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**Respected Colleagues and Readers,**

Welcome to the third issue of the Intercontinental Journal of Emergency Medicine!

This edition encompasses three original research articles: one delving into the clinical, laboratory, and demographic characteristics of the 0-18 age group children with Type 1 Diabetes; an analysis of patients who visited the Covid Emergency Clinic in the Cappadocia region within a year; and an examination of two-wheeled vehicle accidents during the pandemic period.

Additionally, we have two case reports: an exploration of the psychogenic causes of Prurigo Nodularis and a consideration of the diagnostic and therapeutic challenges of meningoencephalitis caused by Streptococcus pneumoniae.

We trust that these papers will provide valuable insights into the ever-evolving world of emergency medicine. Your feedback and contributions continue to be invaluable to our mission.

**Sincerely,**

**Umut OCAK, MD**

**Chief Editor**
**Intercontinental Journal of Emergency Medicine**

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## ORIGINAL ARTICLES



## CASE REPORTS

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Original Article

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# Evaluation of children with type 1 diabetes in Kırıkkale

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## ABSTRACT

**Aims**: The aim of this study is to evaluate the clinical laboratory and demographic characteristics of children aged 0-18 with Type 1 Diabetes who applied to Kırıkkale University Hospital,

**Methods:** Patients who applied to Kırıkkale University Medical Faculty Hospital between January 2011 and January 2021 and were diagnosed with Type 1 diabetes mellitus were included in the study. From file information; age at admission, age at diagnosis and laboratory values at admission were recorded.

**Results:** Of the children, 48 (48.5%) were boys and 51 (51.5%) were girls. The mean age of all patients was 14.4±2.1 years. It was observed that its frequency increased during the adolescence period. It appeared that patients frequently increased in the autumn and winter months. Vitamin D was low in 74.4% of the patients. Statistical significance was found between HbA1c of those who applied to the hospital with a diagnosis of diabetic ketoacidosis.

**Conclusion:** It is instructive to investigate the regional characteristics of the disease in terms of genetic and environmental factors that have an important place in the etiology. The findings of our study were consistent with similar studies and literature.

**Keywords**: Kırıkkale, type 1 diabetes, child, hemoglobin A1c

## INTRODUCTION

Type 1 diabetes mellitus (DM) is the most common chronic disease of childhood and adolescence that results in hyperglycemia due to insulin deficiency that develops due to destruction of pancreatic beta cells due to autoimmunity, viral chemical and toxic reasons. The illness develops in people with genetic predisposition, under the influence of environmental and autoimmune factors. Patients need insulin replacement due to the permanent absence of insulin.[1,2] Compared to previous years, the incidence of new type 1 DM cases detected worldwide in recent years seems to have increased gradually.[3] The basis of diabetes treatment is to provide glucose values close to normal and to increase the quality of life by minimizing the microvascular complications that occur in the future. Chronic complications caused by diabetes lead to more frequent hospital admissions and long-term hospitalizations. As a result, it causes both labor loss and economic losses.[4] Despite the increase in the incidence of type 1 DM worldwide and the changes in admission findings at the time of diagnosis, the data on the incidence of type 1 DM and clinical presentation findings in our country are not sufficient. In this study, it was aimed to evaluate the demographic, clinical and laboratory characteristics of patients aged 0-18 who diagnosed with Type 1 DM, who applied to Kırıkkale University Medical Faculty in the last 10 years, and compare them with the literature findings.

## METHODS

The study was approved by the Kırıkkale University Faculty of Medicine Ethics Committee on 08.07.2021 (Decision No: 2021.07.09). All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki.

The study group was formed retrospectively examining the files of patients who were diagnosed with diabetes at the time of their first admission to the Pediatric Endocrinology and Diabetes Polyclinic, Pediatric Health and Diseases Polyclinics, and Pediatric Emergency Departments in University Hospital between 01.01.2011 and 01.01.2021. Demographic data such as gender, age, season at the time of diagnosis, diabetic ketoacidosis status, and clinical and laboratory information of the patients were recorded in the patient files. Patients with insufficient file data or whose files could not be accessed were excluded from the study.5 As laboratory data, blood glucose, blood gas (pH, HCO3), C-peptide, HbA1c, diabetes autoantibodies at the time of diagnosis were recorded. In the evaluation of metabolic control according to the target recommendations of the

International Society for Pediatric and Adolescent Diabetes (ISPAD) in 2007, if the mean HbA1c is <7.5% good metabolic control, between 7.5-9% moderate metabolic control, and ≥9 % evaluated as poor metabolic control. The subjects were classified into two groups according to the presence of diabetic ketoacidosis aat the time of diagnosis: DKA group and non-DKA groups.

### Statistical Analysis

Statistical analysis was performed using the SPPS 21.0 (SPSS Inc., Chicago, IL, USA) program. The homogeneous distribution of the data was evaluated using the Kolmogorov–Smirnov test. Group homogeneity was also examined when comparing the data of two independent groups; student T test was used to compare homogeneously distributed data, and Mann-Whitney U test was used to compare data that did not show homogeneous distribution. All data are presented as median and mean ± SD. Chi-square test was used to compare group ratios. The p value of <0.05 obtained in the comparison of the groups was considered statistically significant.

## RESULTS

Of the 99 patients included in the study, 48 (48.5%) were male. The mean age of the patients was 11.56±4.68 years, and the median age was 13 years. The mean age of girls was 11.58±4.68 years, and the mean age of boys was 11.54±4.73 years. Considering the age groups of the patients, we observed peaks between 4-6 years and 10-17 years.

When examining the number of applications by season, we observed that 23 (23.2%) patients applied in spring, 20 (20.2%) in summer, 27 (27.3%) in autumn, and 29 (29.3%) in winter. When the application biochemistry laboratory data of the cases were evaluated, the average biochemical values of all patients are given in **Table 1**.

**Table 1. Comparison of the laboratory mean values of the cases**

| Parameters | n | Median (min-max) |
|---|---|---|
| Blood Glucose (mg/dl) | 99 | 295 (81-830) |
| C-Peptide (ng/ml) | 37 | 0.32 (0-2.67) |
| HbA1C (%) | 99 | 10.3 (6.5-19.4) |
| HDL (mg/dl) | 99 | 54 (30-103) |
| LDL (mg/dl) | 99 | 83 (50-173) |
| Cholesterol (mg/dl) | 99 | 153 (80-423) |
| TG (mg/dl) | 99 | 100 (43-618) |
| Vitamin B12 (pq/mL) | 58 | 373 (36-1667) |
| Folic Acid (ng/mL) | 49 | 11.4 (2.69-20.0) |
| Vitamin D (ng/mL) | 39 | 10.2 ( 3-102) |
| Insulin auto antibody (U/ml) | 38 | 2.76 (0.01-12.9) |

Vitamin D (25OH Vitamin-D) levels were examined in the diagnosis of 39 patients. In the results of these patients, it was observed that the vitamin D level was at least 3ng/ml, maximum 36 ng/ml, and the mean was 13.96±8.45. When patients with vitamin D deficiency (<20 ng/ml) were examined, it was seen that the rate among all patients was 74.4%.

In our study, from the perspective of DKA at the time of application, we observed that 17 (17.2%) patients presented with DKA. When the patients presenting with DKA were analyzed according to gender, it was seen that there was no statistical difference. (p=0.508) The mean age of the patients presenting with DKA was 11.23±4.58 years, while those without DKA were 11.63±4.75 years old (p=0.745). When the patients presenting with DKA were examined in terms of HbA1c at admission, a significant difference was observed. (p<0.005). When the laboratories of the patients were evaluated, there were only differences in blood glucose, blood gas and blood HCO3 between the patients who presented with DKA and those who did not present with DKA (**Table 2**). When the patients presenting with DKA were analyzed according to the season, no statistical difference was found. (p=0.168).

**Table 2. Comparison of patients with DKA and Non-DKA**

| Parameters | DKA | Non-DKA | p |
|---|---|---|---|
| Num. of Applications (%) | 17 | 82 | |
| Gender (boy/girl) | 7/10 | 41/41 | 0.508 |
| Age (Mean ± STD) | 11.23 ± 4.58 | 11.63 ± 4.75 | 0.745 |
| HbA1c (%) | 11.69 ± 2.50 | 10.28 ± 2.55 | 0.041 |
| Blood Glucose (mg/dl) | 460.58 ± 157.72 | 302.90 ± 167.47 | 0.001 |
| pH | 7.23 ± 0.15 | 7.39 ± 0.14 | 0.000 |
| HCO3 | 13.05 ± 9.12 | 21.54 ± 6.47 | 0.000 |

## DISCUSSION

Type 1 DM is the most common chronic endocrine and metabolic disease in the pediatric population. It causes disturbances in carbohydrate, fat and protein metabolism caused by various etiological factors and deficiency of insulin hormone released from pancreatic beta cells. It has a multifactorial etiology including genetic, autoimmune and environmental factors. There are differences in the disease's appearance such as age, race, gender, season, geographical region. Type 1 DM is seen equally in boys and girls in the world.[5] These rates have not changed in recent domestic and international studies.6-10 There was no change in these rates in our study.

In a study conducted by Yeşilkaya et al.10 by obtaining the data of 17175 cases diagnosed between January 2011 and December 2013 from the Social Security Institution of the Republic of Turkey (SGK), the age at diagnosis was found to be 10.6±4.[6] years. In our study, the mean age at which the patients were diagnosed was 11.5±4.7 years. It is thought that the incidence of type 1 DM peaks at the age of 5-7 when exposure to infections increases with starting school, and peaks at the age of 10-14 years when it is triggered by the effects of gonadal steroids, growth hormone and emotional stress.[11] In a study by Acar et al.[12], the peak age of the cases was 4-6 (18.1%) and 8-10 (17%). In a study by Cotellessa et al.13, the most common age at diagnosis was 10-14 years (44.2%), followed by 5-9 years (32.9%). In our study, the number of patients between the ages of 12-16 was found to be 46 (46.4%) and the age at which the disease was most common.

