

Prevalence of urinary tract infections in an elderly population in the municipality of Anápolis

Prevalência de infecções urinárias em uma população idosa no município de Anápolis

Prevalencia de infecciones urinarias en una población de personas mayores en el municipio de Anápolis

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How to cite: Melo LDA, Rizzo CM, Álvares NDM, Gomide VC, Torres VRT, Labre LVQ. Prevalence of urinary tract infections in an elderly population in the municipality of Anápolis. *REVISA*. 2026; 15(Esp.3): 130-135. Doi: <https://doi.org/10.36239/revisa.v15.nEsp3.p130a135>

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Recebido: 20/01/2026
Aprovado: 10/03/2026

RESUMO

Objetivo: Este é um estudo observacional, transversal e analítico cujo objetivo foi entender a prevalência de infecções do trato urinário (ITUs) em 48 idosos participantes da Universidade Aberta para a Pessoa Idosa (UniApi), selecionados de uma população de 240 indivíduos. Foram incluídos idosos com função cognitiva preservada, enquanto aqueles com demência, dependência física, uso de antibióticos ou idade inferior a 60 anos foram excluídos. O estudo foi aprovado pelo Comitê de Ética em Pesquisa - CAAE 75454523.6.0000.5076, seguiu todas as normas éticas da Resolução 466/12 do Conselho Nacional de Saúde, e todos os participantes assinaram o TCLE. Os dados foram analisados por meio do teste do qui-quadrado ($p < 0,05$), cujos resultados demonstraram maior risco de ITU em mulheres com idade superior a 75 anos, com forte associação entre diabetes e alterações laboratoriais, como hematúria, células epiteliais, nitrito positivo, odor fétido e urina turva. Além disso, o microrganismo *Escherichia coli* foi o patógeno predominante. Dessa forma, os achados confirmam a prevalência de ITUs na população idosa e reforçam a necessidade de pesquisas futuras para aprimorar o diagnóstico e manejo terapêutico dos pacientes idosos.

Palavras-chave: Idosos; Urianálise; Infecção do Trato Urinário.

ABSTRACT

Objective: This observational, cross-sectional, and analytical study aimed to the prevalence of urinary tract infections (UTIs) in 48 elderly participants from the Open University for Seniors (UniApi), selected from a population of 240 individuals. Elderly individuals with preserved cognitive function were included, while those with dementia, physical dependence, antibiotic use, or aged under 60 were excluded. The study was approved by the Research Ethics Committee under CAAE number 75454523.6.0000.5076, followed all ethical guidelines of Resolution 466/12 of the National Health Council, and all participants signed the ICF. Data were analyzed using the chi-square test ($p < 0.05$), and the results showed a higher risk of UTI in women over 75 years of age, with a strong association between diabetes and laboratory alterations, such as hematuria, epithelial cells, positive nitrite, foul odor, and turbid urine. Furthermore, *Escherichia coli* was identified as the predominant pathogen. Therefore, the findings confirm the prevalence of UTIs in the elderly population and highlight the need for future research to improve diagnostic methods and therapeutic management in elderly patients.

Keywords: Elderly; Urinalysis; Urinary Tract Infection.

RESUMEN

Objetivo: Este estudio observacional, transversal y analítico tuvo como objetivo prevalencia de infecciones del tracto urinario (ITUs) en 48 adultos mayores participantes de la Universidad Abierta para la Persona Mayor (UniApi), seleccionados de una población de 240 individuos. Se incluyeron personas con función cognitiva preservada y se excluyeron aquellas con demencia, dependencia física, uso de antibióticos o menores de 60 años. El estudio fue aprobado por el Comité de Ética bajo el número de CAAE 75454523.6.0000.5076, cumplió con todas las normas éticas de la Resolución 466/12 del Consejo Nacional de Salud y todos los participantes firmaron el CI. Los datos se analizaron mediante la prueba de chi-cuadrado ($p < 0,05$), y los resultados mostraron un mayor riesgo de ITU en mujeres mayores de 75 años, con una fuerte asociación entre la diabetes y alteraciones de laboratorio, como hematuria, células epiteliales, nitrito positivo, olor fétido y orina turbia. Además, *Escherichia coli* fue identificada como el patógeno predominante. Por lo tanto, los hallazgos confirman la prevalencia de ITUs en la población adulta mayor y destacan la necesidad de futuras investigaciones para mejorar los métodos diagnósticos y el manejo terapéutico en pacientes mayores.

