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SAFETY AND EFFECTIVENESS OF COVID-19 SPUTNIK V VACCINE IN DIALYSIS PATIENTS

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Abstract **Introduction:** Given the vulnerability of chronic kidney disease individuals to SARS-CoV-2, nephrology societies have issued statements calling for prioritization of these patients for vaccination. It is not yet known whether COVID-19 vaccines grant the same high level of protection in patients with kidney disease compared to the non-dialysis population. The aims of this study were to evaluate the safety - measured by the adverse events potentially attributed to vaccines (ESAVI) - and the effectiveness - evaluated by the presence of antibodies - in dialysis patients immunized with the COVID-19 Sputnik V vaccine. **Methods:** multicenter, observational and analytical study of a prospective cohort of hemodialysis patients from the *Ciudad Autónoma de Buenos Aires* participating in an official vaccination program. Dialysis requiring individuals older than 18 years, who received both components of the COVID-19 vaccine were included. **Results:** Data from 491 patients were included in the safety analysis. ESAVI with either the first or second component was detected in 186 (37.9%, 95% CI 33.6%-42.3%). Effectiveness analysis measuring antibodies levels against SARS-CoV-2 were performed in 102 patients; 98% presented these IgG antibodies at day 21 after the second component. In patients with COVID-19 prior to vaccination, antibodies at day 21 after the first component reached almost the highest levels compared to patients without previous COVID-19, but IgG rise among patients with previous COVID-19 was lower than in those without this previous disease. **Conclusion:** The Sputnik V vaccine has been shown to be safe and effective in this patient's population.

Key words: COVID-19 vaccines, dialysis, serologic tests

Resumen ***Seguridad y efectividad de vacuna COVID-19 SPUTNIK V en pacientes en diálisis*** **Introducción:** Dada la vulnerabilidad al SARS-CoV-2 de las personas con enfermedad renal crónica, las sociedades de nefrología han emitido declaraciones pidiendo priorizar a estos pacientes para la vacunación. Aún no se sabe si las vacunas COVID-19 confieren el mismo nivel de protección en pacientes con enfermedad renal. Los objetivos de este estudio fueron evaluar la seguridad, medida por eventos supuestamente atribuidos a las vacunas (ESAVI) y la efectividad, evaluada por la presencia de anticuerpos en pacientes en diálisis inmunizados con la vacuna COVID-19 Sputnik V. **Métodos**: estudio multicéntrico, observacional y analítico de una cohorte prospectiva de pacientes en hemodiálisis, en la Ciudad Autónoma de Buenos Aires, con plan de vacunación. Se incluyeron pacientes mayores de 18 años en diálisis que recibieron ambos componentes de la vacuna COVID-19. **Resultados:** 491 pacientes fueron incluidos en el análisis de seguridad. Se detectó ESAVI con el primer o el segundo componente en 186 (37.9% IC 95%: 33.6%-42.3%). La efectividad medida por presencia de anticuerpos IgG contra SARS-Cov-2 se realizó en 102 pacientes, 98% presentaba IgG contra SARS-CoV-2, 21 días después del segundo componente. En pacientes con COVID-19 previo a la vacunación, los anticuerpos al día 21 del primer componente alcanzaron niveles casi mayores que en aquellos que no habían sufrido COVID-19, aunque el aumento de los niveles a los 21 días del segundo componente fue menor que en los pacientes sin COVID-19 previo. **Conclusión:** Los pacientes en diálisis constituyen una población vulnerable para la infección por SARS-CoV-2, por lo tanto, más allá de las recomendaciones implementadas por las unidades de diálisis, la vacunación completa es mandatoria. Se ha demostrado que la vacuna Sputnik V es segura y eficaz en esta población de pacientes.

Palabras clave: vacunas COVID-19, diálisis, pruebas serológicas

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KEY POINTS
Evidence before this study

- In the face of COVID pandemic, dialysis patients represent a population at high risk of severe outcomes. The COVID Registry of the Argentine Registry of Dialysis (Registro Argentino de Diálisis) showed that COVID infection affected 12% of this population, and that mortality was 11 times higher compared to the general population.
- Several SARS-CoV-2 vaccines have been shown to be safe and effective in preventing COVID-19 in the general population, but its performance in dialysis patients is unclear given the lack of appropriated trials carried out in this population.

