

## ORIGINAL ARTICLE

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## What is the role of intoxication cases in the intensive care workload during the pandemic period?

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### Abstract

The aim of our study is to examine intoxication cases treated in the intensive care unit during the covid-19 pandemic, to reveal the effect of these cases on the number of intensive care patients and their relationship with the pandemic period. The patient records of the pandemic period and the year before the pandemic were retrospectively reviewed. During the pandemic period, the ratio of intoxication cases to other intensive care patients treated in the same period decreased. Among the intoxication cases, the use of drugs for suicide was increased. The average age of intoxication cases and length of stay in the hospital increased. Although the covid-19 pandemic does not add an additional burden to the workload in intensive care, it has changed the demographics of intoxications.

**Keywords:** Covid-19; Intoxications, intensive care, workload

### Introduction

Intoxications develop as a result of the intake of substances that cause harmful effects when taken in the body. These harmful substances are called toxins. Spoiled foods, poisonous mushrooms, pesticides, carbon monoxide, alcohol, medicines or animal bites can be considered toxins. Intoxication can occur accidentally or intentionally. Whatever the cause, poisoning creates a medical emergency [1]. Intoxications, while creating the 0.02-0.93% of all emergency room visits in developed countries, intoxications, while creating the 0.02-0.93% of all emergency room visits in developed countries, this ratio was as 0.46-1.73% in Turkey. The reasons for intoxications, demographic characteristics of the patients and treatment protocols may vary according to the regions. In our country, intoxication cases are usually followed up in emergency services and intensive care units in coordination with the poison counseling center [2].

In December 2019, a virus epidemic started in Wuhan, China, and affected the whole world. The cause of the epidemic was identified as a new type of coronavirus, the world health organization named this new virus "Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2)" and the resulting disease "Coronavirus Disease 2019"[3]. Approximately 5% of the patients followed up for Covid 19 disease require intensive care treatment [4,5]. It has been observed that this rate increased to 18% in Italy and 26.1% in China during the epidemic period [4,6].

The first cases in our country started in March and it was reported that the number of cases started to decrease on April 18. New increases in the number of cases may be observed with the increasing cold in winter and people spending more time in indoor places. Currently, the ICU occupancy rate in our country has been reported as 55.8% [7]. The increasing number of intensive care patients due to Covid-19 also changes the workloads and patient demographics of these units.

Another effect of the Covid-19 pandemic is that it negatively affects social and economic life. Long-term closed educational institutions, workplaces and the uncertainties of the pandemic can also trigger psychological problems in societies. Depressive condition that develops due to Covid-19 has been put into literature

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as Covid Stress Syndrome [8,9]. In addition, people who stay at home for longer periods as a result of restricted work areas are less exposed to risks in work areas or there may be an increase in home accidents. The effect of this situation on community behaviors, the health system, or the demographics of intensive care patients is worth exploring. As far as we know, intoxications during the pandemic period, which is an exceptional situation with its causes and consequences, is an area that has not been studied in the literature [10].

The aim of our study are to reveal the characteristics of intoxication patients who applied to health institutions and followed up in intensive care units during the pandemic period, which negatively affected the social psychology, and to examine the effect of intoxication patients on the intensive care workload among the increasing number of patients due to Covid-19.

## Materials and Methods

For our study, after obtaining permission from the local ethics committee (2017-KAEK-2020-23092020) and from the head physician to use the hospital archives, the cases of intoxication followed in the intensive care units of our hospital between December 2018 and December 2020 were retrospectively analyzed. The hospital where the study was carried out is the only training and research hospital in a city with a total population of 424 thousand. Our hospital has 20 3<sup>rd</sup> stage and 10 2<sup>nd</sup> stage intensive care beds. There is a city hospital and 6 district hospitals in the same region.

Within the study year range (December 2018-December 2020), patients were grouped according to their applications as Pre-Pandemic (Before March 2020) and Pandemic Period (After March 2020) patients. In these periods, the reasons for intoxication and rates of intoxication cases among the applications were examined according to the groups. In addition, the age, gender, bodies, condition, length of hospital stay and discharge, referral or mortality status of the admissions due to intoxications were examined.