Seasonal differences in type 1 DM are often seen in autumn and winter, when exposure to infection increases.[14] Cotellessa et al.[13] In a study conducted by Italy, it was found that 34.25% peaked in the winter months. In a study conducted by Aydoğan et al.[15] in Çanakkale, it was shown that 32.6% were diagnosed in autumn and 30.43% in winter. In our study, 23.2% of the cases were seen in spring, 20.2% in summer, 29.3% in autumn and 27.3% in winter. Studies have

reported that type 1 diabetes patients are diagnosed more often in autumn and winter, and this may be associated with increased viral infections.[16] We also attributed the increase in autumn and winter months to the more dominant sedentary life in those months.

Glycated hemoglobin (HbA1c), which is the gold standard in the diagnosis of DM and monitoring the adequacy of metabolic control and insulin therapy; It occurs by the glycosylation of glucose by non-enzymatic pathways. For this reason, since it is related to blood glucose level and erythrocyte lifespan, its changes in the blood are slow and reflect the blood glucose level of a 2-3 month period.[17] In two previous studies conducted abroad, mean HbA1c at the time of diagnosis was found to be 11.6±2.6% and 10.6±4.4% in patients with type 1 DM.[18,19] In a study conducted by Demir et al.[20] in our country, HbA1c was found to be 10.5±2.6%. In a study conducted by Taşkın et al.21, HbA1c was found to be 10.8±2.91. In our study, the HbA1c of type 1 DM patients at the time of diagnosis was found to be 10.52±2.59% and it was seen as poor metabolic control in accordance with the literature.

C-peptide is a type of beta cell-secreted marker used in the differentiation of endogenous and exogenous insulin in hypoglycemia, which also shows the production capacity of the pancreas. When patients with type 1 DM were examined in terms of C-peptide levels, in a study conducted by Mayer Davis et al.[21] on 1316 patients with type 1 DM, C-peptide level was found to be 0.69±0.6 (ng/ml). In a study conducted by Xin et al.[22] in China, the mean of C-peptide was found to be 0.49±0.40 ng/ml. In a study by Bideci et al.[23] with 101 cases in our country, C-peptide level was found to be 0.76±0.6 (ng/ml). In our study, the C-peptide level was found to be 0.58±0.62 (ng/ml), similar to the literature. Studies have shown that high HbA1c levels and low C-peptide levels are risk factors for DKA.[24]

In a study by Xin et al.[22]; mean blood sugar at diagnosis was 376.2±154.8 mg/dL, mean HbA1c was 12.7%±2.5, mean C-peptide was 0.49±0.40 ng/ml, the mean insulin was 3.17±2.33 mU/L. In a study conducted by Demir et al.[20] in Istanbul, the mean blood glucose level at the time of diagnosis was reported as 444.7±157.1 mg/dL, and the mean HbA1c was 10.5±2.6%. We have obtained similar results to other studies.

When patients with type 1 DM were examined in terms of dyslipidemia (DLP), the frequency of dyslipidemia was found to be 7.4% in a study by Akyürek et al.[25] In a study by Zambrana-Calvi et al.[26], 1.1% of the cases had HDL <40 mg/dl, 34.4% had LDL >100 mg/dl, 2.2% had TG>150 mg/dl. It was found above.[26] In our study, the frequency of DLP was found to be 5.05%. In our study, the mean TG level was 119.6±88.28 mg/dl, HDL cholesterol level was 56.69±15.41 mg/dl, and LDL cholesterol level was 89.53±25.13 mg/dl.

When patients with type 1 DM were evaluated in terms of vitamin D, in a study conducted by Pozzilli et al.[27] in which they were compared with a new type 1 DM diagnosis control group, average 1.25-OH D levels were found to be lower in patients with diabetes. In a study conducted by Svoren et al.[28] in patients with type 1 DM, vitamin D levels were deficient in 15% (deficiency level was <20 ng/ml), 61% were insufficient (20-30 ng as deficiency level). /ml) was found to be sufficient in 24% of patients. When the vitamin D levels of the patients in our study were examined, the vitamin levels of 39 patients who participated in our study were examined. The rate of patients with vitamin D deficiency (<20 ng/dl) among the patients whose levels were checked was 74.4% and the rate of patients with normal vitamin D levels (>20 ng/dl) was 25.6%.

In type 1 DM, one or more of the insulin autoantibody (IAA), islet cell antibody (ICA), glutamic acid decarboxylase antibody (anti-GAD) and tyrosine phosphatase antibody (IA-2) are mostly positive at the time of diagnosis.17 Louraki et al.[29] found that anti-GAD positivity was 62.4%, IA-2 positivity was 58.8%, and both antibodies were positive together in 42.4%. In the study of Kawasaki 30, anti-GAD positivity was found in 83%, IA-2 positivity in 78%, IAA positivity in 49%, and no autoantibodies were detected in 10% of cases. In a study by Demir et al.[20], anti-GAD was positive in 70.6%, ICA positive in 44.4%, and IAA positive in 42.6%. In a study by Kocabaş et al.[31] they found anti-GAD (69.4%), ICA (28.5%), and IAA (25.5%). In our study, auto-antibodies were not examined in all patients, and this could not be done because of the lack of laboratory facilities in our hospital, the absence of a pediatric endocrinology department, and in cases identified and referred from the emergency services and polyclinics, either not being requested under emergency conditions or repetitive requests being avoided. Insulin autoantibody examined in our hospital was found to be positive in 20 (52.6%) of 38 patients included in the study. This rate is higher than other studies and may not reflect the true rate, as not all diagnosed diabetes patients were examined.

Considering the frequency of diagnosis of patients with type 1 DM, the most common form of admission to the hospital is diabetic ketoacidosis, this rate varies between 15-70% in studies.[32] In a multicenter study by Klingensmith et al.[33] conducted in the USA in 2013 with 805 cases, the frequency of DKA at the time of diagnosis was found to be 34%. In a study by Demir et al.[34] it was found to be 41%. In our study, it was observed that 17.2% (n:17) of the cases presented with DKA. The relatively low rate in our results is due to the fact that there was no pediatric endocrine department in our center for 4 years, and in this case, patients with DKA were referred to another center via the 112 emergency service from the center they first applied.

Considering the mean age of patients presenting with DKA, in a study by Burcul et al.[35], the mean age at presentation with DKA was 9.9±4.8 years. In a study by Bui et al.[36] the mean age at presentation with DKA was 7.8±4.9 years. In our study, the age of admission was found to be 11.23±4.58, and we think that this increase was due to the fact that mild and moderate DKA suspected cases were preferred to other centers after 2016, since there was no pediatric endocrinology clinic in our hospital.

No significant differences were found in previous studies conducted in terms of gender in patients with Type 1 DM presenting with DKA.[37-39] In our study, 41.9% of the patients presenting with DKA were male and 58.1% female, and it was not found to be statistically significant (p:0.508).

Considering the relationship between DKA and blood glucose, in a study conducted by Vicinanza et al.[40], blood glucose levels were found to be statistically significant between patients presenting with DKA and patients not presenting with DKA. (p=0.001). In a study by Sağlam et al.[41] the mean blood glucose level of DKA patients was found to be 473.09±141.04 mg/dl. In our study, blood glucose was found to be 460.58±157.71 mg/dl in accordance with the literature, and the blood glucose levels of the patients presenting with DKA were found to be statistically significant (p=0.001).

Considering the relationship between DKA and HbA1c,

in a study conducted by Hanas et al.[40] on patients presenting with recurrent attacks, the mean HbA1c was found to be statistically significant compared to those who applied once (p=0.004). In the study conducted by Vicinanza et al.[39] there was a statistically significant difference between the mean HbA1c values of the patients presenting with DKA and those presenting without DKA (p<0.001).

## CONCLUSION

Investigating the regional characteristics of the disease is guiding in terms of genetic and environmental factors that have an important place in the etiology. The findings of our study were found to be consistent with similar studies and literature.

## ETHICAL DECLARATIONS

**Ethics Committee Approval:** The study was initiated with the approval of the Kırıkkale University Medical Faculty Clinical Researches Ethics Committee (Date: 08.07.2021, Decision No: 2021.07.09).

**Informed Consent:** Because the study was designed retrospectively, no written informed consent form was obtained from patients.

**Referee Evaluation Process:** Externally peer-reviewed.

**Conflict of Interest Statement:** The authors have no conflicts of interest to declare.

**Financial Disclosure:** The authors declared that this study has received no financial support.

**Author Contributions:** All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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# Analysis of the patients who applied to the covid emergency polyclinic in the Cappadocia region

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## ABSTRACT

**Aims:** To perform a retrospective analysis of patients who applied to the covid emergency department of a pandemic hospital within one year.

**Methods:** Patients who applied to the hospital-wide and covid emergency unit between 01.01.2021 and 31.12.2021 in a pandemic hospital were evaluated retrospectively through hospital electronic data. The time of admission, age range, tomography scan rate, and hospitalization rates were evaluated. In the statistical analysis, descriptive analyzes were performed using the Statistical Package for Social Sciences for Windows 21.0 (SPSS 21.0) program.

**Results:** 9% of hospital admissions were made from the covid emergency area. 96.3% of the cases were citizens of the Republic of Türkiye. The female patient admission rate was 52.4%, which was higher than that of males. The highest number of applicants was between the ages of 18-65 (79.5%). While the highest number of applications in terms of months was in September (17.1%), the highest number of applications was between 08.00-16.00 (58.5%) in terms of hours. The tomography rate was 9.1%. 2% of hospitalizations were made to the ward and 0.4% to the intensive care unit.