Contribution

- First published report on the safety and efficacy of the Sputnik V vaccine in dialysis patients.
- Sputnik V vaccine has been shown to be safe and effective in this patient population.

The World Health Organization (WHO)[1] recommends vaccination against coronavirus disease 19 (COVID-19) as an essential primary prevention tool to limit the health and economic effects of the pandemic. As a consequence, having effective and safe vaccines in the short term, which can be used in a national strategy, will help to reduce the incidence of illness, hospitalizations and deaths related to COVID-19 and to gradually reestablish a new normality in the functioning of our country.

On December 23 (2020), the National Administration of Medicines, Food and Medical Technology (ANMAT) submitted the report on the Sputnik V vaccine to the National Ministry of Health to advance in the Emergency Authorization of a batch series of Sputnik V vaccine, which - according to preliminary phase 1, 2 and 3 studies - confer immunogenicity[2, 3].

After the emergency authorization of the Sputnik V vaccine, other vaccines were approved for use, including the recombinant ChAdOx1-S vaccine from AstraZeneca[4, 5] and the Sinopharm vaccine[4]. All of them demonstrated efficacy as was reported in several publications[2, 4, 6]. Effectiveness refers to the protection provided by the vaccine as measured in observational studies that include people with underlying medical conditions who have been receiving preparations from different healthcare providers under real-world conditions.

So far, there are no observational or epidemiological studies demonstrating the performance in those individuals vaccinated for COVID-19 in Argentina, and therefore evaluating their effectiveness and reactogenicity. The safety profile and reactogenicity of vaccines is a central element for their acceptance in the population. If a vaccine is perceived as too reactogenic, the involved subject may refuse additional doses, or the healthcare professional may choose not to recommend it. Therefore this can lead to incomplete protection of the individual and low rate of vaccination in a given population[7,8].

Maintaining a high immunization coverage is critical to the success of any vaccination program. A few years ago, it was able to consider the concept “no pain, no gain”, assuming that, if a vaccine does not produce inflammation as a “proxy” for pain, the immune response achieved was poor, leaving a common belief that a reaction in the place of injection to a vaccine is a predictive sign of a desirable vaccine response[9].

The Argentine Ministry of Health (*Ministerio de Salud de la Nación Argentina*)[10] , designed the Strategic Plan for vaccination against COVID-19 in Argentina[11], being one of its specific objectives to establish essential priority axes to evaluate vaccination goals: coverage rates, continuous safety and effectiveness monitoring of vaccines, in association with the epidemiological impact that vaccination produces on COVID-19[11].

Kidney disease substantially increases the risk of severe COVID-19. Considering the relative efficacy of the current therapeutic strategies available to reduce hospitalizations and mortality from COVID-19, effective and safe vaccination is currently the only genuine option to limit the ongoing pandemic and reduce SARS CoV-2 infections. Throughout 2020, several vaccines were licensed for emergency use, and many more are in development and in progress of approval[12].

Dialysis patients constitute a population at risk, not only because of their vulnerability to COVID-19, but because they cannot adhere with social isolation since they must go to dialysis almost three times per week. The COVID Registry of the Argentine Registry of Dialysis (Registro Argentino de Diálisis) showed that COVID infection affected 12% of the dialysis population to date, and that mortality was 11 times higher compared to the general population[13].

Given the vulnerability of people with chronic kidney disease (CKD) to COVID-19, nephrology societies, such as the UK Kidney Association and the US National Kidney Foundation, have issued statements calling for prioritization of these patients for vaccination. The Argentine Society of Nephrology (Sociedad Argentina de Nefrología – SAN) timely presented it to the National Ministry of Health, which has considered the priority of this patient population. However, it is not yet known whether COVID-19 vaccines offer the same high degree of protection in kidney diseased individuals as that obtained in healthy controls, as reported for participants in several current trials[14].

Numerous SARS-CoV-2 vaccines have been shown to be safe and effective in preventing COVID-19 in the general population[1-3]. But dialysis patients were not included in any of the previously reported trials performed.

