

EXAGENEOUS INTOXICATIONS IN ALAGOAS, BRAZIL: PESTICIDES EMPHASIS

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ABSTRACT - In order to describe the cases of exogenous intoxication in the State of Alagoas, with emphasis on pesticides, a survey was conducted between the period 2007 and 2017, from the SINAN database, provided by the Alagoas State Health Department. They were recorded total of 28,314 cases of exogenous intoxication, wherein medicines (33.9%), food and beverages (11.3%) and pesticides (8.8%) were the main intoxicating agents. The year 2013, with 4,489 notifications, was those with the highest number of records. In relation to pesticides, 1,151 cases were reported, wherein the city of Arapiraca, with 246 records, led the ranking of notifications. Male population (73.7%), aged between 20 and 49 years (60.7%), with a low educational level (21.6%), who became intoxicated at their residence (39.7%), in sprayings (20.8%) of herbicide (28.5%), mainly 2,4D (60.8%), were the main circumstances. It was detected that 90% of the aggravations by pesticides presented cure without sequels, despite the registry of 28 deaths. This information shows that exogenous poisoning is a public health issue and that monitoring of records and on-site monitoring by health workers, investments in rural extension work, and technical assistance could significantly reduce the problem.

KEYWORDS: Sinitox. Sinan. Public health. Medicines. Herbicide.

INTOXICAÇÕES EXÓGENAS EM ALAGOAS, BRASIL: ÊNFASE AOS AGROTÓXICOS

RESUMO - Objetivando descrever os casos de intoxicações exógenas no Estado de Alagoas, com ênfase aos agrotóxicos, foi realizado um levantamento entre o período de 2007 e 2017, a partir do banco de dados do SINAN, disponibilizados pela Secretaria Estadual de Saúde do Estado de Alagoas. Foram registrados total de 28.314 casos de intoxicação exógena, em que medicamentos (33,9%), alimentos e bebidas (11,3%) e agrotóxicos (8,8%) foram os principais agentes intoxicantes. O ano de 2013, com 4.489 notificações, foi aquele com maior número de registros. Em relação aos agrotóxicos, foram notificados 1.151 casos, em que Arapiraca, com 246 registros, liderou o ranking de notificações. Pessoas do gênero masculino (73,7%), com idade entre 20 e 49 anos (60,7%), de baixo grau de escolaridade (21,6%), que se intoxicaram na sua residência (39,7%), com a pulverizações (20,8%) de herbicida (28,5%), principalmente 2,4D (60,8%), foram as principais circunstâncias. Detectou-se que 90% dos agravos por agrotóxicos apresentaram cura sem sequelas, apesar do registro de 28 óbitos. Estas informações evidenciam que as intoxicações exógenas constituem problemas de saúde pública e que o monitoramento dos registros e o acompanhamento pelos agentes de saúde, investimentos em trabalhos de extensão rural e assistência técnica poderão reduzir sensivelmente o problema.

PALAVRAS-CHAVE: Sinitox. Sinan. Saúde pública. Medicamentos. Herbicida.

INTOXICACIONES EXÓGENAS EN ALAGOAS, BRASIL: ÉNFASIS EN LOS PESTICIDAS

RESUMEN - Con el objetivo de describir los casos de intoxicaciones exógenas en el Estado de Alagoas, con énfasis en los pesticidas, se llevó a cabo un levantamiento de datos entre el período de 2007 y 2017, a partir del banco de datos del SINAN,

puestos a disposición por la Secretaria Estadual de Saúde do Estado de Alagoas. Se registró un total de 28.314 casos de intoxicación exógena, en que medicamentos (33,9%), alimentos y bebidas (11,3%) y pesticidas (8,8%) fueron los principales agentes intoxicantes. El año 2013, con 4.489 notificaciones, fue aquel con mayor número de registros. En relación a los pesticidas, se notificaron 1.151 casos, en los que Arapiraca, con 246 registros, encabezó el ranking de notificaciones. Las personas del género masculino (73,7%), con edades entre 20 y 49 años (60,7%), con bajo grado de escolaridad (21,6%), que se intoxicaron en su residencia (39,7%), con la pulverización (20,8%) de herbicida (28,5%), principalmente 2,4D (60,8%), fueron las principales circunstancias. Se detectó que el 90% de los daños por pesticidas presentaron cura sin secuelas, a pesar del registro de 28 muertes. Estas informaciones evidencian que las intoxicaciones exógenas constituyen problemas de salud pública y que el monitoreo de los registros y el acompañamiento por los agentes de salud, inversiones en trabajos de extensión rural y asistencia técnica pueden reducir sensiblemente el problema.

