Assessment of Partial Renal Function in Children with Pyelonephritis During the Covid-19 Pandemic

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ABSTRACT

Annotation: The pathogenesis of kidney damage in SARS-CoV-2 infection is multifactorial. First, SARS-CoV-2 may have a direct cytopathic effect on the kidney. This is confirmed by the detection of coronavirus fragments by polymerase chain reaction in the urine of patients infected with COVID-19 [5]. **Purpose:** to assess partial kidney function in children with pyelonephritis against the background of COVID-19. **Materials and research methods:** Group I - we selected 50 children with pyelonephritis according to the medical records and outpatient cards of children infected with COVID-19 in Samarkand region. Group II Also, the data of 50 children with pyelonephritis who tested negative for COVID-19 in the period from 2020 to 2022 were included in the study**. RESULTS:** Thus, the involvement of the kidneys in the infectious process was detected in every 8 children infected with COVID-19, often in the form of undifferentiated urinary syndrome, the frequency of its detection was related to the severity of the coronavirus infection: 31 of the patients in severe cases Proteinuria was found in 6%, hematuria in 21%, pyelonephritis in 10.5%. **Conclusion:** Our clinical observation shows that COVID-19, even if mild, causes exacerbation of pyelonephritis in children, and at the same time, it was found that chronic pyelonephritis often recurs**.**

Keywords: COVID-19, pyelonephritis, protienuria, microhematuria, sarcoiduria.

Relevance. The novel coronavirus disease (COVID-19), called severe acute respiratory syndrome coronavirus-2 (SARS-Cov-2), first appeared in Wuhan, China in December 2019 [1, 2]. Soon after, the World Health Organization (WHO) declared a global pandemic. As the virus traveled around the world, it disrupted many health systems. In early March 2020, the WHO reported a 13-fold increase in the number of confirmed cases outside of China (37,364 patients) and a tripling of the number of countries affected (113 countries) in 2 weeks. Thus, the WHO declared the new coronavirus infection (COVID-19, SARS-CoV-2) as a pandemic [2]. COVID-19 is the biggest challenge facing medicine and scientists in the world in modern times. The highly contagious and severe course of the disease has become a serious test for the global health system. Although SARS-CoV-2 primarily causes acute respiratory disease with diffuse alveolar damage and interstitial pneumonia, it can infect many parts of the body, including the heart, liver, kidney, gastrointestinal tract, central nervous system, and hematopoietic system. can affect the organs of the pleb [7]. Currently, there are very few pediatric data on acute kidney injury (pyelonephritis) associated with COVID-19.

The pathogenesis of kidney damage in SARS-CoV-2 infection is multifactorial. First, SARS-CoV-2 can have a direct cytopathic effect on the kidney. This is confirmed by the detection of coronavirus fragments by

polymerase chain reaction in the urine of patients infected with COVID-19 [5]. As previously mentioned, SARS-CoV-2 uses ACE2 to enter the host cell [2, 7]. Recent data from human tissue RNA sequencing showed that ACE2 expression in the kidney is almost 100-fold higher than in the respiratory organs (lung) [10]. In addition, ACE2 expression was detected in different parts of the nephron: in the kidney body (podocytes, mesangial cells), in the endothelium of the capillaries of the vascular ball, in the epithelial cells of the proximal tubules [1, 9, 13]. Consequently, most parts of the nephron are targets for COVID-19!

The purpose of the work: to assess partial kidney function in children with pyelonephritis against the background of COVID-19.

Materials and research methods

- Group I - we selected 50 children with pyelonephritis according to the medical records and outpatient cards of children infected with COVID-19 in Samarkand region.
- Group II Also, the data of 50 children with pyelonephritis who tested negative for COVID-19 in the period from 2020 to 2022 were included in the study.

All patients were examined using clinical, instrumental and laboratory methods. Clinical-laboratory examination methods of sheep were carried out in them: general blood and urine analysis; bacteriological examination of urine; determination of urea and creatinine in blood, total blood protein, procalcitonin, creatinine in urine, concentration ability of kidneys by Zimnitsky test.

Instrumental examination included ultrasound examination of kidneys and bladder.

Results: according to clinical, laboratory and instrumental examination, children with pyelonephritis were divided into two groups. The first group consisted of children with pyelonephritis who were infected with COVID-19 (n = 50), and the second group was a comparison group of children with pyelonephritis who were not infected with COVID-19 (n = 50).