Palabras clave: Adultos mayores; Urianálisis; Infecciones del Tracto Urinario.

ORIGINAL

Introduction

Urinary tract infection (UTI) is one of the most common infections in adults and remains a major health problem due to the costs associated with emergency care and hospitalizations. It occurs due to a change in the intestinal flora caused by uropathogenic bacteria, which adhere to the epithelium and colonize the region and its tract. This condition is more prevalent among women – who have a shorter urethra and an environment more favorable to microbial infestation – individuals with diabetes, those who use urinary catheters, and the elderly. Diagnostic analysis is based primarily on the patient's clinical presentation and history, although it also depends on additional tests, such as urinalysis.^{1,2}

This test has been used for a long time and, even today, along with clinical evaluation, provides crucial information for medical diagnosis. Urine collection is simple, but requires specific instructions to ensure a quality sample, avoiding errors in the analytical phase and in the final results. Using specific evaluation methods, it is possible to detect elements that may indicate a urinary tract infection and perform a multidimensional assessment of the human specimen.^{3,4}

Due to bodily dysfunction caused by the loss of systemic functions, the elderly population has a high frequency of developing UTIs. Sarcopenia, a characteristic of aging, combined with a sedentary lifestyle, reduces an individual's mobility and ability to maintain proper personal hygiene. These factors, together, contribute to UTI complications.^{5,6}

In this context, urinary tract infections have become common in society, especially among the elderly, as this age group is more susceptible to physiological changes resulting from the aging process. This process individualizes the clinical manifestations of UTIs, often making them atypical. Such occurrences lead to physical debilitation, reduced quality of life, and increased public health costs. Therefore, it is essential to identify urinary tract infections in older adults early to minimize their consequences, allowing for a rapid and effective approach and reducing the costs of a condition that can be treated in primary care.⁷

Objective

The study aims to synthesize the correlation between urine samples from elderly students at the Open University for the Elderly (UniApi). This was done through a questionnaire and laboratory analysis of the urine samples.

Materials and methods

This is an observational, cross-sectional and analytical study, with the objective of identifying the urinary profile and frequency of infections in elderly participants of the Open University for the Elderly (UniApi), a permanent project of

UniEVANGÉLICA, which offers free workshops and sports activities to the community, aimed at people aged 60 or over.

The estimated study population consisted of 240 individuals aged 60 or older attending the institution. The convenience sample included 48 elderly participants, recruited through invitation and after signing the Informed Consent Form (ICF). Inclusion criteria were: age 60 or older, participation in UniApi, and preserved cognitive function (assessed by reports from institutional professionals). Individuals diagnosed with dementia, those under 60, those physically dependent, those who refused to sign the ICF, or those taking antibiotics were excluded.

Laboratory analyses were performed at the UniEVANGÉLICA Clinical Analysis Laboratory, and urine samples were collected by the participants themselves, following the guidelines of collecting urine at home up to two hours before delivery, discarding the first jet and using the container provided.

Data collection occurred in four phases. The first phase, project preparation, included a meeting with the UniApi coordinator to clarify the study objectives and sign the approval form. In the second phase, the project and objectives were presented to the participants, the risks were explained, the consent form was shown, and all necessary information was provided. Volunteers who agreed signed the form, completed a demographic questionnaire, and collected their urine samples following specific instructions.

The third phase consisted of sample analysis. First, physical examinations were performed by laboratory technician Helayne Moreira de Assis Feitosa, evaluating color, odor, volume, turbidity, and sediment. The authors then performed microscopic analysis of the sediment under technical supervision. If there was a significant amount of bacteria and/or positive nitrite, culture was performed on MacConkey and CLED media, with pathogen identification using the Bactray I and II systems, when necessary.

The fourth phase consisted of an informational meeting with the elderly and in cases of changes in urine analysis, participants were referred for free medical care by Dr. Aila Davis Fanstone Pina Vieira.

