

Voluntary drug intoxication in adolescents: impact of COVID-19 pandemic

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Abstract

Introduction and Objectives: The COVID-19 pandemic caused social isolation and disruption of routines, with an increase in psychiatric symptoms in adolescents, namely suicide attempts. Voluntary drug intoxication is the most common form of attempted suicide in young people. Our objective was to evaluate the impact of COVID-19 pandemic in cases of voluntary drug intoxication in adolescents. **Methods:** A retrospective study conducted on adolescents admitted to the Pediatric Emergency Department for voluntary drug intoxication between January 2020 and June 2021. We defined a pre-COVID period: January/2019-February/2020, and COVID period: March/2020-June/2021. **Results:** There were 64 admissions for voluntary drug intoxication in a total of 50 adolescents, 76.0% of whom were female. The mean age was 15.6 ± 1.6 years. There were 19 intoxications in the pre-COVID period (1.4 cases/month) and 45 in the COVID period (2.8 cases/month). Most commonly used drugs were paracetamol (23.4%), alprazolam (21.9%) and sertraline (20.3%), with 39.1% of intoxications using more than 1 drug. In 59.4% it was the first voluntary drug intoxication. A trigger was identified in 75.0% of cases. There was previous follow-up in Child Psychiatry in 67.2% of cases. In the COVID period there was an increase of other coexisting self-harming behaviors ($p = 0.017$) and fewer urgent transfers to Child Psychiatry ($p = 0.002$). Male sex was associated with older age ($p < 0.001$) and familiar instability ($p = 0.004$). **Discussion:** There was a two-fold increase of voluntary drug intoxication during the pandemic, consistent with the literature on its impact on young people's mental health, which reinforces the importance of preventive action in adolescents at risk.

Keywords: Adolescent. COVID-19. Drug overdose.

Intoxicações medicamentosas voluntárias em adolescentes: impacto da pandemia COVID-19

Resumo

Introdução e Objetivos: A pandemia COVID-19 causou isolamento e interrupção da rotina, com consequente aumento da sintomatologia psiquiátrica em adolescentes, nomeadamente tentativas de suicídio. A intoxicação medicamentosa voluntária é a forma de tentativa de suicídio mais frequente nos jovens. O objetivo deste estudo foi avaliar o impacto da pandemia nos casos de intoxicação medicamentosa voluntária em adolescentes. **Métodos:** Estudo retrospectivo realizado em adolescentes admitidos na urgência pediátrica por intoxicação medicamentosa voluntária entre 1 de Janeiro de 2019 e 30 de junho de 2021. Definuiu-se como período pré-COVID: Janeiro/2019-Fevereiro/2020, e período COVID: Março/2020-Junho/2021. **Resultados:** Houve 64 admissões por intoxicação medicamentosa voluntária, num total de 50 adolescentes, 76,0% do sexo feminino. A idade média

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foi $15,6 \pm 1,6$ anos. Houve 19 intoxicações no período pré-COVID (1,4 casos/mês) e 45 no período COVID (2,8 casos/mês). Os fármacos mais usados foram paracetamol (23,4%), alprazolam (21,9%) e sertralina (20,3%), sendo 39,1% das intoxicações com mais do que 1 fármaco. Em 59,4% dos casos foi a primeira intoxicação medicamentosa voluntária. Identificou-se desencadeante em 75,0% dos casos. Tinham seguimento pedopsiquiátrico prévio 67,2%, associados a menor menção a desencadeante ($p = 0,030$). No período COVID houve aumento da coexistência de outros comportamentos auto-lesivos ($p = 0,017$) e diminuição das transferências urgentes para Pedopsiquiatria ($p = 0,002$). O sexo masculino associou-se a maior idade ($p < 0,001$) e instabilidade familiar ($p = 0,004$). **Discussão:** Observou-se uma duplicação das intoxicações medicamentosas voluntárias durante a pandemia, concordante com a literatura acerca do impacto na saúde mental dos jovens, o que reforça a importância de atuar preventivamente em adolescentes de risco.

Palavras-chave: Adolescente. COVID-19. Intoxicação medicamentosa.

Keypoints

What is known

- Voluntary drug intoxication is the most common form of attempted suicide in young people.
- COVID-19 pandemic has had a negative impact in mental health in all age groups.