Further studies testing most of the available vaccines have been performed or are already in progress in dialysis

patients; most of them, show a seroconversion rate of 67% to 100% which is similar to that obtained in the general population[15-27].

At the present time only two papers refer to the safety of COVID immunization in dialysis patients (17-20); both of them report the results observed from a single category of vaccine. Therefore, it is critical that as dialysis units begin to vaccinate their patients, adverse events are reported and post-vaccination antibody levels are monitored to determine optimal immunization schedules. It should be noted that to date no study have been reported the results with the use of the Sputnik V vaccine in patients on maintenance dialysis.

The aims of this study were to evaluate the safety measured by the events potentially attributed to the vaccine and the effectiveness evaluated by the presence of antibodies in dialysis patients immunized with the COVID-19 Sputnik V vaccine.

A previous version of this manuscript has been shared in medRxiv, a free online archive and distribution server for complete but unpublished manuscripts (preprints) in the medical, clinical, and related health sciences[28].

Materials and methods

The study was approved by the Ethics Committee of the Alberto C Taquini Institute for Translational Medicine Research, School of Medicine, Buenos Aires University (*Facultad de Medicina, Universidad de Buenos Aires*). For the effectiveness study, based on the measurement of antibodies, informed consent was requested. The study protocol was registered in ClinicalTrials.gov Identifier: NCT04944433

A multicenter, observational and analytical study was carried out on a prospective cohort of hemodialysis patients in the Autonomous City of Buenos Aires (*Ciudad Autónoma de Buenos Aires*) participating in an official vaccination program. The date of inclusion in the cohort was the start date of vaccination. Dialysis-requiring patients older than 18 years who received both components of the COVID-19 vaccine were included.

Safety-related data were collected; events potentially attributed to immunization (ESAVI) after receiving the Sputnik V vaccine, the history of COVID-19 prior to inoculation and the presence of symptomatic COVID-19 after it. Demographic and kidney disease-related (type of dialysis - hemodialysis or peritoneal; kidney transplant- as well as time on renal replacement therapy) information was obtained This information was retrieved by the health professionals of the individual centers who were in charge of the dialysis sessions of the patients using an epidemiological file designed for this study.

Immunoglobulin G (IgG) antibody titles against SARS-CoV-2 were assumed as effectiveness parameter The "COVIDAR IgG" test, which is registered in ANMAT, was used for the determination of antibodies. The test detects antibodies in blood and serum that the immune system produces for the new coronavirus, specifically against two viral antigens: the spike protein (S) and the receptor-binding domain (RBD). It is performed on plates that allow testing 96 sera at the same time using the technique known as ELISA, the same one used, for example, for the detection of HIV and hepatitis B infection. The COVIDAR IgG test detects the presence of IgG qualitatively and semi-quantitatively. In the semi-quantitative determination, the values are measured in absorbance levels (DO) with a maximum of 3.3 and an inferior limit of detection of 0.3. The processing of the samples and the performance of the ELISA, both for detection of the SARS-CoV-2 were carried out by the virology laboratory of the School of Medicine, Buenos Aires University (Facultad de Medicina - Universidad de Buenos Aires) - and the measurements were carried out before the administration of the first component, at 21 days of the same and at 21 days of the second component.

A sample size of 369 patients was estimated, for the safety end-point considering a prevalence of ESAVI with the Sputnik V vaccine[29] of 60% with a precision of 5% and a 95% confidence interval (95%CI).

For the effectiveness end-point, considering a published phase 1 and 2 results of the Sputnik V vaccine study (2) and assuming that the vaccinated population in Buenos Aires will have the same behavior as reported, the following sample scenarios were evaluated:

a) For a difference of IgG antibody titers between 0 and 21 days of 1.24 with a standard deviation (SD) of 1, a power of 90% and an alpha error of 0.01, in a two-tailed hypothesis test, the resulting sample size is 11 individuals.

b) For a delta of IgG antibodies between 14 and 21 days of 0.57, and SD of 1, a power of 90% and an alpha of 0.01, for a two-tailed hypothesis test, the optimal sample size is 49.

Adjusting for a 20% loss to follow-up and considering that the immunogenicity of these patients is lower than that of the general population, the calculated sample size was estimated to be 100.