**Conclusion:** During the epidemic period, the way of patient management and patient's application rates may vary in hospitals and emergency services. During the epidemic, the number of patients fluctuates in the process and there may be differences in age groups. In all kinds of epidemics, it is thought that the data obtained in the past epidemics can guide the reorganization of hospital emergency services.

**Keywords:** COVID -19, emergency service, pandemic

## INTRODUCTION

The coronavirus disease (Covid-19) emerged in December 2019 in Wuhan, China, as a new disease caused by the SARS-CoV-2 virus.[1] The disease spread rapidly around the world and was classified as a pandemic by the World Health Organization (WHO) on March 11, 2020.[2] In Turkey, the first case was announced on March 10, 2020 by the Republic of Turkey, Ministry of Health. After this process, many hospitals across the country were designated as pandemic hospitals.[3] After the first case was detected in Turkey and Covid-19 was declared a pandemic in the worldwide, measures were taken to prevent the spread of the virus. Among these measures, regulations regarding patient admission to the pandemic hospitals were also included.[4] Pandemic polyclinics were established in a separate area from the emergency services, and cases with suspected Covid-19 were directed to the these pandemic outpatient clinics.[5]

In this study, we aimed to make a statistical analysis of the patients who applied to the "covid emergency" department of a secondary level pandemic hospital within one year.

## METHODS

After obtaining the decision of Hacı Bektaş Veli University Ethics Committee (dated 28.12.2021 and numbered 462); the study was conducted retrospectively in a secondary care hospital between 01.01.2021-31.12.2021 by analyzing the number of hospital-wide admissions and screening the patients admitted to the covid emergency department area through hospital electronic data. All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki.

Patients in all age groups who applied to the Covid emergency department for examination and coronavirus test were included in the study. The numbers of patients who are Turkish citizens and foreign nationals were analyzed. The date and time of admission, age range, gender, and rate of thoracic tomography scan were evaluated in the patients. In patient clinic and intensive care hospitalization rates of hospitalized patients were evaluated. The number of patients referred to an external health center was evaluated. Cases that

resulted in death in the emergency department were excluded from the study.

Statistical Package for Social Sciences for Windows 21.0 (SPSS 21.0) program was used to analyze the data. Descriptive statistics (frequency, percentage distribution) were used as statistical analysis. Results are given as mean ± SD, or frequency (percent).

## RESULTS

In the hospital where this study was conducted, annual examination applications were 1375325, while 9% of the applications (124874 applications) were made from the 'covid emergency' application area. While 120277 (96.3%) of the patients who applied from the Covid emergency area were citizens of the Republic of Turkey, 4507 (3.6%) of the patients were foreign nationals. 52.4% of the patients were female. When the classification of the applications according to the age range is examined, the number of patients aged 18 and under was 14509 (11.6%), the number of patients between the ages of 18-65 was 99271 (79.5%), and the number of patients over the age of 65 was 11004 (8.8%) found. Considering the application season of the patients during the year, it was seen that the highest number of applications was in September with 21355 (17.1%) patients, and the least application was in February with 3543 (2.8%) patients. The distribution of hospital-wide applications and covid emergency applications during the year is given in detail in graph1. According to the graph, it is seen that there was a sudden increase in covid emergency applications in April and then there was a sudden decrease. The application hours of the patients to the covid emergency area were examined in 3 different time periods and the results were highest number of applications between was 08.00-16.00 (58.5%) and the least application was between 24.00-08.00 (1.3%). In the other time interval is between 16.00-24.00, the application rate was 40%. Also, it was seen that 71.5% of the applications were on weekdays. Thoracic tomography imaging was performed in 11384 of the admitted patients. According to this data, it is seen that 9.1% of the patients evaluated in the covid emergency area had a tomography scan. When the patients were evaluated according to the final outcome in the emergency department, 2061 (2%) patients were hospitalized in the service and 586 (0.4%) patients in the intensive care unit for treatment. 37 patients (0.02%) were referred to another health institution due to hospital intensive care occupancy. When evaluated according to months, the highest number of patients admitted to the ward was in April with 348 (13.3%) and the highest number of admissions to the intensive care unit was in September (16.8%) with 99 patients. The distribution of patients admitted to the Covid emergency area by months is given in **Table 1** in detail.

## DISCUSSION

The Covid-19 pandemic is a major health emergency that affects the behavior of the entire population, both personally and socially.[6] In our study, it is seen that 96.3% of the applications from the covid emergency area are citizens of the republic of Turkey, while it is seen that there are foreign patients with a rate of 3.6%. In the study conducted by Şahin et al.[7], it was observed that 0.6% of the patients receiving inpatient treatment in the hospital were foreign nationals. In a similar study by Çatal et al.[8], 4.3% of the patients were foreign nationals. It is thought that immigrants are more helpless about the implementation of necessary measures during the pandemic period. At the same time, determinants such as socioeconomic level and legal status may restrict immigrants's access to health services In this study, the number of foreign patients was low. According to these results, it can be interpreted that immigrants have high access to health services in Turkey. However, more detailed research can be done on the subject in order to reach more accurate results. In our study, 124784 patients applied to the covid emergency area in one year, which is 9% of the total number of hospital admissions. In a similar study, the rate of admission to the pandemic area among emergency room patients was evaluated as 7.6%. In this study, 52.4% of the patients who applied to the covid emergency area were women. In their study, Çatal et al.[7] reported that 54.6% of the cases were male.In another study, 50.9% of patients were male.[9] In the study of Özdemir et al, the rate of male patients was reported as 58%.[10] In a study conducted in the emergency department, 53% of the patients who applied were women.[11] There were no significant gender differences between studies, and we think that it may vary according to the region of study.

In this study, the rate of application among the 18-65 age group is 79.5%. The rate of patients over 65 years of age is 8.8%. In a similar study, the rate of application for those aged 18-65 was 67.9% and for those over 65 years old was 6.9%.[7] In some studies, it is emphasized that there is a decrease in emergency service applications, especially over the age of

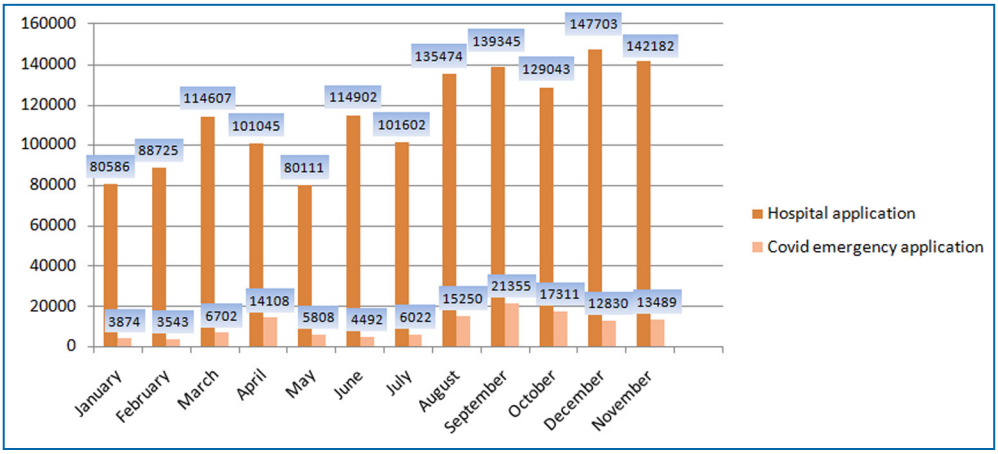


**Figure 1.** Analysis of the number of patients admitted to the hospital and covid emergency department by month

**Table 1. The distribution of patients admitted to the Covid emergency area by months**

| | January | | February | | March | | April | |
|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % |
| Nationality | | | | | | | | |
| T.C.* | 3774 | 97.4 | 3436 | 96.9 | 6528 | 97.4 | 13821 | 97.9 |
| Foreign | 100 | 2.6 | 107 | 3.1 | 174 | 2.6 | 287 | 2.1 |
| Gender | | | | | | | | |
| Male | 1903 | 49.1 | 1740 | 49.1 | 3167 | 47.2 | 7006 | 49.6 |
| Female | 1971 | 50.9 | 1803 | 50.9 | 3535 | 58.8 | 7102 | 50.4 |
| Age | | | | | | | | |
| <18 | 94 | 2.4 | 145 | 4.0 | 521 | 7.8 | 676 | 4.7 |
| 18-65 | 3194 | 82.4 | 2849 | 80.4 | 5425 | 80.9 | 12091 | 85.7 |
| >65 | 586 | 15.2 | 549 | 15.6 | 756 | 11.3 | 1341 | 9.6 |
| Application time | | | | | | | | |
| 08:00-16:00 | 2421 | 62.5 | 2260 | 63.8 | 4147 | 61.9 | 8510 | 60.3 |
| 16:00-24:00 | 1370 | 35.4 | 1201 | 33.9 | 2451 | 36.6 | 5383 | 38.2 |
| 24:00-08:00 | 83 | 2.1 | 82 | 2.3 | 104 | 1.5 | 215 | 1.5 |
| Hospitalization service | 196 | 5.0 | 147 | 4.1 | 187 | 2.8 | 348 | 2.5 |
| intensive care | 48 | 1.2 | 30 | 0.8 | 37 | 0.6 | 62 | 0.4 |

