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RESEARCH ARTICLE

Impact of the COVID-19 pandemic on interest in renal diseases

Ozgur Akin Oto[1] · Sinan Kardeş[2] · Nurane Guller[1] · Seda Safak[1] · Ahmet Burak Dirim[1] · Yağmur Başhan[3] · Erol Demir[1] · Ayse Serra Artan[1] · Halil Yazıcı[1] · Aydın Turkmen[1]

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Abstract

There is an information gap about the public's interest in nephrological diseases in the COVID-19 era. The objective was to identify public interest in kidney diseases during the pandemic. In this infodemiology study, Google Trends was queried for a total of 50 search queries corresponding to a broad spectrum of nephrological diseases and the term "nephrologist." Two time intervals of 2020 (March 15–July 4 and July 5–October 31) were compared to similar time intervals of 2016–2019 for providing information on interest in different phases of the pandemic. Compared to the prior 4 years, analyses showed significant decreases in relative search volume (RSV) in the majority (76%) of search queries on March 15–July 4, 2020 period. However, RSV of the majority of search queries (≈70%) on July 5–October 31, 2020 period was not significantly different from similar periods of the previous 4 years, with an increase in search terms of amyloidosis, kidney biopsy, hematuria, chronic kidney disease, hypertension, nephrolithiasis, acute kidney injury, and Fabry disease. During the early pandemic, there have been significant decreases in search volumes for many nephrological diseases. However, this trend reversed in the period from July 5 to October 31, 2020, implying the increased need for information on kidney diseases. The results of this study enable us to understand how COVID-19 impacted the interest in kidney diseases and demands/needs for kidney diseases by the general public during the pandemic.

Keywords Kidney diseases; · Nephrology; · Nephrological diseases; · Nephrologist; · COVID-19; · Google Trends

Introduction

The coronavirus disease-2019 (COVID-19) pandemic has caused devastating effects all over the world (El-Sayed et al. 2021; Yin et al. 2021; Alola and Olowu 2020). Globally, a total of 70,829,855 confirmed cases of COVID-19, including 1,605,091 deaths, have been reported to the World Health Organization so far (WHO (World Health Organization) 2021). This pandemic, which deeply affected health systems and caused significant changes in nephrology practice as well.

Although the first publications at the beginning of the epidemic reported that renal complications of COVID-19 were low (Deng et al. 2020; Guan et al. 2020), later publications revealed that individuals with kidney disease are vulnerable to this disease (Kliger and Silberzweig 2020). Also, it was found that COVID-19-related acute kidney injury (AKI) was several times higher in USA data (Arentz et al. 2020) compared to the previous Chinese series (Yang et al. 2020). Kidney transplant operations were stopped in many centers during the pandemic. The reasons for this were COVID-19 test limitations that prevented the detection of infected donors and recipients, the incomplete understanding of the transmission dynamics of SARS-COV2, and the possibility of de-novo immunosuppression worsening the course of COVID-19 (Loupy et al. 2020; Lentine et al. 2020). Indeed in the studies in our group and Turkish Society of Nephrology, the mortality of COVID-19 in renal transplant patients 12.5% and 11.1% respectively (Ozturk et al. 2020; Demir et al. 2020). Also, both nephrologists and patients faced difficult decisions regarding the management of glomerular diseases (Bomback et al. 2020).

Health systems have struggled to cope with the increasing spread of the infection and many clinics/wards have converted to COVID-19 units. Therefore, important disruptions

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✉ Ozgur Akin Oto
maviozgurluk@gmail.com

[1] Department of Nephrology, Istanbul Faculty of Medicine, Istanbul University, Istanbul, Turkey

[2] Department of Medical Ecology and Hydroclimatology, Istanbul Faculty of Medicine, Istanbul University, Istanbul, Turkey

[3] Department of Nephrology, Haseki Education Research Hospital, Istanbul, Turkey

occurred in the delivery of routine health services. Mobilization restrictions, problems in accessing healthcare facilities, and the effective role of nephrologists in combating the COVID pandemic restricted the patient's access to the nephrologist. The widespread use of telemedicine applications as a result of digitalization in health systems and disruptions in the health system might lead to an increased interest in internet-based searches in the population.

