

## Epidemiology of Poisoning in Northeast of Iran (2004-2013)

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### ABSTRACT

**Background:** Poisoning is a major concern, especially in developing countries. We aimed to focus on poisoning trends based on registry data for the recent 10 years.

**Methods:** This cross-sectional study was performed on registry database of Imam Reza Hospital in Mashhad, Iran. All cases of toxic exposure or poisoning during 2004 to 2013 were included (49189 patients). Data from two national censuses were used for calculating rates. SPSS 11.5 was used for data analysis. P<0.05 was considered statistically significant.

**Results:** There were 49189 admissions during the 10-year period with a mean age of 26.21±14.97 years out of which 50.3% were female. The prevalence rate had increased three times in women and four times in men. Pharmaceutical toxins (63.5%) had the highest proportional mortality ratio, which mostly occurred in winters. The mean age of admission began to decline again in recent years.

**Conclusion:** Analyzing data on secular trends can always enlighten the healthcare decision makers for real health problems. Designing the proper population-based interventions can be one of the many uses of these findings.

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► *Implication for health policy/practice/research/medical education:* Poisoning in Northeast of Iran

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### 1. Introduction:

Poisoning is a major concern, especially in developing countries (1, 2). The developed world has accurate information on the incidence and changing trends of causative

agents because of the rigorous population census and the development of poison control centers (3-6).

In developing countries, the situation is different. For example, China has done some studies on poisoning trends (7). Iran, as a developing country has reported separate low sample size articles (8-11) but a single study focusing on poisoning trends based on registry data was not found in the recent decade.

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This paper reviews trends in referrals to the Toxicology Center of northeast of Iran due to poisoning over the 10 years 2004-13 and is based on information collected in a Hospital Information System.

## 2. Materials and Methods:

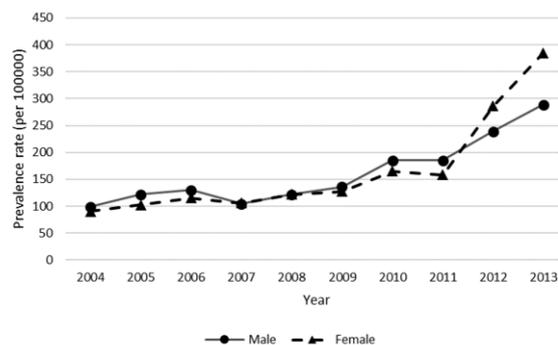
This routine database study was performed on Imam Reza Hospital computerized registry during 2004 to 2013 in Mashhad, Iran. Mashhad is the capital of Khorasan Razavi province (largest province in northeast Iran). This province occupies about 118,884 square kilometers of Iran. Six million people (8% of Iran's total population) are living in Khorasan Razavi. Imam Reza Hospital is the only tertiary referral center for intoxicated patients in the north east of Iran.

All cases of toxic exposure or poisoning contain household poisons, bites; agricultural or medicinal compounds and suicidal attempts were included. We used International Classification of Disease-10 for coding of poisonings, including pharmaceutical (T36-T44, T50), chemical (T45-T49, T51-T60) and natural (T61-T65) intoxications. Age categories are represented using 10-year periods. The population of each age category in the 10 years of the study period was calculated by basic information from the last two national censuses. For those findings, which are based on rates, the data have been analyzed for all referrals to the hospital. The population figures for Mashhad are midyear estimates and were provided by the Iran Statistics Center (12).

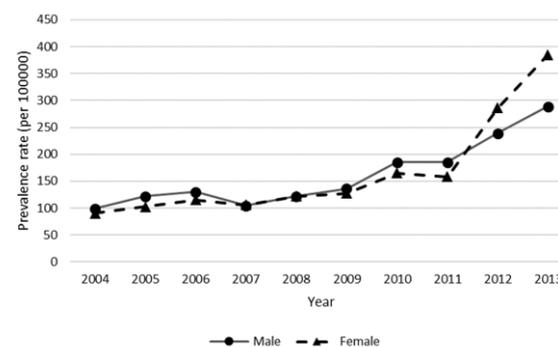
Statistical Package for Social Sciences version 11.5 was used for data analysis. Descriptive analysis is presented with frequency and percentage and Chi-square test and the independent sample t test was used for inferential analysis.  $P < 0.05$  was considered statistically significant.