PALABRAS CLAVE: Sinitox. Sinan. Salud pública. Medicamentos. Herbicida.

INTRODUCTION

Intoxication is defined as a clinical manifestation of an adverse effect on a living organism when exposed to harmful chemicals (Oliveira and Suchara 2014). When the intoxicating substance is present in the environment it is classified as exogenous, in which medicines, pesticides, veterinary products, cosmetics, metals, drugs of abuse, toxic plants, foods and beverages are those notified by the National System of Toxicological and Pharmacological Information (SINITOX).

According to Zambolim et al. (2008), poisonings may be intentional in cases of murder or suicide attempted, or accidental, with children under three years of age being the most vulnerable to accidental intoxication, as well as the elderly, hospitalized (for medication errors) and agricultural and livestock workers and industry.

Medicines and pesticides are widely used in Brazil. The pharmaceutical industry handled US\$ 17.8 billion in 2017, representing 2% of the world market (SINDUSFARMA 2018). Already of pesticides, US\$ 9.4 billion (ABIFINA 2017). The facility to buy of these products and self-management in their use, without following specialized technical orientation, may be the causes of the occurrence of intoxications, considered a serious public health problem.

The agricultural sector has been highlighting nationally in the use of technologies that accompany productivity, contributing positively to the growth of the country. In 2017, industry expanded 13%, with Gross Domestic Product (GDP) value reached R\$ 299.5 billion (AGRICULTURA 2018). This is the growth by the greater use of inputs, among them, the pesticides. The state of Alagoas, with 3.12 million people, has 324 thousand inhabitants distributed in 98.5 thousand agricultural jobs (IBGE 2019a), of which 30.5 thousand units use pesticides in their crops. 90% of the agricultural population is classified as a family farmer (Law No. 11.326 of 2006), which is a lack of technical assistance, lines of financing for investment in their activity, coupled with the low level of schooling, it is possible that this category presents greater vulnerability to poisoning.

Despite the existence of a large database, which registered in 2017 more than 108 thousand cases of exogenous intoxication in Brazil (DATASUS 2019), already published studies have revealed the public health problems due to its high prevalence rate (Carvalho et al. 2017), indicating that it is an essential tool for decision-making by management bodies, such as those associated with Epidemiological Surveillance, as a triggering factor for the information-decision-action process. In Alagoas, there are no published data and there is no relation between registered cases of intoxication and actions of effective public policies.

The present study aimed to describe the cases of exogenous intoxication in the State of Alagoas, with emphasis on the use of pesticides, between 2007 and 2017.

MATERIAL AND METHODS

This research was based on a descriptive, quantitative, retrospective and documental epidemiological study that used exogenous poisoning records from the SINAN Information System between 2007 and 2017, based on information provided by the Secretary of State for Health of Alagoas (SESAU), service protocol N° 2000.021150/2018.

