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MONITORING OF CHRONIC KIDNEY DISEASE IN PROFESSIONAL FISHERMEN AND THE IMPORTANCE OF NURSES IN THE COMMUNITY

RASTREAMENTO DE DOENÇA RENAL CRÔNICA EM PESCADORES PROFISSIONAIS E A IMPORTÂNCIA DO ENFERMEIRO NA COMUNIDADE

SEGUIMIENTO DE ENFERMEDAD RENAL CRÓNICA EN PESCADORES PROFESIONALES Y LA IMPORTANCIA DEL ENFERMERO EN LA COMUNIDAD

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ABSTRACT
Screening is a strategy involving examinations in asymptomatic populations for early diagnosis and reduction of morbidity and mortality and is essential for diseases such as chronic kidney disease (CKD). CKD, characterized by progressive loss of kidney function, is associated with common risk factors among vulnerable populations, such as professional fishermen. This study aimed to identify indicators of CKD among these workers through the analysis of urea, creatinine, fasting blood glucose, and urinalysis. A descriptive, quantitative, cross-sectional study was conducted during the 2023 fishing season with fishermen from the Z2 fishing colony in Cáceres, Mato Grosso, Brazil. Blood samples from 103 fishermen and urine samples from 83 were analyzed. The results indicated exposure to CKD risk factors, such as diabetes mellitus, evidenced by elevated mean glucose levels in both sexes, classified as prediabetes. Increased urinary protein and crystals were also detected, which may indicate renal dysfunction. It is concluded that indicators of CKD can be identified among artisanal professional fishermen, reinforcing that this population is vulnerable to the disease.

KEYWORDS: Chronic Kidney Disease. Fishermen. Screening. Primary Health Care. Social Vulnerability.

RESUMO
O rastreamento é uma estratégia de exames em populações assintomáticas para diagnóstico precoce e redução da morbidade e mortalidade, sendo essencial para doenças como a doença renal crônica (DRC). A DRC, caracterizada pela perda progressiva da função renal, está associada a fatores de risco comuns em populações vulneráveis, como pescadores profissionais. Esta pesquisa teve como objetivo identificar indicativos de DRC nesses trabalhadores, por meio da análise de ureia, creatinina, glicemia em jejum e uroanálise, em um estudo descritivo, quantitativo e transversal realizado durante o período de pesca de 2023, com pescadores da

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colônia Z2 de Cáceres – MT. Foram analisadas amostras de sangue de 103 pescadores e urina de 83. Os resultados indicaram exposição a fatores de risco para DRC, como diabetes mellitus, evidenciada por médias elevadas de glicose em ambos os sexos, classificadas como pré-diabetes. Também foram detectados aumento de proteína e cristais na urina, possíveis sinais de disfunção renal. Conclui-se que é possível identificar indicativos de DRC entre pescadores profissionais artesanais, reafirmando-os como uma população vulnerável à doença.

PALAVRAS-CHAVE: Atenção Primária à Saúde. Enfermagem. Pesca. Saúde Pública. Vulnerabilidade Social.

RESUMEN
El rastreo es una estrategia de realización de exámenes en poblaciones asintomáticas para el diagnóstico precoz y la reducción de la morbilidad y la mortalidad, siendo esencial para enfermedades como la enfermedad renal crónica (ERC). La ERC, caracterizada por la pérdida progresiva de la función renal, está asociada a factores de riesgo comunes en poblaciones vulnerables, como los pescadores profesionales. Esta investigación tuvo como objetivo identificar indicios de ERC en estos trabajadores mediante el análisis de urea, creatinina, glucemia en ayunas y uroanálisis, en un estudio descriptivo, cuantitativo y transversal realizado durante el período de pesca de 2023, con pescadores de la colonia Z2 de Cáceres, Mato Grosso (MT), Brasil. Se analizaron muestras de sangre de 103 pescadores y muestras de orina de 83. Los resultados indicaron exposición a factores de riesgo para la ERC, como la diabetes mellitus, evidenciada por valores medios elevados de glucosa en ambos sexos, clasificados como prediabetes. También se detectaron niveles elevados de proteínas y presencia de cristales en la orina, posibles signos de disfunción renal. Se concluye que es posible identificar indicios de ERC entre los pescadores profesionales artesanales, reafirmando su condición de población vulnerable a esta enfermedad.