Intoxications were divided into medical drugs, pesticides, carbon monoxide, mushrooms and foods, corrosive substances and alcohol. Intoxications with more than one substance or more than one drug were included in the class that complied with priority intoxication according to the epicrisis reports. In addition, intoxications were classified as intentional or accidental according to their occurrence.

Inclusion criteria in the study; All applications due to intoxication, including pediatric patients, at the appropriate time were included in the study. Exclusion criteria; Patients whose reason for hospitalization or patient data could not be found in the hospital registry system and archives were removed.

## Statistical analysis

At the end of the study, all data were transferred to the computer and statistical calculations were made using the SPSS 18 (IBM, Chicago IL) program. The average, standard deviation, minimum and maximum values of the data were calculated. Frequencies were given in percentages and proportions. Categorical variables

were analyzed using the chi-square test, and the fisher exact test was used instead. The Kolmogorov Smirnov test was used to evaluate whether the data was normally distributed.

The difference between normally distributed parameters was analyzed with Student's t-test, while non-normally distributed parameters were analyzed with the Mann-Whitney U test. A  $p < 0.05$  was considered statistically significant for all analyzes.

## Results

A total of 853 patients were treated in intensive care units during the study period. 402 patients in the pre-pandemic period and 451 patients in the pandemic period were hospitalized in intensive care. There was no significant change in the number of intensive care patients by years. Of these patients, 8.2% of the hospitalizations in the pre-pandemic year and 5.3% of the hospitalizations in the pandemic year were hospitalized due to intoxication. During the pandemic period, the number of intoxication cases followed in the intensive care unit and its rate among the patients hospitalized that year decreased compared to the previous year.

When the two groups were evaluated together, the median age of intoxication cases was calculated as  $29 \pm 17.11$  (minimum 3-maximum 73). The age of intoxication patients hospitalized during the pandemic period increased compared to the previous year. However, this ratio was not statistically significant ( $p=0.07$ ).

While the ratio of females to males was 54.3% in 2019, it increased to 62.5% in 2020. Looking at the marital status, it was observed that while it was 37% in 2019, 62.5% of intoxication cases were married in 2020. While the cases of intoxication before and after the pandemic did not differ according to gender ( $p=0.181$ ), the rate of being married was significantly higher in intoxication cases during the pandemic period ( $p=0.042$ ). The characteristics of the intoxication cases are concluded in Table 1.

When the causes of intoxication were examined in patients, 56.5% of the patients had suicide intoxications before the pandemic and 70.8% during the pandemic period. However, there was no significant difference between the pandemic period and before in terms of suicide rates ( $p=0.243$ ). While no mortality was observed in pre-pandemic intoxication cases, 4 patients were transferred to another institution during the pandemic period and the situation was mortal in 2 patients. The length of stay in cases during the pandemic period also increased compared to the previous year. It was observed that cases in the pandemic period were more severe cases in terms of hospitalization and mortality.

In both groups, the most common toxins were drugs (56.5% and 83.3% in the pre-pandemic and pandemic group, respectively), followed by pesticides and carbon monoxide and corrosive substances for the Pre-Pandemic Period. In the pandemic period, the distribution of non-drug factors was equal. The intoxication factors according to the groups are presented in Table 2.

**Table 1.** Characteristics of intoxication cases

|                                   |           | Pre-Pandemic (n=46) | Pandemic Period (n=24) | Total           | P                   |
|-----------------------------------|-----------|---------------------|------------------------|-----------------|---------------------|
| Age (years) <sup>1</sup>          |           | 27.50±15.44 (4-63)  | 36.45±19.25            | 29±17.11 (3-73) | 0.07*               |
| Sex <sup>2</sup>                  | Male      | 21 (45.7%)          | 15 (62.5%)             | 46 (65.7%)      | 0.181               |
|                                   | Female    | 25 (54.3%)          | 9 (37.5%)              | 24 (34.3%)      |                     |
| Marital status <sup>2</sup>       | Married   | 17 (37%)            | 15 (62.5%)             | 32 (45.7%)      | 0.042               |
|                                   | Single    | 29 (76.3%)          | 9 (37.5%)              | 38 (54.3%)      |                     |
| Type of Dismission <sup>2</sup>   | Discharge | 46 (64.7%)          | 18 (25.7%)             | 64 (91.4%)      | 0.02 <sup>#</sup>   |
|                                   | Exitus    | 0 (0.0%)            | 2 (8.3%)               | 2 (2.9%)        |                     |
|                                   | Referral  | 0 (0.0%)            | 4 (16.7%)              | 4 (5.7%)        |                     |
| Mortality <sup>2</sup>            | Healing   | 46 (67.6%)          | 22 (32.4%)             | 68 (97.1%)      | 0.47 <sup>Y</sup>   |
|                                   | Exitus    | 0 (0.0%)            | 2 (8.3%)               | 2 (2.9%)        |                     |
| Lenth of Stay (days) <sup>3</sup> |           | 1.0 (1-1)           | 1.0 (1-2)              | 1.0 (1-1)       | <0.001 <sup>Y</sup> |