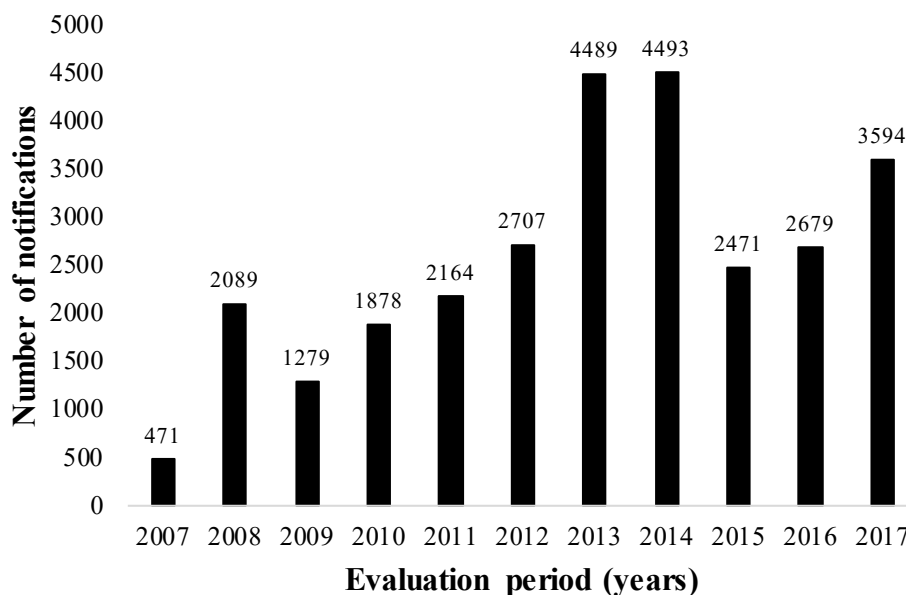
With the data collection, a survey of exogenous poisonings occurred in the State of Alagoas, quantifying, for each year, the number of intoxications occurred in the 10 years of evaluation. For the intoxicant agent, the sum of all cases was considered over the investigation period. In relation to pesticide poisonings, the number of notifications was quantified for each year. For the incidence of notifications by gender, age, educational level, place of poisoning and purpose of use of the product, activity during intoxication, active principles of intoxicating pesticides, circumstances and evolution of intoxications, the total sum was considered.

By using public domain secondary databases, requested through the e-SIC (Electronic System of the Citizen Information Service) of Law N° 12527 of 2011 (Law of Access to Information), exempted the authorization of the Ethics Committee in research. The researchers made a commitment to comply with all stages of the work in accordance with the norms regarding scientific research.

RESULTS AND DISCUSSION

From 2007 to 2017, total of 28,314 cases of exogenous intoxication were reported in Alagoas, with higher occurrences between 2013 and 2014, respectively (Figure 1). It was during this period that the State of Alagoas presented the 3rd highest GDP growth in relation to the Federative Units and the 2nd in relation to the states of the Northeast region, standing out the agricultural sector, which contributed 27.6% of GDP, followed by the industrial sector (2.2%) and services, with 1.9% (SINC 2016).

Figure 1. Total distribution of notifications of exogenous poisonings registered in Alagoas between the years 2007 to 2017 (Total notifications: 28,314).



The main causes of intoxication (Table 1) were medicines use (9,590 cases, 33.3%), food and beverages (3,201 cases, 11.1%) and pesticides (2,502 cases, 8.7%), respectively. In Minas Gerais, from 2011 and 2015, medicines also led the ranking, with 53.2% of cases (Carvalho et al. 2017). In the same way, in the Northern region (Liberato

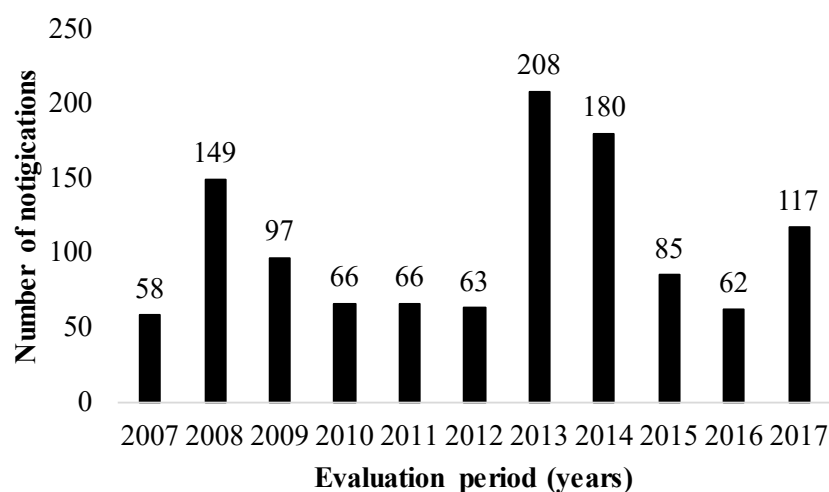
et al. 2017), Santa Catarina (Silva and Costa 2018) and in other States, medicines were also the toxic agents most frequently mentioned as causing intoxication. Although medicines represent an important instrument for prophylactic, curative or palliative purposes, a public health problem in the country can be avoided by means of improvements in the regulation of drug advertising, improvement of pharmaceutical assistance, restriction of access to medicines drugs, as well as campaigns to avoid self-medication (Vieira and Carvalho 2016).