PALABRAS CLAVE: Atención Primaria de Salud. Enfermería. Pesca. Salud Pública. Vulnerabilidad Social.

INTRODUCTION

Screening is a strategy through which diagnostic tests or examinations are performed in asymptomatic individuals or populations with the aim of achieving early diagnosis. This approach seeks to identify and control risk factors and reduce morbidity and mortality associated with the condition being screened for[1]. Given its purpose, screening is a relevant strategy for the diagnosis of chronic kidney disease (CKD), a condition characterized by an asymptomatic course[2].

CKD, also known as chronic renal failure (CRF), consists of a slow and progressive loss of kidney function, resulting in biochemical, metabolic, and endocrine disorders, including respiratory and cardiovascular alterations[3]. The Brazilian Ministry of Health states that CKD may have different causes and multiple risk factors, among which systemic arterial hypertension and diabetes mellitus stand out, representing opportunities for the early detection of CKD[2].

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Both conditions share a high prevalence among individuals experiencing socioeconomic vulnerability. In addition, educational factors may influence individuals' knowledge of lifestyle behaviors that can contribute to better health outcomes[4].

In this context, considering that chronic kidney disease is a major public health concern[3] and is associated with risk factors more commonly found in vulnerable populations[4,5], such as professional fishermen, who experience socioeconomic vulnerability and limited political support[6], the following question arises: Is chronic kidney disease a condition that affects and/or may affect professional fishermen from the Z2 fishing colony in the municipality of Cáceres, Mato Grosso (MT), Brazil?

This study is justified by the fact that Cáceres, MT, is located on the banks of the Paraguay River, in the Mato Grosso Pantanal, where fishing is an important economic activity for several families in the municipality[7]. Therefore, there is a need to assess the health status of professional fishermen, increasing their visibility within the municipality and in academic research.

The growing concern regarding chronic kidney disease is supported by its alarming epidemiological burden, affecting more than 10% of the global population, corresponding to approximately 800 million individuals[8]. Furthermore, this condition not only affects a substantial proportion of the population but is also among the leading causes of death in the 21st century[8]. Given this scenario, it is imperative to understand and address CKD as a global health issue.

Therefore, the present study aimed to identify indicators of chronic kidney disease among professional fishermen through screening based on the measurement of blood urea, creatinine, fasting blood glucose, and urinalysis.

METHODS

This study was designed as a cross-sectional field study, characterized as descriptive and quantitative, derived from a doctoral project entitled "Health Profile of Artisanal Professional Fishermen after the COVID-19 Pandemic." The research was conducted throughout the 2023 fishing season, from February to September. Subsequently, the data were tabulated and analyzed, followed by the preparation of the scientific manuscript.

The target population consisted of professional fishermen residing in the municipality of Cáceres, Mato Grosso, Brazil, who were registered with and affiliated to Fishing Colony Z2. The colony had a total of 257 registered fishermen, including 175 men and 79 women. The sample was selected using a non-probability sampling method, specifically accessibility or convenience sampling[9]. In this approach, the researcher selects participants who are readily accessible,

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allowing the participation of different individuals and assuming that they may represent the population under study.

The inclusion criteria were: being an artisanal professional fisherman affiliated with Fishing Colony Z2 and in good standing with the colony; being aged 18 years or older; and agreeing to participate in the study by signing the Informed Consent Form. The exclusion criteria were: professional fishermen who were not affiliated with Fishing Colony Z2; colony workers or other individuals who did not work as fishermen; being under 18 years of age; failure to sign the Informed Consent Form; and hemolyzed samples.

After application of the inclusion and exclusion criteria, the final sample consisted of 102 fishermen who voluntarily agreed to participate in the study. Given the use of accessibility sampling, the final sample was influenced by the fishermen's willingness to participate in the research.

For data collection, two days were scheduled for the fishermen to attend the colony. The first biological sample collection took place at the facilities of Fishing Colony Z2 on April 22, 2023, involving 74 affiliated fishermen. The second collection was conducted on May 20, 2023, with the participation of 28 fishermen affiliated with the same colony, totaling 102 participants. All participants were informed in advance of the need to fast before sample collection to ensure the reliability of the laboratory test results.

