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ORIGINAL ARTICLE

Google Trends (or social media) and its effects on pediatric emergency department visits during the pandemic period

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ABSTRACT

Objective: During sudden epidemics, the public needs access to timely and reliable information on disease symptoms and prevention. The aim of this study is to reveal the effect of social media in the field of health by evaluating the relationship between the information learned about the COVID-19 pandemic in Google Trend searches and pediatric emergency applications.

Material and Methods: The data were obtained from pediatric emergency visits in 2017–2020, covering the period from January 1 to May 31. The main study period aiming to analyze the relationship between pediatric emergency department visits and "interest over time (IOT)" was determined as January 1–May 31, 2020. Visits to the pediatric emergency department and Google Trends search data were analyzed. The relationships between the urgency ranking determined according to the triage system applied in our hospital and the Google Trends search data were evaluated.

Results: Until the first case of COVID was reported in Türkiye, it was observed that while the green zone patients were dominant in the visits to the pediatric emergency department, the yellow zone patients' visits became dominant in the period after this date. A strong negative correlation was found between Google Trends search popularity and green zone ($r=-0.0693$, $p<0.05$, IQR=5.353). In our Google Trends analysis during the pandemic study period, as of March 11, 2020, which had the highest 100 IOT value, and as Google search trends increased, it was determined that the number of pediatric patients with non-COVID symptoms decreased and with COVID-like symptoms increased.

Conclusion: People avoided unnecessary applications as a result of learning the transmission routes of COVID-19, the symptoms of the disease, morbid, and mortal results with the search term "corona" from the search engine. The use of social media data in the field of health information can prevent unrealistic emergencies in Türkiye and around the world.

Keywords: COVID-19, Google Trends, pediatric emergency department visits.

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INTRODUCTION

People who think and have the ability to realize what they think want to share their knowledge and experiences. For this sharing, they need to communicate. Mass media have been developed to meet the need for communication. With the development of the internet, communication tools such as Facebook, Twitter, and YouTube, which are called social media, have begun to be preferred instead of traditional media. Today, these communication systems are also frequently used for health information that may affect individuals or the entire society.[1]

During sudden epidemics, the public needs access to timely and reliable information on disease symptoms and prevention. Today, social media are generally known as fast and effective platforms for searching, sharing, and distributing health information in the society.[2] For example, social media can raise awareness in the society against the epidemic diseases or can lead society to protect against diseases. Social media is also a method of social interaction. It combines web-based technology to quickly disseminate information and details to a wide range of users.[3]

Health communication has an important role in being a healthy person, increasing the quality of life and preventing diseases.[4] Health communication aims to change the health behaviors toward individuals in a positive way. Health communication as a branch of science, it is of great importance in studies to increase preventive health services, decrease the rate of disease at the community level, and improve quality of life.[3]

Social media is a vital tool that directly affects people's decision-making processes on health. When this tool is used in an uncontrolled and unconscious way, it brings many dangers and can create important problems for health.[5]

In situations such as the ongoing COVID-19 pandemic, social media has benefits that allow governments, health officials, and individuals to spread messages of reassurance and comfort by offering them direct access. Due to the protracted duration of the epidemic and the uncertainties surrounding it, responsible officials and leaders can alleviate the difficulties by curbing widespread panic and offering reassurance through continuous communication.[6]

It has been determined that there are a very high number of patient admissions to emergency services in our country and in world.[7,8] This intensity may cause disruptions in health services due to the inadequacy of the physical environment, health workers, and personnel of the emergency services struggling during the COVID-19 pandemic. The coronavirus pandemic is at the top of the world agenda and causes anxiety in all segments of society. It is inevitable that the information learned through communication channels will affect these concerns and the applications of patients to the pediatric emergency room. The aim of this study is to reveal the effect of social media in the field of health by evaluating the relationship between the information learned about the COVID-19 pandemic in Google Trend searches and pediatric emergency applications. In addition, we aimed to determine the density of non-emergency pediatric emergency visits.

Google Trends

Google Trends, a free Google service, is an application that shows how often search words are searched. This makes it an important tool for keyword research. Popular searches during the day can be seen, and the desired keywords can be searched to see statistically, in which periods are searched the most according to the date range.[9]

Google Trends; It presents the volumes of target keywords in comparison with their historical search volumes.

