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Özgün Araştırma

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Have COVID-19 Quarantine Measures Triggered the Incidence of Stroke Patients Transported By Ambulance?

COVID-19 Karantina Önlemleri, Ambulansla Taşınan İnme Hastalarının İnsidansını Tetikledi mi?

ABSTRACT
Objective:
The aim of this retrospective study was to determine to what extent the incidence of stroke in individuals whose physical activity was restricted due to the mandatory lockdown during the pandemic has been affected.

Material and Method:
The study population consists of patients with the International Classification of Disease (ICD) codes of stroke, subarachnoid hemorrhages, cerebrovascular situations, cerebrovascular diseases, subdural hemorrhages, hemiplegia and hemiparesis who were admitted to the Kayseri EMS between March 2019 and February 2021.

Results:
The average timeframe in which the assigned Emergency Medical Services (EMS) team reached stroke patients before the COVID-19 pandemic was 7.69±5.85 minute. The mean time to reach the patient during the COVID-19 process was found to be 8.94±6.51 minutes. Ambulance transportation times during COVID-19 were longer and statistically significant. The mean age pre-COVID-19 was 72.18±11.69 (min:42, max:99); The intrapandemic mean age was 71.46±11.79 (min:42.00, max:97.00). There was no significant difference between the mean age of the two groups (p=0.929).

Conclusion:
As a result of this single-center study conducted in Turkey, it was observed that the COVID-19 pandemic did not affect the incidence of stroke patients and significantly affected the duration of transportation in emergency healthcare applications. More comprehensive multicenter studies are recommended.

Key Words:
Stroke, Ambulance, COVID-19

ÖZ

Amaç:

Bu retrospektif çalışmanın amacı, pandemi sırasında zorunlu tecrit nedeniyle fiziksel aktivitesi kısıtlanan bireylerde inme insidansının ne ölçüde etkilendiğini belirlemektir.

Gereç ve Yöntem:

Çalışma popülasyonu, Mart 2019 ile Şubat 2021 tarihleri arasında Kayseri acil sağlık servisini aktive eden inme, subaraknoid kanamalar, serebrovasküler durumlar, serebrovasküler hastalıklar, subdural kanamalar, hemipleji ve hemiparezi uluslararası hastalık kodlarına sahip hastalardan oluşmaktadır.

Bulgular:

Görevlendirilen acil sağlık servisi ekibinin inme hastalarına COVID-19 pandemisi öncesinde ulaştığı ortalama süre 7,69±5,85 dakikaydı. COVID-19 sürecinde hastaya ortalama ulaşım süresi 8,94±6,51 dakika olarak bulundu. COVID-19 sırasında ambulans taşıma süreleri daha uzundu ve istatistiksel olarak anlamlıydı. COVID-19 öncesi ortalama yaş 72,18±11,69 (min:42, maks.:99); Pandemi sırasında ortalama yaş 71,46±11,79 (min:42,00, maks:97,00) idi. İki grubun yaş ortalamaları arasında anlamlı fark yoktu (p=0,929).

Sonuç:

Türkiye'de yapılan bu tek merkezli çalışma sonucunda COVID-19 pandemisinin inme hastalarının insidansını etkilemediği ve acil sağlık hizmetleri uygulamalarında ulaşım süresini anlamlı olarak etkilediği gözlemlenmiştir. Daha kapsamlı çok merkezli çalışmaların yapılması önerilmektedir.

Anahtar Sözcükler:

İnme, Ambulans Servisi, COVID-19

INTRODUCTION

According to the World Health Organization, stroke is the second leading cause of death and the third leading cause of loss of life years due to disability (1). Notably, more than 85% of fatal strokes are reported to occur in low-to-middle-income countries, placing a great burden on the health resources of these countries (1). There are many risk factors for stroke such as hypertension, diabetes, hyperlipidemia, obesity, smoking and physical inactivity (1,2). A meta-analysis showed that physical activity is a protective factor against stroke (OR 0.49 (95% CI 0.29-0.83) (2). Systematic observations and meta-analyses have shown that physical activity can reduce the risk, of stroke or death by 25% to 30% (2-4). According to the guidelines for the diagnosis and treatment of stroke, limited physical activity is an important risk factor for stroke. To reduce this risk, moderate to intense aerobic exercise three to four times per week for the duration of 40 minutes on average is recommended (5).

