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Original Article

Evaluation of the Effect of the COVID-19 Pandemic on the Distribution of Kidney Transplants in the World in 2019 and 2020

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ABSTRACT

Background The COVID-19 pandemic caused by SARS-CoV-2 has had adverse effects in every field. One of the affected areas is organ supply and transplantation. This study aimed to evaluate the impact of the pandemic period on the number of kidney transplants in 2019 and 2020 in countries with a population of 40 million and above.

Material and Methods We evaluated kidney transplants from living and deceased donors reported between 2019 and 2020 from the Global Observatory on Donation and Transplantation (GODT). We obtained the number of kidney transplants in countries with a population of 40 million and over before and after the COVID-19 pandemic.

Results The total number of kidney transplants performed in 2019 and 2020 of countries with a population of 40 million or more, which sent data to the GODT database, were respectively: Sudan 313 and 139, Algeria 270 and 91, Argentina 1,675 and 854, Spain 3,423 and 2,702, Colombia 947 and 526, Republic of Korea 2,293 and 2,280, Italy 2,139 and 1,907, France 3,643 and 2,595, UK 3,649 and 2,567, Thailand 679 and 712, Germany 2,132 and 1,909, Iran 2,101 and 1,240, Turkey 3,863 and 2,498, Philippines 300 and 132, Ethiopia 35 and 8, Japan 1,913 and 1,697, Mexico 2,976 and 913, Russian Federation 1,473 and 1,124, Bangladesh 205 and 155, Nigeria 164 and 165, Pakistan 1,306 and 129, Brazil 6,298 and 4,830, United States 24,273 and 23,644, India 9,751 and 5,486, China 12,124 and 11,037.

Conclusions Compared to 2019, deceased and living kidney transplants increased only in Thailand in 2020, while kidney transplants in other countries have decreased. Countries where deceased kidney transplants increased in 2020, were Thailand, Korea, and the United States. Total kidney transplants in Turkey decreased by 35.4% in 2020 compared to 2019.

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Introduction

The number of patients diagnosed with SARS-CoV-2 in the world in 2020 is 83,999,379.[1] According to the World Health Organization (WHO) data, 1,937,987 patients died in 2020.[2] 2.3% of all patients with SARS-CoV-2 infection died. The COVID-19 pandemic caused by SARS-CoV-2 has had adverse socio-cultural, economic and health effects. Organ supply and transplantation were also one of the affected areas. This study aimed to evaluate the impact of the pandemic period on the number of kidney transplants in 2019 and 2020 in countries with a population of 40 million and above.

Material and Methods

According to the Global Observatory on Donation and Transplantation (GODT) data, kidney transplants from living and deceased donors reported between 2019 and 2020 were examined.[3] The number of kidney transplants in countries with a population of 40 million and over before and after the COVID-19 pandemic was obtained.

Results

The number of kidney transplants performed in 2019 and 2020 (*Figure 1*) of countries with a population of 40 million or more, which sent data to the GODT database, were respectively: Sudan 313 and 139 (-55.59%), Algeria 270 and 91 (-66.30%), Argentina 1,675 and 854 (-49.01%), Spain 3,423 and 2,702 (-21.06%), Colombia 947 and 526 (-44.46%), Republic of Korea 2,293 and 2,280 (-0.57%), Italy 2,139 and 1,907 (-10.85%), France 3,643 and 2,595 (-28.77%), UK 3,649 and 2,567 (-29.65%), Thailand 679 and 712 (4.86%), Germany 2,132 and 1,909 (-10.46%), Iran 2,101 and 1,240 (-40.98%), Turkey 3,863 and 2,498 (-35.34%), Philippines 300 and 132 (-56.00%), Ethiopia 35 and 8 (-77.14%), Japan 1,913 and 1,697 (-11.29%), Mexico 2,976 and 913 (-69.32%), Russian Federation 1,473 and 1,124 (-23.69%), Bangladesh 205 and 155 (-24.39%), Nigeria 164 and 165 (-0.61%), Pakistan 1,306 and 129 (-90.12%), Brazil 6,298 and 4,830 (-23.31%), United States America (USA) 24,273 and 23,644 (-2.59%), India 9,751 and 5,486 (-43.74%), and China 12,124 and 11,037 (-8.97%). Compared to 2019, deceased and living kidney transplants increased only in Thailand in 2020. The number of kidney transplants in other countries has decreased.