Table 1. Distribution of reports of exogenous poisonings, according to toxic agent, registered in Alagoas between the years 2007 to 2017.

Toxic Agent	Number of notifications	%
Ignored/White	8055	28.4
Medications	9590	33.9
Pesticides	2502	8.8
Veterinary products	264	0.9
Household products	1588	5.6
Cosmetics	260	0.9
Chemical products	505	1.8
Metal	9	0.0
Drugs of abuse	914	3.2
Toxic plant	619	2.2
Food and Beverage	3201	11.3
Others	807	2.9
Total	28,314	100.0

In relation to pesticides, there were higher records of intoxication in Alagoas between 2013 and 2014, with 208 and 180 cases, respectively, that is, GDP growth, driven by the agricultural sector, increased the use of pesticides and human contamination. This information is in agreement with the analysis of the use of pesticides by Souza et al. (2016) between 2012 and 2013, which showed that the State of Alagoas presented the 3rd place in the national ranking with the highest amounts of pesticides sold per hectare, losing to the States of Rio de Janeiro (1st) and São Paulo (2nd).

Figure 2. Total distribution of notifications of exogenous intoxications by pesticides registered in Alagoas between 2007 and 2017 (Total notifications: 1,151).

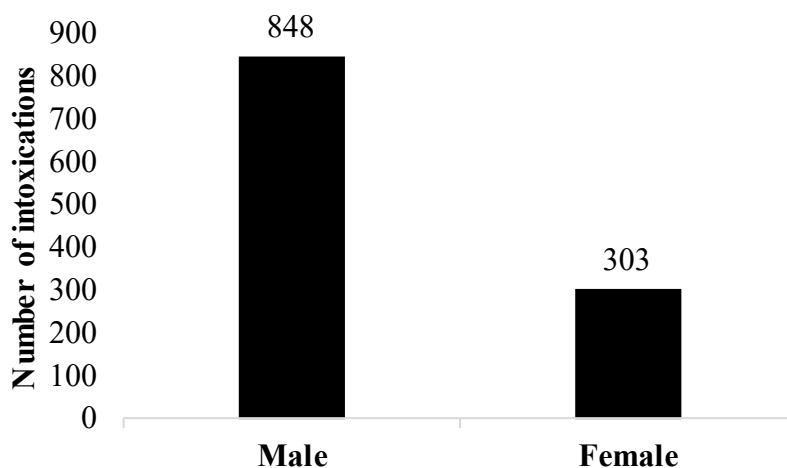


The Agreste mesoregion, with 851 cases, was the one with the highest number of exogenous intoxication records by pesticides, especially the cities of Arapiraca, Craíbas, Girau do Ponciano and Feira Grande, with 246, 119, 92 and 78 notifications, respectively. This information corroborates with Bombardi (2017), indicating the agricultural establishments of this region as those that use pesticides most in the State. In these cities, the agriculture is formed (IBGE 2019b), predominantly, by corn (6,325 ha), tobacco (5,143 ha), beans (3,809 ha), cassava (1,958 ha) and pumpkin (218 ha) plantations, crops that lead, during their cycle, expressive amounts of pesticides (Pignati et al. 2017). It is also worth noting that in the Agreste region 46% of family farmers are concentrated, where the highest density were found in the Arapiraca micro-region (Barboza et al. 2016). Considering that 85.5% of family-based farmers have primary education (1st grade), according to IBGE (2019a), the high level of intoxication can be associated with the low level of schooling.

In the eastern mesoregion of Alagoas, 256 notifications were recorded, highlighting the city of Igreja Nova, with 177 registrations, possibly due to the alcohol sectors (4,070 ha) and ranching (418 ha). In the Sertão mesoregion, 43 records of intoxication were observed, with six cases in Major Isidoro, in the dairy basin region, with corn (2,501 ha), forage palm (625 ha) and bean (344 ha) predominating, according to IBGE (2019b).