## 3. Results:

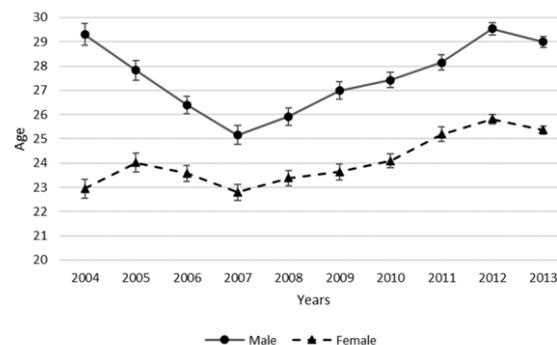
There were 49189 admissions during the 10-year period. The mean age of admitted patients was  $26.21 \pm 14.97$  years ( $27.89 \pm 16.15$  in male and  $24.55 \pm 13.5$  in females) with a wide range from below one-



**Fig. 1.** Secular trend of prevalence of admissions in Toxicology Center in two genders.

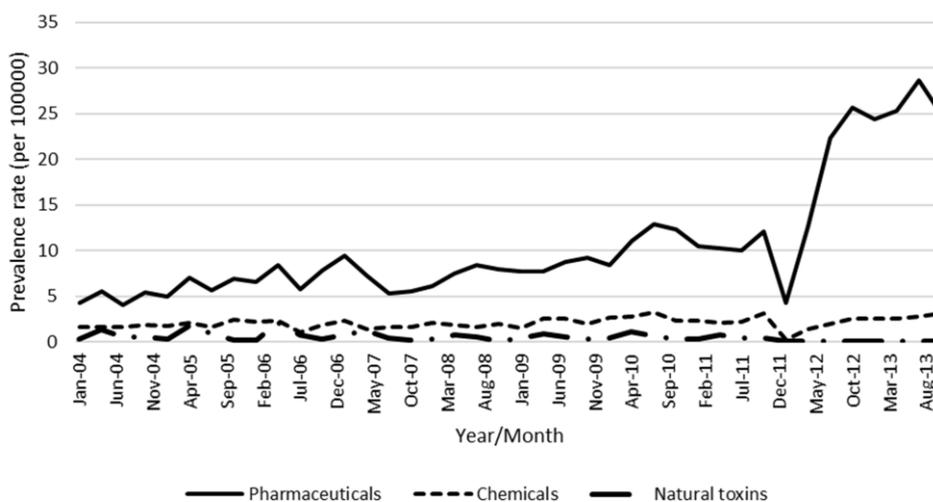


**Fig. 2.** It shows percentage of admissions in Toxicology Center in different seasons 2004-2013.



**Fig. 3.** It shows secular trend of age (Mean ± SE) in two genders from 2004 to 2013.

year-old to 98 years old. Nearly half of patients (24731, 50.3%) were female and the same percentages (19427, 50.5%) were married. Housewives were the most frequent (39.7%) category regarding job titles. More than 80% of patients were completely cured and nearly 12% were self-discharged. Case fatality rate was 3.03% in men and 1.42% in women. Most of which were due to pharmaceutical (63.5%) followed by chemical (33.5%) and natural toxins (3%). Men mostly died because of pharmaceutical and chemical agents (68.8%, 28.1%, respectively). This measure was much closer



**Fig. 4.** It shows secular trend of prevalence rate for different main causes of admissions in Toxicology Center 2004-2013.

**Table 1- Number of admissions in two genders and overall prevalence rate in different age categories**

	Male	Female	Total	Age-Specific Prevalence Rate ( $\times 10^5$ )
<10 years	2562 (56.9)*	1940 (43.1)	4502 (100)	108.3
10-20 years	3757 (34.4)	7155 (65.6)	10912 (100)	249.3
20-30 years	9640(49.8)	9724(50.2)	19364 (100)	294.6
30-40 years	3800 (54.5)	3172 (45.5)	6972 (100)	144.2
40-50 years	2044 (60.5)	1334 (39.5)	3378 (100)	98.0
50-60 years	1282 (66.7)	639 (33.3)	1921 (100)	81.5
>60 years	1359 (63.9)	767 (36.1)	2126 (100)	97.7
<b>Total</b>	<b>24444 (49.7)</b>	<b>24731 (50.3)</b>	<b>49175 (100)</b>	<b>153.4</b>

\*Data is represented as Frequency (percentage)

to these two causes in women (52.4% for pharmaceutical and 45.1% of chemical agents).

Most patients were in 20-30 age group. (19364, 39.3%) Only in 10-20 year, age group women had dominance over men. (Table 1) This different distribution was statistically significant ( $p < 0.001$ ). Similarly, the highest prevalence rate was in 20-30 followed by 10-20 age group.