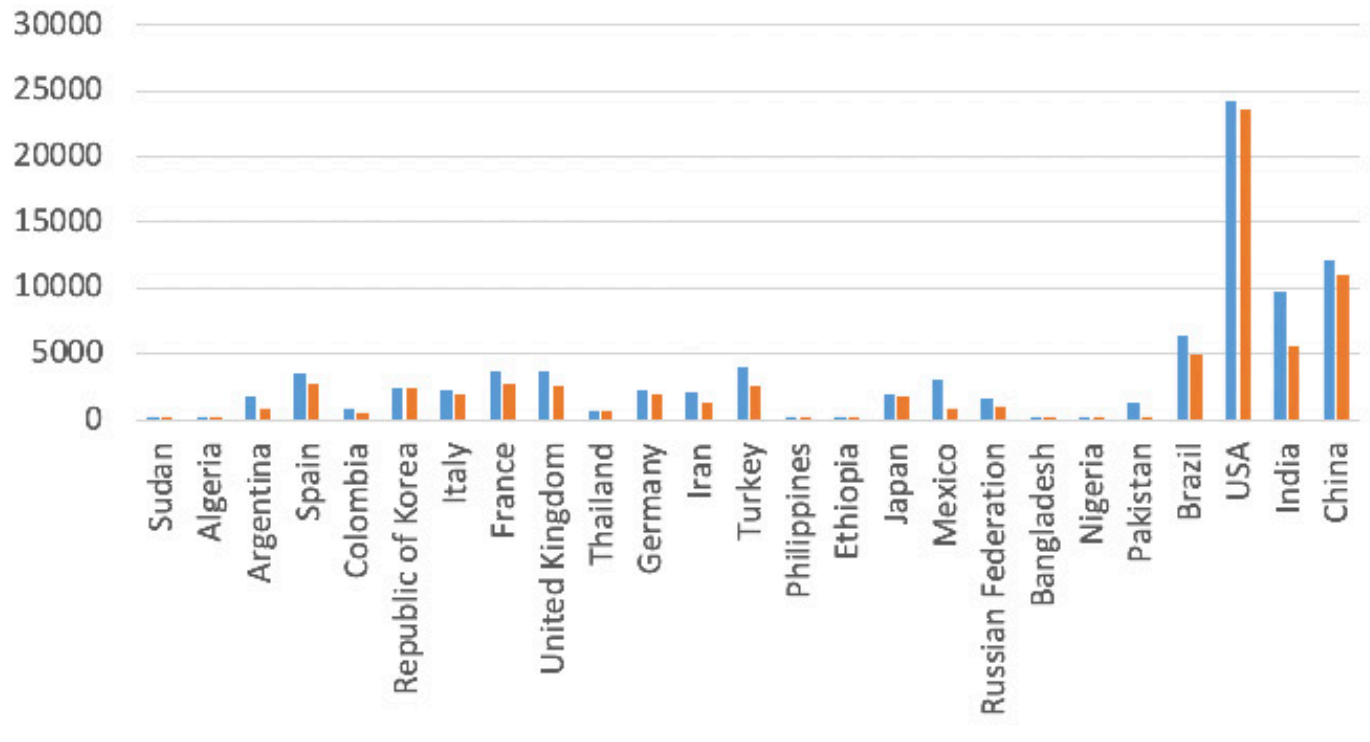

Figure 1. Total number of kidney transplants performed in 2019 and 2020.

The mean change in the total number of kidney transplants in these countries was -32.77±25.96%.

