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Urine Examination In Analysing The Severity Of Covid Infection

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Abstract :

Introduction :

Coronavirus is an RNA virus which affects the lung and leads to acute respiratory infection. RT-PCR test of nasopharyngeal and oropharyngeal swab is the confirmatory test to diagnose SARS-COV-2 infection. The comparison between SARS-COV-2 and body fluid parameters is still not known. There are very less studies correlating the SARS-COV-2 and body fluids. The aim of the study is to find the alternative ways in detecting the severity of covid infection with help of urine biochemical examination and to find an alternative way in detecting SARS covid 2 infection severity in patients.

Methods:

The study was conducted in Sree Balaji Medical College and Hospital from June 2020 to June 2021.. Totally 600 patients were selected,among them 300 RT-PCR positive Patients were selected from the corona isolation ward independent of the severity score in CT scan. 300 normal patients were selected . urine samples were collected for all the 600 patients and routine urine examination was done by semi automated urine analyser machine and statistical analysis was done .

Results:

Among 600 patients , 300 were normal patients had mild increase PH value 5.9 ± 0.77 , Specific gravity 1.022 ± 1.038 , U.blood 9(1.3%), U.glucose 8(1.1%), U.protein 12(2.1%), U.Leu E1(0.03%) and when compared with 300 covid positive patient , they had the PH value 7.0 ± 9.0 , Specific gravity 1.040 ± 0.010 , U.blood 221(72.3%), U.glucose 234(73.20%), U.protein 278(82.13%), U.Leu E1 228(72.8%). then the urine examination parameters were compared among different subgroups in covid positive patients depending upon the CT score grading , mild cases had U. blood in 10 mild group, 75 moderate group and 89 severe group with significant p value < 0.034 . Urinary leukocyte esterase observed in 6 mild cases, 12 moderate cases, 70 severe cases with significant p value < 0.045 . urinary protein (U. Pro) was observed in 12 mild cases, 62 moderate cases and 126 in severe cases with significant p value < 0.023 . Urinary glucose was observed in 8 mild cases, 46 moderate cases, 88 severe cases with significant p value < 0.043 . urinary Ketone positive for 8 mild cases, 40 for moderate cases and 88 severe cases with significant p value < 0.036 . urinary protein , urinary blood , urine Ph and urinary ketone bodies were elevated when compared to the healthy persons with significant p value < 0.05 . From this study we conclude that urine examination reports are directly proportional to the severity of covid infection.

Conclusion:

Urine examination parameters is directly proportional in grading the severity of the infection in covid patient and it plays an important role in determining the clinical diagnosis and treatment in covid patient.

Key words: SARS-COV-2 infection, Urinary occult blood, urinary protein, Urinary ketone and Urinary glucose.

Introduction:

Coronavirus is an RNA virus which affects the lung and leads to acute respiratory infection. (1) virus was discovered in China which causes severe ARSD in human beings .SARS-COV-2 virus spreads throughout the world from 2019 so the World Health Organization declared it as pandemic (2) . Due to decreased diagnostic test methods for identifying the virus ,it was a tuff situation in reporting and identifying the exact cause of the disease (3-5). Later we observed corona virus not only affects the lung it also affects the other organs like heart, kidney and intestine .Few studies have proved that the involvement of urinary system was common in patients infected with SARS-COV-2 so many studies very done to find the involvement of kidney in covid patient and diagnostic test methods in detecting and to find the factor in predicting progressive deterioration of kidney function. The comparison between SARS-COV-2 and body fluid parameters is still not known. There are very less studies correlating the SARS-COV-2 and body fluids .Many studies proved that urine examination have a significant role in detecting severity of covid infection in kidney. The aim of the study is to find the alternative ways in detecting the severity of covid infection and to know importance urine examination in analysis of severity of SARSCoV-2 infection in covid patient.

Materials and Methods :

The study was conducted in Sree Balaji Medical College and Hospital from June 2020 to June 2021.. Totally 600 patients were selected, among them 300 RT-PCR positive Patients were selected from the corona isolation ward and they subdivided into mild (100), moderate (100) and severe (100) infected patient according to the National Clinical Management Protocol (CT- grading) and 300 normal patients were selected . urine samples

were collected for all the 600 patients and routine urine examination was done by semi automated urine analyser machine and statistical analysis was done

The case groups are as follows:

1. Mild group- Patients with pneumonia and no signs of severe pneumonia;
2. Moderate -fever or suspected respiratory infection, plus any of the following like; respiratory rate >30 breaths/min, severe respiratory distress, SpO2 <0.05.
3. Severe- new or worsening respiratory symptoms within one week of known clinical or chest imaging showing bilateral opacities, not fully explained by effusions, lobar or lung collapse, or nodules.