Google Trends ™ is a widely used tool to monitor Big Data by analyzing Google ™ search engine queries (Mavragani and Ochoa 2019). It is possible to analyze the relative search volume (RSV) and obtain information about trends in public interest in a particular subject with Google Trends ™, which is also used to analyze the temporal and geographical trends of search queries (Mavragani and Ochoa 2019; Kardeş and Kardeş 2021; Doepker et al. 2021). In many studies, Google Trends ™ has proven to be worthwhile for investigating epidemics and surveying public interest (Eysenbach 2009; Mavragani and Ochoa 2019; Kardeş 2021). This tool has been used in previous outbreaks including Influenza (Lampos et al. 2015; Lu et al. 2018) and Zika virus (Teng et al. 2017). Besides, population-level interest in several fields such as urology (Bhambhvani et al. 2020), rheumatology (Kardeş et al. 2021a, 2021b), dermatology (Kutlu 2020; Esen-Salman et al. 2021), plastic surgery (Dhanda et al. 2020), pediatric neurosurgery (Güdük et al. 2021), and otolaryngology (Pier et al. 2020) during the COVID-19 pandemic has been investigated analyzing Google Trends data. These studies show that it is possible to integrate Google Trends into the medical field as a valuable source of epidemiological data for monitoring the public interest.

During the pandemic, there is an information gap about the public's interest in nephrological diseases and nephrologists. This information enables us to understand how COVID-19 has impacted the interest in nephrology-related conditions. Thus, this report aims to identify public interest in nephrological diseases and nephrologists during the pandemic.

Methods

Google Trends provides information on online search patterns of Google search engine. The search frequency is represented as relative search volume (RSV) indexed to all search quires. RSV values scaled from 0 to 100; wherein 100 corresponds to the highest interest for a particular search query (Google Trends 2020).

Search queries corresponding to a broad spectrum of nephrological diseases and related conditions were chosen. The total of 51 search queries were as follows: Minimal change disease, nephrotic syndrome, nephritic syndrome, focal segmental glomerulosclerosis, nephropathy, membranous nephropathy, glomerulonephritis, membranoproliferative glomerulonephritis, IgA nephropathy, thin basement membrane disease, Goodpasture disease, lupus nephritis, amyloidosis, hemolytic uremic syndrome, atypical hemolytic uremic syndrome, kidney biopsy, hematuria, proteinuria, diabetic nephropathy, chronic kidney disease, hypertension, renovascular hypertension, kidney cyst, autosomal dominant polycystic kidney disease, Alport syndrome, congenital kidney, nephrolithiasis, nephrocalcinosis, acute interstitial nephritis, chronic interstitial nephritis, vesicoureteral reflux, acute kidney injury, renal replacement therapy, hemodialysis, peritoneal dialysis, kidney transplantation, renal rejection, antibody-mediated rejection, end-stage renal disease, urinary tract infection, cystitis, pyelonephritis, neurogenic bladder, renal mass, renal cell carcinoma, C3 glomerulopathy, obstructive nephropathy, Fabry disease, pulmonary-renal syndrome, renal osteodystrophy, and nephrologist.

On November 19, 2020, Google Trends was queried and its results were downloaded for each search keyword in the "United States," from January 1, 2016, to November 19, 2020, selecting the "All categories." Two time intervals of 2020 (March 15–July 4 and July 5–October 31) were compared to similar time intervals of 2016 – 2019 for providing information on interest in different phases of the pandemic. To investigate changes in RSV between time intervals, we applied generalized estimation equations selecting the gamma model. All analyses were conducted in SPSS V.21.0 statistical package (IBM Corp.). A p-value <0.05 was considered to indicate statistical significance. Presentation of results are based on the recent review (Misra et al. 2021).

Results

In the March 15–July 4, 2020, time interval, the RSV for 38 among the 51 search terms (i.e., nephrotic syndrome, nephritic syndrome, focal segmental glomerulosclerosis, nephropathy, glomerulonephritis, membranoproliferative glomerulonephritis, IgA nephropathy, thin basement membrane disease, Goodpasture disease, hemolytic uremic syndrome, kidney biopsy, hematuria, diabetic nephropathy, chronic kidney disease, renovascular hypertension, kidney cyst, autosomal dominant polycystic kidney disease, Alport syndrome, congenital kidney, nephrolithiasis, nephrocalcinosis, acute interstitial nephritis, vesicoureteral reflux, hemodialysis, kidney transplantation, renal rejection, antibody-mediated rejection, urinary tract infection, cystitis, pyelonephritis, neurogenic bladder, renal mass, renal cell carcinoma, C3 glomerulopathy, obstructive nephropathy, pulmonary-renal syndrome, renal osteodystrophy, and nephrologist) were significantly lower; but 2 search queries (i.e., acute kidney injury, and amyloidosis) were significantly higher compared to previous 4 years (Table 1).