There was no transplant from a deceased donor in Sudan, Ethiopia, Bangladesh, Nigeria and Pakistan in 2020. When we compared 2019 and 2020 years, the changes in the number of kidney transplants from deceased donors in other countries were as follows: Algeria -100%, Argentina -45.32%, Spain 3-20.89%, Colombia -47.14%, Republic of Korea 6.80%, Italy -9.78%, France -29.62%, UK -23.52%, Thailand 3.21%, Germany -9.49%, Iran -39.44%, Turkey -69.18%, Philippines -29.41%, Japan -38.70%, Mexico -69.44%, Russian Federation -25.04%, Brazil -16.11%, USA 5.77%, India -54.66%, and China -9.53%. The three countries where the number of kidney transplants from deceased donors increased in 2020 compared to 2019 were the Republic of Korea, the USA, and Thailand (*Figure 2*). The mean change in kidney transplantation from a deceased donor in these countries was -31.07±27.71%.

Transplant numbers from living donors had decreased in all countries except Thailand (*Figure 3*). The changes in the number of transplants from living donors by country in 2019 and 2020 were as follows: Sudan -55.59%, Algeria -66.04%, Argentina -62.96%), Spain -22.69%, Colombia -32.96%, Republic of Korea -4.47%, Italy -16.47%, France -23.53%, UK -45.40%, Thailand 12.61%, Germany -13.46%, Iran -43.78%, Turkey -26.38%, Philippines -57.60%, Ethiopia -77.14%, Japan -7.55%, Mexico -69.27%, Russian Federation -14.21%, Bangladesh -24.39%, Nigeria -0.61%, Pakistan -90.12%, Brazil -58.45%, USA -23.78%, India -42.30%, and China -5.59%. The mean change in kidney transplantation from a living donor in these countries was -34.88±26.84%.

Discussion

The COVID-19 pandemic negatively affected the numbers of living and deceased kidney transplants in countries with 40 million and above, outside of Thailand, in 2019 and 2020. Only in Thailand has the number of kidney transplants increased. Total kidney transplants in Turkey decreased by 35.4% in 2020 compared to 2019. The rate of kidney transplants from living donors among all transplantations in Turkey increased from 79.13% in 2019 to 90.04% in 2020. In the USA,

