DOI: https://doi.org/10.17816/fm14217

Общая характеристика острых отравлений в сельской местности Южной Индии по данным медицинского центра третьего уровня

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АННОТАЦИЯ

Обоснование. Отравления являются четвёртой по частоте причиной смертности в сельских районах Индии. Наиболее распространённые возбудители пищевых отравлений в Индии — пестициды, седативные средства, химикаты, алкоголь, токсины животных и растений, а также бытовые токсины. В нашу больницу ежемесячно поступает в среднем 20–25 пациентов с отравлениями.

Цели исследования — составить общую характеристику всех случаев отравлений, зарегистрированных в отделении скорой помощи больницы при Институте медицинского образования и исследований им. д-ра Чандрамма Даянанды Сагара (Dr. Chandramma Dayananda Sagar Institute of Medical Education and Research, CDSIMER); изучить типы и частоту отравлений, а также социально-демографические показатели пациентов, поступающих с отравлениями в наше учреждение.

Материалы и методы. Выполнено ретроспективное наблюдательное исследование случаев острых отравлений, зарегистрированных в отделении скорой помощи в CDSIMER, которое является медицинским учреждением третьего уровня, расположенным в сельской местности вблизи города Харохалли (р-н Раманагара, Индия).

Результаты. Число пациентов мужского пола в нашем исследовании составило 58%, 33,52% — в возрастной группе 21–30 лет. В 81,4% случаев госпитализация пострадавших осуществлялась в течение 1–8 часов. Выздоровели и были выписаны из отделения в течение 3 дней 56% больных. В 22 случаях длительность госпитализации составила более 2 недель в связи с развитием осложнений. Фосфорорганическая группа инсектицидов была наиболее распространённым видом потребляемых ядов (40,8% случаев), на втором месте — укус змеи. Попытки самоубийства встречались чаще (60,35%), чем случайное отравление.

Заключение. Инсектициды, главным образом фосфорорганические соединения, — наиболее распространённая группа ядов, вызывающая заболеваемость и смертность среди сельского населения Индии, особенно среди молодых людей в возрасте от 21 до 40 лет. В связи с наличием в регионе лесов вторым по значимости видом отравлений становится укус змеи. В сельской местности часто происходят самоубийства, основная причина которых — финансовые проблемы.

Ключевые слова: отравление; инсектициды; самоубийство; укус змеи.

Как цитировать:
Geetha K.B., Jayanth S.H., Prakash Manju. Общая характеристика острых отравлений в сельской местности Южной Индии по данным медицинского центра третьего уровня // *Судебная медицина*. 2023. Т. 9, № 4. С. 383–390. DOI: https://doi.org/10.17816/fm14217

Рукопись получена: 01.08.2023 **Рукопись одобрена:** 23.10.2023 **Опубликована:** 27.11.2023

DOI: https://doi.org/10.17816/fm14217

Profile of poisoning cases in a tertiary care centre in rural South India

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ABSTRACT

BACKGROUND: Poisoning is the fourth most common cause of mortality in rural India. The commonest agents in India appear to be pesticides, sedatives, chemicals, alcohol, animal & plant toxins and household toxins. Our hospital receives an average of 20 to 25 poisoning cases every month.

AIMS: To profile all cases of poisoning those are reported to casualty department at Dr. Chandramma Dayananda Sagar Institute of Medical Education and Research (CDSIMER); to study the types and frequency of poisoning cases admitted to the centre; to study the socio demographic associations of the poisoning cases.

MATERIALS AND METHODS: Present study is a hospital record-based retrospective observational study of acute poisoning cases registered in the medicolegal register in the casualty of CDSIMER, which is a tertiary care centre situated in rural area near Harohalli, Ramanagara District, India.

RESULTS: Males constituted 58% of the cases and 33.52% of the cases were in the age group of 21–30 years. 81.4% of the cases were able to reach hospital between 1 to 8 hours. 56% of the cases recovered and were discharged within 3 days. In 22 cases the duration of admission was more than 2 weeks as they went into complications. Organo phosphorus group of insecticide was the most common type of poison consumed constituting to 40.8% of the cases followed by Snake bite. Attempt to suicide (60.35%) was more common than accidental poisoning.

CONCLUSION: Insecticides mainly Organophosphorus compound are the most common group of poisons which causes morbidity and mortality in rural Indian population especially in young adults between 21 to 40 years. Owing to the presence of forests in the region, Snake bite becomes the second largest type of poisoning. Suicide frequently prevails in the rural areas; financial problem is the leading cause for farmers to commit suicide.