Table 1 Relative search volume (RSV) of nephrological diseases and nephrologist

	March 15–July 4				July 5–October 31			
	2020	2016–2019	% Change	*P* value	2020	2016–2019	% Change	*P* value
Minimal Change Disease	34.5 ± 4.84	37.97 ± 2.12	- 9.14	0.512	28.38 ± 2.28	35.81 ± 1.81	- 20.75	0.011
Nephrotic Syndrome	62.75 ± 1.87	71.78 ± 1.43	- 12.58	<0.001	68.53 ± 1.9	67.57 ± 1.23	+ 1.42	0.674
Nephritic Syndrome	33.56 ± 2.69	42.09 ± 1.78	- 20.27	0.008	40.24 ± 3.28	35.5 ± 1.85	+13.35	0.209
Focal Segmental Glomerulosclerosis	32.8 ± 3.29	41.32 ± 1.83	- 20.62	0.024	33.06 ± 2.66	38.75 ± 1.64	- 14.68	0.069
Nephropathy	53.43 ± 1.66	64.68 ±1.40	- 17.39	<0.001	63.58 ± 1.77	64.35 ± 1.42	- 1.20	0.736
Membranous Nephropathy	29.5 ± 2.32	35.09 ±1.72	-15.93	0.053	32.47 ± 2.96	35.1 ± 1.4	- 7.49	0.422
Glomerulonephritis	52.44 ± 2.72	64.25 ± 1.6	- 18.38	<0.001	50.71 ± 2.24	49.78 ± 1.18	+1.87	0.715
Membranoproliferative Glomerulonephritis	28.9 ±2.36	41.56 ± 2.25	- 30.46	<0.001	33.3 ± 2.73	40.12 ± 2.12	- 17.00	0.049
IgA Nephropathy	49.19 ± 3.13	63.48 ± 1.75	- 22.51	<0.001	51.88 ± 2.58	62.72 ± 1.84	- 17.28	0.001
Thin Basement Membrane Disease	28.33 ±1.51	41.02 ± 2.2	- 30.94	<0.001	32.62 ±2.31	37.52 ± 1.45	- 13.06	0.073
Goodpasture Disease	36.07 ± 3.17	45.38 ± 2.21	- 20.52	0.016	45.13 ± 4.45	41.58 ± 1.89	+ 8.54	0.463
Lupus Nephritis	47.44 ± 2.39	46.56 ± 1.48	+ 1.89	0.757	54.12 ± 2.08	50.56 ± 1.73	+ 7.04	0.189
Amyloidosis	36.81 ± 2.46	27.13 ± 0.72	+35.68	<0.001	46.18 ± 1.2	30.87 ± 1.46	+ 49.60	<0.001
Hemolytic Uremic Syndrome	17.31 ± 1.78	24.91 ± 1.51	- 30.51	0.001	15.7 ± 1.05	20.56 ± 0.86	- 23.64	<0.001
Atypical Hemolytic Uremic Syndrome	27.33 ±3.61	36.03 ±1.91	- 24.15	0.033	27.08 ± 1.00	38.29 ± 2.41	- 29.28	<0.001
Kidney Biopsy	37.56 ± 2.91	51.08 ±1.77	- 26.47	<0.001	60.71 ± 4.35	50.12 ±1.75	+ 21.13	0.024
Hematuria	59.25 ± 1.44	70.56 ± 1.14	- 16.03	<0.001	74.41 ± 1.66	69.66 ± 1.38	+ 6.82	0.028
Proteinuria	64.69 ± 2.72	65.42 ± 1.49	- 1.12	0.813	70.41 ± 3.43	65.31 ± 1.35	+ 7.81	0.167
Diabetic Nephropathy	40.06 ± 2.64	48.27 ± 1.63	- 17.01	0.008	46.29 ± 4.41	48.4 ± 1.81	- 4.36	0.657
Chronic Kidney Disease	60.81 ± 1.42	65.73 ± 1.02	- 7.49	0.005	73.82 ± 2.84	64.1 ± 1.11	+ 15.16	0.001
Hypertension	69.75 ± 2.6	64.41 ± 0.99	+ 8.29	0.055	69.00 ± 1.63	63.44 ± 1.06	+ 8.76	0.004
Renovascular Hypertension	23.07 ± 2.06	34.83 ± 2.35	- 33.76	<0.001	27.23 ± 3.71	28.04 ± 1.35	- 2.89	0.837
Kidney Cyst	47.37 ± 3.13	66.06 ± 1.31	- 28.29	<0.001	67.52 ± 2.53	67.66 ± 1.37	- 0.21	0.963