What is added

- We found a two-fold increase in cases of voluntary drug intoxications in Portuguese adolescents during the first months of the COVID-19 pandemic.
- There was no change in demographic and social profile between the pre-COVID and COVID groups.

Introduction

Several studies have demonstrated an increase in psychopathology in children and adolescents in the last decade¹, with approximately 20% of children and adolescents having an emotional, mental or behavior disorder diagnosed². Consequently, suicide is the second most common cause of death between ages of 15 and 19 years old in Europe³ and the United States of America⁴. Therefore, attempted suicide is the most common psychiatric emergency in young people, frequently observed in the Pediatric Emergency Department (PED), with voluntary drug intoxication (VDI) being the most commonly used method in this age⁵.

Social and political measures imposed during the first months of the COVID-19 pandemic, with social distancing and daily routine disruption, led to increased isolation of many teenagers, aggravating symptoms of anxiety, depression and suicide ideation⁶⁻¹⁰, mainly in those already at risk or with previous psychiatric illness^{2,7,11,12}. Most studies to date show an increase in affluence to PED for suicide attempts and VDI since the beginning of the pandemic^{6,12}. Contrastingly, Fidanci et al. described a decrease in the number of admissions to PED when comparing the period between April and October 2019 and the similar period in 2020. According to these authors, this decrease was justified by the protective effect of parental supervision and retraction from negative social environments in school and peer groups¹³. However, the contrary can also be true, with school and

social interaction being protective factors in cases of instability, or even violence, within the family^{10,11,14}.

Therefore, our main objective in this study was to evaluate the impact of the COVID-19 pandemic in cases of VDI in adolescents admitted to PED in our hospital. As a secondary objective, we also aimed to characterize the socio-demographic profile of these adolescents.

Methods

A retrospective descriptive study was conducted in the 14 months preceding the beginning of the COVID-19 pandemic in Portugal and in the first 16 months of the pandemic, between 1 January, 2019 and 30 June, 2021. The study population was defined as all adolescents (ages 10-17 years old) admitted to PED of a level I hospital during that period. The only inclusion criterion was admission for voluntary drug intoxication.

We defined the pre-COVID period (PCP) as the period between 1 January, 2019 and 28 February, 2020 (14 months), and the COVID period (CP) between 1 March, 2020 and 30 June, 2021 (16 months).

We analyzed demographic variables, the drugs that were used (number and type), clinical symptoms, personal medical history and identifiable triggers.

Statistical treatment of data was done using SPSS® version 26, with simple descriptive analysis and Chi-square test or Fisher's exact test to assess the association between two categorical variables,

Mann-Whitney test or Student t-test to assess the association between categorical and numeric variables, and the Pearson correlation coefficient to assess the correlation between two numeric variables. The significance level in this study was $p < 0.05$.

This study was approved by the Ethics Committee of our hospital.

Results

Characterization of the population sample

In our study's period, 75,918 children and adolescents were admitted to the PED in a level I hospital (PCP: $n = 49,175$; CP: $n = 26,743$). Among these, there were 64 admissions for VDI, in a total of 50 adolescents, of whom 38 (76.0%) were females. Mean age was 15.6 ± 1.6 years. Nine adolescents were admitted for VDI more than once during the study's period: six females (15.8% of total female adolescents) and three males (25.0% of total male adolescents) ($p = 0.668$). An unstable family situation was described in 32 (64.0%) cases, with 30 (60.0%) having separated parents and 4 adolescents (5.6%) were institutionalized. Male gender was associated with increased age ($15,0 \pm 1,6$ in females vs. $16,8 \pm 0,8$ in males, $p < 0,001$) and family instability (51.2% in females vs. 89.5% in males, $p = 0.004$). Socio-demographic characterization of these adolescents is described in [table 1](#).

Almost all VDI (92.1%) happened at home. It was the adolescent's first VDI in 38 cases (59.4%), with the number of previous VDI varying between one and five (median [interquartile area] = 1 [1,2]). There was a record of previous psychiatric diagnosis in 78.9% of cases, predominantly depression (42.2%), with 67.2% having Child Psychiatry follow-up appointments at the time of VDI. Other concurrent self-harming behaviors (SHB) were present in 54.7% of cases, mainly self-mutilation (46.9%). There was a positive association between the existence of other SHB and number of previous VDI ($p = 0.001$).

