance system.

JNDPIC faces many challenges. These existing challenges have been a part of the limitations to this study. A major limitation is that services provided by the center are not optimally utilized. A solution to this problem is setting more educational programs about the role of JNDPIC. These programs should be designated towards three individualized groups; the public, healthcare providers and the government.

Collaborative efforts are essential not only on a national level, but also on an international level, to enforce the position taken by JNDPIC. International collaboration will help in reaching the ultimate goal of harmonization and improving the quality of collected data as recommended by IPCS/ INTOX international program.<sup>20</sup> This can simply start out with networking with other equivalent poison centers within the region.

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## التسمم في الأردن: تحليل بيانات ثلاث سنوات من المركز الوطني لمعلومات الأدوية والسموم

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### الملخص

الأهداف: تهدف هذه الدراسة إلى التعرف على أنماط التسمم في الأردن وتوضيح الدور والتحديات التي تواجه المركز الوطني لمعلومات الأدوية والسموم من وجهة نظر عملية.

طرق البحث: تحليل البيانات المسجلة لجميع حالات التسمم الواردة إلى المركز على مدى ثلاثة أعوام ما بين عامي 2006-2008.

النتائج: خلال مدة الدراسة، قام المركز بتسجيل 914 حالة، تم التبليغ عن 90% منها من قبل الكوادر الطبية. شملت حالات التسمم في هذه الدراسة أعماراً تراوحت ما بين أقل من عام إلى ثمانين عاماً، وكانت أكثر فئة عمرية معرضة للتسمم هم الأطفال دون سن الخامسة وبنسبة 34.9% من المتسممين. وكان التسمم غير المقصود (49.39%) هو أكثر ظروف التسمم شيوعاً خاصة عند الأطفال، تلتها حالات الانتحار (23.94%). وقد كانت المستحضرات الصيدلانية هي الفئة الأكثر شيوعاً. وكانت المنتجات التي تحوي مادة الأسيتامينوفين أكثر المواد التي يتعرض لها المواطن الأردني.

الخلاصة: إن نمط التسمم في هذه الدراسة يعكس بوضوح الحالات التي تحدث في العاصمة وبعض المدن الأخرى في الأردن. وبناءً عليه، فإن المركز يسعى إلى زيادة وعي المجتمع المحلي تجاه الأدوية والسموم، الحصول على تأييد أكثر من المؤسسات والكوادر الطبية، وإلى دعم الجهات الحكومية المختصة حتى يتمكن المركز من اتمام مهامه حسب المراجع المتبعة عالمياً.

الكلمات الدالة: التسمم، معلومات، الأردن.