Blood samples were collected using the vacuum blood collection method. For urine collection, participants were previously provided with urine containers and instructed to collect their first urine of the day. In addition, visits were conducted at some fishermen's camps in the Pantanal, where a questionnaire was administered and blood pressure was measured when appropriate, while observing the participants during their professional activities.

Sample analyses were performed at the Environmental Ecophysiology Laboratory (LEFA), located at the facilities of the State University of Mato Grosso (UNEMAT). Biochemical analyses were performed according to the manufacturer's instructions for the reagents used (Biotécnica), using a biochemical analyzer.

After biological sample analysis, the results were compared with the reference ranges established by the reagent manufacturer: creatinine, 0.9–1.3 mg/dL for men and 0.6–1.1 mg/dL for women; urea, 13–45 mg/dL; and fasting blood glucose, 74–99 mg/dL. Urine chemical analysis was performed according to the standards provided by the reagent strip manufacturer and the descriptions established by the Brazilian Society of Nephrology (SBN)[10]. Urinary sediment analysis was performed using the general reference standards established by the SBN for

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leukocytes, epithelial cells, hyaline casts, amorphous urates, uric acid, and triple phosphate crystals.

All variables were obtained through anamnesis (nursing history), biological sample collection, and laboratory analysis. The data were entered into a Microsoft Excel 2009 spreadsheet for analysis, comparison, and classification.

Glucose, urea, and creatinine data were statistically analyzed using Student's *t*-test assuming unequal variances in Microsoft Excel, in order to assess differences between men and women for each laboratory test and determine whether the observed means were above or below the established reference values. The results for these tests were also presented as boxplots generated using the R software, stratified by sex. In addition, Pearson's correlation analysis was performed among the three aforementioned laboratory parameters.

For the chemical and urinary sediment analyses, the chi-square test was applied to assess possible differences in frequencies between men and women. In addition, the percentage of abnormalities identified in the urine tests among men and women was presented using a Sankey diagram.

Regarding ethical aspects, the study was conducted in accordance with Resolution No. 466/2012 of the Brazilian National Health Council, Ministry of Health. The research was submitted to and approved by the Research Ethics Committee under Opinion No. 5,928,210, in accordance with Resolution 466/12. Before participation, professional fishermen were informed about the Informed Consent Form and subsequently signed it. Only after signing the form were participants included in the study. Regarding financial support, the project to which this study was linked was funded by the Coordination for the Improvement of Higher Education Personnel (CAPES), under CAPES Call for Proposals No. 12/2021 PDPG.

RESULTS

Of the 257 fishermen registered with the colony, 39.68% participated in this study. All participants underwent biological sample collection and analysis. Of these, 56.9% were male and 43.1% were female. Among the 102 fishermen who participated in biological sample collection, 83 provided urine samples, of whom 60% were male and 40% were female. These samples underwent physical, chemical, and urinary sediment analyses.

Physical analysis revealed changes in urine color in all samples analyzed. Chemical urine analysis identified the presence of leukocytes, hemoglobin, nitrite, protein, bilirubin, ketone bodies, glucose, and urobilinogen. Females accounted for 13.22% of the abnormalities, whereas males accounted for 10.82%. Of the 83 samples, 75.96% showed no abnormalities, as