A trigger was possible to identify in 42 VDI (75.0%, n° total = 56), most frequently a breakup/conflict with partner (35.7%) and conflict with a family member (33.3%) ([Table 2](#)). The presence of other SHB, previous psychiatric diagnosis and previous Child Psychiatry appointments were associated with fewer references to a trigger ($p = 0.023$, $p = 0.039$, $p = 0.030$, respectively). No association was found between the number of previous VDI and the presence of an identifiable trigger ($p = 0.147$).

There were 48 different drugs used, the most frequent being paracetamol (23.4%), alprazolam (21.9%)

Table 1. Socio-demographic characteristics of adolescents admitted to the Pediatric Emergency Department for voluntary drug intoxication

	Total (n = 50)
Age, years	
Mean $\pm$ SD	15.6 ± 1.63
Minimum-Maximum	10.9-17.9
Gender, n (%)	
Feminine	38 (76%)
Masculine	12 (24%)
Nationality, n (%)	
Portuguese	45 (90%)
Brazilian	3 (6%)
French	1 (2%)
Cape verdean	1 (2%)
Familial context, n (%)	
Unstable family	32 (64%)
Separated parents	30 (60%)
Institutionalized	4 (6%)

Table 2. Triggers associated with voluntary drug intoxications

Trigger, n (%)	Total (n = 42)
Breakup/conflict with partner	15 (35.7%)
Conflict with family	14 (33.3%)
Conflict with friend	3 (7.1%)
School failure	3 (7.1%)
Anxiety crisis	2 (4.8%)
Cry for attention	2 (4.8%)
Bullying	1 (2.4%)
Terminal organic disease	1 (2.4%)
Sexual abuse	1 (2.4%)

and sertraline (20.3%) ([Table 3](#)). More than 1 drug was used in 39.1% of VDI, with a maximum of 10 different drugs used simultaneously. The number of different drugs used did not correlate with the number of previous VDI ($p = 0.670$; $r = -0.056$). In 10 cases (15.6%) the drug used was part of the adolescents' regular medication.

Physical symptoms were reported in 43 cases (67.2%), the most prevalent were motor impairment/sleepiness (51.2%) and vomiting (18.6%) ([Table 4](#)). No adolescents were admitted to the Intensive Care Unit and no deaths were reported. There were 31 patients (48.4%) transferred to a level III hospital for an urgent

Table 3. Drugs used in voluntary drug intoxications

Drug, n (%)	Total (n = 64)	Drug, n (%)	Total (n = 64)
Paracetamol	15 (23.4%)	Bioflavonoids	1 (1.6%)
Alprazolam	14 (21.9%)	Diazepam	1 (1.6%)
Sertraline	13 (20.3%)	Etinilestradiol + gestodeno	1 (1.6%)
Ibuprofen	11 (17.2%)	Escitalopram	1 (1.6%)
Paroxetine	4 (6.3%)	Fexofenadine	1 (1.6%)
Naproxen	3 (4.7%)	Haloperidol	1 (1.6%)
Trazodone	3 (4.7%)	Levetiracetam	1 (1.6%)
Sodium valproate	3 (4.7%)	Ethyl loflazepate	1 (1.6%)
Zolpidem	3 (4.7%)	Losartan + hydrochlorothiazide	1 (1.6%)
Acetylsalicylic acid	2 (3.1%)	Metamizole	1 (1.6%)
Aripiprazol	2 (3.1%)	Metformin	1 (1.6%)
Clonazepam	2 (3.1%)	Methylphenidate	1 (1.6%)
Fluoxetine	2 (3.1%)	Montelukast	1 (1.6%)
Fluvoxamine	2 (3.1%)	Ondansetron	1 (1.6%)
Lorazepam	2 (3.1%)	Omega-3 supplement	1 (1.6%)
Risperidone	2 (3.1%)	Oxazepam	1 (1.6%)
Amitriptyline	1 (1.6%)	Paracetamol + thiocolchicoside	1 (1.6%)
Acetofenac	1 (1.6%)	Pantoprazole	1 (1.6%)
Amoxicillin + clavulanate	1 (1.6%)	Pravastatin	1 (1.6%)
Melatonin + valerian	1 (1.6%)	Prednisolone	1 (1.6%)
Aripiprazole	1 (1.6%)	Quetiapine	1 (1.6%)
Bupropion	1 (1.6%)	Fiber supplement	1 (1.6%)
Chlorphenamine + paracetamol	1 (1.6%)	Topiramate	1 (1.6%)
Cotrimoxazole	1 (1.6%)	Valerian	1 (1.6%)

Child Psychiatry consulting, while 60 (93.8%) were referred for a short-term Child Psychiatry appointment. Three adolescents (4.7%) were admitted as inpatients in a Child Psychiatry Unit.

