

# A Pharmacoepidemiological Analysis of Antibiotic Therapy in Patients with Chronic Pyelonephritis was Conducted in Some Hospitals in the Khorezm Region

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**Abstract** In the course of the study, the case histories of 230 patients treated for chronic pyelonephritis in some hospitals of Khorezm region, namely 128 patients in the Medical Association (MA) of Yangibazar district and 102 patients in the MA of Khanka district, were studied retrospectively using pharmacoepidemiological methods. The pharmacoepidemiological analysis focused on the use, efficacy and safety of antibacterial agents alone or in appropriate combinations. All data were statistically analysed. According to the data obtained, only 13 out of more than 20 antibacterial drugs studied were used in the MA of Yangibazar district, 11 drugs were used in the MA of Khanka district, and the remaining drugs were not used at all in the patients studied. Antibacterial drugs used for treatment of chronic pyelonephritis in these hospitals do not fully comply with the national clinical protocol recommended by nephrologists of Uzbekistan.

**Keywords** Chronic pyelonephritis, Pharmacoepidemiology, Antibacterial drugs

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## 1. Introduction

Chronic pyelonephritis is a long-term infectious and inflammatory process of the kidneys in which the renal parenchyma and the pelvis are affected simultaneously or sequentially, and is the second most common inflammatory disease of the urogenital tract after acute respiratory viral infections, accounting for up to 65% of all inflammatory diseases of the urogenital tract. [1,4,5] There is a marked gender difference in the incidence rate - women are more likely to be affected (3-5 times more often). This fact is explained by the peculiarities of the anatomy of the female urinary system: short urethra, which facilitates the invasion of microorganisms into the urinary system. [6,7]

The World Health Organisation classifies pyelonephritis as a problem of social importance, as the disease occurs more frequently in people of working age and is often disabling. [4,5] The most important aetiological factor provoking the development of chronic pyelonephritis is bacterial flora and is the second most common reason for prescribing antibiotics

after acute respiratory infections. [7] Chronic pyelonephritis is caused both by a single type of microorganism and by microbial associations, when several types of microorganisms are simultaneously isolated during bacteriological examination and the use of antibacterial agents is an obligatory component of therapy, and their rational use contributes to the elimination or reduction of the microbial inflammatory process in the kidney tissue and urinary tract, reduces the likelihood of damage to the kidney parenchyma, and prevents the growth of antibiotic-resistant pathogens, which is an important factor in the development of chronic pyelonephritis. [8] According to current recommendations, the choice of an initial antibiotic should be based not only on local data from microbiological studies, but also on the therapeutic efficacy and safety of different antibacterial agents. [2,3]

## 2. Purpose of the Research

The purpose of this pharmacoepidemiological study is to analyze and evaluate the patterns of antibiotic therapy in patients with chronic pyelonephritis across selected hospitals in the Khorezm region. Specifically, the research aims to assess Prescription Practices – Examine the types, frequency, and duration of antibiotics prescribed for chronic pyelonephritis to understand current treatment trends.

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By conducting this analysis, the study seeks to contribute to better clinical practices, promote antimicrobial stewardship, and ultimately improve the management of chronic pyelonephritis in the region.

The aim of this research is to study the pharmacoepidemiology of antibacterial drugs in patients treated for chronic pyelonephritis in some hospitals of Khorezm region.

### 3. Materials and Methods

Clinical studies were conducted on the basis of medical records of patients with chronic pyelonephritis who were treated as inpatients in the medical associations of Yangibazar and Khanka districts of Khorezm region. Using pharmacoepidemiological methods based on a specially designed questionnaire, the case histories of 230 patients treated in the period 2019-2024 from the archives of these MAs of Khorezm region were retrospectively analysed.

The following data were collected during the review of the patients' case histories Full name, age and sex of the patients, duration of the disease, frequency of exacerbations and presence of complications of the disease, nature, efficacy, combination and compliance with national clinical standards of treatment of the drugs used in these patients.

### 4. Results and Discussion

Based on the results of the study, we can say that according to the gender distribution of 128 patients treated in the MA of Yangibazar district 60% (77) were women and 40% (51) were men, and in 102 patients treated in the MA of Khanka

district 75% (76) were women and 25% (26) were men. On this basis, the picture for the MAs studied in both districts is as follows: women account for 67% (153) and men for 33% (77). At the same time, a high incidence of morbidity was observed in women, which is in line with literature data (Figure 1).