Keywords: poisoning; insecticides; suicide; snake bite.

To cite this article:
Geetha KB, Jayanth SH, Manju Prakash. Profile of poisoning cases in a tertiary care centre in rural South India. *Russian Journal of Forensic Medicine*. 2023;9(4):383–390. DOI: https://doi.org/10.17816/fm14217

Received: 01.08.2023 **Accepted:** 23.10.2023 **Published:** 27.11.2023

DOI: https://doi.org/10.17816/fm14217

一家三级医疗中心报告的南印度农村地区急性中毒的一般特征

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简评

论证。中毒是印度农村地区第四大常见死因。在印度，食物中毒最常见的致病因素是杀虫剂、镇静剂、化学品、酒精、动植物毒素和生活中的毒素。我们医院平均每月收治20-25名中毒患者。

该研究的目的是对ChandrammaDayanandaSagar医学院（ChandrammaDayanandaSagar institute of Medical Education and Research，CDSIMER）医院急诊科报告的所有中毒病例进行总体分析，研究本院中毒病例的类型和频率以及中毒患者的社会人口学特征。

材料和方法。本研究是对急性中毒病例的回顾性观察研究。这些病例都是在CDSIMER的急诊科登记的。CDSIMER是一家三级医疗机构。它位于Harohalli市（Ramanagara district，印度）附近的农村地区。

结果。58%的患者为男性，33.52%的患者年龄在21-30岁之间。81.4%的患者在1-8小时内接受住院治疗。56%的患者在3天内康复出院。有22例患者的住院时间超过2周，因为出现了并发症。有机磷类杀虫剂是最常见的中毒种类。此类中毒占40.8%。蛇咬伤是第二种最常见的住院原因。自杀未遂（60.35%）比意外中毒更常见。

结论。杀虫剂，主要是有机磷化合物，是最常见的一类毒药。它们是造成印度农村人口发病和死亡的原因，尤其是21至40岁的年轻人中。由于该地区有森林，蛇咬伤是第二种最常见的中毒种类。自杀在农村地区很常见，主要原因是金钱问题。

关键词：中毒；杀虫剂；自杀；蛇咬伤。

引用本文：
Geetha KB, Jayanth SH, Manju Prakash. 一家三级医疗中心报告的南印度农村地区急性中毒的一般特征. *Russian Journal of Forensic Medicine*. 2023;9(4):383–390. DOI: https://doi.org/10.17816/fm14217

收到：01.08.2023 **接受：**23.10.2023 **发布日期：**27.11.2023

BACKGROUND

Poisoning is the fourth most common cause of mortality in rural India. Poisoning has various causes such as industrial, accidental, and intentional. Despite laws regulating the use of poisons, the use of poisonous chemicals in nearly all spheres of human life has steadily increased globally. More than nine million natural and synthetic chemicals exist, of which <3000 cause >95% of the reported cases of poisoning [1]. The most common agents in India include pesticides, sedative drugs, chemicals, alcohol, animal and plant toxins, and household toxins.

In India, all poisoning cases are medicolegal; if the patient dies, an inquest will have to be done, followed by postmortem examination by a forensic pathologist. This is to ascertain the circumstances how the poisoning occurred and establish the exact cause and manner of death. A forensic pathologist must be aware of the common types of poisons around his/her place of work.

Our hospital receives an average of 20–25 poisoning cases monthly. Such high numbers are quite alarming and worrisome. Thus, this study was undertaken to understand the pattern of different types of poisoning and the factors associated with the presenting cases. This will pave the way toward devising a plan to promote awareness in the community about the different types of poison and their remedial measures that might help in reducing the incidence of poisoning.

AIMS

This study aimed to profile all cases of poisoning reported to the casualty department at CDSIMER, analyze the types and frequency of poisoning cases admitted to the center, and determine the sociodemographic associations of poisoning cases.

MATERIALS AND METHODS

This is a hospital record-based retrospective observational study of acute poisoning cases registered in the medicolegal registry in the casualty department of CDSIMER, which is a tertiary care center situated in a rural area near Harohalli, Ramanagara District, India. Data were collected from the medicolegal registers and hospital case sheets of CDSIMER from January 2020 to September 2021 (21 months).

Inclusion criteria

All cases of poisoning reported to the casualty department at CDSIMER, Harohalli, Ramanagara District.

All cases of poisoning with complete case sheets and extensive records available for data extraction

Exclusion criteria

Patients who were dead on arrival.

Poisoning of unknown cause.