Autosomal Dominant Polycystic Kidney Disease	23.35 ± 2.51	30.54 ± 1.44	- 23.54	0.013	32.12 ± 3.24	27.92 ± 1.32	+ 15.04	0.23
Alport Syndrome	27.37 ± 2.2	37.53 ± 1.98	- 27.07	0.001	33.0 ± 2.32	32.42 ± 1.41	+ 1.79	0.833
Congenital Kidney	36.75 ± 3.09	48.3 ± 2.05	- 23.91	0.002	39.12 ± 3.32	46.11 ± 1.93	- 15.16	0.069
Nephrolithiasis	58.12 ± 1.49	63.48 ± 1.75	- 8.44	0.020	70.88 ± 1.81	65.41 ± 1.42	+ 8.36	0.018
Nephrocalcinosis	27.12 ± 2.46	38.32 ± 1.57	- 29.23	<0.001	33.82 ± 2.09	35.67 ± 1.45	- 5.19	0.468
Acute Interstitial Nephritis	11.25 ± 0.97	14.56 ± 0.86	- 22.73	0.011	11.88 ± 1.12	13.63 ± 0.84	- 12.84	0.214
Chronic Interstitial Nephritis	35.12 ± 4.18	41.37 ± 2.28	- 15.11	0.190	36.40 ± 3.83	43.12 ±3.18	- 15.58	0.177
Vesicoureteral Reflux	36.56 ± 3.15	49.71 ± 1.68	- 26.45	<0.001	41.88 ± 3.2	44.82 ± 1.99	- 6.56	0.436
Acute Kidney Injury	58.87 ± 1.75	50.65 ± 1.92	+ 16.23	0.002	70.23 ± 2.91	54.79 ± 1.59	+ 28.18	<0.001
Renal Replacement Therapy	29.87 ± 2.12	34.47 ± 1.45	- 13.34	0.074	31.64 ± 2.00	32.52 ± 1.83	- 2.71	0.745
Hemodialysis	68.06 ± 1.92	75.71 ± 1.21	- 10.10	0.001	72.47 ± 2.54	71.89 ± 1.14	+ 0.81	0.837
Peritoneal Dialysis	65.75 ± 2.90	68.65 ± 1.32	- 4.22	0.362	68.29 ± 2.75	66.75 ± 1.53	+ 2.31	0.624
Kidney Transplantation	21.33 ± 2.25	27.33 ± 1.63	- 21.95	0.031	21.62 ± 2.29	24.66 ± 1.59	- 12.33	0.276
Renal Rejection	24.07 ± 1.71	33.54 ± 2.16	- 28.23	0.001	35.15 ± 4.21	33.67 ± 1.57	+ 4.40	0.742
Antibody Mediated Rejection	26.22 ± 2.23	43.4 ± 3.18	- 39.59	<0.001	33.85 ± 3.30	40.16 ± 2.60	- 15.71	0.133
End Stage Renal Disease	50.56 ± 2.65	55.42 ± 1.65	- 8.77	0.120	55.88 ± 2.68	60.67 ± 1.94	- 7.90	0.148
Urinary Tract Infection	65.06 ± 0.89	78.60 ± 0.66	- 17.23	<0.001	69.17 ± 1.12	80.25 ± 0.66	- 13. 81	<0.001
Cystitis	61.75 ± 1.48	72.68 ± 0.83	- 15.04	<0.001	70.88 ± 0.94	71.39 ± 0.80	- 0.71	0.677
Pyelonephritis	62.62 ± 1.80	72.03 ± 1.41	- 13.06	<0.001	76.17 ± 1.52	73.29 ± 1.18	+ 3.93	0.136
Neurogenic Bladder	53.00 ± 2.17	62.76 ± 1.50	- 15.55	<0.001	65.35 ± 2.48	60.94 ± 1.57	+ 7.24	0.134
Renal Mass	45.62 ± 3.06	59.78 ± 1.91	- 23.69	<0.001	59.35 ± 3.33	54.88 ± 1.44	+ 8.15	0.219
Renal Cell Carcinoma	48.12 ± 1.44	58.23 ± 1.06	- 17.36	<0.001	57.23 ± 1.90	58.60 ± 1.25	- 2.34	0.549
C3 Glomerulopathy	31.71 ± 3.61	40.66 ± 2.62	- 22.01	0.045	32.33 ± 1.89	43.77 ± 3.99	- 26.14	0.010
Obstructive Nephropathy	25.00 ± 0.40	36.50 ± 2.20	- 31.51	<0.001	27.33 ± 0.49	39.50 ± 3.66	- 30.81	0.001