After the World Health Organization declared the epidemic COVID-19 a global emergency on the 30th of January 2020, governments were forced to take various measures such as closing the borders, imposing travel restrictions and quarantine and curfew measures (6-8). These measures, taken to contain the spread of infection, resulted in long stays at home and an increase in sedentary behaviors such as sitting, lying down and watching television, a decrease in regular physical activity and consequently an increase in the risk for chronic health disorders (9). Another situation in which the COVID-19 pandemic triggers the incidence of stroke is the emergence of neurological complications such as stroke, especially in patients with concomitant diseases (10). Some studies in the literature emphasize that the number of recorded strokes decreases significantly during the pandemic (11, 12). This is probably because fewer patients are admitted with milder strokes, perhaps due to fears of infection when referred to the hospital during times of social distancing and lockdown. In some studies it has been suggested that despite the decrease in stroke incidence, COVID-19 infection itself may cause a stroke (13-16). However, no sufficient resources have been found which may reveal how the incidence of stroke patients who are not infected with COVID-19 has been affected (17). In addition, no studies have been carried out on this subject in Turkey, as far as we are aware. The aim of this retrospective study was to determine to what extent the incidence of stroke in individuals whose physical activity was restricted because of mandatory lockdown during the pandemic was affected.

MATERIAL and METHODS

Setting and Design

This cross-sectional study was conducted using the retrospective record scanning method. The research was carried out in the province of Kayseri, which is one of the largest cities in Turkey. The total population in the province of Kayseri is 1.421.455 and emergency healthcare services are provided by the Kayseri EMS system through 52 emergency healthcare stations and a call center, a total of 656 healthcare personnel and 80 ambulances (18). All emergency services in Turkey are centralized on a single number. Central dispatch for the police, fire department and EMS and automatic location identification is present for the universal emergency number 1-1-2. If medical assistance is needed, the call is forwarded to an EMS employee who answers the call, reaffirms the address and activates the nearest ambulance. Calls, including the medical priority referral system, are answered in eight different languages including Turkish.

Participants

The study population consists of patients with ICD codes of stroke, subarachnoid hemorrhage, cerebrovascular situations, cerebrovascular disease, subdural hemorrhage, hemiplegia, and hemiparesis activated between March 2019 and February 2021 in Kayseri EMS. The first COVID-19 case was observed in Turkey on the 10th of March 2020 (19). Therefore, data were examined and compared in two groups, namely the pre-pandemic group (March 2019-February 2020) and intrapandemic group (March 2020-February 2021). Traumatic cerebral hemorrhages and records of patients younger than 18 years of age were excluded from the study.

Data Sourcing/ Management

The data were taken from the ASOS system used by the Kayseri EMS. All patients and injured people who receive treatment

through EMS are recorded in the ASOS system, which is used on a national basis in Turkish EMS. A unique serial number is assigned to each patient/ injured person who activates EMS in the ASOS system.

During the examination of the records, socio-demographic characteristics of patients such as age, sex, social security and region (urban-rural), the timeframe in which an ambulance was sent to the patient and patient outcomes (transfer to a hospital, transfer between hospitals) were evaluated. The time it takes for the ambulance to reach the patient. The time it takes for the ambulance to reach the patient starts from EMS activates the team closest to the patient and ends when the patient is transported by the team from EMS. This time should not exceed 10 minutes in the city center and 30 minutes in the countryside. When the EMS team transports the patient from the scene of an accident to a hospital, the patient is said to be hospitalized. In some cases, a patient in the hospital is transferred to a higher level hospital. This situation is called an interhospital transfer. The patient's state of consciousness was divided into four groups: open, confused, unconscious, and unknown. The patient's state of consciousness is assessed by the paramedic or physician in charge of the EMS team. If the state of consciousness was not recorded in the ASOS system, it was classified as unknown. Since the Glasgow coma scale was missing in many patients, consciousness level data were used. Because the mean age of the data set was 71.81±11.74 years, the age variable was divided into two groups: younger than 72 years and 72 years and older.

In addition, the case outcome was divided into two groups as "Transportation to hospital" and "Transportation between hospitals". The patients that the ambulance intervened by going to the scene are included in the Transportation to hospital group. The transfer of outpatients admitted to the hospital to another hospital is grouped as Transportation between hospitals.

Sample Scope

The sample selection method was not used in this study. All non-traumatic EMS-treated stroke patients during the research period were included. A total of 4475 patient registration forms, 2266 patients before Covid-19 and 2209 patients during COVID-19, who met the criteria suitable for our research, were included (Figure 1).