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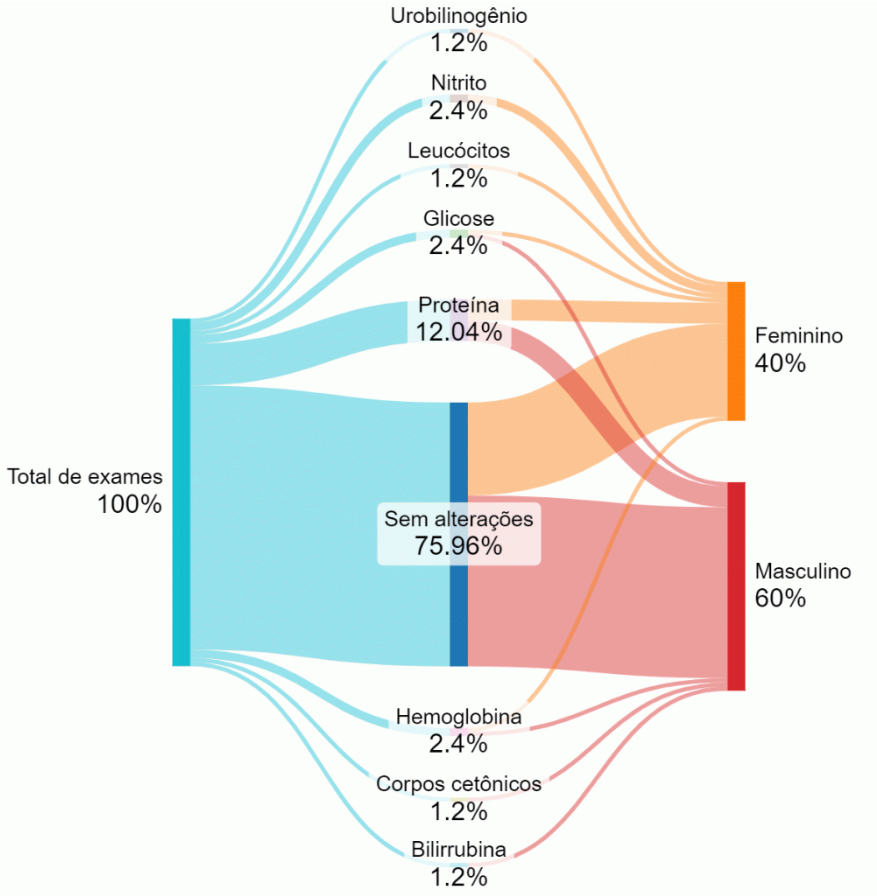
demonstrated in Figure 1. The chi-square test ($\chi^2(48) = 40.00$; $p < 0.05$) showed a statistically significant difference among the urinary chemical components, with protein being the most frequently detected abnormality.

Figure 1 – Chemical analysis of urine according to sex among artisanal professional fishermen in the municipality of Cáceres, Mato Grosso, Brazil, in 2023.



Source: Author's own elaboration (Made at Sankeymatic, 2024)

For the urinary sediment analysis, all 83 samples presented at least one abnormality, resulting in 100% of samples being classified as abnormal. Amorphous urates were the most frequently observed finding, accounting for 60% of the abnormalities detected (Figure 2). The chi-square test ($\chi^2(48) = 416.00$; $p < 0.05$) indicated a statistically significant difference among the

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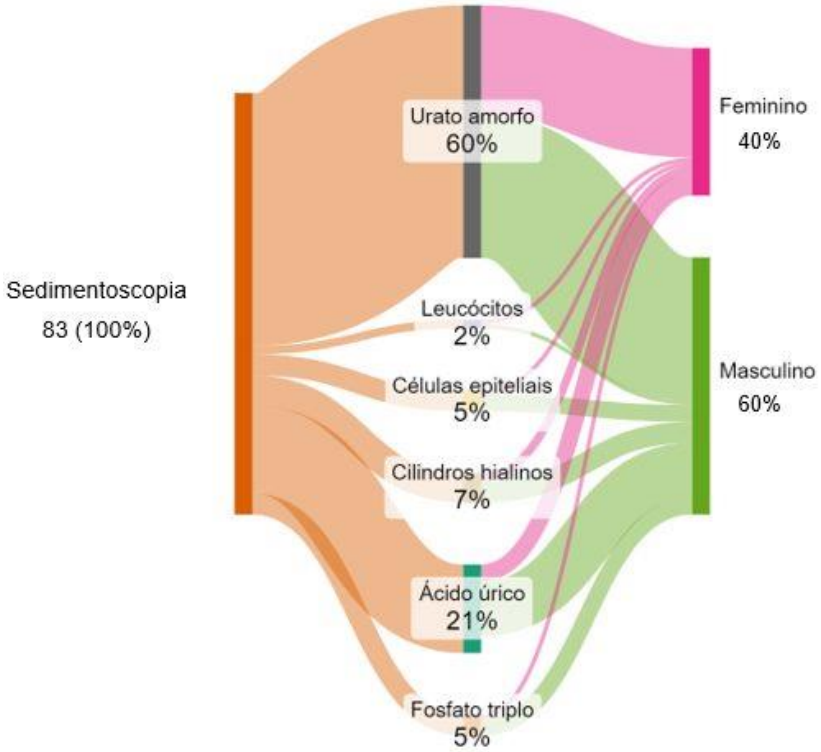
urinary sediment components, with amorphous urates being the most frequent finding in both sexes.