Pre-COVID Period (PCP) vs. COVID Period (CP)

The characteristics of VDI during PCP and CP are described in [table 5](#). From a total of 64 VDI, 19 occurred in PCP (0.04% of admission to the PED), corresponding to 1.4 VDI per month; and 45 VDI in CP (0.17% of admission to the PED), corresponding to 2.8 VDI per month. There was no statistically significant difference in mean age ($p = 0.628$), median number of drugs used ($p = 0.065$)

or number of cases at first VDI ($p = 0.425$). There was a predominance of female gender in both groups, with a tendency to increase the gender gap in CP, although with no statistical significance (57.9% vs. 75.6%, $p = 0.158$).

We did not observe any statistical difference regarding the presence of an identifiable trigger ($p = 0.475$), family instability ($p = 0.550$), existence of previous psychiatric diagnosis or follow-up in Child Psychiatry appointments ($p = 0.737$, $p = 0.107$, respectively). However, in CP there was higher coexistence of other SHB (35.3% vs. 64.3%, $p = 0.017$). We further verified a decrease in transfers to a level III hospital for urgent Child Psychiatry consults (78.9% vs. 35.6%, $p = 0.002$), with an increase in referrals to Child Psychiatry appointments in our hospital (36.8% vs. 73.3%, $p = 0.006$).

Table 4. Symptoms associated with voluntary drug intoxication

Symptoms, n (%)	Total (n = 42)
Fatigue/motor impairment/sleepiness	22 (51.2%)
Vomit	8 (18.6%)
Nausea	5 (11.6%)
Slurred speech	4 (9.3%)
Abdominal pain	4 (9.3%)
Headache	3 (7%)
Ataxia	3 (7%)
Diarrhea	2 (4.7%)
Tremor	2 (4.7%)
Dehydration	1 (2.3%)
Miosis	1 (2.3%)
Seizure	1 (2.3%)

Discussion

During the 30 months of the study, we observed 64 cases of VDI, showing a two-fold increase in the number of VDI from 1.4 to 2.8 cases per month in pre-COVID and COVID periods, respectively. Simultaneously, there was a decrease in the number of total admissions to PED, translating to a four-fold increase in representativeness of VDI across causes of admission (0.04% vs. 0.17%). Hill et al. had already reported an increase in admissions to PED for suicide ideation or attempt since the beginning of COVID-19 pandemic⁶, with a more marked increase in female gender⁶⁻⁹. We also verified this tendency for a greater impact in female gender, although with no statistical significance (57.9% vs. 75.6%, $p = 0.158$).

Simultaneous to the increasing number of VDI, there was also a more frequent association with other SHB, reinforcing the negative impact of the pandemic period on adolescents' mental health.

Nistor et al. described familial dysfunction and separated parents as risk factors for suicide ideation and attempt in adolescence¹⁵. In our study, family instability was described in 62.9% of cases, however, contrary to what could be expected, this was not associated with VDI in CP, despite the increased time spent at home with family during that period.

The profile of adolescents admitted for VDI overlapped that previously described in Portuguese and European literature, with pronounced predominance

of female gender (85-87% vs. 76.0% in our study)^{5,15-18} and mean age of 15 years^{5,17}. Almost all VDI happened at home (96% vs. 92.1% in our study)⁵, using easily accessible over-the-counter drugs or the adolescents' own medication⁸, most frequently paracetamol, followed by benzodiazepines. We also observed a frequent use of other antidepressants, although other studies report anti-epileptic drugs and antibiotics as the most commonly used drugs¹⁵⁻¹⁷. In most cases (60.9%) only one drug was used in VDI, which was consistent with previous studies (45-52%)^{5,17}.