Figure 1: Data Sourcing
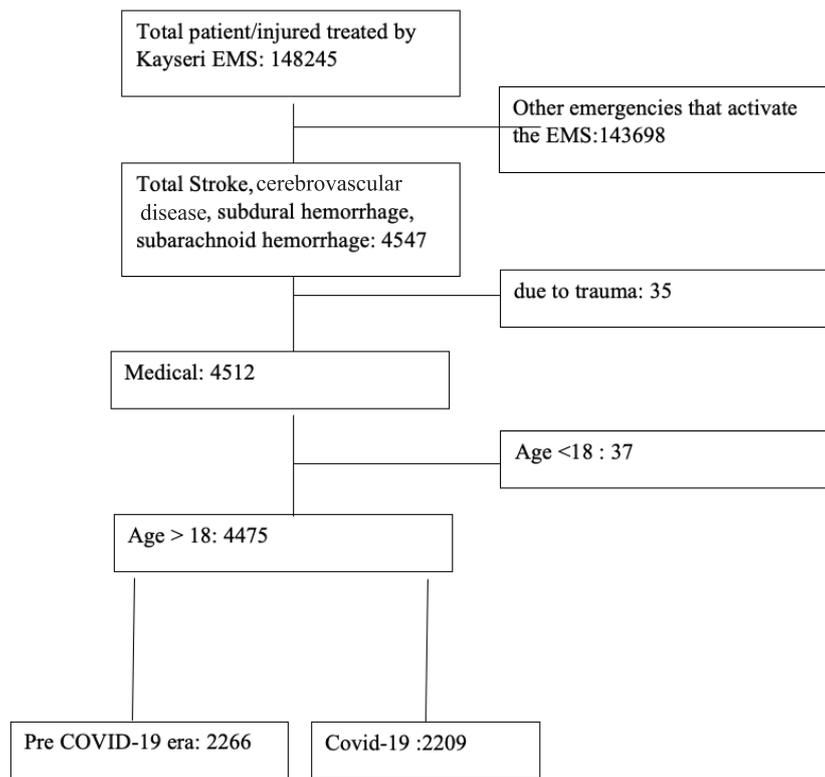
Statistical Analysis

The statistical analysis was performed using Excel and the Statistical Package for Social Sciences (IBM SPSS Version 23, NY, USA). Descriptive features are given as numbers and percentages. In addition, the chi-square analysis method was used to compare the situation of the data related to the independent variables before and during covid. The independent group t test was used to compare the ambulance transport time averages. $p<0.05$ was accepted for significance in the study.

Ethics

This research complies with all relevant national regulations, institutional policies and the principles of the Declaration of Helsinki. Permission to carry out the study was obtained from the Provincial Directorate for Healthcare of Kayseri and the Ethics Commission for Nonclinical Studies of the Gazi University on 24.06.2021 by decision number 11. For conducting the study permission was obtained from the COVID-19 Scientific Studies Committee of the Ministry of Healthcare of the Republic of Turkey.

RESULTS

The mean age of the patients included in this study was 71.82±11.74 (min:42.00, max:99.00). The mean age pre-Covid-19 was 72.18±11.69 (min:42, max:99); The intrapandemic mean age was 71.46±11.79 (min:42.00, max:97.00).

There was no significant difference between the mean age of the two groups (p=0.929). According to Figure 2, the number of pre-COVID-19 and intra pandemic activation of EMS for stroke cases showed similar characteristics.

Figure 2: Monthly Pre-Covid-19 and Intrapandemic Distribution of the Number of Stroke Patients for whom EMS was Activated and Positive Covid-19 Cases in Turkey.
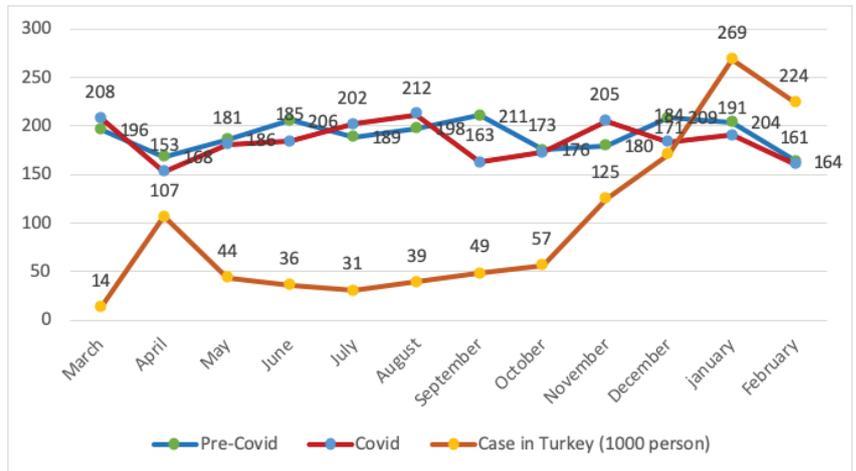
Figure 3 shows the distribution of ambulance transport times for stroke patients treated with EMS between the period before and during the COVID-19 pandemic. According to the results of the t test in the independent group, the average ambulance transport time to stroke patients increased significantly during the pandemic period (p < 0.001).

