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Clinical Features Of Chronic Obstructive Pulmonary Disease And Renal Dysfunction

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Abstract: Purpose: to study the development of renal dysfunction in patients with chronic obstructive pulmonary disease. Materials and methods: A retrospective analysis of the medical history of 609 patients with chronic obstructive pulmonary disease of varying severity aged 24 to 82 years, who were hospitalized in the pulmonology department of the multidisciplinary clinic of the Tashkent Medical Academy in 2020-2023, was conducted. At the same time, the 1st degree of severity was 23 (3.8%), the 2nd degree was 117 (19.6%), the 3rd degree was 141 (23%), and the 4th degree was 328 (53.6%) patients. Results: in patients with chronic obstructive pulmonary disease, changes in kidney function are observed as a result of systemic inflammation, hypoxia, and hemodynamic changes. In patients with chronic obstructive pulmonary disease, a significant increase in the indicators of C-reactive protein, urea, serum creatinine, and erythrocyte sedimentation rate was revealed ($p<0.05$). This indicated an intensification of the systemic inflammatory process. Conclusion: It was established that as the disease progressed, the levels of urea, creatinine, C-reactive protein, and erythrocyte sedimentation rate significantly increased. Changes in these indicators are early signs of decreased kidney function under the influence of chronic pulmonary hypoxia and systemic inflammation.

Keywords: Chronic obstructive pulmonary disease, renal dysfunction.

Introduction: Chronic obstructive pulmonary disease (COPD) is a disease characterized by prolonged inflammatory and irreversible obstructive changes in the respiratory tract. COPD ranks 3rd among the causes of death in the world (after cardiovascular diseases and cancer). Every year, more than 3.2 million people die from COPD (WHO, 2023). According to the World Health Organization (WHO), by 2030, this disease will become the third cause of death after cerebrovascular and cardiovascular diseases (1,5,8).

At least 10-12% of the world's population has various degrees of COPD. In recent decades, COPD is a disease characterized not only by respiratory symptoms, but also by systemic manifestations, which is mainly associated with systemic inflammation (6). In this case, structural and functional changes in the respiratory system lead to changes in homeostasis, cardiovascular, anemia, bone mineral metabolism, depressive-psychological disorders, and renal dysfunction (7,10,14, 15).

According to a number of studies, renal dysfunction in COPD is observed in 10.2% of patients, the majority of whom are over 75 years old (11). In another study, it was shown that COPD was combined with chronic kidney disease (CKD) in 20-53% of cases (3.4,12,14). Some authors have shown that in patients with COPD, risk factors leading to CKD are also encountered in most cases (1,2,15). In particular, high levels of C-reactive protein (100%), smoking (92.0%), age over 65 (78.6%), and concomitant arterial hypertension (65.6%) were identified. At the same time, in the majority of patients diagnosed with COPD (92.6%), three or more risk factors were identified (2). In another observation, along with the above-mentioned risk factors, excess body weight and obesity were noted in 49.6% of cases (8).

It is advisable to study scientific research aimed at studying comorbid conditions, including renal dysfunction, in patients with COPD.

Research objective. Study of kidney function in patients with COPD of varying severity.

METHODS

Clinical and functional studies of patients with COPD of varying severity were carried out according to the latest international program [Global Initiative for Chronic Obstructive Lung Disease (GOLD) 2014]. This research work was carried out in the pulmonology department of the multidisciplinary clinic of the Tashkent Medical Academy in 2020-2023, a retrospective analysis of the medical histories of 609 patients with COPD of varying severity aged 24 to 82 years, who were hospitalized. In this case, the I degree of mild severity was observed in 23 (3.8%), the II degree of moderate severity in 117 (19.6%), the III degree of severity in 141 (23%), and the IV degree of severity in 328 (53.6%) patients.

Table 1

Distribution of patients with COPD of varying severity by age and sex

COPD of varying severity, n=609								
Age	Ist degree of severity (n=23)		IInd degree of severity n=117		III degree of severity n=141		IVth degree of severity n=328	
	Men	Women	Men	Women	Men	Women	Men	Women
up to 40	0	0	3 2,6±1,5	2 1,7±1,2	4 2,8±1,4	7 5,0±1,8	7 2,1±0,8	6 1,8±0,7
40-59	7 30,4±9,6	5 21,7±8,6	24 20,5±3,7	20 17,1±3,5	15 10,7±2,6	13 9,2±2,4	42 12,8±1,9	24 7,3±1,4
60-74	6 26,1±9,2	5 21,7±8,6	28 23,9±3,9	25 21,4±3,8	42 29,8±3,9	40 28,4±3,8	134 40,9±2,7	47 14,3±1,9
≥75	0	0	9 7,7±2,5	6 7,7±2,5	13 9,2±2,4	7 5,0±1,8	47 14,3±1,9	20 6,1±1,3
Total	13 56,5±10,3	10 43,5±10,3	64 54,7±4,6	53 45,3±4,6	74 52,5±4,2	67 47,5±4,2	230 70,1±2,5	97 29,9±2,5