| | May | | June | | July | | August | |
|---|---|---|---|---|---|---|---|---|
| | % | n | % | n | % | n | % | n | % |
| Nationality | | | | | | | | |
| T.C.* | 97.9 | 5604 | 96.4 | 4218 | 93.9 | 5647 | 93.7 | 14468 | 94.8 |
| Foreign | 2.1 | 204 | 3.6 | 274 | 6.1 | 375 | 6.3 | 782 | 5.2 |
| Gender | | | | | | | | | |
| Male | 49.6 | 2678 | 46.1 | 2115 | 47.0 | 2834 | 47.0 | 7075 | 46.3 |
| Female | 50.4 | 3130 | 53.9 | 2377 | 53.0 | 3188 | 53.0 | 8175 | 53.7 |
| Age | | | | | | | | | |
| <18 | 4.7 | 229 | 3.5 | 300 | 6.7 | 520 | 8.6 | 1761 | 11.5 |
| 18-65 | 85.7 | 4920 | 75.8 | 3644 | 81.1 | 4906 | 81.5 | 12082 | 79.2 |
| >65 | 9.6 | 1341 | 20.7 | 548 | 12.2 | 596 | 9.9 | 1407 | 9.3 |
| Application time | | | | | | | | | |
| 08:00-16:00 | 60.3 | 3431 | 59.0 | 2767 | 60.7 | 3433 | 57.0 | 8749 | 57.4 |
| 16:00-24:00 | 38.2 | 2229 | 38.4 | 1639 | 36.0 | 2467 | 41.0 | 6219 | 40.8 |
| 24:00-08:00 | 1.5 | 148 | 2.6 | 148 | 3.3 | 122 | 2.0 | 282 | 1.8 |
| Hospitalization service | 2.5 | 228 | 3.9 | 112 | 2.5 | 118 | 2.0 | 302 | 2.0 |
| intensive care | 0.4 | 29 | 0.5 | 22 | 0.5 | 27 | 0.4 | 78 | 0.5 |

| | September | | October | | November | | December | |
|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % |
| Nationality | | | | | | | | |
| T.C.* | 20670 | 96.7 | 16719 | 96.5 | 12375 | 96.4 | 13017 | 96.5 |
| Foreign | 685 | 3.3 | 592 | 3.5 | 455 | 3.6 | 472 | 3.5 |
| Gender | | | | | | | | |
| Male | 9925 | 46.4 | 8022 | 46.3 | 6242 | 48.6 | 6671 | 49.4 |
| Female | 11430 | 53.6 | 9289 | 53.7 | 6588 | 51.4 | 6818 | 50.6 |
| Age | | | | | | | | |
| <18 | 3125 | 14.6 | 3323 | 19.2 | 1858 | 14.5 | 1957 | 14.5 |
| 18-65 | 16821 | 78.8 | 12847 | 74.2 | 9937 | 77.5 | 10555 | 78.2 |
| >65 | 1409 | 6.6 | 1141 | 6.6 | 1035 | 8.0 | 977 | 7.3 |
| Application time | | | | | | | | |
| 08:00-16:00 | 11907 | 55.8 | 10087 | 58.3 | 7694 | 60.0 | 7690 | 57.0 |
| 16:00-24:00 | 9211 | 43.1 | 7074 | 40.9 | 5024 | 39.2 | 5693 | 42.2 |
| 24:00-08:00 | 237 | 1.1 | 150 | 0.8 | 112 | 0.8 | 106 | 0.8 |
| Hospitalization service | 331 | 1.5 | 263 | 1.5 | 200 | 1.6 | 149 | 1.1 |
| intensive care | 99 | 0.5 | 54 | 0.3 | 56 | 0.4 | 44 | 0.3 |

*Turkish Republic

65, with the emergence of the covid-19 pandemic.[7,12,13] In addition, Çatal et al.[7] In their study, they observed that the number of applications decreased mostly among the 0-17 age group (80.5%). In one study, the rate of application between the ages of 18-60 was stated as 77.9%.[11] During the pandemic period, the fact that parents did not take their children to health institutions in order to protect them from the disease may have been effective in the decrease in the number of applications, especially in the child age group. At the same time, it can be thought that the curfews of the patient group over 65 years of age and the fear of the disease being more mortal in the elderly may be effective in reducing hospital admissions.

In our study during the analysis by months, it was observed that there was a rapid increase in the number of cases in April. Afterwards, it was observed that there were high number of patient admissions starting from August until December. Catal et al.[7] In their study, they did not see seasonal differences between patient admissions before the pandemic. However, there has been an increase in the number of applications in the autumn period of 2020. Yakar et al.[11] In their study, they compared between 2019 and 2020, and while the number of emergency service applications was higher in the summer months before the pandemic, the outpatient clinic applications decreased with the onset of the pandemic, and the emergency service applications increased rapidly in April and May. In the process of the pandemic, there has been a rapid decrease and increase in patient applications due to the mutation of the virus in some periods and the effect of vaccination studies. For this reason, it may not have been foreseen that the disease will increase especially in certain seasons or months.

During the Covid-19 pandemic process, curfews have also affected the number of emergency service applications. In our study, while the minimum number of applications was between 24.00-08.00 (1.3%), the highest number of applications was between 08.00-16.00. In a similar study, the rate of emergency service application between 08:00 and 20:00 was 66%.[11]

Since the PCR (polymeraz chain reaction) test can be negative in the early period in cases of Covid- 19 pneumonia, thorax CT is used as an important diagnostic method.[14,15] Computed tomography has a high sensitivity (91.9% [89.8-93.7%]) and low specificity (25.1% [21.0-29.5%]) in diagnosing the disease. It can make important contributions to the diagnosis in cases where the PCR test is negative and the chest radiography is normal.[16] In our study, lung tomography was performed on 11384 (9.1%) patients.

In order to prevent the spread of the disease during the pandemic process and to regulate the treatment of patients diagnosed with coronavirus disease, hospitalization was restricted for patients who do not have an emergency in hospitals. During the period of the study, 2061 patients were hospitalized in the ward, 586 patients in the intensive care unit, and 37 patients were transferred to another health center due to bed occupancy. In a similar study, 307 patients were hospitalized with the diagnosis of covid-19 in 2020.[17] In another study, 372 patients were hospitalized with the diagnosis of covid-19 in one year.[9] In a study, comparisons were made between the mortal and non-mortal patient groups of 499 patients hospitalized with the diagnosis of covid-19.[18] In another study, 407 patients diagnosed with covid-19 in a 3-month period were hospitalized and analyzed.[19] It is seen that there are variable rates of hospitalizations in different studies. We think that the reason for this is the increase in the process of the disease and the difference in the number of pandemic hospitals in the region in studies conducted in different regions and times.

## CONCLUSION

As a result, considering the workload of the emergency services, new work plans should be prepared by evaluating

the data in the literature in order to detect the disruptions that may occur in extraordinary situations such as epidemics and pandemics.

## ETHICAL DECLARATIONS

**Ethics Committee Approval:** The study was initiated with the approval of the Nevşehir Hacı Bektaş University Medical Faculty Clinical Researches Ethics Committee (Date: 08.07.2021, Decision No: 2021.07.09).

**Informed Consent:** Because the study was designed retrospectively, no written informed consent form was obtained from patients.

**Referee Evaluation Process:** Externally peer-reviewed.

**Conflict of Interest Statement:** The authors have no conflicts of interest to declare.

**Financial Disclosure:** The authors declared that this study has received no financial support.

**Author Contributions:** All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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# Injuries as a result of two-wheeler accidents and its relationship with the COVID-19 pandemic

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## ABSTRACT

**Aims:** The numbers of two-wheeled vehicle (TWV) accidents are rising continually. Social isolation caused by the Covid-19 pandemic affected the frequency of such accidents. This study was conducted in order to examine the general characteristics of victims presenting to the emergency department due to TWV accidents and to investigate the effect of the pandemic on such incidents.

**Methods:** This retrospective study involved patients involved in TWV accidents. Presentations made prior to 11 March, 2020, were classified as the pre-pandemic period and those made subsequently as the pandemic period. The type of TWV, the accident mechanism, victims' demographic characteristics, possession of a driver's license, crash helmet use, injuries observed in victims, trauma severity scores (Glasgow Coma Scale[GCS]; injury severity score[ISS]; and revised trauma score[RTS]), laboratory test and imaging results, victims' clinical outcomes (discharge, admission, or exitus), and the daily numbers of presentations to the emergency department due to TWV accidents before and after the pandemic were recorded.

**Results:** A-349 patients were included in the study, 77.3% involved in motorcycle accidents and 22.7% in bicycle accidents. The mean age of the entire victim group was 24.48±13.52 years, and 93.1% were male. Riders comprised 93.7% of the victims and passengers 6.3%. Driver's licenses were possessed by 16.6% of the victims, and 9.5% wore crash helmets. Motorcycle accidents were most frequently due to "falls associated with loss of balance", and bicycle accidents as a results of "collision with another vehicle or object". The three most commonly injured regions were the extremities, head, and thorax. RTS levels were 10.13±3.51 before the pandemic and 11.98±0.20 during it (p=0.046). ISS levels were 16.07±21.27 before the pandemic and 13.29±17.28 during it (p=0.259). The pre-pandemic mortality rate was 3.9%, while no fatal accidents occurred during the pandemic (p=0.068). Daily numbers of presentations to the emergency department due to TWV accidents were 0.09 before the pandemic and 0.17 during it.

**Conclusion:** TWV accidents are frequently observed among young/middle-aged men. The great majority do not hold driver's licenses, and crash helmet use is low. The extremities are the most frequently injured regions in such accidents. The number of accident victims presenting to the emergency department due to TWV accidents during the pandemic was almost twice as high as in the pre-pandemic period. The trauma energy of accidents occurring during the pandemic was lower than that in the pre-pandemic period, victims suffered less harm from trauma, and mortality decreased.