The average timeframe in which the assigned EMS team reached stroke patients before the COVID-19 pandemic was 7.69±5.85 minute (min:1.00 minute, max:48.00 minute). The average transportation time to the patient during Covid-19 was 8.94±6.51 minute (Min:1.00 minute, max:49.00 minute). Ambulance transportation times during Covid-19 were longer and statistically significant (p<0.001).

Figure 3: Pre-Covid-19 and Intrapandemic Distribution of Transportation Times to Stroke Patients transfer (minute).
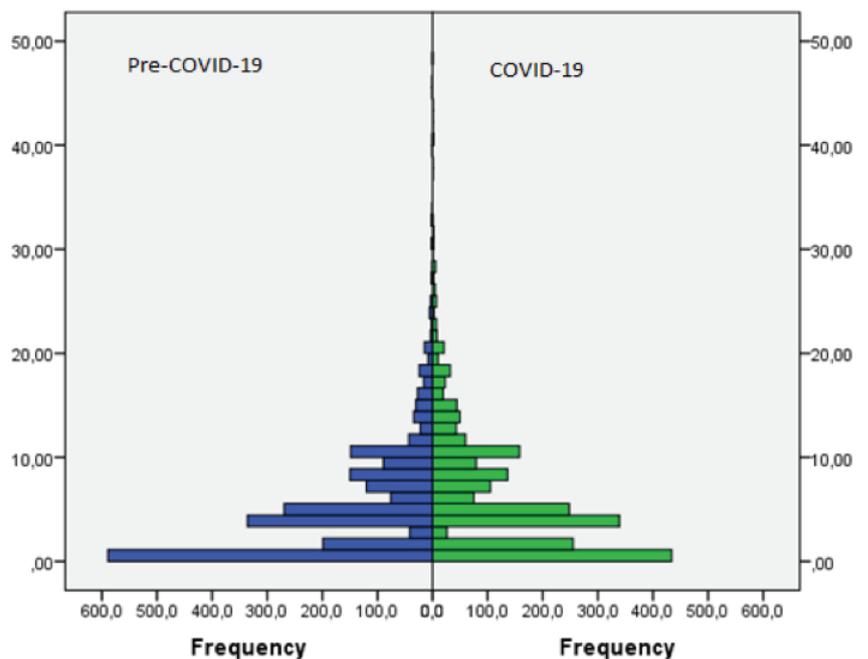
Table I: Some Characteristics of Stroke Patients for whom EMS was Activated Before and During Covid-19.

	Before Covid-19		During Covid-19			
Age	n	%	n	%	f	P*
<72	797	35.2	839	38.0	3.805	0.051
72 and older	1469	64.8	1370	62.0		
Sex						
Male	1097	48.4	1089	49.3	0.352	0.570
Female	1169	51.6	1120	50.7		
Region						
Urban	1831	80.8	1722	78.0	5.552	**0.018**
Rural	435	19.2	487	22.0		
Consciousness						
Conscious	1351	59.6	1344	60.8		
Confused	466	20.6	448	20.3	1.086	0.781
Unconscious	89	3.9	77	3.5		
Unknown	360	15,9	340	15,4		
Case result						
Transportation to hospital	1156	51.0	1168	52.9	1.550	0.213
Transportation between hospitals	1110	49.0	1041	47.1		

*Chi square

According to Table I the number of stroke cases transfer in rural areas during Covid-19 was higher than before Covid-19 and statistically significant (p=0.018). There has been an increase in the number of stroke cases younger than 72 years of age during the Covid-19 pandemic, but this increase is not significant. Most of the patients who were admitted to the ambulance due to stroke, both before and during covid, were conscious.