In the descriptive analysis, quantitative data were expressed as median and interquartile range (IQR) according to their distribution. Qualitative data were expressed as absolute (n) and relative (%) frequencies. To allow external comparisons with other publications, we also defined a dichotomous classification in ≤ 55 or > 55 years old individuals. For the comparisons according to the presence of ESAVI, the T or Wilcoxon test was used for the quantitative data according to their distribution and the Chi square or Fisher test according to the assumptions.

The proportion of patients with ESAVI was estimated with a 95% CI. To evaluate the factors associated with the presence of ESAVI, a multiple logistic regression was performed, considering as independent variables those statistically significant in the bivariate analysis and those that were clinically significant according to the research team. The crude Odds ratio (OR) with their 95% CI are reported.

A fixed random effect model was used to compare the immunoglobulin G levels for coronavirus type 2 that causes severe acute respiratory syndrome. A level of statistical significance less than 5% was considered. The analysis was carried out with software R version 4.0.3

The COVIDAR group provided the serokits for sampling and the ELISA COVIDAR IgG kits, supported by *Fondo para la Convergencia Estructural del Mercosur(FOCEM)* and *Asociación Civil Siempre Ayuda Nunca Dañes (SAND).* None of the funding sources provided economical support for the data collection, statistical analysis, or were used to write the manuscript, or to submit it for publication.

Results

A total of 996 patients were immunized with the two components of the Sputnik V vaccine and 491 were included for the safety analysis. Of them, 186 people, 37.9% (95% CI 33.6%-42.34%) presented at least one ESAVI, with either the first or second component: 112 (28.3%) with the

first component, and 99 (20.2%) with the second. The administration of antipyretics before the second component was reported by 60 patients (12.2%). Of 99 individuals who had ESAVI - both with the first and second component -, 54 (54.5%) perceived symptoms resulting worse with the second component than with the first; while 13 (13.1%) perceived that with the second component, they suffered from fewer symptoms, and for 32 (32.3%) the symptoms resulted almost identical. Table 1 shows the characteristics of the whole cohort and the comparison according to the presence or absence of ESAVI with any component of the vaccine.

There were 355 ESAVI, because some patients had more than one ESAVI. No events of special interest were observed (vaccine-augmented disease; multisystemic inflammatory syndrome; respiratory distress; acute heart failure; cardiomyopathy; arrhythmias; coronary artery disease; myocarditis; acute kidney failure; acute liver failure; Guillain Barré; encephalopathy; acute disseminated encephalomyelitis; transverse myelitis; seizures; meningoencephalitis; thromboembolism; thrombocytopenia vasculitis; acute septic arthritis; erythema multiforme; perineum erythema; anaphylaxis)

Of the total ESAVI, the most frequent was pain at the injection site with both components of the vaccine, new or worse muscular pain and fever. All ESAVI were more frequent with the first component except pain at the injection site, which was the same in both components and vomiting that was more frequent with the second component. Figure 1 shows the frequency of ESAVI globally and after each component.

Considering having any ESAVI with either the first or the second component, any allergy prior to vaccination, being 55 years or younger and renal transplantation were predictors of ESAVI (Table 2)

Eighteen patients had COVID-19 infection after the first component, fifteen of them were symptomatic, 17 of them were detected by PCR; only in one patient the diagnosis was for epidemiological link. The median of time (days) lasting between the first component and COVID-19 was 23.5 with a minimum of 2 and a maximum of 65 days. All cases were mild.

The effectiveness analysis measuring antibodies against SARS-Cov-2 was performed in 102 patients, fifty of whom (49.0%) were female, with median age of 51.6 years (IQR 39.8-62.0) and 42; older than 55 years (41.0%). Sixteen patients (15.7%) suffered from COVID-19 prior to vaccination.