Most admissions happened on Mondays (14.7%). Although February was the highest single month for admissions, but 26% of admissions were in summer. Figure 1 shows that most admissions were in 2013 (21.5%) and also in the middle of 2011, the prevalence rate in females had passed males for the first time. Besides, there was a statistical difference in admissions in

seasons during the study period ( $p < 0.001$ ) (Figure 2).

There was a significant relation between gender and final condition of patients. ( $p < 0.001$ ) Nearly 60% of self-discharged patients were female. Death and running away happened more in males than females (2 times and 4 times, respectively). However, there was no gender difference in cure rate.

There was no significant difference in gender and season, month or day of admission. However, as indicated above, gender and year of admission were significantly related ( $p < 0.001$ ).

Male patients were significantly older than women patients in all 10-year period. ( $p < 0.001$ ) Except for the first 2 years, the trend of mean age at admission is changing

concurrently in both genders and age variation is also reduced (Figure 3).

The percentage of both single and married patients had raised in the study period. ( $p < 0.001$ ) Admitted men were single and admitted women were mostly married. However, this finding is overruled for men in 2004 and for women in 2007 and 2008.

Most intoxications were due to pharmaceutical (39559, 80.4%) following by chemicals (8014, 16.3%) and natural toxins (1616, 3.3%). Pharmaceutical and chemical intoxication were nearly equal in single and married individuals (both 49.4% vs 50.6%). However, married individuals had more poisonings due to natural toxins (51.6% vs 48.3%) ( $p < 0.001$ ). Gender analysis revealed that females had more admissions due to pharmaceutical and chemical intoxications (50.6% and 52%, respectively). Surprisingly the gender difference was high in natural intoxications in which men (66.5%) had predominance ( $p < 0.001$ ).

The trend of these three main causes is shown in figure 4. Both genders followed the same pattern. (Data are not shown in the figure) Pharmaceutical and chemical poisonings mostly occurred in winters (26.5% and 25.5, respectively). However, natural intoxications were mostly in the summer (26%) ( $p < 0.001$ ). Most pharmaceutical, chemical, and natural intoxication happened in January, May, and June, respectively. ( $p < 0.001$ ) Besides Monday was the most prevalent day for admissions due to pharmaceutical intoxications. Chemical and natural intoxications mostly happened on Saturdays ( $p < 0.001$ ).

The highest number of admissions was in 20-30 age category, including 40.5% of pharmaceutical, 36.8% of chemical and 25.9% of natural intoxications. Almost 40 percent of admitted patients with pharmaceutical or chemical cause were housewives, while more than 37% of admitted patients due to the natural cause were self-employed.

More than ninety percent of self-discharges were in pharmaceutical intoxicated patients. Although 80% of cured patients were in this

category, but 63.5% of total deaths were due to pharmaceutical toxins, too.

#### 4. Discussion:

The results of this study showed an increase in the prevalence of intoxication during 2004-2013. The mean age of admitted patients has also risen in this period regardless of gender. We had previously reported the mean age of admission as  $22.3 \pm 14.3$  in 1993-2000 (13). The mean age of admitted patients was lower in females. However, in contrast to other studies in Tehran (14), Malaysia (15), United Kingdom (16) and also our center (13), we did not find any gender difference. But mortality rate was higher in men. Higher pharmaceutical intoxications were observed in men than women, which can implicate the poor prognosis for men.

Results showed that more poisonings occurred in younger adults. This finding was also reported in the majority of toxicology centers, including our center in 1993-2000 (13, 17, 18). The rise in prevalence of intoxications could be a due worsening of the socio-economic condition, especially in the last 3 years. Most pharmaceutical intoxications are due to suicide attempts, which mostly occur in summer. As previously known for suicide attempts, marriage is protective only for men (19). This study showed the same findings.

Pharmaceutical agents were the most prevalent cause of morbidity and mortality like previously reported studies (13, 14, 17, 20). As Friday is the weekend in Iran, it not surprising that most of natural (e.g. due to vacations in nature) and chemical (e.g. due to house cleaning) intoxications happen in this day. However, pharmaceutical ones are mostly on Mondays. These findings remain an open field of investigation.

#### 5. Conclusion

One of the limitations of this study was referrals from nearby small cities. However, this was less than 0.01% of all admissions. We used the whole registered data that could be an important strength of this study. Finally, we believe that analyzing data on secular trends can always enlighten the

healthcare decision makers for real health problems. But obviously, the prerequisite of this is an appropriate surveillance system. We are happy that at least in Mashhad Toxicology Center, we have a good running one.

## 6. Acknowledgement

The efforts of personnel of toxicology ward for a continuous gathering of these data are highly appreciated.

## 7. Conflicts of interest

The author declares that there were no conflicts of interest.

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