Underlying psychiatric illness confers a significant risk, with 78.9% presenting with previous psychiatric diagnosis. This percentage is higher than previous reports by other authors of 50-61% of adolescents with a previous diagnosis, more frequently suicide attempts, eating disorders and depression^{5,15}. This group of adolescents with a previous psychiatric diagnosis and follow-up or with other associated SHB reported less frequently the existence of a trigger, suggesting that VDI may happen less as a reactive behavior to adverse life events and more probably as a manifestation of suicidal ideation in the context of their underlying disease.

Consistent with this higher prevalence of previous psychiatric diagnosis, the number of adolescents with previous history of other VDI (40.6%) was also higher than the rate of re-attempted suicide of 34.8% reported by Romero et al., and even higher than previously described in other studies (6-14%)⁸, with no significant difference between PCP and CP ($p = 0.425$). In line with this increase in psychopathology in adolescents, there was an expansion of our hospital's Child Psychiatry Unit, which allowed an increase in the number of short-term appointments for adolescents referred from the PED. This may justify the reduction to half in transfers to a level III hospital for urgent Child Psychiatry consults ($p = 0.002$), while doubling the referrals to Child Psychiatry appointments in our hospital ($p = 0.006$) from PCP to PC.

According to Ahmedani et al., within adolescents who died by suicide, 38% were seen by a doctor in the month prior to their death (11% in an Emergency Department), and 77% in the preceding year (28% in an Emergency Department)¹⁹. Therefore, we emphasize that adolescents at risk of VDI, in addition to the well-established profile already described, are frequent users of health services, creating a window of opportunity for detection of warning signs and early intervention.

Table 5. Comparison between voluntary drug intoxication cases in pre-COVID and COVID periods

	Pre-COVID Period (n = 19)	COVID Period (n = 45)	
Age (years) Mean $\pm$ SD	15.7 $\pm$ 2.0	15.5 $\pm$ 1.5	p = 0.628
Gender, n (%)			
Female	11 (57.9%)	34 (75.6%)	p = 0.158
Male	8 (42.1%)	11 (24.4%)	
Number of VDI, n (%)			
First VDI	13 (68.4%)	26 (57.8%)	p = 0.425
> 1 VDI	6 (31.6%)	19 (42.2%)	
Number of drugs used, n Median [IQA]	1 [1;1]	1 [1;2]	p = 0.065
Medical history, n (%)			
Other SHB	6 (35.3%) (n = 17)	29 (64.3%) (n = 42)	p = 0.017
Previous diagnosis	13 (76.5%) (n = 17)	32 (80%) (n = 40)	p = 0.737
Previous Child Psychiatry consult	10 (52.6%)	33 (73.3%)	p = 0.107
Trigger	11 (61.1%) (n = 18)	31 (79.5%) (n = 44)	p = 0.475
Family instability	13 (68.4%)	26 (60.5%) (n = 43)	p = 0.550
Referral, n (%)			
Transferred to level III hospital	15 (78.9%)	16 (35.6%)	p = 0.002

Our study has some limitations. Firstly, generalization of these results is limited due to being a unicentric retrospective study with a small sized sample. Secondly, data was retrieved from clinical record written by different doctors, sometimes with incomplete information that may create a potential bias. Thirdly, the results were not adjusted to adolescents' socioeconomic status, which may be a confounder for psychiatric pathology. Lastly, we compared periods with different lengths (14 vs. 16 months), which results in a methodological error that was partially compensated by presenting number of cases per month rather than absolute numbers, when comparing different periods.

Awards and previous presentations

The present study was presented as an oral communication in the 21^o Congresso Nacional de Pediatria, in Braga, in 28 October, 2021. It received the Pierre Fabre/SPP Award for works presented in the aforementioned congress.

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Conflicts of interest

None.

Ethical disclosures

Protection of human and animal subjects. The authors declare that no experiments were performed on humans or animals for this study.

Confidentiality of data. The authors declare that they have followed the protocols of their work center on the publication of patient data.

Right to privacy and informed consent. The authors have obtained approval from the Ethics Committee for analysis and publication of routinely acquired clinical data and informed consent was not required for this retrospective observational study.

Use of artificial intelligence for generating text. The authors declare that they have not used any type of generative artificial intelligence for the writing of this manuscript, nor for the creation of images, graphics, tables, or their corresponding captions.

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