Pre-pandemic; Data for the year 2019, Pandemic Period; Data for the year 2020. ICU: intensive Care Unit

<sup>1</sup> presented by mean± standard (min-max). <sup>2</sup> presented number (%). <sup>3</sup> presented by Median (25-75 p.). \*Independent sample t-test. <sup>#</sup>Mann-Whitney U test. <sup>Y</sup>Fisher exact test. <sup>Y</sup>Fisher Freeman Halton Test**Table 2.** Distribution of intoxication cases

|                                 | Total      | Pre-Pandemic | Pandemic Period |
|---------------------------------|------------|--------------|-----------------|
| ICU Admissions (case/year)      | 853        | 402          | 451             |
| Intoxications(n)                | 70(8.2%)   | 46 (11.4%)   | 24 (5.3%)       |
| Suicide Rate (n,%)              | 43 (61.4%) | 26 (56.5%)   | 17 (70.8%)      |
| Medical Drugs (n,%)             | 46 (65.7%) | 26 (56.5%)   | 20 (83.3%)      |
| Agriculture Drugs (n,%)         | 5 (7.1%)   | 4 (8.7%)     | 1 (4.2%)        |
| Carbon monoxide (n,%)           | 8 (11.4%)  | 8 (17.4%)    | 0 (0%)          |
| Mushrooms and other foods (n,%) | 2 (2.9%)   | 1 (2.2%)     | 1 (4.2%)        |
| Corrosive substances (n,%)      | 6 (8.6%)   | 5 (10.9%)    | 1 (4.2%)        |
| Alcohol                         | 3 (4.3%)   | 2 (4.3%)     | 1 (4.2%)        |

Pre-pandemic; Data for the year 2019, Pandemic Period; Data for the year 2020. ICU: intensive Care Unit

## Discussion

The Covid-19 pandemic has brought heavy burdens to health systems all over the world. Occupancy rates have increased in intensive care. Even the operating rooms have been converted to intensive care in some hospitals, despite the new hospitals opened in our country in the last year, our intensive care occupancy rates are increasing. In this period, the importance of effective use of intensive care beds increased and physicians began to be more selective in hospitalization indications. The effect of intoxication cases, which occupy approximately 5% of the intensive care beds, on the intensive care workload is an issue worth questioning [11].

Intoxications are the most common reason for emergency room admissions with non-traumatic coma in patients under 35 years [2]. Again, it constitutes 0.46-1.57% of total emergency service admissions. In general, the most common intoxication agents are overdose drugs, excessive reactions to drugs, chemical or agricultural toxic substances [12]. In pediatric patients, drugs and household chemicals are common toxins [13,14]. In the USA, 2.3 million patients annually and 150 thousand patients in our country apply to the emergency department due to intoxication [15].

Social and economic effects of the pandemic as well as factors such as unemployment, depression, and future anxiety have a negative impact on community life, which can be expected to

increase suicidal poisoning. In our study group, it was observed that intoxications for suicidal purposes during the pandemic period increased by approximately 15% compared to the previous period. In total intoxication, the cause of suicide increased from 56.5% to 70.8%, the mean length of stay increased statistically significantly, and mortality and the need for referral to advanced centers increased during the pandemic period compared to the pre-pandemic period. This situation may be interpreted as an increase in intoxication during the pandemic period with more severe factors and with the aim of committed suicide.