Ethical review

Ethics approval was obtained from the Institutional Ethics Committee of Dr Chandramma Dayananda Sagar Institute of Medical Education and Research vide letter No CDSIMER/MR/0026/IEC/2021 dated November 22, 2021.

Statistical analysis

Data regarding age, sex, time taken to reach the hospital, circumstances of poisoning, type of poisonous substance, duration of hospitalization, severity, and outcome were collected in the prestructured proforma. The extracted data were tabulated and analyzed in Microsoft Excel.

RESULTS

Research sample (participants/respondents)

A total of 522 patients with acute poisoning presented to the casualty department of CDSIMER between January 2020 and September 2021. Among these patients, 12 were treated at the casualty department, kept under observation, and sent home within 24 h. Moreover, 510 patients were hospitalized, and 20 of them died.

For 21 months (January 2020 to September 2021), a total of 522 poisoning cases met the inclusion criteria. Hospital records of the patients were reviewed and analyzed. Descriptive statistics for qualitative data were summarized using frequency and percentage. Of the 522 patients, 10 were discharged from the emergency department. They were asymptomatic and had consumed nonlethal doses of a poisonous substance, and all of them presented to the hospital within 1 h. Their vital parameters and laboratory test reports were normal, so they were discharged home within 24 h as outpatients.

Men constituted 58% of the cases, 33.52% of the patients were between 21 and 30 years old, and 21.45% were between 31–40 years old. Three patients were between 81–90 years old (Table 1).

Moreover, 81.4% of the patients were able to reach the hospital between 1 to 8 h, and 11.4 % of them could reach the hospital within the first hour. Two patients came to our hospital after 2 days, where they received treatment from a primary hospital and were later referred to our hospital for further management (Table 2).

Of 510 patients hospitalized for poisoning, 20 succumbed, and 56% recovered and were discharged within 3 days. Moreover, 22 patients were hospitalized for >2 weeks because of complications (Table 3). The 10 patients who succumbed were between 21 and 30 years old, 6 were between 31 and 40 years old, and 4 were between 11 and 20 years old. Moreover, 12 of the 20 who did not recover were men (60%). Those who recovered were most commonly between 21 and 30 years old, followed by those aged 31–40 years.

The organophosphorus group of insecticides was the most common type of poison consumed, constituting 40.8% of the cases followed by snake bites (23.4%) and

Table 1. Age and sex distribution of cases

Age group	Males (303) (58%)	Females (219) (42%)	Total (522)	Percentage
01–10	10	7	17	3.25%
11–20	60	42	102	19.54%
21–30	98	77	175	33.52%
31–40	68	44	112	21.45%
41–50	23	20	43	8.23%
51–60	22	18	40	7.66%
61–70	15	10	25	4.78%
71–80	4	1	5	0.95%
81–90	3	0	3	0.57%

Table 2. Time interval between the incident and hospital arrival

Time interval	No of cases	Percentage
<1 h	60	11.4
1–8 h	425	81.4
8–24 h	31	6
1–2 days	4	0.8
>2 days	2	0.4
Total	522	100

Table 3. Duration of hospitalization

Duration of hospitalization	Male	Female	Total	Percentage
1–3 days	166	120	286	56.1%
4–7 days	86	60	146	28.6%
8–14 days	30	26	56	11%
>14 days	12	10	22	4.3%
	294	216	510	100 %

Table 4. Type of poison

Type of poison	Male	Female	No	Perc
Organophosphorus	118	95	213	40.8
Snake bite	70	52	122	23.4
Medicinal drugs	60	51	111	21.3
Bee sting	20	15	35	6.7
Hydrochloric acid	15	1	16	3.1
Benzene	4	1	5	0.94
Scorpion sting	3	2	5	0.94
Acetone	4	0	4	0.73
Sodium hypochlorite	3	0	3	0.57
Formalin	2	0	2	0.38
Unknown insect bite	0	2	2	0.38
Glass powder	1	0	1	0.19
Iodine	1	0	1	0.19
Silicon dioxide	1	0	1	0.19
Hydro carbon	1	0	1	0.19
Total	303	219	522	100

Table 5. Manner of poisoning

Manner of poisoning	No	Perc
Suicidal	315	60.35
Accidental	207	39.65
Total	522	100

medicinal drug overdose (21.3%). Table 4 also shows the sex distribution of the type of poisons. Insecticides were the most common poison, occurring in all groups aged >11 years. Snake bites were more common in the population working in agricultural fields. Medicinal drug poisoning was more common in children aged <11 years and individuals aged >50 years.