Figure 2 – Urinary sediment analysis according to sex among artisanal professional fishermen in the municipality of Cáceres, Mato Grosso, Brazil, in 2023.



Source: Prepared by the authors (*SankeyMATIC*, 2024).

For glucose levels, no statistically significant differences were observed between the sexes. However, the mean glucose levels were above the cutoff value of 99 mg/dL adopted for this analysis, as shown in Figure 3. Female participants had a mean glucose level of 109.74 ± 31.25 mg/dL, whereas male participants had a mean of 114.55 ± 51.03 mg/dL. The Student's t-test ($t(99) = 0.33 < t_{0{\cdot}05} = 1.66$) showed no statistically significant difference between the sexes.

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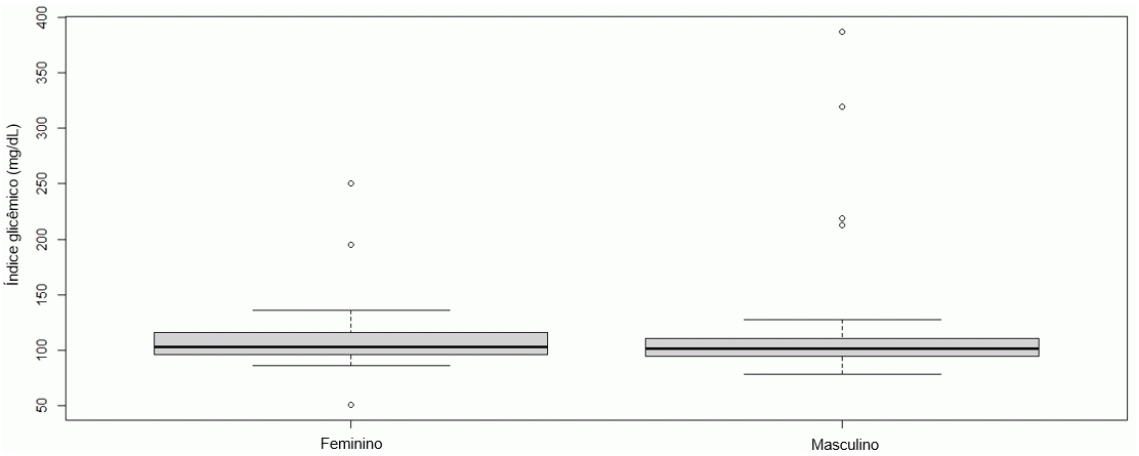
Figure 3 – Comparison of glucose levels according to sex among artisanal professional fishermen in Cáceres, Mato Grosso, Brazil, 2023.



Source: Prepared by the authors (2024).

Urea analysis also showed no statistically significant differences between female and male artisanal professional fishermen. The mean values for both sexes remained within the reference range of 13–45 mg/dL, as shown in Figure 3, with a mean of 22.46 ± 11.31 mg/dL for females and 24.21 ± 9.41 mg/dL for males. The Student's *t*-test ($t(61) = 0.29 < t_{0.05} = 1.67$) showed no statistically significant difference between the sexes.

For creatinine, female participants had a mean value of 0.89 ± 0.27 mg/dL, remaining within the reference range of 0.6–1.1 mg/dL. Male participants had a mean value of 1.00 ± 0.27 mg/dL, also within the reference range of 0.9–1.3 mg/dL. The Student's *t*-test ($t(98) = 0.02 < t_{0.05} = 1.66$) showed no statistically significant difference between the sexes.