Table 1 (continued)

	March 15–July 4				July 5–October 31			
	2020	2016–2019	% Change	*P* value	2020	2016–2019	% Change	*P* value
Fabry Disease	25.37 ± 2.22	28.67 ± 1.69	- 11.51	0.239	33.88 ± 1.51	26.83 ± 1.40	+ 26.28	0.001
Pulmonary-Renal syndrome	23.88 ± 2.50	29.23 ± 1.46	- 18.30	0.066	26.88 ± 3.37	27.08 ± 1.67	- 0.74	0.958
Renal Osteodystrophy	25.80 ± 2.71	33.20 ± 2.12	- 22.29	0.032	23.52 ± 3.12	28.50 ±1.63	- 17.47	0.159
Nephrologist	60.12 ± 2.64	66.92 ± 1.31	- 10.16	0.021	75.52 ± 1.83	69.89 ± 1.60	+ 8.06	0.021

Data are means ± standard error (generalized estimating equations)

In the July 5–October 31, 2020, time interval, the RSV for 8 among the 51 search queries (i.e., minimal change disease, membranoproliferative glomerulonephritis, IgA nephropathy, hemolytic uremic syndrome, atypical hemolytic uremic syndrome, urinary tract infection, c3 glomerulopathy, and obstructive nephropathy) were significantly lower; but 9 search queries (i.e., amyloidosis, kidney biopsy, hematuria, chronic kidney disease, hypertension, nephrolithiasis, acute kidney injury, Fabry disease, and nephrologist) were significantly higher compared to previous 4 years (Table 1, Fig. 1).

Discussion

Compared to the prior 4 years, analyses showed a significant decrease in RSV in the majority (75%) of search queries over the time interval of March 15–July 4, 2020, while only 2 search queries showed a significant increase. However, this downward trend has reversed dramatically after this period. In the time interval of July 5–October 31, 2020, analyses showed a significant decrease in RSV in only 8 search queries, while an increase in 9 search terms was detected. The RSV of the majority of search queries (about 70%) in this period was not

Fig. 1 The interest in nephrological diseases and nephrologist during the second phase of the pandemic (July 5–October 31, 2020)

significantly different from similar time intervals of the previous 4 years. The RSV values for the search queries amyloidosis and acute kidney injury increased significantly in both periods compared to the previous 4 years.

Our findings revealed that public interest in nephrological conditions and procedures were reduced in the early pandemic. This is in line with the earlier studies evaluating the public's interest in other fields in the COVID-19 era (Bhambhvani et al. 2020; Kardeş et al. 2021c; Esen-Salman et al. 2021; Dhanda et al. 2020; Maccarone et al. 2021). The shift of patient attention from nephrological diseases and associated conditions to COVID-19 may be responsible for these observations in our and previous studies. The frequent decision to "shut-down" and "stay-at-home" orders by local authorities and the rapid spread of the disease after mid-March might be the reason for patients' attention being focused on COVID-19. However, the lack of a significant change in RSV values for many terms in the second period compared to the previous 4 years indicated that interest in nephrological diseases and associated conditions is improved after the early COVID-19 episode, and returned to its prior levels. The recovery of public interest in nephrological diseases may be associated not only with increased perceptions of COVID-19-related risk, but also lack of knowledge about potential risks, particularly among individuals with kidney disease or under immunosuppressive therapy. Furthermore, in this period, RSV of amyloidosis, kidney biopsy, hematuria, chronic kidney disease, hypertension, nephrolithiasis, acute kidney injury, and Fabry disease was found to have increased implying an increased need for information on these kidney diseases. In this period, intensive research on Fabry disease, which is a genetic disease and is not related to COVID-19, was also found surprising.