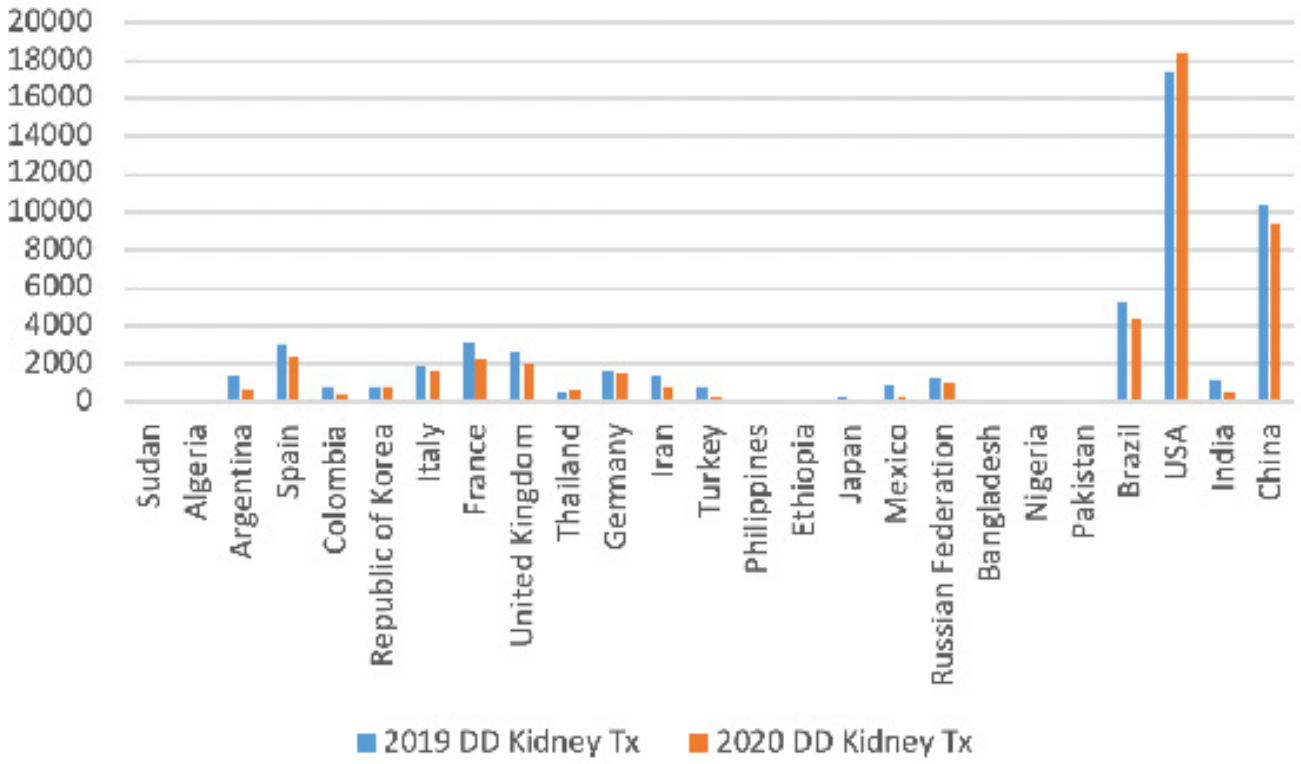

Figure 2. Number of kidney transplants from deceased donors (DD) in 2019 and 2020.

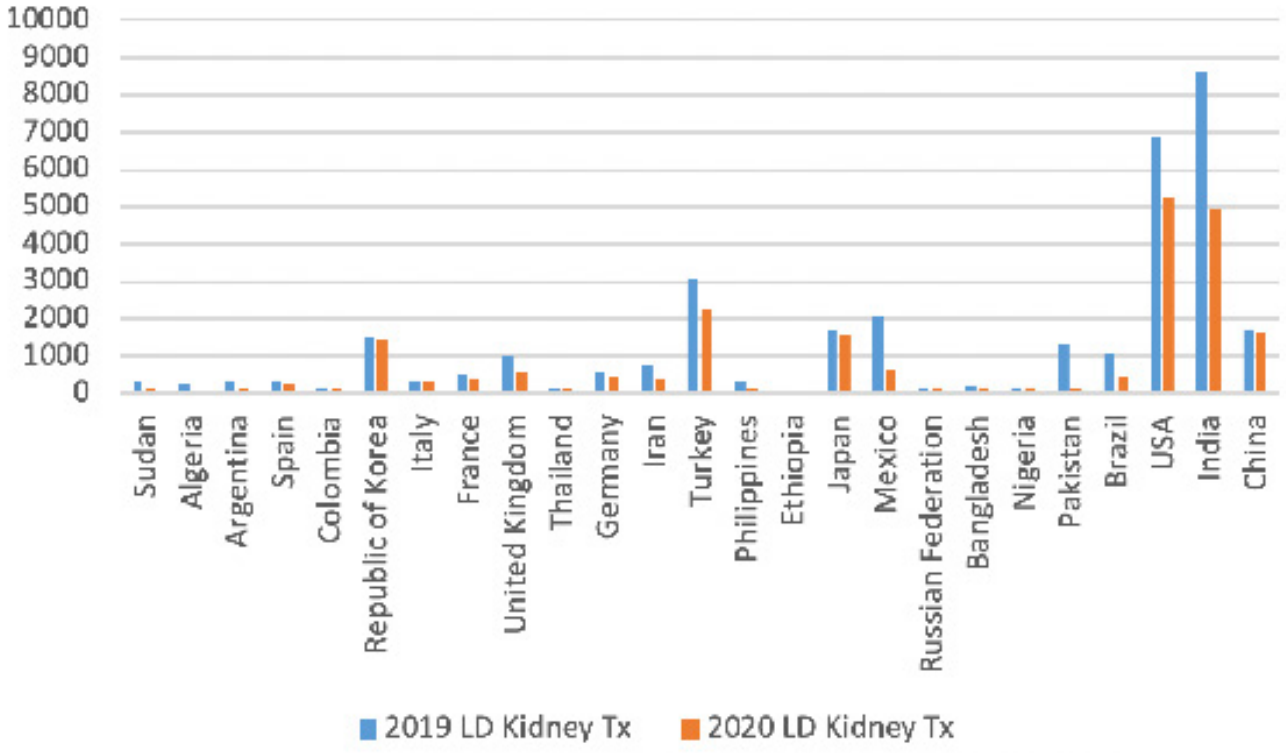

Figure 3. Number of kidney transplants from living donors (LD) in 2019 and 2020.