**Keywords:** Emergency department, bicycle, Covid-19 pandemic, motorcycle, traffic accident

## INTRODUCTION

Reasons for the use of two-wheeled vehicles (TWVs) differ among communities, depending on their level of socioeconomic development. While TWVs are frequently used for day to day purposes such as carrying goods and transport in countries with low income levels (such as India, Indonesia, and Brazil), in countries with high socioeconomic levels (such as the USA, the Netherlands, and Germany) they are employed for sport, fun, or travel.[1-3] Vehicles such as bicycles and motorcycles are frequently used to solve transportation problems in countries such as China, with high traffic density where vehicular speed sometimes falls to as low as 5-6 km/hour.[3] In Turkey, in addition to all these reasons, TWVs are also frequently employed in settlement areas with flatter topographic characteristics, such as Konya, Adana, İskenderun, and İzmit.[4]

Restrictions resulting from the Covid-19 pandemic led to changes in people's daily habits, and due to social isolation and quarantine, efforts began being made to meet almost all daily needs, particularly food and drink habits, through e-commerce or local companies.[5,6] Suppliers seeking to meet day-to-day needs either expanded their existing courier networks or else established new ones (particularly motorbike couriers) to reach customers in isolation.[7,8] Although a rise in the number of TWV accidents during

the pandemic was predicted in the light of numerous factors, such as the physical condition of the roads, inadequacies in the transportation system, high vehicle numbers, traffic regulation violations, failure to use personal protective equipment (such as crash helmets, gloves, and knee and elbow pads), alcohol and substance use, rider inexperience, economic causes, and lengthy working hours, some studies have suggested the opposite.[9,10]

This study has two purposes. The first is to examine the general characteristics of TWV accidents whose victims present to the emergency department. The second aim is to investigate the effect of the pandemic on TWV accidents.

## METHODS

### Study Design

This retrospective study involved patients presenting to the Kırıkkale University Medical Faculty Hospital emergency department due to TWV accidents between 01 January, 2013 and 31 December, 2021. The study was carried out with the permission of Kırıkkale University Non-Interventional Researches Ethics Committee (Date:09.12.2021, Decision No: 2021.12.04). The Declaration of Helsinki was strictly adhered to during the study. Patient data were retrieved from the hospital's data-processing automation system and archive records. Non-TWV accidents and patients whose record information was unavailable were excluded. The nature of the TWV accident, the mechanism involved, the victims' demographic data, whether the driver had a driver's license, crash helmet use, physical examination findings at the time of presentation, laboratory and imaging test results, and clinical outcome (discharge, admission, or mortality) were recorded. Electrical/battery powered TWVs were classified into motorcycle or bicycle categories depending on their characteristics. Presentations made before 11 March, 2020, when Covid-19 was officially declared to be a pandemic by the WHO, were classified as the "pre-pandemic period", and those made after that date as the "pandemic period".

### Statistical Analysis

The study data were analyzed on SPSS version 21.0 software. Descriptive statistics were expressed as number (n), frequency (%), and mean ± standard deviation (±SD). Normality of data distribution was evaluated using the Kolmogorov-Smirnov test. Independent sample t-test was applied in the comparison of normally distributed variables and the Mann-Whitney U-test in case of non-normal distribution. Categorical variables were compared using Pearson's chi-square test. p values <0.05 were regarded as statistically significant.

## RESULTS

Four hundred seven individuals presented to the emergency department during the study period, although 58 with deficient data were excluded, and the research was completed with 349 accident victims. The victims' general characteristics are shown in **Table 1.**

TWV accidents in general were found to occur most frequently in 2021, in June, and between the hours of 16.00 and 20.00. Motorcycle accidents were most frequently due to "falls associated with loss of balance", and bicycle accidents as a results of "collision with another vehicle or object" (**Table 2**).

**Table 1. The accident victims' general characteristics**

| | |
|---|---|
| Age (years) (n=349) | mean±SD |
| All patients | 24.48±13.52 |
| Motorcycle | 25.97±12.24 |
| ▪ Motorcycle, (n=266) | 25.87±12.11 |
| ▪ Electric motorcycle, (n=4) | 32.75±20.13 |
| Bicycle | 19.39±16.28 |
| ▪ Bicycle, (n=67) n | 15.61±12.83 |
| ▪ Electric bicycle, (n=12) | 33.18±20.14 |
| Sex | n (%) |
| Male | 325 (93.1) |
| Female, | 24 (6.9) |
| Victim | n (%) |
| Driver/Rider | 327 (93.7) |
| Passenger | 22 (6.3) |
| Clinical outcome | n (%) |
| Discharged from the emergency department | 258 (73.9) |
| Admitted to the ward | 86 (24.6) |
| Admitted to intensive care | 17 (19.8) |
| Exitus | 10 (4.9) |
| ▪ Exitus in the emergency department | 5 (50) |
| ▪ Exitus in intensive care | 5 (50) |
| Accident mechanism | n (%) |
| Motorcycle (n=270) | |
| ▪ Falls associated with loss of balance | 130 (48.3) |
| ▪ Rollover and drift due to a secondary agent | 26 (9.7) |
| ▪ Single vehicle accident | 14 (5.2) |
| ▪ Multi-vehicle accident | 99 (36.8) |
| Bicycle (n=79) | |
| ▪ Falls associated with loss of balance | 15 (19) |
| ▪ Rollover and drift due to a secondary factor | 3 (3.8) |
| ▪ Single-vehicle accident | 2 (2.5) |
| ▪ Multi-vehicle accident | 59 (74.7) |

**Table 2. Distributions of two-wheeled vehicle accidents by time and the accident mechanism**

| | Motorcycle | Bicycle | Total |
|---|---|---|---|
| Year of presentation | n (%) | n (%) | n (%) |
| ▪ 2013 | 15 (5.6) | 2 (2.5) | 17 (4.9) |
| ▪ 2014 | 30 (11.1) | 7 (8.9) | 37 (10.6) |
| ▪ 2015 | 30 (11.1) | 3 (3.8) | 33 (9.5) |
| ▪ 2016 | 27 (10.0) | 6 (7.6) | 33 (9.5) |
| ▪ 2017 | 32 (11.9) | 16 (20.3) | 48 (13.8) |
| ▪ 2018 | 24 (8.9) | 6 (7.6) | 30 (8.6) |
| ▪ 2019 | 39 (14.4) | 13 (16.5) | 52 (14.9) |
| ▪ 2020 | 34 (12.6) | 11 (13.9) | 45 (12.9) |
| ▪ 2021 | 39 (14.4) | 15 (19.0) | 54 (15.5) |
| Month of presentation | n (%) | n (%) | n (%) |
| ▪ January | 9 (3.3) | 1 (1.3) | 10 (2.9) |
| ▪ February | 14 (5.2) | 1 (1.3) | 15 (4.3) |
| ▪ March | 20 (7.4) | 3 (3.8) | 23 (6.6) |
| ▪ April | 24 (8.9) | 2 (2.5) | 26 (7.4) |
| ▪ May | 28 (10.4) | 6 (7.6) | 34 (9.7) |
| ▪ June | 36 (13.3) | 17 (21.5) | 53 (15.2) |

| | | | |
|---|---|---|---|
| ▪ July | 30 (11.1) | 11 (13.9) | 41 (11.7) |
| ▪ August | 39 (14.4) | 12 (15.2) | 51 (14.6) |
| ▪ September | 30 (11.1) | 10 (12.7) | 40 (11.5) |
| ▪ October | 20 (7.4) | 7 (8.9) | 27 (7.7) |
| ▪ November | 13 (4.8) | 3 (3.8) | 16 (4.6) |
| ▪ December | 7 (2.6) | 6 (7.6) | 13 (3.7) |
| Time of presentation | n (%) | n (%) | n (%) |
| ▪ 08:00-12:00 | 31 (11.5) | 8 (10.1) | 39 (11.2) |
| ▪ 12:00-16:00 | 85 (31.5) | 22 (27.8) | 107 (30.7) |
| ▪ 16:00-20:00 | 69 (25.6) | 39 (49.4) | 108 (30.9) |
| ▪ 20:00-00:00 | 52 (19.3) | 7 (8.9) | 59 (16.9) |
| ▪ 00:00-04:00 | 25 (9.3) | 3 (3.8) | 28 (8) |
| ▪ 04:00-08:00 | 8 (3) | 0 (0) | 8 (2.3) |

No difference was determined in vital findings between individuals involved in motorcycle and bicycle accidents. Blood ethanol levels were investigated in 232 accident victims and exceeded legal limits (>0.5 promille or 50 mg/dL) in 6.5%. The extremities were most frequently injured region as a result of accidents (64.8%). No difference was found between motorcycle and bicycle accident victims in terms of regions of injury. However, victims presenting to the emergency department due to motorcycle accidents had higher ISS scores than bicycle accident victims (p=0.005). No difference was observed between the two groups in terms of other trauma scores (Table 3).

**Table 3. A comparison of motorcycle and bicycle accident victims**

| | Motorcycle | Bicycle | |
|---|---|---|---|
| Vital findings | mean±SD | mean±SD | p*,† |
| ▪ Body temperature (°C) | 36.14±0.29 | 36.24±0.30 | 0.059 |
| ▪ Heart rate (beats/min) | 78.95±11.76 | 81.73±12.95 | 0.074 |
| ▪ RR(/min) | 17.51±5.52 | 17.18±1.95 | 0.605 |
| ▪ SBP (mmHg) | 124.47±10.87 | 121.83±13.11 | 0.074 |
| ▪ DBP (mmHg) | 75.19±9.88 | 76.86±8.94 | 0.183 |
| ▪ Oxygen saturation (%) | 96.27±2.44 | 96.60±1.92 | 0.264 |
| Trauma score | mean±SD | mean±SD | |
| ▪ GCS | 14.49±2.25 | 14.84±1.35 | 0.200 |
| ▪ ISS | 16.99±21.44 | 9.67±14.53 | 0.005* |
| ▪ RTS | 11.60±2.00 | 11.77±1.50 | 0.489 |
| ▪ PTS | 9.97±3.68 | 10.94±2.09 | 0.090 |
| Ethanol (0-1.79) (mg/dL) | 0.060±0.23 | 0.008±0.02 | 0.174 |
| Injured region | n (%) | n (%) | |
| ▪ Head | 96 (35.5) | 29 (39.7) | 0.868 |
| ▪ Neck | 13 (4.8) | 2 (2.7) | 0.376 |
| ▪ Thorax | 52 (19.2) | 17 (23.2) | 0.668 |
| ▪ Abdomen | 28 (10.3) | 6 (8.2) | 0.459 |
| ▪ Pelvis | 29 (10.7) | 10 (13.6) | 0.642 |
| ▪ Extremity | 180 (66.6) | 45 (61.6) | 0.214 |

RR, Respiratory rate; SBP, Systolic blood pressure; DBP, Diastolic blood pressure; GCS, Glasgow Coma Scale; ISS, Injury Severity Score; RTS, Revised Trauma Score, PTS, Pediatric Trauma Score.
*Independent sample t test; †Pearsons's chi-square test.