Interestingly, RSV values for the terms "amyloidosis" and "acute kidney injury" were increased compared to the previous 4 years in both time intervals. We cannot explain this increase for the term "amyloidosis." However, various studies have reported that the incidence of AKI in patients with COVID-19 is between 3 and 15% and this is associated with increased mortality (Zhou et al. 2020; Sİpahİ et al. 2020; Adapa et al. 2020; Öztürk et al. 2021). Also, AKI rates are 14.5–50% in patients with severe COVID-19 infection in the intensive care unit (Zhou et al. 2020; Sİpahİ et al. 2020; Adapa et al. 2020; Öztürk et al. 2021; Dirim et al. 2021). As this condition is known to be associated with COVID-19 since the early stage of the pandemic, the initial increase in RSV for search query "acute kidney injury" is not unexpected. Regardless, this finding implies the public informational needs for both amyloidosis and acute kidney injury.

Although not statistically significant (p= 0.055), there was an upward trend in RSV values for the search query "hypertension" in the early stage of the pandemic compared to previous years. This increase reached statistical significance in the second period. Published studies highlighted the significantly higher prevalence of hypertension among COVID-19 patients (Esler and Esler 2020; Öztürk et al. 2020; Fang et al. 2020). Hypertension was the most frequent coexisting condition in the largest of several case series published during the COVID-19 outbreak from China (Guan et al. 2020). This increased interest in hypertension can be partly explained by this factor.

It is interesting to note that there was decreased RSV for "nephrologist" between March 15–July 4, 2020, compared to the previous 4 years; however, increased interest was detected in the July 5–October 31, 2020, time interval. Although many government agencies and health systems are working every day to control the spread of infection, patients with underlying kidney diseases and kidney transplantation are vulnerable to the devastating effects of the COVID-19 pandemic (Pakhchanian et al. 2021). The mortality rate associated with COVID-19 is higher in dialysis and transplant recipients than in the general population (Ozturk et al. 2020; Demir et al. 2020; Sİpahİ et al. 2020; Jager et al. 2020; Petrilli et al. 2020; Dheİr et al. 2020; Oto et al. 2021). Regardless, the increased internet searches for nephrologists imply the increased need for nephrologists in the COVID-19 pandemic.

One of the important aspects of the study was that the search for chronic kidney diseases, like all chronic diseases also decreased during the early pandemic period. As shown in the second period of the study, it was seen that after the first shock event of the pandemic, public increasingly searched key terms related to chronic kidney disease (such as amyloidosis, kidney biopsy, hematuria, chronic kidney disease, hypertension, nephrolithiasis, acute kidney injury) were investigated further. This may be due to general population getting used to living with the pandemic. Alternatively, the demand for chronic renal disease can no longer be delayed.

There are limitations that should be taken into account when interpreting our results. First, Google Trends only offer data of searches made on the Google search engine. However, as it corresponds to 85% of all internet searches (Statcounter 2020), it probably mirrors all online searches. In addition, Google Trends does not offer access to the demographic data of its users. Therefore, subgroup analyzes cannot be made and our results can only be interpreted as the interest of the general public. Lastly, this study could not provide any specific data for reasons underlying the changing trends in the public interest. Despite these limitations, this study provides important information about how COVID-19 has impacted the interest in nephrology-related conditions. This information enables nephrologists to address the changed public interest and to design effective ways to manage patients with kidney disease during the pandemic.

In conclusion, between March 15 and July 4, 2020, there were significant decreases in search volumes for many nephrological diseases compared to the previous 4 years. However, this trend reversed between July 5 and October

31, 2020. There was a marked increase in search volumes of amyloidosis, kidney biopsy, hematuria, chronic kidney disease, hypertension, nephrolithiasis, acute kidney injury, and Fabry disease. The increased need for information on these kidney diseases should be addressed. Furthermore, the search volume of the nephrologist showed an upward trend in the second period, indicating the need for nephrologists during the pandemic.

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Author contribution Ozgur Akin Oto planned the study, interpreted data, wrote the initial draft, and critically revised the manuscript. Sinan Kardeş planned the study, collected/analyzed/interpreted data, and critically revised the manuscript. Nurane Guller interpreted data and critically revised the manuscript. Seda Safak interpreted data and critically revised the manuscript. Ahmet Burak Dirim interpreted data and critically revised the manuscript. Yağmur Başhan interpreted data and critically revised the manuscript. Erol Demir interpreted data and critically revised the manuscript. Ayse Serra Artan interpreted data and critically revised the manuscript. Halil Yazıcı interpreted data and critically revised the manuscript. Aydın Turkmen planned the study, interpreted data, and critically revised the manuscript.

Data availability Data are available from the second author (SK) upon a reasonable request.

Declarations

Ethics approval and consent to participate Not applicable.

Consent for publication Not applicable.

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