Suicide attempts (60.35%) were more common than accidental (39.65%) poisoning. Poisonous snake bites, bee stings, and scorpion stings were other types of animal bites incurred accidentally. (Table 5)

DISCUSSION

Men constituted 58% of the cases, and 33.52% of the patients were between 21 and 30 years old. Studies conducted in Ahmednagar, India, and Beagavi reported similar findings where 32.18% and 38.2% of the patients were in similar age groups [2,3]. Poisoning more commonly occur in men similar to the results of other studies conducted in Manipal (52.15%) [4] and Belagavi (60.1%) [3]. Individuals aged 21–30 years form the vast majority of the Indian population and are in the period of building their careers. Owing to the challenges in life including stress, financial insecurity, and love affairs, many attempt suicide in this age group. Similarly, they are more adventurous and have risk-taking behaviors, which makes them more susceptible to accidental poisonings.

Only 11% of the cases could reach the hospital within the first hour, and the majority of the cases (81.4%) were able to reach the hospital within 1–8 h after the incident. In a study conducted in New Delhi, the median time point of the first medical contact after exposure was 60 (51.25–120) min [5]. In Hyderabad, >51% of cases were reported to the hospital within 2 h of ingestion of poison [6]. In Warangal, 80% of poisoning cases were brought to the hospital within 6 h [7]. The availability of ambulance services or other transport services determines the time taken to reach the hospital. Our hospital, a tertiary hospital in a rural area catering to a larger population and vast area, most patients reach our hospital in more than an hour. Moreover, >40% of the cases were initially treated at a primary center and were later referred to our hospital. This could be the reason for patients arriving later in other hospitals in the city.

In addition, 56.1% of the patients were hospitalized for 1–3 days, and 4.3% spent >2 weeks in a hospital. In a study at a tertiary hospital in West Bengal, the median duration of

hospitalization was 4 (interquartile range, 2–6) days. Among all the recruited patients, 72.13% recovered without sequelae, 2.87% recovered with sequelae, 9.97% left against medical advice, and 15.03% died. [8] Only 20 (3.83%) of a total of 522 patients who had poisoning succumbed.

Insecticides mainly organophosphorus compounds are the most common type of poison consumed, constituting to 40.8% of the cases followed by snake bites (23.4%) and medicinal drug poisoning. The type of poisoning depends on various factors such as rural or urban areas, availability of a particular poison in an area, and presence of certain poisonous animals unique to that environment. Considering these factors, drug overdose (21.3%) was common in New Delhi [5]. Ingestion of organophosphates was reported in Hyderabad (41%) [6] and Manipal (36%) [4].

However, the incidence of envenomation caused by snake bites is also high in West Bengal and ranks second in our area (23.4%) and in Manipal (16.2%) [4]; both rural places have vast areas of forests nearby. Corrosives and sedatives were more commonly used than organophosphorus compounds in West Bengal [8]. Our institute is a rural tertiary care center, and the main occupation of the people in the vicinity is agriculture. Insecticides and pesticides are freely available to farmers and within the reach of their family members.

As regards the manner of poisoning, suicide attempts by poisoning (60%) were more common than accidental poisoning (40%). No homicidal poisoning was reported. Findings were similar in other studies. The incidence rates of suicide by poisoning were 64.36%, 79%, 52%, and 67% and those by accidental poisoning were 33.33%, 14%, 48%, and 32.4% in similar studies conducted in Ahmednagar, Hyderabad, Warangal, and Belgavi, [2,3,6,7] respectively.

CONCLUSION

Insecticides mainly organophosphorus compounds are the most common group of poisons that cause morbidity and mortality in rural Indian population, particularly in adults aged 21–40 years. They have free access to these poisons from nearby stores as they are used in agriculture, which is the primary occupation in this region. Owing to the presence of forests in the region, snake bites become the second most common type of poisoning. Ambulance service and first aid in rural areas are still a concern. The results obtained will not only help clinicians but also forensic pathologists and investigative agencies in identifying the type and manner of poisoning during autopsies.

Suicide frequently prevails in rural areas, and financial problem is the leading cause of suicides among farmers. Most of the accidental poisoning cases are animal bites mainly snake bites. A fully functional poison control center would help in the early diagnosis and specific treatment. Educating the uninformed villagers about first aid for snake bites and introducing policies curbing free access to insecticides would decrease poisoning cases.

ADDITIONAL INFORMATION

Funding source. This study was not supported by any external sources of funding.

Competing interests. The authors declare that they have no competing interests.