Inclusion criteria:

1. All positive conformed cases for SARS-COV-2 infection were included in the group
2. Age group above 30yrs were included in the study

Exclusion criteria:

1. All positive cases with comorbid illness were excluded from the study
2. Age group below 30yrs excluded from the study

Statistical Analysis: Chi-square (χ^2) test was used to analyze the data. Mean \pm SD was done for normally distributed data and it was analyzed using t-test.

Result:

Among 600 patients , 300 were normal patients had mild increase PH value 5.9+0.77 ,Specific gravity 1.022+1.038, U.blood 9(1.3%), U.glucose 8(1.1%),U.protein 12(2.1%),U.LeuE1(0.03%) and when compared with 300 covid positive patient , they had the PH value7.0+9.0 ,Specific gravity 1.040+0.010 , U.blood 221(72.3%), U.glucose 234(73.20%) ,U.protein 278(82.13%) ,U.LeuE1228(72.8%) .then the urine examination parameters were compared among different subgroups in covid positive patients depending upon the CT score grading , mild cases had U.blood in 10 mild group,75 moderate group and 89 severe group with significant p value <0.034 .Urinary leukocyte esterase observed in 6 mild cases,12 moderate cases,70 severe cases with significant p value <0.045 . urinary protein (U. Pro) was observed in 12 mild cases,62 moderate cases and 126 in severe cases with significant p value <0.023. Urinary glucose was observed in 8 mild cases, 46 moderate cases,88 severe cases with significant p value <0.043. urinary Ketone positive for 8 mild cases,40 for moderate cases and 88 severe cases with significant p value <0.036. urinary protein ,urinary blood , urine Ph and urinary ketone bodies were elevated when compared to the healthy persons with significant p value <0.05.in this study it is clearly understood that according to severity of the covid infection there is a raise in the urine examination parameters, and the parameters show significant increase in the value when we compare with normal group of patients. From this study we conclude that urine examination reports are directly proportional to the severity of covid infection.

Table 1. Comparison Of Mean Age, Sex And Number Of Cases Among Case Group And The Control Group

Group	Gender	Age	number
mild	Male	30-45	55
	female	30-45	45
moderate	Male	45-60	60
	female	45-60	40
severe	Male	Above 60	56

	female	Above 60	44
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Table 2 Comparison Of Urine Parameters With SARS-COVID-19 And Healthy

	Number of cases	PH value	Specific gravity	U.blood	U.glucose	U.protein	U.LeuE
SARS Covid 19	300	5.8+0.75	1.023+0.006	185(69.4%)	142(45.2%)	200(78.5%)	88(34.9%)
healthy	300	5.9+0.77	1.022+0.008	9(1.3%)	8(1.1%)	12(2.1%)	1(0.03%)
Covid positive	300	7.0+9.0	1.040+0.010	221(72.3%)	234(73.20%)	278(82.13%)	228(72.8%)
χ^2/t	456.093	34.5098	456.908	23.498	567.43	478.45	345.78
P value	6.012	<0.035	<0.125	<0.981	<0.345	<0.002	<0.045

Table 3. Evaluation Of The Severity Of SARS-COV-2 Cases By Urine Biochemical Parameters Among Different Subgroups

	Mild (100) (N=100)	Moderate (n=100)	Severe (N=100)	χ^2/t	p-value
Urinary blood	10	75	89	543.886	<0.034
leukocyte esterase	6	12	70	152.963	<0.045
urinary protein (U. Pro),	12	62	126	423.96	<0.023
Urinary glucose (U. Glu)	8	46	88	112.678	<0.043
Ketone	8	40	88	253.876	<0.036

Discussion :

SARS-COV-2 infection has an impact in large number of people worldwide. From many studies it is proved that the virus affects organs like lung , kidney, intestine etc . In many studies says that corona virus as a strong binding affinity to the angiotensin converting enzyme 2 (ACE 2) binds to receptor in the glomeruli and enters the host cells to cause infection (5).They also affects other organs like kidney, heart, gut cells and endothelium which are affected in the SARSCoV-2 infection by strong binding affinity of the angiotensin converting enzyme 2 (ACE 2) receptorsto the virus. Clinical features of SARS-COV-2 infection are graded according to the signs and symptoms of the infection they are graded from asymptomatic state with mild or no symptoms to critical stage causing acute respiratory distress with sepsis and multiorgan failure (7, 8). In many studies showed significance of SARS-COV-2 viral infection in urine and demonstrated the presence of SARS-COV-2 virus in urine (7). In few publications showedpositive result when compared between analysis of urine sample and disease progression (8). In our study we observed that urine proteins , urine occult blood were high positive andleukocyte esterase was not statistically significant when compared to the healthy patients ,this is due to positivity rates of urine occult blood and urinary protein due to SARS-CoV-2 infection and not because of