All patients were of working age, i.e.  $42.0 \pm 1.7$  years:  $40.0 \pm 1.6$  years In the MA of Yangibazar district and  $44.0 \pm 1.8$  years In the MA of Khanka district. During the study of comorbidity and presence of complications of the main disease, it was found that 9 and 3 patients had comorbidities and 39 and 18 patients treated in Yangibazar and Khanka districts, respectively, had chronic renal failure (CRF).

When analysing the treatment given, it was found that of the 23 antibacterial drugs included in the questionnaire, 13 names were used in the MA of Yangibazar district and 11 in the MA of Khanka district. When examining the appropriateness and effectiveness of these drugs, it was found that 43% (99) of patients were prescribed one, 46% (106) were prescribed two or more, and 11% (25) were not prescribed at all (Figure 2).

Looking at the antibacterial drugs used by name in the MA of Yangibazar district, cefazolin was used as monotherapy in 12 patients (29%), nitroxoline in 8 patients (20%), ceftriaxone and metronidazole in 7 patients (17% each), levofloxacin in 4 patients (10%), benzylpenicillin in 2 patients (5%) and cefuroxime in 1 patient (2%). In the MA of Khanka district these figures were as follows: levofloxacin and ceftriaxone in 18 patients (18% each), metronidazole in 11 patients (11%), nitroxoline in 3 patients (3%), ciprofloxacin in 2 patients (2%), cefazolin and cefoperazone in 1 patient (1% each).

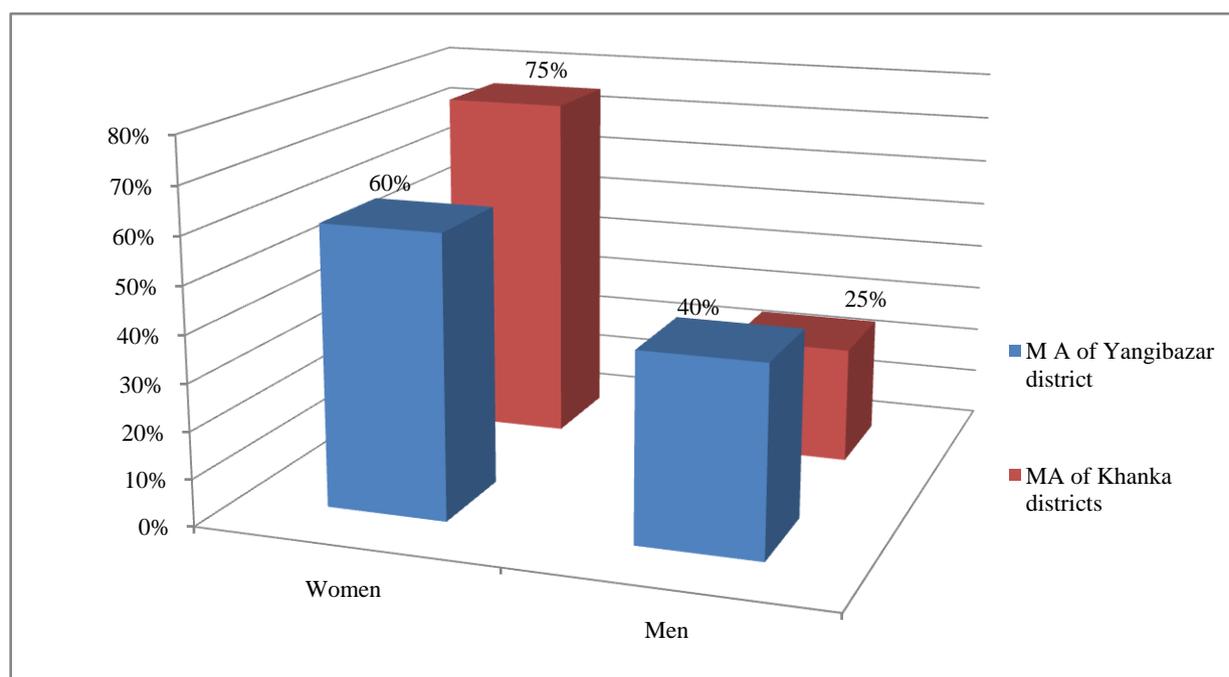
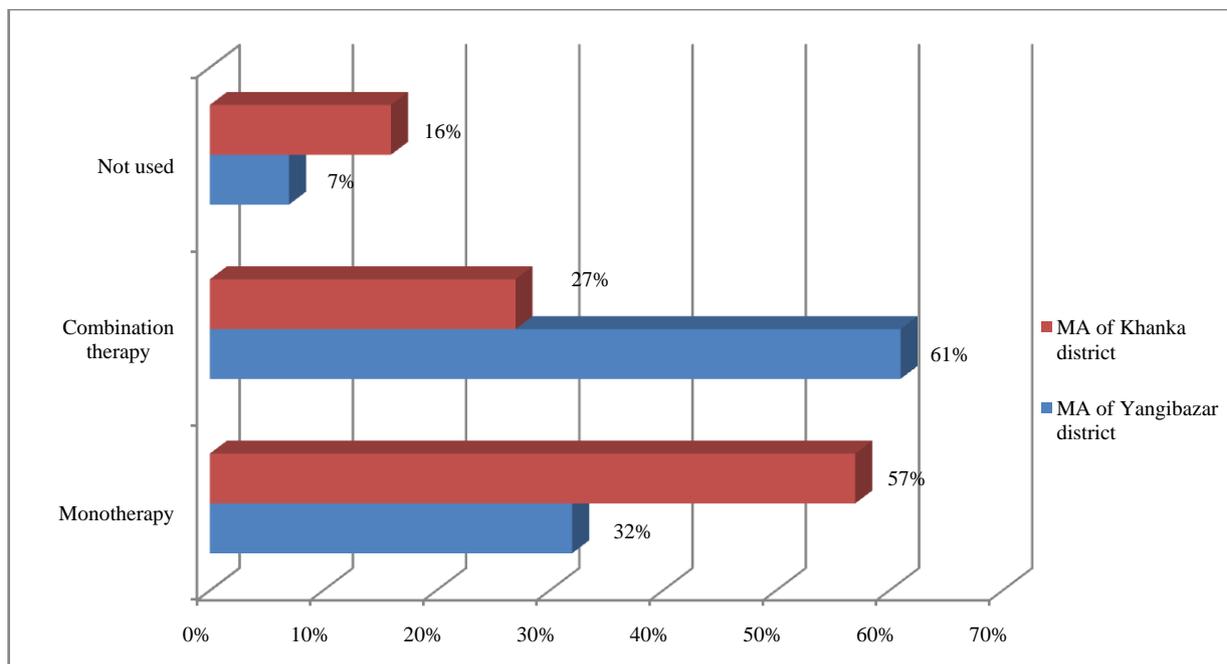