Authors' contribution. All authors made a substantial contribution to the conception of the work, acquisition, analysis, interpretation of data for the work, drafting and revising the work, final approval of the version to be published and agree to be accountable for all aspects of the work.

REFERENCES

1. Mittal C, Singh S, Kumar MP, et al. Toxicoepidemiology of poisoning exhibited in Indian population from 2010 to 2020: A systematic review and meta-analysis. *BMJ Open*. 2021;11(5):e045182. doi: 10.1136/ bmjopen-2020-045182

2. Tandle RM, Kadu SS. Study of pattern of acute poisoning cases in females at a rural. *Int J Education Res Health Sci*. 2017;3(3):122–124. doi: 10.5005/jp-journals-10056-0053

3. Bannur V, Jirli PS, Honnungar RS, et al. Pattern of poisoning cases at a tertiary health care centre: A cross sectional study. *Medico-legal Update*. 2019;19(1):124–129. doi: 10.5958/0974-1283.2019.00025.2

4. Ramesha KN, Rao BH, Kumar GS. Pattern and outcome of acute poisoning cases in a tertiary care hospital in Karnataka, India. *Indian J Crit Care Med*. 2009;13(3):152–155. doi: 10.4103/0972-5229.5854

5. Mathew R, Jamshed N, Aggarwal P, et al. Profile of acute poisoning cases and their outcome in a teaching hospital of north India. *J Family Med Prim Care*. 2019;8(12):3935–3939. doi: 10.4103/jfmpc.jfmpc_832_19

6. Nadeem MN, Maqdoom M, Akif ME. A prospective observational study on pattern of poisoning cases reported to emergency department of a teaching hospital in south India. *Biomed Pharmacol J*. 2020;13(4):1863–1869. doi: 10.13005/bpj/2061

7. Kumar SV, Venkateswarlu B, Sasikala M, Kumar GV. A study on poisoning cases in a Tertiary care hospital. *J Nat Sci Biol Med*. 2010;1(1):35–39. doi: 10.4103/0976-9668.71671

8. Chatterjee S, Verma VK, Hazra A, et al. An observational study on acute poisoning in a tertiary care hospital in West Bengal, India. *Perspectives Clin Res*. 2020;11(2):75–80. doi: 10.4103/picr.PICR_181_18

СПИСОК ЛИТЕРАТУРЫ

1. Mittal C., Singh S., Kumar M.P., et al. Toxicoepidemiology of poisoning exhibited in Indian population from 2010 to 2020: A systematic review and meta-analysis // BMJ Open. 2021. Vol. 11, N 5. P. e045182. doi: 10.1136/ bmjopen-2020-045182

2. Tandle R.M., Kadu S.S. Study of pattern of acute poisoning cases in females at a rural // Int J Education Res Health Sci. 2017. Vol. 3, N 3. P. 122–124. doi: 10.5005/jp-journals-10056-0053

3. Bannur V., Jirli P.S., Honnungar R.S., et al. Pattern of poisoning cases at a tertiary health care centre: A cross sectional study // Medico-legal Updatee. 2019. Vol. 19, N 1. P. 124–129. doi: 10.5958/0974-1283.2019.00025.2

4. Ramesha K.N., Rao B.H., Kumar G.S. Pattern and outcome of acute poisoning cases in a tertiary care hospital in Karnataka, India // Indian J Crit Care Med. 2009 Vol. 13, N 3. P. 152–155. doi: 10.4103/0972-5229.5854

5. Mathew R., Jamshed N., Aggarwal P., et al. Profile of acute poisoning cases and their outcome in a teaching hospital of north India // J Family Med Prim Care. 2019. Vol. 8, N 12. P. 3935–3939. doi: 10.4103/jfmpc.jfmpc_832_19

6. Nadeem M.N., Maqdoom M., Akif M.E. A prospective observational study on pattern of poisoning cases reported to emergency department of a teaching hospital in south India // Biomed Pharmacol J. 2020. Vol. 13, N 4. P. 1863–1869. doi: 10.13005/bpj/2061

7. Kumar S.V., Venkateswarlu B., Sasikala M., Kumar G.V. A study on poisoning cases in a Tertiary care hospital // J Nat Sci Biol Med. 2010. Vol. 1, N 1. P. 35–39. doi: 10.4103/0976-9668.71671

8. Chatterjee S., Verma V.K., Hazra A., et al. An observational study on acute poisoning in a tertiary care hospital in West Bengal, India // Perspectives Clin Res. 2020. Vol. 11, N 2. P. 75–80. doi: 10.4103/picr.PICR_181_18

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