Male population (Figure 3), which corresponds to the predominant fraction of labor in agriculture (Mattei 2015), in the age range between 20 and 49 years (Table 2), it was identified with a low level of schooling (Table 3), was the highest victims of exogenous intoxication by pesticides in the period evaluated. These data corroborate with those obtained by Souza et al. (2016) in Bahia, where between 2007 and 2011 there were 696 cases of poisoning by pesticides, of which men between 20 and 49 years of age, with low educational level were the main victims. This information evidenced the degree of vulnerability that rural workers are exposed to, because without adequate access to information, credit lines, specialized technical assistance, they make inappropriate use of pesticides (purchase, handling, use and disposal of packaging), reflecting in intoxication and even death.

Figure 3. Distribution of notifications of exogenous intoxications by agricultural pesticides registered in Alagoas from 2007 to 2017, according to the genus. (Total: 1,151 notifications).



The incidence of intoxication in children under 5 years of age was observed in 52 cases (Table 2). Direct contact with the crop, cutaneous route or accidental intake of the product at home or at the place of application could be the cause.

Table 2. Distribution of notifications of exogenous poisonings by agricultural pesticides registered in Alagoas between the years 2007 to 2017, according to the age group.

Age	Number of notifications	%
Under 1 year old	18	1.6
1 to 4 years old	34	3.0
5 to 9 years old	13	1.1
10 to 14 years old	40	3.5
15 to 19 years old	159	13.8
20 to 29 years old	284	24.7
30 to 39 years old	255	22.2
40 to 49 years old	159	13.8
50 to 59 years old	107	9.3
60 to 69 years old	63	5.5
Greater than 70 years old	19	1.7
Total	1,151	100.0

Table 3. Distribution of notifications of exogenous poisonings by agricultural pesticides registered in Alagoas between 2007 and 2017, according to schooling.

Schooling	Number of notifications	%
Ignored/White	653	56.7
Illiteracy	53	4.6
1st to 4th incomplete EF	161	14.0
Complete 4th grade EF	35	3.0
Incomplete 5th to 8th Grade	91	7.9
Complete primary education (EF)	19	1.7
Incomplete secondary school	25	2.2
High school completed	49	4.3
Incomplete higher education	6	0.5
Higher education completed	3	0.3
Not applicable	56	4.9
Total	1,151	100.0

Intoxication sites were observed more frequently in residences and in workplaces (Table 4), which used insecticides and herbicides (Table 5), when at the time of dilution of the chemical in the preparation of the syrup before the application in the sprays (Table 6), due, in large part, to the lack of use of personal protective equipment (PPE). This information may be related to the agricultural activity developed in the different regions. Pesticides with high toxicities, responsible for exogenous intoxications in Alagoas, are widely used in sugarcane plantations, corn, beans, tobacco (Table 7) and several other crops not mentioned in this text, but cultivated in the State.

Table 4. Distribution of notifications of exogenous poisonings by agricultural pesticides registered in Alagoas between 2007 and 2017, according to the location of occurrence.

Place of occurrence	Number of notifications	%
Ignored/White	197	17.1
Residence	457	39.7
Working environment	437	38.0
Path of work	2	0.2
School/Nursery	2	0.2
External environment	39	3.4
Other	17	1.5
Total	1,151	100.0

Table 5. Distribution of notifications of exogenous intoxications by agricultural pesticides registered in Alagoas between 2007 and 2017, according to the purpose of use.

Purpose of using	Number of notifications	%
Ignored/White	418	36.3
Insecticide	288	25.0
Herbicide	328	28.5
Tickicide	24	2.1
Rodenticide	2	0.2
Fungicide	20	1.7
Other	14	1.2
Not applicable	57	5.0
Total	1,151	100.0

Table 6. Distribution of notifications of exogenous intoxications by agricultural pesticides, registered in Alagoas between 2007 and 2017, according to the activity performed.

Activity	Number of Notificaations	%
Ignored/White	441	38.3
Dilution	217	18.9
Spraying	239	20.8
Seed treatment	23	2.0
Storage	11	1.0
Harvest	80	7.0
Transportation	3	0.3
Fumigation	8	0.7
Production	1	0.1
Others	37	3.2
Not Applicable	91	7.9
Total	1,151	100.0

Table 7. Distribution of notifications of active principles of pesticides causing exogenous intoxication in Alagoas.