Pearson's correlation analysis ($r = 0.25$, $p < 0.05$) among urea, glucose, and creatinine showed a statistically significant positive correlation, indicating a positive association among the variables. Figure 4 presents the correlation coefficients among the laboratory tests performed.

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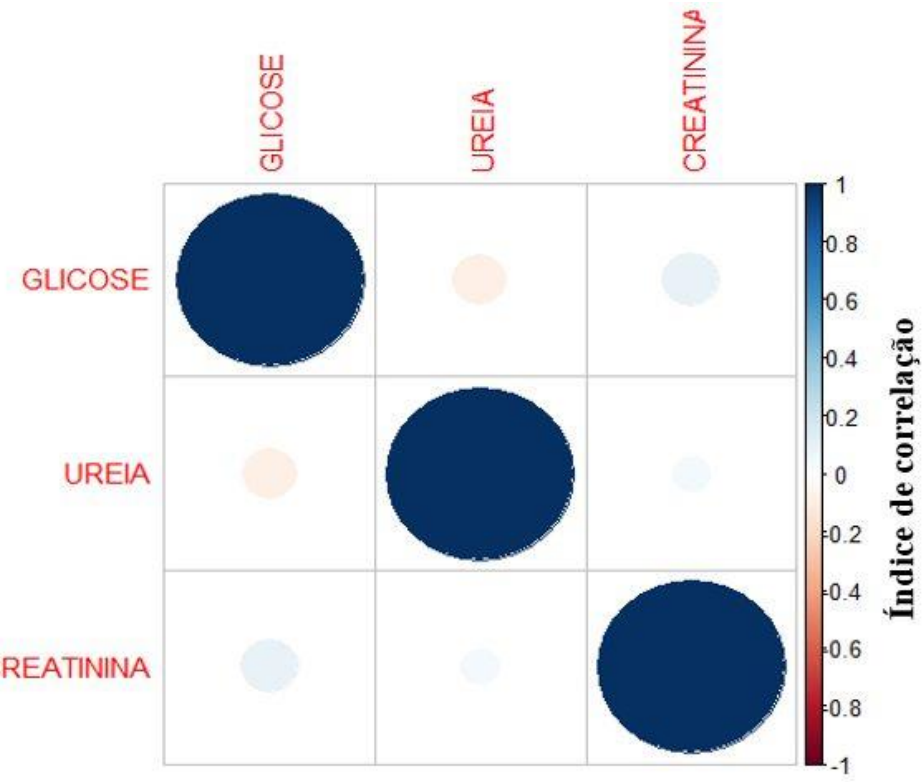
Figure 4 – Pearson correlation plot among glucose, urea, and creatinine levels in artisanal professional fishermen in Cáceres, Mato Grosso, Brazil, 2023.

Source: Prepared by the authors (2024).



DISCUSSION

Artisanal fishing is an important economic activity that employs approximately 36 million people worldwide, with most of them relying on this activity as their primary source of income[11]. In Cáceres, Mato Grosso, Brazil, artisanal fishermen represent an important social group, as artisanal fishing is a significant practice in the municipality, contributing to ecological balance, market activities, and the work of certain public-sector agents[7].

As fishing is their primary source of income, the earnings of professional fishermen are generally considered low, highlighting their socioeconomic vulnerability[12]. However, there are no specific public policies focused on healthcare for this population group, resulting in limited incentives for health promotion, disease prevention, and healthcare services directed toward fishermen. This situation highlights the need to investigate health conditions affecting this population[6].

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To assess the health status of artisanal fishermen, laboratory tests were performed, providing important findings regarding the health conditions of this population, including urinalysis, urea, creatinine, and blood glucose measurements. Chemical urine analysis identified protein as the main abnormal finding, with proteinuria indicated in 12.04% of the analyzed samples. Increased urinary protein may be associated with several health conditions, including severe diseases such as CKD[10]. Because proteinuria may have multiple clinical causes[13] and may serve as a marker of kidney disease[14], alterations in other components of chemical urinalysis may also provide important indications of previously undiagnosed disorders[15].

Urinary sediment analysis identified amorphous urates as the most frequent abnormal finding. These are urinary crystals associated with the concentration of solutes in urine[10]. The high proportion of amorphous urates detected in the samples (60%) indicates the presence of crystalluria in this population, a finding commonly observed among agricultural workers and associated with a range of kidney injuries[16].