In a study, 92% of intoxication cases were stated as the use of drugs for suicidal purposes [16,17]. These rates varied between 63-92% in studies conducted in different provinces [18]. In intoxications observed during the pandemic period, the average age increased to 36.45±19.25, and the rate of getting married increased from 37% to 62.5%. During the pandemic period, many employees were dismissed. We believe that problems that can be experienced frequently in middle age, such as unemployment or family problems, may have been effective in suicide cases during the pandemic period. During the pandemic period, unemployment, sudden change in living conditions, future uncertainty and depression were observed to affect a large number of people in the society. This condition is called Covid Stress Syndrome. Although the end of the pandemic is approaching with vaccination studies in the current situation, economic, social and psychological side

effects of this situation will continue to be observed [8]. Although the end of the pandemic is approaching with vaccination studies in the current situation, economic, social and psychological side effects of this situation will continue to be observed [19].

On the other hand, intoxications due to agricultural chemicals decreased during the pandemic period. We do not have enough data on whether the agricultural activities decreased during this period. A decrease or difficulties have been observed in side sectors such as transportation and distribution of agricultural products [20,21]. In this study, the active ingredients of medicinal drugs were not examined in drugs intoxications. However, studies show that medicine available without a prescription, the drugs used by the patients themselves or their relatives, are known more frequently in intoxication, or accidental ingestion or overdose causes [2].

In a study previously conducted in the same region and examining 5-year data in an emergency call center, 636 (35.1%) carbon monoxide, 430 (23.7%) alcohol, 345 (19%) food, 212 (11%) patients were 7) exposure to toxic effects from drugs, 137 (7.5%) corrosive substances, and 50 (2.7%) other agents were reported [2]. The high rate of carbon monoxide poisoning is generally associated with the use of stoves, which is more common in the rural area. It should be noted that these rates may vary in developed industrial cities. Poisoning varies depending on the geographical region and socio-cultural and economic situation and represents a medical and social problem with increasing intensive care rates. Acute poisoning may have different clinical pictures depending on the material used, the method of intake, exposure time and many factors related to the patient (such as age, gender, comorbidities). Youth population, unemployment, education level, even weather can affect the number and distribution of cases [22]. In this respect, there may be deficiencies in presenting the data here for the city where the study was conducted and adapting it to the country. In general, intoxications, which constitute 0.46-1.57% of emergency service admissions, were 3% in the province where the study was conducted, and 1.5% in emergency room admissions according to a study in Eskisehir City [23]. The two-fold difference in percentage here is thought to be affected by local factors, but the comparison of the results with the previous year's data from the same city adds meaning to the data.

The follow-up of intoxication cases in the intensive care unit before their general condition deteriorates is still open to discussion for clinicians. Individual evaluation of the cases, monitoring early or late complications according to the toxic agent, and early intervention can be life-saving. However, effective use of intensive care beds in the pandemic period, not admitting patients who do not need intensive care according to their clinical status, and limiting the contact of Covid patients and non-Covid patients who are treated in intensive care may require carefully planned national strategies. According to our study, the number and rate of intoxication cases admitted to intensive care during the pandemic period decreased. However, among these intoxication cases, the rate and mortality and the ratio of suicide purposes increased significantly.

## Limitations

The single-center nature of our study can be considered a limitation. Although the data obtained here compares the

pandemic and pre-period, it may be influenced by local factors. Another limitation of our study was the increase or decrease in the number of intoxications in terms of admission to intensive care. The number of simple intoxications admitted to the emergency service or hesitating to apply to the hospital due to pandemic was not included in this study. The change in total intoxication cases during this pandemic period may be the subject of a new study. It may be necessary to pay attention to the effect of increasing suicide intoxications on the society.

## Conclusion

During the pandemic period, the type and number of intoxication cases hospitalized in intensive care have changed. In terms of effective use of intensive care beds, it should be questioned whether these patients actually need intensive care.