Active ingredients	Notifications	Class	Class toxicological	Cultures indicated
Glyphosate	38	Herbicide	Moderately toxic	Sugar cane, corn, rice
Cypermethrin	12	Insecticide	Extremely Toxic	Sugar Cane, corn
Deltamethrin	06	Insecticide	Extremely Toxic	Rice, corn, beans, smoke
Flumetralin	02	Antibacterial	Extremely Toxic	Smoke
Imidacloprid + Cyfluthrin	03	Insecticide	Highly toxic	Beans, tobacco, rice, corn, sugar cane
Methamidophos	24	Insecticide	Highly toxic	Beans
2,4-D	135	Herbicide	Extremely toxic	Sugar cane, corn, rice
Velpark	02	Herbicide	Moderately toxic	Sugar cane
Total	222	--	--	--

The herbicide 2,4D was the pesticide that promoted the greatest number of notifications, in more than 60% of the cases. This is an extremely toxic product whose active ingredient (2,4-Dichlorophenoxyacetic acid) may persist in the environment for more than 2.5 years (Baumgartner et al. 2017, Islam et al. 2017), contaminating people through the nasal, dermal or oral routes. Depending on the level and intensity of contact with the product, it may cause burning sensation, itching, vomiting, diarrhea, neurological problems, musculoskeletal injury and myotomy, as well as death (Hiran and Kumar 2017). Herbicide 2,4D presents low cost and high efficiency in the control of a broad spectrum of weeds, it is an economically viable option, easily accessible to producers. In Alagoas, 345 cases

(30%) of suicide attempts were reported (Table 8). The ease of access to the product is considered to be the main reason for the use of pesticides in cases of attempted suicide by northeastern elderly (Gomes et al. 2018).

Table 8. Distribution of notifications of exogenous poisonings by agricultural pesticides, registered in Alagoas between the years 2007 to 2017, according to the circumstances.

Circumstance	Number of notifications	%
Ignored/White	38	3.3
Usual use	236	20.5
Accidental	284	24.7
Environmental	211	18.3
Therapeutic use	3	0.3
Medical prescription	1	0.1
Error of administration	5	0.4
Self-medication	1	0.1
Abuse	1	0.1
Food intake	5	0.4
Attempted suicide	345	30.0
Other	21	1.8
Total	1,151	100.0

Other conditions of pesticide poisoning were caused by accidental contact, by usual use in applications and by contact with the product in the environment, with 284, 236 and 211 records, respectively (Table 8). These cases could be avoided by complying with Law N° 7802 of 1989, which conditions the handling and utilization of pesticides to the use of personal protective equipment, and more, the CONAMA Resolution N° 465 of 2014, which regulates the reverse logistics of pesticides, thus avoiding inappropriate disposal, thus avoiding the contamination of terrestrial and aquatic fauna and flora.

Despite the high rate of suicide attempts using pesticides, more than 90% of cases presented cure without sequelae, despite the 28 deaths recorded (Table 9).

Table 9. Distribution of notifications of exogenous intoxications by agricultural pesticides, registered in Alagoas between 2007 and 2017, according to the evolution of intoxication.

Evolution	Number of cases	%
Ignored/White	62	5.4
Cure without sequels	1.041	90.4
Cure with sequels	12	1.0
Death due to exogenous intoxication	28	2.4
Death due to another cause	1	0.1
Loss of follow-up	7	0.6
Total	1,151	100.0

The information presented evidenced a serious scenario of poisonings that occurred in Alagoas, which implies State expenses in the treatment. The main cause is the low level of schooling associated with the lack of effective public policies in the follow-up of the cases and the routine of the workers, based on the practice of technical assistance. The absence of information (ignored/blank) about poisoning reports regarding toxic agent, schooling, location of occurrence, purpose of use, activity performed and the circumstances (Tables 1, 3, 4, 5, 6, 8 and 9) makes it impossible effective action, by public health agents, that can mitigate the problem.

CONCLUSIONS

In the State of Alagoas, medicines, food and beverages and pesticides are the major cause of exogenous intoxication. Among pesticides, the Agreste region has the highest records, with emphasis on the 2,4D herbicide. Male population, aged between 20 and 49 years, with a low level of schooling are the most contaminated.

Exogenous intoxications are public health problems that generate negative impacts to the economy from medical care. Hence, the monitoring of intoxication records and on-site monitoring by health workers, investments in rural extension work and technical assistance will be measures that may reduce the records of intoxication.

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