Two hundred fifty-six victims presented to the emergency department due to TWV accidents before the pandemic and 93 during it. Pre-pandemic presentations were most common in 2019, in August, and during the hours of 12:00 and 16:00 (30.9%) and 16:00 and 20:00 (30.9%). Presentations during the pandemic were most common in 2021, in July, and between the hours of 16:00 and 20:00 (31.2%) and 12:00 and 16:00 (30.1%). The mean number of accident victim presentations per day was 0.09 during the pre-pandemic period and 0.17 during the pandemic. Motorcycle accidents represented 74.8% of incidents in the pre-pandemic period and 73.1% during the pandemic (p=0.253) (Table 4).

**Table 4. Pre-pandemic and pandemic distributions of two-wheeled vehicle accidents**

| | Pre-pandemic (n=256) | Pandemic (n=93) |
|---|---|---|
| Type of TWV | n (%) | **n (%)** |
| ▪ Motorcycle | 202 (74.8) | 68 (73.1) |
| ▪ Bicycle | 54 (25.2) | 25 (26.9) |
| Year of presentation | n (%) | **n (%)** |
| ▪ 2013 | 17 (6.6) | - |
| ▪ 2014 | 37 (14.5) | - |
| ▪ 2015 | 33 (12.9) | - |
| ▪ 2016 | 33 (12.9) | - |
| ▪ 2017 | 48 (18.8) | - |
| ▪ 2018 | 30 (11.7) | - |
| ▪ 2019 | 52 (20.3) | - |
| ▪ 2020 | 6 (2.3) | - |
| ▪ 2020 | - | 39 (41.9) |
| ▪ 2021 | - | 54 (58.1) |
| Month of presentation | n (%) | **n (%)** |
| ▪ January | 8 (3.1) | 2 (2.2) |
| ▪ February | 14 (5.5) | 1 (1.1) |
| ▪ March | 19 (7.4) | 4 (4.3) |
| ▪ April | 20 (7.8) | 6 (6.5) |
| ▪ May | 26 (10.2) | 8 (8.6) |
| ▪ June | 37 (14.5) | 16 (17.2) |
| ▪ July | 18 (7.0) | 23 (24.7) |
| ▪ August | 39 (15.2) | 12 (12.9) |
| ▪ September | 31 (12.1) | 9 (9.7) |
| ▪ October | 21 (8.2) | 6 (6.5) |
| ▪ November | 14 (5.5) | 2 (2.2) |
| ▪ December | 9 (3.5) | 4 (4.3) |
| Time of presentation | n (%) | **n (%)** |
| ▪ 08:00-12:00 | 27 (10.5) | 12 (12.9) |
| ▪ 12:00-16:00 | 79 (30.9) | 28 (30.1) |
| ▪ 16:00-20:00 | 79 (30.9) | 29 (31.2) |
| ▪ 20:00-00:00 | 43 (16.8) | 16 (17.2) |
| ▪ 00:00-04:00 | 21 (8.2) | 7 (7.5) |
| ▪ 04:00-08:00 | 7 (2.7) | 1 (1.1) |

TWV accidents in the pre-pandemic period were most frequently the result of "collision with another vehicle or object" (46.9%), while during the pandemic they most commonly resulted from "falls associated with loss of balance" (45.2%). Rates of driver's license possession were 16.1% in the pre-pandemic period and 18.3% during the pandemic (p=0.615). Crash helmet use rates were 9.8% (n=25) before the pandemic and 8.6% (n=8) during it (p=0.287). RTS

scores were 11.98±0.20 during the pandemic and 10.13±3.51 in the pre-pandemic period (p=0.046). No difference was determined between the two groups in terms of other trauma scores. The mortality rate was 3.9% in the pre-pandemic period, but no fatal accidents occurred during the pandemic (p=0.068) (**Table 5**).

**Table 5. A comparison of pre-pandemic and pandemic period accident victims**

| | | | |
|---|---|---|---|
| ▪Multi-vehicle accident | 120 (46.9) | 38 (40.9) | |
| Driver's license | n (%) | n (%) | |
| ▪ available | 41 (16.1) | 17 (18.3) | 0.615 |
| ▪ not available | 211 (83.9) | 76 (81.7) | |
| Crash helmet use | n (%) | n (%) | |
| ▪ Yes | 25 (9.8) | 8 (8.6) | 0.287 |
| ▪ No | 167 (65.2) | 84 (90.3) | |
| Mortality | 10 (3.9) | 0 (0.0) | 0.068 |
| **Trauma score** | **mean±SD** | **mean±SD** | |
| ▪ GCS | 14.45±2.37 | 14.91±0.83 | 0.064 |
| ▪ ISS | 16.07±21.27 | 13.29±17.28 | 0.259 |
| ▪ RTS | 10.13±3.51 | 11.98±0.20 | 0.046* |
| ▪ PTS | 11.52±2.20 | 11.18±1.18 | 0.095 |

GCS, Glasgow Coma Scale; ISS, Injury Severity Score; RTS, Revised Trauma Score, PTS, Pediatric Trauma Score. *Independent sample t test; †Pearsons's chi-square test.

## DISCUSSION

Pedestrians and individuals on bicycles and motorcycles across the world are frequently involved in traffic accidents.[11] Examination of TWV accidents shows that they generally involve young/middle-aged men. A study from Nigeria showed that a large proportion of motorcycle victims were men aged 20-30, while research has reported a mean age of 28.8 in Germany with 90.7% of victims being men, and a mean age of 34.4% in Iran with a male-female ratio of 28/1.[12-14] Although male predominance persisted in bicycle accidents, the mean age was slightly lower. A previous study from the USA reported that males under 21 represented 60% of individuals involved in bicycle accidents.[15] Mean ages in the present study were 25.97±12.24 years for motorcycle accidents and 19.39±16.28 for bicycle accidents, with male gender predominating in both. These findings regarding sex and age are consistent with previous studies in the literature.

Road conditions, daylight, and weather conditions are factors that directly affect driving quality and that are thus closely associated with the occurrence of accidents.[16] Erenler et al. reported that TWV frequently occurred in summer, while Ersan et al. found that the majority of motorcycle accidents took place between the hours of 16:01 and 00:00, while Aşırdizer et al. reported that 75% of bicycle accidents and 65.4% of motorcycle accidents occurred between the hours of 12:01 and 20:00.[17-19] TWV accidents also frequently occurred in summer in the present study. The increased numbers of bicycle accidents in that season may be due to children being given bicycles as presents to celebrate the end of term in the summer and to weather conditions being better suited to the use of TWVs. In addition to other factors, the increase in motorcycle accident numbers may also be attributable to failure to adhere to traffic regulations, speeding, or alcohol consumption. The great majority of victims in the present study presented to the emergency department between 12:00 and 20:00. The fact that this time period coincides with lunch and dinner may have led motorbike couriers to be busier and to drive faster to fulfill their orders and to experience more accidents because of increased vehicular or pedestrian traffic.

Loss of balance is an important mechanism in TWV accidents. Loss of control can lead to the vehicle falling over or to a collision with other objects or vehicles.[20] Koçak et al. reported that the great majority of TWV accidents were caused by "loss of vehicular control", while Ramos-Villalon et al. concluded that they frequently resulted from "collision with a moving object".[21,22] Our findings are consistent with those of previous studies, with motorcycle accidents most commonly resulting from "falls associated with loss of balance" and bicycle accidents most frequently being caused by "collision with another vehicle or object". This may be associated with the physical features of the road impairing balance or control, artificial or geographical obstacles, the use of vehicles incompatible with traffic regulations, and alcohol and substance use.

Minor injuries (such as soft tissue injury or fractures) or life-threatening insults to organs may be observed following TWV accidents.[23] Both motorcycle and bicycle accidents in the present study most commonly resulted in extremity injuries, followed by injuries to the head and thorax. This highlights the importance using crash helmets and other protective equipment among users of TWVs in order to reduce the effects of trauma.

Alcohol and substance use also occupies an important place in traffic accidents.[24] The E-Survey of Road Users Attitudes (ESRA) study involving 48 countries reports of alcohol being detected in the blood of motorcycle riders of 18% in Africa, 15% in America, and 19% in Asia-Oceania, with rates among bicycle users of 15% in America and 19% in Asia-Oceania.[25] Maurer et al. reported that alcohol levels exceeding the legal thresholds were determined in 13.8% of motorcycle riders and 14.1% of bicycle riders at police spot checks on drivers suspected of having used alcohol.[26] The rate of vehicle use under the influence of alcohol among all the accident victims in the present study was 6.5%, but was particularly marked among the motorcycle riders. Our rate of alcohol use among TWV accident victims was lower than that in previous studies. We think that this may be due to the single-center nature of this study, religious and cultural disapproval of alcohol use in Turkey, and to increased traffic checks during the pandemic.