Figure 1. Gender distribution of patients



**Figure 2.** Types of antibacterial drug use therapy

In the MA of Yangibazar district, 78 patients were treated with combined antibacterials. Of these, 68 patients were treated with 2 drugs simultaneously. Specifically, in 23 patients (29%) cefazolin + nitroxoline, in 19 (24%) - ceftriaxone + nitroxoline, in 8 (10%) - nitroxoline + metronidazole, in 5 (6%) - ceftriaxone + metronidazole, in 3 (4%) - metronidazole + levofloxacin, in 2 (2, 5%) ceftriaxone + levofloxacin and ceftriaxone + ciprofloxacin, 1 (1,2% each) - ceftriaxone + penicillin, nitroxolin + ofloxacin, ceftriaxone + cefazolin, ceftriaxone + gentamicin, ceftazidime + azithromycin, metrogil + cefazolin. And in 10 patients, 3 antibacterial drugs were combined simultaneously in the following combinations: ceftriaxone + nitroxoline + cefazolin in 2 patients (2.5%), nitroxoline + cefipime + ciprofloxacin, nitroxoline + metrogil + azithromycin, nitroxoline + metrogil + ampicillin in 8 patients (1.2% each), nitroxoline + cefazolin + levofloxacin, nitroxoline + cefazolin + ciprofloxacin, nitroxoline + metronidazole + levofloxacin, ceftriaxone + cefazolin + levofloxacin, ceftriaxone + levofloxacin + cefoperazone.

In the MA of Khanka district, 28 patients were treated with antibacterial drugs in combination. Of these, 21 patients were treated with 2 drugs simultaneously. In particular, the most common combination was ceftriaxone + ciprofloxacin, which was used in 5 patients and accounted for 18%, followed by ceftriaxone + metronidazole, ceftriaxone + levofloxacin, nitroxoline + levofloxacin, and metronidazole + levofloxacin - in equal amounts in 2 patients, each combination accounted for 7% (28.5% in total, ), ceftriaxone + penicillin, nitroxolin + metronidazole, ciprofloxacin + ampicillin, nitroxolin + ampicillin, levofloxacin + amikacin, ceftriaxone + nitroxolin, metronidazole + cefazolin, cefoperazone + levofloxacin - each combination in 1 patient, which is 3.6% (28.5% in total). And in 7 patients, 3 antibacterial drugs were combined in 1 patient, each combination making up 3.6% (25% in total):

Nitroxoline + ciprofloxacin + ampicillin, ceftriaxone + nitroxoline + ciprofloxacin, nitroxoline + metronidazole + cefazolin, ceftriaxone + nitroxoline + metronidazole, ceftriaxone + levofloxacin + co-trimoxazole, ceftriaxone + metronidazole + ceftazidime, ceftriaxone + ciprofloxacin + levofloxacin.