This service, which is open to everyone, can be used to follow the agenda, view current search queries, or predict and evaluate seasonal ups and downs. It is generated from Google search and other websites that Google is affiliated with.[10] The popularity of the search term is indicated as a number defined as the IOT. Peak popularity of the search term is 100 points, 50 points means that the search term is half the popularity. A score of 0 means that there is not enough data for this term.[9]

MATERIAL AND METHODS

This study was carried out by the Pediatric Emergency Unit of the Institute of Health Sciences Umraniye Training and Research Hospital (İstanbul, Türkiye) Department of Pediatrics, where trauma patients were not admitted and approximately 400,000 patients visited annually. Our study is a cross-sectional and observational study. It was started after the approval of the Institutional Review Board with the approval number 8600. Written consent was not obtained from the patients or their relatives, as no information about the patients was used and no examination was made.

A non-traumatic pediatric patient group under the age of 18 was included in the study. Despite their visit to the emergency department, patient files that belonged to patients that were discharged without examination were not included in the analysis.

The data in our study were obtained from pediatric emergency visits in 2017, 2018, 2019, and 2020, covering the period from January 1 to May 31.

On the other hand, the main study period aiming to analyze the relationship between pediatric emergency department visits and "interest over time (IOT)" was determined as January 1–May 31, 2020.

Two independent data used in the study; visits to the pediatric emergency department and Google Trends search data were analyzed using time series analysis. In addition, the relationships between the urgency ranking determined according to the triage system applied in our hospital and the Google Trends search data were evaluated.

Patient admission and epidemiological data were obtained from the hospital information management system, which includes digital records of patients visiting the pediatric emergency department, while Google Trends data were obtained from https://trends.google.com/. Patients with COVID-like symptoms were considered yellow zone patients according to the color scale emergency triage system. Other patients were referred to their zones in accordance with the color scale emergency triage system according to their symptoms and vital signs.

As search terms for obtaining Google Trend information, "coronavirus," "COVID," "COVID19," "SARS-Cov-2," "corona," "korona," and "koronavirus" words related to COVID-19 were searched, which are frequently used by the WHO, Ministry of Health, and the pub-

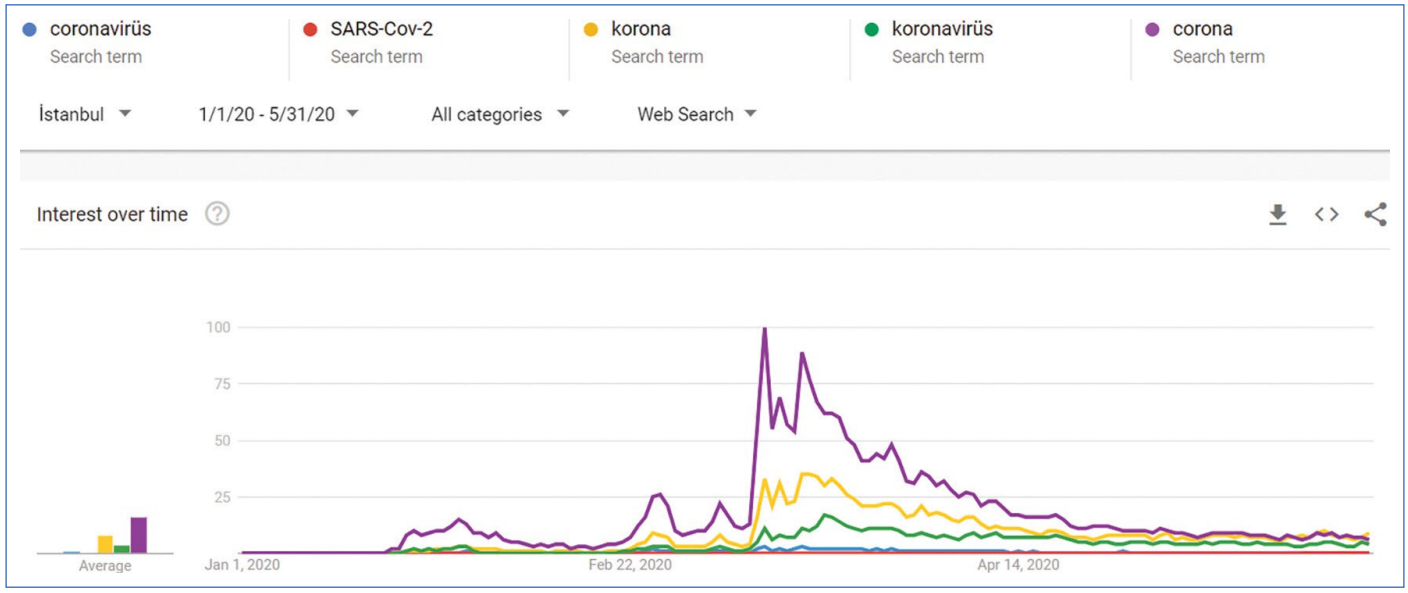

Figure 1: The terms searched in Google Trends.