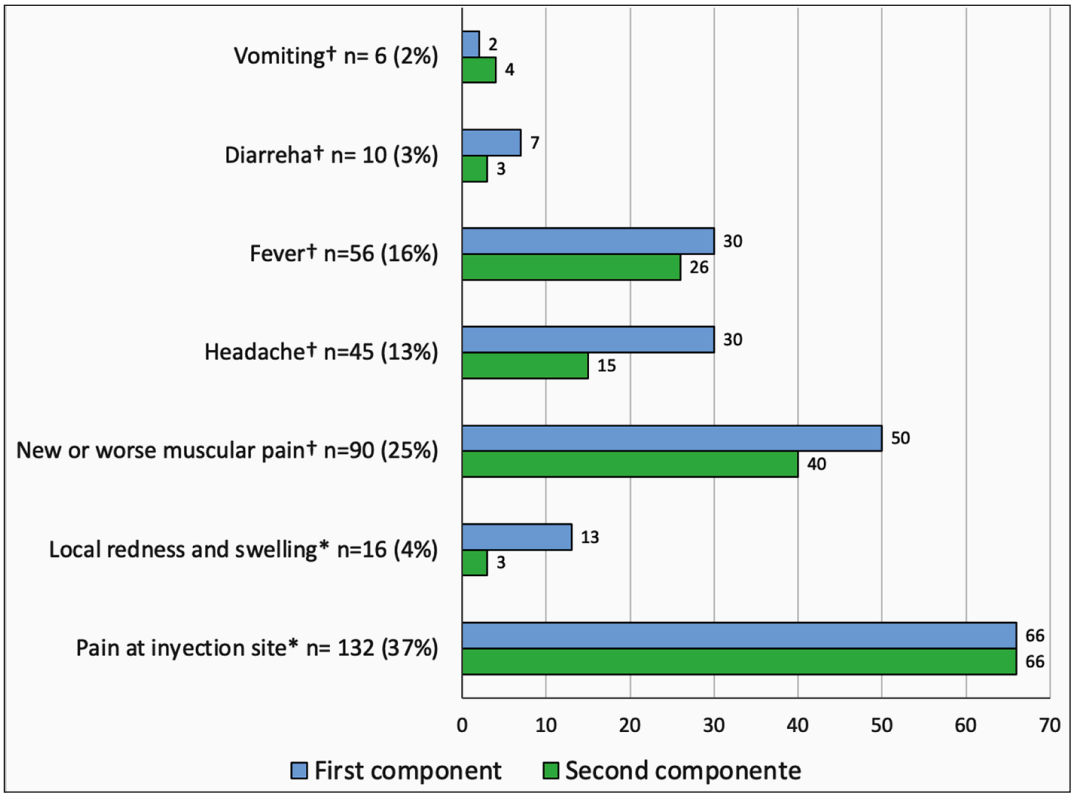
The median time from the diagnoses to the administration of the first component was 7.0 months (IQR 6-8). Median time for the administration of the second

TABLE 1.– *Characteristics of 491 patients and comparison according to the presence or absence of events supposedly attributed to vaccination-immunization (ESAVI) with any component of the Sputnik V vaccine*

Characteristics	Total n = 491	ESAVI n = 186	NO ESAVI n = 305	p valor
Female[1]	194 (39.5)	81 (43.5)	113 (37.0)	0.182
Age in years at first component[2]	54.3 (43.3-64.2)	50.1 (38.3-60.2)	57.1 (46.5-65.5)	<0.001
>50 years[1]	242 (49.3)	71 (38.2)	171 (56.1)	< 0.001
Hemodialysis[1]	470 (95.7)	177 (95.2)	293 (96.1)	0.802
Time on dialysis in years[2]	3.6 (1.8-5.8)	3.5 (1.8-6,4)	3.6 (1.8-5.2)	0.284
Comorbidities				
Vaccine allergies[1]	15 (3.1)	11 (5.9)	4 (1.3)	0.009
Diabetes[1]	109 (22.2)	32 (17.2)	77 (25.2)	0.049
High blood pressure[1]	299 (60.9)	108 (58.1)	191 (62.6)	0.363
Hepatitis C[1]	10 (2.0)	6 (3.2)	4 (1.3)	0.189
Hepatitis B[1]	0	0	0	
HIV[1]	4 (0.8)	1 (0.5)	3 (1)	0.999
Dyslipemia[1]	86 (17.5)	25 (13.4)	61 (20.0)	0.083
Coronary heart disease[1]	30 (6.1)	12 (6.5)	18 (5.9)	0.958
Epilepsy[1]	9 (1.8)	4 (2.2)	5 (1.6)	0.736
Autoimmune diseases[1]	26 (5.3)	13 (7.0)	13 (4.3)	0.271
Malnutrition[1]	15 (3.1)	4 (2.2)	11 (3.6)	0.523
Kidney transplant[1]	59 (12.0)	36 (19.4)	23 (7.5)	<0.001
COVID before vaccination[1]	66 (13.5)	29 (15.6)	37 (12.2)	0.280
NSAIDs prior to vaccination[1]	60 (12.2)	22 (11.8)	38 (12.4)	0.948