Sick children were divided according to age and gender. When studying the incidence of boys and girls, it was noted that the incidence of pyelonephritis in girls was high, in the ratio of 1:2.5. This situation corresponds to the indicators in the studied literature and is related to the anatomical and physiological haracteristics of the urinary tract in girls

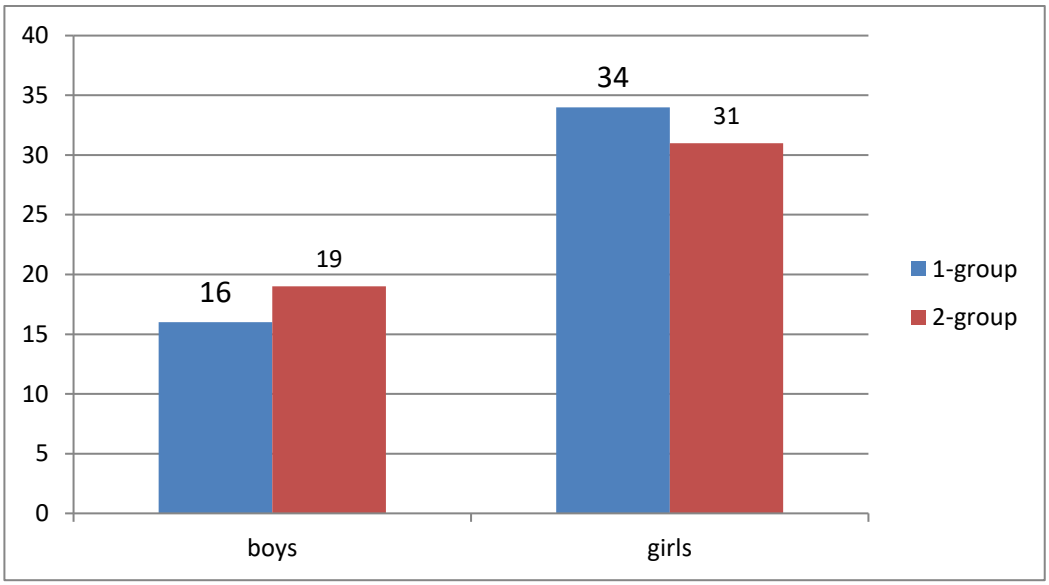
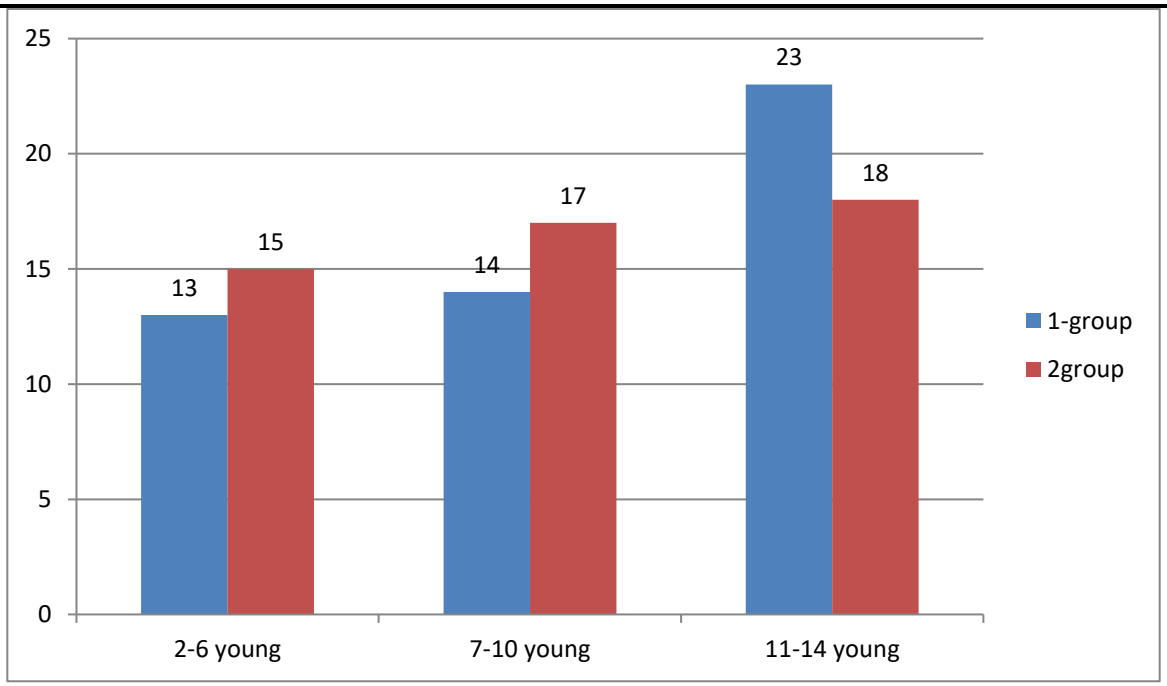


Figure 1. Distribution of sick children by gender

Sick children were also divided according to age groups. The average age of the children was 9±2.4 years.



To determine the level of activity of the inflammatory process in the kidneys, A.N. Inflammatory process activity index (IAFI), which is calculated by the scale of quantitative assessment of symptoms of acute pyelonephritis proposed by Avdeev (2006), was used. The level of activity of the inflammatory process is low if the score is up to 8 points, moderate if it is 9-16 points, and high if it is 17-24 points.