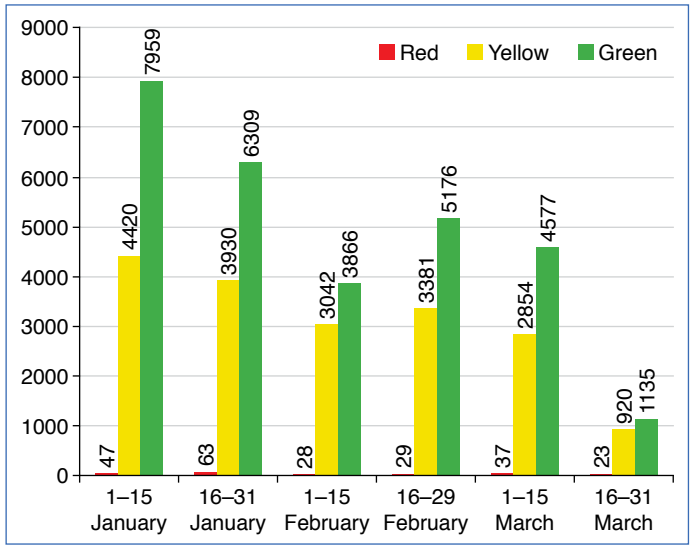

Figure 2: Pediatric emergency triage data during the pandemic period (red, yellow, and green area).

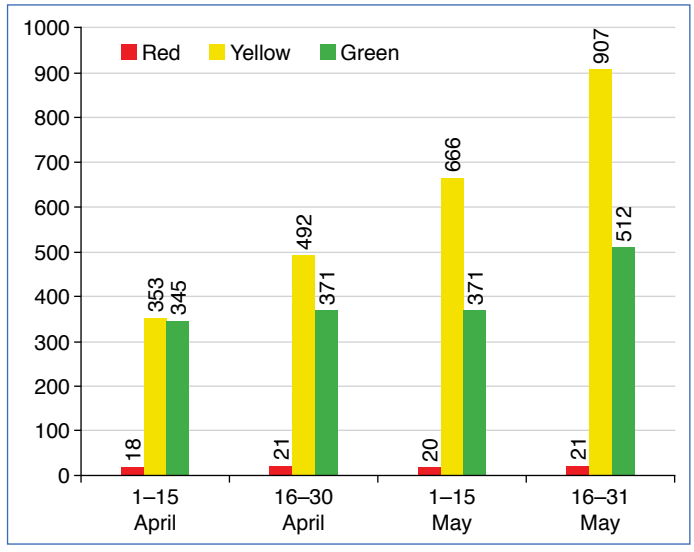

Figure 3: Pediatric emergency triage data during the pandemic period (red, yellow, and green area).

lic. These words were initially searched in separate groups as it did not allow more than five searches. Comparative analyzes were then made according to the term "corona," which had the highest relevance over time (Fig. 1). It is planned to compare the urgent application numbers, triage, and Google Trends data.

Statistical Analysis

Statistical analysis was performed using SPSS 25.0 for Mac OS X (Chicago, IL, USA). The normality of the data distribution was determined by the Kolmogorov–Smirnov test. Because the variables were not normally distributed, Spearman's correlation was performed to calculate the correlation of COVID-19-related IOTs ("corona") with the number of emergency admissions. $p \leq 0.05$ was admitted statistically significant.

RESULTS

A total of 218,530 patient visits were made to all pediatric emergency departments in 2017, 2018, 2019, and 2020, covering the extended study period from January 1 to May 31. In addition, these patients were classified according to the triage system, with 2838 in red, 62,706 in yellow, and 152,986 in green. During the extended study period, an average of 1438 patient visits was made to the pediatric emergency department per day.