[1]*n (%)* [2]*median (IQR)*

Fig. 1.– Local and systemic reactions in dialytic patients, globally and after each component of Sputnik V COVID-19 vaccine received (n = 355)



*Local reactions, †Systemic reactions

component was 2.8 month (IQR 2.7- 2.9). Twenty seven of the 102 patients (26.5%), had positive IgG against SARS-CoV-2 at baseline, and 13 did not refer previous COVID-19, which implies a rate of asymptomatic COVID disease of 13/102 = 12.7%. Median time in dialysis was 2.9 years (IQR 1.5-5.6).

Nine patients were diagnosed of COVID-19 between the first and the second component and 6 had positive antibodies measured 21 days after the first component, and all had positive IgG 21 days after the second component.

Ninety eight percent of the patients had positive IgG against SARS-Cov-2 antibodies 21 days after the second component. Among the 16 patients that had COVID-19 before the first component, fourteen had positive IgG at baseline measure and only two hadn't got positive IgG 21 days after the second component (Fig. 2).

Neither of these two patients, who did not show IgG at day 21, had COVID-19 between the first and the second component. Both patients had hemodialysis as renal replacement therapy (RRT); one was male and the other female with ages of 71 and 55 years old. Only the 71 years old man presented a mild adverse reaction to vaccine.

There were differences in the levels of IgG antibodies in each time measure between patients with or without COVID-19 prior to vaccination. The first group had higher levels in every measure. Patients without COVID-19 had the baseline measure under the detection limit (<0.38). Both groups of patients showed a significant rise in the level of IgG in the 3 measures (Table 3).

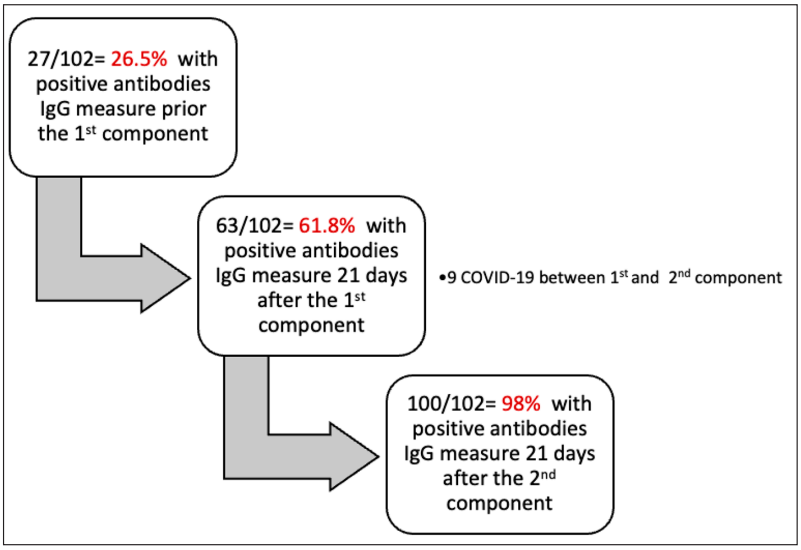
In patients with COVID-19 prior to vaccination, antibodies at day 21 after the first component reached almost the highest levels compared to those patients who did not have COVID-19, and the rise between the first and second measures was lower than in patients without prior COVID-19 (Table 3, Fig. 3).