1- Table

Quantitative scale of symptoms of pyelonephritis

Criteria	**Scoring**		
	0 score	1 score	2 score
chills	no	average	strong
Increased arterial pressure	the norm	100 up to the mercury column	100 below the mercury column
Temperature	the norm	38 oS gacha	38oS higher than
Lumbar pain syndrome	no	average	strong
Amount of urea	the norm	12 up to mmol'/l	12 more than mmol'/l
The number of leukocytes in the blood	the norm	15 mln/l gacha up to mmol'/l	15 more than mmol'/l
Leukocyte formula shift	no	Neutrophils with rod nuclei up to 10	Neutrophils with rod nuclei are more than 10
Symptom of beating	(-)	average (+)	strong (+)
Pain on palpation of the kidney area	no	average	strong
Tension of the muscles of the front wall of the abdomen in the area of the kidneys	no	average	strong

Enlargement of kidney cyst during ultrasound examination	no	length up to 13.2 cm, thickness up to 5.8 cm length	over 13.2 cm, thickness more than 5.8 cm
Decreased echogenicity of renal parenchyma in ultrasound examination	no	moderately	moderatel strong
Non-uniformity of renal parenchyma in ultrasound examination	no	in a lesser field	sure
irregularity of kidney contours during ultrasound examination	no	it looks slow	it seems obvious
an increase in the thickness of the renal parenchyma during ultrasound examination	no	up to 1.9 cm	More than 1.9 cm
limitation of kidney mobility during breathing during ultrasound examination	haraka tchan	cheklangan	no

The frequency of kidney damage during the acute period of coronavirus infection is presented in the table below

Table-2
Incidence of kidney injury by severity of illness in children with COVID-19

Buyraklar shikastlanish xarakteri	**Severity of COVID-19**			**c^2, p**
	Light (n=278)	**Medium heavy (n=144)**	**Heavy (n=19)**	
undifferentiated urinary syndrome (n = 55)	15 (5,4%)	34 (23,6%)	6 (31,6%)	4,55< 0,05*
proteinuria (n = 36)	6 (2,2%)	24 (16,7%)	6 (31,6%)	5,82< 0,01*
hematuria (n = 16)	1 (0,4%)	11 (7,6%)	4 (21,0%)	7,33< 0,01*
leukocyturia (n = 12)	10 (3,6%)	2 (1,4%)	0	0,04> 0,5
OPP (n = 2)	0	0	2 (10,5%)	

Thus, the involvement of the kidneys in the infectious process was detected in the form of undifferentiated urine syndrome in every 8 children infected with COVID-19, the frequency of its detection was related to the severity of the coronavirus infection: 31.6 of the patients in severe cases Proteinuria was found in %, hematuria - in 21%, pyelonephritis - in 10.5%.

50 children who developed kidney damage (pyelonephritis) while infected with Covid-19 were selected for the study. At the primary examination of all patient children, their anamnesis data, objective examination results, clinical laboratory indicators, as well as special pathochemical examination results were analyzed.

In the analysis of patients' anamnesis, the relationship between their contact with patients infected with Covid-19, the period of appearance of clinical symptoms of Covid-19 and kidney damage was studied

Table 3
Initial demographic data and disease characteristics of sick children

Characteristics	**COVID-19+ pyelonephritis**	**COVID-19**	**p indicator**
Age	9±2,4	9±2,2	<0,05
Girl children	34	31	<0,05
Boys	16	19	<0,05
Body mass index (kg/m2)	19,4±1,4	18,8±1,2	<0,05
Contact with COVID-19 patients	84%	80%	<0,05
History of travel	16%	20%	<0,05
Comorbidities, %	96%	78%	<0,05

Clinical signs of pyelonephritis in the primary examination are presented in Table 4

Table 4
Frequency of clinical symptoms of pyelonephritis in patients

Disease symptoms	**Groups**			
	1- group		**2-- group**	
	абс	**%**	**абс**	**%**
Pain in the lower back	30	100	32	100
Increased urination	37	74	42	84
Imperative urges to urinate	4	8	17	34
Fatigue	50	100	50	100
Nausea	5	10	9	18
Vomiting	-	0	2	4
Headache	38	76	50	100
Dizziness	38	76	50	100
chills	44	88	49	98
Sweating profusely	50	100	50	100
Abdominal wall tension	16	32	30	60
Pain on palpation in the region of the kidneys	12	24	50	100
Paleness of the skin	46	92	50	100
Cyanosis of mucous membranes	3	6	4	8
Lumbar palpation symptom is positive	6	12	50	100
Increase in body temperature	50	100	50	100
Leukocyturia	10	20	50	100
Bacteriuria	14	28	50	100
Erythrocyturia	-	0	43	86

From the data of this table, it follows that the active phase of pyelonephritis: fever (100%), pain in the back (100%), general weakness (100%), malaria (96%), headache (100%)), accompanied by symptoms such as dizziness (100%), nausea (18%). Most of the patients had leukocyturia (100%), bacteriuria (100%), erythrocyturia (54.8%), positive symptoms of palpation in the lumbar area (100%). As we can see, in patients with pyelonephritis against the background of COVID-19, in the active stage of inflammation, symptoms of general intoxication of the body (fever, weakness, fever, headache, dizziness, nausea) and local symptoms of the disease (a positive symptom of palpitation, tension of the muscles of the abdominal wall, pain in the area of the kidneys) appears.

Conclusion: Our clinical observation shows that COVID-19, even if mild, causes exacerbation of pyelonephritis in children, and at the same time, it was found that chronic pyelonephritis often recurs.

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