bacterial infection .When our study compared with Mumm JN, Osterman A, et al study Urinary Frequency as a Possibly Overlooked Symptom in COVID-19 Patients study had significant result . In Liu et al study compared with our study showed statistically significant P value in Specific gravity and pH. In both the study revealed that kidney damage progression found to be significantly higher in moderate and severe cases. Involvement of kidney in covid patient is a bad prognostic factor in treating covid patient. When Peng et al 2019 Novel Coronavirus can be detected in urine, blood, anal swabs and oropharyngeal swabs study compared to our study showed observation that few urine chemical parameters, especially urine occult blood and urinary protein are significantly higher in SARS-CoV2 infection as compared with controls. They also showed urine parameters can be used for differentiating mild, moderate and severe cases and predicting the course of the infection and the severity and it was with CT grading(9,10). The limitation of the study w less infected patients without any signs and symptoms of covid , patient in home isolation, patients without treatment in them it was difficult to obtain information or data from these patients.

Conclusion :

Urine examination parameters is directly proportional in grading the severity of the infection in covid patient and it plays an important role in determining the clinical diagnosis and treatment in covid patient.

References :

1. Liu R, Ma Q, Han H, Su H, Liu F, Wu K et al. The value of urine biochemical parameters in the prediction of the severity of coronavirus disease 2019. *Clin Chem Lab Med (CCLM)*. 2020 Apr 14;1. [DOI:10.1515/cclm-2020-0220] [PMID]
2. Mumm JN, Osterman A, Ruzicka M, Stihl C, Vilsmaier T, Munker D et al. Urinary Frequency as a Possibly Overlooked Symptom in COVID-19 Patients: Does SARS-CoV-2 Cause Viral Cystitis?. *Europ Urol*. 2020 May 19. [DOI:10.1016/j.eururo.2020.05.013] [PMID] [PMCID]
3. WHO. Coronavirus disease (COVID-2019) situation reports. 2020; Available from: <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports>.
4. Ahn DG, Shin HJ, Kim MH, Lee S, Kim HS, Myoung J, et al. Current Status of Epidemiology, Diagnosis, Therapeutics, and Vaccines for Novel Coronavirus Disease 2019 (COVID-19). *J Microbiol Biotechnol*. 2020;30(3):313-24. [DOI:10.4014/jmb.2003.03011] [PMID]
5. Adhikari SP, Meng S, Wu YJ, Mao YP, Ye RX, Wang QZ, et al. Epidemiology, causes, clinical manifestation and diagnosis, prevention and control of coronavirus disease (COVID-19) during the early outbreak period: a scoping review. *Infect Dis Pov*. 2020;9(1):29. [DOI:10.1186/s40249-020-00646-x] [PMID] [PMCID]
6. Kashi AH, Fallah-karkan M, Amini E, Vaezjalali M. The Presence of COVID-19 in Urine: A Systematic Review and Meta-analysis of the Literature. *medRxiv*. 2020 Jan 1.
7. Yuki K, Fujiogi M, Koutsogiannaki S. COVID19 pathophysiology: A review. *Clin Immunol*. 2020 Apr 20:108427. [DOI:10.1016/j.clim.2020.108427] [PMID] [PMCID]
8. Bonetti G, Manelli F, Bettinardi A, Borrelli G, Fiordalisi G, Marino A et al. Urinalysis parameters for predicting severity in coronavirus disease 2019 (COVID-19). *Clin Chem Lab Med (CCLM)*. 2020 Jun 2;1. [DOI:10.1515/cclm2020-0576] [PMID]
9. Devillé WL, Yzermans JC, Van Duijn NP, Bezemer PD, Van Der Windt DA et al. The urine dipstick test useful to rule out infections. A metaanalysis of the accuracy. *BMC Urol*. 2004 Dec 1;4(1):4. [DOI:10.1186/1471-2490-4-4] [PMID] [PMCID]
10. Peng L, Liu J, Xu W, Luo Q, Deng K, Lin B et al. 2019 Novel Coronavirus can be detected in urine, blood, anal swabs and oropharyngeal swabs

11. Singh, Neha, et al. "Awareness Towards Covid-19 Pandemic among Farm Women and its Technological Strategies." *International Journal of Agricultural Science and Research (IJASR)* 10.4, Aug 2020, 151–158
12. Nathan, Daniel Setiawan, and Hoo Yumilia. "Association Thyroid Function to Prognosis OF Covid-19: The Systematic Review." *International Journal of General Medicine and Pharmacy (IJGMP)* 10.2, Jul–Dec 2021; 21–28
13. Garg, Arnesh, S. Sathasivasubramanian, and C. V. Divyambika. "Oral Manifestations of Severe Acute Respiratory Syndrome (Sars) Virus In Human Beings and Implications for Safe Dental Practices-A." *International Journal of General Medicine and Pharmacy (IJGMP)* 9.5, Jul–Dec 2020; 17–24
14. Tabish, S. A. "India's Covid-19 Crisis: Challenges & Strategies." *International Journal of General Medicine and Pharmacy (IJGMP)* 10.1, Jan-Jun 2021; 69–86