which has the highest transplant numbers, total kidney transplants decreased by 2.59% compared to 2019. However, the rate of transplants from deceased donors increased by 5.77%. The Organ Procurement Organization (OPO) activities in the states affiliated to the United Network for Organ Sharing (UNOS), which is used for organ harvesting in the USA, could have positively affected this increase.[4]

The COVID-19 pandemic also adversely affected the organ donation rates and organ supply in kidney transplantation.[5] During the pandemic period, transplant centres prioritized the management of patients with COVID-19 and the safety of healthcare personnel.[6] They have made different approaches periodically in living or deceased kidney transplantations.[7] In particular, the number of donations from living donors has decreased in most countries.

In some countries, the number of families applying for donations has decreased significantly. The limitation of face-to-face meetings between the coordinator and donor family members, which included emotional support and visual explanations regarding the medical condition, may have been effective in this decrease. In addition, intensive care units' increasing care for patients with COVID-19 infection and less detection of brain death may be another factor. Fewer donors have been admitted to the intensive care unit in Israel, and the number of donor organs has decreased.[8]

A group of researchers reviewed transplantation statistics from the World Health Organization website on June 15, 2021.[9] Comparing the average of global kidney transplant statistics between 2010 and 2019 with 2020 statistics, they found a significant decrease in kidney transplants from living donors. In Brazil, the number of solid organ transplants decreased significantly in 2020, and the number of active patients on the kidney transplant waiting list increased.[10] A Mexican study also found that transplants decreased more in public institutions than in private institutions (89% vs 57%).[11] COVID-19 has also negatively affected transplantation activities in general (public) transplantation centres in India.[12]

Conclusions

When we compared the years 2019 and 2020 in countries with populations of 40 million or more, the median changes were -28.76% (range: -90.12% to 4.86%, 25 countries) in total kidney transplantation, -27.22% (range: -100% to 6.80%, 20 countries) in deceased donor transplantation and -26.38% (range: -90.12% to 12.61%, 25 countries) in transplants from living donors.

As in the whole world, kidney transplantation activities in our country have slowed down during the pandemic. The Health Ministry declared the first official COVID-19 case in Turkey on March 11, 2020. The COVID-19 pandemic severely affected kidney transplantation in our country throughout 2020. The number of kidney transplants decreased from 3,863 in 2019 to 2,498 in 2020 (-35.34%). In 2020, the transplant rate from a deceased donor was 10%. This rate was generally low in the 18-25% band. This rate confirms a severe reduction in the activity of transplantation from deceased donors, which is already low. In our country, the decrease in organ transplantation from a deceased donor (from 808 in 2019 to 249 in 2020; -69.18%) was higher than in kidney transplantation from a living donor (from 3,055 in 2019 to 2,249 in 2020; -26.38%). This difference may be due to the decrease in brain death reporting and organ donation during the pandemic. Interestingly, the pre-emptive transplant rate increased from 46.1% in 2019 to 53.6% in 2020.[13]

As a result, many centres had to suspend kidney transplant activities due to the pandemic. Therefore, the COVID-19 pandemic has adversely affected the number of kidney transplants worldwide and in our country.

Acknowledgment

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Conflict of interest

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

Authors' Contribution

Study Conception: EE; Study Design: EE, MS, AE; Supervision: AE; Materials: EE, KS, RO; Data Collection and/or Processing: EE, KS, RO, SEGB, MÇÇ, KÖG, AY, AO; Statistical Analysis and/or Data Interpretation: EE, AE; Literature Review: AE, EE; Manuscript Preparation: EE, AE; Critical Review: AE.

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