During the pandemic study period (5 months of 2020), a total of 53,050 patient applications were made to all emergency pediatric service zones, with an average of 574 patient applications per day. The distribution of emergency pediatric service applications in this period according to the triage system is shown in Figures 2 and 3. In addition, during the main pandemic study period (between March 1,

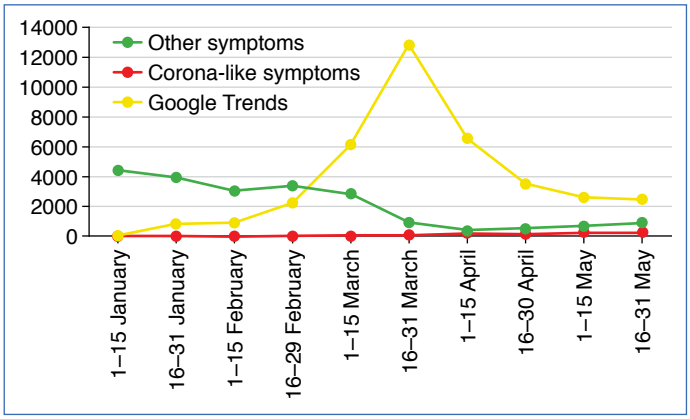

Figure 4: Comparison of child emergency yellow zone applications with Google Trends searches during the main pandemic study period.

and May 31, 2020), the distribution is shown in Figure 4, when the patients with yellow fever who applied to the pediatric emergency department were classified as patients with or without COVID-19 and similar symptoms.

According to our Google Trend analysis, the search term yielding the highest IOT value was "corona" (Fig. 1). Therefore, we used this term for statistical analysis in our study. The data, in our study, were obtained from pediatric emergency visits in 2017, 2018, 2019, and 2020, covering the period from January 1 to May 31. On the other hand, the main study period aiming to analyze the relationship between emergency pediatric service visits and "IOT" was determined as January 1–May 31, 2020. The date of 11 March 2020 had the highest 100 IOT value: the first COVID-19 case in Türkiye was announced that day. The second peak was recorded on March 16, 2020 (IOTs=86/100); this coincided with the day after the first reported death in Türkiye.

When the patients who visited the pediatric emergency department during the extended study period were evaluated according to the triage code, the majority of the patients were evaluated as the green triage code. During the pandemic study period, until March 11, 2020, when the first case of COVID was reported in Türkiye, it was observed that while the green zone patients were dominant in the visits to the pediatric emergency department, the yellow zone patients' visits became dominant in the period after this date (Fig. 2 and 3).

A strong negative correlation was found between Google Trends search popularity and green zone ($r=-0.0693$, $p<0.05$, IQR=5.353).

In our Google Trends analysis during the pandemic study period, as of March 11, 2020, which had the highest 100 IOT value, and as Google search trends increased, it was determined that the number of pediatric patients with non-COVID symptoms decreased and the number of pediatric patients with COVID-like symptoms increased (Fig. 4).

DISCUSSION

Social media can be used to gather and address rumors or popular beliefs among target audiences, share evidence-based and timely health information, get instant feedback on materials, conduct distance learning, raise awareness about a project, mission, and events, and more. As an increasing number of individuals search online for health information, social media platforms can both lead to the right life-saving action that individuals, families, and communities can take to reduce their risk, and the lightning-fast spread of dangerous coronavirus misinformation.

The biggest motivation for searching real-world case information on the Internet; most of the data is on the internet. Studies conducted in recent years have mostly focused on data in blogs or websites, and it has been stated that these data sources are seen as "common data" in predicting real-world cases.[11–13] For example, Fukuhara et al.[12] have successfully described "social thought patterns." They showed a correlation between blogs and real-world data.

Google Trends is a time series view of the number of search queries users that have submitted within a geographic area. In the health branch, Google Trends data were used up to 2014 according to 20 research papers. In epidemic forecasting, Google Trends is often used as a primary source for information about people who may have symptoms of a particular disease.[14]

The previous studies reviewed the relationship between outbreaks and internet search engine data. In these studies, the use of internet search engine data was evaluated in terms of monitoring infectious disease activity, epidemics, and mental health.[15–17] Our study is similar to these studies due to the use of Google Trends analysis as a methodology.