The elevated mean blood glucose levels observed in both sexes are concerning, since diabetes mellitus is one of the major risk factors associated with chronic kidney disease[2]. Based on the results obtained, participants in this study may have prediabetes or an increased risk of developing diabetes mellitus, according to the diagnostic criteria established by the Brazilian Diabetes Society, which defines prediabetes as fasting blood glucose levels ≥100 and <126 mg/dL[17]. Considering that artisanal professional fishermen constitute a population experiencing socioeconomic vulnerability[6], there is particular concern regarding diabetes mellitus, as this condition is commonly observed among socioeconomically vulnerable populations[5] and is associated with CKD, representing an important risk factor for the disease[2].

Poorly controlled diabetes mellitus is one of the leading causes of CKD, as it causes significant microvascular changes that may affect the kidneys. It is also recognized as the second leading cause of CKD among patients with end-stage renal disease[18]. Furthermore, approximately 30% to 50% of patients with diabetes mellitus, particularly type 2 diabetes, develop CKD, underscoring the importance of CKD screening among individuals diagnosed with diabetes to facilitate early diagnosis and, consequently, improve prognosis[18].

Urea levels remained within the reference range in both sexes. Although urea is an important marker of renal function, its levels are susceptible to changes that are not directly related to renal impairment, such as a high-protein diet, tissue breakdown, gastrointestinal bleeding, and corticosteroid use, all of which may increase blood urea levels. Conversely, low-protein diets and liver dysfunction may reduce urea levels[19]. Therefore, although urea provides

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relevant information regarding renal alterations, it has not been shown to be sufficiently effective for diagnosing CKD in its early stages[20].

Creatinine testing provides important information for the diagnosis of chronic kidney disease because its clearance is closely related to the glomerular filtration rate (GFR), which directly assesses renal function[10]. However, creatinine levels are influenced by factors such as age, sex, ethnicity, and muscle mass, as its production is closely related to muscle mass. This may interfere with diagnosis in cases of muscle loss, such as malnutrition or amputation. In addition, low-protein diets may reduce blood creatinine levels, whereas the use of certain medications may increase this biomarker[10].

Although urea and creatinine levels may be influenced by several factors, both are important indicators of normal renal function and renal dysfunction. They should therefore be considered, given the strong association between alterations in their levels and renal disorders, providing relevant information regarding kidney function[21].

Screening is an important strategy for the early detection of diseases in asymptomatic populations through the performance of appropriate tests, with the aim of reducing disease-related morbidity and mortality[1]. In this context, nurses play an essential role, as they work across several areas of healthcare, including disease prevention, which encompasses different levels of intervention, including early disease detection[22].

In this role, nurses contribute directly to comprehensive community healthcare by providing care to individuals, families, and groups within the community while understanding their social context and establishing relationships with them. Nursing practice also addresses social and healthcare issues, taking into account health inequalities among different social groups and focusing on meeting their specific needs[23].

CONCLUSION

Based on the results obtained and the analyses performed, there is a clear need for specific screening and prevention strategies for the population of artisanal professional fishermen affiliated with Fishing Colony Z2 in the municipality of Cáceres, Mato Grosso, Brazil. The presence of abnormalities such as proteinuria and increased amorphous urates in the urine, in addition to elevated glucose levels, reinforces the importance of continuous and targeted follow-up for this population.

The socioeconomic vulnerability of artisanal professional fishermen highlights the urgent need for further studies focused on the health of this population. Early identification of metabolic and renal abnormalities is essential for implementing interventions that may prevent the

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progression of chronic diseases and minimize their impact on fishermen's lives. Therefore, this study reinforces the relevance of screening as an essential tool for identifying and controlling health conditions that often remain undetected in vulnerable populations.

It can be concluded that indicators of chronic kidney disease can be identified among artisanal professional fishermen, demonstrating the population's vulnerability to this health condition. The findings obtained from the laboratory tests reinforce concerns regarding the health of these workers, who are exposed to risk factors that may contribute to the development of chronic kidney disease and therefore require targeted health promotion and disease prevention strategies.

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