TABLE 2.– *Predictor of Events Supposedly Attributed to Vaccines and Immunizations (ESAVI) in dialysis requiring patients after Sputnik V COVID-19 vaccine*

Predictor	Cr OR	CI 95%	p value	Ad OR	CI 95%	p value
Sex						
Male	Reference					
Female	1.3	0.9-1.9	0.153	1.2	0.8-1.5	0.268
Age						
> 55	Reference					
≤ 55	2.1	1.4-3.0	<0.001	1.8	1.2-2.6	0.005
Any allergy prior to vaccination						
None	Reference					
Yes	4.7	1.6-17.3	0.009	4.6	1.4-17	0.014
Diabetes						
No	reference					
Yes	0.6	0.4-0.9	0.039	0.9	0.5-1.5	0.622
High blood pressure						
No	Reference					
Yes	0.8	0.6-1.2	0.316	1.2	0.8-1.9	0.357
Dislipemia						
No	Reference					
Yes	0.62	0.4-1.0	0.065	0.7	0.4-1.2	0.184
Kidney transplantation						
No	Reference					
Yes	2.9	1.7-5.2	<0.001	2.5	1.4-4.6	0.003
Nonsteroidal anti-inflammatory drugs prior vaccination						
No	Reference					
Yes	0.9	0.5-1.6	0.836	0.9	0.5-1.5	0.615
Time on dialysis in years	1.0	0.9-1.1	0.435	1.0	0.9-1.0	0.786

crOR = crude odds ratio; adOR = adjusted odds ratio; CI 95% = confidence interval 95%

Fig. 2.– Flowchart of the sequence of acquired antibodies against SARS-CoV-2 (n: 102)



Reference 9 COVID-19 between 1st and 2nd component: Nine patients were diagnosed of COVID-19 between the first and the second component and 6 had positive antibodies measured 21 days after the first component, and all had positive IgG 21 days after the second component

TABLE 3.– *Comparison of antibodies presence against SARS-Cov-2 in two groups, with and without previous COVID-19, at two periods of time after vaccination*

Measure	No COVID-19 before vaccination	COVID-19 before vaccination	p value between groups
Baseline	0.22 (0.20-0.24)	2.54 (2.04-2.89)	< 0.001†
21 days after 1est component	0.35 (0.22-1.14)	3.37 (3.34-3.4)	< 0.001†
21 days after 2nd component	3.24 (1.96-3.37)	3.38 (3.36-3.40)	< 0.001†
P value intra group	p < 0.001*	< 0.001*	

†*wilcoxon test comparing median in each time measure by group whether had COVID = 19 before vaccination or not*
**random effect fixed model comparing median in 3 measures in each group whether had COVID-19 before vaccination or not*

Fig. 3.– Change in antibodies IgG level against SARS-CoV-2 in each measure in groups with or without previous COVID-19

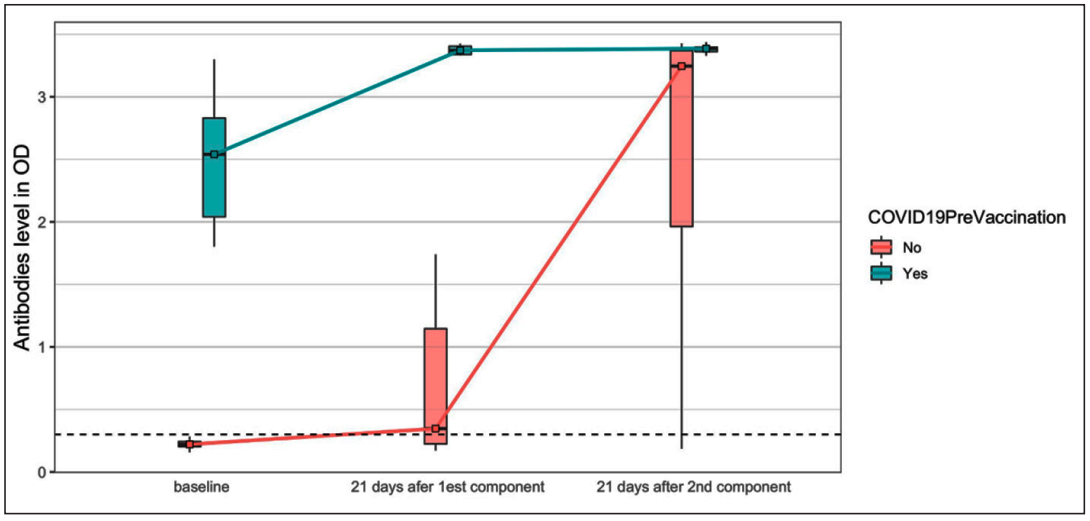


Figure shows change in antibodies levels in each measure in patients according to whether they had or not COVID-19 before vaccination. Solid lines join to the median in each box plot. Dash line shows measure under detection limit (no reactive)