DISCUSSION

In this retrospective study at a single centre similar numbers were observed before COVID-19 and one year after the pandemic at EMS. In the literature, there are studies showing that the incidence of stroke has increased as a complication of COVID-19 and that hospital incidence of mild stroke patients have decreased due to the fear of transmission of Covid-19 (11,12,18-20). We are of the opinion that the difference in results of studies on this subject is due to the difference in characteristics such as the research population and the study region. In addition, people's concern about covid contamination may have affected their hospital admissions.

On the 21st of March 2020, individuals aged 65 and older were prohibited subjected to curfew in Turkey. Figure 2 shows that the number of patients who called an ambulance for stroke before and during the pandemic did not change significantly. Despite the second Covid-19 wave observed in Turkey in November 2020, no significant change was observed in stroke patients compared to the previous year. Similar results were observed in a study conducted by Bullrich et al. (2020) in a stroke center in London (17). According to a meta-analysis by

Bhati and Srivastava (2021), the association between covid-19 and stroke was explained by the fact that individuals who had covid-19 had risk factors for stroke. A small proportion of stroke patients were directly associated with Covid-19 infection (21). In this study, the mean age of stroke patients who admitted to EMS before and during Covid-19 showed similar characteristics. When the age groups of the patients included in the study were examined, no significant difference was found between the age groups before and during Covid-19. In the study conducted by Siegleer et al. (2020), in which stroke patients who applied to the Cooper University Emergency Service were evaluated, the mean age of the patients who applied before Covid-19 and during the Covid-19 pandemic was found to be similar (12). Gender-based characteristics of stroke patients applying to EMS were similar before and during Covid-19. The number of male stroke patients was lower than that of females, but this was not found to be significant. In the study conducted by Şensöz et al. (2018), concerning the determination of the stroke epidemiology in Turkey, the gender characteristics of patients were compatible with this study (22). According to the systematic review by Siow et al, most patients diagnosed with stroke during the Covid 19 pandemic were women, but there was no significant difference (23). Both population-based studies and studies conducted during the pandemic show that the prevalence of stroke is similar in both sexes.

During the Covid-19 pandemic, the rate of stroke patients in rural areas increased significantly compared to the rate of urban stroke patients. We are of the opinion that the main reason for this is the migration of citizens residing in urban areas to rural areas during the lockdown implemented in Turkey and the fact that those with chronic diseases such as hypertension could not go to their regular checkups due to increased concerns about safe access to healthcare services. According to the results of a study conducted in the USA, the number of laboratory tests related to chronic diseases performed in primary care during the Covid-19 period decreased by 81-90% and new drug treatments decreased by 52-60%, which was found to be alarming (23). Suspending checkups and follow-ups of chronic diseases can lead to fatal results. For this reason, it is important for healthcare providers and especially family physicians to carefully monitor the general condition of the patients whom they follow up. It is necessary to develop at-home patient follow-up applications both in terms of technology and manpower.

According to the study conducted by Weldegebreal et al. (2020), which was planned to determine the risk factors affecting mortality in patients hospitalized for stroke, unconsciousness increases the severity and mortality in stroke patients (being unconscious (AOR=2.61, 95%CI:1.06-6.40, p=0.037) during admission were positively associated with mortality) (24). In this study, the number of patients who were confused and completely unconscious was similar in the pre-covid-19 and intrapandemic period.

The study conducted by Siegleer et al (2020), which evaluated patients admitted to the Cooper University emergency department for stroke, did note a decrease in emergency department admissions of stroke patients with mild symptoms, primarily

because of fear of COVID -19 contamination; however, this study did not note a change in the rate of hospital transfers and interhospital transfers of patients who went to the hospital on their own (12).

Limitations

This study is a single-center observational study of a short duration in the early phase of the Covid-19 pandemic. Therefore, no generalization to the whole country can be made and the study may not indicate lasting consequences for the local stroke epidemiology. In addition, only some characteristics of stroke patients were evaluated in this data set and mortality rates and other risk factors determining severity were not evaluated. In the EMS registration system, there is no information about the presence of chronic diseases or COVID-19 positivity of the patients. For this reason, covid-19 positivity and risk factors for chronic diseases were not discussed in this study.

CONCLUSION

As a result of this single-center study conducted in Turkey, it was observed that the Covid-19 pandemic did not affect the incidence of stroke patients and significantly affected the duration of transportation in emergency healthcare applications. More comprehensive multicenter studies are recommended.

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