The evaluation of injuries occurring as a result of trauma using trauma scoring systems based on anatomical, physiological, and neurological variables can indicate the intensity of the trauma energy experienced by the victim.[27] Hsieh et al. reported higher ISS scores among elderly individuals involved in motorcycle accidents compared to younger adults (elderly 9.6±6.1; younger adults 8.1±7.3 years) and that mortality and morbidity rose in line with the ISS score.28 Yadollahi et al. reported a mean ISS score of 6.67±9.55, and mean GCS value of 14.45±2.08, and a mean RTS value of 7.70±0.59 in individuals involved in motorcycle accidents.29 In another study, Yılmaz et al. reported a mean GCS value of 12.8±3.9 and value a mean RTS of 7.1±1.7 among individuals involved in bicycle accidents.30 Choi et al. observed a significantly higher ISS level among individuals involved in motorcycle accidents (10.6±12.1) compared to bicycle accidents (7.9±9.9).31 The ISS level of the motorcycle accident victims in the present study (16.99±21.44) was also

significantly higher than that of the bicycle accident victims (9.67±14.53). We attribute this to motorcycles reaching higher speeds than bicycles due to their greater horsepower and/or battery capacity and to greater trauma energy being released at the time of impact.

The emergence of new or expansion of existing courier networks during the pandemic led to a rise in the numbers of such vehicles in traffic. However, the restrictions imposed during the pandemic also represented an obstacle to the use of other vehicles, the numbers of which decreased. Inconsistent data therefore exist concerning TWV accidents during the pandemic. One study of TWV accidents during the pandemic reported a 38.7% decrease in motorcycle-related accidents and a 28.4% decreased in bicycle-associated accidents during the pandemic. DiFazio et al. reported a 75% decrease in all motor vehicle accidents.32,33 However, a study from Turkey reported that the proportion of motorcycle accidents rose from 2.9% to 6.8% during the pandemic, while bicycle accidents decreased from 0.5% to 0.2%.34 Kaya et al. reported an increase in motorcycle accidents during the pandemic and that this was associated with long and intensive working hours and rider inexperience (<30 years).35 In the present study, the daily numbers of patients presenting to the emergency department due to TWV accidents almost doubled during the pandemic compared to the pre-pandemic period. In addition, the ISS scores of these accident victims decreased compared to the pre-pandemic period, while RTS values increased significantly. The mortality rate was 2.9% before the pandemic, but no fatalities were observed in TWV accidents during the pandemic. This suggests that accident victims were exposed to less trauma energy during the pandemic or where less affected by trauma. In addition, increased traffic spot-checks during the pandemic and drivers proceeding more slowly may have resulted in lower-energy traumas in accidents. This idea is also supported by the fact that motorcycle accidents decreased during the pandemic and that no fatalities occurred.

## CONCLUSION

Based on the findings of this study, TWV accidents frequently involve young or middle-aged men, and more commonly occur in the summer and between the hours of 12:00 and 20:00. The great majority of victims, particularly among motorcycle riders, do not wear crash helmets, and the rate of driver's license possession is very low. The extremities, head, and thorax are the most frequently injured anatomical regions. Victims were exposed to less trauma energy in accidents occurring during the pandemic, and mortality rates were lower than in the pre-pandemic period.

### Study limitations

There are a number of limitations to this study. The first and most important involves its retrospective nature. This meant that some data that might be linked to TWV accidents, particularly patient-related data, were unavailable. A second limitation is that the results were obtained from a single center. Some of our results may therefore differ from those obtained in previous studies.

## ETHICAL DECLARATIONS

**Ethics Committee Approval:** The study was carried out with the permission of Kırıkkale University Non-Interventional Research Ethics Committee (Date:09.12.2021, Decision No: 2021.12.04).

**Informed Consent:** Because the study was designed retrospectively, no written informed consent form was obtained from patients.

**Referee Evaluation Process:** Externally peer-reviewed.

**Conflict of Interest Statement:** The authors have no conflicts of interest to declare.

**Financial Disclosure:** The authors declared that this study has received no financial support.

**Author Contributions:** All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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# Psychogenic pruritis as a cause of prurigo nodularis

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## ABSTRACT

Prurigo Nodularis is a skin disease, secondary to a chronic scratching behavior. As multiple etiologies were said to be the cause of this condition, no clear pathophysiology has been described, and treatment is still not readily available. An elderly patient presented to the Emergency Department for confusion was found to have multiple excoriating lesions on the abdomen, back and extremities. Multiple treatment regimens were tried to manage this skin disease prior to this admission, with no improvements. This patient was eventually diagnosed with Prurigo Nodularis and treatment was initiated. In this case report we discussed the etiologies, presentation and management of Prurigo Nodularis, while focusing on the case in hand .

**Keywords**: Dermatology, prurigo nodularis, psychogenic pruritis

## INTRODUCTION

Prurigo Nodularis (PN) is a chronic skin disease, inflammatory in nature,secondary to a chronic scratching behavior, for which no clear pathophysiology has yet been identified.[1] The skin rash that characterizes PN consists mainly of excoriating hyperkeratotic, itchy nodules, or plaques. The distribution is usually asymmetric bilaterally dispersed on the trunk, abdomen and all extremities. If there is back involvement, the butterfly sign can be a useful clinical tool for diagnosis.[2] The diagnosis of PN is therefore a clinical one and its assessment is subjective.

Physicians can rely on 2 tools to assess the intensity of the pruritus: The Visual Analog Scale (VAS), 10-cm line with 0 cm indicating no pruritus and 10 cm being the worst.The patient can cross the line at the point that they feel corresponds to the intensity of their symptom. The Numerical Rating Scale (NRS) is a scale which gradesthe intensity of the pruritis, from 0 to 10, according to the patient. These two scales are helpful in categorizing pruritis by severity,mild/low, moderate, severe and very severe pruritis.[3] Once diagnosed, some underlying disorders need to be ruled out. The etiologies of the disease are unknown, however some studiesmade certain associations with it. Literature associated PN with hypertension, ischemic diseases, Alzheimer's Disease, chronic kidney disease, chronic hepatitis C, chronic obstructive pulmonary disease (COPD), congestive heart failure(CHF) and depression;[4] PN is also linked to liver disorders, malignancies, mainly lymphomas, thyroid illnessesand human immunodeficiency virus (HIV),hence the need for an extensive workout prior to initiating any treatment.[3] PN was also associated with age, average age of diagnosis being between 51 and 65. The aging process is associated with pathologic and immunologic changes, where the epidermis, per se, deteriorates with age, which predisposes the elderly to the itch.[5]

When all systemic, metabolic and infectious causes are ruled out, physicians should consider other underlying conditions for PN, such as psychogenic itch. In fact, literature associated depression with itch; also, delusion of parasitosis is on the differential diagnosis.[6]

PN is poorly studied; some researchers have in fact identified it as being a dermatosis that decreases the quality of life, mainly affecting sleep, figure, and patient's mood, which stresses the importance of finding a treatment.[4] Randomized control trials (CRT) argued that when all topical steroid, topical anesthetics and antihistamine fails, immunomodulatory agents, such as cyclosporine and methotrexate, can be beneficial. Few reports claim that gabapentin and neurokinin-1 receptor antagonists are successful in treating PN, along with antiepileptics and antidepressants.[7] One article studied the effect of Dupilumab, a monoclonal antibody in a single case of PN, and showed its efficacy.[8] No real importance is given in the literature to treating psychogenic itch especially seen in elderlies however this case report shows that behavioral approach should always be offered.

## CASE PRESENTATION

A 74-year-old female patient, with multiple comorbidities, presented to the Emergency Department with confusion and

fever, found to have encephalitis. On an extensive physical exam, patient was found to have a diffuse rash (**Figure 1-2-3**). Rash involved mainly both upper and lower limbs, back, and mildly the abdomen; no lesions were foundon face or genitals.

After a thorough history taking from the patient and the family,they revealed that this rash has been present for at least 7 years, which is itchy in nature, fluctuates in intensity, but has never completely resolved. The rash was never related to any triggers, whether food, allergens or a season. Patient saw dermatologistson multiple occasionsin outpatient clinic, and wasprescribed emollients, non-sedating and sedating antihistamine as needed, but skin lesions did not improve, and patient lost follow up to the clinics.

On further questioning, she admitsapplying topical steroids and topical emollients to the rash;which also was not helpful, the lesions and pruritis persisted.

4 months prior to this hospitalization, she seeked the help of a primary care physician who introduced a treatment with methotrexate, which the patient took for 3 months, and stopped after suffering from side effects and due to persistence of the dermatological symptoms. During all these years, despite different interventions, patient suffered continuous itch, especially in her upper body accompanied by non-resolving , fluctuating, nodular rash.

As part of her workup,the patient had a mildly elevated white blood count, explained by her current infection, with normal chemistries, normal liver enzymes and lipid panel, normal TSH, and an anemia workup in favor of iron deficiency anemia (IDA). Her past medical history is significant for diabetes mellitus type II, hypertension, asthma, and coronary artery disease (CAD),status post 3 stents placement. There was nothing significant on review of systems; her home medications aremetformin, gliclazide, long-acting insulin, atorvastatin, nebivolol, aspirin, amlodipine, moxonidine, fluticasone inhaler and tiotropium bromide inhaler. None of them was associated with the eruption and fluctuating nature of the rash. Therefore, no agent related to the current illness, chronic ones or their treatments was correlated to the skin eruptions.

Patient was hence diagnosed with Prurigo Nodularis, secondary to psychogenic chronic pruritis. Therefore, she was prescribed a short course of topical steroids, with antihistamine at bedtime and escitalopram. Simple behavioral changes such as keeping a moist skin and short nails were recommended as well. Patient was discharged from medical ward after resolution of her encephalitis, and a follow up at 8 weeks showed stabilization of the rash, resolution of pruritis and a better quality of life as reported by her, with better quality of sleep.