Of the patients with COPD of mild severity I, 13 (56.5±10.3%) were men and 10 (43.5±10.3%) were women (total average age 58.1±2.3), moderate - 64 (54.7±4.6) and 53 (45.3±4.6%), respectively (total average age 61.5±1.0 years), severe - 74 (52.5±4.2%) and 67 (47.5±4.2%), (total average age 62.2±0.9 years), very severe - 230 (70.1±2.5%) were men and 97 (29.9±2.5%) were women (total average age 65.5±0.6 years). The distribution of COPD patients depending on age and sex is presented in table 1.

To assess kidney function in all patients, the blood composition of creatinine, urea, C-reactive protein, hemoglobin, leukocyte and erythrocyte sedimentation rates were determined.

RESULTS

The results of the study in patients with chronic obstructive pulmonary disease showed that with an increase in the severity of the disease, significant ($p<0.05$) changes were observed in a number of homeostatic indicators. These changes are mainly explained by a decrease in renal function, an increase in the level of systemic inflammation, and hematological changes. Clinical and functional changes in patients with COPD of varying severity are presented in table 2.

Table 2

Clinical and functional changes in patients with COPD of varying severity (n=609)

Indicators	Ist severity level (n=23)	IInd severity level (n=117)	IIIrd severity level (n=141)	IVth severity level (n=328)	p
Urea (mmol/l)	6,4 ± 0,3	8,9 ± 0,2	9,4 ± 0,2	7,8 ± 0,1	< 0,05

Creatinine (mmol/l)	70,9 ± 3,1	99,3 ± 1,8	95,8 ± 1,6	100,3 ± 1,1	< 0,05
CRP (mg/l)	15,0 ± 0,6	23,3 ± 0,4	21,9 ± 0,4	26,6 ± 0,3	< 0,001
Leukocytes (×109/l)	8,3 ± 0,3	7,8 ± 0,1	8,3 ± 0,1	8,9 ± 0,1	> 0,05
Hemoglobin (g/l)	114,6 ± 4,8	104,6 ± 1,9	107,6 ± 1,8	116,0 ± 1,3	> 0,05
ESR (mm/h)	16,6 ± 0,7	17,9 ± 0,3	17,2 ± 0,3	18,9 ± 0,2	< 0,05

In patients with stage I COPD, the urea level was 6.4±0.3 mmol/l, while in stage IV it increased to 7.8±0.1 mmol/l ($p < 0.05$). A significant increase in this indicator confirms the pathological connection between the pulmonary-renal system. In COPD, under the influence of hypoxia and hypercapnia, a decrease in renal perfusion and a decrease in the glomerular filtration rate are observed. As a result, nitrogenous metabolites, including urea, accumulate in the body. The creatinine level was 70.9±3.1 mmol/l in mild COPD grade I and 100.3±1.1 mmol/l in severe COPD grade IV, respectively, and was significantly increased ($p<0.05$). An increase in the level of creatinine in blood serum indicates a decrease in filtration in the kidneys and the development of metabolic acidosis in the body. This, in turn, is explained by the suppression of nephron function and metabolic disorders in them under the influence of chronic hypoxia observed in COPD. Pulmonary hypoxia and systemic inflammation damage the renal tubules, disrupting the excretion of nitrogenous substances.

According to the results obtained, the C-reactive protein level was 15.0±0.6 mg/l in mild COPD stage I, 21.9±0.4 mg/l in severe COPD stage III, and 26.6±0.3 mg/l in severe COPD stage IV, respectively ($p<0.001$). Consequently, as the disease worsened in patients, the C-reactive protein level also increased, directly correlating with the severity of COPD, which confirms the leading role of inflammation and oxidative stress in the pathogenesis of COPD. At the same time, an increase in urea and creatinine was also noted in patients with a high level of C-reactive protein ($p<0.05$). This can be associated with damage to the endothelium not only of the lungs, but also of the kidney tissue. Changes in the number of leukocytes were 8.3±0.3×109/l in mild stage I and 8.9±0.1×109/l in very severe stage IV. Although a statistically significant increase in the number of leukocytes ($p>0.05$) was not observed, this indicates the relative stability of inflammatory activity in the chronic, remission stage of COPD. It was established that the ESR index increased to 16.6 ± 0.7 mm/hour in the I-mild degree of the disease, and to 18.9 ± 0.2 mm/hour in the IV-very severe degree ($p < 0.05$). This indicates a prolonged course of the inflammatory process and, in accordance with the C-reactive protein, an increase in the severity of the disease, which indicates the influence of systemic inflammation on kidney function.