Coronaviruses were first described in 1966 and are non-segmented, positive-sense RNA viruses.[18] They infect humans as well as many animal species.[19] It is known that in the past 20 years, two major coronavirus-related outbreaks, defined as SARS-CoV and MERS-CoV, have occurred. Finally, the new type of coronavirus, identified as SARS-COV-2 in the past days of 2019, caused serious respiratory and systemic diseases, COVID-19, with a global impact. The COVID-19 pandemic is a pandemic caused by a new coronavirus called SARS-CoV-2, which originated in Wuhan, the capital of the Hubei region of China, that started on December 1, 2019. The epidemic later spread to various countries in Europe, North America, and Asia-Pacific. It was declared a pandemic by the World Health Organization on March 11, 2020. The first detected COVID-19 case in Türkiye of the worldwide COVID-19 outbreak was announced by the Ministry of Health on March 10, 2020.[20]

Recent studies have shown that the web and social media are good sources of data for the detection of flu-like diseases.[13,16,21,22] Searches related to flu-like diseases on Google were examined and compared with real-world data, and significant relationships were found between them.[13,23]

In another study, the trends of flu-related messages on blogs were evaluated and it was stated that there was a strong correlation between the weekly frequencies of the messages and the records kept in the Centers for Disease Control and Prevention about flu-like diseases[24] Szomszor et al.[22] stated that Twitter detects flu-like diseases about 1 week before the flu data reported by physicians. On the other hand, this study did not find a strong correlation between real-world data and online flu-related data. Although social media resources in other countries have a serious potential to detect such cases, the current situation in Türkiye is still insufficient.

One of the biggest reasons for this is that individuals in Türkiye do not use the internet regularly. However, it is thought that there will be an increase in the use of social media with the developments in technology and communication and this situation will change rapidly in developing countries such as Türkiye.

In our study, Google Trends was used as the search engine and data source, and the popularity of the search term was represented as a number defined as IOT. In our study, a strong negative correlation was found between Google Trends search popularity and green space (r=–0.0693, p<0.05, IQR=5.353). "Corona" term IOTs with the highest IOT among other terms were positively correlated with the proportion of patients with corona-like symptoms to all patients. This result shows that patients visit the emergency departments less due to non-urgent symptoms in the COVID-19 pandemic. Alicino et al.,[15] in their study, published in 2015, it was reported that there was a significant relationship between Google Trends activities and epidemiological data during the 2014 Ebola epidemic in West Africa. In another study, Malik et al.[25] Google found that syndromic indicators based on Flu Trends and emergency room data were strongly correlated with each other and with virological data during both waves of the 2009 H1N1 outbreak in Manitoba.

Due to the triage system recommendation of the Turkish Ministry of Health, emergency service applications are divided into green zones, yellow zones, and red zones. The meaning of these colors is considered, respectively, from the lowest level of urgency to the highest. In our study, 60.4% of the cases received green zone triage during the main pandemic study period. For this reason, it can be said that non-emergency cases are still high, although they are decreasing in this period.

It is noteworthy that in the past decade, social media has been seen as a practical tool for the exchange of thoughts and information, and the use of social media tools such as Facebook and Twitter has been expanded in the field of modern medicine.[26] Strengthened health messages allow interactive communication and integration with target audiences; this situation enables people to make safer and healthier decisions.[27] In our study, the decrease in pediatric emergency applications, especially green field applications, with the increase in search engines supports this information.

CONCLUSION

The annual number of pediatric emergency visits in Türkiye is 400,000, and most of them are unnecessary non-urgent applications. As a result of our study, it was determined that people avoided unnecessary applications such as fear, anxiety, mood changes, and non-urgent applications as a result of learning the transmission routes of COVID-19, the symptoms of the disease, morbid, and mortal results with the search term "corona" from the search engine. In addition, with this study, it has been seen that the use of search engines and social media data in the field of health information is increasing rapidly. It has been concluded that this development can prevent unrealistic emergencies in Türkiye and in the world. Public health programs must have a proactive presence in these information sharing areas to ensure access to reliable and accurate information.

Statement

Ethics Committee Approval: The Ümraniye Training and Research Hospital Clinical Research Ethics Committee granted approval for this study (date: 14.04.2020, number: 89).

Informed Consent: Written informed consent was obtained from patients who participated in this study.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept – SA; Design – SA; Supervision – SA; Resource – SA; Materials – SA; Data Collection and/or Processing – SA; Analysis and/or Interpretation – SA, NÖS; Literature Search – SA, NÖS; Writing – SA, NÖS; Critical Reviews – SA, NÖS.

Conflict of Interest: The authors have no conflict of interest to declare.

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