## DISCUSSION

In this case, the patientwith a nodular scaly rash, was diagnosed withPruritis Nodularis. Several differential diagnoses were raised including scabies and arthropod bites which were ruled out byhistory taking and interrogatory with the family. Atopic dermatitis or underlying inflammatory conditions, were to be ruled out by biopsy. Autoimmune Bullous Pemphigoid was ruled out via absence of blisters on physical exam.Hypertrophic Lichen Planus, Multiple Keratoacanthomas or Lichen Amyloidosis were to be ruled out via dermoscopy and histopathology.Also,brachioradical pruritis was on the differential diagnosis, however this the rash presents locally, rather than diffusely, as in this patient. Finally, skin-picking disorder, can be assessed for by a psychiatric evaluation.[4]

As for the work up of the underlying causes for pruritis, none of the patients' medicationsare associated with this itch. The metabolic panel and blood test did not indicate any liver, renal or infectious illnesses that could explain her condition. Workup was only significant for an acute encephalitis causing her current admission;however,this patient has been suffering from the rash for the last 7 years; IDA is not one of the etiologies mentioned in the literature earlier. Therefore, the most likely diagnosis of PN is secondary to psychogenic itch.

Finally, it is worth noting that the patient had a management very similar to the one discussed in the literature; she used topical agents, steroids, antihistamines and even disease modifying anti-rheumatic drugs (DMARDs) with no improvement, and lastly, she was put on Selective Serotonin Reuptake Inhibitors (SSRI) as a final resort, which seemed to be the one that stabilized and helped best her situation.

Starting SSRI or any other antidepressant in an elderly patient, require the physician to engage in close follow up, frequent visits to monitor clinical and biological side effects.

**Figure 1.** Nodular lesions on back with scars of old lesions. Note the "butterfly sign" on the upper back where patient can barely reach to scratch.

**Figure 2.** Small nodules on the thigh.

**Figure 3.** Scaly brown plaques on the lower limb.

### Limitations

During the management of patient, there was multiple differential diagnoses and underlying etiologies to be ruled out. However, patient did not receive an extensive workup to rule out malignancy, mainly lymphomas, as previously discussed. Also, the patient refused skin biopsy anddermoscopy. The itch causing this chronic rash could be of psychogenic origin, dermatillomania, or skin pricking disorder, which falls in the category of obsessive-compulsivedisease.

## CONCLUSION

This is a rare case of PN in an elderly patient, thought to be secondary to psychogenic itch. After several failed trials of oral anti histamine and topical soothing creams and steroids, patient was started on SSRI and improvement was noted. PN is a skin condition that can affect patients sleep, mood and quality of life, hence further studies and RCTs should aim at identifying a safe treatment.

## CONFLICT OF INTEREST

The author declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

## ABBREVIATIONS

PN: Prurigo Nodularis
RCT: Randomized Control trials
SSRI: Selective Serotonin Reuptake Inhibitor
IDA: Iron Deficiency Anemia

## ETHICAL DECLARATIONS

**Informed Consent:** All patients signed the free and informed consent form.

**Referee Evaluation Process:** Externally peer-reviewed.

**Conflict of Interest Statement:** The authors have no conflicts of interest to declare.

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# Streptococcus pneumoniae-induced meningoencephalitis presenting as rhinitis and acute stroke

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## ABSTRACT

Meningoencephalitis, caused by streptococcus (S) pneumoniae, a gram-positive bacterium, is a potentially fatal inflammation of the brain and spinal cord with a wide range of symptoms. S. pneumoniaeis a common causative agent of meningoencephalitis, and the condition can be challenging to diagnose as its symptoms often resemble other diseases. We report a case of a 48-year-old woman with pneumococcal meningoencephalitis presenting with symptoms of rhinitis (inflammation of the nasal passages) and acute stroke, who was treated with intravenous antibiotics (ceftriaxone and vancomycin) with a favorable post-treatment outcome. This case report underscores that early diagnosis and proper treatment of meningoencephalitis are essential to improve patient outcomes, and physicians must recognize conditions like meningoencephalitis, which may mimic other diseases. Additionally, this case serves as a reminder of the important role of preventive measures, such as vaccination against pathogens such as S. pneumoniae, in reducing the incidence and impact of such infections.

**Keywords:** CNS infections, meningoencephalitis, stroke, rhinitis, emergency service.

## 1. INTRODUCTION

Meningoencephalitis caused by S. pneumoniae is a rare and potentially fatal condition that results from inflammation of the brain and spinal cord.[1] Meningoencephalitis can result from various cause including infections of the central nervous system (CNS). Streptococcus pneumoniae is a major bacterial cause of meningoencephalitis, contributing to significant morbidity and mortality worldwide.[2] Recent studies have noted the significant prevalence of meningoencephalitis caused by Streptococcus pneumoniae, emphasizing its importance on global public health. Meningoencephalitis can present with varied symptoms such as fever, headache, seizures, behavioral changes, stroke, or even death.[3,4] Accurate diagnosis is crucial for timely treatment and improved patient outcomes. Physicians should remain vigilant about atypical presentations of meningoencephalitis to ensure prompt diagnosis and treatment.

Diagnosing meningoencephalitis remains a challenge because of its diverse clinical presentation. Advances in diagnostic techniques, including molecular methods and neuroimaging, have enhanced our ability to identify meningoencephalitis etiology.[5] However, these diagnostic tools are not always readily available, especially in emergency settings. Consequently, clinical presentation and patient history remain crucial in guiding diagnostic workup and determining appropriate treatment strategies.[6]

Streptococcus pneumoniae-induced meningoencephalitis has a high mortality rate, ranging from 16% to 37%.[7] Early initiation of antibiotic therapy is vital in reducing mortality and improving patient outcomes.[8] Current guidelines recommend using third-generation cephalosporins, such as ceftriaxone or cefotaxime, in combination with vancomycin for empirical treatment .[9,10]

In this case report, we present an unusual case of pneumococcal meningoencephalitis admitted to our emergency service with symptoms resembling rhinitis and acute stroke. We aim to emphasize the importance of considering meningoencephalitis in differential diagnoses for atypical presentations and the critical role early diagnosis and treatment play in improving patient outcomes.

## 2. CASE

A 48-year-old woman presented to our emergency department with a history of fever, severe headache, rhinorrhea, nausea, vomiting, dysarthria, lethargy, and left hemiparesis. She had a three-year history of hypertension. Upon physical examination, the patient was alert and

oriented. Vital signs revealed a temperature of 36.4 °C, heart rate of 104 beats per minute, respiratory rate of 18 breaths per minute, and blood pressure of 105/62 mmHg.

The patient exhibited post-nasal drip, left hemiparesis, a positive left Babinski sign, and decreased nasolabial fold prominence on the left side. There was no clinical indication of neck stiffness. Laboratory tests revealed elevated C-reactive protein levels (355 mg/dL) and leukocytosis. Based on the clinical presentation and initial workup, including blood tests, computed tomography (CT), and diffusion-weighted imaging (DWI), bacterial meningitis was suspected. The patient was started on a third-generation cephalosporin, ceftriaxone. Further evaluation revealed the patient's lack of vaccination against S. pneumoniae. A lumbar puncture was performed, and cerebrospinal fluid (CSF) analysis confirmed the diagnosis of pneumococcal meningoencephalitis. The patient then received intravenous vancomycin and was hospitalized for further management.

## 3. DISCUSSION

The literature indicates that not all patients with meningoencephalitis present with the classic triad of fever, neck stiffness, and altered mental status.[3,11] In our case, the patient's varied symptoms were consistent with reports in the literature that meningoencephalitis can manifest in diverse ways.[4] Our case underscores the importance of considering meningoencephalitis in the differential diagnosis of patients presenting with atypical symptoms such as rhinitis and acute stroke. A detailed history and physical examination are pivotal in guiding the diagnostic workup and treatment strategy.

The diagnostic approach in our case involved an initial workup with blood tests, CT, and DWI, followed by a lumbar puncture for CSF analysis. Our diagnostic approach aligns with the recommended diagnostic algorithm for encephalitis described in literature.[11,12] The importance of early diagnosis and treatment in our case is also supported by the literature, as early initiation of appropriate antibiotic therapy is crucial for improving patient outcomes.[6,8] Our case underscores the need for emergency physicians to recognize the potential for CNS infections to mimic other diseases. We highlight the need for further research on the atypical presentations of meningoencephalitis and the development of novel diagnostic and therapeutic strategies to improve patient outcomes. Additionally, the role of vaccination in preventing S.pneumoniae-induced meningoencephalitis cannot be overstated and should be considered in preventive measures. Rapid diagnosis and early treatment are vital in emergency settings, particularly for life-threatening conditions like meningoencephalitis. By considering atypical presentations and administering timely antibiotic therapy, emergency physicians can improve patient outcomes and potentially save lives.

## 4. CONCLUSION

In conclusion, we emphasize the importance of considering meningoencephalitis in the differential diagnosis of patients presenting with atypical symptoms, such as rhinitis and acute stroke. Our case serves as a reminder for physicians to consider meningoencephalitis in patients with atypical presentations and to employ a comprehensive diagnostic approach, including the use of advanced diagnostic techniques when available, to provide timely and effective treatment. We advocate for further research and guidelines on the role of vaccines in preventing meningoencephalitis, highlighting its clinical significance. Physicians must remain vigilant in recognizing life-threatening conditions like meningoencephalitis to provide prompt management and timely initiation of antibiotic therapy, ultimately improving patient outcomes. Given our experience and current literature, it is paramount for clinicians to remain astute and adaptable in their diagnostic approach, particularly for conditions with diverse presentations, ensuring that every patient receives the best chance for a favorable outcome.

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