Discussion

This study shows that Sputnik V COVID-19 vaccine in dialysis patients had a low rate of ESAVI and highly remarkable immunogenicity. Regarding adverse events, none of those reported adverse events were considered as major adverse event, being the most frequent pain at the injection site with both components of the vaccine. Considering systemic symptoms, new or worsening muscle pain and fever were the most frequent although, none of the ESAVI, required hospitalization. ESAVI were less frequent compared to phase 2 and 3 studies of the vaccine and also lower compared to the ESAVI in health workers[29]. This could be due to the widespread use of antipyretics prior to vaccination. Studies in dialysis patients with BNT162b2 mRNA COVID-19 vaccine showed that also local pain was the most frequent ESAVI in dialysis patients, while diarrhea, fatigue and myalgia the most frequent systemic manifestations[18-21]. Symptoms were less frequent with the second component. We found that young age and a history of allergy or recent transplantation were associated with a higher frequency of adverse events.

Regarding the seroconversion rate, almost 40% of the patients did not achieve a detectable anti-SARS-Cov-2 IgG antibody titer with the first component, but had a significant increase after the administration of the second component. Patients with COVID-19 prior to vaccination reached almost maximum levels of antibodies at 21 days of the first component, remaining stable at 21 days of the second. Almost 98% of our population had detectable

antibodies after vaccination at that time. Hypo-response to vaccines, in general, has been described in dialysis patients, in vaccination against hepatitis B, which shows a seroconversion of only 40-70% compared to more than 95% in healthy controls[30], attributing associated factors such as age, the presence of diabetes, poor nutritional status and altered innate and adaptive immune response[31]. However, in our experience, the level of seroconversion with the two Sputnik V components was, on the contrary, much higher, and has already been described with other COVID-19 vaccines in dialysis patients[21-24, 32, 33], thus highlighting the importance of a complete vaccination in these individuals[21-24]. It is noteworthy that patients who presented COVID-19 after the first Sputnik V component had mild forms of the disease, as has been already seen in the general population[34].

The case of patients who had detectable anti-SARS-Cov-2 IgG antibodies before the first dose, without a clinical history of COVID-19, thus considered asymptomatic patients, has been already described in the literature[35, 36]. This group of patients as well as those with known COVID-19 presented a significant seroconversion with the first component[21]. This characteristic is not reported in most of the published studies, since these patients were generally excluded. Here the presence of SARS-CoV-2 infection was not associated with a higher frequency of ESAVI. Recent studies show that the majority of patients with COVID-19 prior to vaccination develop robust and durable immune responses at 6 months, with less than 5% displaying no evidence of humoral and cellular immunity[37, 38]. However, preliminary studies carried out with another category of vaccine showed that in the case of those immunized without previous infection, there was a drop in antibody levels at six months, considering the need for a third dose afterwards[39,40]. In this context, identifying which subgroup of dialysis patients would need a booster dose according to their characteristics, comorbidities and type of vaccine received deserves to be investigated in the coming months.

Our work has the strength of being the first published report on the safety and efficacy of the Sputnik V vaccine in dialysis patients, especially considering that this vaccine has not yet been recognized by the WHO. The weakness of this study was not being able to evaluate cellular immunity. Two reports[18, 24] found a cellular immunity (T response) close to 60% of those vaccinated, less than humoral immunity found in our study, which was almost 100%. In any case, the effectiveness of the vaccines applied in dialysis patients will be demonstrated by the reduction in the symptomatic infection rate as well as the fatality rate.

Dialysis patients constitute a vulnerable population for SARS-Cov-2 infection, beyond the recommendations that were implemented by dialysis units[41], full vaccination is necessary and also a strong priority. The Sputnik V vaccine has been shown to be safe and effective in this patient population.

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So he had two great aptitudes -the power to see what was really there and the more mysterious flair for distinguishing between the important and the trivial- whether, in fact, what he was seeing was the tip of a vast, submerged iceberg or merely a passing ice-floe.

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