Examining the frequency of use of antibacterial drugs and the average ratio per patient in each hospital, the following results were obtained: in the MA of Yangibazar district, only 206 items of antibacterial drugs were used, of which the most frequently used were nitroxoline in 67 patients, ceftriaxone and cefazolin in equal amounts in 42 patients each, and metronidazole in 27 patients, and 1.6 drugs per patient. In the MA of Khanka district - 120 items, of which the most frequently used was ceftriaxone in 34 patients, levofloxacin in 32 patients, metronidazole in 20 patients and nitroxoline in 12 patients, and 1.2 drugs per patient (see table 1).

Based on the above, it can be said that in the treatment of this disease, antibacterial agents were used as a basic drug. However, when studying the compliance of this treatment with the National Clinical Protocol for the nosology "Chronic pyelonephritis", Annex 1 to the Order of the Minister of Health of the Republic of Uzbekistan № 107 dated 29 March 2024, recommended by nephrologists of Uzbekistan (except for 7% of patients in the MA of Yangibazar district and 16% of patients in the MA of Khanka district), it was found that the treatment carried out did not coincide with this protocol. Since the most commonly used therapies were cephalosporins and nitrofurans in in the MA of Yangibazar district, cephalosporins in the MA of Khanka district, which are on the list of additional drugs (with less than 100% probability of use), instead of fluoroquinolones, which are on the list of basic drugs (with 100% probability of use).

**Table 1.** Quantitative ratio of antibacterial drugs according to their use

№	Antibacterial drugs included in the questionnaire	Number of patients treated with antibacterial drugs in the MA of Yangibazar district	Number of patients treated with antibacterial drugs in the MA of Khanka district
1.	Nitroxoline	67	12
2.	Ceftriaxone	42	34
3.	Cefazolin	42	3
4.	Levofloxacin	13	32
5.	Metronidazole	27	20
6.	Ciprofloxacin	4	10
7.	Ampicillin	1	3
8.	Cefoperazone	1	3
9.	Benzylpenicillin	2	-
10.	Azithromycin	2	-
11.	Ceftazidime	1	1
12.	Gentamicin	1	-
13.	Ofloxacin	1	-
14.	Cefipime	1	-
15.	Cefuroxime	1	-
16.	Amikacin	-	1
17.	Cotrimaxazole	-	1
18.	Moxifloxacin	-	-
19.	Bactrim	-	-
20.	Biseptol	-	-
21.	Furodonin	-	-
22.	Amoxicillin	-	-
23.	Erythromycin	-	-
	In total	206	120

## 5. Conclusions

The incidence of chronic pyelonephritis among women in the MAs of Yangibazar and Khanka districts of Khorezm region is high, which is consistent with literature data. Antibacterial agents were used as monotherapy and in combination in the treatment of chronic pyelonephritis. The antibacterial drugs used for the treatment of chronic pyelonephritis in the MAs of Yangibazar and Khanka districts of Khorezm region do not fully comply with the national clinical protocol recommended by nephrologists in Uzbekistan.

This pharmacoepidemiological study on antibiotic therapy in patients with chronic pyelonephritis in selected hospitals of the Khorezm region provided valuable insights into current prescribing practices, adherence to clinical guidelines, and potential areas for improvement. The findings revealed the

most commonly used antibiotics, their dosage regimens, and treatment durations, highlighting both appropriate practices and deviations from recommended protocols.

Key observations included possible instances of antibiotic overuse, misuse, or suboptimal selection, which could contribute to the risk of antimicrobial resistance (AMR) and reduced treatment efficacy. The study underscores the need for enhanced adherence to evidence-based guidelines, continuous medical education for healthcare providers, and the implementation of antimicrobial stewardship programs in the region.

By optimizing antibiotic prescribing patterns, healthcare professionals can improve patient outcomes, minimize adverse effects, and combat the growing threat of antibiotic resistance. Future research should include larger, multicenter studies and longitudinal assessments to monitor the long-term impact of antibiotic therapy in chronic pyelonephritis management.

Ultimately, this study serves as a foundation for policymakers and clinicians to refine treatment strategies, ensuring safer and more effective care for patients with chronic pyelonephritis in the Khorezm region and beyond.

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