The collected data were subjected to statistical tests of prevalence and analysis of the frequency distribution of the variables using the chi-square test, with a significance level of $p < 0.05$. The results were related to the urinary profile and the frequency of infections, considering the demographic context of the participants. The study complies with Resolution 466/12 of the National Health Council, was approved by the Research Ethics Committee of UniEVANGÉLICA under CAAE 75454523.6.0000.5076, and all elderly participants signed the TCLE

Results

Among the 240 elderly participants at UniApi, the study used a sample of 52 volunteers, 48 of whom submitted their urine samples to the UniEVANGÉLICA Clinical Analysis Laboratory. During collection, some participants were excluded: two for inadequate urine volume, three for not signing the informed consent form correctly or completing the questionnaire, and two for not submitting the material properly. Thus, 45 valid samples were analyzed.

In the demographic analysis, the variables sex and age were considered. Although female sex is a risk factor for a higher incidence of UTI—due to anatomy, for example—no significant relationship was found between culture positivity and gender ($p=0.259$). Similarly, there was no significant association between age (<75 years and ≥ 75 years) and the presence of positive cultures ($p=0.552$).

Regarding sample analysis, eight were cultured on MacConkey agar medium, considering the presence of nitrite, esterase, or red blood cells and/or leukocytes, as these parameters indicate a higher probability of pathogens and, consequently, infection. Among these samples, 6 showed bacterial growth, with 5 identified as *E. coli*. The sixth sample was analyzed by the Bactray I and II systems and, after evaluation, it was concluded that it was also *E. coli*, with a probability of 99.83% in Bactray I and 0.17% in Bactray II.

A correlation was observed between positive and negative cultures and several other aspects assessed in the urine test. Among the samples with positive cultures, 4 of the 6 had a foul odor, while 2 had a normal or unique odor. Regarding nitrite, 4 also tested positive, while 2 did not present nitrite in the sample. Both correlations — between culture and nitrite, as well as between culture and odor — had a $p\text{-value} = 0.000$.

Discussion

Based on the analysis of the results, this study confirms the prevalence of the urinary profile in the elderly population in relation to urinary tract infections (UTIs), where a clear change was observed in the chemical (nitrite and esterase), physical (color, odor, and appearance), and sedimentary aspects of urine (red blood cells, leukocytes, and epithelial cells). This is the first study conducted at UniApi that has managed to establish multiple relationships between the profile of elderly individuals, their diseases, physical and chemical criteria, and the prevalence of urinary tract infections, aiming to ensure primary prevention and optimize quality of life.

Among the results obtained, a higher frequency of urinary tract infections in women was also confirmed. Due to the anatomical profile of women, with a shorter urethra and proximity to the anal canal, a higher prevalence of UTIs in this group was expected. However, a paradox when analyzing the significance of the increase in these infections, as no relationship was found between prevalence and demographic records, either in relation to age or gender.⁸

The results presented indicate that all urinary tract infections confirmed by culture growth were caused by the microorganism *Escherichia coli*, which was expected, since this is the most prevalent agent in UTIs. Its virulence factors, such as adhesins and toxins, help colonize the urinary tract and promote biofilm formation, which makes them bacteria that cause recurring infections and more resistant to antimicrobials.⁹

Regarding the chemical and physical laboratory aspects for confirming the diagnosis of UTIs, this study is consistent with other studies. Changes in urine appearance have been reported when the infection is present, from clear to cloudy and with a foul odor. In this analysis, these changes were also observed: of the 6 positive

cultures, 5 had cloudy urine and only 1 slightly cloudy. Also, foul odor was identified in 66% of the samples analyzed with urinary infection.¹⁰

On the other hand, the study confirmed the controversy regarding the symptoms of urinary infections. Theoretically, several symptoms are described, such as dysuria, urinary frequency, urgency and hematuria. However, UTIs can be asymptomatic in the elderly, making diagnosis challenging in this population due to aging-related physiological changes. In this analysis, all patients with urinary tract infections were asymptomatic for cystitis.¹¹

It is important to emphasize that, during the research, some limitations were identified related to study biases: information bias, as it was not possible to assess the prevalence of polypharmacy among the elderly due to the participants' lack of knowledge about the medications used, and it was only possible to infer the presence of polypharmacy based on the number of comorbidities; and selection bias, as only 52 samples were made available for analysis by the Clinical Analysis Laboratory of UniEVANGÉLICA.

Final Considerations

This study confirms the prevalence of urinary tract infections (UTIs) in the elderly, with changes in physical, chemical and sedimentary aspects of urine, mainly due to the presence of *Escherichia coli*. The study also highlights methodological limitations and the need for further research to improve the diagnosis and treatment of UTIs in the elderly.

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