CONCLUSION

1. It was established that with the aggravation of COPD of varying severity, the indicators of urea, serum creatinine, C-reactive protein, and ESR ($p<0.05$) significantly increased. Changes in these indicators are the first signs of the development of renal dysfunction under the influence of chronic hypoxia and systemic inflammation of the lungs.

2. Statistically significant changes in the number of leukocytes and hemoglobin were not detected, which indicates the predominance of a chronic, compensated form of the disease in most patients. Regular monitoring of high C-reactive protein and erythrocyte sedimentation rate indicators allows for the early detection of pathological conditions between the lungs and the renal system.

REFERENCES

1. Бакина А. А., Павленко В. И., Нарышкина С. В. Комплексная оценка функционального состояния почек у больных хронической обструктивной болезнью легких. Сибирское медицинское обозрение. 2020; (2):45-51.
2. Бакина А.А., Павленко В.И. Хроническая болезнь почек как проявление коморбидности у больных хронической обструктивной болезнью легких. Бюллетень. Выпуск 69, 2018. С.115-122.
3. Болотова Е.В., Дудникова А.В. Факторы, ассоциированные со снижением скорости клубочковой фильтрации, у больных хронической обструктивной болезнью легких. Терапевтический архив. 2019. 6. С. 62-66.
4. Болотова Е.В., Дудникова А.В. Хроническая болезнь почек у пациентов с хронической обструктивной болезнью легких: роль частоты обострений. Пульмонология. 2016; 26 (5): 578–

583.

5. Долгополова Д.А. Предикторы развития хронической болезни почек у больных хронической обструктивной болезнью легких // Клиницист. 2016;10(3):51-57.
6. Клинические практические рекомендации KDIGO 2012 по диагностике и лечению хронической болезни почек. Нефрология и диализ. 2017;19(1):22-206 [Clinical practice guidelines by KDIGO 2012 to the diagnosis and treatment of chronic kidney disease. Nefrologiya i Dializ. 2017;19(1):22-206 (In Russ.)].
7. Нургазиева Д.С. Хроническая болезнь почек у пациентов с хронической обструктивной болезнью легких // Бюллетень медицинских Интернет-конференций. 2016. Т.6, № 5. С.518.
8. Салаева М.С., Худайберганова Н.Х. Взаимосвязь социальных факторов с параметрами качества жизни у больных хронической обструктивной болезнью легких. Вестник кыргызской государственной медицинской академии имени И.К. Ахунбаева. №3. 2015. С. 74-79. ISSN: 1694-6405eISSN: 1694-870X
9. Смирнов А. В., Шилов Е. М., Добронравов В. А. и др. Национальные рекомендации. Хроническая болезнь почек: основные принципы скрининга, диагностики, профилактики и подходы к лечению. Нефрология 2012;16(1):85–115.
10. Софронова А.Ф., Хуснуллина Г.Ф. Хроническая болезнь почек у пациентов с хронической обструктивной болезнью легких: оценка факторов риска. Ульяновский государственный университет Россия. 2020. С.117-118.
11. Тришина В.В., Бычкова Л.В., Федоренко М.Г. Роль ХОБЛ в развитии почечной патологии. Вестник РУДН, серия Медицина, 2011, №2.
12. Чучалин А.Г., Авдеев С.Н., Айсанов З.Р. и др. Российское респираторное общество. Федеральные клинические рекомендации по диагностике и лечению хронической обструктивной болезни легких. Пульмонология. 2014; 3: 15–54.
13. Bolotova E.V., Dudnikova A.V. Features of renal dysfunction in patients with chronic obstructive pulmonary disease. Clinical Nephrology 2015; (2-3):27–32 (in Russian).
14. Chen C-Y, Liao K-M. Chronic Obstructive Pulmonary Disease is asso ciated with risk of Chronic Kidney Disease: A Nationwide Case-Cohort Study. Sci Rep. 2016;6:25855. doi: 10.1038/srep25855.
15. Corrado Pelaia at al. Predictors of Renal Function Worsening in Patients with Chronic Obstructive Pulmonary Disease (COPD): A Multicenter Observational Study. Nutrients 2021, 13, 2811. https://doi.org/10.3390/nu13082811.