## Conflict of interests

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

## Financial Disclosure

*All authors declare no financial support.*

## Ethical approval

*Ethical Committee: Approval for this study was obtained from the local Ethics Committee of Yozgat Bozok University with the decision numbered "2017-KAEK-2020-23092020".*

## References

1. Yesiler FI, Sendur UG, Inan Demiroglu G. Analysis of acute intoxication cases in intensive care unit. *Aegean J Med Sci*. 2019 2:1:14-8.
2. Talih G, Yuksek A, Yardimci C, et al. Analysis of the patients applied to the 112 call center because of intoxication: Retrospective evaluation of the last 5 years. *J Multidisciplinary Clin Toxicology*. 2019;1:19-22.
3. Zhu N, Zhang D, Wang W, et al. A novel coronavirus from patients with pneumonia in China, 2019. *N Engl J Med*. 2020 20;382:727-33.
4. Turkmen E. Organization of the Intensive Care Units during COVID-19 Outbreak. *Yoğun Bakım Hemşireliği Derg*. 2020;24:39-45.
5. Wu Z, McGoogan JM. Characteristics of and important lessons from the coronavirus disease 2019 (COVID-19) outbreak in China. *JAMA* 2020 7;323:1239-42.
6. Wu Z, McGoogan JM. Characteristics of and important lessons from the coronavirus disease 2019 (COVID-19) outbreak in China: Summary of a report of 72314 cases from the Chinese Center for Disease Control and Prevention. *JAMA - J Am Med Assoc*. 2020 7;323:1239-42.
7. Health M of. Adult ICU Occupancy Rates n.d. <https://covid19.saglik.gov.tr/> (accessed December 16, 2020).
8. Taylor S, Landry CA, Paluszek MM, et al. COVID stress syndrome: Concept, structure, and correlates. *Depress Anxiety*. 2020. 37:706-14.
9. Wang C, Pan R, Wan X, et al. Immediate psychological responses and associated factors during the initial stage of the 2019 coronavirus disease (COVID-19) epidemic among the general population in China. *Int J Environ Res Public Health*. 2020 6;17:1729.
10. CoViD-19, containment and accidents in children's domestic life. *Bull Acad Natl Med*. 2020 204:e30.
11. Guan W, Ni Z, Hu Y, et al. Clinical characteristics of coronavirus disease 2019 in China. *N Engl J Med*. 2020 30;382:1708-20.
12. Aydin G, Gencay I, Colak S, et al. Carbon monoxide intoxication treatment in intensive care; Retrospective analysis of the cases. *Osmangazi J Med* 2020;42;39-47.
13. Dutta AK, Seth A, Goyal PK, et al. Poisoning in children: Indian scenario. *Indian J Pediatr*. 1998 65:365-70.
14. Sahin S, Carman KB, Dinleyici EC. Acute poisoning in children; data of a pediatric emergency unit. *Iran J Pediatr*. 2011 21:479-84.

15. Deniz T, Kandis H, Saygun M, et al. Evaluation of intoxication cases applied to emergency department of Kirikkale University Hospital. *Düzce Med J* 2009 11:31-4.
16. Guloglu C, Kara IH. Acute poisoning cases admitted to a university hospital emergency department in Diyarbakir, Turkey. *Hum Exp Toxicol*. 2005 24:49-54.
17. Yuzkat N, Duran M, Uludag O. The analysis of adult intoxication cases seen in Adıyaman Region and treated in intensive care unit. *Med Sci Discov*. 2015;3:1–5.
18. Tufekci IB, Curgunlu A, Sirin F. Characteristics of acute adult poisoning cases admitted to a university hospital in Istanbul. *Hum Exp Toxicol*. 2004 23:347-51.
19. Susilawati S, Falefi R, Purwoko A. Impact of COVID-19's pandemic on the economy of Indonesia. *Budapest Int Res Critics Inst Humanit Soc Sci* 2020;3;1147-56.
20. Siche R. What is the impact of COVID-19 disease on agriculture? *Sci Agropecu* 2020;11;3-6
21. Gray RS. Agriculture, transportation, and the COVID-19 crisis. *Can J Agric Econ* 2020;68;239-243.
22. de Miguel-Bouzas JC, Castro-Tubío E, Bermejo-Barrera AM, et al. Epidemiological study of acute poisoning cases treated at a Galician hospital between 2005 and 2008. *Adicciones*. 2012 24:239-46.
23. Tozun M, Unsal A, Arberk K. Investigation of the calls to 112 emergency and rescue station of Eskisehir Province in 2008. *Duzce Med J*. 2012;14:54–7.